Detroit River
INTERNATIONAL CROSSING
PROJECT

A BORDER TRANSPORTATION PARTNERSHIP

U.S. Department of Transportation Federal Highway Administration · Canada · MDOT Michigan Department of Transportation · Ontario

DETROIT RIVER INTERNATIONAL CROSSING

Engineering Report

VOLUME 1: SECTIONS 1 THROUGH 6

November 2008

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Under agreement with: CORRADINO THE CORRADINO GROUP

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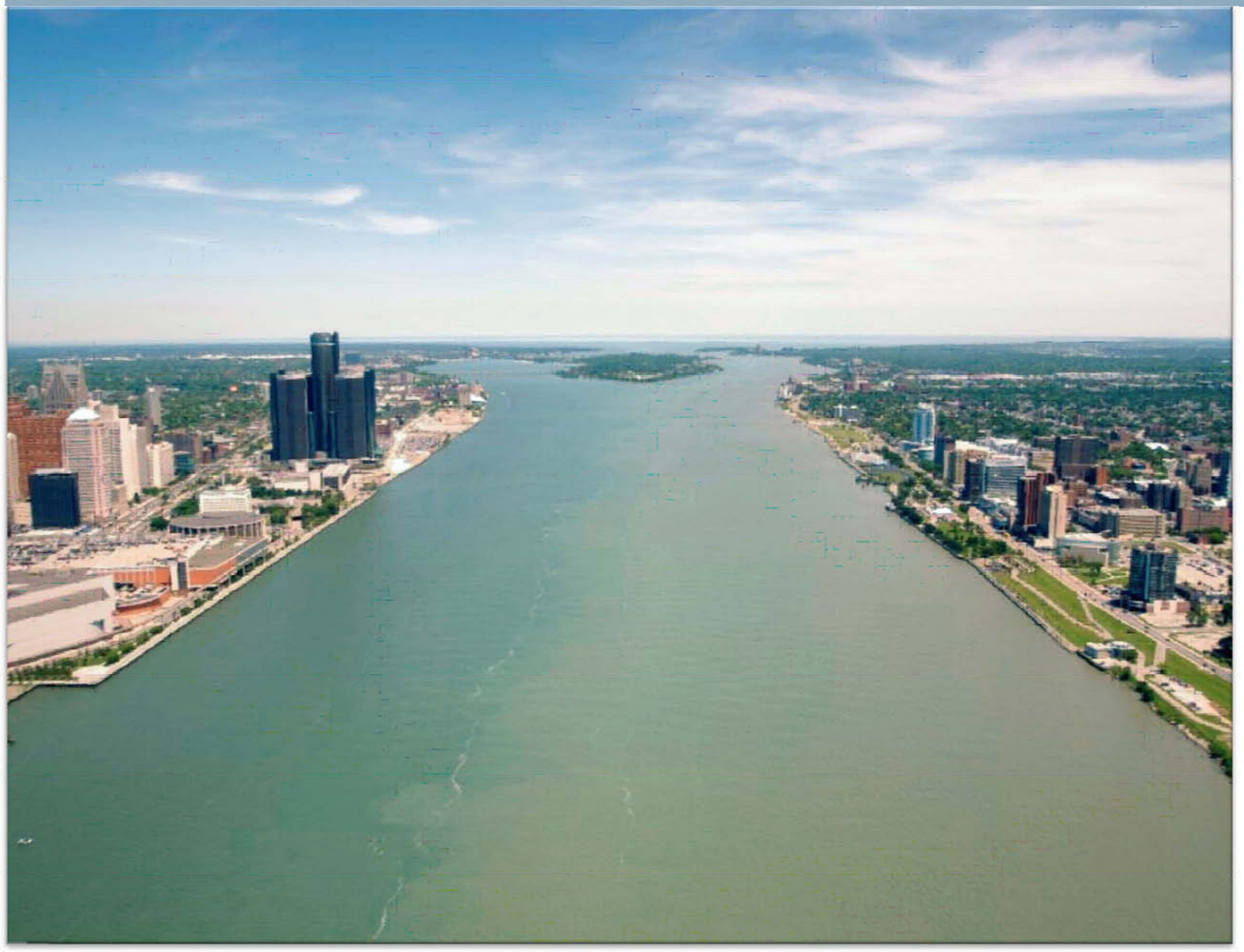


1. EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

1.1 Project Introduction

The Detroit River International Crossing (DRIC) Study is a bi-national effort to complete the environmental study processes for the United States, Michigan, Canada, and Ontario governments. The purpose of the study is to identify solutions that support the region, state, provincial, and national economies while addressing civil and national defense and homeland security needs of this trade corridor between the United States and Canada. Transportation alternatives have been considered that will improve the border crossing facilities, operations, and connections to meet existing and future mobility needs, security needs, and border crossing redundancy.

The Border Transportation Partnership (the Partnership) was formed to comprehensively assess mobility needs in the Detroit River area. This Partnership includes members from the following agencies:

- Federal Highway Administration (FHWA)
- Michigan Department of Transportation (MDOT)
- Ontario Ministry of Transportation (MTO)
- Transport Canada (TC)

The Partnership completed the Planning/Needs and Feasibility Study in February 2004. Its findings serve as the foundation for the environmental study. The Partnership is also studying governance options to determine the structure for ownership, operations, and maintenance of a new facility.

1.1.1 Project Purpose and Need

The purpose of the Detroit River International Crossing Study is, for the foreseeable future (i.e., at least 30 years from today), to:

- Provide safe, efficient and secure movement of people and goods across the U.S.-Canadian border in the Detroit River area to support the economies of Michigan, Ontario, Canada and the U.S.
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements (i.e., at least 30 years from today) across the U.S.-Canada border, there is a need to:

- Provide new border-crossing capacity to meet increased long-term demand;
- Improve system connectivity to enhance the seamless flow of people and goods;
- Improve operations and processing capability in accommodating the flow of people and goods at the plazas; and,
- Provide reasonable and secure border crossing system options in the event of incidents, maintenance, congestion, or other disruptions.

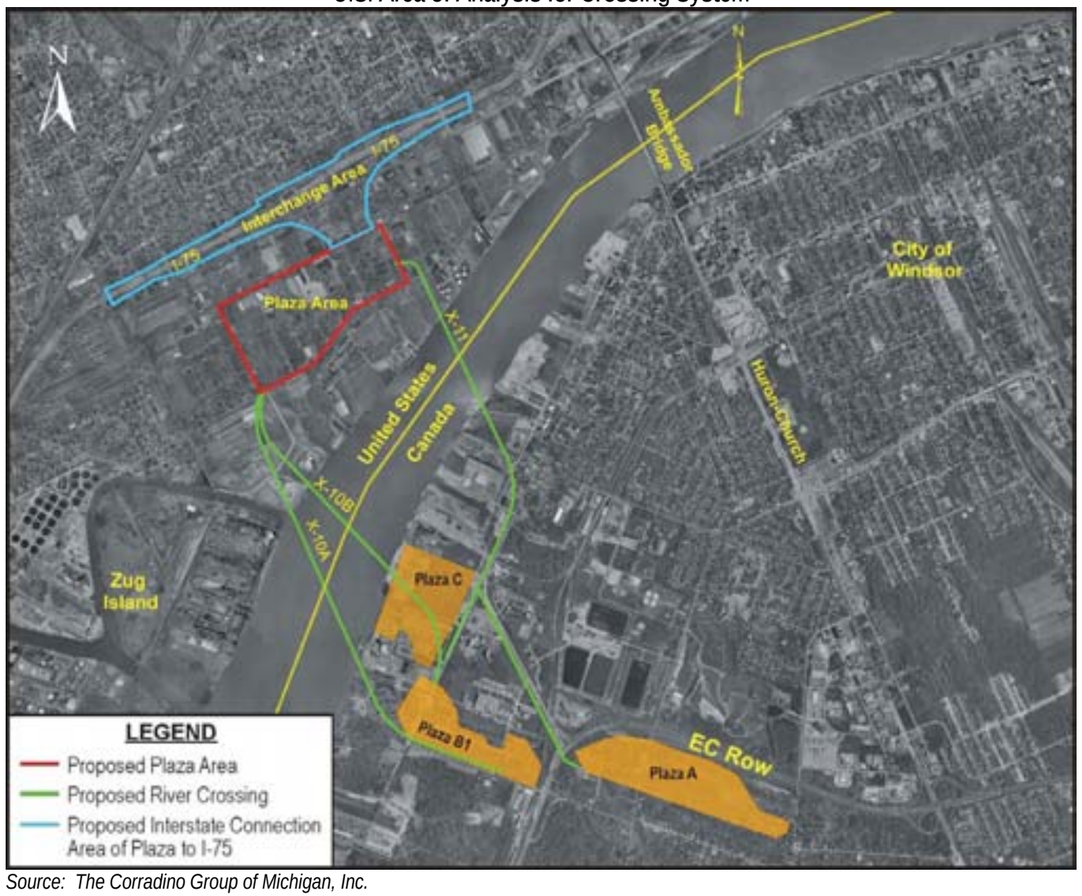
1.1.2 Project Goals

The goals of the Border Transportation Partnership for the DRIC Study are to:

- Recommend a location for a new border crossing;
- Recommend connections to freeways in the U.S. and Canada;
- Recommend locations for plazas in the U.S. and Canada;
- Complete engineering to support subsequent approvals, property acquisition, design and construction;
- Submit all of the above for review and approval (Record of Decision in U.S.) by December 2008; and,
- Submit the Canadian Environmental Assessment for approval in 2008.

The border crossing facilities, roads, interchanges, and processes operate as a system. Solving capacity problems involves a comprehensive approach. This means that roadway deficiencies on the cross border structures cannot be effectively addressed apart from issues dealing with interchange and processing capabilities, and, conversely, processing and interchange capacity issues cannot be effectively addressed without dealing with impending capacity problems on the cross border structures.

Figure 1.1-1
Detroit River International Crossing Study
U.S. Area of Analysis for Crossing System



Source: The Corradino Group of Michigan, Inc.

1.1.3 Report Scope and Approach

The purpose of the Engineering Report is to document the engineering details of the Project which include: summarizing the development and evaluation of initial and practical alternatives, and development of the Preferred Alternative. The report focuses primarily on the U.S. side of the border. Figure 1.1-1 shows the area of analysis for the project from the U.S. side to the Canadian side. The connections from the Canadian Plazas to Highway 401 are not shown.

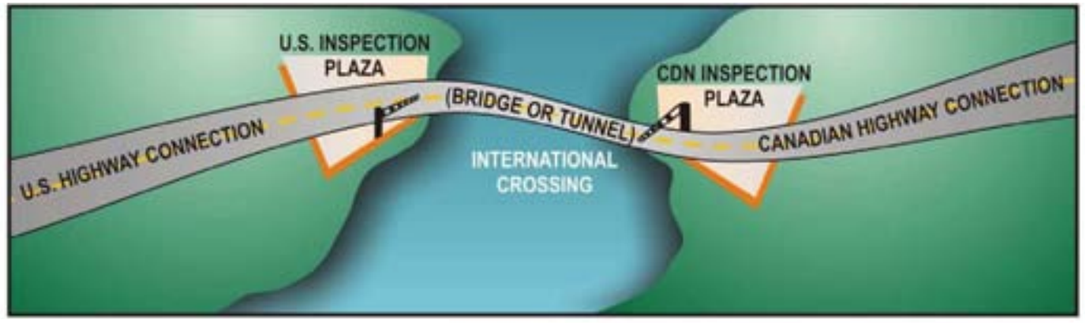
1.2 Practical Alternatives

The Practical Alternatives were presented in the Conceptual Engineering Report, dated February 2008, and were included in the Draft Environmental Impact Statement (DEIS). All alternatives that were developed and evaluated are described in Section 2. The Practical Alternatives were those that had the best opportunity to be implemented, i.e., the most practical.

1.2.1 General Alternative Description

Each end-to-end alternative has several components (Figure 1.2-1): highway route + plaza + border crossing + plaza + highway route going from the U.S. interstate highway system to Highway 401 in Canada.

Figure 1.2-1
Components of New or Expanded International Crossing



Source: The Corradino Group of Michigan, Inc.

1.2.2 Practical Alternatives

After the screening of alternatives, nine Practical Alternatives were retained for study in the DEIS. The nine Practical Alternatives were made up of a combination of six interchange options for connection to I-75 and the local roadway system, two toll and inspection Plazas, and two bridge crossing corridors. Section 2 presents the Practical Alternative figures and the design drawings are included in Appendix B of the Conceptual Engineering Report.

For the main Detroit River Bridge three alignments were under consideration X-10(A), X-10(B), and X-11(C) (see Figure 1.1-1). For each of the crossing alignments a series of bridge types were developed and evaluated as documented in the Bridge Type Study Report. Four bridge type concepts selected for further development and evaluation after the Type Study. In the Type Study Report Crossing X-10(A) was determined to not be preferred from a bridge engineering perspective therefore advancing conceptual engineering of bridge options at X10(A) was postponed until results were obtained from the brine well geotechnical investigation program. The geotechnical investigation found that X-10(B) was a feasible crossing.

1.3 Practical Alternative Evaluation

In summary, all of the Practical Alternatives are fully functional in that they meet the project design criteria, meet the project purpose and need, and project goals. Each alternative has similar features and magnitude of impacts. All of the Practical Alternatives under consideration had good traffic Levels of Service on both the I-75 mainline and local intersections. The mainline operates at Level of Service (LOS) ranging from A to D, for the AM and PM Peak Hours. For the intersections all operate at LOS C and above.

From an engineering perspective there were very few differentiators among the Practical Alternatives. A more in depth discussion of the alternatives evaluation can be found in Section 2.

Using the data provided in the DEIS and similar Canadian documentation an analysis of the alternatives was performed to indicate which was the best candidate for being considered “preferred.” That is the essential next step for completing environmental documents on both sides of the border.

The evaluation of alternatives was a U.S.-Canadian collaboration to make all decisions on an "end-to-end" basis. The work reported here and in Section 3 addresses the alternatives by crossing component – bridge, plaza and U.S. interchange. The Canadian access road is addressed in Canadian project documentation.

1.3.1 Crossing and Plaza Evaluation Summary

First, data on the crossing on each side of the border was examined to determine if the characteristics of the three bridges – X-10(A), X-10(B) or X-11(C) – significantly advantage/disadvantage one alternative or another. This was an important first step because of the uniqueness of the connection of the U.S. and Canadian plazas to the proposed crossings. For example, in the U.S., Plaza P-a would only connect to the X-10 Crossings, while Plaza P-c would only connect to the X-11 Crossing. In Canada, Plaza C would only connect to Crossing X-11. In examining the crossing evaluation data, it is noted there are no significant differences except in the areas of regional mobility, constructability, and potential relocations. The results were:

- The X-10 Crossings are forecast to carry, in 2035, 15 to 50 percent more traffic than the X-11 Crossing.
- The X-10 Crossings are forecast to carry, in 2035, approximately 50 to 60 percent of the combined traffic carried by the proposed new crossing and the Ambassador Bridge. The X-11 Crossing, is forecast to carry between 40 and 43 percent of the combined traffic.
    - This measure indicates the relief to be provided to the regional network, particularly Huron Church Road.
- The brine well investigation indicates that:
    - All bridge foundations on both sides of the river are cleared from risk.
    - But, along the Canadian approach to Crossing X-11:
        - Additional investigation is needed to clear the crossing from risk.
        - Even if those investigations are undertaken, the resulting data may still indicate the risk may not be acceptable.
        - The extra time to assess the risk and build the facility would be at least one year compared to the X-10A crossing.

  - If proved feasible, the extra cost associated with building the X-11(C) approach structure in Canada would be as much as $CAD260 million (w/inflation) compared to the X-10(A) Crossing.

- The number of potential relocations of active residential properties associated with the X-10 Crossings (0) are lower than the X-11(C) Crossing (21).
- The number of potential relocations of active businesses associated with the X-10 Crossings (1) are lower than the X-11(C) Crossing (5).

Based on these findings it was determined that:

- Crossing X-11(C) is not considered a candidate for being the Preferred Alternative.
  - Plaza P-c in the U.S., attached to Crossing X-11(C), therefore, is also not a candidate for being the Preferred Alternative.

A comparison of the two X-10 Crossings resulted in the following findings:

- The estimated construction cost of the main span of the suspension bridge at Crossing X-10(A) ($920 million) is significantly greater than the suspension bridges at Crossings X-10(B) and X-11(C).
- The duration of 62 months to construct the main span of Crossing X-10(A) is over one year more than Crossing X-10(B).

Therefore, Crossing X-10(A) was not considered a candidate for being the Preferred Alternative. And, the removal of the X-11(C) and X-10(A) crossings from further consideration left Practical Alternatives #1, #2, #3, #5, #14, and #16.

1.3.2 Interchange Evaluation Summary

The interchanges associated with the remaining alternatives were examined next. The findings were:

- Practical Alternative #3/Interchange C and Practical Alternative #5/Interchange E would:
  - Remove at least one historic structure which can be avoided by the other interchanges options.
  - Impact about 25 businesses, a larger number than all other interchange alternatives (16 to 20 business units).
- Practical Alternative #14/Interchange G would:
  - Offer no roadway access across I-75 between Waterman and Clark Streets. Other interchange alternatives provide better cross-access.
  - Not provide the same access to I-75 as the other interchange alternatives.
  - Have a lower design speed than all other alternative interchanges.

Therefore, Practical Alternative #3/Interchange C, Practical Alternative #5/Interchange E, and Practical Alternative #14/Interchange G were not considered candidates for the Preferred Alternative.

Based on a detailed analysis of the remaining alternatives/interchanges, part of Practical Alternatives #1, #2, and #16, were then carried further, a "hybrid" was developed (Figure 1.3-1) combining the best elements of each. The hybrid interchange includes the southbound local ramps from Practical Alternative #2 and the northbound local ramps from Practical Alternative #1. It provides five pedestrian crossings of I-75, compared to five today; four vehicular crossings of I-75, compared to seven today; and, complete interchange access at Springwells Avenue. The entrance ramp to southbound I-75 from Clark Street and the northbound I-75 exit ramp to Clark Street have been eliminated.

Figure 1.3-1
Hybrid Alternative

1.4 Preferred Alternative Development

After the Preferred Alternative was identified, engineering work began to refine the alternative to best meet the engineering standards, site constraints, and public input. Several items in the Hybrid Alternative were identified that required additional analysis including; avoidance of the Berwalt Manor building, I-75 pedestrian crossings, I-75 design speed, railroad modifications, modifications to reduce property impacts, local street treatments, etc. Also, structure studies for the interchange bridges and Detroit River Bridge approach were developed. These issues are discussed in more detail in Section 4.

The final Preferred Alternative modified the Hybrid Alternative as follows:

- The Berwalt Manor (a National Register Eligible property) was avoided by terminating the I-75 northbound Service Drive at Livernois and terminating the northbound I-75 exit ramp at Campbell Street.
- The Beard School (NRE eligible) was avoided.
- Five pedestrian crossings were incorporated.
- A single railroad alignment was chosen near Westend Street.
- Campbell Street was developed into a boulevard section south of the railroad.
- The Green Street boulevard was adjusted to avoid isolating properties.
- Springwells interchange was improved to avoid properties in the northwest quadrant.

- Local street intersections were improved along Jefferson Avenue.

For the Toll and Inspection Plaza, the U.S. General Services Administration (GSA) engaged a consultant, Gensler, to refine the Plaza design in cooperation with the inspection agencies. In addition, other Plaza facilities, such as maintenance, were refined.

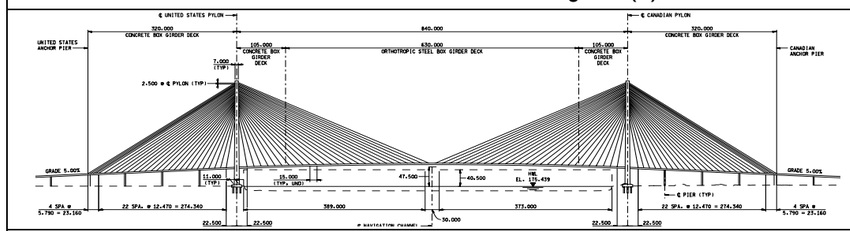
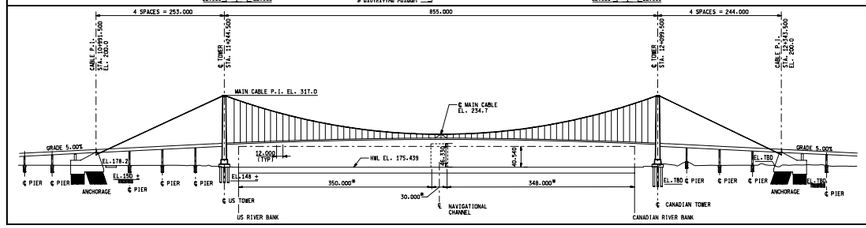
1.5 Overview of the Preferred Alternative

Figure 1.5-1 shows the Preferred Alternative. The following subsections generally describe the Preferred Alternative. Detailed plans including cross sections, horizontal and vertical alignments, and bridges are in the Separately Bound Appendix – Roadway Plans.

1.5.1 Detroit River Bridge

The Detroit River Bridge, presented herein as X-10(B), will span from the U.S. to the Canadian Toll and Inspection Plazas over the Detroit River, Figure 1.1-1. The bridge may be either a cable-stay or suspension type, both are presented in this study, as seen in Table 1.5-1. On the U.S. side the bridge crosses Jefferson Avenue, Springwells Court, and the LaFarge railroad spur on right-of-way. The bridge entirely spans the Detroit River from shore to shore, with no piers placed in the water, for a main span of 2,756 feet (840 m) to 2,805 feet (855 m) depending on bridge type. The bridge maintains a navigation envelop from harbor line to harbor line of 135 feet (41 m) with a 152 foot (46.3 m) clearance at the center line for a width of 100 feet (30.5 m). The bridge is designed in SI units to harmonize with the Canadian side of the project.

Table 1.5-1
Bridge Types

Bridge Type Elevation	PA Option
Crossing X-10(B)	
	Option 4 Cable-Stay
	Option 7 Suspension

1.5.2 Toll and Inspection Plaza

A Toll and Inspection Plaza, presented herein as Plaza P-a, contains the U.S. Federal Agency operations required for a land port of entry as well as other facilities necessary for the operation of the port including tolls, administration, maintenance, brokers, Michigan State Police, and Duty Free. The Plaza is proposed to be placed on MDOT right-of-way. Federal operations will operate through a lease arrangement with MDOT.

The Plaza is bounded by the Norfolk Southern railroad track right-of-way, Jefferson Avenue, Post and Campbell Streets with an approximate 100' buffer surrounding it. The buffer zone will also accommodate the relocation of all utilities currently running through the Plaza area.

1.5.3 I-75 Corridor within the Project Limits

The limits of work within the I-75 corridor are from the Fort Street Bridge (S06 of 82194), approximately 1,300 feet southwest of Springwells Street, to approximately 600 feet northeast of Clark Street. The freeway was reconstructed in 1998 using metric units. As a result, four 11'-10" lanes exist in each direction. The current freeway has a 60 MPH design speed, as discussed in Section 4.3.1.

I-75 mainline is not proposed to be reconstructed, with the exception of the outside shoulders. The outside shoulders are to be removed, and the reconfigured service drive ramps and the new plaza ramps are to be constructed adjacent to the mainline lanes. I-75 median and inside shoulder work will also be required, to remove and construct piers for bridges. The proposed design will accommodate reconstruction of I-75 to current standards in the future, with 12 foot lanes and a 60 MPH design speed, by slightly increasing reconstructed shoulder width, and by increasing the underclearance of the proposed crossover I-75 bridges by approximately 6 inches.

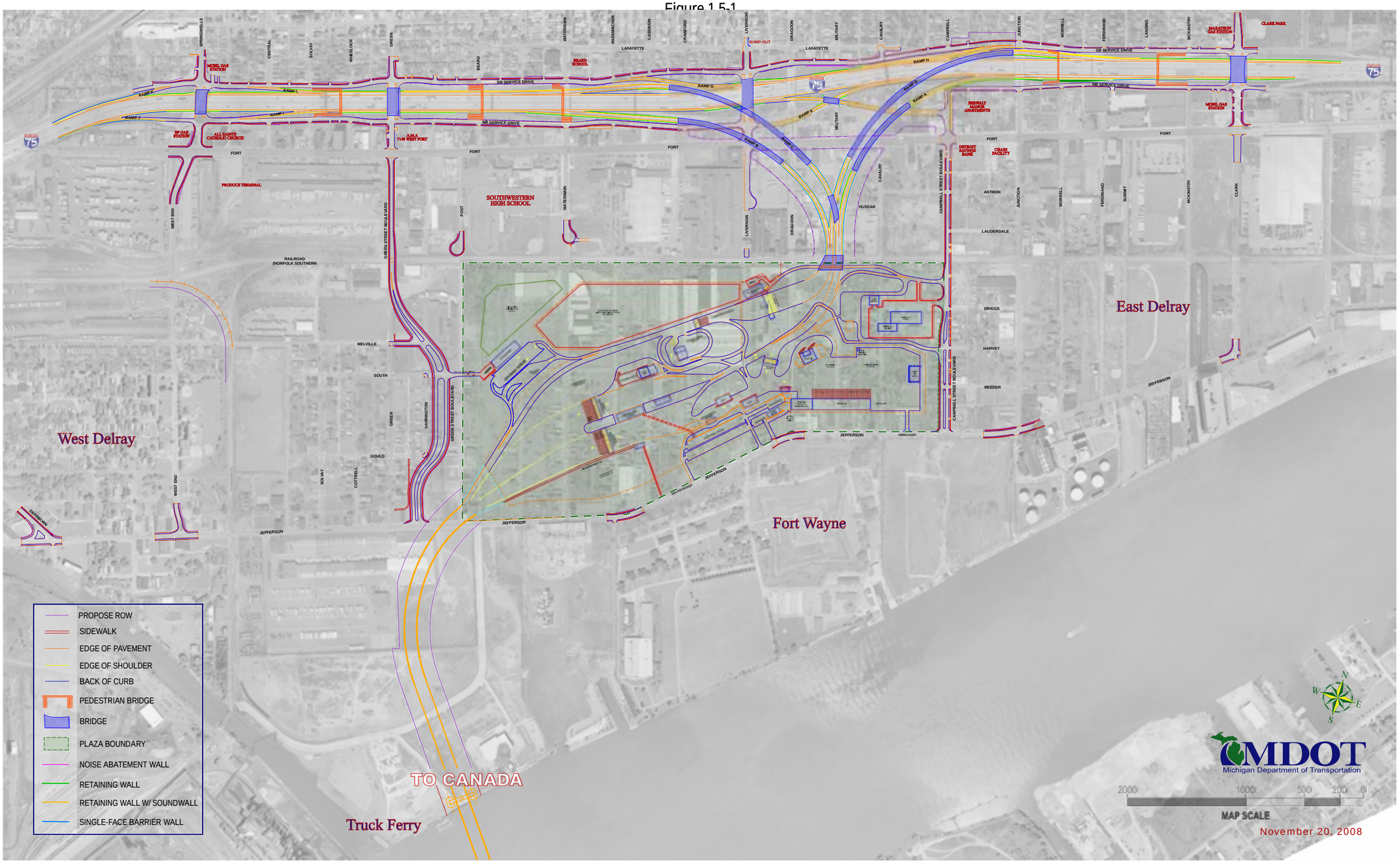
I-75 cross road bridges at Waterman, Dragoon and Junction Streets are to be removed and not replaced. I-75 cross road bridges at Springwells, Green, Livernois, and Clark Streets are to be removed and replaced. Livernois will be converted to two-way traffic across I-75. Springwells and Clark Street bridges will be constructed part width, and Green Street and Livernois Avenue bridges will be closed during construction, with traffic detoured. The reconstructed bridges will use either spread or side-by-side concrete box beams (as described in the individual structure studies).

Springwells Street is to be realigned south of Fort Street, to make the bridge crossing approximately 90 degrees over the freeway. Fort Street will be raised approximately 6 inches at Springwells and at Livernois intersections only. It is not anticipated that any underground utilities in Fort Street would need to be relocated, except due to the Springwells realignment.

The I-75 Service Drives are to be reconstructed from southwest of Springwells Street to northeast of Clark Street, to facilitate service drive ramp reconfigurations, the new plaza interchange, and retaining wall construction. These will generally be along the same alignment, except near proposed pedestrian bridges and in the plaza interchange, where they will move away from the freeway. The vertical alignments are approximately 2 feet higher at the roads that cross I-75 and are brought back down to existing grade away from these roads.

New pedestrian bridges will replace the existing pedestrian bridges at Solvay, Beard, Waterman, Morrell, and McKinstry Streets. All existing pedestrian bridges will be removed.

Figure 1.5-1


West Delray
East Delray
Fort Wayne
Truck Ferry
TO CANADA
SOUTHWESTERN HIGH SCHOOL
BEARD SCHOOL
ALL SAINTS CATHOLIC CHURCH
MOBIL GAS STATION
BP GAS STATION
MARATHON GAS STATION
PRODUCE TERMINAL
RAILROAD (NORFOLK SOUTHERN
FORT
WEST END
SPRINGWELLS
CENTRAL
SOLVAY
WHEELOCK
GREEN
BEARD
WATERMAN
RASMACHER
CASGRAIN
CRAWFORD
LIVERNOIS
DRAGOON
MILITARY
CAVALRY
CAMPBELL
JUNCTION
MORRELL
FERDINAND
LANSING
MCKINSTRY
CLARK PARK
SB SERVICE DRIVE
NB SERVICE DRIVE
LAFAYETTE
BUMP-OUT
RAMP A
RAMP B
RAMP C
RAMP D
RAMP E
RAMP F
RAMP G
RAMP H
RAMP I
RAMP J
RAMP K
RAMP L
HIGHWALT MANOR APARTMENTS
DETROIT RIVERVIEW BANK
CHASE FACILITY
ANTHON
LAUDERDALE
SUMMIT
CLARK
DRIGGS
HARVEY
REEDER
JEFFERSON
MELVILLE
SOUTH
GOULD
HARRINGTON
COTTRELL
DEARBORN
GREEN STREET BOULEVARD
CAMPBELL STREET BOULEVARD
PROPOSE ROW
SIDEWALK
EDGE OF PAVEMENT
EDGE OF SHOULDER
BACK OF CURB
PEDESTRIAN BRIDGE
BRIDGE
PLAZA BOUNDARY
NOISE ABATEMENT WALL
RETAINING WALL
RETAINING WALL W/ SOUNDWALL
SINGLE-FACE BARRIER WALL
MDOT
Michigan Department of Transportation
2000
1000
500
200
0
MAP SCALE
November 20, 2008

1.5.4 Local Streets

Jefferson Avenue is to be milled and overlaid from southwest of Dearborn Street to Clark Street. Intersection radii along Jefferson Avenue are to be increased to facilitate truck traffic at Dearborn, Westend, Rademacher, Dragoon, Junction, and Clark Streets.

Green Street is to be reconstructed from Lafayette Boulevard to Jefferson Avenue. South of Fort Street to Jefferson Avenue a boulevard section is proposed. This boulevard section will stay on the current alignment, but will be widened to the northeast from Fort Street to the railroad tracks, then curve to the east toward Post Street and then curve back near Harrington Street at Jefferson Avenue. As a result of this realignment, Post Street will be closed from the Norfolk Southern railroad tracks to Jefferson Avenue and Harrington Street will also be closed except for a block between South and Gould Streets.

Campbell Street will also be reconstructed from the I-75 northbound service drive to Jefferson Avenue. The reconstruction will be along the same alignment and width from Fort Street to the tracks, then will widen into a boulevard section from the tracks to Jefferson Avenue. The widening will be to the Plaza side of Campbell Street.

Most local roads that remain in close proximity of the Plaza are proposed to be milled and overlaid, see Figure 4.1-2. Sidewalk ramp upgrades at mill and overlay locations will be required. A final decision has not been made as to what roads will be rehabilitated.

1.6 Cost Estimates

Table 1.6-1 presents the *base line* cost estimate for the U.S. portion of the Preferred Alternative in year-of-expenditure U.S. dollars. Volume 2: Appendix B presents the detail cost estimates. The project costs were reviewed by the U.S. Federal Highway Administration, in cooperation with the Project Team, which developed a risk based cost distribution to include the uncertainty associated with major cost items. The cost review used the *base line* costs in Table 1.6-1 to produce a cost distribution for both bridge options. Figures 1.6-1 and 1.6-2 present the cost distribution curves. Using a 70% confidence level the Preferred Alternative costs are calculated to be less than $1.847 or $1.850 billion for the cable-stay (Option 4) and suspension bridge (Option 7) options respectively.

Table 1.6-1
Baseline Cost Estimates – U.S. Portion of Project

	Preferred Alt.	
Bridge Option:	**4**	**7**
Cost Detail	(million)	
MDOT Construction Costs [1]		
Detroit River Bridge	$ 395	$ 399
MDOT Toll Plaza & Plaza Site Work	$ 57	$ 57
Interchange & Local Roadways	$ 190	$ 190
Subtotal - Construction	*$ 642*	*$ 646*
Enhancements[5]	$ 21	$ 21
Utilities [2]	$ 157	$ 157
Management Reserve (5%)	$ 40	$ 40
Grand Total - Construction & Acquisition	**$ 860**	**$ 864**
Soft Costs[3]		
Preliminary Engineering & Permits (10%)	$ 80	$ 80
Construction Engineering (10%)	$ 80	$ 80
Grand Total - Soft Costs	**$ 160**	**$ 161**
Grand Total Alternative Cost (rounded)	**$ 1,020**	**$ 1,024**
Inflation (rounded) 17%	**$ 172**	**$ 173**
Property Acquisition/Remediation		
Property Acquisition	$ 365	$ 365
Remediation	$ 17	$ 17
Subtotal - Property	*$ 382*	*$ 382*
Inflation ROW - 9%	$ 35	$ 35
Grand Total - Property	**$ 418**	**$ 418**
GSA Plaza Costs	*$ 200*	*$ 200*
Grand Total Cost (rounded)	**$ 1,809**	**$ 1,814**

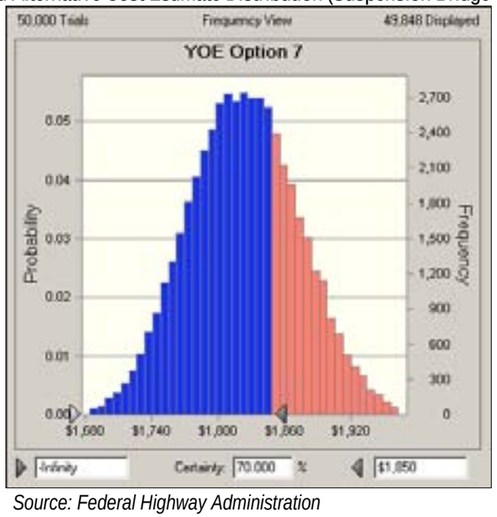
General Notes:
Grand Total Cost in year of expenditure (YOE) dollars.
Contingency format per FHWA Major Project Estimating Guidance (http://www.fhwa.dot.gov/programadmin/mega/).
Bridge Options: 4 - Cable-Stay, 7 - Suspension

Notes:
1. Construction Costs include design (15%) & construction (10%) contingencies, Maintenance of Traffic (5%) and Mobilization (10%) in 2008$.
2. Utility costs include both public and private relocation costs.
3. Final Design & Construction Engineering soft costs are 10% of Construction Subtotal and Utilities each.
4. Inflation costs weighted using cash flow for estimated year of expenditure.
5. Enhancements from "Green Sheet" as listed at the end of FEIS Section 4.
6. Property acquisition costs include demolition and all real estate contingencies.
7. Management Reserve - 5% of Construction and Utliity cost.

Figure 1.6-1
Preferred Alternative Cost Estimate Distribution (Cable-Stay Bridge Option 4)

Source: Federal Highway Administration

Figure 1.6-2
Preferred Alternative Cost Estimate Distribution (Suspension Bridge Option 7)



Source: Federal Highway Administration

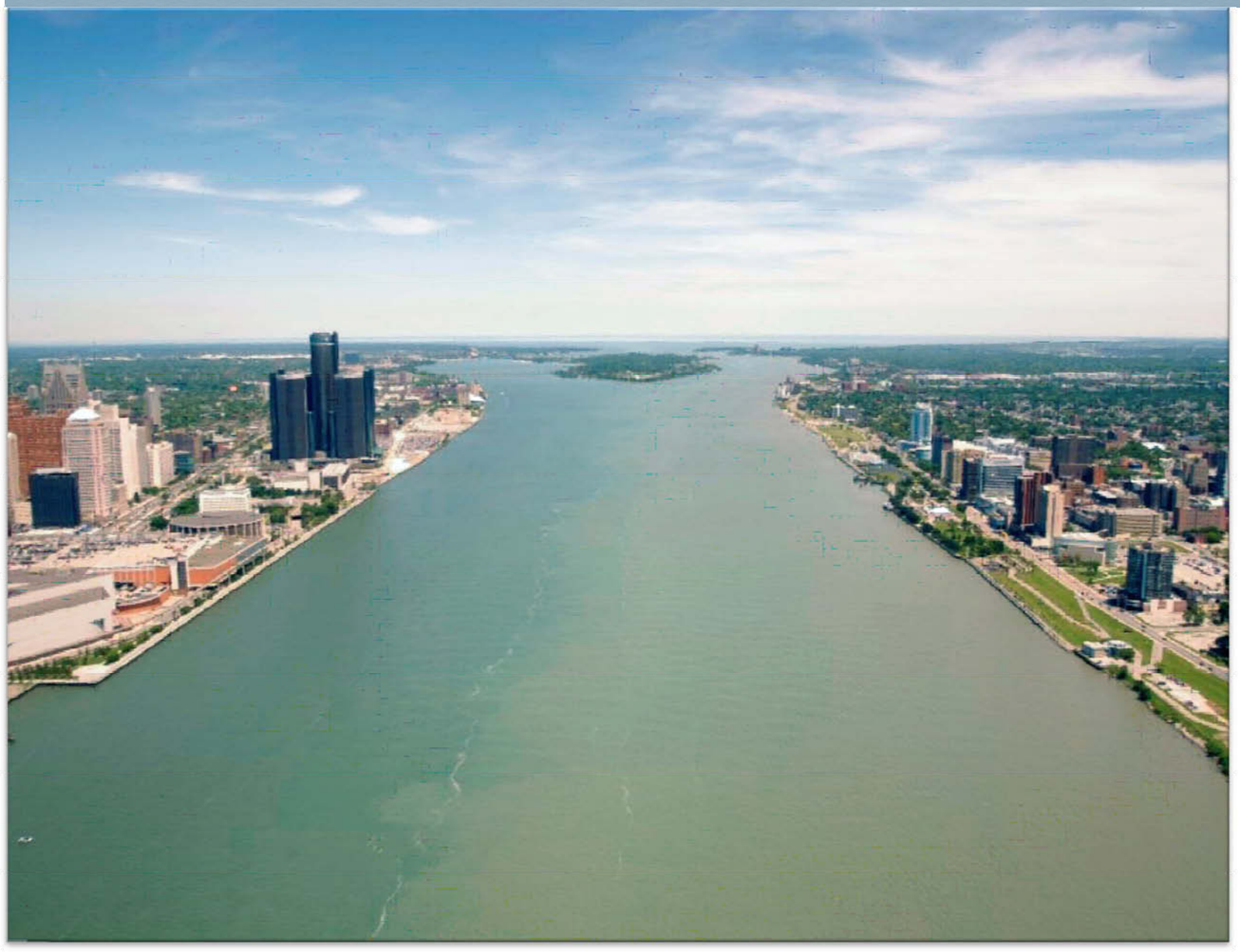
1.7 Schedule

The project schedule is as follows:

- January 2009 – Complete Environmental Process (Record of Decision)
- May 2009 – Begin property acquisition
- May 2009 – Begin final design of Preferred Alternative
- 2010 – Begin utility relocations
- 2011 – Begin construction
- December 2015 – Complete construction and open to traffic

1.8 Maintenance of Traffic and Staging

Traffic control along I-75 will require shoulder and temporary single lane closures. Temporary freeway closures will be necessary during removal of the existing bridges and erection of the new beams. Local street construction will be staged to minimize local disruptions.



2. INTRODUCTION, PROJECT OVERVIEW AND ALTERNATIVES DEVELOPED AND EVALUATED

2.0 INTRODUCTION, PROJECT OVERVIEW AND ALTERNATIVES DEVELOPED AND EVALUATED

2.1 Project Background

The Detroit River area represents the busiest corridor for trade between Canada and the United States. The benefits of such trade to the local, regional and national economies are represented in the prosperity, opportunities and high standards of living the citizens of each country enjoy. The prospect of continued and increased trade passing through this corridor must be supported as well as protected.

International border crossings in the Detroit River area occur via the Ambassador Bridge, the Detroit-Windsor Tunnel, the Detroit-Canada Rail Tunnel, and the Detroit-Windsor Truck Ferry that principally carries trucks hauling hazardous materials not allowed on the bridge or in the tunnel. (See Figure 2.1-1.) Almost one-fourth of all surface trade between the countries crosses the border at Detroit-Windsor, demonstrating the importance of this corridor to the economic well being (regional, national, and international) of the United States, Canada and their communities. Traffic demand could exceed the cross-border roadway capacity as early as 2015 if high growth occurs. Even under "low" projections of cross-border traffic, the border-crossing capacity (bridge and tunnel, combined) will be reached between 2030 and 2035.

Figure 2.1-1
Detroit International Border Crossings

The Detroit River International Crossing (DRIC) Study is a bi-national effort to complete the environmental study processes for the United States, Michigan, Canada, and Ontario governments. The purpose of the study is to identify solutions that support the region, state, provincial, and national economies while addressing civil and national defense and homeland security needs of this trade corridor between the United States and Canada. Transportation alternatives have been considered that will improve the border crossing facilities, operations, and connections to meet existing and future mobility needs, security needs, and border crossing redundancy.

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- Transport Canada (TC)

The Partnership completed the Planning/Needs and Feasibility Study in February 2004. Its findings serve as the foundation for the environmental study. The Partnership is also studying governance options to determine the structure for ownership, operations, and maintenance of a new facility.

2.2 Project Purpose and Need

The purpose of the Detroit River International Crossing Project is to (for the foreseeable future, i.e., at least 30 years):

- Provide safe, efficient, and secure movement of people and goods across the Canadian-U.S. border in the Detroit River area to support the economies of Michigan, Ontario, Canada, and the U.S.
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements (i.e., at least 30 years from today) across the U.S.-Canada border, there is a need to:

- Provide new border-crossing capacity to meet increased long-term demand;
- Improve system connectivity to enhance the seamless flow of people and goods;
- Improve operations and processing capability in accommodating the flow of people and goods at the plazas; and,
- Provide reasonable and secure border crossing system options in the event of incidents, maintenance, congestion, or other disruptions.

The border crossing facilities, roads, interchanges, and processes operate as a system. Solving capacity problems involves a comprehensive approach. This means that roadway deficiencies on the cross border structures cannot be effectively addressed apart from issues dealing with interchange and processing capabilities, and, conversely, processing and interchange capacity issues cannot be effectively addressed without dealing with impending capacity problems on the cross border structures.

2.3 Report Scope and Approach

The DRIC Study consists of all work related to the Route Planning and Environmental Impact Statement through the Record of Decision (ROD) for a new Detroit River International Crossing, including the following:

- Preparing needed documentation to receive approvals under the United States National Environmental Policy Act (NEPA) for a new crossing of the Detroit River along with roadway approaches and connections to the existing transportation system.
- Coordinating NEPA activities with the Canadian Environmental Assessment Act (CEAA) and the Ontario Environmental Assessment Act (OEAA).
- Working in conformance with current MDOT, FHWA, and AASHTO practices, guidelines, policies, and standards. For the Detroit River Bridge, Canadian practices, guidelines, policies, and standards were reviewed. The more rigorous or restricting standard will generally prevail when standards differ between nations.

The purpose of this report is to document the engineering details of the alternatives development, evaluation process for the Practical Analysis, and finally the Preferred Alternative. The report focuses primarily on the U.S. side of the border.

The study started within the geographic area of Wayne County, and the cities of Detroit, Ecorse, River Rouge, and Wyandotte, Michigan. The preliminary study limits extended from Belle Isle on the east, to the I-94 corridor on the north, to Grosse Isle on the west, and to the Canadian border in the Detroit River on the south. Within these geographical limits the Illustrative Alternatives were developed. After a comprehensive evaluation, the Illustrative Alternatives were screened down to an Area of Continued Analysis that is located between the Ambassador Bridge and Zug Island in the U.S. Within the Area of Continued Analysis Practical Alternatives were developed through a comprehensive engineering, environmental, and public consultation process. See Section 2.4 for a discussion of the alternative development and evaluation process.

2.4 Alternatives Developed and Evaluated

A comprehensive alternative development and evaluation process was conducted for the DRIC project. This section describes what constitutes a project alternative, then the alternative development process from project inception to refinement of the Practical Alternatives, and, finally, the Build Alternatives that are evaluated in the Draft Environmental Impact Statement.

2.4.1 General Alternative Description

Each end-to-end alternative has several components (Figure 2.4-1): highway route + plaza + border crossing + plaza + highway route going from the U.S. interstate highway system to Highway 401 in Canada.

This report will address the three primary elements in the U.S.:

- Roadway Connections to a Plaza
- Toll and Inspection Plaza
- Main River Bridge

2.4.1.1 Roadway Connections to the Plaza

Each alternative has a connection to the local roadway and highway network. The primary connection will be to the U.S. Interstate Highway system with full directional connectivity to the Plaza. Secondarily, alternative connections to the local roadway system are provided for each plaza alternative, to allow for the movement of international traffic to the local businesses and residences within the immediate vicinity of the Plaza if desired.

2.4.1.2 U.S. Toll and Inspection Plaza

Each alternative will have a Toll and Inspection Plaza which consists of a Federal Inspection Station (FIS) where people and goods are inspected either entering or exiting the U.S. In addition, tolling facilities will be provided on the Canada-bound side of the U.S. Plaza. The FIS facilities house a variety of Federal inspection agencies. The primary inspection agency is U.S. Customs and Border Protection (CBP), within the Department of Homeland Security. The facilities are the responsibility of the General Services Administration (GSA). Other facilities included on the U.S. Plaza are Michigan State Police, maintenance, and a Duty Free store.

Figure 2.4-1
Components of New or Expanded International Crossing

Source: The Corradino Group of Michigan, Inc.

2.4.1.3 International Crossing

The last part of the U.S. portion of the end-to-end alternative is the international crossing of the Detroit River. At the outset of the DRIC Study, bridge or tunnel river crossings were under consideration. Tunnel alternatives are not feasible in this area. Due to the width of the Detroit River any crossing would be a significant structure.

2.4.2 Alternatives Development Process

The Alternatives Development Process for this project was advanced through the following stages:

- Illustrative Alternatives
- Initial Practical Alternatives
- Refined Practical Alternatives
- Preferred Alternative

2.4.2.1 Illustrative Alternatives

In the Illustrative Alternative evaluation process, schematic alternatives were developed which included a connecting roadway to the interstate highway system, plaza, and international crossing. The required capacity for each alternative roadway was determined using the travel demand model traffic volumes, agency plaza requirements, and project area constraints.

Each Illustrative Alternative was evaluated against seven screening criteria which were weighted by both the general public and the consultant team. The seven criteria were:

- Maintain Air Quality
- Protect Community/Neighborhood Characteristics
- Maintain Consistency with Local Planning
- Protect Cultural Resources
- Protect the Natural Environment
- Improve Regional Mobility
- Assess How Project Can Be Built

Costs were used to weight effectiveness. Each alternative was put through a thorough technical analysis, and the performance of each alternative was scored by each screening criterion by the consultant team. The weightings assigned to each criterion by the public and the consultant team were then applied and the alternatives ranked. The DRIC Canadian team followed a similar process. A consensus ranking of the end-to-end alternatives was developed considering impacts on both sides of the border.

Through this comprehensive evaluation process, the alternatives were narrowed to the Area of Continued Analysis (see Figure 2.4-2) between the Ambassador Bridge and Zug Island.[1]

Figure 2.4-2
Area of Continued Analysis

[1] Corradino, Evaluation of Illustrative Alternatives on U.S. Side of Border, Vol. 1-3

2.4.3 Project Design Criteria

During the Detroit River International Crossing Study, all of the alternatives were developed and evaluated to conform to current MDOT, FHWA, and AASHTO guidelines, policies, and standards. The recommended highway design criteria reflect the urban areas within which alternatives were developed and the heavy truck traffic that is expected to use the facilities.

Detroit River Bridge

The Detroit River Bridge is designed and presented in System International (SI), or metric, units to harmonize with Canada. The recommended bridge geometric design criteria reflect the assumption that the bridge will function as a connection between the U.S. and Canadian Plazas, both of which are secure facilities, with traffic entrances and exits to functional areas very close to the ends of the bridge. Traffic entering and exiting the plazas needs to be traveling at low speeds to protect the safety of bridge operator and government staff working on the plazas. Other international crossings in Michigan have posted speed limits of 50 km/h (30 MPH). The recommended design speed of 60 km/h (35 MPH), which is lower than the approach roadways, enables use of somewhat higher profile grades, and shorter vertical curves than the approach highways, which will substantially reduce the length of bridge approaches needed to cross the shipping channels on the Detroit River.

Interchange

Plaza Ramps
The geometric design guides listed below were used to prepare roadway geometric layouts in accordance with current standards and guidelines, which were suitable for traffic analysis.

2 Lane Entrance Ramps: MDOT geometric design guide GEO-110-C (Case IV freeway lanes increase by one after the gore). The additional auxiliary lane is dropped after a 900 ft. length per AASHTO, a Policy on Geometric Design of Highways and Streets, page 857.

Urban 2 Lane Exit Ramps: MDOT geometric design guide VII-240-A (Case II with the same number of freeway lanes before and after the gore). Applies to the ramps connecting the plaza to the I-75 freeway. This includes construction of new ramps as indicated on the plans.

Local Access Ramps
The Springwells Interchange ramps have been designed as 12 foot urban slip ramps, with 5 foot outside shoulders and no inside shoulders. Ramp I, the Springwells to I-75 Entrance ramp, has been designed to VII-202-B, 12' Width Entrance and Exit Slip Ramps. Ramp J, the I-75 Exit Ramp to Springwells has been designed in accordance with AASHTO, a Policy on Geometric Design of Highways and Streets, page 850-852, parallel type exits. The exit ramp matches the existing condition, however, MDOT Standard Plans GEO-130-C or GEO-131-D deceleration lane lengths could not be met without the reconstruction of the I-75/Fort Street overpass as part of this project. An MDOT design exception will be required for this ramp. Ramp K, the Springwells to I-75 entrance ramp, has been designed in accordance with AASHTO, A Policy on Geometric Design of Highways and Streets, pages 845-848, parallel type entrances. The entrance ramp matches the existing condition, however, MDOT Standard Plans GEO-100-E and GEO-101-E acceleration lane lengths could not be met without the reconstruction of the I-75/Fort Street overpass as part of this project. An MDOT design exception will be required for this ramp.

The I-75 ramps to the Service Drives and to Campbell Street are urban one lane style with a 6 foot left shoulder, a single 16 foot lane, and an 8 foot right shoulder. If the shoulders are adjacent to retaining wall or barrier curb, a two foot

shy distance is added to their width. The geometric design guides listed below were used to prepare geometrics for subsequent traffic analysis.

One Lane Parallel Entrance Ramps: MDOT geometric design guide GEO-101-E Case I. This item applies to the ramps connecting the service drives to the I-75 freeway.

Urban 1 Lane Exit Ramps: MDOT geometric design guide VII-205. This item applies to the ramps connecting the I-75 freeway to the service drives.

Service Drives
The existing service drives will need to be reconfigured to allow for the new ramps. Where possible, the existing service drive was matched to avoid additional ROW acquisition. The service drives are generally 32 feet wide and allow for two traffic lanes.

Local Roads
To provide continued traffic flow, several local road connections with the proposed improvements will need to be modified. Some roads will be terminated and a cul-de-sac will be placed at the end. Newly reconstructed local roads will have either 11 or 12 foot lanes.

Bridge Underclearance
I-75 in this area is on MDOT's list of Special Routes, therefore, roadway profiles have been adjusted to provide an underclearance of 14'-9", in accordance with MDOT requirements. This roughly matches the existing underclearance provided, therefore the required adjustments are minor in nature. An additional amount of underclearance has been added to account for potential upgrades of existing I-75 vertical alignment in the future. Pedestrian Bridge Crossings are being designed with an underclearance of 17' 0".

Plaza Design Criteria

Plaza space programming and facilities are provided in accordance with the U.S. Land Port of Entry Design Guide Supplement dated March 15, 2006 (Design Guide), U.S. Land Port of Entry Design Guide Security and Information Technology Supplemental Guide dated August 31, 2007, and the Program of Requirements dated September 2008 from the General Services Administration (GSA).

A complete listing of the design criteria used for this project is provided in Appendix A – Design Criteria.

2.4.4 Initial Practical Alternatives Development

Through a series of workshops held from December 2005 to March 2006, the "zone" within which the plazas would be located was determined in concert with the public. Once the plaza zone was defined, plaza concepts were developed to fit within it. Then interchange concepts were established to connect each plaza to I-75. This initially resulted in fourteen alternatives (Table 2.4-1). Impacts were then measured and the resultant data displayed for public review in March 2006. Subsequently, the plazas and interchanges were refined and, along with their impacts, presented to the public in December 2006.

Table 2.4-1
Initial Practical Alternatives
Labeling Nomenclature

Practical Alternative #	Interchange	Plaza	Crossing
1	1	4	X-10
2	2	4	
3	3	4	
4	4	4	
5	6	4	
6	1	5	X-11
7	1	6	
8	2	5	
9	2	6	
10	3	5	
11	3	6	
12	4	5	
13	5	2	
14	1/2	4	X-10

Note: Alternative 14 was later renumbered to Alternative #16

Following the December 2006 public meetings, the interchanges were subject to a detailed "peer group" review called Value Planning, conducted from January 29 to February 2, 2007. A summary of the Value Planning results is provided in Section 6. Additionally, GSA and CBP reviewed the plaza concepts. By combining the impact assessment information, the results of the Value Planning and the input from GSA/CBP, the basis to screen the plazas and interchanges of the Initial Practical Alternatives was formed. The evaluation was intended to retain only those with the best opportunity to be implemented, i.e., the most practical, with the others eliminated from further detailed analysis.

Impact Assessment Information

Among the Initial Practical Alternatives there was little difference in terms of potential significant impacts. The one exception was that utilities to accommodate Plaza P-b had the potential to affect Fort Wayne. As there is an alternative to avoiding this impact, plaza alternative P-b was not considered a desirable alternative. Additionally, the most directly affected community spoke out at the March 2006 Local Advisory Council meeting and subsequent public meetings, stressing the interchanges of Alternatives #4, #12 and #13 (i.e., Interchanges D and F) were unacceptable because they would "isolate" the most viable residential enclave remaining in Delray. Those alternatives would also affect the block-long Produce Terminal, which is potentially eligible for listing on the *National Register of Historic Places*.

Value Planning (VP) Study Results

The Value Planning (VP) study was held from January 29, 2007 through February 2, 2007 to review the new Detroit River International Crossing (DRIC) project between the U.S. and Canada. The scope of the VP study was focused on the interchange connecting the plaza on the U.S. side to I-75. The study did not include the plaza or the bridge crossing the Detroit River into Canada.

The six interchange options are listed below:

- Interchange A (formerly Interchange 1)
- Interchange B (formerly Interchange 2)
- Interchange C (formerly Interchange 3)
- Interchange D (formerly Interchange 4)
- Interchange E (formerly Interchange 5)
- Interchange F (formerly Interchange 6)

The VP Team organized the workshop into two distinct parts: the first to review, analyze and evaluate the alternatives (Value Analysis) that the DRIC Early Preliminary Engineering (EPE) Study Team had developed; and the second, to speculate on improvements to these alternatives or propose new alternatives (Value Planning).

Results of the Value Planning study led to the elimination of Interchanges D and F. Additionally, two new interchange alternatives (Interchange G/Alternative #14 and Interchange H/Alternative #15, See Figures 2.4-3 and 2.4-4.) were developed to mitigate some of the anticipated impacts associated with Interchange E. Interchange G was evaluated in detail in the Draft Environmental Impact Statement, while Interchange H was ultimately eliminated from further analysis because engineering review indicated it was not practical to construct.

Figure 2.4-3 Interchange G/Alternative #14

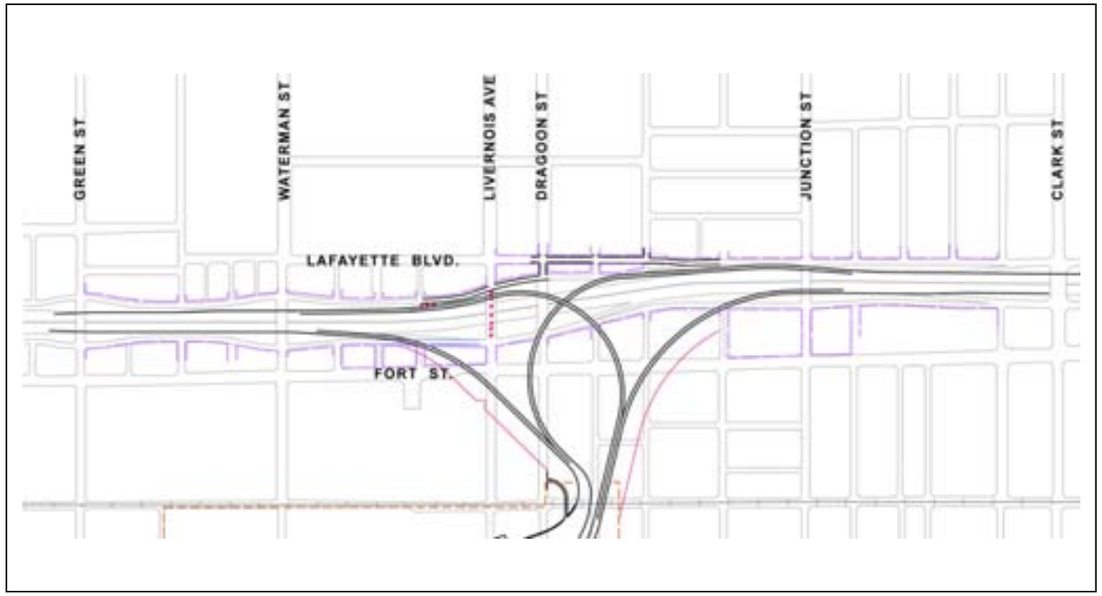
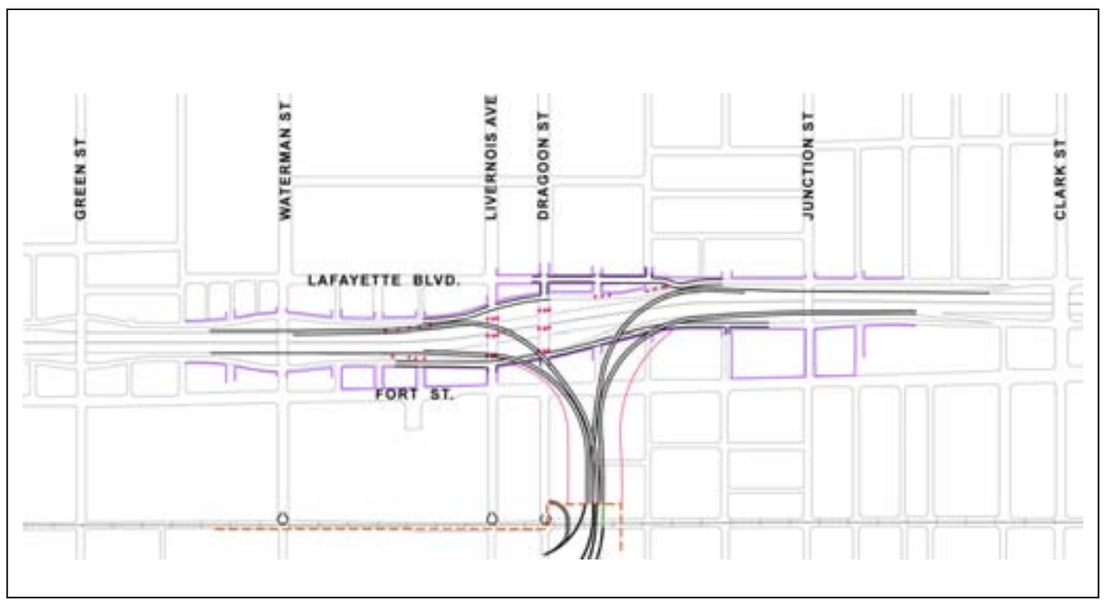


Figure 2.4-4 Interchange H/Alternative #15



Plaza Analysis

In February and March 2007, the General Services Administration (GSA), in combination with the U.S. Customs and Border Protection Agency (CBP), provided detailed input to each of the four remaining DRIC plaza concepts.

The following summarizes the comments received from GSA and CBP:

Plaza P-a (previously Plaza 4)
- Reduces security issue along RR track;
- Provides good service and employee access;
- Has fewest compromises;
- Provides smooth traffic flow;
- Stays away from Mistersky Power Plant; and
- The DTE Substation could be an issue.

Plaza P-b (previously Plaza 5)
- Has limited flexibility/expandability;
- Has difficulty relocating Duty Free for future outbound inspection;
- Has circuitous return to Canada;
- Provides poor employee access;
- Does not allow for smooth traffic flow; and
- Places bridge adjacent to Mistersky Power Plant.

Plaza P-c (previously Plaza 6)
- Reduces security issue along RR track;
- Raises questions regarding service and employee access;
- Moves broker building closer to commercial building;
- Provides smooth traffic flow;
- Has limited flexibility/expandability;
- Places bridge adjacent to Mistersky Power Plant; and
- Mixes outbound traffic/employees.

Plaza P-d (previously Plaza 2)
- Places secondary commercial inspection in close proximity to Southwestern High School;
- Separates outbound from inbound traffic;
- Does not provide smooth traffic flow;
- Requires flag control of “refused entry” vehicles;
- Places bridge adjacent to Mistersky Power Plant; and
- Places perimeter security along RR track.

Based on the comments provided by GSA and CBP, Plaza P-b and Plaza P-d were eliminated from further analysis. The biggest flaw with Plaza P-b was that it would require abandoning the Norfolk Southern rail line, which is not a practical option. It would also have circuitous traffic flow patterns and limited flexibility and expandability. Because Plaza P-b was included with Alternatives #6, #8, #10 and #12, these alternatives were not advanced for detailed evaluation in the DEIS. Plaza P-d was eliminated because of:

1) the large separation that would be required between inbound and outbound inspection functions;

2) its secondary commercial area's proximity to Southwestern High School and the possible effects that would create; and,
3) its limited flexibility and expandability.

This plaza was included with Alternative #13, and therefore, this alternative was not advanced for detailed evaluation in the DEIS.

Summary

During subsequent consultation with the public, it became apparent that local connectivity to and from I-75, as well as across I-75, was a critical issue. After examining in more detail the connectivity issues, Alternative 1-Modified (previously known as Value Planning Alternative #14), a hybrid of several alternatives which had been examined by the VP team and discarded, was brought back into consideration. This was designated as Alternative #16. Based on the evaluation conducted, Alternatives #4, #6, #8, #10, #12, #13, and #15 were eliminated from further analysis. Alternatives #1, #2, #3, #5, #7, #9, #11, #14, and #16 were proposed for further analysis as "Practical Alternatives" (Table 2.4-2).

Table 2.4-2
Status of Interchanges and Plazas following Value Planning, GSA/CBP and Public Input

Alternative	Interchange	Plaza	Crossing	Proposed Status
1	A	P-a	X-10	Retain for future analysis
2	B	P-a	X-10	Retain for future analysis
3	C	P-a	X-10	Retain for future analysis
4	D [1,2]	P-a	X-10	Eliminate from further analysis[1,2]
5	E	P-a	X-10	Retain for future analysis
6	A	P-b [3,4]	X-11	Eliminate from further analysis[3,4]
7	A	P-c	X-11	Retain for future analysis
8	B	P-b [3,4]	X-11	Eliminate from further analysis[3,4]
9	B	P-c	X-11	Retain for future analysis
10	C	P-b [3,4]	X-11	Eliminate from further analysis[3,4]
11	C	P-c	X-11	Retain for future analysis
12	D [1,2]	P-b [3,4]	X-11	Eliminate from further analysis[1,2,3,4]
13	F [1]	P-d [4]	X-11	Eliminate from further analysis[1,4]
14	G	P-a	X-10	Retain for future analysis
15	H [2]	**P-a**	X-10	Eliminate from further analysis[2]
16	**I**	**P-a**	X-10	Retain for future analysis

[1]Unacceptable community impacts.
[2]Unacceptable engineering impacts.
[3]Unacceptable impacts on Fort Wayne due to proposed utility placement.
[4]Unacceptable impacts as judged by U.S. General Services Administration/Customs and Border Protection Agency input.

The nine alternatives retained for future analysis as Practical Alternatives are evaluated in detail in the Draft Environmental Impact Statement. The remaining discussion in this section of the report provides additional information about the practical alternatives.

2.5 Refined Practical Alternatives

Figures 2.5-1 through 2.5-9 show the nine Practical Alternatives retained for evaluation in the DEIS. Figures 2.5-10 through 2.5-12 show the Plazas. These figures are not intended to show detail but are the exact figures analyzed in the DEIS.

Figure 2.5-1 Practical Alternative #1

Figure 2.5-2 Practical Alternative #2

Figure 2.5-3 Practical Alternative #3

Figure 2.5.-4 Practical Alternative #5

Figure 2.5-5 Practical Alternative #7

Figure 2.5-6 Practical Alternative #9

Figure 2.5-7 Practical Alternative #11

Figure 2.5-8 Practical Alternative #14

Figure 2.5-9 Practical Alternative #16

Figure 2.5-10 Plaza P-a

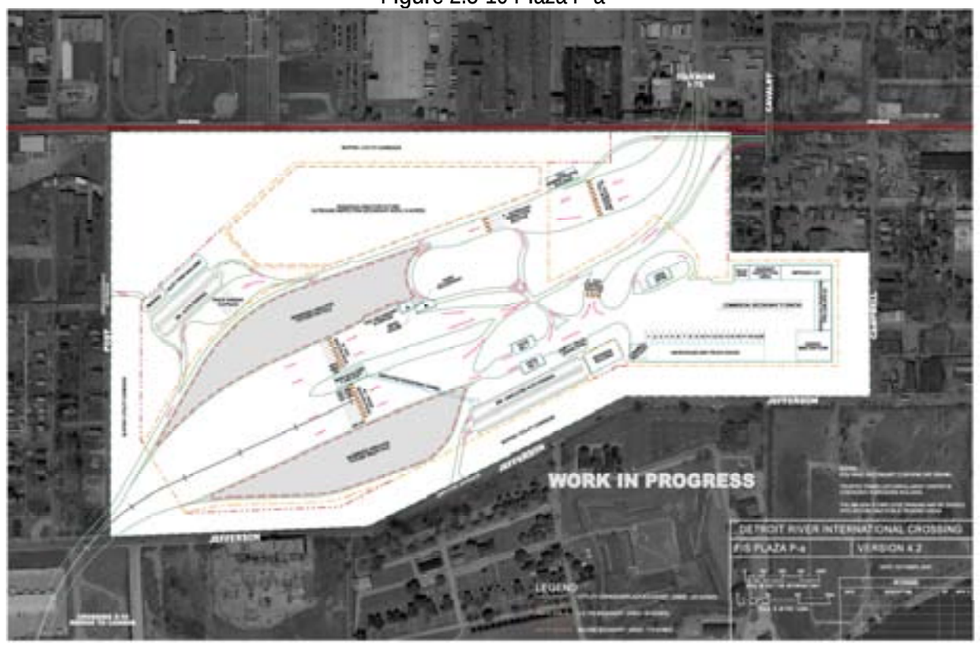


Figure 2.5-11 Plaza P-c

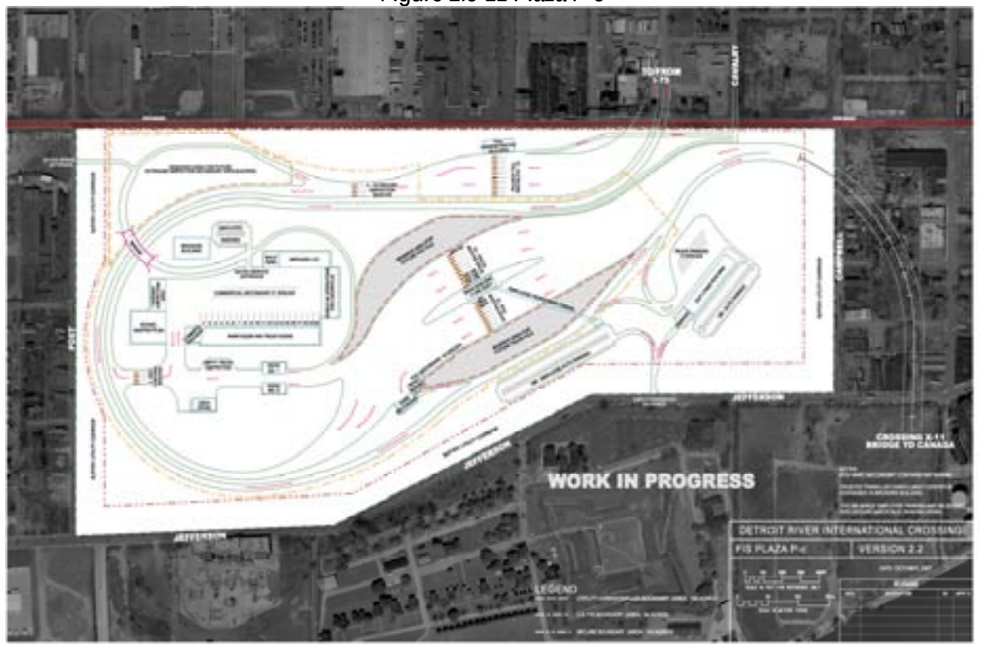
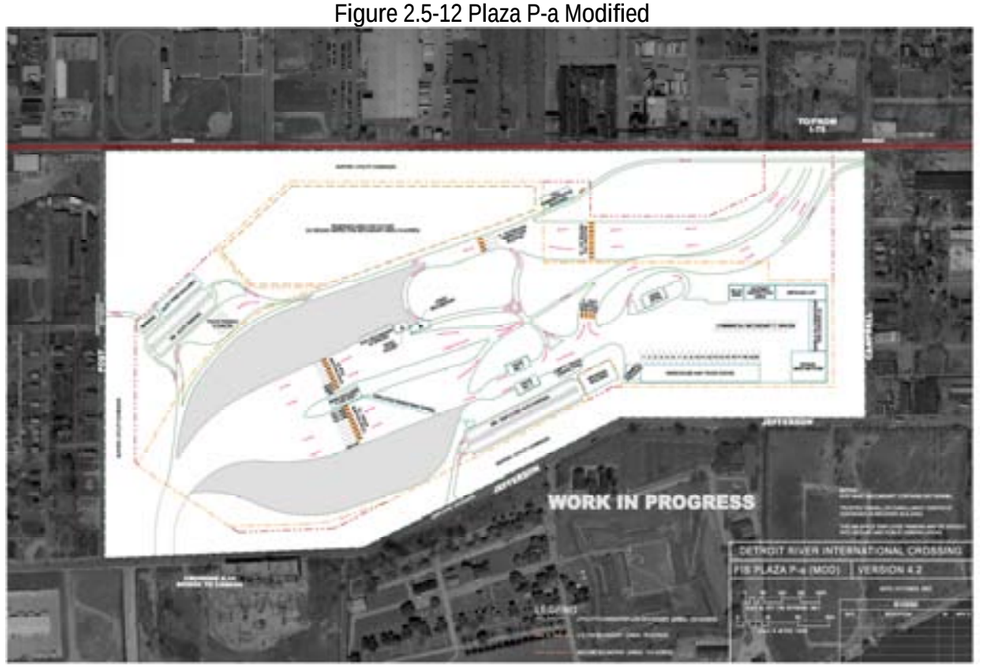


Figure 2.5-12 Plaza P-a Modified

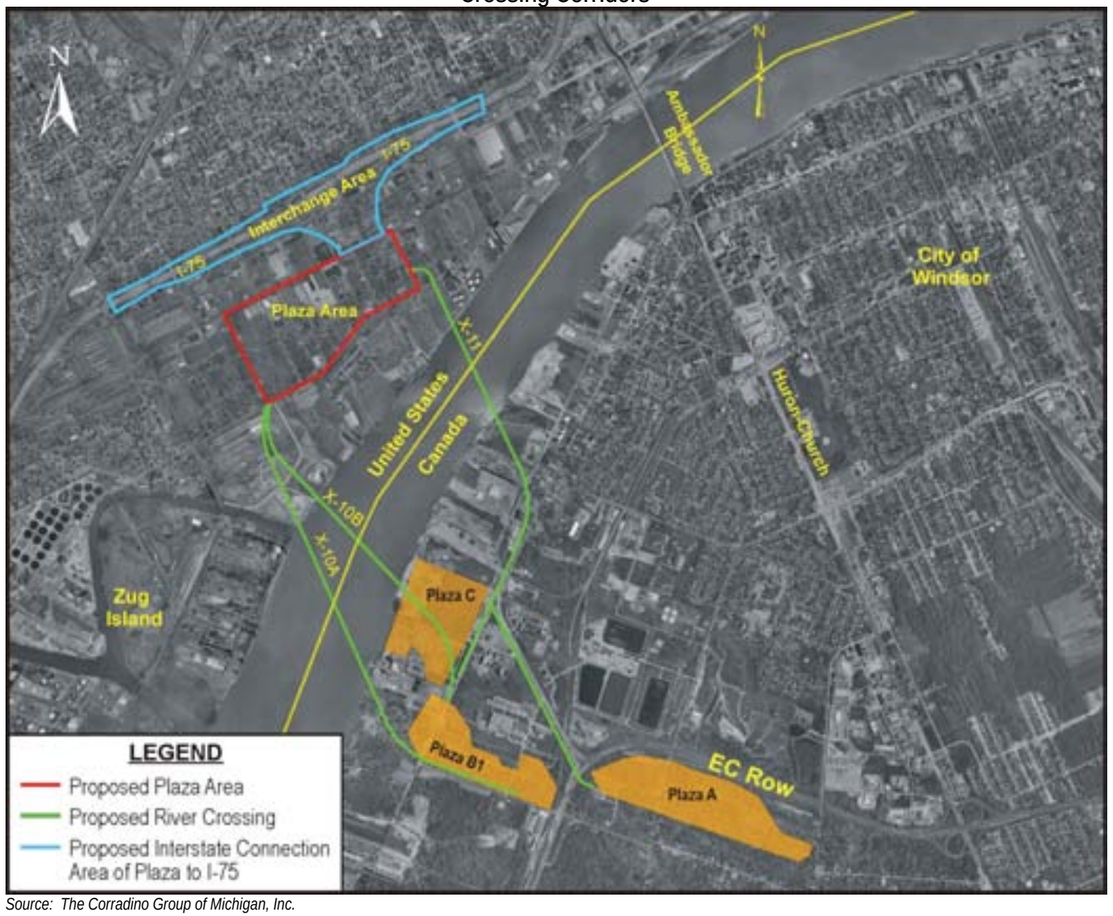


2.5.1 Main River Bridge Engineering

The Area of Continued Analysis incorporated the two river crossing corridors, X-10 and X-11. Based on the locations of the toll and inspection plaza options, geotechnical considerations, as well as the avoidance of major industries and cultural properties, three horizontal alignments were developed, X-10(A), X-10(B) and X-11(C), as shown in Figure 2.5-13. The bridge Options were developed through a two-step process; Phase 1 is the Bridge Type Study (TS Phase); and, Phase 2 is the Conceptual Engineering (CE Phase).

The X-10(A) alignment was developed to avoid the area near a known sinkhole from historical brine mining in Canada. Crossing X-10(A) is not the optimum from a bridge engineering perspective, as detailed in the Type Study Report. Therefore, advancing conceptual engineering of bridge options at X-10(A) was postponed until preliminary results were obtained from the geotechnical investigation program and any other relevant project EIS studies.

Figure 2.5-13
Crossing Corridors



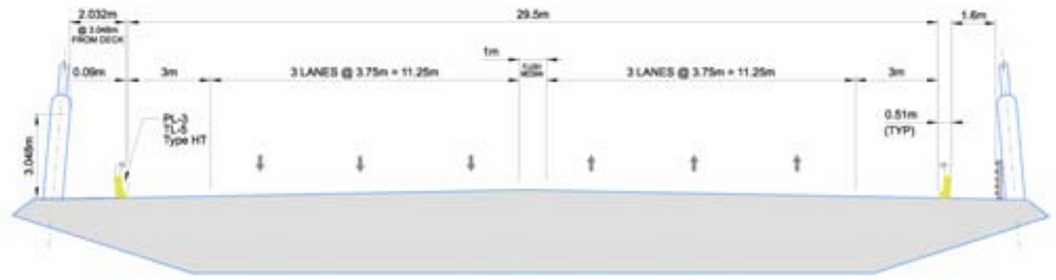
Source: The Corradino Group of Michigan, Inc.

Type Study

The detailed Bridge Type Study Report, Revision 2, dated July 2007 can be found in the DEIS as a separately bound technical report. The first task was to establish a proposed roadway cross section and evaluate the project constraints. Fifteen bridge-type concepts were developed encompassing two structure types in several different configurations. These bridge types included Cable-Stay and Suspension. Configurations included suspended and unsuspended back spans, piers in the water, and piers on land.

The most significant constraint was the navigation clearance of the Detroit River. Initially a channel similar in height and width to the Ambassador Bridge was proposed. This would allow consideration of one or both main piers in the river which would substantially shorten the main span bridge lengths and have a commensurate reduction in cost. However, through consultation with the U.S. Coast Guard, Transport Canada, and project stakeholders, it was determined that piers in the water posed a significant navigation impediment and those options were eliminated because they are not practical. The bridge cross section was established as a six-lane structure with shoulders and a 1m (3-foot) flush median, see Figure 2.5-14 (as noted earlier the Detroit River Bridge is in metric units).

Figure 2.5-14
Proposed Cross Section



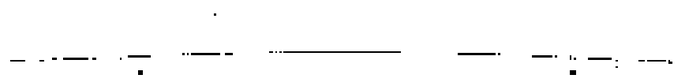
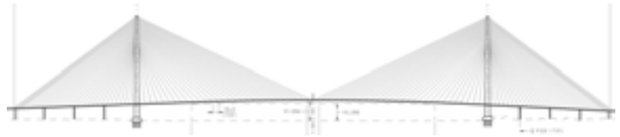
Each of the bridge-type concepts was evaluated against the same evaluation criteria used in the Illustrative Alternatives analysis. These criteria were broken into sub-criteria and a team of bridge experts evaluated each bridge type against those criteria. Based on that evaluation, the bridge concepts shown in Table 2.5-1 were advanced to the Conceptual Engineering phase.

Type Study Key Findings

The key findings of the Bridge Type Study were:

- Cost, cost risk, schedule duration, schedule risk, and vulnerability to ship impact were the major differentiators between the bridge types.
- Piers placed in the Detroit River while producing a lower cost bridge would create an unacceptable navigation hazard.
- Both suspension and cable-stay bridge types were cost competitive.
- For suspension bridges the most economical structural arrangement was an unsuspended side span.
- Crossing X-10(A) is not practical unless crossings X-10(B) and X-11(C) are eliminated due to brine well presence.

Table 2.5-1
Bridge Elevation Options

Conceptual Engineering Option Elevation	CE Option
X10(A)	
	Option 1
X10(B)	
	Option 4
	Option 7
X11(C)	
	Option 9
	Option 10

Conceptual Engineering

The detailed Bridge Conceptual Engineering Report dated November 2007, revised February 2008, is a separately bound technical report in the DEIS. This report documents the development of the four (4) Practical Alternatives advanced through the Conceptual Engineering Phase.

The scope of the Conceptual Engineering Report was to document the development process for the main bridge crossing the Detroit River, discuss the options developed and considered, evaluate the technical merits of those options, and provide input into the evaluation of project alternatives. For the Preferred Alternative, two bridge types, suspension and cable-stay, were advanced for further development.

The crossing locations for the Detroit River that are being considered are described in this section of the report. They include two horizontal alignments that were developed in consideration of project constraints. The alignments cross the river at skew angles of 25 degrees and 29 degrees for alignments X-10(B) and X-11(C), respectively (skew angle measured from a line perpendicular to the centerline of channel to centerline of bridge). The combination of skews and the requirement to clear span the river (no piers in the water) result in the main span lengths shown in Table 2.5-2 that were considered during conceptual engineering for the DRIC crossing.

Table 2.5-2.
Summary of Main Span Lengths and Bridge Types

Alignment	Conceptual Engineering Option/ Sub-Option		Main Span (m) / (ft)	Bridge Type Cable-Stayed (C) Suspension (S)
X10(B)	4	Option 1a	840 / 2756	C
	7	Option 5a	855 / 2805	S
X11(C)	9	Option 1a	760 / 2493	C
	10	Option 2a	760 / 2493	S

Conceptual Engineering Key Findings

The key findings of the Bridge Conceptual Engineering Report were:

- The major differentiator for the crossing bridges was cost. However, market forces and differences in steel and cement commodity prices at the time of construction will significantly influence the cost differentials between structure types, as well as other matters affecting cost, such as a Buy America clause if it were incorporated into the project requirements.
- For Crossing X-10(B) and X-11(C) the Cable-Stayed Bridges, Options 4 & 9, were more economical than the Suspension Bridges, Options 7 & 10. The predominant reason is the cost of the anchorage foundations, which is in part due to unknowns regarding the soil conditions.
- While the structures were estimated based on North American steel sources, the sourcing of structural steel (Buy America vs. international) can have a substantial influence on cost.
- Construction durations for these structures are similar.
- No significant differentiators in technical feasibility or performance were found between the crossings.
- No environmental impact differentiators were found, with the exception of the bridge vertical profiles.

Several issues needed additional investigation for the final Structure Study once a Preferred Alternative Alignment was selected. Other issues were identified for further development during preliminary engineering. Issues for the Structure Study included:

- Suspension bridge anchorage foundation investigation, including soil borings to support the effort.
- Sensitivity analysis of bridge cost to unit price changes for steel and concrete.

2.6 Context Sensitive Solutions

According to FHWA policy, the Context Sensitive Solutions process is “A collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility.” Governor Jennifer M. Granholm directed MDOT to, “Incorporate context sensitive design (solutions) into transportation projects . . . .” In short, CSS is a blending of community values and sound engineering.

The DRIC CSS process is an ongoing effort which began with a community visioning effort, developed land use concepts, and then, with those elements as a basis, transitioned into the engineering and landscape elements of the project. The following community workshops (Table 2.6-1) were held as part of the CSS process:

Table 2.6-1
Context Sensitive Solutions Community Workshops

Meeting #	Date	Workshop Subject
1	December 14, 2005	Vision Statement
2	December 21, 2005	First Step to Plaza Location
3	January 4, 2006	Final Vision Statement and Presentation of Preliminary Plaza Locations
4	January 18, 2006	Proposed Plaza Locations and Work Station "Q and A"
5	February 8, 2006	Proposed Plazas w/ Preliminary Tie to Bridge and I-75
6	February 27, 2006	Land Use Goals
7	March 8, 2006	Community Analysis
8	March 22, 2006	Community Planning
9	April 19, 2006	Context Sensitive Solution Terminology/Process
10	May 9 & 10, 2006	Social and Cultural Issues
11	May 23, 2006	Illustrative Land Use Plans
12	June 22, 2006	Bus Tour to View Toledo and Port Huron Bridges
13	August 24, 2006	Context Sensitive Solutions – Initial Ramp/Plaza/Bridge Concepts
14	November 2 & 15, 2006	Context Sensitive Solutions – Refined Ramp/Plaza/Bridge Concepts
15	April 26, 2007	Context Sensitive Solutions – Refined Local Access and Interchanges
16	August 8, 2007	Context Sensitive Solutions – Refined Bridge Concepts
17	December 12, 2007	Context Sensitive Solutions – Project Summary

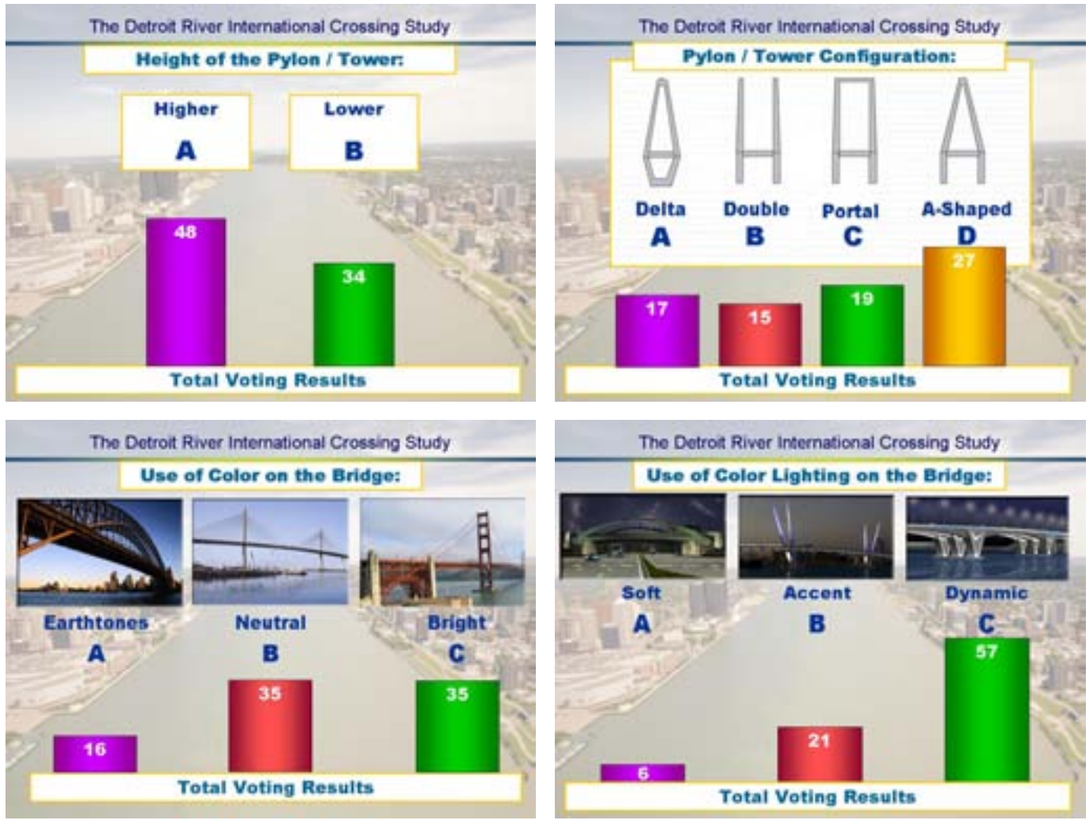
This report addresses the engineering and landscape elements of the project (Workshops 9, and 12 through 16). At each workshop, visual options were presented to the public and rated through a real-time interactive electronic feedback system. The participants pressed a button on a keypad and their choice registered on the presentation slides. This section of the report will generally discuss the options presented and then show those that were preferred by the community.

2.6.1 CSS Workshops

Workshop #9 – April 19, 2006
This workshop generally introduced the CSS process to the public. The project team made a presentation of the general application of the CSS process and its application to the DRIC project, examples from other projects, the elements of the project to which CSS would be applied, and potential themes or visions. The project team also made a presentation of bridge terminology in order to inform the community and presented where aesthetic opportunities existed for the DRIC crossing system.

At the end of the presentation, the public's preferences for use of color, lighting, tower height, and configuration were polled (Figure 2.6-1). The results are as follows:

Figure 2.6-1
Community Aesthetic Preferences



Source: *Parsons Transportation Group Inc. of Michigan*

Workshop #12 – June 22, 2006
This workshop consisted of a bus tour of interested community members to the Maumee River Bridge construction site in Toledo, Ohio and the Blue Water Bridge International Crossing in Port Huron, Michigan (Figure 2.6-2). The Maumee River Bridge project team made a presentation regarding the project and accompanied the participants to the project site and through the adjacent neighborhoods.

Figure 2.6-2
Community Workshop Bus Tour

At the Blue Water Bridge, the participants were able to experience how an existing international crossing could be integrated into a community and see what the surrounding community could look like.

Workshop #13 - August 24, 2006
The goal of this workshop was to work toward consensus on the vision for the aesthetic treatment of the crossing system, including the bridge, plaza, interchange, and local access (Figures 2.6-3 and 2.6-4). A presentation was made by the project team that explained the work done to date, the CSS process, and then presented a series of potential vision expressions for the main river bridge. The community expressed their preferences using the interactive voting system described above. The participant's preferences were as follows:

Bridge

- Friendship and History visions for the bridge component were most preferred for each crossing. Gateway was third for Crossing X-11.

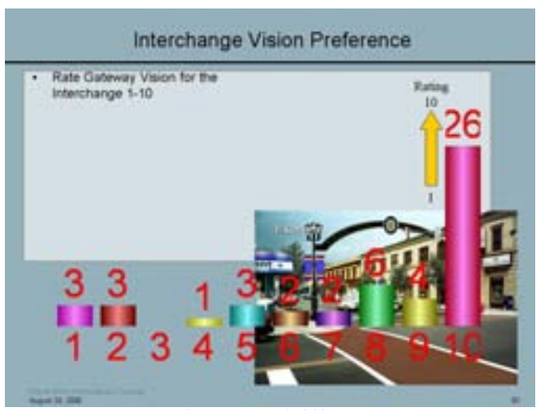
Figure 2.6-3
Initial Bridge Preferences

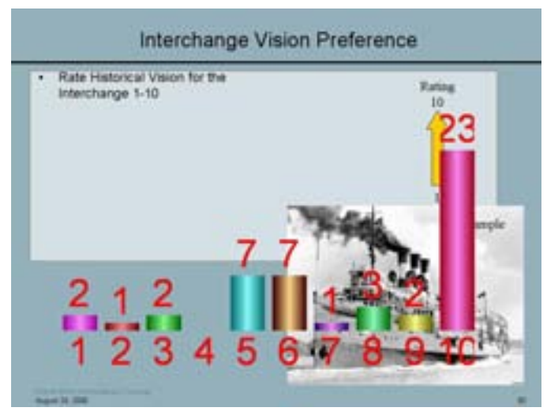
Source: Parsons Transportation Group Inc. of Michigan

Plaza and Interchange

- The top two preferences were the Gateway and History visions with Culture third.

Figure 2.6-4
Initial Plaza/Interchange Preferences





Source: Parsons Transportation Group Inc. of Michigan

U.S. Local Access/Community Buffer

- The top two preferences were Historical and Cultural.

Workshop # 14 – November 2 & 15, 2006
The November 2nd and 15th workshops were held in the U.S. and Canada, respectively. This workshop focused on refining the vision preferences for the bridge, plaza and interchange, and U.S. Local Access and Community Buffer selected in the previous workshop (Figures 2.6-5 through 2.6-8). This was accomplished through a real-time interactive computer simulation model where participants could walk through the project element, like the bridge, and select individual preferences for each element such as lighting, railings, light fixtures, sidewalk patterns, etc.

Figure 2.6-5
Refined Local Access/Community Buffer Vision Preferences - Historical

Source: Parsons Transportation Group Inc. of Michigan

Figure 2.6-6
Refined Interchange Vision Preferences – Historical

Source: Parsons Transportation Group Inc. of Michigan

Figure 2.6-7
Refined Suspension Bridge Vision Preferences – Historical

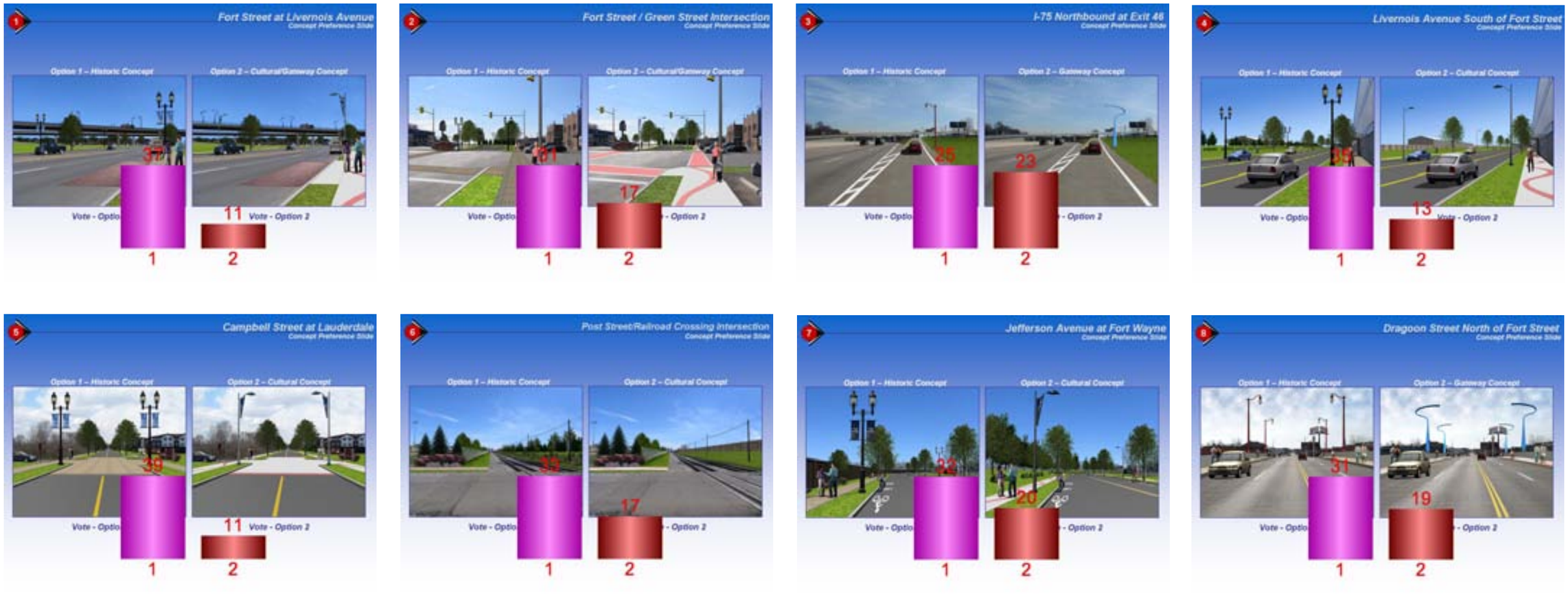
Source: Parsons Transportation Group Inc. of Michigan

Figure 2.6-8
Refined Cable-Stay Bridge Vision Preferences - Friendship

Source: Parsons Transportation Group Inc. of Michigan

Workshop # 15 - April 26, 2007
This workshop continued the refinement process from Workshop #14. At this workshop location specific treatment options were presented for eight local street system locations in the project area. Workshop participants were asked to indicate a preference between the vision expressions using the interactive system. The preferences are shown in Figures 2.6-9. This workshop confirmed that, for all treatments, the Historic Concept expression was preferred.

Figure 2.6-9
Refined Local Access at Interchange Preferences



Source: Parsons Transportation Group Inc. of Michigan

Workshop #16 – August 8, 2007

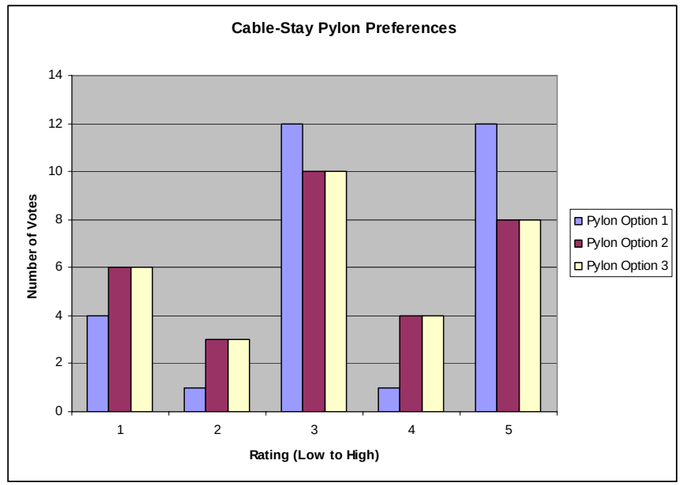
The goal of this workshop was to move toward consensus on the aesthetic vision of the Detroit River Bridge to reflect the community and context. The bridge workshop consisted of an open house session with physical renderings of bridge elements followed by a formal presentation. At the end of the presentation the audience was invited to participate in expressing their preferences using the interactive devices. The workshop focused on the Suspension and Cable-Stayed Bridge types. Each bridge type was simulated to scale at each crossing location. The visual simulation of individual elements did not differentiate between bridge corridors. The results of this workshop are shown in Figures 2.6-10 through 2.6-16.

Cable-Stay Bridge

For the Cable-Stay Bridge three different pylon options were presented (Figure 2.6-10): slightly curved inverted Y; inverted Y; and A. Participants showed a moderate preference for Option 1 with identical preferences for Option 2 and 3 (Figure 2.6-11).

Figure 2.6-10 Cable-Stay Bridge Options

Figure 2.6-11 Cable-Stay Community Preferences



Source: Parsons Transportation Group Inc. of Michigan

Suspension Bridge

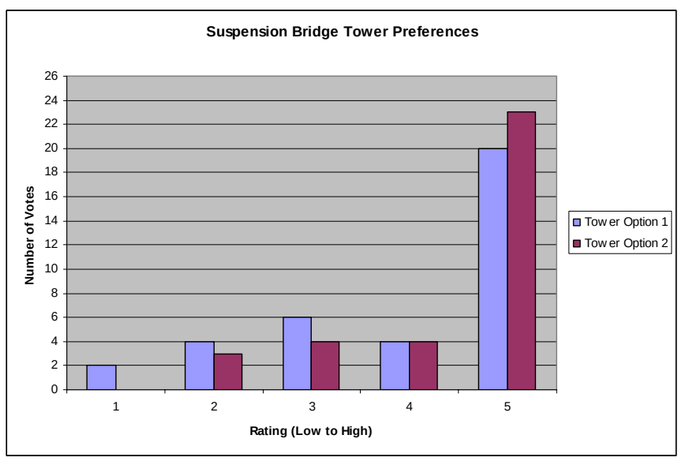
For the Suspension Bridge two different tower options and two different anchorage options were presented (Figure 2.6-12). For the tower options a less ornate type and an Empire Style. Participants showed a slight preference for Option 1 with no strong dislike shown for either (Figure 2.6-13).

Figure 2.6-12 Suspension Bridge Options

Option 1

Option 2

Figure 2.6-13 Suspension Bridge Community Preferences



Source: Parsons Transportation Group Inc. of Michigan

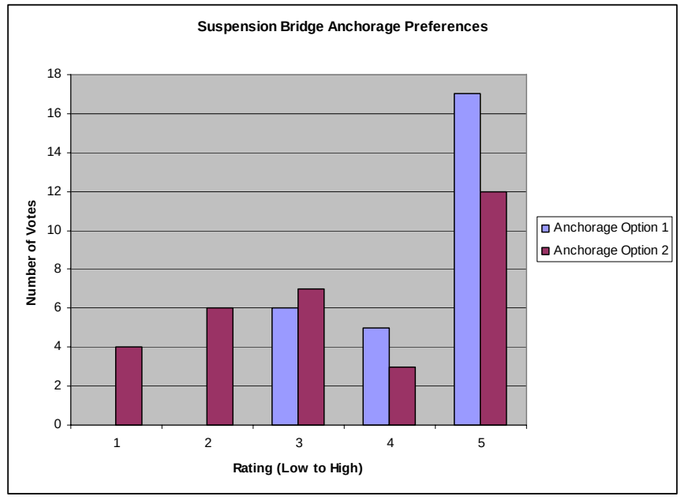
For the anchorages, two options were also reviewed – an Empire Style and a more ornate style with an opportunity for sculptural elements (Figure 2.6-14). A stronger preference was shown for Option 1, the sculptural style (Figure 2.6-15).

Figure 2.6-14 Suspension Bridge Anchorage Options

Option 1

Option 2

Figure 2.6-15 Suspension Bridge Anchorage Preferences

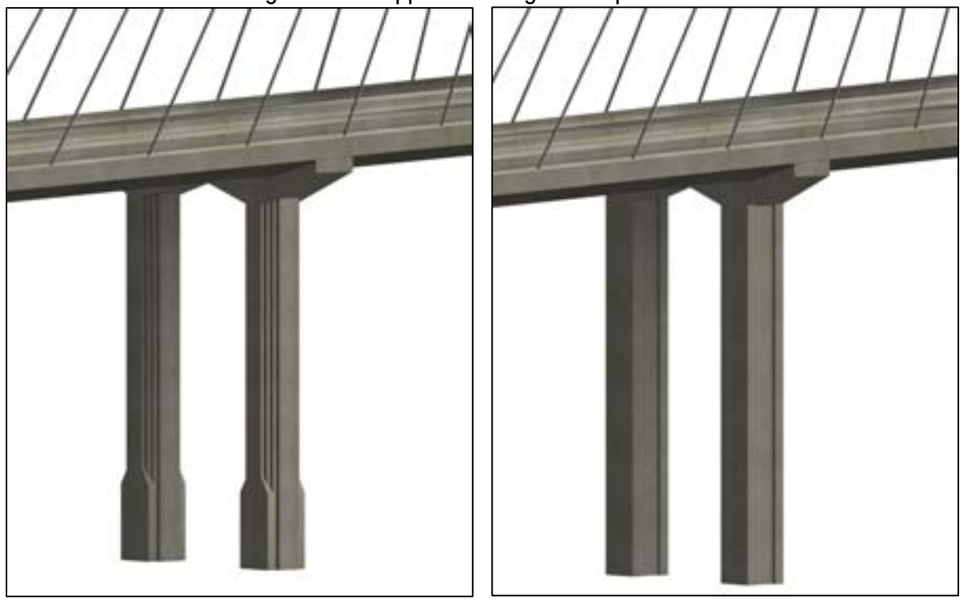


Source: Parsons Transportation Group Inc. of Michigan

Approach Bridge Piers

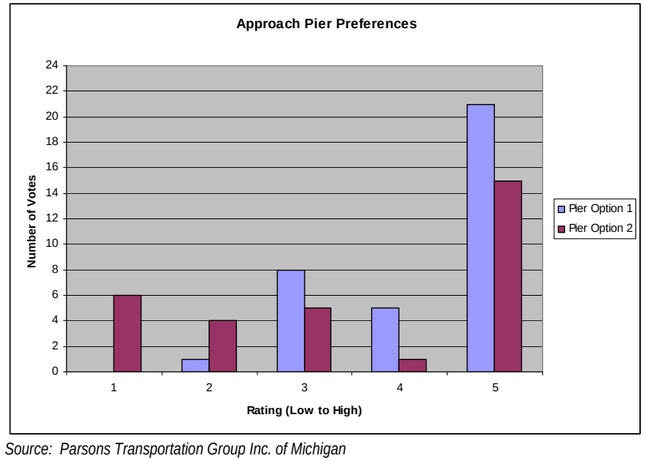
Approach Bridge piers were first shown in earlier workshops often connected with the discussion of interchange ramps. In this workshop, two approach bridge pier options were presented (Figure 2.6-16). Again, a more-sculpted option was shown as well as a more subdued option. A stronger preference was shown for Option 1, the sculpted option (Figure 2.6-17).

Figure 2.6-16 Approach Bridge Pier Options



Option 1 Option 2

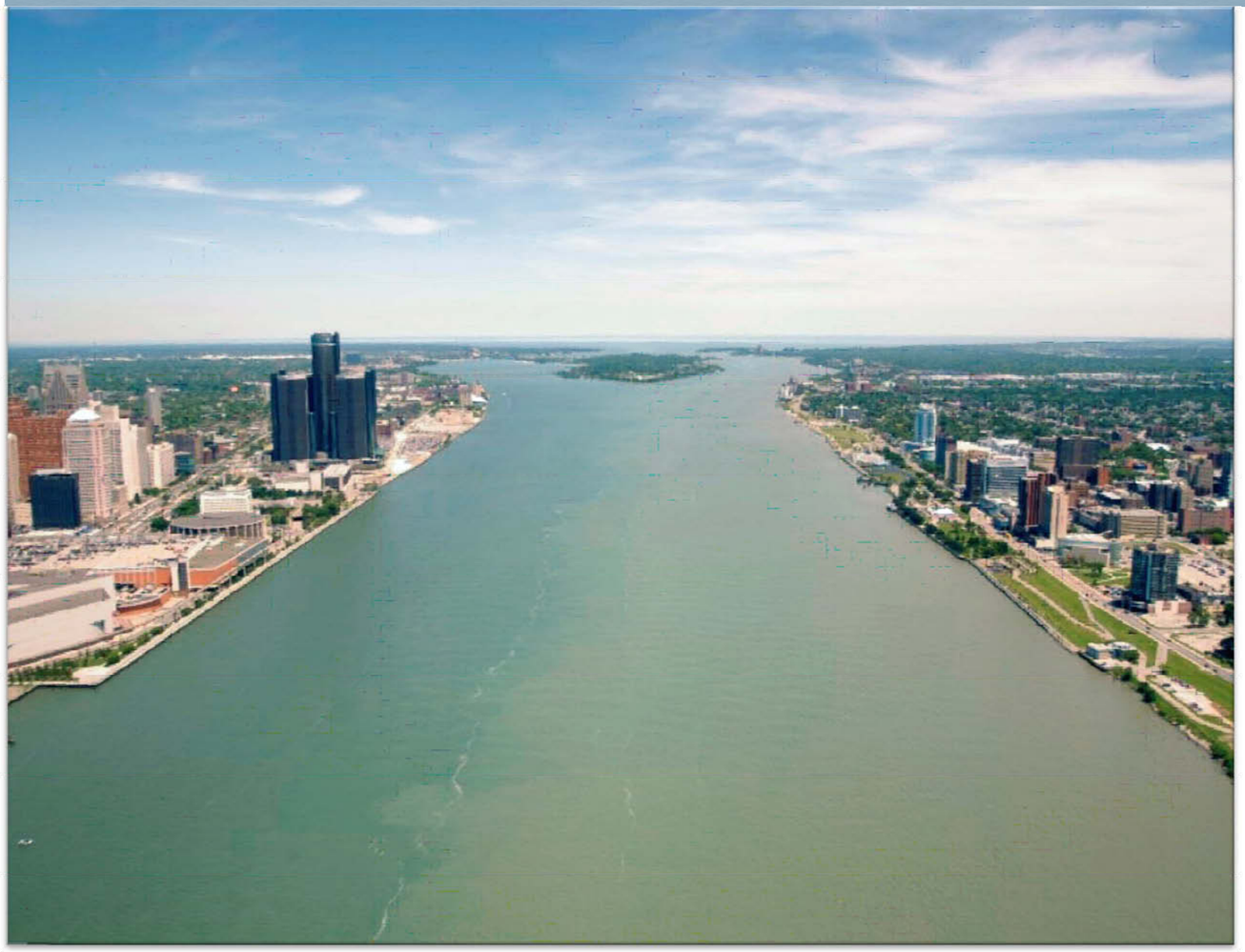
Figure 2.6-17 Approach Bridge Pier Preferences



Source: Parsons Transportation Group Inc. of Michigan

2.6.2 Summary

For the local access, interchanges, and area surrounding the Plaza, the community clearly preferred visual expressions that represented the history of the surrounding area. This is consistent with the culture of the community. For the bridges, the historical vision expression also applied to classical bridge form - the Suspension Bridge. For the more modern Cable-Stay Bridge, the more contemporary vision expressions of Friendship and Gateway were preferred. For the main river bridge, Appendix A – Design Criteria contains aesthetic guidelines which can be used during the final design process.



3. IDENTIFYING A PREFERRED ALTERNATIVE

3.0 IDENTIFYING A PREFERRED ALTERNATIVE

This section of the Engineering Report presents the process of evaluating and screening the nine Practical Alternatives in order to identify a Preferred Alternative. Figure 3.1-2 shows the nine Practical Alternatives evaluated. Section 4 of this report will further describe the refinement of the Preferred Alternative.

3.1 Evaluation

The evaluation of the data on an end-to-end basis was conducted by the U.S. and Canadian Technical Teams. It focused on seven evaluation factors that were established at the very outset of the DRIC. They are:

- Protect community/neighborhood characteristics
- Maintain consistency with local planning
- Protect cultural resources
- Protect the natural environment
- Improve regional mobility
- Maintain air quality
- Assess how the project can be built

The importance of these factors, established by the technical teams in the U.S. and Canada, indicated the most important is improve regional mobility (Figure 3.1-1). Other factors, in order of importance, are:

U.S. Technical Team

- Protect community/neighborhood characteristics
- Protect the natural environment
- Assess how the project can be built (Constructability)
- Maintain air quality
- Protect cultural resources
- Maintain consistency with local planning

Canadian Technical Team

- Protect community/neighborhood characteristics
- Protect the natural environment
- Minimize cost/constructability
- Maintain air quality
- Protect cultural resources
- Maintain consistency with local planning

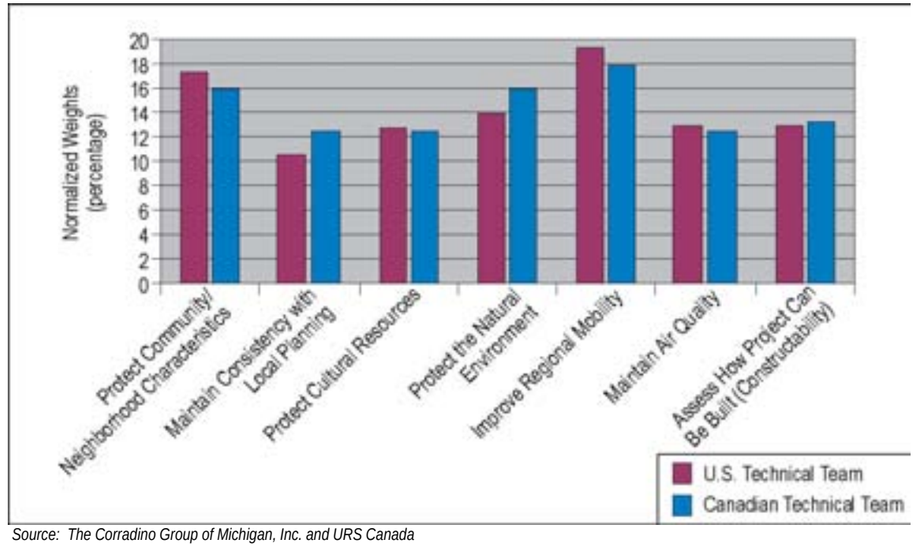
Overall, the two technical teams doing independent weightings placed the evaluation factors in the same order of importance.

Comparison of Crossings

Data on the crossing system on each side of the border were first examined to determine if the characteristics of Crossings X-10(A), X-10(B) or X-11 significantly advantage/disadvantage one alternative or another. This was an important first step because of the uniqueness of the connection of the U.S. and Canadian plazas to the proposed crossings. For example, in the U.S., Plaza P-a would only connect to the X-10 Crossings, while Plaza P-c would only connect to the X-11 Crossing. In Canada, Plaza C would only connect to Crossing X-11.

The most important evaluation factor to the two technical teams, "improve regional mobility," is typified by the volume of traffic on the new crossing, and the ability to shift traffic from Huron Church Road, an arterial road in Canada which accommodates large volumes of international traffic. It has 17 signalized intersections, many of which have several movements at critical levels today. Eleven of these intersections will have approaches which will be over capacity by 2035 without a new crossing and access road to divert traffic.[1] The travel data favor the selection of the X-10 Crossings that are forecast to carry between 15 (□ red box) and 50 (□ blue box) percent more traffic in 2035 than the X-11 Crossing (Tables 3.1-1 and 3.1-2) and from 48 (○ green oval) to 59 (○ yellow oval) percent of the combined traffic carried by the proposed new crossing and the Ambassador Bridge. The X-11 Crossing would handle 40 to 43 percent of the combined traffic of the Ambassador Bridge and the proposed new DRIC crossing. These data are drawn in the U.S. by using two different modeling approaches which reinforce the same conclusion, i.e., that the X-10 Crossings will have a significant advantage over the X-11 Alternative in terms of regional mobility.

Figure 3.1-1
Evaluation Factor Weightings
(Normalized to 100%)
U.S. and Canadian Technical Teams



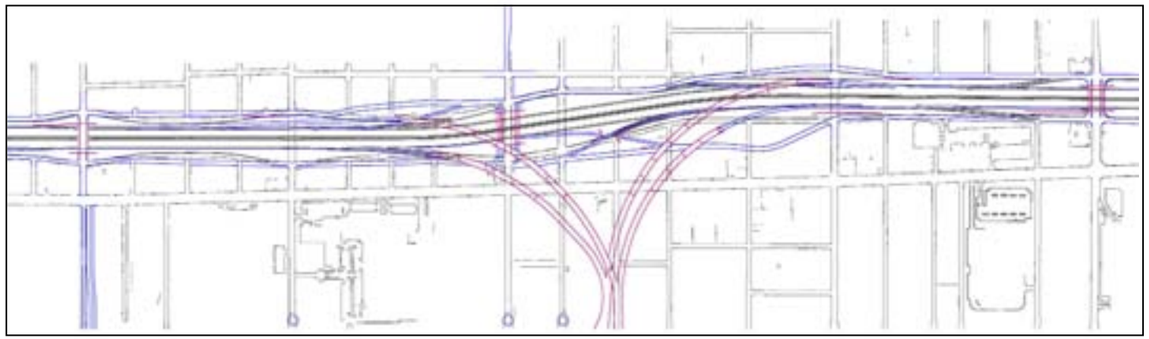
Source: The Corradino Group of Michigan, Inc. and URS Canada

Figure 3.1-2 shows the nine Practical Alternatives evaluated.

[1] *Detroit River International Crossing Study, Draft Level 2 Traffic Operations Analysis*, URS and IBI, November 2006.

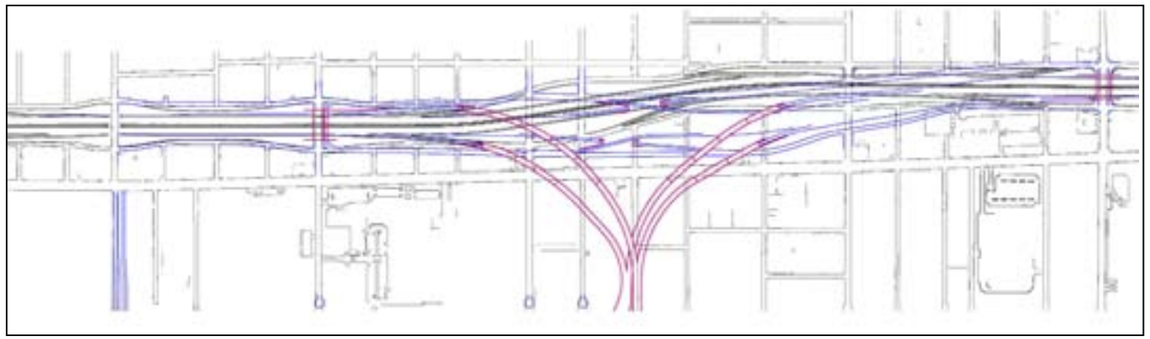
Figure 3.1-2
U.S. Interchange Alternatives with I-75

Alternatives #1 and #7/Interchange A

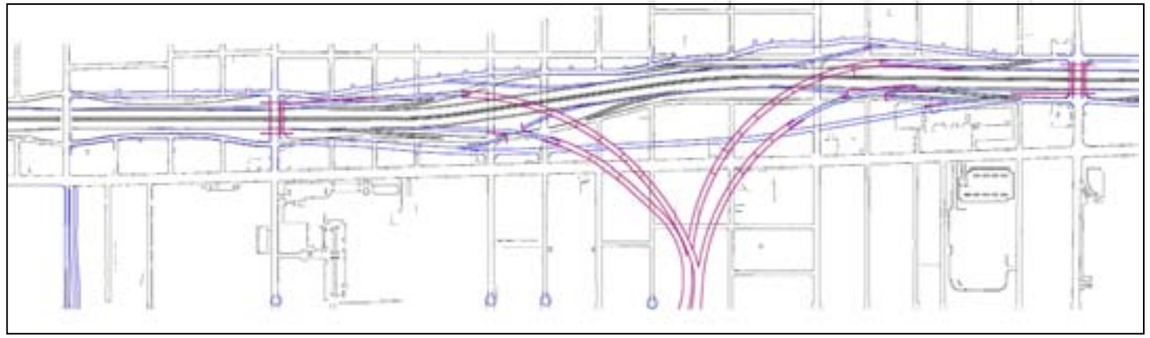


Alternatives #2 and #9/Interchange B

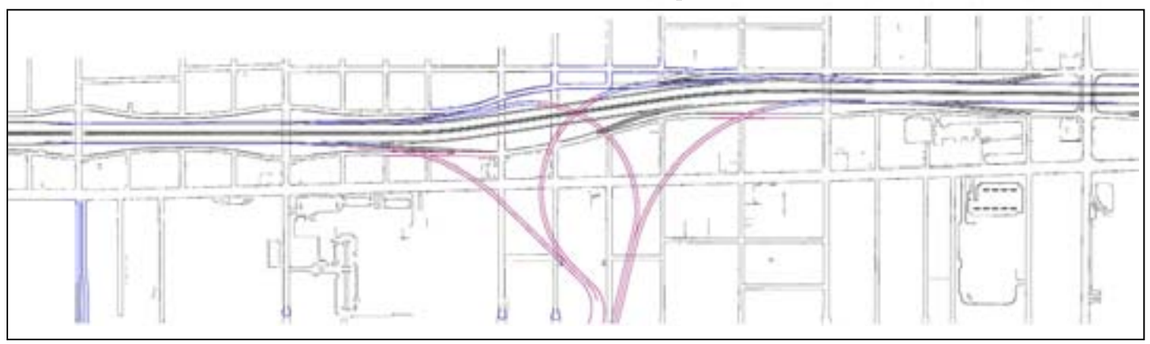
Alternatives #3 and #11/Interchange C



Alternative #5/Interchange E



Alternative #14/Interchange G



Alternative #16/Interchange I

Another critical factor is constructability, or how the project can be built. The X-10 and X-11 Crossings would potentially have foundations located close to where past brine well activity is known to exist. This is the most significant constructability issue. Brine well cavities are usually 1,000 feet or more below the surface of the ground but can cause sinkholes on the ground surface, as occurred in 1954 in Windsor (Figure 3.1-3). Detailed geophysical investigations, including review of the results by an international peer group, concluded that bridge foundations of both crossings in the U.S. and Canada are free from the risk of brine wells. However, the approach in Canada from Plaza C to the X-11 Crossing (Figure 3.1-3) has not been cleared from such risk. To do so requires additional investigations. And, even if those investigations are undertaken, it is the opinion of the geophysical experts that the resulting data would still be insufficient to consider the risk acceptable. That is because the approach to the Crossing X-11 bridge, which would also be a bridge structure, would pass over the eastern end of the former brine well field. A subsurface anomaly was identified in this location which appears to be a brine field cavity, rubble zone, and/or disturbed rock mass. The cost associated with building such a structure to minimize brine well risks ($CAD 260 million, including inflation), and the extra time needed to determine its acceptability and build the facility (at least one year longer), lead to the conclusion that the X-11 Crossing is not preferred from a constructability standpoint.

Table 3.1-1
Detroit River International Crossing Study
2035 Average Annual Daily Traffic – Single-Logit Model[a]

	Network	Two-Way Traffic	
		AMB	NEW
Cars	No Build	29,262	N/A
	#A01, #A02, #A03, #A14, #A16	18,487	14,194
	#A05	18,317	14,445
	#A07, #A09, #A11	21,620	9,564
Trucks	No Build	21,538	N/A
	#A01, #A02, #A03, #A14, #A16	6,218	20,109
	#A05	6,024	20,331
	#A07, #A09, #A11	12,293	13,326
Total	No Build	50,800	N/A
	#A01, #A02, #A03, #A14, #A16	24,705	34,304
	#A05	24,341	34,776
	#A07, #A09, #A11	33,913	22,890
PCEs	No Build	83,108	N/A
	#A01, #A02, #A03, #A14, #A16	34,032	64,467
	#A05	33,376	65,273
	#A07, #A09, #A11	52,353	42,878

[a] A highly time-sensitive model.
Source: The Corradino Group of Michigan, Inc.

Table 3.1-2
Detroit River International Crossing Study
2035 Average Annual Daily Traffic – Nested-Logit Model[b]

	Network	Two-Way Traffic	
		AMB	NEW
Cars	No Build	24,994	N/A
	#A01, #A02, #A03, #A14, #A16	17,738	14,424
	#A05	17,807	14,335
	#A07, #A09, #A11	19,618	11,165
Trucks	No Build	26,289	N/A
	#A01, #A02, #A03, #A14, #A16	15,080	15,948
	#A05	15,155	15,846
	#A07, #A09, #A11	15,660	15,144
Total	No Build	51,283	N/A
	#A01, #A02, #A03, #A14, #A16	32,818	30,372
	#A05	32,962	30,180
	#A07, #A09, #A11	35,278	26,309
PCEs	No Build	90,717	N/A
	#A01, #A02, #A03, #A14, #A16	55,439	54,295
	#A05	55,695	53,949
	#A07, #A09, #A11	58,768	49,026

[b] A less time-sensitive model.
Source: The Corradino Group of Michigan, Inc.

Figure 3.1-3
Canadian Approach Structure Requiring Further Study
Detroit River International Crossing Study

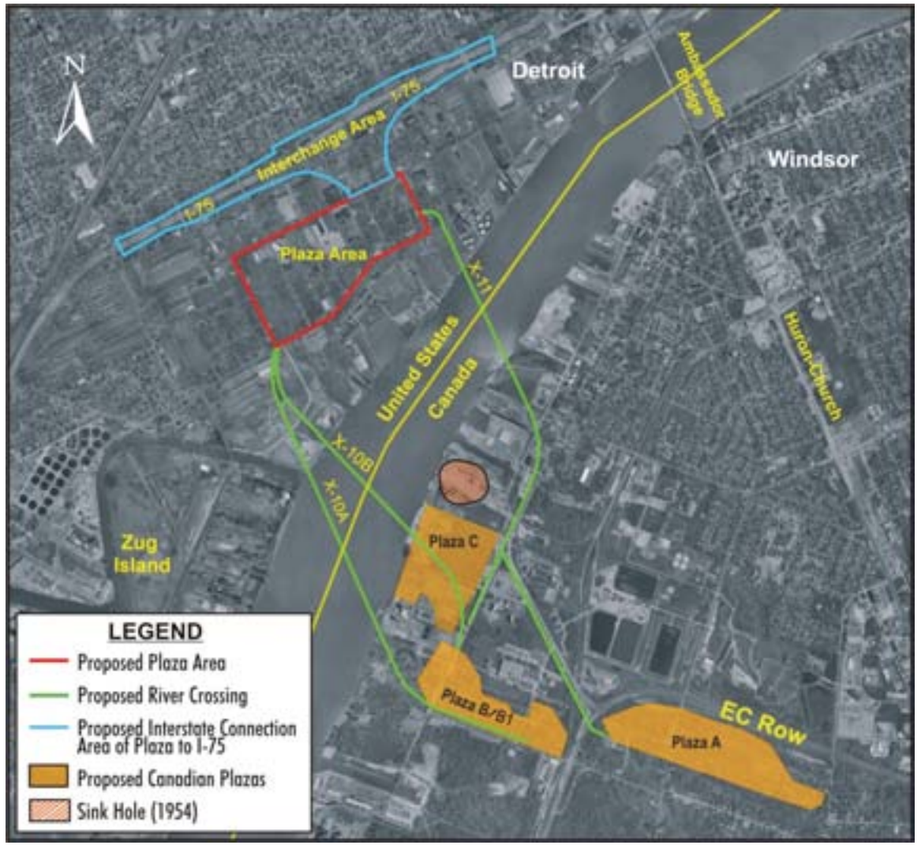


Table 3.1-3
Potential Relocations in U.S. by Border Crossing System Component in Detroit River International Crossing Study

Alt.	Crossing	Active Relocation Units	Crossing	Plaza	Interchange	Gateway Boulevard	Railroad	Total
#1	X-10	Residential	0	143	182	17	7	349
		Business	0	18	18	7	0	43
#2	X-10	Residential	0	143	186	17	7	353
		Business	0	18	19	7	0	44
#3	X-10	Residential	0	143	157	17	7	324
		Business	0	18	24	7	0	49
#5	X-10	Residential	0	143	247	17	7	414
		Business	0	18	26	7	0	51
#7	X-11	Residential	21	155	182		7	365
		Business	5	18	18	9	0	50
#9	X-11	Residential	21	155	186		7	369
		Business	5	18	19	9	0	51
#11	X-11	Residential	21	155	157		7	340
		Business	5	18	24	9	0	56
#14	X-10	Residential	0	143	171	17	7	338
		Business	0	18	16	7	0	41
#16	X-10	Residential	0	143	189	17	7	356
		Business	0	18	20	7	0	45

The X-11 Crossing would have a greater number of impacts in the U.S. to active residential and business units (Table 3.1-3); (○ red oval) albeit relatively few in comparison to the plaza and interchange. On the other hand, data for just the crossings in the evaluation categories of "maintaining air quality," "consistency with local planning," and "protecting the natural environment," do not illustrate any significant differences among the crossings in the U.S. (See Appendix A.)

In Canada, according to the *Draft Generation and Assessment of Plaza and Crossing Alternatives Report, April 2008*, the impacts on community/neighborhood characteristics of historic Sandwich Towne of Crossing X-11 were determined to be greater than the other crossing/plaza alternatives. The results of community consultation on the crossing alternatives indicate concern that the Crossing X-11/Plaza C alternative would have a notable impact to community character in Sandwich Towne. These concerns are related to potential increases in traffic and nuisance impacts (noise, dust) and the relative proximity of the new crossing to Ambassador Bridge. Crossing X-11/Plaza C, and the approach road between the plaza and crossing, are within 200 m (650 feet) of the residential area of Sandwich Towne. This may result in nuisance impacts for residents in this area, which were noted as concerns during the community consultations.

The Crossing X-11/Plaza C alternative also has the potential to impact approximately 100 homes in Sandwich Towne with noise increases greater than 5 dBA – a level of increased noise which is significant. A noise barrier to reduce changes in noise levels to below 5 dBA is estimated cost of approximately $CAD 20 million. Further investigations of mitigation measures in this area of Sandwich Towne would be undertaken, as appropriate. The Crossing X-11/Plaza C alternative was also noted as having a higher impact to the cultural landscape of the historic town of Sandwich. Although no significant portion of the historic town would be directly affected, Crossing X-11/Plaza C may impact the heritage sensitive area through introduction of physical, visual, audible or atmospheric elements that are not in keeping with the resources and/or their setting. In terms of air quality impacts, Crossing X-11/Plaza C was the only crossing shown to have some influence on $PM_{2.5}$ and NOx concentrations in Sandwich.

On these bases, it was concluded the X-11 Crossing was not a candidate for being the Preferred Alternative. In the U.S., this means that Alternatives #7, #9 and #11 and Plaza P-c were eliminated. In Canada, the elimination of Crossing X-11 also eliminated Plaza C.

3.1.1 Comparison of Crossings X-10(A) and X-10(B)

In Canada, Crossing X-10(A) connects to Plaza A, which has been identified as having greater residential, natural and land use impacts compared to other Canadian plaza alternatives. In the U.S., the difference in impacts between Crossings X-10(A) and X-10(B) were indistinguishable except in how each can be built. The X-10(A) Crossing was developed to avoid the area around known historical brine mining in Canada. The alignment of the X-10(A) Crossing would start near the location of X-10(B) in the U.S., which begins near Jefferson Avenue and Post Street passing over the east end of Yellow Trucking then west of the LaFarge Cement terminal and lands in Canada southwest of Brighton Beach Power Station (Refer to Figure 3.1-3). Analyses determined that the only feasible structure type for Crossing X-10(A) is a suspension bridge with an unsuspended back span. The X-10(A) bridge is the longest of the alternatives with a main span of 4,265 feet. Although suspension bridges with main spans exceeding that length do exist, this would become the longest bridge of its type in the Americas.

The bridge analyses conducted by the U.S. and Canadian Technical Teams[2] evaluated eight constructability factors (Tables 3.1-4 and 3.1-5). Of those, cost, cost risk, schedule duration, and schedule risk were considered to be differentiating among the crossings. The estimated construction cost of the X-10(A) Bridge at $920 million is significantly greater than the other suspension bridges at Crossings X-10(B) and X-11 (X-10(B) @ $550 million and X-11 @ $600 million). The construction duration of 62 months for Crossing X-10(A) is over one year more than the other alignments. Because of these factors, Crossing X-10(B) is preferred over Crossing X-10(A) on an end-to-end basis. Therefore, X-10(B) was mutually identified as the overall preferred crossing.

Table 3.1-4
Bridge Evaluation
Construction Cost and Cost Risk Evaluation Data

Crossing	Bridge Type	Construction Cost Estimate 2006 US$ (000,000s)	Risk of Controlled Cost (Scale 1-5)[a]
X-10(A)	Suspension w/o River Pier	$770 – 920	2
	Suspension w/River Pier	$680 – 810	4
	Cable Stay w/River Pier	$620 – 740	1
X-10(B)	Cable Stay w/o River Pier	$430 – 510	2
	Cable Stay w/River Pier	$370 – 440	3
	Suspension w/o River Pier	$480 – 550	5
	Suspension w/o River Pier	$470 – 540	5
	Suspension w/River Pier	$420 – 490	4
X-11(C)	Cable Stay w/o River Pier	$450 – 530	3
	Suspension w/o River Pier	$500 – 580	5
	Suspension w/o River Pier	$520 – 600	5

[a] 1 is highest risk.
Source: Parsons Transportation Group and URS Canada

[2] Refer to www.partnershipborderstudy.com, Reports, U.S., Bridge Type Study.

Table 3.1-5
Bridge Evaluation Data
Constructability Evaluation Data
Detroit River International Crossing Study

Bridge Type	Construction		Disruption to Roadways (Scale 1-5)		Major Utilities			Contamination Sites		Foundation Compatibility (Scale 1-5)[a]	Technical Challenges (Scale 1-5)[a]
	Duration (months)	Risk (Scale 1-5)[a]	U.S.	Can.	# U.S.	# Can.	Risk (Scale 1-5)[a]	#	Risk (Scale 1-5)[a]		
Crossing X-10 (A)											
Suspension w/o River Pier	62	2	3	4	3	3	4	2	4	4	3
Suspension w/ River Pier	56	2	3	4	3	3	4	2	4	4	3
Cable Stay w/ River Pier	55	2	3	4	3	3	4	2	4	4	2
Crossing X-10 (B)											
Cable Stay w/o River Pier	51	4	2	3	3	3	4	2	4	4	2
Cable Stay w/ River Pier	43	3	2	3	3	3	4	2	4	4	3
Suspension w/o River Pier	52	4	2	3	3	3	4	2	4	4	3
Suspension w/o River Pier	49	4	2	3	3	3	4	2	4	4	3
Suspension w/ River Pier	43	3	2	3	3	3	4	2	4	4	3
Crossing X-11(C)											
Cable Stay w/o River Pier	47	5	4	2	1	1	4	5	4	4	3
Suspension w/o River Pier	42	4	4	2	1	1	4	5	4	4	3
Suspension w/o River Pier	51	4	4	2	1	1	4	5	4	4	3

[a] 1 is highest risk.
Source: Parsons Transportation Group and URS Canada

3.1.2 Preliminary Comparison of U.S. Interchanges

In the U.S., six interchanges are associated with the X-10(B) crossing: Alternative #1/Interchange A, Alternative #2/Interchange B, Alternative #3/Interchange C, Alternative #5/Interchange E, Alternative #14/Interchange G, and Alternative #16/Interchange I. (Refer to Table 3.1-3 and Figure 3.1-2.)

It was recognized that there is a significant difference among interchanges in terms of impacts on historic properties. Properties on or eligible for the U.S. *National Register of Historic Places* are protected by law – Section 4(f) of the Department of Transportation Act, 49 U.S.C. 303 – and must be avoided, if there is a feasible and prudent alternative.

The impacts to Section 4(f) properties which distinguish the interchange alternatives were those to the Berwalt Manor apartment building and the Detroit Savings Bank/George International Building. Use of Beard School property is not an issue, as it was in earlier analyses, because engineering modifications were made so that no property on the *National Register of Historic Places* is required (Figures 3.1-4 and 3.1-5).

Alternative #3/Interchange C cannot avoid Berwalt Manor (Figures 3.1-6 and 3.1-7) and would require its removal. Alternative #5/Interchange E would require the removal of Berwalt Manor and the Detroit Savings Bank (Figures 3.1-8 and 3.1-9). There are prudent and feasible alternatives to Alternatives #3 and #5; therefore, they were eliminated.

Other impacts dealing with noise, air quality, and impacts on the natural environment are very similar among interchange alternatives. In terms of regional mobility impacts, including operations of I-75 (Figures 3.1-10 and 3.1-11 and Table 3.1-6),[3] the interchanges are virtually indistinguishable. Relocation impacts vary from a low of 16 active businesses to a high of 26. Alternatives #3 and #5 are both at the high end in terms of business relocations (○ green ovals on Tables 3.1-3 and 3.1-6). Alternative #5 is at the high end of residential relocations ((247) □ orange box on Tables 3.1-3 and 3.1-6) while Alternative #3 is at the low end (157 active residential units (□ blue box)).

- text continued on Page 3-10 -

[3] Refer to www.partnershipborderstudy.com, Reports, U.S., Level 2 Traffic Analysis, Part 2.

Figure 3.1-4
Aerial View of Frank H. Beard School
Detroit River International Crossing Study

Source: The Corradino Group of Michigan, Inc.

Figure 3.1-5
Frank H. Beard School, 8840 North Waterman Street
Detroit River International Crossing Study

Source: Commonwealth Cultural Resources Group, Inc.

Figure 3.1-6
Aerial View of Berwalt Manor Apartment Building
Detroit River International Crossing Study

Source: The Corradino Group of Michigan, Inc.

Figure 3.1-7
Berwalt Manor Apartment Building, 760 South Campbell Street
Detroit River International Crossing Study

Source: Commonwealth Cultural Resources Group, Inc.

Figure 3.1-8
Aerial View of Detroit Savings Bank/George International Building
Detroit River International Crossing Study

Source: The Corradino Group of Michigan, Inc.

Figure 3.1-9
Detroit Savings Bank/George International Building, 5705 West Fort Street
Detroit River International Crossing Study

Source: Commonwealth Cultural Resources Group, Inc.

Figure 3.1-10
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 AM Peak Hour Travel

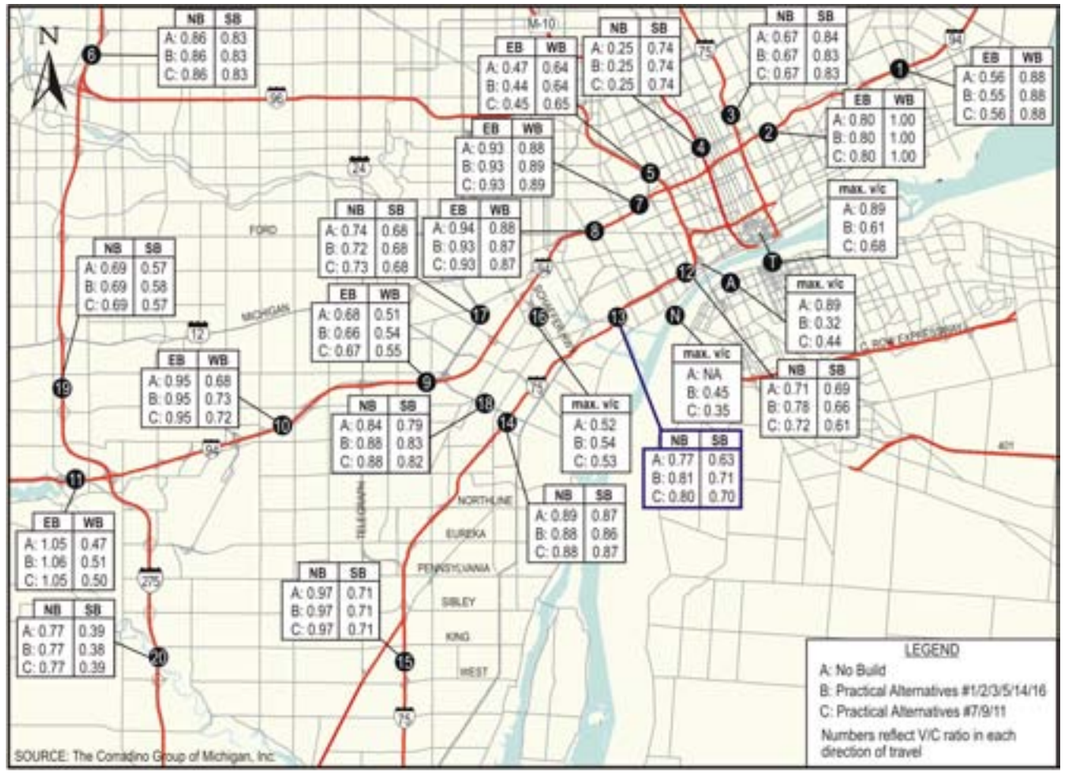


Figure 3.1-11
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 PM Peak Hour Travel

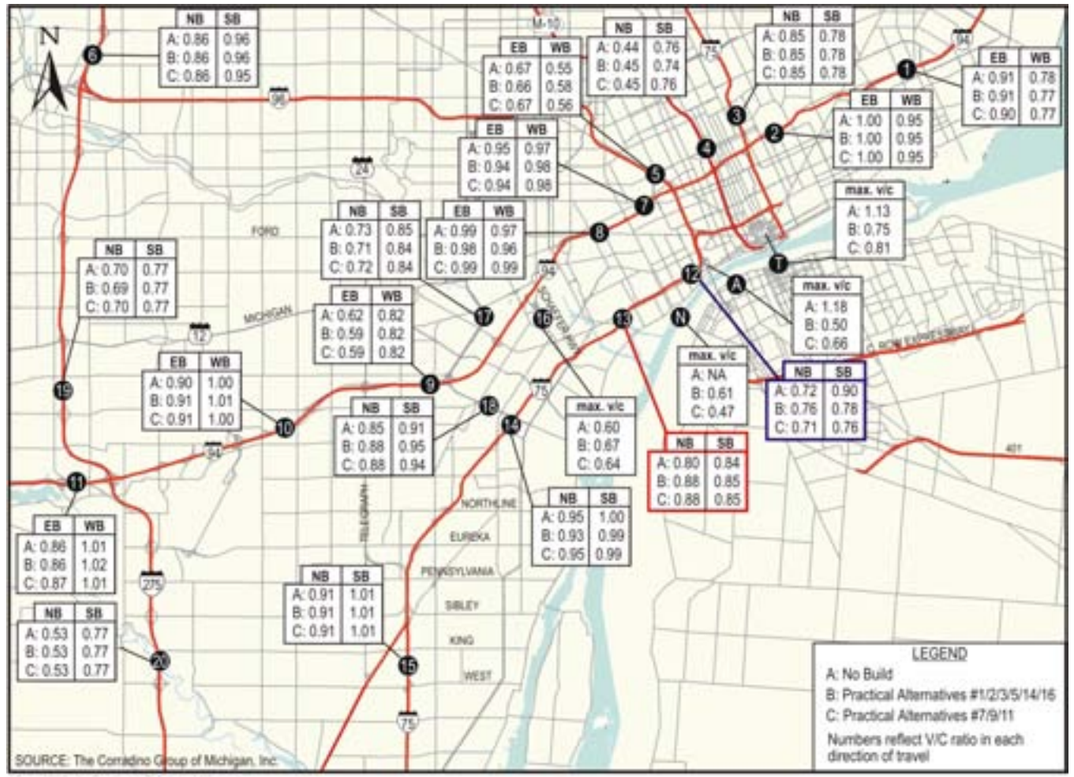


Table 3.1-6
Summary of Interchange Impacts
Detroit River International Crossing Study

Impact Category	Alternative #1/ Interchange A	Alternative #2/ Interchange B	Alternative #3/ Interchange C	Alternative #5/ Interchange E	Alternative #14/ Interchange G	Alternative #16/ Interchange I
Community/Neighborhood Characteristics						
■ Relocations (ref Table 3-6)	RU – 182 Pop-446 BU – 18 Emp-120	RU-186 Pop-456 BU-19 Emp-125	RU-157 Pop-385 BU-24 Emp-175	RU-247 Pop-605 BU-26 Emp-225	RU-171 Pop-419 BU-16 Emp-120	RU-189 Pop-463 BU-20 Emp-125
■ Interchanges Modified (ref Table 3-12)	Springwells ½ Inter Liv/Drgn Full Mod. Clark ½ Inter	Springwells ½ Inter Liv/Drgn Full Mod. Clark ½ Inter	Springwells ½ Inter Liv/Drgn Full Mod Clark ½ Inter	Springwells ½ Inter Liv/Drgn Full Mod. Clark Removed	Springwells Full Liv/Drgn Removed Clark ½ Inter	Springwells Full Liv/Drgn Removed Clark Full Mod. Split
■ Cross Streets Open	Springwells, Green, Livernois, Clark	Springwells, Green, Livernois, Dragoon, Clark	Springwells, Green, Waterman, Clark	Springwells, Green, Waterman, Clark	Springwells, Green, Waterman, Clark	Springwells, Green, Livernois, Dragoon, Clark
■ Springwells Interchange Straightening	NO	NO	NO	NO	NO	YES
■ Distance of re-routed traffic onto Service Drive (Includes Backtracking) Blocks (1 Block is the distance between major cross streets)	12	16	15	18	18	14
SB I-75 to Service Drive	4 (from Springwells to Dragoon)	5 (from Dragoon to Waterman & Springwells to Waterman)	3 (from Springwells to Dragoon)	6 (from Springwells to Dragoon & Clark to Dragoon)	3 (from Dragoon to Springwells)	3 (from Dragoon to Springwells)
SB Service Drive Entrance to I-75	2 (from Clark to Livernois)	4 (from Clark to Junction & Livernois to Springwells)	5 (from Clark to Junction & Livernois to Springwells)	4 (from Clark to Junction & Livernois to Springwells)	6 (from Clark and Livernois to Spingwells)	4 (from Clark to Junction & Livernois to Springwells)
NB I-75 Exit to Service Drive	2 (from Clark to Cavalry)	2 (Livernois to Junction & Clark to Junction)	4 (from Livernois to Junction & Clark to Junction)	2 (from Livernois to Junction)	6 (from Livernois & Clark to Springwells)	4 (from Livernois to Junction & Clark to Junction)
NB Service Drive Entrance to I-75	4 (from Springwells to Cavalry)	5 (Springwells to Waterman & Dragoon to Clark)	3 (from Springwells to Dragoon)	6 (from Springwells to Livernois and from Clark to Dragoon)	3 (from Dragoon to Clark)	3 (from Dragoon to Clark)
■ SB I-75 Direct Access to Cross Street Overpasses	Clark, Livernois	Clark, Green	Clark, Green, Waterman	Waterman	Clark, Springwells	Clark, Springwells
■ NB I-75 Direct Access to Cross Street Overpasses	Springwells, Clark	Springwells, Clark	Springwells, Clark	Springwells, Clark	Springwells, Clark	Springwells
■ Pedestrian/Bicycle-Only Crossings Closed (ref Table 3-13)	Removes 4 of 5 Ped/Bike Crossings	Removes 4 of 5 Ped/Bike Crossings	Removes 3 of 5 Ped/Bike Crossings	Removes 3 of 5 Ped/Bike Crossings	Removes 2 of 5 Ped/Bike Crossings	Removes 4 of 5 Ped/Bike Crossings
■ Noise Levels (ref Table 3-24 & 3-25) ■ Dwelling Units over 66 dBA ■ Noise Wall Length/Cost ■ Dwelling Units over 66 dBA with Noise Walls	 198 – Units NA 198 Units	 198 – Units NA 198 Units	 161 – Units 1,400' ($777,000) 138 Units	 163 – Units 2,230' ($1,234,000) 130 Units	 168 – Units 6,530' ($3,615,000) 87 Units	 198 – Units 1,170' ($646,000) 173 Units
■ Visual	All Options have similar visual impacts					

Table 3.1-6 (continued)
Summary of Interchange Impacts
Detroit River International Crossing Study

Impact Category	Alternative #1/ Interchange A	Alternative #2/ Interchange B	Alternative #3/ Interchange C	Alternative #5/ Interchange E	Alternative #14/ Interchange G	Alternative #16/ Interchange I
Cultural Resources						
■ Historic Properties (ref Table 3-26)	None	None	Berwalt Manor Apart Bldg (Removal)	Berwalt Manor Apart Bldg (Removal) Detroit Savings Bank (Removal)	None	None
■ Archaeological Sites	No adverse effects on prehistoric archaeological sites					
■ Context Sensitive Solutions	All Options have opportunity to implement Context Sensitive Solutions/Aesthetic Treatments					
Air Quality	Greater Split of Air Pollutants from Ambassador Bridge	Greater Split of Air Pollutants from Ambassador Bridge	Greater Split of Air Pollutants from Ambassador Bridge	Less Split of Air Pollutants from Ambassador Bridge	Greater Split of Air Pollutants from Ambassador Bridge	Greater Split of Air Pollutants from Ambassador Bridge
Engineering Performance						
■ Geometrics	Plaza Ramp Speed 45mph, Except Ramp A, at 40 MPH to avoid 4F Impact	Plaza Ramp Speed 45mph, Except Ramp A, at 40 MPH to avoid 4F Impact	Plaza Ramp Speed 45mph Improves I-75 Geometrics	Plaza Ramp Speed 45mph	Plaza Ramp Speed 35mph	Plaza Ramp Speed 45mph, Except Ramp A, at 40 MPH to avoid 4F Impact. Realign Springwells Interchange
■ Weave Areas	None	2- (1 SB, 1 NB); between local Ramps	None	2- (1 SB, 1 NB); between local Ramps	2- (1 SB, 1 NB); w/Plaza Ramps	2- (1 SB, 1 NB); w/Plaza Ramps
■ Drainage Impacts						
Pump Stations Impacted	3	2	2	4	1	5
Impacts to Drains/Sewers Greater than 5 ft. dia.	7	4	6	8	4	8
■ Major Utility Impacts						
Impacts to 54" water main	Yes	Yes	No	Yes	Yes	Yes
■ Traffic Impact on I-75 Gateway Project	NO	NO	NO	Plaza Ramps extend east of Clark Street	NO	NO
■ Traffic LOS						
HCS Analysis I-75 Mainline Freeway	LOS D or better	LOS D or better	LOS D or better	LOS D or better	LOS D or better	LOS D or better
SB I-75 Weaving Segments (PM Peak)						
Ambassador Bridge to Clark	D	D	D	N/A	D	D
Junction to Dragoon	N/A	N/A	N/A	C	N/A	N/A
Junction to Livernois	N/A	C	N/A	N/A	N/A	N/A
DRIC Plaza to Springwells	N/A	N/A	N/A	N/A	C	C
NB I-75 Weaving Segments (AM Peak)						
Springwells to DRIC Plaza	N/A	N/A	N/A	N/A	C	C
Livernois to Junction	N/A	C	N/A	N/A	N/A	N/A
Dragoon to Junction	N/A	N/A	N/A	C	N/A	N/A
Clark to Grand	C	C	C	N/A	C	C
Local Intersections	LOS B or better	LOS B or better	LOS B or better	LOS B or better	LOS B or better (NB Service Drive at West End and SB Service Drive at Clark LOS C)	LOS B or better (SB Service Drive at Clark LOS C)

Table 3.1-6 (continued)
Summary of Interchange Impacts
Detroit River International Crossing Study

Impact Category	Alternative #1/ Interchange A	Alternative #2/ Interchange B	Alternative #3/ Interchange C	Alternative #5/ Interchange E	Alternative #14/ Interchange G	Alternative #16/ Interchange I
Engineering Performance (continued)						
VISSIM Analysis I-75/I-96 Mainline Freeway	NB AM / SB PM	NB AM / SB PM	NB AM / SB PM	NB AM / SB PM	NB AM / SB PM	NB AM / SB PM
Gateway to I-75/I-96 Merge/Diverge	LOS F or better / C	LOS F or better / C	LOS F or better / C	LOS F or better / C	LOS F or better / LOS D or better	LOS F or better / LOS D or better
I-75/I-96 Merge/ Diverge to Clark	LOS E or better / C	LOS E or better / C	LOS F or better / C	F / C	LOS F or better / C	F / LOS D or better
Clark to Junction	LOS C or better / C	LOS D or better / C	LOS E or better / C	C / C	LOS C or better / C	LOS F or better / C
Junction to Waterman	LOS C or better / C	LOS C or better / C	LOS D or better / LOS B or better /	LOS C or better / C	LOS C or better / LOS C or better	LOS D or better / C
Waterman to Springwells	LOS C or better / LOS C or better	LOS C or better / LOS C or better	LOS C or better / LOS C or better	C / LOS C or better	LOS C or better / LOS C or better	LOS C or better / LOS C or better
Springwells to Dearborn	LOS C or better / LOS D or better	C / LOS D or better	C / LOS D or better	C / LOS D or better	C / LOS D or better	C / LOS D or better
Local Intersections	LOS C or better	LOS C or better	LOS C or better	LOS B or better	LOS C or better	LOS C or better
■ Maintenance of Traffic						
Work Zone Mobility	Medium Impacts	Medium Impacts	High Impacts - Additional Staging Required	Medium Impacts	Medium Impacts	Medium Impacts
Incident Management	Quicker emergency response times, more space for vehicles to pull over during an incident.	Quicker emergency response times, more space for vehicles to pull over during an incident.	Additional emergency response times required per incident. Isolation of Workers	Quicker emergency response times, more space for vehicles to pull over during an incident.	Quicker emergency response times, more space for vehicles to pull over during an incident.	Quicker emergency response times, more space for vehicles to pull over during an incident.
Constructability						
■ Transportation Management Plan	Options have similar impacts, as a result, TMP will not be a deciding factor					
	Lane closures adjacent to work zones in the median and outside lanes concurrently. Difficult access and limited laydown area.	Lane closures adjacent to work zones in the median and outside lanes concurrently. Difficult access and limited laydown area.	Improved contractor access over other alternatives. More room for the contractor to work.	Lane closures adjacent to work zones in the median and outside lanes concurrently. Difficult access and limited laydown area.	Lane closures adjacent to work zones in the median and outside lanes concurrently. Difficult access and limited laydown area.	Lane closures adjacent to work zones in the median and outside lanes concurrently. Difficult access and limited laydown area.
■ Availability of Materials	Medium amount of steel	High amount of steel	Lower amount of steel	Medium amount of steel	Lower amount of steel	Medium amount of steel
■ Complexity of Construction	Moderate to Difficult	Moderate to Difficult	Moderate to Difficult	Moderate to Difficult	Difficult	Moderate to Difficult. More Crossings to construct.
■ Contaminated Sites Affected (Total Commercial/Industrial Sites Affected-Acres)	4 Sites	4 Sites	4 Sites	3 Sites	4 Sites	6 Sites
Total Interchange Cost (Excluding Utilities) (From October 2007)	$193,000,000	$208,000,000	$187,000,000	$185,000,000	$140,000,000	$214,000,000

Eliminating Alternative #3/Interchange C and Alternative #5/Interchange E left interchange Alternatives #1/Interchange A, #2/Interchange B, #14/Interchange G, and #16/Interchange I. Additional engineering indicated that Alternatives #1, #2 and #16 could avoid the 4(f) Berwalt Manor property by decreasing the radius of the ramp from Plaza P-a to northbound I-75. The "tightened" curve is within design guidelines – no design exception is needed. Alternative #14 only required an adjustment of the right-of-way limit to avoid the Berwalt Manor. However, Alternative #14 required a 35 mph design speed compared to 45 mph for the other alternatives. The engineering adjustments which were considered to further address the Berwalt Manor building with Alternatives #1 and #16 include shifting the northbound service drive south toward Fort Street such that it would pass Berwalt Manor on the other side of the building from where it is today. Ramp A could then pass over the service drive earlier and start the down grade to I-75 earlier as it passes Berwalt Manor such that it would be near existing ground level with Alternatives #1, #14 and #16 (Figure 3.2-5). Shifting the service drive is allowable because it will ultimately be part of the local road system. This change would not cause capacity/congestion issues.

The relationship of the ramp from Plaza P-a to northbound I-75 would be different under Alternative #2. It would pass within about 20 feet of the building at the 2nd/3rd floor level. It would be this high because it must pass over the northbound service drive at this point.

Another key concern in evaluating Interchange Alternatives #1, #2, #14 and #16 was "protecting community/neighborhood cohesion," the second most-important evaluation factor to the DRIC technical teams. It is noted that Alternative #14 was introduced in the Value Planning process to evaluate whether a change in design speed would significantly reduce the physical impacts of the I-75 interchange or produce other geometric benefits. And, while Alternative #14 would close fewer pedestrian/bicycle crossings of I-75 than the three other alternatives (refer to Table 3.1-6), Alternative #14 would have no vehicular access across I-75 at any point between Waterman and Clark. Alternative #14 would not provide the same local roadway access to/from I-75 between Springwells and Clark as Alternatives #1, #2, and #16. Access to, from and across I-75 is considered significant based on input received at public meetings, business interviews, and comments received on the DEIS. So, Alternative #14's lesser vehicular access across I-75, and to it, is not aided by its lower ramp design speed. Therefore, it is a poorer candidate for selection as the Preferred Alternative.

In summary, because of the 4(f) impacts of Alternatives #3 and #5, and the fact there are feasible and prudent alternatives to avoid such impacts, these interchange alternatives were eliminated as candidates for the Preferred Alternative. Alternative #14/Interchange G was eliminated from further consideration as the Preferred Alternative because of unacceptable access affecting community/neighborhood cohesion and lower design speed. That left Alternatives #1/Interchange A, #2/Interchange B, and #16/Interchange I, or hybrids thereof, for further consideration.

3.2 Results of Engineering Review of Interchanges

Engineering Workshops were held on April 29 and May 1, 2008 to review the remaining interchanges[4] to determine if one alternative or elements of an alternative could be combined into a Preferred Alternative. The Workshop did not include the Plaza or Detroit River Bridge because these were common to the interchange alternatives remaining.

The agenda for the first workshop included a presentation on the project status and public input, including comments on the DEIS to date, followed by: 1) a review and analysis of the project elements; 2) speculation on improvements; and, 3) evaluation and recommendations. The second workshop involved a review of the engineering work of the first workshop to assist in identifying a preferred interchange configuration.

[4] *Detroit River International Crossing Study, Engineering Workshop Report*, May 2008.

Based on an analysis of the engineering issues associated with the remaining interchange alternatives, in combination with the public input received to date, five specific elements were identified for further analysis and evaluation at the workshops:

1. Local vehicular access to/from I-75
2. Local vehicular access across I-75
3. Springwells Interchange
4. Service Drive alignment at Berwalt Manor
5. Pedestrian access across I-75

After the morning review session on the first day, the workshop participants were divided into five work groups for evaluation of the project elements. Each workgroup examined:

- Key Stakeholders
- Constraints
- Key Issues
- Needs/Desires

The workgroups then developed concepts for addressing the key issues. Finally, each workgroup then developed design suggestions to be examined in subsequent engineering analyses and to be documented in the Final Engineering Report.

The results of each workgroup's deliberations are:

- Workgroup 1: Local Access to/from I-75 – The workgroup initially recommended Interchange A, with a full Springwells interchange added.

  After the workshop, engineering analysis of the proposed interchange revision showed that a full Springwells interchange would require design exceptions, including the weave distance between the southbound I-75 entrance ramp and Springwells exit ramp, among others. It was determined that there were insufficient grounds to suggest a design exception when there was a viable alternative that met the design criteria. Therefore, the group recommended a hybrid of Interchange B (local ramp weave section) on the north side of I-75 and Interchange A (local ramp braided section on the south side of I-75) as shown in Figure 3.2-1. This local ramp configuration allows the southbound I-75 plaza ramps to be shifted to the east and the Springwells ramps can be provided.

- Workgroup 2: Local Access Across I-75 – This issue was divided into two items: 1) emergency access at Clark and Junction for the police located in a major safety center on Fort Street; and, 2) local access across I-75 at Livernois/Dragoon. The workgroup recommended that a dedicated signal at a "public safety driveway" be provided to the northbound I-75 service drive tied into automatic "green phase" signals at the Clark/service drive intersection (Figure 3.2-3). This will provide access of the police station between Fort Street and the service drive in emergency situations. The workgroup also recommended closing the Dragoon Street bridge and maintaining the Livernois bridge as a two-way street (Figure 3.2-2). This option addresses the key community issues by discouraging truck traffic in Delray from using Dragoon to the north; two bridges are not justified by the traffic volumes.

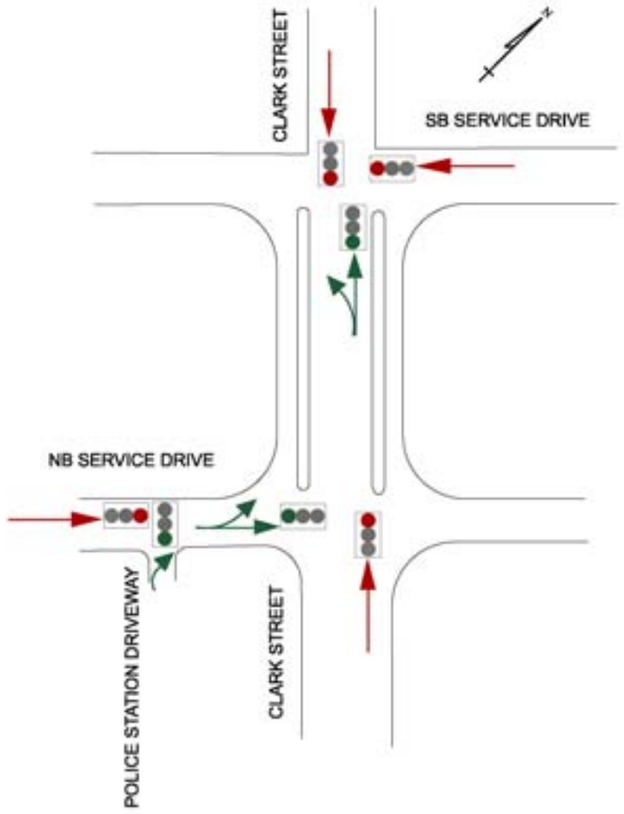
Figure 3.2-1
Proposed Hybrid Crossing System at Livernois/Dragoon
Detroit River International Crossing Study

Source: Parsons Transportation Group

Figure 3.2-2
Cross I-75 Access at Livernois/Dragoon
Detroit River International Crossing Study

Source: Parsons Transportation Group

Figure 3.2-3
Proposed Traffic Signal Phasing at Clark Street
Detroit River International Crossing Study

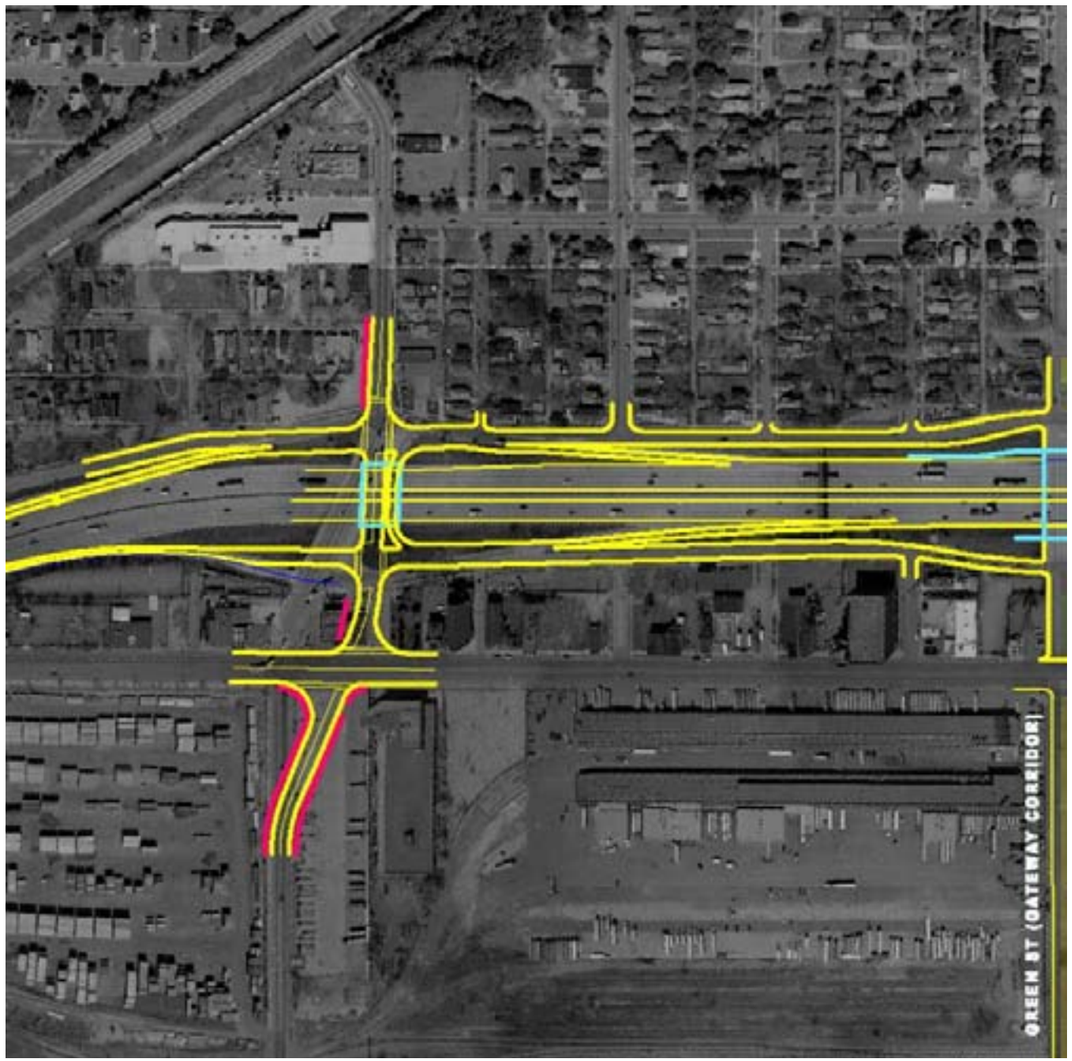


- Workgroup 3: Springwells Interchange – Originally, Interchanges A and B proposed to eliminate the east half of the Springwells interchange with I-75. This workgroup further examined that proposal. In turn, it recommended providing a full urban diamond interchange at Springwells including realignment of Springwells (Figure 3.2-4), similar to Interchange I, but tighten the diamond. Incorporating this element into Interchanges A and B would reduce potential property acquisition, from Interchange I, while it would: 1) maintain existing street and traffic patterns in the northwest quadrant of the interchange; 2) improve the I-75/I-96 ramp function due to traffic accessing northbound I-75 to I-96 weaving sooner; 3) provide for improved geometrics and safety; and, 4) provide full commercial and community access.

- Workgroup 4: Service Drive Alignment at Berwalt Manor Building – Evaluation and analysis of interchange alternatives in the Draft Environmental Impact Statement (DEIS) indicated that the Berwalt Manor Building is eligible for the *National Register of Historic Places.* According to Section 4(f), this structure could not be "used" (i.e., removed) if there were a feasible and prudent alternative. Therefore, the interchanges were re-examined and modifications developed which avoided "use" of the building. The workgroup examined these modifications and recommended Interchange A (Figure 3.2-5) which would place Ramp A to northbound I-75 at grade near the Berwalt Building and shift the I-75 service drive to the south, behind the building. However, further evaluation was needed to determine whether the I-75 service drive should be terminated or shifted near Cavalry Street to avoid the Berwalt Manor, see Section 4 for analysis.

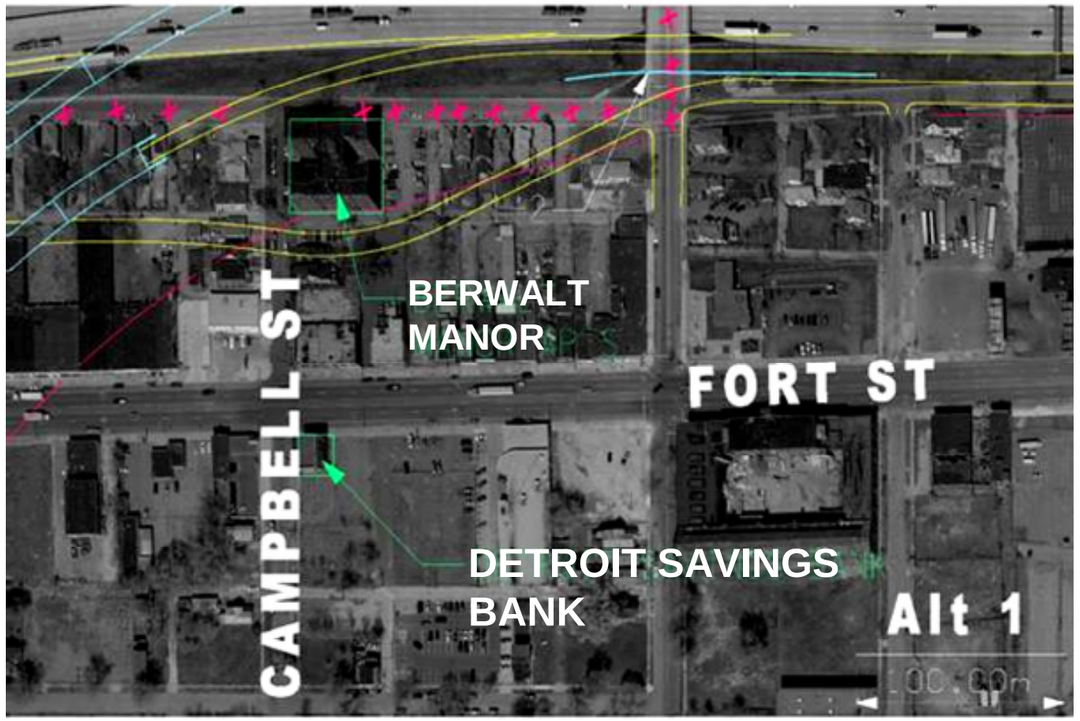
- Workgroup 5: Pedestrian Access Across I-75 – Each of the original interchanges significantly reduced pedestrian access across I-75. (Refer to Table 3.1-6.) This workgroup re-examined that condition and recommended pedestrian crossings be incorporated into the final interchange's design at Waterman, Solvay, Beard, Ferdinand, and Junction (Figure 3.2-6).

Figure 3.2-4
Full Urban Diamond Interchange at Springwells
Detroit River International Crossing Study



Source: Parsons Transportation Group

Figure 3.2-5
Interchange A Modified at Berwalt Manor Building
Detroit River International Crossing Study



Source: Parsons Transportation Group

Figure 3.2-6
Pedestrian Access Across I-75
Detroit River International Crossing Study

Source: Parsons Transportation Group

3.2.1 Interchange Conclusions

The following conclusions were reached based on the workshops of the interchanges:

- Include local northbound braided ramps between the service drives and I-75
- Include local southbound ramps to/from I-75 with a weave section on I-75
- Include a full urban-diamond interchange and realignment at Springwells Avenue
- Modify signalization at Clark for emergency access
- Provide five pedestrian crossings of I-75
- Make additional modifications of ramp/service drive at Berwalt Manor

Based on this analysis, a "hybrid" interchange was developed (Figure 3.2-7) combining the best elements of each. The hybrid interchange provides five pedestrians crossings of I-75, compared to five today; four vehicular crossings of I-75, compared to seven today; a, complete interchange access at Springwells Avenue and Clark Street, and local access mid-corridor.

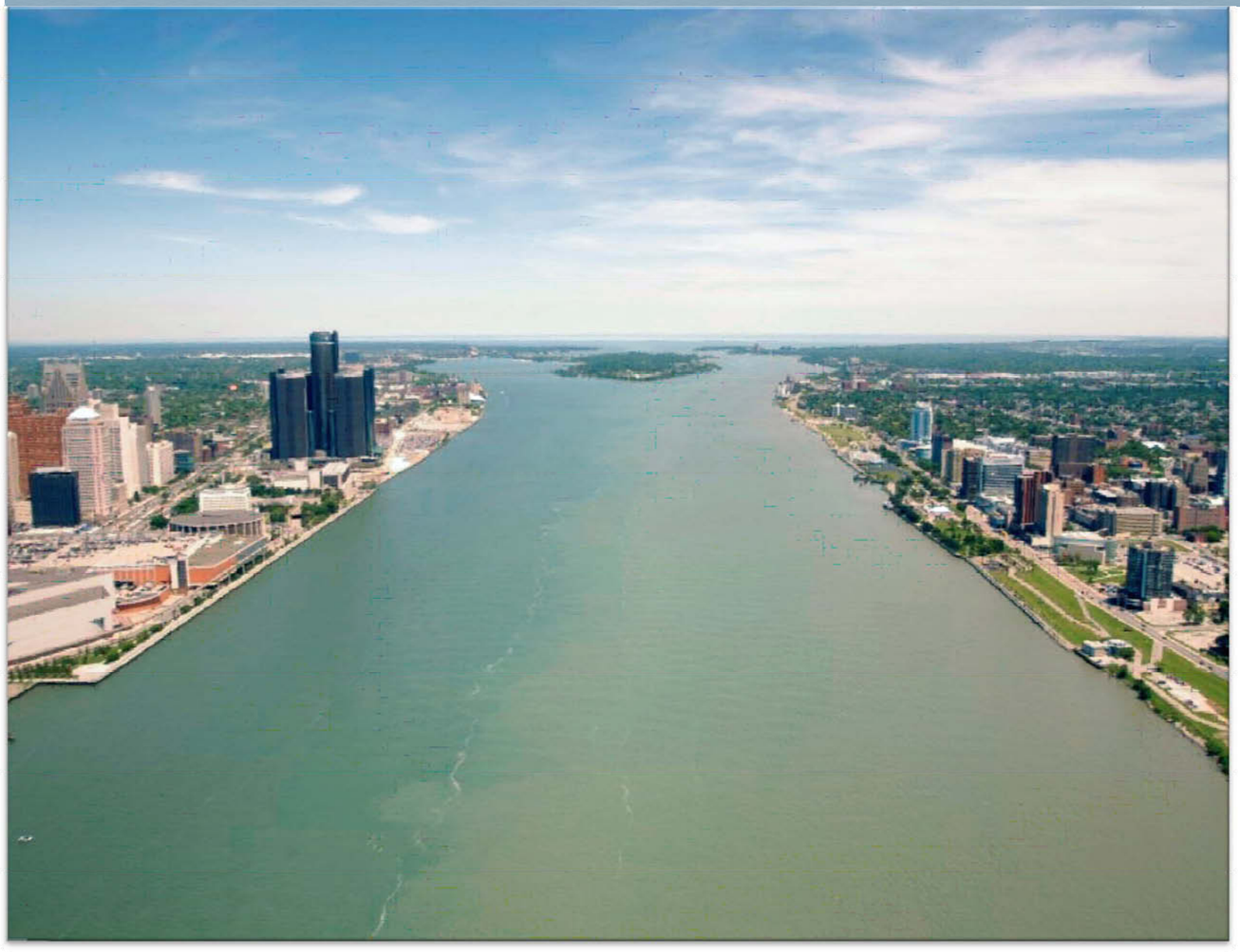
It was also the consensus of the workshop participants to conduct additional engineering in these areas:

- Examine the avoidance of Berwalt Manor and the continuous service drive northbound from Springwells Street to Clark Street
- Vacate Dragoon Street south of Fort Street

3.2.~~1~~2 Preferred Alternative Conclusions

Therefore, based on the analysis presented in this section the Preferred Alternative consists of a Hybrid Interchange, Crossing X-10(B) – with either a cable-stay or suspension bridge type – and, Plaza P-a.

Figure 3.2-7
Hybrid Alternative

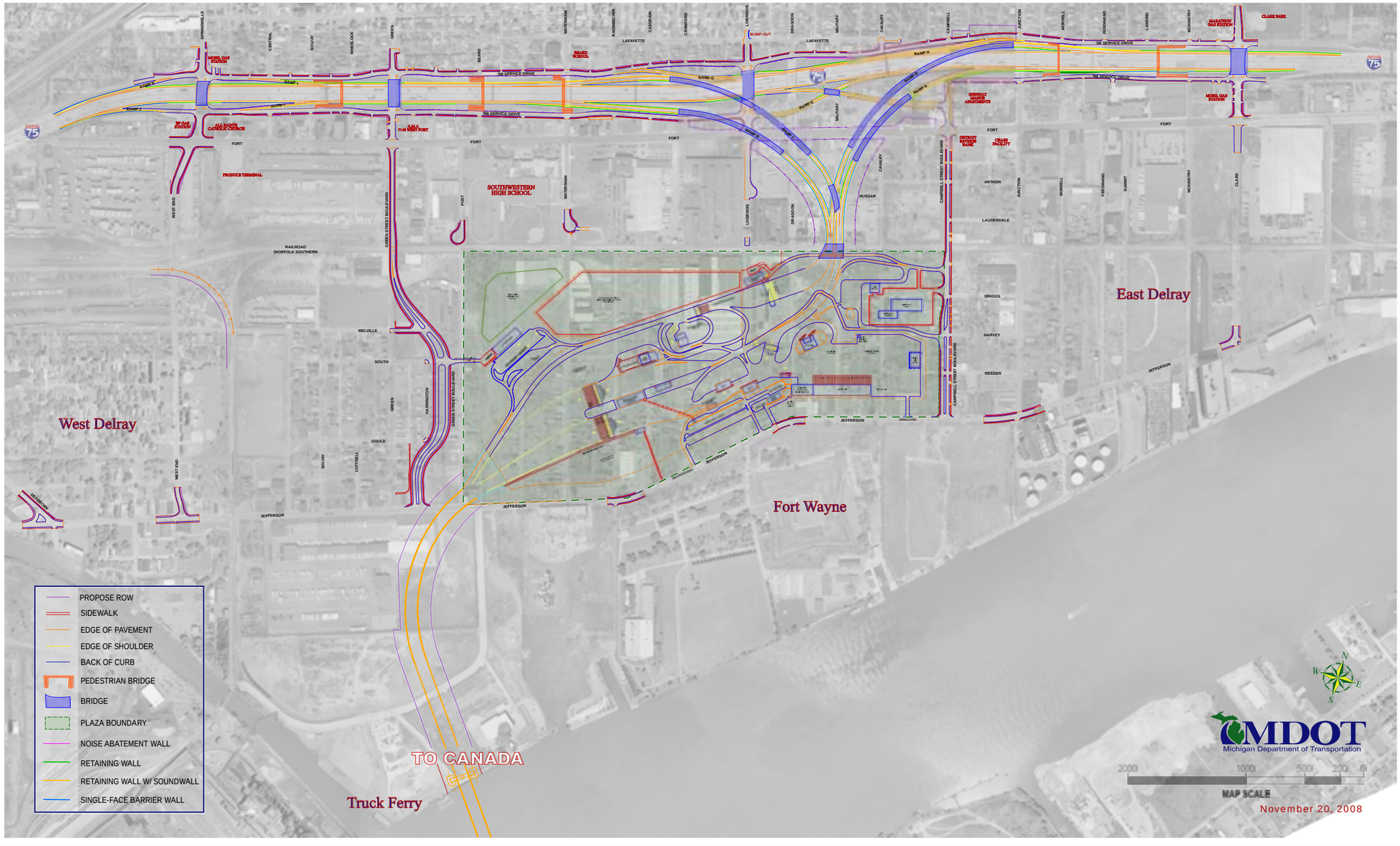


4. PREFERRED ALTERNATIVE DEVELOPMENT

4.0 PREFERRED ALTERNATIVE DEVELOPMENT

Figure 4.0-1 shows the Preferred Alternative, which is described in detail, in this Section. Detailed plans including typical sections, horizontal and vertical alignments, conceptual signing and bridge structural studies are contained in the unbound Appendices.

Figure 4.0-1
DRIC Preferred Alternative



4.1 Design Criteria

The comprehensive design criteria for the roadways and bridges are presented in Appendix A. Aesthetic criteria developed as part of the Context Sensitive Solutions process is also included in this information.

4.2 Preferred Alternative Interchange Details

The Preferred Alternative is a hybrid combination of the most desirable elements of Alternatives 1, 2, and 16, along with other desired elements which were identified through stakeholder reviews. Following is a detailed description of the features of this alternative.

Although I-75 is a north-south interstate within the project limits it is generally running east-west. So for the purposes of the Engineering Report directional references will use the project orientation. Direct references to I-75 will refer to northbound and southbound.

4.2.1 Preferred Alignment Interchange and Local Roads Overview

I-75 Corridor

The limits of work within the I-75 corridor are from the Fort Street Bridge (S06 of 82194), approximately 1,300 feet southwest of Springwells Street, to approximately 600 feet northeast of Clark Street.

The freeway was reconstructed in 1998 following MDOT metric standards for both design and construction. As a result, four 11'-10" (3.6 m) lanes exist in each direction. The existing design speed is 60 MPH and meets 50 MPH for some vertical alignments, as discussed in Section 4.3.1, Engineering Design Speed Study.

At present there are full interchanges at Springwells Street, Livernois Avenue/Dragoon Street, and Clark Street. Each of these is called an urban "diamond" interchange because, in aerial view, the closely spaced ramps form a diamond. Two ramps are oriented to southbound I-75 and two to northbound I-75 at each interchange. At Livernois/Dragoon the diamond is "split" because Livernois and Dragoon are currently one-way streets one block apart (Figure 4.2-3).

The I-75 mainline is not proposed to be reconstructed, with the exception of the outside shoulders. The outside shoulders are to be removed, and the reconfigured Service Drive ramps and the new plaza ramps are to be constructed adjacent to the mainline lanes. It must be understood that a design exception for the interim operations will be necessary until I-75 is reconstructed. If the design exception is not desired, then reconstruction of I-75 to current standards could be performed as part of this project.

I-75 median and inside shoulder work will also be required, to remove and construct piers for bridges. Pavement design has not been completed as part of this preliminary study. Pavement design will be included as part of the final design. The use of concrete or asphalt pavement will be determined as part of MDOT's Life Cycle Cost Analysis.

The proposed design will accommodate reconstruction of I-75 mainline to current standards in the future, not part of the DRIC project. Future design and construction allowing for 12 foot lanes and a 60 MPH design speed are accommodated by the DRIC construction by slightly increasing reconstructed shoulder width as shown in Figure 4.2-1, and by increasing the underclearance of the proposed crossover I-75 bridges by up to six inches.

Local Road Interchanges and Access

I-75 cross road bridges at Waterman, Dragoon, and Junction Streets are to be removed and not replaced. I-75 cross road bridges at Springwells Street, Green Street, Livernois Avenue, and Clark Street are to be removed and replaced. Springwells Street and Clark Street bridges will be constructed part width, and Green Street and Livernois Avenue bridges will be closed during construction, with traffic detoured. The reconstructed bridges will use either spread or side-by-side prestressed concrete box beams (as described in the individual structure studies).

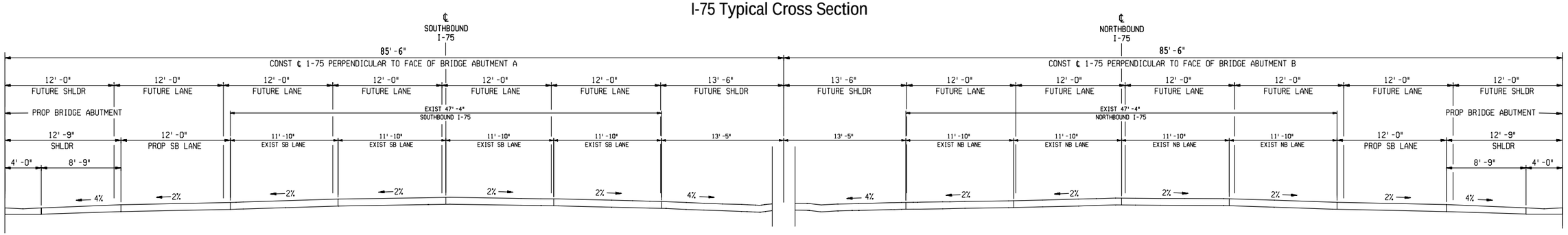
New pedestrian bridges will replace the existing pedestrian bridges at Solvay Street, Beard Street, Waterman Street, Morrell Street, and McKinstry Street. All existing pedestrian bridges will be removed.

Springwells – This interchange will be straightened out to improve traffic operations and safety, but the ramps will remain essentially as they are today. Westend Street is to be realigned south of Fort Street, to make the bridge crossing nearly 90 degrees over the freeway. Fort Street will be raised approximately six inches at Springwells Street. It is not anticipated that any Fort Street underground utilities would need to be relocated, except due to the Springwells Street realignment. An internal MDOT design exception will be required for the acceleration and deceleration lengths for two of the Springwells ramps, however, these meet AASHTO guidelines.

Livernois/Dragoon – The new DRIC interchange (plaza ramps to/from I-75) will cause removal of one-half the Livernois/Dragoon interchange, as well as the Dragoon Street Bridge (Figures 4.2-3 and 4.2-4). As a result, the following modifications will be made to the existing interchange:

1) Livernois Avenue will be converted to a two-way street from Lafayette Boulevard to the Norfolk Southern (NS) railroad.
2) The northbound exit to Livernois Avenue will be removed while the northbound entrance from Dragoon Street

Figure 4.2-1
I-75 Typical Cross Section



will remain close to its current location. With Dragoon closed, this ramp will instead serve as the entrance from Livernois to NB I-75. The southbound exit to Livernois Avenue from I-75 is shifted west to Rademacher Street and the southbound entrance to I-75 is eliminated.

3) Dragoon Street will be abandoned and vacated from the Southbound Service Drive to Jefferson Avenue.

Clark – With the introduction of the DRIC plaza interchange, the east side of the Clark Street interchange will be just as it is today. The west side of the interchange will operate like it does today, but it will be shifted further west to approximately Junction Street (Figure 4.2-5). That is, it will become a "split" interchange like Livernois/Dragoon is now, but with several blocks in the middle. This means potential additional neighborhood traffic may use the southbound Service Drive between Clark and Junction to get on I-75, but in the future, traffic projections indicate there will be less overall traffic using this Service Drive once the DRIC project is constructed.

I-75 Service Drives

The I-75 Service Drives are to be reconstructed from west of Springwells Street to east of Clark Street, to facilitate ramp reconfigurations, I-75 cross bridges, the new plaza interchange, and retaining wall construction. These will be along the same alignment, except near proposed pedestrian bridges and in the plaza interchange, where they will move away from the freeway. The vertical alignments are in general, approximately 2 feet higher at the roads that cross I-75 and at existing grade a short distance away from these crossroads.

Southbound I-75 Service Drive – While the Clark Street to southbound I-75 entrance ramp will be shifted west, the Dragoon Street off ramp from southbound I-75 will be removed. It will be replaced by an off ramp beyond Livernois Avenue that connects to the Service Drive near Casgrain Street (Figures 4.2-2 and 4.2-3). This means trucks now exiting I-75 at Dragoon to use Dragoon Street will likely be unable to do so. Trucks can exit past Livernois Avenue, but they would have to travel down the Service Drive to Springwells Street, which would be additional travel time. Instead they would likely exit directly at Springwells Street.

Northbound I-75 Service Drive – The Livernois Avenue off ramp from northbound I-75 will be removed. It will be replaced by an off ramp beyond Livernois Avenue that connects to Campbell Street (Figures 4.2-2 and 4.2-3). This new ramp also acts as the exit ramp to Fort Street and Clark Street. This means trucks now getting off I-75 and going east on the Service Drive to Dragoon Street will not be able to do so. Due to the Berwalt Manor Apartment mitigation (Section 4.3.2), the northbound Service Drive will end at Livernois Avenue, where the Livernois to I-75 entrance ramp is to be located. Service Drive traffic will be routed along Campbell Street, to Fort Street, where they can proceed to either Junction Street or Clark Street. The Service Drive will begin at the I-75 exit ramp at Campbell Street, however, only passenger vehicles will be allowed to turn left on Campbell Street to the Service Drive, due to a constrained roadway between the Berwalt Manor and Plaza Ramp. Commercial traffic will be routed to Fort Street and Junction Street to access the remaining portion of the northbound Service Drive.

Plaza Interchange and Access

The new interchange will carry traffic going to and from Canada only. All the traffic to and from Canada, connecting with I-75, will use these ramps. Local traffic will not be able to access the plaza via either the Service Drives or other local streets, and similarly, international traffic will have access to I-75, and not the Service Drives or local streets unless via I-75.

The DRIC Plaza Ramps will bring further changes, but will not generate large amounts of truck traffic back to the neighborhood north of I-75, nor to the southbound Service Drive because of the following:

1) the Gateway Project;
2) the new DRIC bridge has direct ramps with I-75. The trucks will use those ramps; and
3) closing of the Livernois/Dragoon interchange will substantially reduce truck use of these one-way streets through Southwest Detroit.

Local traffic to and from the Plaza will access via Campbell Street just south of the NS railroad tracks. Campbell Street is proposed to be reconstructed from I-75 to the railroad tracks adjacent to the plaza. It is intended to be reconstructed and widened to a four-lane boulevard from the railroad tracks to Jefferson Avenue.

Local Road Improvements

In addition to improvements to Campbell Street, Green Street is also to be reconstructed from Lafayette Boulevard to the NS railroad tracks, and a new roadway, Gateway Boulevard is to be constructed as a four-lane boulevard from the railroad tracks to Jefferson Avenue. Green Street will widen to the east from Fort Street to the railroad tracks, then shift toward Post Street, and then back near Harrington Street at Jefferson Avenue. As a result of this realignment, Post Street will be closed from the tracks to Jefferson Avenue, and Harrington Street will be closed from Gould Street to Jefferson Avenue.

Jefferson Avenue is to be milled and overlaid from southwest of Dearborn Street to Clark Street. Intersections radii are to be increased to facilitate truck traffic at Jefferson Avenue intersections with Dearborn, Westend, Rademacher, Dragoon, Junction, and Clark Streets. It is possible that overhead utility and underground utilities at these intersections will need to be relocated. Jefferson Avenue is also proposed to be re-stripped to include bike lanes between Dearborn Street and Clark Street, and for three lanes at major intersections. Clark Street is also proposed to be restriped to add bike lanes. The restriping can be performed within the current roadway widths without widening.

All local streets that remain between Leigh Street in West Delray and Clark Street south of Fort Street to Jefferson Avenue are proposed to be milled and overlaid due to the redistribution of traffic in the neighborhood due to the construction of the Plaza. Sidewalk ramp upgrades will be required at all rehabilitated street locations.

Figure 4.2-2
I-75 (Springwells to Beard)

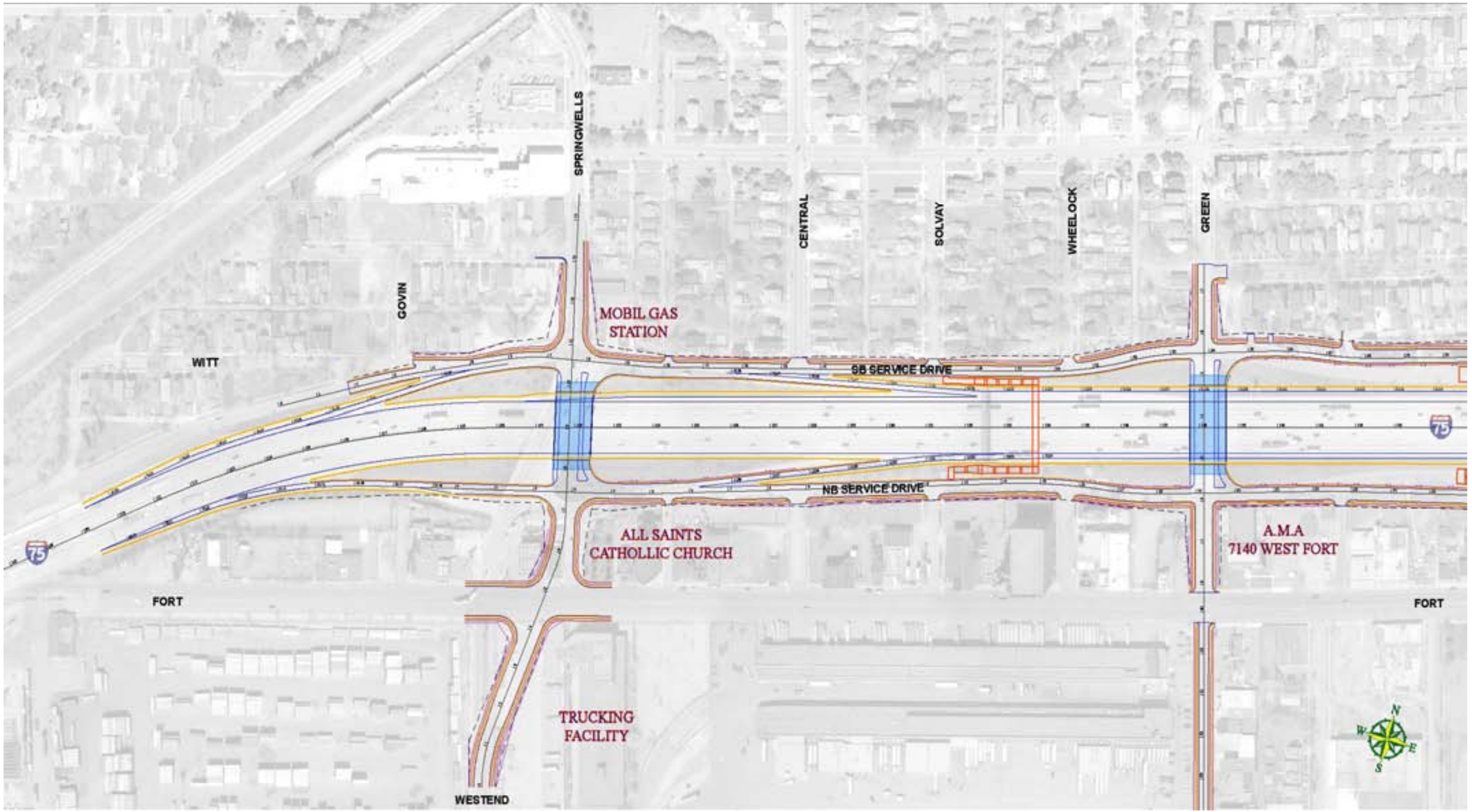


Figure 4.2-3
I-75 (Beard to Cavalry)

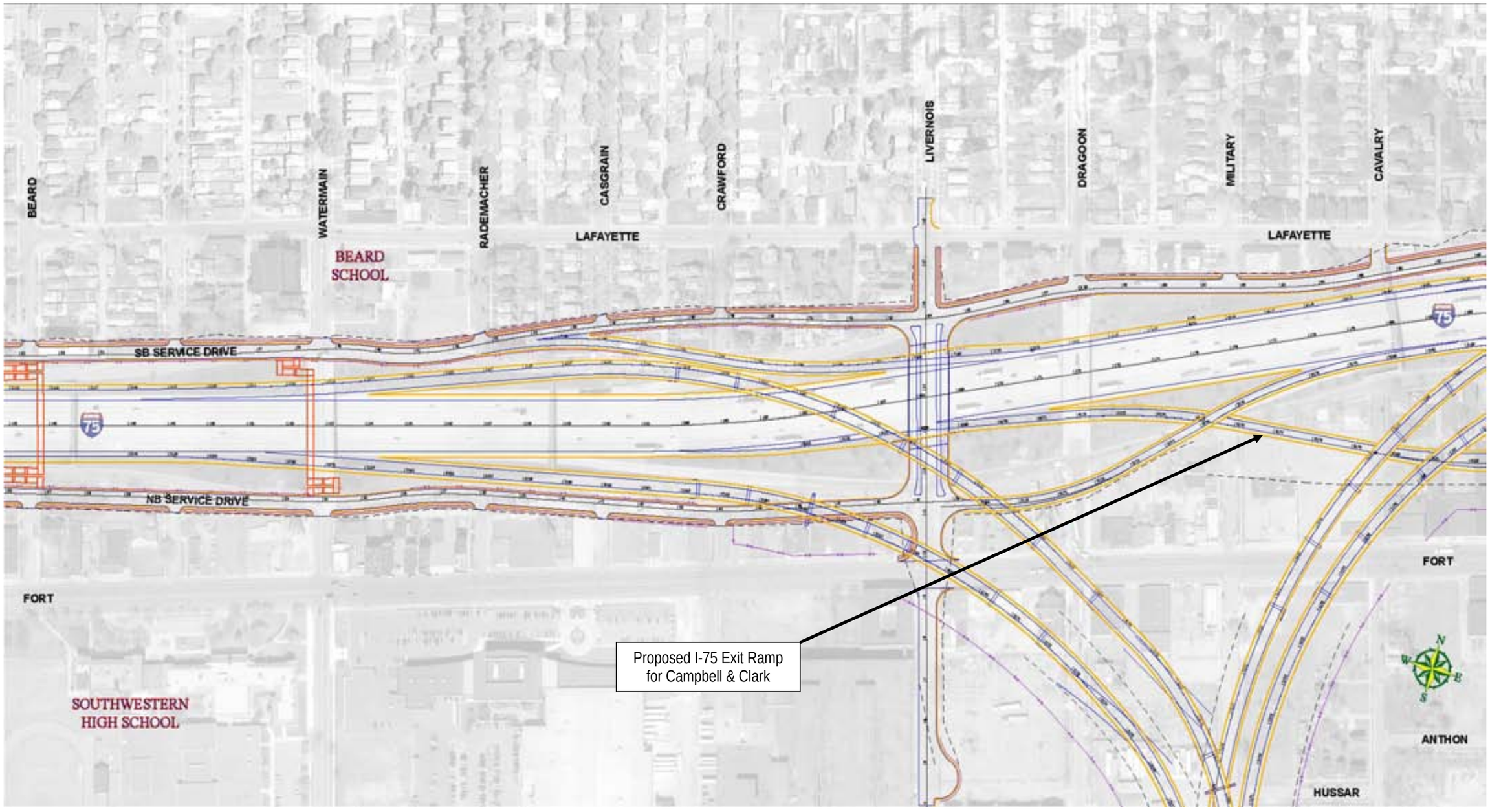
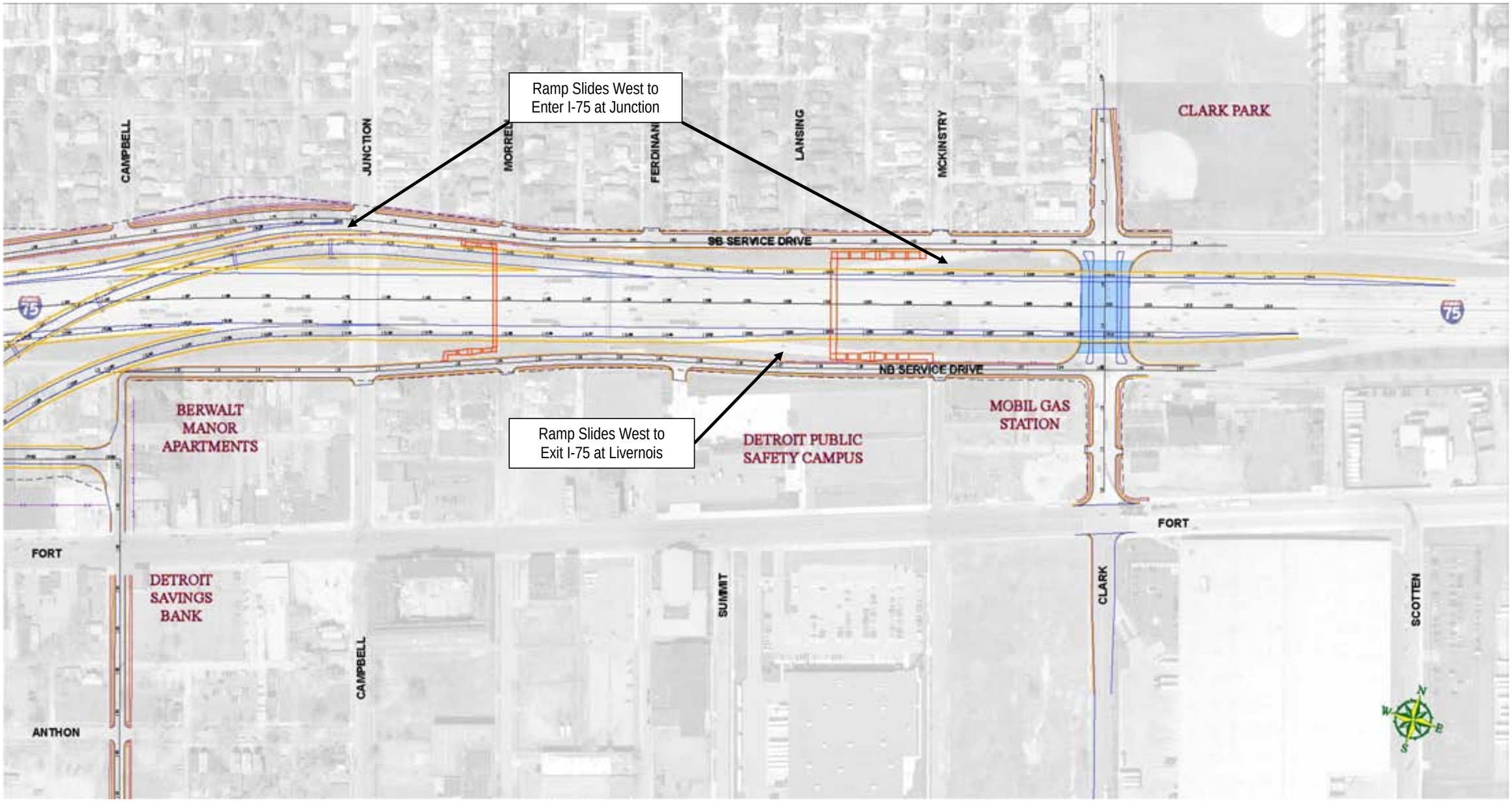


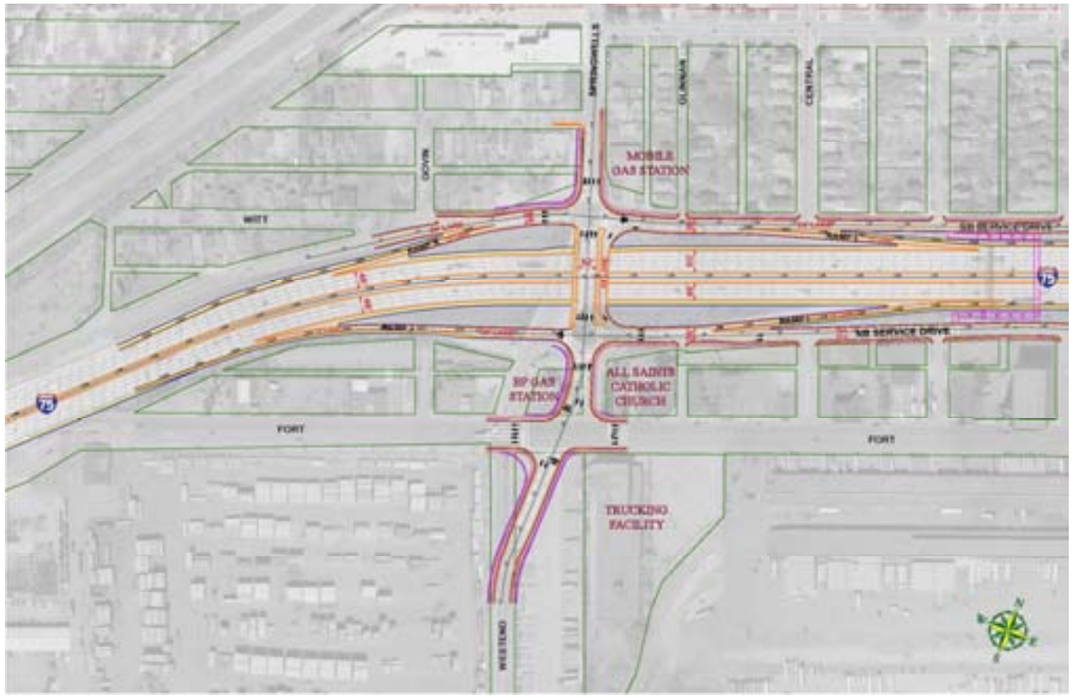
Figure 4.2-4
I-75 (East of Cavalry to Clark)



4.2.2 Preferred Alternative Interchange and Local Roads Detailed Description

4.2.2.1 Springwells Interchange

Figure 4.2-5
I-75/Springwells Street Interchange



As shown in Figure 4.2-4, the I-75/Springwells Street interchange is proposed as an urban diamond interchange.

Springwells Street is to be realigned to provide nearly a 90-degree crossing angle over I-75, to improve safety and to better facilitate truck movements at Fort Street and through the interchange. Four 12 foot lanes, two in each direction, will be provided from south of Fort Street to north of the southbound Service Drive, with appropriate transitions that will connect to the existing 40 foot wide road to the south of Fort Street, and the existing 36 foot wide road to the north of the southbound Service Drive.

The posted speed on Springwells Street is 25 MPH, and the design speed is 30 MPH. The radii used for the realignment of Springwells Street is 350 feet, without superelevation, per AASHTO's "A Policy on Geometric Design of Highways and Streets-2004 Edition" (Green Book), exhibit 3-16, Minimum Radii and Superelevation for Low Speed Urban Streets. Intersections have been designed in accordance with MDOT Geometric Design Guide VII-650-C and AutoTURN, using a WB-62 Truck to estimate minimum curb return radii, as shown in the conceptual road design plans.

A southbound to northbound Service Drive connector is to be provided as part of the bridge replacement. The connector is designed to meet the standards as identified in MDOT Geometric Design Guide VII-400-A.

The proposed interchange ramps are urban in nature, with 12 foot lane widths, no inside shoulders, and 5 foot outside shoulders. Curb and gutter is proposed adjacent to the inside lane and outside shoulders. This typical section is consistent with the MDOT Road Design Manual, and closely matches the current condition.

The lengths of the interchange ramps are laid out to avoid impacts to the I-75 bridge over Fort Street (S06 of 82194), and to allow for adequate auxiliary lane distances between the northbound I-75 plaza exit ramp (Ramp B), and the southbound I-75 plaza entrance ramp (Ramp C). As currently designed, Ramp J, the northbound I-75 exit ramp to Springwells Street, and Ramp K, the southbound I-75 entrance ramp from Springwells Street, meet AASHTO Green Book standards for acceleration and deceleration length, however, these ramps do not meet lengths specified in the MDOT geometric design guides. As a result, a Design Exception will be required for these ramps from MDOT only. These ramps meet all FHWA requirements. If MDOT would like these ramps to meet their current design requirements, the widening and possibly the replacement of the I-75 bridge over Fort Street (S06 of 82194) would need to be included with the DRIC project.

Ramp I, the northbound I-75 entrance ramp from Springwells Street, and Ramp L, the southbound I-75 to Springwells Street exit ramp meet MDOT Geometric Design Criteria GEO-202-B for urban entrance and exit slip ramps.

Access has been maintained to the northwest quadrant of the interchange, where the southbound Service Drive extends to the Witt Street/Govin Street intersection.

The vertical profile of the crossroad bridge will be approximately two feet higher than the existing bridge. This is due to providing additional clearance under the bridge to account for future reconstruction of I-75, the minimum 14'-9" underclearance required, and the proposed bridge superstructure depth, including a 2.0% cross slope on the bridge deck.

The grade raise at the crossroad bridge will require the Service Drive at this location to be raised approximately 2 feet. In addition, Fort Street at Springwells Street will need to be raised approximately 6 inches. As a result of the grade raise and the Springwells Street realignment, additional frontage right-of-way will be required at the northeast and northwest quadrants of the interchange, as shown in the conceptual plans. Driveway permits will be required from the Mobil Gas Station on the northeast quadrant. Significant amounts of right-of-way are required from the trucking facility at the southeast quadrant of Fort Street and Westend Street, and the British Petroleum Gas Station will need to be acquired at the northeast quadrant of Fort Street and Springwells Street.

Relocated Springwells Street will be aligned along an alley just to the northeast of Springwells. A driveway to All Saints Catholic Church exists off of this alley. The garage adjacent to this driveway has been permanently blocked by a cinderblock wall. Because of the grade raise, access to this driveway will need to be eliminated. This is not expected to be an issue but will still require a consent to close drive. There are no other impacts to the All Saints Catholic Church expected due to this project.

4.2.2.2 Plaza Ramp Interchange

Figure 4.2-6
I-75 at the DRIC Plaza Interchange

As shown in Figure 4.2-5, the I-75/DRIC Plaza Interchange is proposed as a three-level trumpet interchange. I-75 is at the bottom level, the crossroad bridges and the Service Drives are at the middle level, and the Plaza Ramp bridges are at the highest level. Based on this configuration of the plaza interchange, Waterman Street and Junction Street Bridges need to be removed and cannot be replaced, due to vertical alignment conflicts with these crossroads.

The traffic analysis has indicated that the Plaza Ramps are to consist of two 12-foot wide lanes. Since these ramps will have a barrier railing, the inside shoulder clear width is 8 feet wide (consisting of a 4 foot shoulder and 4 foot valley gutter) and the outside shoulder clear width is 10 feet wide (consisting of a 6 foot shoulder and a 4 foot valley gutter.) These widths are 2 feet larger than the normal shoulder width because they include a 2 foot shy distance from the barrier. All the Plaza interchange ramps have a maximum vertical grade of 5%, and a maximum superelevation rate of 5%.

Ramp A is the northbound I-75 entrance ramp from the Plaza. This ramp has a design speed of 40 MPH. The design speed was reduced to account for mitigation of impacts to the Berwalt Manor building. This ramp is bridged over the Plaza local access roadway and the NS railroad tracks adjacent to the Plaza, graded with retaining wall as needed just north of the NS railroad tracks to Fort Street, bridged over Fort Street and Ramp F, then graded with retaining wall as needed to the freeway. Ramp A merges with northbound I-75 in accordance with MDOT Geometric Design Guide GEO-110-C, Case IV, two lane entrance ramps with freeway lanes increased by one after the gore. The outside acceleration lane is dropped after a 660 foot parallel section, and the additional freeway ramp acceleration lane is dropped after another 900 feet and ends just east of Clark Street, per the AASHTO Green Book, page 857. Retaining wall or barrier wall is required along the acceleration lanes, due to the grade differential caused by the ramp placement between I-75 and the northbound Service Drive.

Ramp B is the northbound I-75 exit ramp to the Plaza. The ramp design speed is 45 MPH. The deceleration lane and gore for this ramp is designed in accordance with MDOT Geometric Design Guide VII-240-A, Case II. The deceleration lane ties into the Springwells interchange Ramp I acceleration lane, creating a northbound auxiliary lane, a distance of 1,850 feet between the two foot gore points of each ramp. Retaining wall or barrier wall is required adjacent to the auxiliary lane, due to the grade differential caused by the ramp placement between I-75 and the northbound Service Drive. The ramp is bridged over the northbound Service Drive, Livernois Avenue and Fort Street, is graded with retaining wall as needed from Fort Street to just north of the railroad tracks, and is bridged over the NS railroad tracks and the Plaza local access roadway.

Ramp C is the southbound I-75 entrance ramp from the Plaza. Ramp C design speed is 45 MPH. Ramp C is bridged over the Plaza local access roadway and the NS railroad tracks along with Ramp A, is graded with retaining walls a short distance, then separates from Ramp A as a bridge over Ramp D, Fort Street, Ramp E, Livernois Avenue, and I-75. Ramp C is then graded with retaining walls to the southbound I-75 gore point. Ramp C merges with southbound I-75 in accordance with MDOT Geometric Design Guide GEO-110-C, Case IV, two lane entrance ramps with freeway lanes increased by one after the gore. The outside acceleration lane is dropped after a 1,600 foot parallel section as Ramp L at the Springwells interchange. The additional freeway ramp acceleration lane is dropped after another 900 feet and ends just southwest of Springwells Street, per AASHTO Green Book, page 857. Retaining wall or barrier wall is required along the acceleration lanes, due to the grade differential caused by the ramp placement between I-75 and the southbound Service Drive.

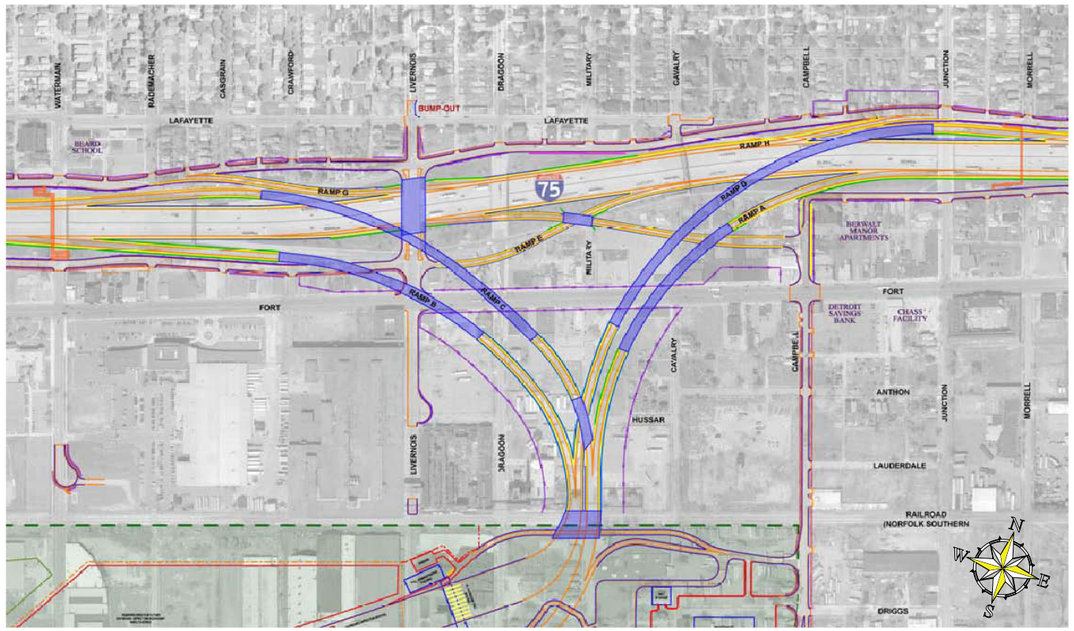
Ramp D is the southbound I-75 exit ramp to the Plaza. Ramp D design speed is 45 MPH. The deceleration lane and gore for this ramp is designed in accordance with MDOT Geometric Design Guide VII-240-A, Case II. The deceleration lane is 1,500 feet and begins east of Clark Street. Retaining wall or barrier wall is required adjacent to the auxiliary lane, due to the grade differential caused by the ramp placement between I-75 and the northbound Service Drive. The ramp is bridged over the I-75, Ramp E, Ramp F, and Fort Street, is graded with retaining wall as needed from Fort Street to the NS railroad, and is bridged over the railroad and the Plaza local access roadway.

The design intent for the Plaza Ramps is to provide access to the Plaza, meet MDOT and FHWA Design Criteria, and minimize right-of-way impacts. Because of the configuration of the interchange, all property between Livernois Street, Campbell Street, I-75 and Fort Street must be acquired for this project. In addition, most property between Fort Street, the NS railroad, Livernois Avenue, and Cavalry Street must be acquired. Military Street and Dragoon Street from the northbound I-75 Service Drive to the proposed Plaza will be abandoned and vacated. Hussar Street from Livernois Avenue to Cavalry Street will also be abandoned and vacated. In addition, lots fronting the southbound Service Drive in the vicinity of Ramps C and D will be impacted by the footprint of the interchange and need to be acquired. Many of these sites are industrial, and the potential for hazardous material excavations are noted elsewhere in this document.

Significant redesign of Ramps A and D has been performed to mitigate initial impacts to the Berwalt Manor Apartments. The mitigation study and the recommendations are noted in Section 4.3.2. In addition, redesign of Ramp C and the southbound service drive have been performed to mitigate impacts to the Beard School.

4.2.2.3 Mid Corridor Local Access Interchange

Figure 4.2-7
I-75 at the Mid Corridor Service Drives Access Interchange



As shown in Figure 4.2-7, inside of the Plaza interchange, I-75 entrance and exit ramps to local roads exist. Ramp F, the northbound I-75 exit ramp to Campbell Street and Ramp H, the southbound I-75 entrance ramp from the southbound Service Drive and Clark Street, represent the split diamond portion of the Clark Street interchange. Ramp E, the northbound I-75 entrance ramp from the northbound Service Drive and Livernois Avenue, and Ramp G, the southbound I-75 exit ramp to the southbound Service Drive and Green Street represent the ½ interchange that remains of the original Livernois Avenue/Dragoon Street interchange.

Traveling northbound on I-75, Ramps E and F are arranged in a braided ramp configuration. Traveling southbound on I-75, Ramps G and H are arranged in a weave/merge configuration. This configuration for the Preferred Alternative is based on recommendations from the Engineering Workshop held on April 29, 2008 and May 1, 2008, as described in Section 3.2 of this document. Advantages of this configuration include:

1) Discourages truck traffic from using Dragoon Street to access the Detroit Intermodal Facility Terminal (DIFT).
2) Northbound exit to Campbell Street, a direct route to Jefferson Avenue, the Plaza local access roadway, and Fort Wayne.
3) Southbound exit to Green Street, a direct route to Jefferson Avenue and Fort Wayne.

All mid-corridor ramps have 16 foot lane widths, 6 foot inside shoulders (8 if next to a barrier wall or retaining wall), and 8 foot outside shoulders (10 if next to a barrier wall or retaining wall). These ramps also have a maximum vertical grade of 5%, and a maximum superelevation rate of 5%.

Ramp E has a design speed of 30 MPH just east of Livernois Avenue at the beginning of the ramp, then increases to 40 MPH at the ramp terminal adjacent to I-75. This modification of design speed is due to matching the 3% grade at Livernois Avenue, then transitioning this grade over a short distance around the first curve. Ramp E merges with northbound I-75 in accordance with MDOT Geometric Design Guide GEO-110-C, Case I.

Ramp F diverges from northbound I-75 in accordance with MDOT Geometric Design Guide VII-205. The design speed of Ramp F is 35 MPH.

Ramp F traverses under Ramp E. At the crossing, retaining wall and a three sided precast structure will be utilized, as shown in the structural study. At other locations, side slopes will be graded at 1:4 slopes. Ramp F will be lowered approximately 11 feet below the existing elevation of I-75, which will impact all utilities crossing at this location, including a 7 foot by 5 foot concrete box combined sewer. Utility impacts are addressed in Section 4.7.

Ramp F terminates at Campbell Street. At the ramp termini, the width of the ramp widens from 16 feet to 36 feet. Two right turn lanes and one left turn lane are provided at Campbell Street. Commercial traffic will be directed to take a right turn onto Campbell Street to Fort Street, due to the discontinuity of the Service Drive. No commercial traffic will be allowed to take a left turn onto Campbell Street, due to the tight radius adjacent to Berwalt Manor where Campbell Street converts back into the northbound Service Drive. Only local or passenger vehicles will be allowed to make this one-way movement. A paved shoulder and a roll curb will be provided around the Campbell Street/northbound Service Drive intersection to allow for emergency vehicle access around the corner adjacent to the Berwalt Manor Apartments.

Limited access right-of-way is required along both sides of Campbell Street from the curb returns of the ramp termini, to 100 feet beyond the curb returns. This is shown in the conceptual plans for the project. The fence on the east side of Campbell Street will extend from the corner of the Berwalt Building and will need to be consistent with Secretary of the Interior Standards.

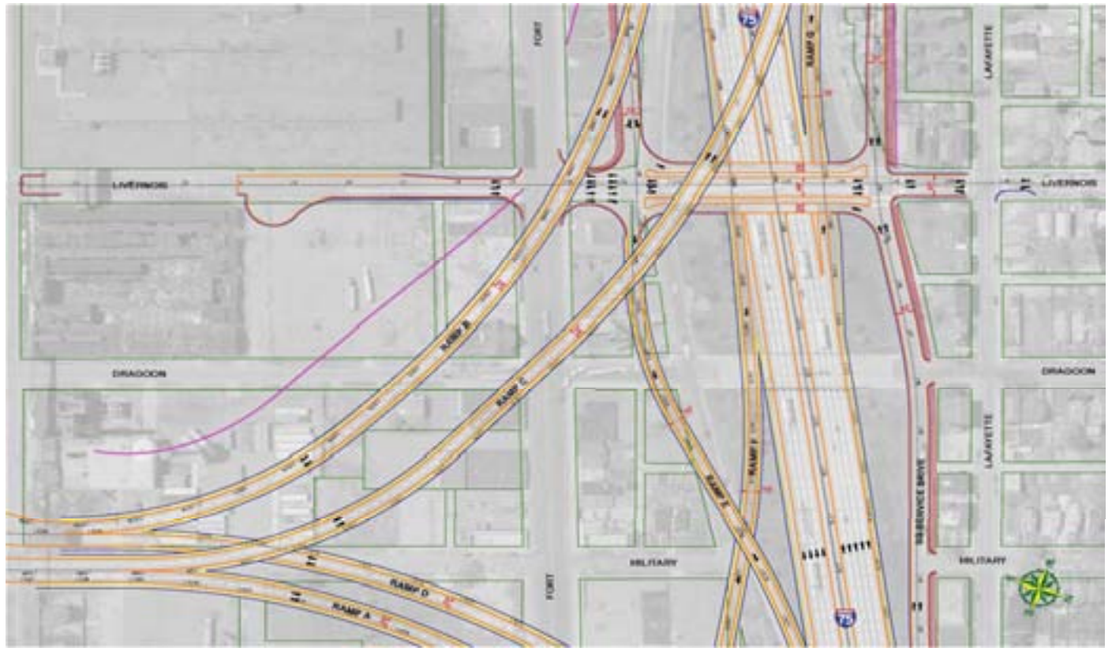
Ramp G has a design speed of 45 MPH. The ramp has been designed in accordance with MDOT Geometric Design Guide VII-205. Ramp H has a design speed of 45 MPH. The ramp entrance to I-75 has been designed in accordance with MDOT Geometric Design Guide GEO-101-E. The exit from the Service Drive has been designed in accordance with MDOT Geometric Design Guide GEO-130-C, Case I. An auxiliary lane is formed between Ramps G and H adjacent to the I-75 mainline. The distance between the 2 foot gore points is approximately 1,140 feet. The 1,600 foot distance between like points, required per Exhibit 10-68 AASHTO Green Book, occurs well within the Ramp G and Ramp H gore areas with I-75. In areas where the Ramp G and H auxiliary lane is too close for a 1:4 side slope grading, and adjacent to the Plaza Ramp abutments, retaining walls are provided.

Because of the Dragoon Bridge removal and vacation of Dragoon Street from I-75 to Jefferson Avenue, Livernois Avenue needs to be reconfigured to a two-way roadway, from a one-way southbound roadway. The reconfiguration is shown in Figure 4.2-7. The posted speed of Livernois Avenue is 25 MPH and the design speed of Livernois is 30 MPH.

To minimize right-of-way impacts, Livernois Avenue will be converted to a private access road between Sta. 0+00 and 4+00, the existing at-grade crossing will be removed, and a curb will be constructed along Livernois at the NS railroad tracks. A cul-de-sac will be provided that will accommodate WB-62 trucks at Sta. 4+00. Livernois Avenue will be a two-lane roadway north of Sta. 4+00 to Sta.18+00 (Lafayette Boulevard). Between the cul-de-sac and Fort Street, one 12 foot southbound lane, an 8 foot southbound parking lane, a northbound 12 foot left turn lane, and a northbound 12 foot

through/right turn lane will be provided. Between Fort Street and the northbound Service Drive, a 12 foot southbound right turn lane, a 12 foot through lane, a 12 foot left turn lane, a northbound 12 foot through and 12 foot right turn lane will be provided. From the northbound Service Drive to the southbound Service Drive, and across the I-75 overpass, a 12 foot southbound lane, a 12 foot left turn lane, and a northbound 12 foot lane will be provided. Twenty-foot wide Service Drive crossovers are provided on both sides of the bridge. Between the southbound Service Drive and Lafayette Street, a southbound 11 foot lane, an 8 foot parking lane, a northbound 12 foot left turn lane, and a northbound 12 foot right turn lane are to be provided. North of Lafayette Boulevard, a curbed bump-out is proposed to prevent northbound through traffic on this portion of the roadway. A southbound left turn lane and through lane will be provided.

Figure 4.2-8
Livernois Avenue Reconfiguration



4.2.2.4 Clark Street Interchange

As shown in Figure 4.2-8, the I-75/Clark Street interchange will be a modified urban diamond interchange. The northbound I-75 entrance ramp from Clark Street and the southbound I-75 exit ramp to Clark Street are not proposed to be modified. These ramps are 12 feet wide, with curb and gutter and a 5 foot wide outside shoulder. As mentioned in the previous section, Ramp F, the northbound I-75 exit ramp to Campbell Street/Clark Street and Ramp H, the southbound I-75 entrance ramp from the southbound Service Drive/Clark Street, represent the split diamond portion of the Clark Street interchange, several blocks to the west of Clark Street. These ramps are proposed as 16 feet wide.

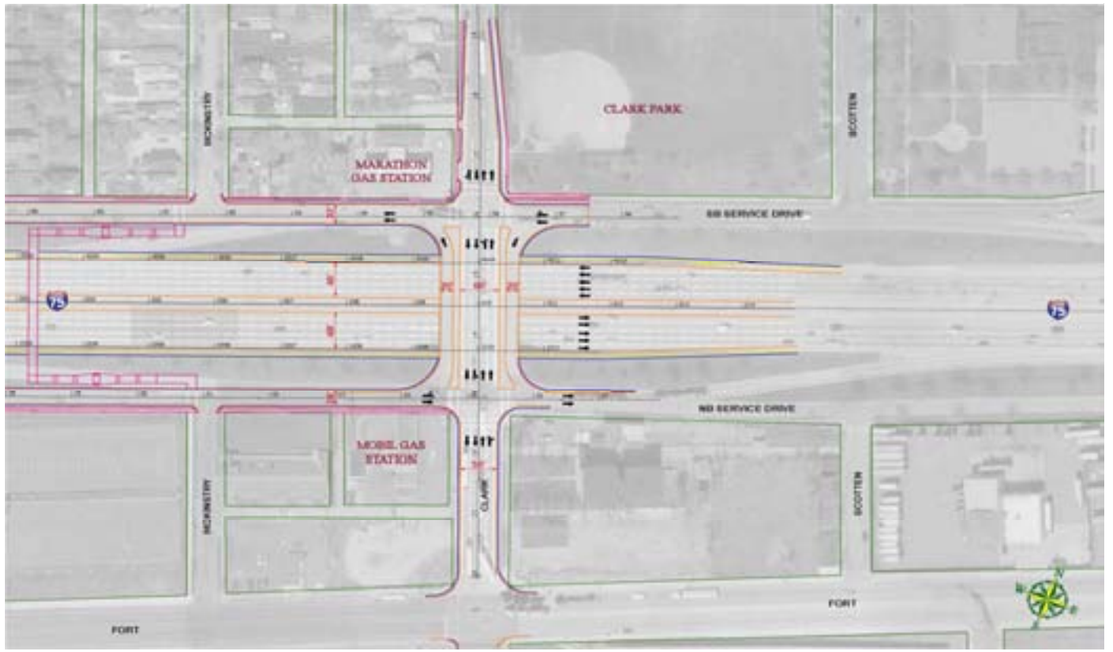
The posted speed on Clark Street is 25 MPH, and the design speed is 30 MPH. Four 12 foot lanes with 4 foot bike lanes are to be provided for from south of Fort Street to north of the southbound Service Drive. The bike lanes will end at Clark Park located at the northeast quadrant of Clark Street and the southbound Service Drive.

Intersections have been designed in accordance with MDOT Standard Plan VII-650-C and AutoTURN, using a WB-62 Truck to estimate minimum curb return radii, as shown in the conceptual road design plans.

Service Drive connectors are to be provided on both sides of the proposed Clark Street Bridge. The connectors meet the standards as identified in MDOT Road Design Guide VII-400-A.

The proposed vertical profile of the crossroad bridge will be approximately two feet higher than the existing bridge. This is due to providing additional clearance under the bridge to account for future reconstruction of I-75, the minimum 14'-9" underclearance required, and the proposed bridge superstructure depth, including a 1.5% cross slope on the bridge deck.

Figure 4.2-9
I-75/Clark Street Interchange



It is anticipated that minor frontage right-of-way acquisition will be needed along both sides of Clark Street from Fort Street to the northbound Service Drive, to account for the widening of Clark to add the bike lanes, and to account for the differential in vertical grade. Permits to grade drive will be required at the Marathon Gas Station adjacent to the southbound Service Drive and the Mobil Gas Station adjacent to the northbound Service Drive. It is not anticipated that any right of way or grading permits will be required at Clark Park, located at the northeast quadrant of the Clark Street, southbound Service Drive intersection.

4.2.2.5 Service Drives

For the Service Drive descriptions reference Figures 4.2-1, 4.2-2 and 4.2-3.

The posted speed on the Service Drives is 30 MPH, and the design speed is 35 MPH. The Service Drive widths are generally 32 feet wide and carry two lanes of traffic. This width deviates from 32 feet at the following locations:

1) at I-75 entrance or exit ramps to the Service Drive, where the Service Drives widen to 36 feet to account for 3 lanes;
2) prior to the I-75 exit ramps, the Service Drive width is transitioned from 36 feet to 24 feet, so that the third lane can be added from the ramp to the Service Drive after the gore; and,
3) between Campbell Street and Clark Street.

The horizontal alignments have many curved sections. These curves have been introduced to account for the Plaza Ramp construction, to account for the Service Drive ramp reconfigurations, and to minimize right-of-way impacts. The radii have been made as large as possible, with the minimum used for these being 510 feet. No superelevation has been provided for these curves. This is consistent with AASHTO's "A Policy on Geometric Design of Highways and Streets-2004 Edition" (Green Book), exhibit 3-16, Minimum Radii and Superelevation for Low Speed Urban Streets.

At the major cross streets of Springwells, Green, Livernois, and Clark, the intersections have been designed in accordance with MDOT Standard Plan VII-650-C and AutoTURN, using a WB-62 Truck to estimate minimum curb return radii, as shown in the conceptual road design plans. The proposed vertical profile of the Service Drives will be approximately two feet higher than the existing crossroad bridges. This is due to providing additional clearance under the bridge to account for future reconstruction of I-75, the minimum 14'-9" underclearance required, and the proposed bridge superstructure depth, including a 2.0% cross slopes on the bridge deck.

At the minor cross street intersections, existing curb return radii of 15 feet have been used, that match the existing curb return radii. This was done to minimize right-of-way impacts at these cross streets. These radii can be made larger in the design phase based on need and the availability of right-of-way to perform this improvement. The conceptual plans show that reconstruction will occur at the edge of the curb return, approximately 15 feet behind the edge of the Service Drive roadway. This may need to be adjusted to approximately 50 feet behind the curb return, to account for intersection crown modifications with the Service Drive.

Permits to grade drives and fee right-of-way acquisition areas are shown on the conceptual plans. Additional corner cut right of way may be required for sidewalk ramp design per ADA Standards, that has not been shown on the plans. Of particular note, the A.M.A. building at the southeast corner of the Green Street intersection, located at 7140 W. Fort Street, will need driveway permits to reconstruct driveways onto their site due to the grade raise at Green Street and the northbound Service Drive. Right of way impacts have been avoided at this facility by proposing a retaining wall on the north side of the property and elimination of the sidewalk on the east side of Green Street adjacent to this property. This building was formerly a Detroit Police Station.

Also, the southbound Service Drive needed to be lowered by approximately 7 feet between Junction and Campbell Streets, as a result of matching in proposed Ramp H, the southbound I-75 entrance ramp from the Service Drive, to the southbound Service Drive. This has resulted in additional right-of-way takes as shown in the conceptual plans.

In addition, when the Service Drives bump out, at times alleys are impacted. If a proposed Service Drive roadway impacts an alley, it is proposed to remove the alley and provide driveway access from the properties affected to the Service Drive directly. Along the northbound Service Drive, alleys are impacted between Beard and Casgrain Streets. Along the southbound Service Drive, alleys are impacted from Green Street to 400 feet east of Green, and 150 feet east of Cavalry to Morell.

4.2.2.6 Pedestrian Crossings

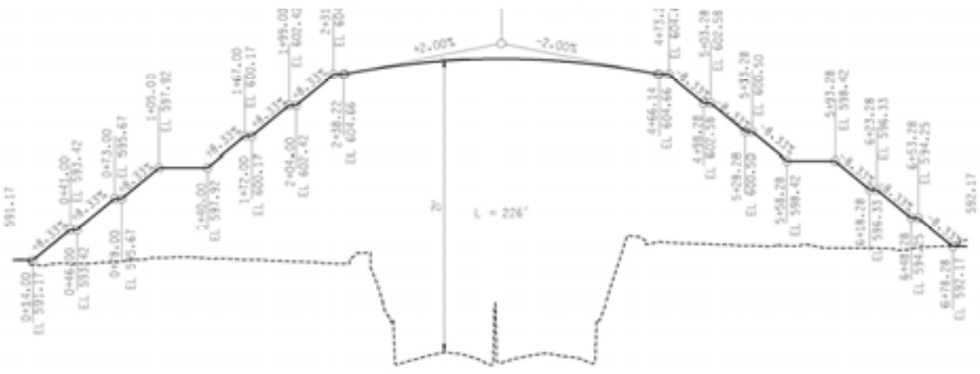
Residential properties exist to the north of the freeway, and mixed commercial properties exist to the south along Fort Street. Major pedestrian traffic generators on the south side of the freeway include Southwestern High School, the Community Health and Social Services Building (CHASS), and the Police and Fire Department at Waterman, Campbell and Junction intersections with Fort Street, respectively.

There are five existing pedestrian bridges that extend across I-75 within the project limits, at Solvay, Beard, Waterman, Cavalry, and Ferdinand. These compliment bridges with sidewalks at Springwells, Green, Waterman, Livernois, Dragoon, Junction and Clark that facilitate pedestrian access from one side of I-75 to the other.

Construction of the Plaza interchange and reconfiguration of the local access interchanges will result in the need to remove all existing pedestrian bridges, as well as remove permanently the Waterman, Dragoon, and Junction bridges. Understanding the impacts that the Preferred Alternative will have on pedestrian access, community involvement meetings were held to determine the proposed locations of new pedestrian crossings. As a result of these meetings, pedestrian crossings are proposed at Solvay, Beard, Waterman, Morell, and McKinstry, between the Service Drives and the freeway. At the community meetings interest was expressed in carrying the pedestrian bridges over the Service Drive. However, this would require additional property acquisitions as well as increasing the pedestrian crossings height and length. For these reasons, the pedestrian bridges are maintained between the Service Drive and mainline. Refer to Figures 4.2-1 and 4.2-2 for proposed pedestrian crossing locations.

The City of Detroit has requested use of their special detail regarding advanced signing for the pedestrian crossings. A pedestrian signal warrant analysis will be performed by the City to determine if signalized crossings at the Service Drives will be required upon completion of construction. The proposed pedestrian crossings are to be designed in accordance with Americans with Disability Act (ADA) and MDOT requirements. The proposed pedestrian crossings, except at Morrell, are to be 14 feet wide. This width will allow for bikes and pedestrians to use the facility. At Morrell, the pedestrian crossing is to be 8 feet wide. Only pedestrians will be allowed to use this crossing. The difference in width is due to the available width between the Service Drive and the freeway for construction of each crossing. Each pedestrian crossing will have a maximum 8.33% grade. Five-foot long landings will be provided at 30-inch vertical elevation differences. Benches will also be provided on one of these landings as a rest stop for pedestrians. The vertical underclearance is a minimum 17 feet over the mainline freeway, Service Drive or Plaza ramps. In addition to the underclearance, a minimum of 3.5 to 4 feet of additional height has been included to account for the superstructure depth. A sample profile view is shown in Figure 4.2-9. Refer to Appendix A, Design Criteria, and the Interchange Structure Study bound appendix for more information regarding the pedestrian crossings.

Figure 4.2-10
Sample Pedestrian Crossing Profile



4.2.3 Miscellaneous Local Road Improvements

4.2.3.1 Green Street and Clark Street

Green Street and Clark Street are local roads that are proposed to be reconstructed from the southbound I-75 Service Drive to Jefferson Avenue. The intent of these roadways is to maintain community continuity given the removal of north-south roadways by the Plaza. The posted speed of both roadways is 25 MPH, and the design speed of both roadways is 30 MPH. The proposed alignments are shown in Figures 4.2-10 and 4.2-11.

Figure 4.2-11
Proposed Green Street Alignment

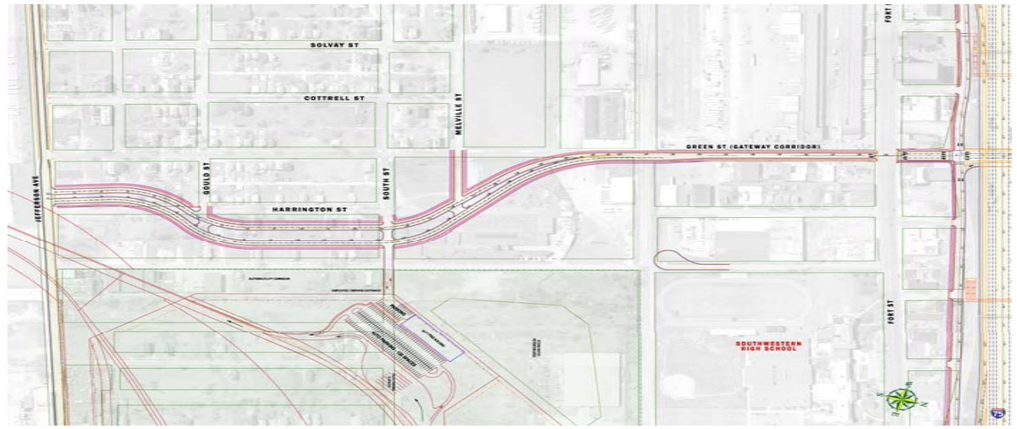


Figure 4.2-12
Proposed Campbell Street Alignment

Local traffic access to and from the Plaza will be via a roadway to Campbell Street. This roadway will serve both cars and local trucks. Campbell Street will also be used to access a Service Drive entrance and exit for the Plaza maintenance facility. Green Street will also be used to access a Service Drive entrance and exit for employees and deliveries to and from the Plaza Duty Free shop. Plaza or Detroit River Bridge traffic will not be able to enter or exit using the service entrances on Green or Campbell Streets. In addition, vehicles entering the service entrance on Green Street will not be able to exit on Campbell Street through the Plaza and visa versa. Both roadways will be reconstructed to Class A All-Weather standards. The intent of the design is to allow for service vehicles into the Plaza, but to discourage large commercial vehicles from using this route from Fort Street to Jefferson Avenue.

To enhance the adjacent neighborhoods next to the Plaza, both Green and Campbell Streets are proposed to be a boulevard section from Jefferson Avenue north to the NS railroad that will consist of two 12 foot lanes in each direction and a raised median. The raised median for Green Street is proposed 55 feet from back of curb to back of curb, at its largest point. The raised median for Campbell Street is proposed 15 feet from back of curb to back of curb, at its widest point.

The horizontal alignment on Green Street in the boulevard section has four major curves. These have been provided so as not to isolate properties between Green Street and the Plaza from the adjacent Delray neighborhood. These curves have also been introduced to provide a traffic calming feature to discourage speeding on Green Street. The radii have been made as large as possible so superelevation is not required. All radii used for horizontal curves exceeds the minimum 333 feet as stated in AASHTO's "A Policy on Geometric Design of Highways and Streets-2004 Edition" (Green Book), exhibit 3-16, Minimum Radii and Superelevation for Low Speed Urban Streets, for a 30 MPH design speed and a 2% adverse crown.

The horizontal alignment on Campbell Street does not have any curves. The reason is so no right-of-way impacts would occur on the east side of the roadway. Right-of-way required on the west side is acquired as part of the Plaza.

Both roadways transition to two 12-foot lanes from the NS railroad tracks to Fort Street. North of Fort Street, Green Street widens to four lanes. The bridge also has Service Drive connectors designed in accordance with Geometric Design Guide VII-400-A. North of the southbound Service Drive, the four lane section transitions to the existing two 19 foot wide lanes that accommodate a through lane and a parking lane in each direction.

North of Fort Street, Campbell Street turns into a three lane section to Ramp F, two southbound lanes and one northbound lane. All northbound I-75 commercial traffic will exit onto Campbell Street and be directed to Fort Street, the Service Drive becomes discontinuous at Livernois Avenue. This commercial traffic can pick up the northbound Service Drive via Junction Street, if so desired.

Intersections in the boulevard section have been designed in accordance with MDOT Geometric Design Guide VII-670-C, as urban bi-directional crossovers, as requested by the City of Detroit. The Green Street intersection with Melville Street, and the Campbell Street intersections with Reeder Street, Harvey Street, and Driggs Street have been designed to accommodate an SU vehicle. The widths of the median crossovers are shown on the conceptual plans.

The Green Street intersections with the northbound and southbound Service Drives, Fort Street, the Plaza Service Drive Entrance (South Street), and Jefferson Avenue have been designed in accordance to MDOT Geometric Design guide VII-650-C, and will accommodate up to a WB-62 commercial vehicle. The Campbell Street intersection with the north side of Fort Street, the Plaza Service Drives and Jefferson Avenue have also been designed to VII-650-C and can accommodate up to a WB-62 commercial vehicle. The south side of the Campbell Street intersection with Fort Street is designed for a WB-50 vehicle, to avoid impacts to the Detroit Savings Bank property.

North of Ramp F, Campbell Street becomes one 18 foot lane. The lane transitions to 15 feet as the 90 degree curve ties into the northbound Service Drive, next to the Berwalt Manor Apartments. The curve radius provided can facilitate only an SU vehicle, therefore no larger commercial traffic will be allowed to use this roadway. Roll curb and a paved shoulder will be provided next to this curve to allow for Emergency Vehicle Access around the Berwalt Manor Apartments.

4.2.3.2 Jefferson Avenue

Throughout the public involvement process, it has been identified that Jefferson Avenue needs to be improved to better facilitate truck movements through the corridor. As a result of the process, it is proposed to improve Jefferson Avenue intersections with Dearborn Street, Westend Street, and Clark Street. Jefferson Avenue is also to be realigned slightly and widened at Rademacher Street, Dragoon Street and Junction Street. The intersections and Jefferson widening will accommodate WB-62 truck movements. Sample diagrams are shown in Figures 4.2-12 through Figure 4.2-14, as well as in the conceptual plans.

Right-of-way acquisition for the Jefferson Avenue improvements involves minor frontage right-of-way, except at Westend. At Westend, the City of Detroit has a parcel in the northeast quadrant. The building as shown in Figure 4.2-13 has been demolished and that parcel is vacant. The road is proposed to be realigned into this parcel to avoid potential impacts to a historic neighborhood in the northwest quadrant, to improve intersection sight distance, and to facilitate WB-62 truck turning movements.

At the Dragoon intersection with Jefferson Avenue, all realignment work is proposed within the existing right-of-way, to avoid acquisition of right-of-way from Historic Fort Wayne, which is located just to the south of the intersection.

The widening to facilitate truck movements on Jefferson is not the only work being proposed. Jefferson Avenue is identified as a primary trail route on the River Rouge Gateway Plan. As a result, Jefferson Avenue from Dearborn Street to Clark Street, and Clark Street from Jefferson Avenue to Clark Park just north of the southbound Service Drive, is proposed to be milled, overlaid with asphalt, and restriped from either a 2 to 4 lane roadway with parking, a two-way roadway with bike lanes and parking, or a three lane roadway with bike lanes, without parking. The average existing width on Jefferson Avenue is 45 feet and on Clark Street is 50 feet. The lane widths and the projected traffic volumes for the design year should allow for this proposed work to be accomplished. A traffic study at the time of design is recommended to ensure that this concept is valid. In areas being milled and overlaid, it is proposed to also upgrade sidewalk access ramps to current ADA standards, as this is current MDOT and FHWA policy.

Figure 4.2-13
Proposed Jefferson/Dearborn Intersection Realignment

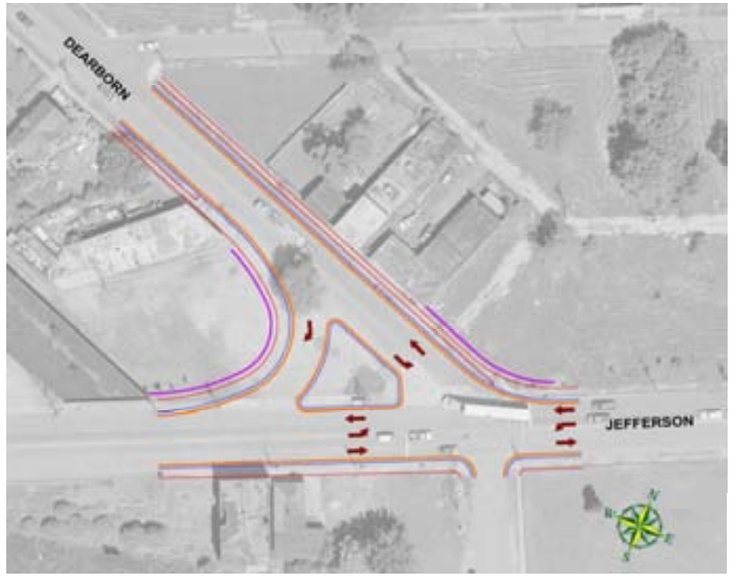
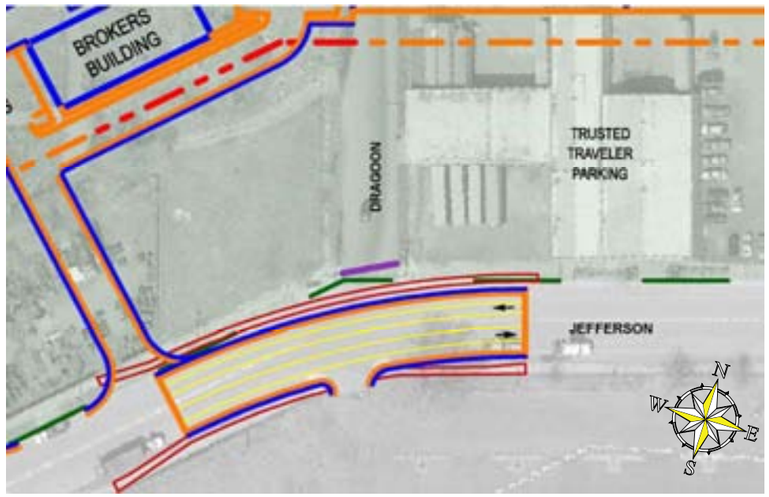


Figure 4.2-14
Proposed Jefferson/Westend Intersection Realignment

Figure 4.2-15
Proposed Jefferson Realignment at Dragoon



4.2.3.3 Cul-De-Sacs

The Plaza and associated bridge construction will cause the closure and abandonment of Post Street, Waterman Street, and Livernois Avenue between the NS railroad and Jefferson Avenue. Cul-de-sacs are proposed at these locations, designed per AASHTO requirements and for a WB-62 design vehicle. The large amount of industrial and commercial businesses along these roadways justifies the size of the cul-se-sacs. At Post Street, the cul-de-sac is placed entirely on the west side of the roadway to eliminate right-of-way impacts to the Southwestern High School property. At Waterman Street, the cul-de-sac is placed entirely on the east side of the roadway also to eliminate right-of-way impacts to the Southwestern High School property. At Livernois Avenue, the cul-de-sac is proposed 400 feet north of the tracks, to the east side of the roadway, to avoid purchase of industrial property and building demolition and removal.

4.2.3.4 Cold Mill and Overlay Community Roadways

To mitigate impacts to the Delray community, the CBC has recommended the cold milling and overlay of roadways as shown in Figure 4.2-15. This work will include 2-inch mill and 2-inch Hot Mix Asphalt (HMA) overlay, as well as the upgrade of all existing sidewalk ramps to meet current Americans with Disabilities Act requirements.

4.2.3.5 Railroad Corridor Improvements

As part of the Detroit River International Crossing project, improvements to the existing double track CSX Riverfront mainlines are proposed to reduce the amount of railroad activity occurring near the proposed international structure.

The CSX Riverfront mainline tracks were originally owned by the Union Belt of Detroit. The track is approximately 3.5 miles long and is located between the Delray interlocking and the Norfolk Southern Boat Yard. CSX dissolved the Union Belt in 1992 and currently owns both mainline tracks. Norfolk Southern currently leases the eastern track.

Presently both CSX and Norfolk Southern operate trains through the corridor. Existing CSX train activity includes a local switching job at Detroit Union Produce as well as operating their TransFlo facility which is located near 15th Street near the NS Boat Yard. The CSX TransFlo facility is a five-track bulk transfer facility where products are transferred from rail car to truck and vice versa. CSX train activity on the Riverfront Mainlines is minimal.

Existing Norfolk Southern train activity includes operating Delray Yard, the Boat Yard and delivery of coke trains to National Steel. Delray Yard is located between the Delray interlocking and Westend Street. The yard is comprised of six tracks and is used as a switching yard. The Boat Yard is located at the end of the Riverfront mainlines on the riverfront and is comprised of approximately 15 tracks. Currently, the Boat Yard is used to store miscellaneous rail cars and is not operated anywhere near capacity. In addition, Norfolk Southern delivers coke to National Steel on Zug Island for use in their plants.

In addition to the existing train activity described, there are seven additional industries located along the Riverfront mainlines that have an industry track going into them but are inactive at this time. Those industries are:

1. A paper company at the end of the tracks near the NS Boat Yard
2. A Detroit News warehouse
3. A tank farm
4. A construction company
5. OJ Logistics
6. American Produce
7. LaFarge Materials

The majority of the train activity operating in the vicinity of the proposed international structure is the Norfolk Southern coke trains heading to Zug Island. Presently, the Norfolk Southern coke trains heading to Zug Island are approximately 5,550 feet in length. In order for the Norfolk Southern trains to get to Zug Island, trains must get off of the CSX Riverfront mainlines and onto the Delray Connecting Railroad. The Delray Connecting Railroad is owned by National Steel and consists of approximately 15.5 miles of track on Zug Island and approaching Zug Island. The majority of this track is a 25 track yard on Zug Island. Currently, there is a connection between the CSX Riverfront mainlines and the Delray Connecting Railroad near Westend Street. The connection is in the southeast quadrant of the intersection between the two mainlines.

Currently, there is not a direct route to Zug Island, trains going to Zug Island must stop, backup and start again several times. The Norfolk Southern coke trains arrive at Delray interlocking from the south on the Conrail mainlines. At Delray, because there is not a direct connection to head east on the CSX Riverfront mainlines, the coke trains must be pulled through the Delray interlocking and pushed to the west into Oakwood Yard via the existing connection at Delray. Once in Oakwood Yard, the locomotive must run around the train and re-attached itself to the opposite end of the train. Once connected, the train is pulled east through the Delray interlocking on the CSX Riverfront mainlines. Similar to at Delray, because there is not a direct connection to the Delray Connecting Railroad from the CSX Riverfront mainlines, the coke trains must be pulled through the connection at Westend Street and into the Boat Yard. At the Boat Yard, the train then must be brought to a stop, and the trains are either pulled or shoved around the existing track connection between the CSX Riverfront mainline and the Delray Connecting Railroad for delivery to Zug Island. If the train is pulled, the locomotive must run around the train and attach itself to the other end of the train. If the train is to be shoved, the locomotive remains on the same end of the train and it pushes the train to Zug Island. While this is occurring, the train blocks the 21 existing grade crossings between Westend Street and the Boat Yard.

Figure 4.2-16
Proposed Delray Roads to be Milled and HMA Overlaid

Source: The Corradino Group of Michigan, Inc.

Since most of the existing train activity in the vicinity of the proposed roadway structure involves the Norfolk Southern coke trains, alternatives were investigated to improve the train operations of the coke trains by providing head-in maneuvers at both the Delray interlocking and the Delray Connecting Railroad connection with the CSX Riverfront mainlines. After several discussions with operating personnel from both CSX and Norfolk Southern it was determined that the need for the coke trains to operate east of Westend Street could be eliminated through construction of two wye tracks.

The first wye track would need to be constructed in the southeast quadrant of the Delray interlocking. The proposed connection track would be a 10º curve and allow the Norfolk Southern coke trains coming from the south the ability to head east directly via the new connection track. This would eliminate the need to pull the coke train through Delray and then west into Oakwood Yard via the existing connection before heading east which currently occurs. In addition, a crossover between the two Conrail mainlines south of the proposed connection track would be constructed to allow the coke trains the ability to arrive at Delray on either track and still have access to the proposed wye track.

The second wye track would need to be constructed just east of the Delray interlocking in the vicinity of Westend Street where the Delray Connecting Railroad connects with the CSX Riverfront mainlines. Similar to the proposed connection at the Delray interlocking, the proposed wye track would be a 10º curve and allow the Norfolk Southern coke trains the ability to make a direct move from the CSX Riverfront mainlines to the Delray Connecting Railroad. This would eliminate the need for the coke trains to operate east of Green Street. By constructing this wye track, the need to pull the coke trains east to the Boat Yard in order to utilize the existing wye track would not be required. Based on aerial mapping, it appears as though nine parcels would be impacted by construction of this wye track.

4.2.4 Interchange and I-75 Bridges

See the bound Interchange Structure Study for a more detailed description of the I-75 interchange bridges.

4.2.5 U.S. Toll and Inspection Plaza

Figure 4.2-17 shows the detailed U.S. Toll and Inspection Plaza plan.

4.2.5.1 U.S. Federal Agency Operations

Plaza space programming and facilities are provided in accordance with the U.S. Land Port of Entry (LPOE) Design Guide Supplement dated 15 March 2006 (Design Guide), U.S. LPOE Design Guide Security and Information Technology Supplemental Guide dated 31 August 2007, and the Program of Requirements dated August 2008 from the General Services Administration (GSA). The secure portion of the Plaza under the control and operation of U.S. Customs and Border Protection (CBP) is called a Federal Inspection Station (FIS). Other portions of the facility which include tolls, brokers building, etc. are run by the bridge owner/operator.

U.S. Federal operations requirements are defined by the General Services Administration (GSA) and include the primary occupant CBP as well as other federal tenants such as Food and Drug Administration (FDA), and USDA Animal Plant Health Inspection Service (APHIS). In summary, the Federal Agency facilities on the Plaza include:

- 30,000 sft. Main Building; housing CBP operations and administrative functions
- 20 Primary Inspection Booths; inspection booth for both commercial and passenger occupied vehicles (POV)
- POV Secondary Inspection; including 20 parking spaces, head house, and hard secondary inspection
- Commercial Secondary Inspection
    - 20,000 sft. Commercial Processing and Trusted Traveler Building
    - 60,000 sft. - 20 space truck dock with 5 enclosed docks
    - 2 – Non-Intrusive Inspection (NII) buildings
    - 2 enclosures for mobile NII
    - 19,000 sft. USDA-APHIS inspection facility for livestock
    - 31 parking spaces for staging
    - 5 exit control booths
- 4 Outbound (Canada bound) inspection booths

The Plaza also contains designated areas to expand primary inspection and outbound inspection. This is due to the different planning horizons between the study, 20 years, versus GSA, 10 years. Plaza access is provided by direct connections to I-75, north and southbound, via direct connect ramps. Local access is provided to and from Campbell Street.

Primary Inspection

Commercial and passenger occupied vehicles (POV) are initially processed in the primary inspection lanes (PIL). There are 10 commercial primary inspection lanes. There are 10 primary POV inspection lanes including 1 bus lane. Primary inspection lanes include provisions for expedited trade and traveler programs with dedicated NEXUS and FAST lanes at the center of the inspection band. Any commercial primary inspection lane can be dedicated as a FAST truck inspection lane. Primary inspection lanes provide for passive Radiation Portal Monitors (RPM), License Plate Readers (LPR), and other technologies.

Space is provided on each side of the PIL band for future expansion to 20 truck booths and 20 auto booths. The layout of the buildings and secondary inspection allows for an easily phased addition of these PIL's without modifying the main buildings.

Commercial Secondary Inspection

For the flow of traffic, commercial secondary inspection is provided after the primary inspection. The secondary inspection facility includes a combined warehouse, truck dock and commercial processing building, a brokers building, two Non-Intrusive Inspection (NII) buildings, and a U.S. Department of Agriculture - Animal and Plant Health Inspection Service (USDA-APHIS) livestock inspection facility. Space is also reserved for a hazardous materials inspection area, bulk bins, impound lot, mobile NII enclosure, and empty-truck inspection. The facility also contains commercial secondary parking spaces for trucks that are not required to park at the truck docks. Exit control is maintained by five exit control booths.

A Hazardous Materials Containment area is provided to contain any truck born hazardous materials.

The warehouse/truck dock/commercial processing building houses CBP commercial inspectors, open and enclosed dock facilities, agency offices, and truck driver processing facilities. The building also contains a trusted traveler enrollment center with unsecured visitor parking.

Passenger Secondary Inspection

The Federal Inspection Station (FIS) Main Building is a two-story building massed in the center of the plaza dividing primary auto and commercial inspection bands. This building houses traveler inspection and processing facilities as well as CBP administrative offices. A head house and hard secondary are provided at the end of the auto secondary inspection canopy to the left of the POV PIL's. Sixteen auto spaces are provided in the secondary facility. This location of the FIS building along the center of the plaza allows for passenger traffic to flow primarily to the left side of the plaza as it enters the U.S. thereby reducing vehicle conflicts. A bus inspection lane is provided on the left side of the main

building. This is preferred because bus entry doors are located on the right and this allows disembarking right into the Main Building.

Canada Bound Traffic

Ten toll booths are provided on the Canada-bound side of the Plaza. An administration building, which would consist of administrative offices, locker rooms, and other toll support services, is provided to the right of tolls. This facility is outside the FIS boundary but past the point-of-no-return.

Four outbound, or Canada-bound, inspection booths are provided on the westbound lanes. A dedicated secure ramp is provided which would allow outbound inspectors to divert autos and trucks directly to the secondary inspection area, as the need arises. Export inspection and US-VISIT program requirements can be accommodated in the Duty Free facility. Space is provided for a future full independent outbound secondary inspection area.

Employee Parking

Two hundred and twenty-five secure employee parking spaces are provided along Jefferson Avenue.

4.2.5.2 Crossing Operator

For the purposes of this report it is assumed that there will be a publically controlled crossing operator. This operator may be the State of Michigan or a contracted private entity. In any case there will be required components on the Plaza related to operations for the manager of the facilities. A summary of other facilities for the Plaza operator included in the Plaza are:

- 10 Toll Booths;
- 10,000 sft. Administration Building; which contains administrative functions, support for toll operations, and traffic operations;
- 30,000 sft. Maintenance Facility; and
- Storm Water Detention; to be used to meter storm water for the Detroit River Bridge and Plaza.

A maintenance facility is provided that includes an administrative/supervisory building combined with maintenance equipment storage and maintenance garage, and a deicing chemical storage building. Employee parking is also provided. Access to the facility is to and from Campbell Street. Access to the Plaza is via the local access roadways.

4.2.5.3 Other Facilities

In addition to the facilities detailed above, the following other facilities are required on the Plaza:

- 10,000 sft. Brokers Building, which houses Commercial Brokers;
- 15,000 sft. Duty Free; and
- Michigan State Police truck inspection facility [details to follow].

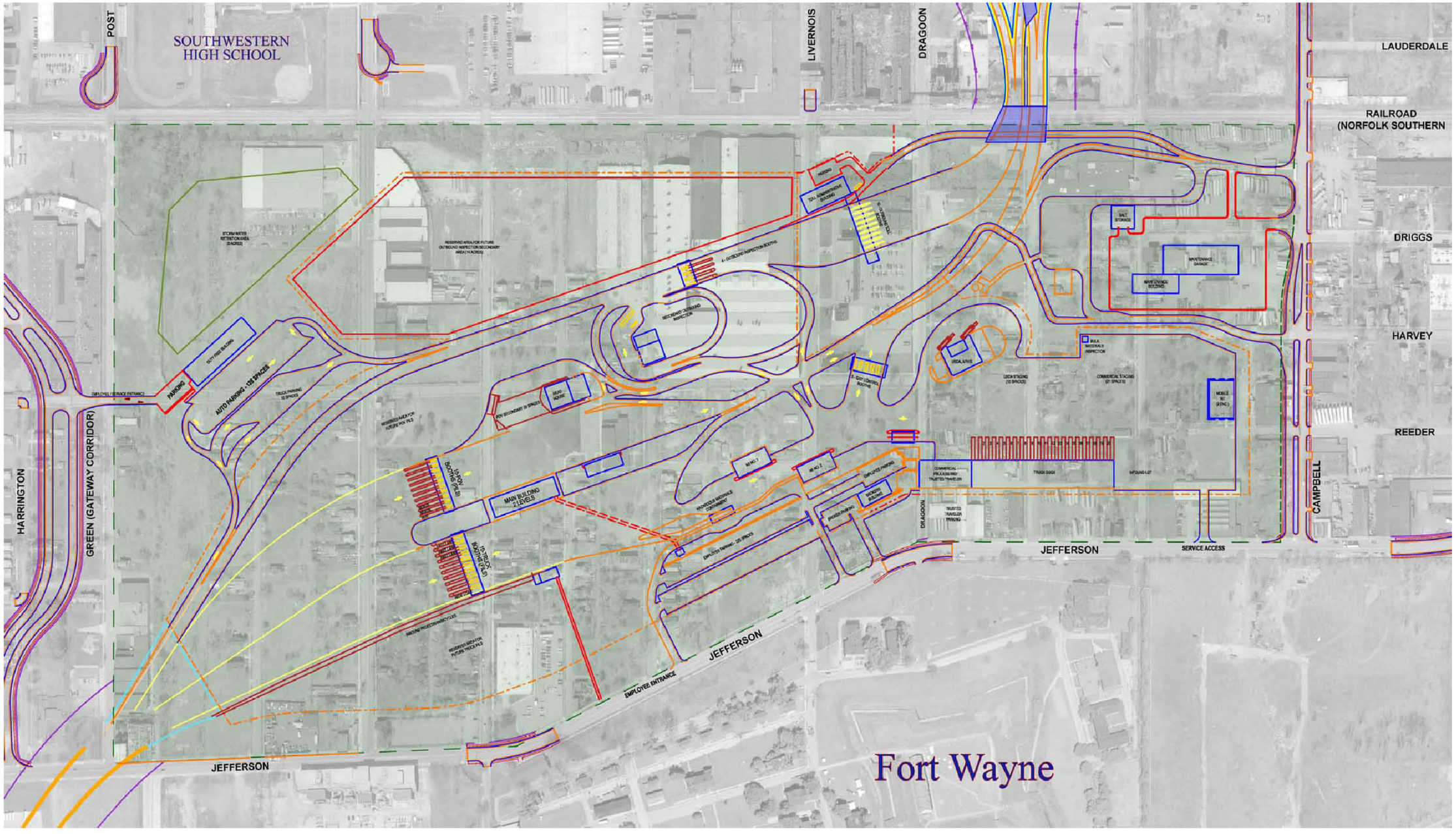
Other Facilities

Duty Free is a building located within the secure perimeter of the Plaza past the tolls and outbound inspection lanes. The Duty Free provides crossing revenue to supplement tolls, traveler comfort services, and economic opportunities for local residents. A service entrance and employee parking accessed from Green Street is provided. Duty Free parking for cars and trucks is provided adjacent to the Duty Free Building.

A Commercial Brokers Building is provided. Brokers provide services to truck drivers necessary to bring commercial goods across the border. The Broker Building has separate unsecured parking.

The Michigan State Police facility provides commercial inspection. This facility includes a booth for observing commercial trucks as they exit the U.S. Plaza, a level inspection pad for weighing vehicles, and an inspection building for indoor inspection of trucks. Also, associated with the facility is overhead signing and signalization. In order to accommodate observing and pulling trucks out of a line of moving vehicles it was necessary to segregate cars from trucks.

Figure 4.2-17
Plaza Plan



4.2.6 Detroit River Bridge

See the separately bound Volume 5: Detroit River Bridge Structure Study for a more detailed description of the Detroit River Bridge and its approaches.

4.2.7 Miscellaneous Improvements

4.2.7.1 Intelligent Transportation System (ITS)

MDOT Intelligent Transportation System (ITS) medium includes fiber optic lines, radio, and wireless communications. ITS devices include vehicle detection, video cameras, and changeable message signs.

In the project area there are existing cameras on I-75 in the vicinity of Springwells, Junction and Ambassador Bridge (east of West Grand Boulevard). There is one changeable message sign (CMS) at Green Street, supported on the existing bridge for northbound traffic, and placed on an independent single post sign support for southbound traffic. Cameras exist at the northeast corner of the northbound Service Drive and Springwells Street intersection, and the northeast corner of the northbound Service Drive and Junction Street intersection.

MDOT has requested the following ITS components, as shown in the conceptual drawings. The cameras at Springwells and Junction shall be replaced. One new camera should be placed in the DRIC interchange that can view the toll area and plaza ramps. The height of the camera shall be approximately 100 feet tall.

In regards to the CMS, there is currently a gap of CMS signs between the I-75/I-275 split and I-75 at the Rouge River. A current contract may install signs in this gap. An additional CMS sign should be considered in the area to provide advance warning of border congestion or incidents.

The following vehicle detection should be added to the project area: two detectors on the main line and one on each Plaza ramp.

Hard-line fiber optic communications should be added to the shoulder reconstruction from the Ambassador Gateway to I-75 over Fort Street. The project will need to tie into the Gateway ITS infrastructure.

ITS signing and control will be coordinated with the DRIC crossing operator similar to other locations like the Tunnel and the Palace of Auburn Hills. There are some legacy issues with camera control but these will be addressed during the normal upgrade process. MDOT would share video with operators, including the Canadian side.

The ITS components of the project should have little to no impact on the project footprint. All components will be placed in existing or currently proposed ROW, in the approximate areas as shown on the conceptual plans.

4.2.7.2 Lighting

There is existing street lighting on both the northbound and southbound Service Drives, I-75 crossover bridges, and on I-75. The lighting on the Service Drives is owned and operated by the Detroit Public Lighting Department (PLD). The lighting on the bridges and on mainline I-75 are owned and operated by MDOT, service may be provided by PLD or DTE.

PLD has the Mistersky Power Plant between Jefferson and the Detroit River near Junction. Some of the transmission lines extending from the Mistersky plant will require relocation in the area of the Plaza, however, the plant itself will not be impacted by this project.

All local road lighting within the footprint of the Plaza will require removal.

PLD is preparing a relocation plan as part of the utility coordination task for this project. All existing bridge lighting and Service Drive lighting will need to be replaced. High mast lighting is proposed for the interchange. Coordination in the final design stage will be necessary, for PLD may feed the electricity for the MDOT lighting. In addition, PLD indicated that a separate materials contract may be required for the project, based on the current amount of delay for obtaining conduit and other materials on the Ambassador Gateway project.

4.2.7.3 Signing

In the separately bound Volume 3: Interchange and Local Roadway Plans is a full set of conceptual signing plans. Through the public involvement process, it was identified that direct routes from I-75 to Fort Wayne needed to be identified, since Livernois and Dragoon were being closed off by the Plaza. Signing to Fort Wayne has also been shown on the conceptual signing plans.

Another issue that requires resolution is how the current Ambassador Bridge and the DRIC bridges will be signed. The plans call out the DRIC Bridge as “DRIC Bridge to Canada.” The name of the bridge will be coordinated during the final design process.

Clear view font in accordance with MDOT Standards is to be used for development of the signing plans during the design phase.

4.2.7.4 Traffic Signals

It is anticipated that new traffic signals are to replace existing traffic signals along Springwells Street, Green Street, Livernois Avenue, and Clark Street at the intersections with the northbound Service Drive, southbound Service Drive, and Fort Street. Other signal replacements will be performed at the Jefferson Avenue intersections with Dearborn and Westend Streets. Existing signals at Waterman Street, Dragoon Street, and Junction Street with the intersections of the northbound Service Drive, the southbound Service Drive, and Fort Street, shall be removed. Stop sign control will be used at intersections where signals are not called out to be replaced, as well as all other intersections affected by this project.

Emergency Signal Phasing

The Detroit Police Department (DPD) has expressed concern about access to the north side of I-75 via the northbound I-75 Service Drive and Clark Street. The most direct route for the DPD is to exit their driveway on the northbound I-75 Service Drive and proceed north to Clark Street where they would turn left either at the main intersection or the directional crossover immediately prior to Clark Street. The DPD concern is the potential for queues (backup) to occur on the service drive at the Clark Street traffic signal that would block emergency vehicles from getting through.

In order to alleviate that potential, a solution would be a combination of a new traffic signal at the Police Station driveway onto the service drive that can be activated by the DPD coupled with revised traffic signal operations at Clark Street that would work in conjunction with the Police Station signal. The operation would be such that upon activation of the Police Station Driveway signal (see diagram below), the signal at Clark Street would terminate whatever phase it is operating under, then a new signal phase would begin that would allow only those movements shown in green to move. This in essence would “clear out” any queue that could potentially hinder the emergency vehicles.

Sequence of Signal Operation	Movements with Green Light
Current Normal Operation	Northbound and southbound Service Drive traffic
	Clark Street traffic
	Clark Street left turning traffic (green arrow)
Upon Activation of Emergency Operation	See diagram for movements permitted
Return to Normal Operation	Northbound and southbound Service Drive traffic

Figure 4.2-18
Clark Street Signalization

4.3 Preferred Alternative Engineering Studies

During the development of the Preferred Alternative various issues are identified that require additional engineering consideration. This section presents the engineering studies developed for the I-75 design speed and treatment of the Berwalt Manor building.

4.3.1 Design Speed Study

4.3.1.1 Introduction

A Design Speed Limit study on I-75 was prepared in response to questions posed regarding the posted and design speed for the existing section of I-75 within the project area.

The current Environmental Documentation and Engineering Report has been based on the assumption that no work is to be performed on I-75, that the current I-75 design speed is 60 MPH (100 km/hr), and the directional plaza ramps that tie into I-75 are designed with a design speed range of 40 MPH to 50 MPH. The assumed I-75 design speed was based on an existing 1998 plan set showing the design of the freeway at 100 km/hr.

The I-75 design speed was evaluated based on existing plan data and survey information, to verify that the actual conditions match the assumed design speed. Then an evaluation was made of what work would be necessary if the roadway design speed were updated to 60 MPH and 75 MPH, to determine the feasibility, work associated with the changes, and the potential impacts to the Preferred Alternative.

4.3.1.2 Existing I-75 Design Speed

Based on a review of the alignments shown on the existing plans and survey, the design speed of I-75 is 60 MPH and meets 50 MPH for some vertical alignments. Please note that the superelevation rates meet or exceed those shown for Straight Line Superelevation Method for a 60 MPH design speed, however they do not meet the current MDOT Standard Plan R-107 criteria. MDOT does accept use of superelevation derived from the Straight Line Method if R-107 criteria cannot be met.

4.3.1.3. Raising the Design Speed to 60 MPH

Since some vertical alignments of I-75 do not match the design criteria of 60 MPH, at a minimum, the DRIC improvements will need to account for the upgrade of I-75 (either in conjunction with the project or in the future at the end of the current facility design life) to the 60 MPH design speed, to avoid any State or Federal design exceptions. Upgrading the existing mainline profile was evaluated, and has determined that the vertical adjustments in grade would be within +/- six inches. The impacts of raising the profile six inches in the sag (caused by lengthening the vertical curve) would be to raise the cross road bridges over I-75, which may result in raising of the Service Drive grades. Raising the Service Drive grades would result in the possible need for either fee right-of-way or grading permits from adjacent property owners located adjacent to the freeway. MDOT and the FHWA will need to be consulted to determine if they desire that I-75 be reconstructed as part of the DRIC project, although this would have no impact on the Environmental Study.

4.3.1.4 Raising the Design Speed to 75 MPH

To raise I-75 to a 75 MPH design speed, the urban freeway design criteria can no longer be used, and rural design criteria would apply. The horizontal alignment impacts on existing I-75 mainline include lengthening one curve and upgrade of all superelevation within the project limits. All vertical curve alignments would need to be upgraded. Ramp terminals would need to be designed for rural freeway design criteria. Most ramps would need to be designed with longer acceleration/deceleration lengths and different breakaway delta angles.[1]

If the design speed is raised to 75 MPH, it is most likely that at Springwells Street, the northbound Service Drive entrance (Ramp I) and the southbound Service Drive exit (Ramp L) would need to be eliminated based on an approximate extension of the plaza ramps acceleration/deceleration lanes by 400 feet. In addition, the plaza ramp spacing between Ramps B and A would need to be lengthened to account for the lengthening of the northbound Service Drive exit and entrance acceleration and deceleration lanes. The separation length would need to be approximately 330 feet. Since Ramp B can not be moved closer to Ramp I at Springwells, Ramp A would need to move closer to Clark Street. Moving Ramp A would result in the closure of the existing northbound Service Drive entrance to I-75. Furthermore, modification of the horizontal and vertical alignments of I-75 would necessitate raising the freeway crossroads and the Service Drives.

Another option to raising the design speed to 75 MPH is discussed as follows:

- To avoid removal of the northbound Service Drive entrance and the southbound Service Drive exit ramps at Springwells, the entire Plaza interchange could be shifted to the north-east by approximately 400 feet;
- The shift would necessitate the elimination of the proposed bridge at Livernois, possibly keeping the bridge over Dragoon open, and require northbound Service Drive to I-75 entrance and exit ramps to be weave/merge lanes as originally laid out in Practical Alternative #2;
- The shift would cause the northbound entrance ramp from the Plaza to conflict with the existing northbound I-75 entrance ramp at Clark Street and the southbound exit ramp to the Plaza to conflict with the existing southbound exit ramp at Clark Street, because of the increase in acceleration/deceleration lengths. These Clark Street ramps would therefore, be removed, basically eliminating the entire Clark interchange;
- The Plaza acceleration lane would need to tie into the northbound exit ramp into the Ambassador Gateway Project;
- The shifting of the interchange would require realignment of the neck of the Plaza where it connects with the interchange ramps;
- Additionally, the ROW needs would be significantly changed, properties to the southwest of the interchange originally impacted would be avoided and additional properties to the northeast of the interchange originally avoided would be impacted; and

[1] Technical Memorandum, DRIC Design Speed Limit Supplemental Study, August 11, 2008.

- The Berwalt Manor Apartments would most likely have to be removed with this alternative.

The net result would be poorer local access to I-75, more property acquisitions, additional utility impacts, and higher construction costs than the Preferred Alternative.

4.3.1.5 Recommendation

The recommendation is to maintain the design speed of I-75 at 60 MPH, and to obtain a design exception for the vertical profile until such time that I-75 is reconstructed, and will ensure the DRIC project will accommodate the reconstruction of I-75 in the future.

4.3.2 Berwalt Manor Avoidance

4.3.2.1 Introduction

The Berwalt Manor is located on the southeast corner of the Campbell Street/northbound I-75 Service Drive intersection. The Berwalt Manor shown in Figure 4.3-1 has been identified through consultation with the Michigan State Historic Preservation Officer (SHPO) as eligible for the National Register of Historic Places (NRHP) in accordance with Criterion C as defined by the National Park Service NRHP Guidelines – because it "embod[ies] distinctive characteristics of a type, period, or method of construction . . . ." The building currently serves as a multi-unit apartment building. The population of Berwalt Manor is reported by the owner to be primarily of Hispanic origin, therefore, they are protected by Environmental Justice regulations. Figure 4.3-2 presents the plan view and property boundaries.

Figure 4.3-1
Berwalt Manor Building

Figure 4.3-2
Berwalt Manor Building Plan View

Regulations supporting Section 106 of the National Historic Preservation Act require that properties of national, state and/or local significance be considered, together with any adverse impacts to such properties. It calls for avoiding, minimizing, or mitigating adverse impacts. Section 4(f) of the Department of Transportation Act of 1966 applies to USDOT projects and protects parklands and historic sites. It prohibits use of such properties unless there is no prudent and feasible alternative and documentation shows that all possible planning was done to minimize harm.

As a result, after the Detroit River International Crossing (DRIC) Draft Environmental Impact Statement (DEIS) public comment period closed, a series of engineering options were developed to avoid, minimize, or mitigate adverse impacts to the building. The development of options was done concurrently with the development of other components of the project, to ensure that mitigation measures were consistent with the overall project development.

This technical memo presents and analyzes the no-build condition and three options to mitigate impacts to the Berwalt Manor that will occur with construction of the Preferred Alternative. The purpose of the memo is to recommend the most viable mitigation option for inclusion in the Final Environmental Impact Statement (FEIS) Engineering Report, as a part of the Preferred Alternative. The three options presented are:

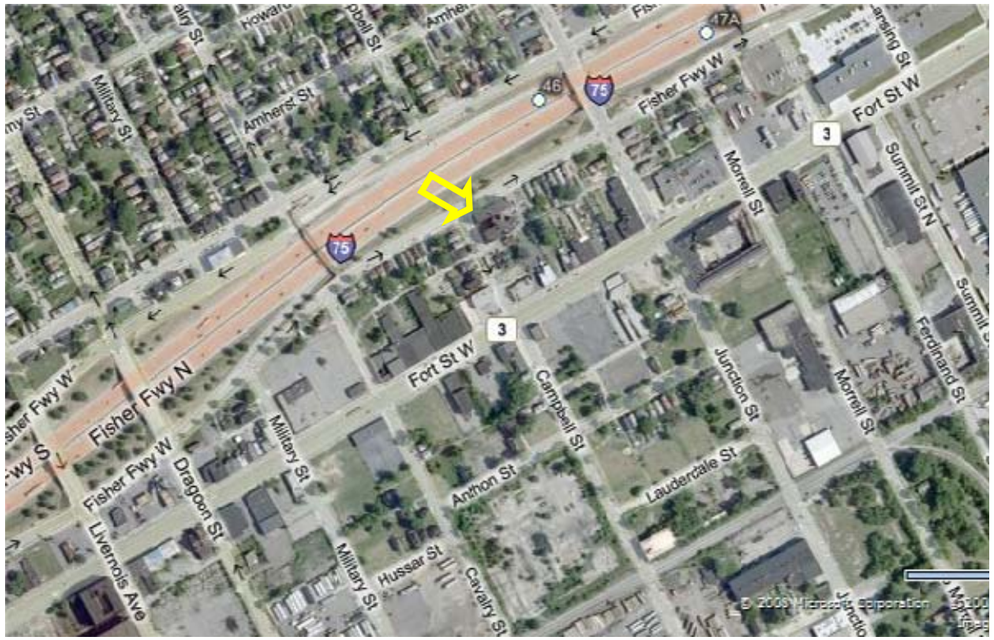
- No-Build Option: For comparison purposes, the no-build option is reviewed to assess the impacts of build alternatives (Figure 4.3-3).
- Option 1: Acquire and remove the building (Figure 4.3-4).
- Option 2: Maintain a continuous northbound I-75 Service Drive to the south of Berwalt Manor and construct the northbound entrance ramp to I-75 from the proposed Plaza to the north of Berwalt Manor, while avoiding the property (Figure 4.3-5).
- Option 3: End the northbound Service Drive at Livernois and the I-75 exit ramp at Campbell, while constructing the northbound entrance ramp to I-75 from the proposed Plaza on the north of Berwalt Manor. Avoid taking Berwalt and all property acquisitions in the block bounded by the northbound I-75 Service Drive, Campbell and Junction Streets (Figure 4.3-7).

Each option presented in this report meets all applicable engineering standards. Analysis of each option considered the following engineering and environmental benefits and impacts:

- Engineering:
  - Access and Mobility
  - Operations
- Environmental:
  - Relocation impacts
  - Environmental Justice
  - Historical resource impacts
  - Noise impacts
  - Commercial viability

4.3.2.2 No-Build Alternative

Figure 4.3-3
No-Build Alternative



Currently, Berwalt Manor sits adjacent to the northbound I-75 Service Drive at Campbell Street, see Figure 4.3-3. In 2006, the northbound Service Drive had approximately 84 cars and 2 trucks on it in the AM peak hour. In 2035, the peak hour traffic on the northbound Service Drive is expected to be 80 cars and 2 trucks. Current AM peak hour northbound I-75 traffic is 5,525 vehicles; this will change little by 2035, when the volume is expected to be 5,356.

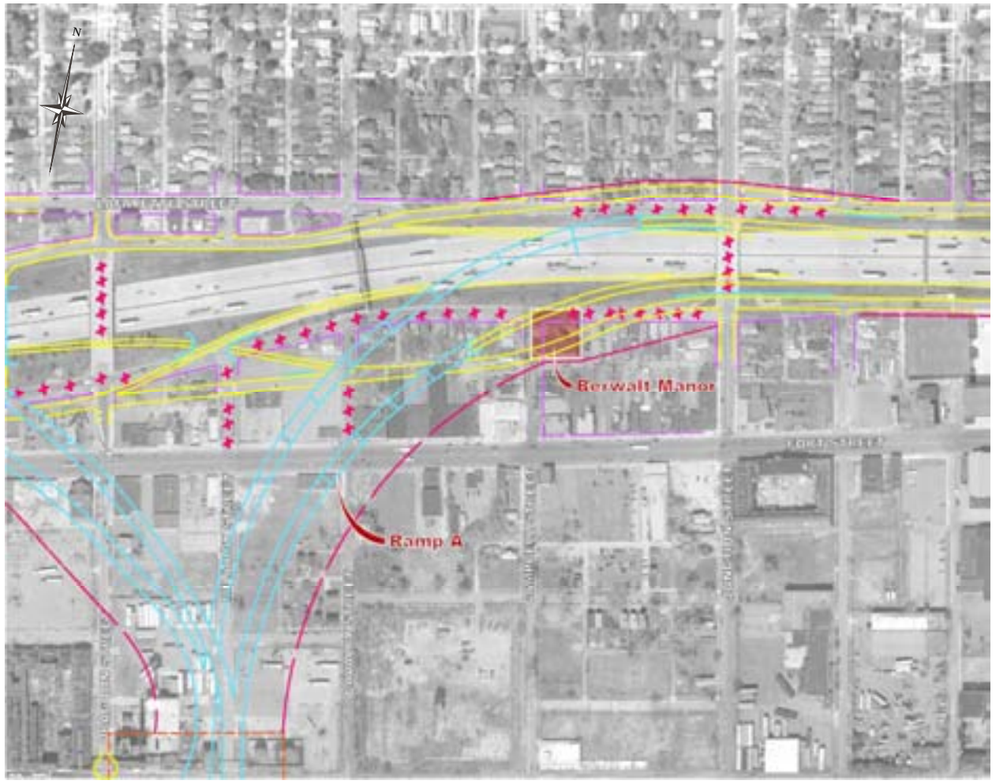
Residents now open their windows or use window mounted air conditioning units for cooling in the summer. This exposes them to noise from the mainline I-75 and Service Drive. Noise is currently measured at 69 dBA in this area. Traffic volumes in 2035 under no-build conditions would not change that noise level.

4.3.2.3 Option 1

Description

A hybrid interchange alternative was developed from refinements to the DEIS Alternatives #1, #2 and #16 through an engineering workshop to identify a Preferred Alternative. This hybrid alternative has the best operational characteristics, minimizes the environmental impacts and satisfies community concerns. The Service Drive and Plaza ramp layout of Alternative #1 south of I-75, in the area of the Berwalt Manor, was desired because it is associated with a braided local ramp configuration and a shorter ramp bridge length. For the purposes of this memo DEIS Alternative #1 Ramp A – Plaza to northbound I-75 – and the northbound Service Drive ramp are Option 1. Option 1 would involve acquiring the Berwalt Manor and the northern half of the block it occupies, see Figure 4.3-4.

Figure 4.3-4
Option 1



The northbound I-75 local exit ramp merges with the northbound Service Drive near Cavalry Street. The first cross street would be Junction Street and the Service Drive would end at Clark Street. The I-75 exit would be signed Junction Street. In this area Dragoon, Military, Cavalry, and Campbell Streets would be abandoned between Fort Street and the Service Drive.

Benefits and Impacts

Engineering

By removing Berwalt Manor the horizontal radius of Plaza Ramp A is approximately 1,500 feet. This provides a ramp design speed of 45 MPH. Variations on the ramp curvature do not significantly affect the vertical profile, therefore, the bridge length is not significantly different. The local ramp from northbound I-75 exits in the vicinity of Cavalry Street, where it joins the Service Drive, and then proceeds to Junction Street. Traffic can then access Fort Street to the south, or can continue along the Service Drive to Clark Street which is the first north/south access across I-75.

The Service Drive would have approximately 271 vehicles per hour in the AM peak hour in the design year 2035, including 16 trucks.

From an operational perspective Option 1 provides a continuous Service Drive along I-75. Continuous Service Drives are operationally beneficial whenever they are possible. Service drives can:

- Serve as an alternate route for the mainline freeway during construction and maintenance activities;
- Provide for storage of heavy volumes of traffic to avoid backups on the freeway itself;
- Maintain local access points to businesses and residences; and
- Serve as an alternate route in the event of incidents on the mainline freeway.

Alternative routes are much more attractive to motorists, and can most optimally serve traffic demand, when the number of turns and direction changes are minimized through the use of continuous Service Drives.

Environmental

Relocation Impacts

In the vicinity of Berwalt Manor, Option 1 requires acquisition of the northern half of the block bounded by the northbound I-75 Service Drive, Campbell, Junction, and Fort Streets. Option 1 takes Berwalt Manor at 64 dwelling units, plus six single-family residences on I-75 northbound Service Drive, plus one residence on the west side of Junction Street for a total of 71 dwelling units. Removal of Berwalt Manor means less City of Detroit taxes and the residents would be displaced.

Environmental Justice

The population of Berwalt Manor that would be acquired is reported to be of Hispanic origin, therefore, they are protected by Environmental Justice regulations. In Option 1, these individuals would be displaced constituting a disproportionate impact.

Historic Resources

In Option 1, Berwalt Manor would be acquired and demolished. Required mitigation would include creation of a permanent record of Berwalt Manor's history and current conditions at the time the project commences. Relocation of the building is not feasible.

Land use planning for the project places a high degree of importance on the treatment of Fort Wayne due to its historic importance. This includes simplified way finding and routing to the Fort around the proposed Plaza and improvements, along with aesthetic improvements to both the routes and surrounding area. A parkway type boulevard roadway, where possible, has been considered along this improved route.

Plaza P-a, which is common to all options, would route local traffic to Campbell Street south of the railroad line where they could then travel to Fort Street or Jefferson Avenue. Campbell Street south of the railroad line can be transitioned into a boulevard section without the acquisition of additional properties by widening on the Plaza side of the street.

In Option 1, the local traffic exiting northbound I-75 would use Junction Street to access Fort Wayne. This is not the same route as traffic exiting the Plaza would utilize, which is Campbell Street. Junction Street cannot be improved to a boulevard section without acquiring right-of-way. This situation would: 1) create less consistent access to Historic Fort Wayne; and, 2) eliminate the ability to provide an improved parkway effect from I-75.

Noise

Removal of the properties along the Service Drive would eliminate noise receptors; however the remaining buildings fronting Fort Street would have an active Service Drive behind them. This would have no noise effect, as these are commercial structures and the primary noise source today, and would remain, Fort Street.

Summary

Option 1 would require the acquisition of the Berwalt Manor building but would offer good operational characteristics for the northbound Service Drive and a higher speed on Ramp A. The residents of Berwalt would be displaced, which would place a disproportionate burden on minorities. In addition, the adjacent residential and commercial properties would be acquired, thereby displacing those occupants.

4.3.2.4 Option 2

Description

Section 4(f) requires that avoidance alternatives be developed to avoid impacts to historic resources where feasible and prudent. Option 2, shown in Figure 4.3-5, modifies the Practical Alternative #1 Ramp A and the northbound I-75 Service Drive to avoid Berwalt Manor. Figure 4.3-6 shows the profile of Ramp A adjacent to the Berwalt. The building would be between Plaza Ramp A and the northbound Service Drive. All other properties on the northern half of the block would be acquired as well as the property at Campbell and Fort Streets south of Berwalt Manor. Access to the building would be from the northbound Service Drive.

In Option 2, the northbound I-75 local ramp exits and merges with the northbound Service Drive near Cavalry Street. The first intersection would be at Junction Street and the first cross street is Clark Street. The I-75 exit would be signed Junction Street. In this area Dragoon, Cavalry, and Campbell Streets would be abandoned between Fort Street and the Service Drive. Access to Berwalt Manor would be off of the northbound Service Drive which would be accessed from Livernois Avenue only, as the Service Drive is one-way, and egress would be via the Service Drive to Junction Street.

Benefits and Impacts

Engineering

To avoid Berwalt Manor, the Ramp A radius would be revised to approximately 1,340 feet. This would reduce the ramp design speed from 45 MPH to 40 MPH. Variations on the ramp curvature between Options 1 and 2 do not significantly affect the vertical profile. Therefore, the bridge length and its associated cost is not a differentiator between options.

The local ramp from northbound I-75 exits in the vicinity of Cavalry Street, where it joins the northbound Service Drive, and then proceeds to Junction Street. Traffic can then access Fort Street to the south, or can continue along the Service Drive to Clark Street which is the first north/south access across I-75.

The northbound I-75 Service Drive would have approximately 271 vehicles in the AM peak hour in the design year 2035, including 16 trucks, the same as Option 1. Ramp A in the AM peak hour, in the design year 2035, would have 499 cars and 194 trucks.

From an operational perspective, Option 2 which provides a continuous Service Drive along I-75, would have the same operational benefits as Option 1.

Figure 4.3-5
Option 2

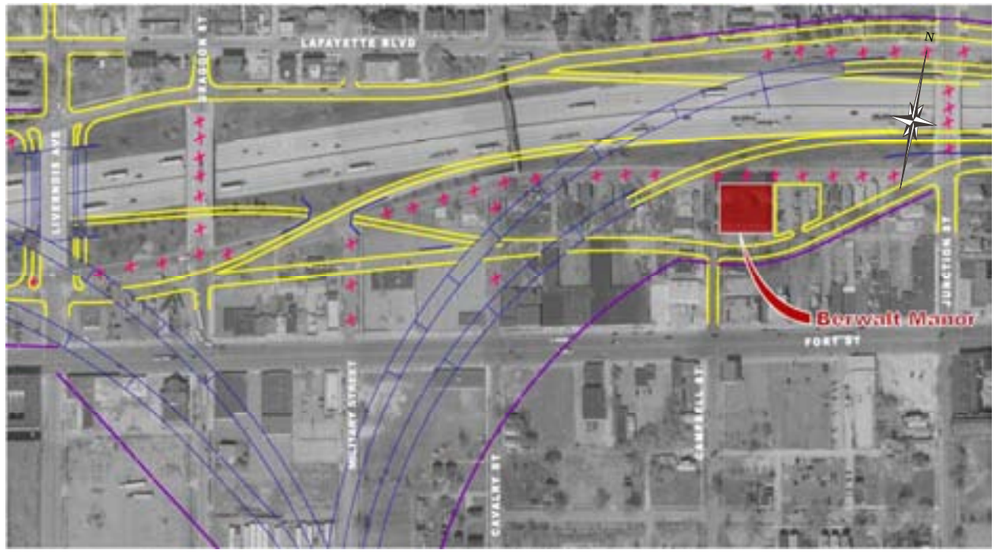
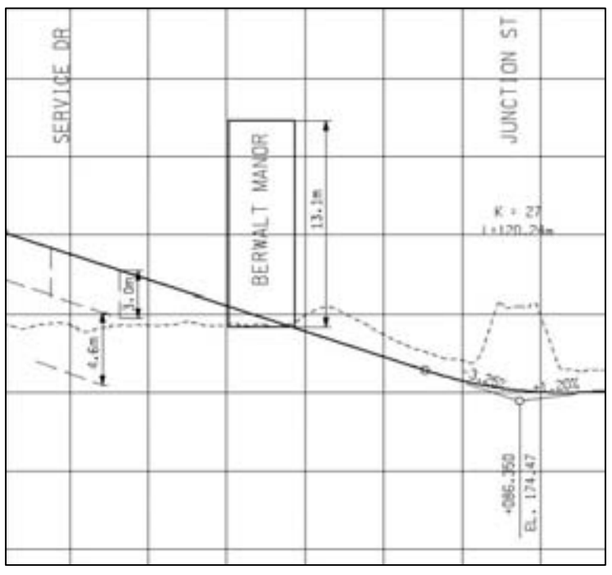


Figure 4.3-6
Option 2 - Ramp A Vertical Alignment



Environmental

Relocation Impacts

Option 2 requires acquisition of eight single-family residences (dwelling units), one on the east side of Campbell Street, six on the I-75 northbound Service Drive, and one on the west side of Junction Street. Acquisition of these homes would remove them from the City of Detroit tax rolls and the residents would be displaced.

Environmental Justice

The population of Berwalt Manor is reported by the owner to be of Hispanic origin, therefore, they are protected by Environmental Justice regulations. In Option 2 residents would not be displaced; however, mitigation is required due to impacts caused by the introduction of Ramp A in close proximity to the building. Mitigation would consist of replacing the existing building windows with triple pane Low-E windows consistent with Secretary of the Interior Standards for Rehabilitating Historic Buildings and by providing central heating ventilation and air conditioning (HVAC). In addition, an acoustical analysis could be performed within the building to determine the application of noise abatement materials such as; roof material, exterior wall insulation and acoustical windows and doors. Due to the current low-energy efficiencies based on poor windows, older equipment, and window air conditioners, it is likely that a modern HVAC system, coupled with window improvements, would not increase the building's utility costs. Although the above described improvements to the building could make it more desirable, potentially increasing rents which could force low-income residents out, this is doubtful given its close proximity to Ramp A and the mainline I-75.

Historic Resources

It is all but certain the SHPO would find that having the future ramp on one side of Berwalt Manor and the Service Drive on the other would result in an adverse effect to the building.

Land use planning for the project places a high degree of importance on the treatment of Fort Wayne due to its historic importance. This includes simplified way finding and routing to the Fort around the proposed Plaza and improvements, along with aesthetic improvements to both the routes and surrounding area. A parkway-type boulevard roadway has been considered along this improved route.

Plaza P-a, which is common to all options, would route local traffic to Campbell Street south of the railroad line where they could then travel to Fort Street or Jefferson Avenue. Campbell Street south of the railroad line can be transitioned into a boulevard section without the acquisition of additional properties by widening on the Plaza side of the street.

In Option 2 the local traffic exiting northbound I-75 would likely take Junction Street to access Historic Fort Wayne. This is not the same route as traffic exiting the Plaza would take. Junction Street cannot be improved to a boulevard section without acquiring right-of-way. This situation would: 1) create less consistent access to Historic Fort Wayne; and, 2) eliminate the ability to provide an improved parkway effect from I-75.

Consultation will continue to assure window and HVAC improvements follow the Secretary of the Interior Standards and that the limited access fence design, materials, and scale be compatible and complementary to the historic Berwalt Manor.

Noise

The existing properties along the northbound Service Drive in this area currently experience a noise level of 69 dBA. The addition of Ramp A which has 194 trucks per hour increases the noise 3 dBA from the No-Build option. However, construction of a noise wall is not feasible. The ramp is so close to the building that a wall would have to be nearly as tall as the building (40 feet) to protect it. Such a wall simply cannot be built due to wind loads and other factors, even if

someone wanted it. A lower wall would not protect residents in the upper floors of the building. Mitigation for Berwalt Manor resident's purposes has the benefit of lessening the noise on the interior of the building to levels below what is currently experienced.

Commercial Viability

The Berwalt Manor owner in interviews and correspondence indicates that the apartment building would not continue to be viable if it were isolated and surrounded by the I-75 exit ramp and northbound Service Drive. The building could potentially be transitioned to some other commercially viable use although this could not adequately be determined until the property acquisition phase of the project after the Record of Decision.

Summary

Option 2 would leave the Berwalt Manor building isolated between the I-75 mainline and Plaza Ramp A and the I-75 exit/Service Drive. However, the continuous Service Drive would offer good traffic operational characteristics to motorists. The adjacent residential properties would be acquired displacing their occupants. There would be less synergy between I-75 access to Fort Wayne and local Plaza access, which could reduce the visibility and attractiveness of the Fort. This could discourage increased use of the facility and diminish the opportunity to fund needed improvements there. The SHPO is likely to consider the impacts to Berwalt Manor adverse. It is unlikely that the building would remain commercially viable as an apartment building.

4.3.2.5 Option 3

Description

Section 4(f) requires that avoidance alternatives be developed to avoid impacts to historic resources where feasible and prudent. Option 2, as discussed above, would isolate Berwalt Manor between Ramp A and the I-75 Service Drive. So options to avoid this effect were examined including direct connections to Fort Street.

Option 3, shown in Figure 4.3-7, terminates the I-75 northbound exit ramp at Campbell Street. The vertical profile of Ramp A would be similar to Option 2, Figure 4.3-6. Access to Berwalt Manor would be off of the northbound I-75 Service Drive via Campbell Street from Fort Street as shown in Figure 4.3-8. There would be no access to any properties on Campbell Street between Fort Street and the Service Drive.

The exit ramp and Campbell Street intersection would be either signed as stop or yield control, or have a signal coordinated with the signal at Fort Street. The northbound Service Drive is terminated at Livernois Avenue but begins again at Campbell Street north of Berwalt Manor. The I-75 exit would be signed Campbell Street and the street would be fenced as limited access right-of-way. In this area, Dragoon and Cavalry Streets would be abandoned between Fort Street and the Service Drive. In Option 3, Campbell Street, between the Plaza and Jefferson Avenue, would be modified to a narrow boulevard section due to the volume of traffic and its synergy with the I-75 exit in order to create an improved gateway to Historic Fort Wayne.

Benefits and Impacts

Engineering

To avoid Berwalt Manor, the horizontal radius of Plaza Ramp A is approximately 1,340 feet to accommodate a ramp speed of 40 MPH. Variations on the ramp curvature among Options 1, 2, and 3 do not significantly affect the vertical profile, therefore, the bridge length and its associated cost is not a differentiator among options.

Figure 4.3-7
Option 3

The local exit ramp from northbound I-75 exits at Campbell Street where traffic would turn right to access Fort Street, or turn left to access Berwalt Manor or the northbound I-75 Service Drive.

The northbound I-75 exit ramp is projected to have 135 cars and 7 trucks in the AM peak hour in the design year 2035. The Service Drive adjacent to Berwalt Manor would have approximately 111 cars in the AM peak hour in the design year 2035. No trucks would be allowed on this portion of the Service Drive due to inadequate geometry.

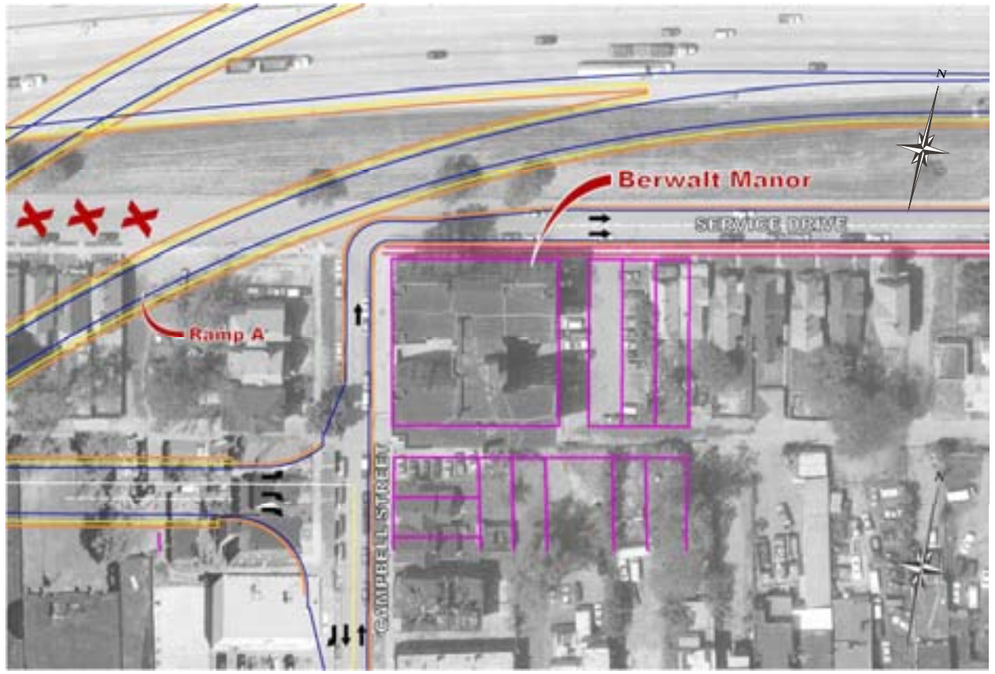
From an operational perspective, Option 3 does not provide a continuous Service Drive along I-75. Existing Service Drive traffic would need to utilize Livernois to Fort to Junction. Therefore, the operational benefits noted in Options 1 and 2 are not realized with Option 3. However, in the area, Fort Street is in close proximity to I-75 and has adequate reserve capacity to handle this Service Drive traffic.

Environmental

Relocation Impacts

In the area of Berwalt Manor, Option 3 does not require acquisition of any properties on the block bounded by the northbound I-75 Service Drive, Campbell, Junction, and Fort Streets. Campbell Street properties access to the street would be eliminated and replaced by alternate access as shown in Figure 4.3-8.

Figure 4.3-8
Option 3 - Berwalt Right-of-Way, Access and Parking



Environmental Justice

The population of Berwalt Manor is reported by the owner to be of Hispanic origin, therefore, they are protected by Environmental Justice regulations. In Option 3, residents would not be displaced, however, mitigation is required due to impacts caused by the introduction of Ramp A in close proximity to the building. Mitigation would consist of replacing the existing building windows with triple pane Low-E windows consistent with Secretary of the Interior Standards for Rehabilitating Historic Buildings and by providing central heating ventilation and air conditioning (HVAC). In addition, an acoustical analysis could be performed within the building to determine the application of noise abatement materials such as; roof material, exterior wall insulation and acoustical windows and doors. Due to the current low-energy efficiencies based on poor windows, older equipment, and window air conditioners, it is likely that a modern HVAC system coupled with window improvements would not increase the building's utility costs. Although the above described improvements to the building could make it more desirable, potentially increasing rents which could force low-income residents out, this is doubtful given its close proximity to Ramp A and the mainline I-75.

Historic Resources

Through consultations with the SHPO, the Option 3 treatment of Berwalt Manor would not result in a finding of adverse impact.

Land use planning for the project places a high degree of importance on the treatment of Historic Fort Wayne. This includes simplified way finding and routing to the Fort around the proposed Plaza. Plaza P-a, which is common to all options, would route local traffic to Campbell Street where they could then travel to Fort Street or Jefferson Avenue and to Historic Fort Wayne. In Option 3, the local traffic exiting northbound I-75 would also be routed to Campbell Street, to access Fort Wayne. This combined access, as well as the proposed improvements to Campbell Street, would create consistent access and an improved "gateway" effect or feel on the route to Historic Fort Wayne.

Consultation will continue to assure window and HVAC improvements follow the Secretary of the Interior Standards and that the limited access fence design, materials, and scale be compatible and complementary to the historic Berwalt Manor.

Noise

The existing properties along the northbound Service Drive in this area currently experience a noise level of 69 dBA. The addition of Ramp A, which has 194 trucks in the AM peak hour, increases the noise 3 dBA. However, construction of a noise wall is not feasible. The ramp is so close to the building that a wall would have to be nearly as tall as the building (40 feet) to protect it. Such a wall simply cannot be built due to wind loads and other factors, even if someone wanted it. A lower wall would not protect residents in the upper floors of the building. Fortunately, as noted above, mitigation for Berwalt Manor residents has the benefit of lessening the noise on the interior of the building to levels below what is currently experienced. Due to this mitigation, even though there is a new stop condition at the I-75 exit ramp intersection with Campbell Street, there would be a negligible difference in noise levels at Berwalt Manor between Options 2 and 3. As I-75 is the primary noise source for points along the northbound Service Drive east of Berwalt Manor, the change in noise under Option 3 for the homes remaining along the Service Drive will be negligible.

Commercial Viability

The Berwalt Manor owners in interviews and correspondence indicated that the apartment building would continue to be viable if it were part of a contiguous block of viable properties.

Summary

Option 3 would leave the Berwalt Manor building on a cohesive block of properties which would maintain its commercial viability. The Service Drive would not be continuous decreasing the traffic operational characteristics of the option; however, this is mitigated by the available capacity of the adjacent Fort Street and the fact that traffic traveling past Berwalt Manor would be reduced from the No-Build Alternative as well as Options 1 and 2. Replacing the windows and HVAC of Berwalt Manor would mitigate negative effects on a minority population satisfying Environmental Justice concerns and reduce noise. The access to Historic Fort Wayne from I-75 and the new bridge's Plaza would be consistent with land use planning conducive to needed improvements along Campbell Street. The SHPO would not consider the impacts to Berwalt Manor adverse, and the treatment would satisfy Section 4(f) regulations by avoiding and minimizing impacts.

4.3.2.6 Recommendation

The following table summarizes the evaluation of the categories presented at the beginning of this section for each option presented above.

Evaluation Category	No-Build	Option 1	Option 2	Option 3
Engineering:				
Access and Mobility	No change	Continuous Service Drive	Continuous Service Drive	Discontinuous Service Drive
Operations	No change	Good operations	Good operations	Adequate operations
Environmental:				
Relocation impacts	None	71 D.U.'s*	8 D.U.'s*	None
Environmental Justice	No change	Disproportionate	Disproportionate	Mitigated
Historical resource impacts	None	Section 106 - Adverse & 4(f) - Use	Section 106 - Adverse	None
Noise impacts	Significant	No building	Improved	Improved
Commercial viability	No change	Building taken	Not viable	Viable

* D.U. denotes dwelling unit.

The project team recommends the incorporation of *Option 3*, as the preferred treatment for the Berwalt Manor building, into the Preferred Alternative because, *Option 3* would:

- Mitigate disproportionate effects on a minority population.
- Avoid adverse impacts to an historic resource.
- Maintain the commercial viability of the Berwalt Manor building.
- Be consistent with land use planning.
- Maximize synergy between Plaza and I-75 access to Historic Fort Wayne.
- Mitigate the less desirable operational characteristics of the continuous Service Drive with the available capacity of Fort Street.

4.4 Utilities

4.4.1 Description of Investigation

An investigation into the utility impact of the Detroit River International Crossing project was conducted starting in early 2006. During early stages of the project study, multiple alternatives were being considered and the utility impact was a big factor in choosing the best alternative. Local utility companies were contacted and sent requests for utility maps showing their facilities within the alternative project areas. After receiving location maps from each utility company, Northwest Consultants Inc. (NCI) drafted some preliminary utility plans showing all underground utilities, as well as any significant above ground structures and aerial wires.

After all utility information was collected and compiled, individual meetings were held with the utility companies. The locations and accuracy of the drafted facilities were then verified by the individual company. At this point in the investigation, utility locations were considered a best estimate from the information provided and based on these estimates, NCI prepared cost estimates of utility impact for each alternative.

Each alternative was carefully studied, considering all aspects of utility disruption and a final decision on the project alternative was made. After the project alternative was finalized, NCI revised the cost estimate for the specific alternative chosen. Utility maps (Appendix D) were updated; showing each individual utility on a separate map, highlighting all major facilities and lines located within the preferred project area.

4.4.2 General Utility Issues

The Customs and Border Control stated that no utilities would be permitted in the Plaza. A buffer zone around the Plaza is being planned. It is possible to relocate some of the utilities into this area. Within the buffer zone, individual utilities will be given a specific zone, with varying widths, that will house all their utility reroutes around the Plaza, allowing 24-hour access to all the facilities. Distribution lines within the Plaza limits will most likely be abandoned and removed.

Proposed work to I-75 will also affect some of the utilities in the area. Service Drives along I-75 are to be shifted and regraded, causing utility poles to be shifted and/or moved. Aerial lines traveling through the interchange "braid" area will need to be routed underground due to the multiple bridge heights and lack of acceptable clearances. Bridges crossing I-75 are to be either removed or reconstructed. Existing utilities crossing I-75 at these bridge locations shall be rerouted to an acceptable crossing area or route the lines under the bridges.

4.4.3 Specific Utility Concerns

There are utility lines from numerous companies that are located within the project area. Many of these lines are considered distribution lines that will either be abandoned or removed without any issues. Other facilities located within the Plaza area will need to be relocated according to each utility company's specific standards. Some major utility concerns are as follows:

- DWSD
  - Sewers – A large number of sewers run through the proposed Plaza boundaries. Typically, the north-south sewers are large and carry both sanitary and storm flow. These sewers, which discharge into the Detroit River Interceptor (DRI) along Jefferson Avenue, will need to be rerouted around the Plaza within the buffer zone. Concerns about the hydraulic loss associated with "bending" a large sewer around the Plaza have been raised, but cannot be accurately determined until a full drainage study has been conducted. Another area of concern is with the existing sewer siphons located across I-75. The existing siphons are very shallow and may need to be extended to accommodate the proposed widening of I-75.
  - Water – The water distribution conflicts associated with this project are minimal. There are two major water mains located outside of the Plaza limits. A 42" line runs along Jefferson Avenue and should not be impacted with this project. A 54" line, which runs from Beard Street, north of I-75, south to Post Street and along the western border of the Plaza, shall only be impacted at the I-75 crossing. If work is to be done in the vicinity of either of these lines, care will be taken to coordinate all utility efforts with these lines.
  - Laboratory – The existing DWSD Laboratory located near South Street and Livernois Avenue will be removed from its current location and relocated to a new facility.
- DTE Energy

There are 32 active circuits starting at the Waterman Substation and flowing throughout Detroit. The circuits flow into 3 general directions: Downtown Detroit, Northwest Detroit, and Southwest Detroit. DTE estimates that 22 of these circuits will be impacted by the plaza construction. The existing circuits snake their way through the plaza area. They do not travel in a direct path to their location, but instead weave through different conduits through each street. If they were to be moved overhead, they would require 11 pole leads. This is undesired due to the space required and the unsightly aesthetics. Another impact was the relocation of the Artillery Substation. This relocation could begin quickly once DTE receives the funds from MDOT.

The DTE plan estimated a project length of 9.5 years from begin on design to end of construction. This was a worst-case scenario where everything was done in series while replacing all of the lines. The typical construction sequence involves constructing the conduit, constructing the manholes, pulling the lines, and finally making the splices and joints. DTE does all of their own splices and joints. This is a highly specialized field and takes approximately 4 years of experience to become proficient. The other items could be contracted.

The preliminary relocation concept for DTE Energy is to cross I-75 in a new crossing near Post Street. This crossing could be moved to the Green Street structure. However, it was discussed that there may not be enough room in the Green Street structure for all of the circuits. The relocations along Jefferson and Clark would reuse existing conduits as possible.

There are ways to quicken the schedule. These include:

- *Upgrading the system (reducing the number of circuits):* DTE Energy is looking at upgrading their system, however, does not have the funds for the study and design. The current system is somewhere between 50 to 60 years old. If MDOT was to provide seed money, DTE could review their system in the area and possibly eliminate or otherwise optimize the system in Delray. This could reduce the number of new circuits required to be constructed which would reduce the schedule. They would like to start work on this study next year.
- *Construct some portions in parallel:* DTE Energy could construct some of the conduits and manholes in parallel instead of one line at a time. This would depend on circumstances and the design. Most of the cables will need to be pulled and spliced in series, but depending on the design and needs, some of them could be done in parallel.
- *Construct some portions during plaza construction:* Not all of the relocated lines will need to be moved prior to start of plaza construction. With close coordination, it may be possible to modify the plaza design to work with the electrical relocations to minimize construction time.

Items needed by DTE Energy to begin the relocation work include:

- *Relocation route identified:* The route needs to be identified along with the land purchased and the ROW dedicated. Also, potential conflict areas within the relocation route need to be known. This includes other relocated utilities. The DTE conduits will need to peel off and exit the buffer zone along the relocation path. These locations will need to be identified.
- *Proposed buildings within plaza:* Knowledge of the proposed buildings within the plaza will allow DTE and MDOT to potentially phase the construction of the relocations to reduce the construction schedule.
- *Electrical service for the plaza:* DTE Energy would need to know how the new plaza and custom buildings would receive their electricity. It may be necessary to place a small transformer and substation to supply power.

Figure 4.4-1 identifies DTE's proposed route for their underground conduit/cable facilities. Approximately 48,000 feet of conduit will have to be built.

The following identifies the number of new conduits 3 x 3 each, with 5" ducts that will be needed to relocate DTE's underground facilities. DTE requires a minimum of 10 feet between conduits.

Section J (light green)	3 separate conduit runs – 30' in buffer zone
Section A (light blue)	4 separate conduit runs – 40' in buffer zone
Section B (purple)	2 separate conduit runs – 20' in buffer zone
Section C (royal blue)	2 separate conduit runs – 20' in buffer zone
Section D (olive green)	2 separate conduit runs – 20' in buffer zone
Section E (orange)	2 separate conduit runs – 20' in buffer zone

FIGURE 4.4-1
DTE Energy Conceptual Conduit and Cable Relocation Routes

Source: DTE Energy, 2008.

DTE stated that they need to maintain the interstate crossing at I-75 and Springwells where three separate conduits (3 x 3 each, with 5" ducts) are required. Three (3) borings under I-75 and Springwells will be needed. DTE would also maintain the existing interstate crossings at I-75 & Waterman (under freeway), I-75 & Rademacher (under freeway), I-75 & Crawford (under freeway), I-75 & Military (under freeway), I-75 & Mckinstry (under freeway) and I-75 & Clark streets (in bridge). DTE would bore under the railroad at two locations (section B & D). Each boring will accommodate 2 separate conduit runs. Currently, DTE would plan on boring under I-75 in the vicinity of Post Street with 2 separate conduit runs.

Scheduling for the electrical relocations is of vital importance to this project. According to DTE the following schedule of construction has been developed:

- Each of the 22 trunk lines (24-kV) has to be relocated one at a time. The average "downtime" to de-energize and re-energize a relocated trunk line is 2 weeks. Three distribution circuits will also have to be energized/de-energized with the relocation and generally require 1 week of downtime per circuit. Due to the nature of loading during the summer months, 24-kV trunk lines generally cannot be shut down in June, July and August. Careful planning and scheduling will have to be done to work around this.
- To better convey the magnitude of this project as an example, the relocation process for one (1) 24-kV trunk line follows. DTE is proposing to relocate 24-kV Trk 721 that presently runs from Waterman Station to the Lafayette/Livernois area via the plaza area. The new conduit and cable will follow the

route identified by segments J, A and B on the attached map. Relocation includes the installation of 7,600 feet of conduit. One hundred feet of conduit can be installed per day. The conduit installation will take 76 days. Three-way manholes are installed at every intersection and 2-way manholes are installed to keep the distances between manholes under 500 feet. Twenty-five (25) 3-way manholes and four (4) 2-way manholes will be built throughout this new 3 x 3 – 5" conduit run. Most of these manholes will take 3 days to construct. A couple of manholes will take 20 days each to construct due to conflicts with existing underground facilities. Manhole construction will take 101 days. Twenty-eight (28) sections of underground cable will be installed. After adding extra slack cable in the calculation, over 8,100 feet of cable will be installed. Since three (3) sections of cable can be pulled per day, it will take over 9 days to pull the cable for one (1) trunk line. Splicing takes two (2) days per manhole. Since we've constructed 29 manholes, it will take 58 days to complete the cable splicing. We also have allowed 9 days to remove the old cable. We are planning on 10 days to de-energize the old/re-energize the new cables. In total, the estimated time to relocate one (1) 24-kV trunk line around the proposed plaza area is 263 days.

- ITC

There are two concerns with the ITC facilities. The first are the overhead transmission towers and lines. The second area of concern is the underground transmission lines. According to ITC, the overall time needed to design and construct all of the circuits is three years.

Overhead tower circuits:
The scope of the overhead line work involves the relocation of at least 6 transmission line structures. More structure relocations may be necessary if the west utility buffer cannot accommodate the structures in addition to all of the other utilities that are going to be placed there. There is also a concern with the structures going over the bridge entrance/exit as to whether this will be allowed for security reasons. For this estimate, it will be assumed that the buffer zone around the plaza can accommodate the new structures and the structures can span over the entrance/exit to the bridge. The current structures will be replaced with steel poles so as to make the footprint of the structures smaller and take up less room within the buffer zone. If for any reason the line must be completely relocated and new rights-of-way outside the utility buffer need to be obtained, the costs will increase substantially. The time frame for this project would involve 3 months for easement review and design, 6 months for material procurement and 6 months for construction. A construction staging area would be needed for the steel poles, conductor and hardware.

Underground Circuits:
There is a moderate degree of uncertainty in the underground estimate because details of the routes are not known. Costs are highly dependant on route selection. A seemingly minor change in route can have a significant effect on total project cost. The circuit routes are very preliminary, and depend on the availability of right of way and avoidance of underground obstructions.

Reroute of 120-kV underground circuits:

- *Cato-Waterman and St. Antoine-Waterman circuits. (cross-linked polyethylene insulated cable)*
  These circuits and their associated control cable circuits are presently routed in a common duct structure. It is not known at this time if the circuits will be rerouted independently or continue in a common duct structure. Since these cables are installed in conduit structures, their associated control cable circuits are assumed to be in the same duct structure. It is not certain if the reroute from Waterman Substation to Scotten St. and the I-75 east bound service drive will utilize the Plaza utility zone.
- *Frisbie-Waterman (high pressure pipe-type) cable circuit*
  The route of this circuit from Waterman Substation to Howard and Military probably will not utilize the utility corridor because of the need to cross I-75 away from the bridge approach roadways. (NOTE: Since this cable is in an eight inch mild steel pipe, its associated low voltage control cable circuit is routed separately in DTE owned duct structures.)
- *Low voltage control cable circuits*
  Reroute of the Frisbie-Waterman, River Rouge-Waterman, Alfred-River Rouge, and Waterman-Zug "B" low voltage control circuits depends on the reroute of the DTE conduit structures. A "best guess" was used to estimate reroute lengths. The estimate does not include the cost of a conduit structure. A construction staging area would be needed for the underground cable, conduit and associated heavy equipment. Design time for the 120-kV cable and low voltage control cable reroutes is one year. Construction time is two years to complete conduit installation, pipe installation, cable pulling, and splicing.

- DTE Michcon – There is a large high-pressure gas main located along Fort Street. However, work done on or near Fort Street will be minimal and should not affect the gas main. All other gas lines should be able to be relocated, however, Michcon did express that they prefer not to have to relocate high-pressure lines on a bridge structure.
- Dome Pipeline – The previously known Dome Pipelines are now owned by separate companies (Kinder Morgan and British Petroleum (BP)). The Plaza and Bridge should not disturb the pipelines, however, when the ITC Transmission towers are relocated, care will need to be taken to avoid the existing pipelines.
- SBC – An SBC control center is located at Wheelock Street and Fort Street. This is the main control for the majority of homes on the north side of I-75. A significant duct bank runs from the control center, north to be distributed throughout the residential zone. SBC believes their duct banks within the project area are old and brittle and any "major" work (i.e. pile driving, etc) may affect the structural integrity of the duct banks.
- Comcast/Qwest/Level 3/MCI/Nextel/AT&T/Telecom/Lightcore – These utility companies all have lines located within the project limits, but have not expressed any major concerns with relocating them.

Until a complete utility relocation design is completed, many of the utility companies cannot give an accurate estimate on the work needed to relocate their facilities. At this point in time, the major concerns have been addressed and discussed with the project team. Coordination between all affected utility companies will continue during the design phase.

4.5 Geotechnical Issues

A limited geotechnical investigation of the two proposed Plaza areas for the Detroit River International Crossing project was completed in August 2006. A limited geotechnical investigation of the X-10(B) Detroit River Bridge main foundation areas was performed in August 2008. Its purpose was to provide sufficient geotechnical information to advance the conceptual engineering of the Detroit River Bridge foundations. The geotechnical report is contained in the separately bound Volume 6: Detroit River Bridge Structure Study- Appendix D. Finally, a limited geotechnical investigation is under way for the Interchange walls, fill and bridges. A supplemental report will be produced when complete.

4.5.1 Plaza Area

A limited geotechnical investigation of the two proposed Plaza areas for the Detroit River International Crossing project was completed in August 2006. Its purpose was to obtain a general description of the subsurface conditions across the site. The description and results of the Plaza geotechnical field investigation are provided below.

Description of Field Investigation

Proposed boring locations were generally spaced in a grid pattern, at 500-foot intervals, across the two proposed Plaza areas. During this phase of the fieldwork, all soil borings were performed within City of Detroit streets. At the time of

the investigation, authorization to drill on property parcels owned by individuals, or railroad right-of-way had not been given. Therefore, when practical, borings were moved to within the right-of-way of city streets.

A total of 45 borings were performed (see Figure 4.5-1). All were to a depth of 10 feet, with the exception of three borings (B-71, B-82, and B-88), which terminated on apparent obstructions at about 5 feet below grade.

Figure 4.5-1
Soil Boring Location Diagram

Generalized Description of Subsurface Conditions
A generalized description of the soils encountered in the borings drilled in the areas of the proposed Plazas, beginning at the existing ground surface and proceeding downward, is provided below:

Stratum 1: Pavement. In 33 out of 45 borings, asphaltic cement concrete over Portland cement concrete pavement was encountered. The thicknesses of the asphalt pavement ranged from 2 to 9 inches. The thicknesses of the concrete pavement ranged from 2 to 11 inches. The pavement section typically consisted of 3 to 6 inches of asphaltic cement concrete over 6 to 10 inches of Portland cement concrete. (In boring B-52, alternating layers of asphaltic cement concrete and Portland cement concrete were encountered to a depth of 1.5 feet below the pavement surface).

Table 4.5-1 summarizes the pavement conditions encountered in the remaining 12 borings.

Table 4.5-1
Pavement Conditions

Pavement Description	No. of Borings	Boring Designations
6 inches of Portland cement concrete	2	B-42, B-58
5 to 8 inches of asphaltic cement concrete	3	B-35, B-36, B-45
2 to 4 inches of asphaltic cement concrete over a 4 inch brick layer	2	B-40, B-41
4 to 9 inches of asphaltic cement concrete over 4 to 8 inches of crushed concrete fill	5	B-33, B-49, B-56, B-73, B-80

Stratum 2: Fill. Fill or possible fill soils were encountered beneath the pavement in all borings. These soils consisted primarily of mixtures of clay, silt, sand, and gravel. Brick layers, however, were encountered in borings B-70, B-82, and B-87. The fill materials extended to depths ranging from about 1 foot beneath the pavement surface to the boring termination depths of 5 or 10 feet.

Stratum 3A: Silt. Layers of clayey silt or sandy silt were encountered beneath the fill soils in borings B-28, B-44, B-45, B-48, B-52, and B-90. The silt soils extended to depths ranging from about 8 to at least 10 feet, and had apparent densities ranging from loose to medium dense.

Stratum 3B: Clay. Natural brown or gray silty clay soils were encountered in all borings, except those that terminated in fill materials, or in borings B-45, B-52, and B-90, which terminated in silt soils. The consistencies of these clay soils ranged from soft to hard. When encountered, the natural clay soils extended to the termination depths of the borings, or 10 feet.

Groundwater was encountered during drilling in borings B-46, B-78, and B-84, at depths ranging from 5 to 8± feet below grades. Upon completion of drilling, groundwater was measured in only one boring, B-46, at a depth of approximately 7 feet.

The majority of the soil profile across the site, beneath the fill soils, consists predominantly of clay soils. Therefore, a longer time may be required for the water level in the borings to reach an equilibrium position. The depth at which the soil color changes from brown to gray is frequently indicative of the long-term groundwater level.

Based on the available groundwater and soil information, it is estimated that the long-term groundwater level in the area of the proposed Plazas is situated at about 5.5 to 9 feet below existing grades.

Geotechnically Related Construction Considerations
It is anticipated that the future Plaza area will consist of building and pavement structures, as well as landscaped areas.

Pavement overlying fill soils was encountered in each of the 45 borings. Prior to the placement of engineered fill or construction of new pavement or slabs-on-grade, the existing pavement will need to be completely removed. The existing fill soils encountered in the borings are generally considered suitable for support of pavement and slabs-on-grade, provided they are properly prepared. Typical subgrade preparation includes proofrolling and compaction. It is possible that removal and replacement of existing fill soils will be required if organic or deleterious materials are encountered during construction activities.

Foundations constructed on fill soils are not recommended. Any foundations constructed within the Plaza area must extend through the existing fill soils to the underlying natural silt or clay. As an alternative, the existing fill soils could be removed and replaced with granular engineered fill. It should be noted that in several of the borings the fill soils extended to depths of at least 10 feet (the boring termination depth). It is probable that deeper fill soils and building rubble will be encountered on property parcels outside of the right-of-way of the city streets.

As stated previously, obstructions were encountered at an approximate depth of 5 feet below grade in borings B-71, B-82, and B-88. Generally, obstructions are expected within this area of Detroit due to previously existing roads and houses. (It is common for entire basements to be backfilled with building debris). Significant obstructions may result in construction delays and budget issues.

Voids were encountered beneath a brick layer in borings B-70 and B-87. It is assumed the voids may be old, abandoned brick sewer tunnels. (The obstructions encountered in borings B-71, B-82, and B-88 also indicate the presence of abandoned brick tunnels). Depending on the proposed design of the Plaza, these old tunnels may need to be backfilled.

Additional Geotechnical Investigations

In May 2007, soil borings on six city parcels were performed. A generalized description of the soils encountered in the six additional borings, beginning at the existing ground surface and proceeding downward, is provided below:

Stratum 1A: Topsoil. A 26 inch topsoil layer in boring B-101 and a7 inch topsoil layer in boring B-106 were reported.

Stratum 1B: Pavement. Asphaltic cement concrete and associated base material was encountered from the surface of boring B-102 and B-104. In boring B-102, 2.5 inches of asphalt underlain by about 4.5 inches of broken concrete was reported. In boring B-103, 2 inches of asphalt and 12 inches of pavement base material, consisting of coarse sand and gravel were encountered.

Stratum 2: Fill/Possible Fill. Fill or possible fill soils were encountered from the surface of borings B-104 and B-105, and beneath the topsoil or pavement in the other borings. These soils consisted primarily of medium-dense to very loose and sand soils, occasionally mixed with topsoil or silty clay. However, in boring B-104, a layer of broken concrete was encountered beneath the sandy fill soil. The fill/possible fill materials extend to depths ranging from 3 feet to 10 feet below grade.

Stratum 3: Sand. Natural medium-dense to dense sand and gravel was encountered in all borings except B-102 and B-104. The natural sand soils were encountered beneath the fill/possible fill soils, and typically extend to the boring termination depth of 10 feet. In boring B-101, the natural fine-to-coarse sand and gravel extend to only 8.5 feet.

Stratum 4: Clayey Silt/Silty Clay. Layers of natural loose clayey silt or stiff-to-very-stiff silty clay were encountered beneath the fill/possible fill soils in borings B-102 and B-103, and beneath the natural sand in boring B-101, and extend to a depth of 10 feet.

Groundwater was encountered during drilling in borings B-101, B-102, B-103, and B-105 at depths ranging from 2.5 to 6± feet below grades. Upon completion of drilling, groundwater was measured in borings B-101 through B-103 at depths ranging from 4.5 to 7 feet.

Based on available groundwater and soil information, it is estimated that the long-term groundwater level in the area of the proposed plazas is situated at about 5.5 to 9 feet below existing grades.

Soil conditions at specific boring locations are provided with the Logs of Test Borings (Appendix C). It is noted that the stratification lines shown on the Logs of Test Borings are approximate indications of change from one soil type to another at the locations of the boreholes. The actual transition from one stratum to the next may be gradual, and may vary within the area represented by the test boring.

4.5.2 Brine Well Investigation

The Michigan Basin is one of the largest areas of halite (salt-NaCl) deposition in the world. Halite has historically been mined either directly in solid form as rock salt or as natural or artificial brine pumped through solution mining wells. The area beneath Detroit and Windsor within the Michigan Basin is currently mined primarily using conventional room-and-pillar excavation methods. Beginning in the late 1880's, solution mining was used to extract salt. Solution mining in the proposed crossing areas was generally discontinued in the 1960's as a result of increasing concerns of surface subsidence.

Generally, known solution mining areas are located on Zug Island up river to the western end of the project study area, but the occurrence of brine wells throughout the crossing corridors cannot be precluded as undocumented wells may exist. Further, solution mining companies are known to have owned parcels of land along the river in addition to those where brine wells were documented. Generally, the brine wells extended to depths of 1,100 feet to 1,500 feet in the area of continued analysis.

Solution mining consists of introducing water from the surface down a well casing between an outer casing and a central tube. The brine produced from the salt dissolving in the water is recovered through the central tube. With continued production using this method, solution cavities often coalesce with adjacent cavities to form composite cavities called galleries. When this occurred historically, one or more of the wells were then converted to water inlet wells and the brine was pumped out through other wells in the interconnected system, creating a gallery.

As production continued in the gallery, large spans of unsupported roofs were sometimes created, which in turn could result in sagging, downward flexure, and local separation of rock units resulting in local roof collapse and eventual surface subsidence in some instances. Uncontrolled solution mining near the top of a salt layer commonly left overlying weak or weakened rocks exposed at the top of the cavity, which increased potential for roof collapses. The subsidence and/or collapse would progress upwards as a chimney effect on an angle from the outside edges of the cavity.

The solution mining areas are of concern for the proposed crossing locations, as they present the potential for future ground subsidence and related adverse effects on elements of the proposed crossing structure. Due to the concerns regarding solution mining an extensive field investigation program has been completed.

Conclusions

Based on the data gathered and analyzed to date in the U.S., no large cavities have been observed in either crossing corridor, greater than 125 feet wide by 20 feet high for X-10, nor is there evidence of potential instability of the rock mass within the crossing corridors. In fact, the analysis shows that the observed anomalies have probably been filled by one of several mechanisms. In addition, even for the largest of the anomalies discovered, and assuming an unfilled cavern, the anomaly is stable, and will not progress upward any significant distance. These results were peer reviewed and accepted by the Geotechnical Advisory Group as documented in DEIS Appendix G.

4.5.3 Detroit River Bridge Geotechnical Investigation

The geotechnical investigation report is contained in the separately bound Volume 5: Detroit River Bridge Structure Study - Appendix D.

4.5.4 Interchange Geotechnical Investigation

This investigation is currently under way. Figures 4.5-2 and 4.5-3 show the bore hole locations for the Plaza Bridges.

Figure 4.5-2
Bridge Boring Locations

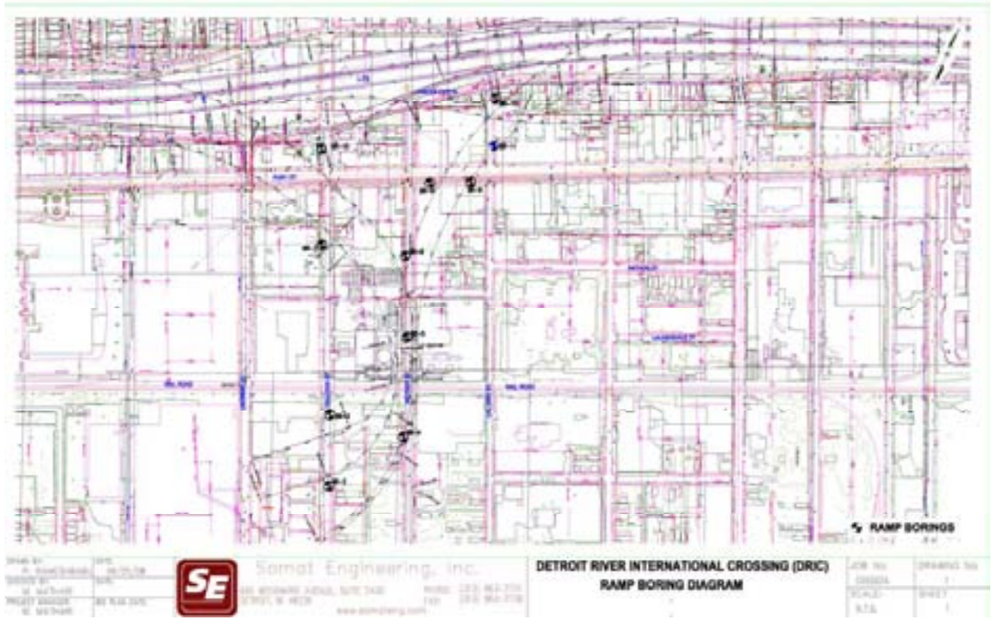
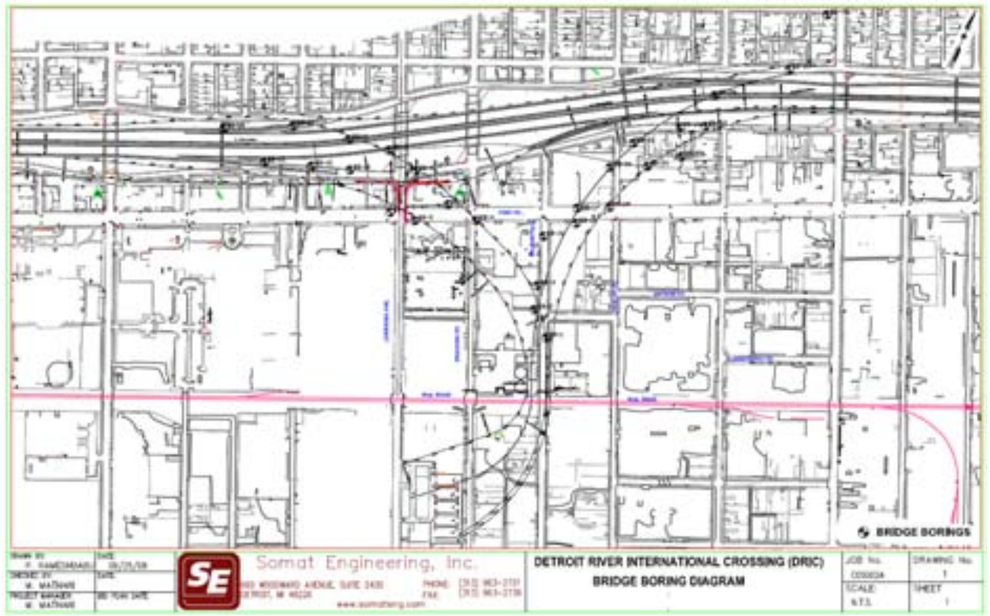


Figure 4.5-3
Plaza Ramp Bridge Boring Locations



4.6 DRAINAGE

This section summarizes the existing drainage system in the DRIC study area and identifies the potential major impact of the proposed improvements.

4.6.1 Sewer Outfalls

The project area is drained by a series of storm sewer outfalls from the north side of I-75 in a southerly direction out letting to the Detroit River. The storm sewer systems throughout the study are combined sewers that are under the jurisdiction of the Detroit Water and Sewer Department (DWSD). These combined sewers are between 55 and 100 years old as shown in the *DWSD Wastewater Master Plan Project- Review of Collection Systems Regulators and Outfalls (#CS-1314)* report which is on the DWSD website.

There are a total of eleven (11) sewers crossing I-75 within the study area. These sewers range in size from 6 feet to 13 feet in diameter. Once on the south side of I-75 these sewers come together to make up the nine (9) sewer outfalls. Most outfalls are a combination of two or more pipes. The sewer flow collected in the DWSD combined sewers outlet to the Detroit River with one outfall to the Rouge River. During discussions, it was noted that sewers constructed before 1920 are typically made of brick but are still in relatively good shape. See Table 4.6-1 and Table 4.6-2 for outfall information and capacities. Existing sewer outfalls are identified in Figure 4.6-1.

When the depressed I-75 freeway was constructed the existing DWSD combined sewer system was modified to maintain the flow. This modification included the construction of four (4) large siphons and chambers located within the study area.

Along with the main DWSD system there is existing storm sewer along I-75 and the Service Drives. The secondary sewers eventual outlet into the DWSD combined sewer outfall as discussed above.

The existing DWSD outfalls will be able to be used as outfalls for the proposed drainage systems along I-75, Service Drives, the new ramps and the new Plaza. Based on this preliminary study there are enough outfalls for a proposed drainage system. The existing sewer outfall system has no additional capacity. So, given that the proposed design is adding runoff volume to the system, detention will be required. An option to address additional runoff would be to remove and extend inlets on the southbound Service Drive section of the freeway, and remove existing inlets along the northbound Service Drive section, close off the pipes that drain to the median system, and provide a new drainage system on the northbound Service Drive section side that would tie into the new pump plants. This new storm sewer system would drain to the center of the northbound lanes, divert two existing lanes of runoff into new pipes that would provide the additional capacity. In-line detention can be provided in the new storm sewer system. As the storm sewer design moves forward, a hydraulic report will be prepared that analyzes the proposed and existing system, with existing and proposed tributary area maps and runoff rates calculated which would be submitted to DWSD for review and approval. The additional runoff contributed from the Plaza and Detroit River Bridge will be detained within the proposed plaza.

A stormwater management plan will be developed for the project especially for the Plaza runoff. Through the use of 'Best Management Practice' (BMP's) the pollutants in the storm water leaving the project site will be minimized. This also, includes controlling soil erosion and sedimentation during and after construction.

4.6.2 Combined Sewer System

The study area is generally flat with a general ground elevation of approximately 590 feet. Storm water throughout the study area is routed to combined sewers that fall under the jurisdiction of the Detroit Water and Sewerage Department (DWSD). These combined sewers are between 55 and 100 years old as shown in the *DWSD Wastewater Master Plan*

Project – Review of Collection System Regulators and Outfalls (CS-1314) report which was found on the DWSD website. This project will not address separating the combined sewer system, though providing provisions for future separation shall be discussed with DWSD. DWSD is working with Michigan Department of Environmental Quality (MDEQ) to modify their system to adhere to the new state and federal guidelines.

4.6.3 Impacts to the Existing System

The major impacts of the project are the DWSD combined sewers within the boundary of the Plaza, and the siphons affected by the widening of I-75. The widening of I-75 along with the realigning of the Service Drives will require the extension of the siphons and rebuilding the chambers. Homeland Security has indicated that no large diameter pipes or tunnels (man-sized or large) will be allowed underneath the Plaza area. The proposed Plaza will impact two combined sewer trunklines that are 6 feet in diameter. These sewers will need to be relocated outside of the Plaza.

As the drainage design proceeds, the following items must be reviewed and/or addressed:

- The existing DWSD system has no additional capacity.
- The sewer outfalls leading to the Detroit River must remain in operation.
- The existing combined sewer system is gravity driven at a minimal slope. Relocating sewers may require larger sewer to maintain the same capacity.
- The number of sewers, sewer size, location and number of connections to the Detroit River Interceptor (DRI) located along Jefferson Avenue needs to be closely coordinated with DWDS due to limitations with the DRI.
- All abandoned sewers would need to be filled or removed to prevent collapse.
- If sewers are relocated the effects of their relocation of the existing intercepting chambers along Fort Street and Jefferson Avenue will need to be studied.

The existing ground within the proposed Plaza location has an elevation of about 590 feet and the proposed Plaza could have an elevation up to 620 feet. Assuming that the Plaza area is to be higher than the surrounding ground, it is hydraulically possible to utilize the same outfalls. However, other factors may need to be considered before using the outfalls for this major development.

The most significant and costly impact to the existing drainage system is the relocation of DWSD combined sewers and secondary sewers that run underneath the proposed Plaza area. These sewers are planned to be rerouted around the Plaza area via the proposed utility corridor, see Appendix D for plans.

Additional analysis will need to be done on regional conveyance, downstream conveyance, detention, and water quality. These items are not part of this evaluation.

Table 4.6-1
Existing Outfalls

Outfall ID #	MDEQ Permit #	Outfall Location	Year Built	Sewer	Material / Shape	Size	Length (ft)	Downstream Invert (ft)	Upstream Invert (ft)
B35	037	McKinstry & Jefferson	1927	McKinstry	Brick / Cylinder	2 @ 4'-5"	950	91.38	94.00
							950	91.38	93.61
B36	D38	Sumner & Jefferson	1922	Clara-Sumner	Concrete / Box	3 @ 8'-8" x 7'-6"	600	84.00	88.33
B37	D39	Ferdinand & Jefferson	1956	Ferdinand	Concrete / Cylinder	2 @ 4'-9"	120	93.35	94.10
B38	D40	Merrell & Jefferson	1912	Manor	Brick / Cylinder	4 @ 5'-0"	880	91.00	91.00
B39	D41	Junction & Jefferson	1978	Calvary	Concrete / Cylinder	132'-0"	850	81.35	81.83
B40	D42	Campbell & Jefferson	1908	Campbell	Brick / Cylinder	1 @ 6'-5" & 3'-6" & 6'-2"	1078	90.21	94.40
B41	D43	Dragoon & Jefferson	1952	Livernois Relief	Concrete / Cylinder	10'-6"	2053	85.20	85.70
B42	D44	Schroeder & Jefferson	1936	Schroeder	Brick / Cylinder	1 @ 6'-0"	1200	93.60	95.60
						1 @ 6'-6"	1200	93.60	94.20
B44	D46	Cary & Jefferson	1945	Cary	Brick / Egg	3'-3" x 5'-3"	447	94.53	96.53

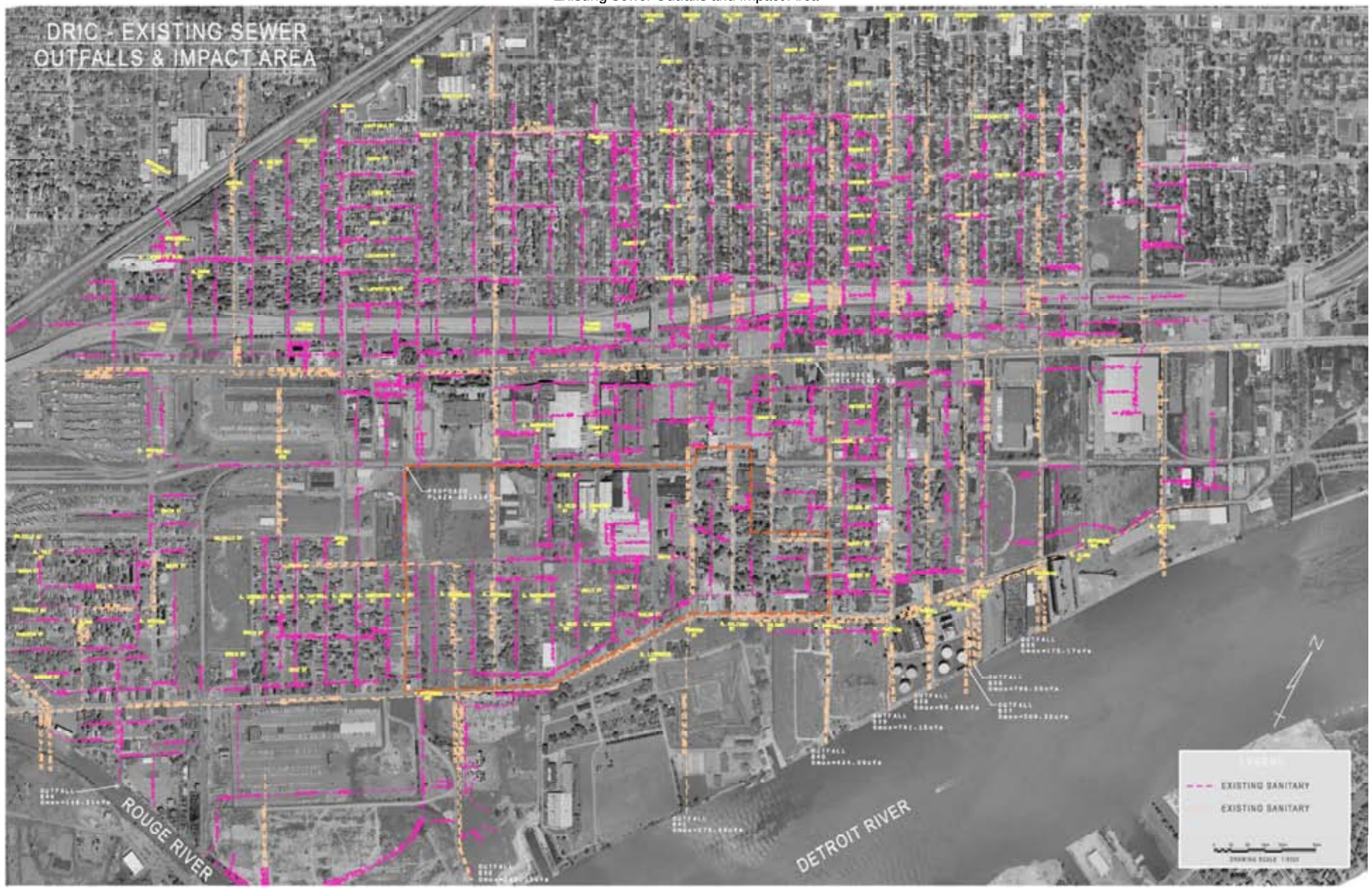
Notes
1) Outfall information is from the DWSD Wastewater Master Plan Project # CS-1314 Review of Collection System Regulators and Outfalls
2) Refer to http://www.dwsd.org/about/wastewater/volume2/Review_of_Collection_System_Regulators_and_Outfalls.pdf
3) Refer to "C_EXIST_ExSewerEx.tif.pdf" for Outfall ID # locations

Table 4.6-2
Existing Maximum Capacity

Outfall ID #	Outfall Location	Material / Shape	Size	Length (ft)	Downstream Invert	Upstream Invert	Slope (ft/ft)	Manning's n	Area (ft^2)	Wetted Perimeter	Hydraulic Radius	Max Q (cfs)
B35	McKinstry & Jefferson	Brick / Cylinder	4'-5"	950	91.38	94.00	0.00276	0.013	15.90	14.13	1.13	84.07
			4'-5"	950	91.38	93.61	0.00234	0.013	15.90	14.13	1.13	91.10
											Total for Outfall =	175.17
B36	Sumner & Jefferson	Concrete / Box	8'-8" x 7'-6"	600	84.00	88.33	0.00722	0.013	65.01	32.04	2.03	255.52
			8'-8" x 7'-6"	600	84.00	88.33	0.00722	0.013	65.01	32.04	2.03	255.52
			8'-8" x 7'-6"	600	84.00	88.33	0.00722	0.013	65.01	32.04	2.03	255.52
											Total for Outfall =	766.55
B37	Ferdinand & Jefferson	Concrete / Cylinder	4'-9"	120	93.35	94.10	0.00625	0.013	17.72	14.93	1.19	154.68
			4'-9"	120	93.35	94.10	0.00625	0.013	17.72	14.93	1.19	154.68
											Total for Outfall =	309.36
B38	Merrell & Jefferson	Brick / Cylinder	5'-0"	880	91.00	91.00	0.00000	0.013	19.63	15.71	1.25	0.00
			5'-0"	880	91.00	91.00	0.00057	0.013	19.63	15.71	1.25	22.62
			5'-0"	880	91.00	91.00	0.00057	0.013	19.63	15.71	1.25	22.62
			5'-0"	880	91.00	91.00	0.00057	0.013	19.63	15.71	1.25	22.62
											Total for Outfall =	90.46
B39	Junction & Jefferson	Concrete / Cylinder	11'-0"	850	81.35	81.83	0.00056	0.013	104.72	34.56	3.03	791.15
											Total for Outfall =	791.15
B40	Campbell & Jefferson	Brick / Cylinder	6'-1"	1078	90.21	94.40	0.00389	0.013	43.78	20.42	1.54	157.45
			6'-7"	1078	90.21	94.40	0.00389	0.013	50.17	19.79	1.90	196.29
			6'-5"	1078	90.21	94.40	0.00389	0.013	48.16	19.47	1.83	186.48
											Total for Outfall =	424.09
B41	Dragoon & Jefferson	Concrete / Cylinder	10'-6"	2053	85.20	85.70	0.00024	0.013	86.59	30.91	2.80	275.28
											Total for Outfall =	275.28
B42	Schroeder & Jefferson	Brick / Cylinder	6'-0"	1200	93.60	95.60	0.00167	0.013	28.27	18.85	1.50	150.01
			6'-6"	1200	93.60	94.20	0.00050	0.013	33.18	20.36	1.63	114.64
											Total for Outfall =	264.65
B44	Cary & Jefferson	Brick / Egg	3'-3" x 5'-3"	447	94.53	96.53	0.00145	0.013	17.49	17.49	1.00	116.21
											Total for Outfall =	116.21

Notes
1) Outfall information is from the DWSD Wastewater Master Plan Project # CS-1314 Review of Collection System Regulators and Outfalls
2) Refer to http://www.dwsd.org/about/wastewater/volume2/Review_of_Collection_System_Regulators_and_Outfalls.pdf
3) Refer to "C_EXIST_ExSewerEx.tif.pdf" for Outfall ID # locations
4) Capacities are based on Manning equation assuming Pipes are flowing full

Figure 4.6-1
Existing Sewer Outfalls and Impact Area



4.7 Project Phasing

This section summarizes the potential construction contracts, construction durations, and project sequencing for the Preferred Alternative.

The Preferred Alternative contains the following construction elements:

- Detroit River Bridge and approach spans
- Toll and Inspection Plaza
- Local access to and from the plaza utilizing Campbell Street
- Local access to and from the Duty Free utilizing Greet Street
- Four I-75 interchange ramps connecting I-75 to the Plaza
- Reconstruction of the one-way Service Drives on each side of I-75
- Elimination of several crossroad bridges over I-75 and reconstruction of others, including U-Turn movements
- Elimination of select local ramps and reconstruction and/or relocation of others
- Re-aligned Springwells Street
- Improvements to local roadway corridors to serve as a "Gateway Corridor" into the neighborhood surrounding Historic Fort Wayne; including existing Green Street and Campbell Street
- Widening of I-75 for the addition of auxiliary lanes associated with ramp terminals only
- Major utility modifications or relocations required for the construction of the plaza, crossroad bridges, and widening of I-75
- Remediation of hazardous soil contamination
- Improvements to local roads including milling and overlay and sidewalk ramp improvements

The following goals were identified prior to developing the proposed construction staging and preliminary Project Sequencing Schedule:

- Maintain local access across I-75 during construction

  Considering Livernois and Dragoon as a single crossing (they are currently one-way southbound and northbound, respectively), there are six crossings within the corridor including Springwells Street, Green Street, Waterman Street, Livernois Avenue, Junction Street and Clark Street. Prior to the completion of a detailed traffic analysis of detoured traffic, the desire would be to maintain four of the crossings during all phases of construction.

- Complete construction of the Green Street "Gateway Corridor" and Campbell Street reconstruction early in the project

  Because each of the Plaza Options disrupts the continuity of several north-south local streets, the construction of the new corridors between Fort Street and Jefferson Avenue is vital for the area's circulation. Also, completing a high-profile access link to Historic Fort Wayne and the surrounding area will have positive effects. Improvements to both the Gateway Corridor and Campbell Street should also be completed early.

- Provide for continuity of east-west local travel along the I-75 corridor

  There are two factors that drive the need for this: 1) closures of existing ramps and crossroads which will limit access along the corridor; and, 2) traffic wanting to avoid the congestion on I-75 due to construction within the corridor will require a reasonably continuous alternate route.

  Fort Street, which is two-way and parallels the project corridor on the south side from Springwells Street to Clark Street, would be an excellent detour route during the construction of the northbound Service Drive and work along I-75. Proposed work along Fort Street is currently envisioned to include only intersection improvements including the realignment of Springwells, minor grade raises, curb return radii improvements at miscellaneous intersections, and possible minor construction impacts due to the interchange ramps crossing Fort Street.

  Lafayette Boulevard, on the north side of I-75, is not continuous from Clark Street to Springwells Street but, when combined with the existing southbound Service Drive from Clark Street to west of Junction Street, a continuous southbound corridor could be provided as far as Beard Street on the west. With a short jog to the north on Beard Street, access to Springwells Street can be continued on Lafayette Boulevard.

  Jefferson Avenue intersection improvements will better facilitate truck movement from industrial complexes near Zug Island to Springwells and Clark interchanges. Intersection improvements are proposed at Dearborn, Westend, Rademacher, Dragoon, Junction, and Clark Streets.

- Provide multiple local access points to and from I-75 along the corridor during construction

  The closure of crossroads across I-75 will cause traffic to find alternate routes. Because of the full diamond interchanges at Springwells Street and Clark Street, these streets will undoubtedly realize an increase in traffic. Maintaining the existing Springwells Street and Clark Street ramp movements until Ramps E, F, G and H are completed will facilitate local access.

4.7.1 Construction Contracts

If a conventional design/bid/build project implementation approach is pursued, the following construction packages are suggested:

- Hazardous Soil Contamination Remediation (for Plaza area only).
- Utility Relocations in multiple packages to allow for variable utility design schedules, procurement of long lead time items, similar types of utility construction, and/or to meet the desired sequence of construction. (Relocation contracts will also have to be separated out by public and private utilities since they are processed differently.)
- Local street improvements including; Green Street corridor, Campbell Street, and the milling and overlay of existing streets in the project area.
- Service Drives and local ramps including related minor utility modifications or relocations. This work could be split into multiple contracts based on logical segments for traffic operations, or size of contract.
- Removal and replacement of crossroad bridges over I-75, including the roadway approaches and intersections with the Service Drives. This work could also be split into several separate contracts.
- Toll and Inspection Plaza. This work could be split between discreet facilities with the Federal Agency facilities being constructed separately from State and Private facilities, such as the Toll and Duty Free elements.
- Main span and approach spans up to plaza. Advance acquisition for long lead items such as cable wire could be undertaken concurrently with utility relocation.
- Interchange ramps from plaza to I-75, including widening work along I-75. Interface with Service Drive work will require coordination or splitting of work between contracts.
- Railroad track construction.

Other project implementation methods, such as Design/Build or Public Private Partnership, would modify the contract packaging, although the general sequencing would likely remain the same.

4.7.2 Construction Durations for Project Elements

The local street and interchange roadway/bridge improvements were divided into "Units" of construction for estimating construction durations. A 1,300-foot segment corresponding to the distance between cross-roads was used for the road work. The MDOT Critical Path Construction Time Estimates were used for the individual operation rates. Use of these estimates provides a conservative estimate for the potential duration of construction activity. Accelerated schedules may ultimately be used when constructing certain portions of this project. A more detailed construction schedule will be developed as the project proceeds through final design. Refer to Appendix E of the Conceptual Engineering Report dated February 2008 for the detailed information for each "Unit" which lists the work element, assumed work rates, and other assumptions used to develop the durations. The following general assumptions were used:

- A single crew for a specific work element, unless noted
- The durations have been developed without overtime, double shifts or weekend work, except for work requiring off-peak traffic restrictions on I-75
- An average of 19 Work Days/month
- Overlap of activities when feasible as noted
- The interchange ramp work between the Plaza and the ramp structures can be accomplished within the duration of the ramp structure work

The "Units" and the corresponding durations, rounded to the nearest month, with 3 months minimum, are summarized in Table 4.7-1. Combinations of these durations and other elements have been used to determine a conceptual Project Sequencing Schedule.

Table 4.7-1
Construction Duration Units

Unit No.	Description	Duration (months)
1	Removal of Crossroad bridge with no Replacement (each)	3
2	Removal of Crossroad bridge with construction of new bridge (each)	7
3	Construction of a 1,300 foot segment of Service Drive (including 160 feet of retaining wall)	6
4	Construction of a 1,300 foot segment of a single direction of the "Gateway Corridor"	3
5	Widening of a 1,300 foot segment of I-75 (including 500 feet of retaining wall)	5
6	Reconstruction of a 5,300 foot length of I-75 on an offset alignment. For information only, the Preferred Alternative does not reconstruct I-75	18
7	Construction of 4-span to 7-span interchange ramp bridge (each)	7-10

In addition to the unit durations listed above, the Table 4.7-2 summarizes the durations for other construction elements.

Table 4.7-2
Other Construction Durations

Project Element	Construction Durations
Hazardous Soil Contamination Remediation	6-9 months/area
Utility relocations for the construction of the Plaza	*
Utility relocations to the "Utility Corridor" required for the construction of the "Gateway Corridor"	*
Utility modifications/relocations for the construction of the Service Drives, Crossroad bridges, and widening of I-75	*
Utility relocations for the construction of the Main Span and approach spans	*
Inspection and Toll Plaza	36 months**
Main River Span; Corridors X-10B and approach spans including advance acquisition and fabrication	4 years**
Corridor X-10A and approach spans including advance acquisition and fabrication	5 years**

* Utility relocations durations are being coordinated with individual utility companies.
** These estimates are based on similar projects.

4.8 Maintenance of Traffic

The following general Maintenance of Traffic (MOT) approach (Table 4.8-1) is recommended for each of the main project elements. A minimum of three lanes of traffic is to be maintained in each direction on I-75.

Table 4.8-1
Maintenance of Traffic Approach

Project Element	MOT Approach
Utility relocations for the construction of the Plaza	Local road lane closures as required.
Utility modifications/relocations for the construction of the cross-road bridges, and widening of I-75	I-75 lane closures and shifts as required. Open cuts along I-75 may be required.
Utility relocations for the construction of the Detroit River Bridge and approach spans	Local road lane closures as required.
One-way Service Drives on each side of I-75. (Unit No. 3)	Detour the NB Service Drive traffic to Fort Street. Detour the SB Service Drive traffic to Lafayette Blvd. for construction west of Dragoon. East of Dragoon, either maintain the existing SB Service Drive or detour to Fort Street. Convert Dragoon to two-way between Fort Street and Lafayette.
Demolition and/or reconstruction of existing cross-road bridges over I-75. (Unit Nos. 1 and 2)	Close cross-road across I-75 and detour traffic to adjacent cross-road. Clark and Springwells to be reconstructed half-width under traffic. I-75 lane and shoulder closures for bridge removal and superstructure construction.
Reconstruction and/or relocation of local ramps.	Closure of ramp with signed detour. Maintain traffic on SB I-75 exit to Clark Street if possible.
"Gateway Corridor" and other local road improvements (Unit No. 4)	Lane closures and part-width phased construction to maintain access along corridors.
I-75 interchange ramps (Unit No. 7)	Local road lane closures adjacent to structure work; median shoulder and possible inside lane closures for median pier work; off-peak closure of I-75 and local road lanes for superstructure erection.
Widening of I-75 for the addition of auxiliary lanes (Unit No. 5)	Outside lane closures of 8-lane facility, as required.
Toll and Inspection Plaza	Closure of intersecting streets; lane closures for local access ramps.
Detroit River Bridge and approach spans	Minimal impact; possible lane closures and detours on local roads.

4.8.1 Project Sequencing Schedule

The current project schedule requires that the end-to-end crossing be operational by the end of 2015 (Figure 4.8-1). If the project begins after the Record of Decision, planned for January 2009, preliminary design could begin by April 2009, if scoping documents are prepared and negotiations begin in anticipation of the Record of Decision. A conceptual Project Sequencing Schedule has been developed that meets these two constraints and is based on incorporating the following:

- Constructing the Detroit River Bridge will take a minimum of four years for the Main Span and approaches.
- A critical element of the schedule is expediting the design, procurement, and relocation of the utilities that must be moved for the plaza construction.
- Preliminary design will be expedited to allow the preparation of ROW documents for separate contracts to allow the individual elements of work to proceed. Final Right-of-Way plans can be prepared and approved so as to allow the acquisition to occur, as required. The acquisition of the right-of-way necessary for specific elements of the improvements would be sequenced such that right-of-way acquisition would not delay the start of that specific construction element. Potential constraints for the sequence of right-of-way acquisition are not known at this time and could not be factored into developing the sequence of construction.
- No ROW would be acquired prior to the Record of Decision.
- Most of the major utility relocations required for the project will be part of the project scope.
- The improvements for the "Gateway Corridor" will be completed prior to closing the local streets impacted by the Plaza.

The Project Sequencing Schedule is included as Figure 4.8-1. The schedule is very general and is not intended to be a detailed construction schedule. The schedule uses the "Unit" durations derived and assumes that several units can be completed in a construction season without multiple crews or extended weekly work schedule, by overlapping the construction of each unit. An overlap of approximately 20 percent of the "Unit" duration (1 to 2 months) has been assumed to account for the individual work elements proceeding linearly from one section to another. An exception to non-expedited work is; both Service Drives are shown to be under construction in Phase 2 at the same time which would require multiple crews.

A summary of the seven year schedule is as follows:

Year 1 (2008):
- Complete Engineering Report
- Complete DEIS
- Hold public hearing
- Select Preferred Alternative
- Complete FEIS

Year 2 (2009):
- Issue ROD
- Begin utility relocation design
- Prepare preliminary and final ROW Plans for critical elements
- Begin design survey
- Begin Gateway Corridor roadway design, with an emphasis on identifying ROW requirements and utility impacts

Year 3 (2010):
- Complete Gateway Corridor design. Begin service drive, crossroad, and interchange ramp design.
- Complete critical utility design for the project and begin construction of the critical utility relocations for the Plaza, Main Span, and the "Gateway Corridor"
- Acquire ROW, initially focusing on parcels required for utility relocations, Utility Corridor, Plaza, Main Span, and the "Gateway Corridor"
- Begin advanced acquisition of long lead items for the Main Span. Begin bridge and approaches if ROW is acquired

Year 4 (2011):

- Construct off-system traffic mitigation improvements, if required, for signed detours (Fort Street) or potential alternate routes (Lafayette Boulevard)
- Complete design for the Service Drives and Crossroads
- Begin utility relocations for the Service Drives and Crossroads
- Complete utility relocations required for the "Gateway Corridor" and misc. roads
- Construct NB and SB lanes of the "Gateway Corridor" improvements
- Begin construction of Main Span

Year 5 (2012):

- Complete Main Span and Plaza design
- Complete all ROW acquisitions
- Start hazardous soil remediation
- Substantially complete with utility relocations for the Service Drives and Crossroads
- Begin Service Drive construction
- Demolish and construct crossroad bridges and approaches at Green Street and Livernois
- Continue Main Span and approaches

Year 6 (2013):

- Continue additional segments of the Service Drives and construct Ramps E, F, G, and H
- Remove crossroad bridges at Waterman, Dragoon, and Junction
- Continue Main Span and approaches
- Begin construction of the Plaza

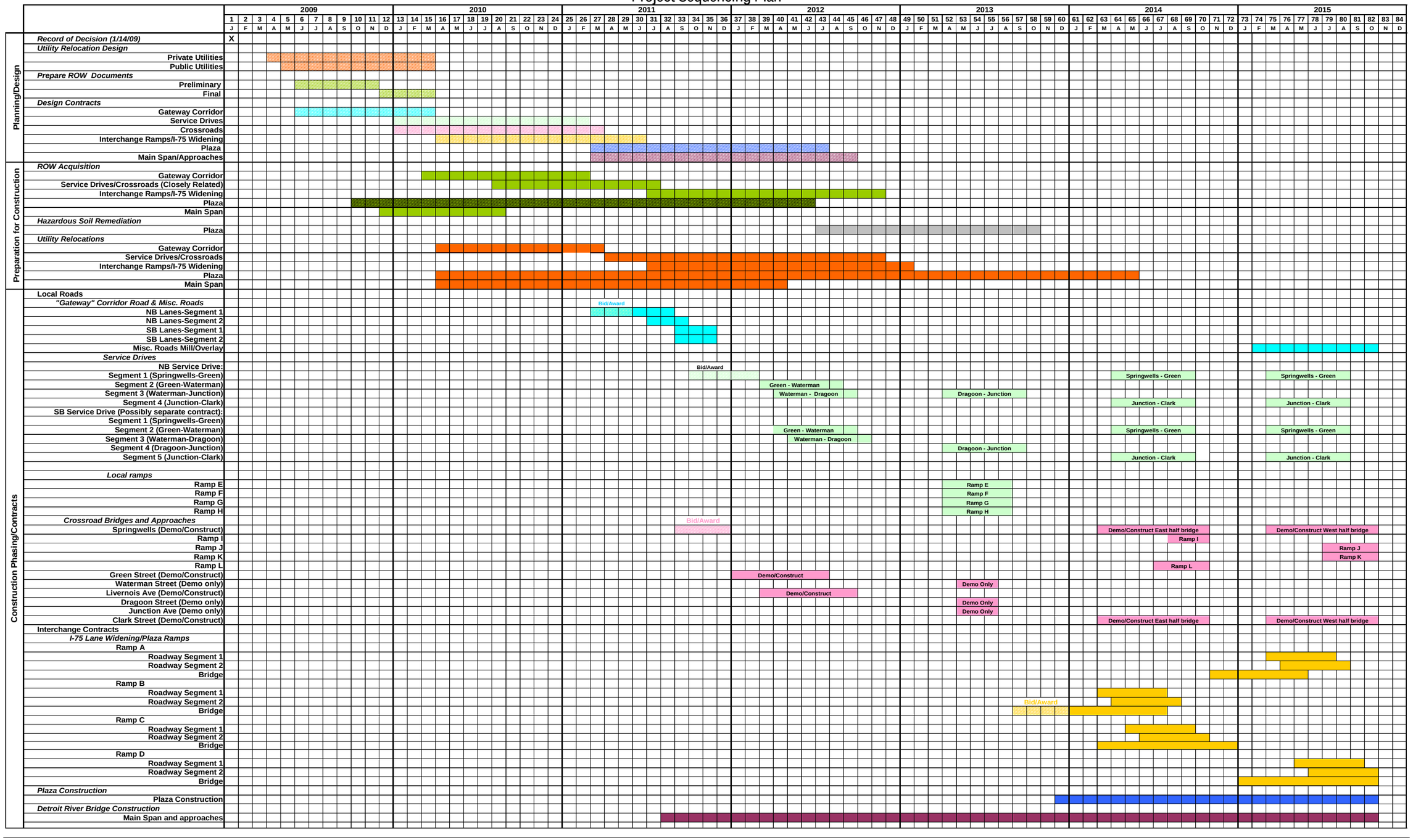
Year 7 (2014):

- Continue construction of Service Drives at Clark and Springwells
- Part width construct Springwells and Clark Interchanges
- Begin plaza interchange ramps
- Continue Main Span
- Continue Plaza

Year 8 (2015):

- Complete remaining segments of the Service Drives
- Complete Springwells and Clark Interchanges
- Complete Main Span
- Complete Plaza
- Complete interchange ramps
- Construct local street improvements

Figure 4.8-1
Project Sequencing Plan



4.8.2 Road Phasing Plan

A conceptual phasing plan for the construction of the local road improvements has been developed and a summary of the concept is provided below. The four phases meet the following goals:

- Construction of the "Gateway Corridor" and improvements to Campbell Street prior to the closure of local streets and construction of the Plaza.
- Four local crossings of I-75 are maintained.
- Construction of the SB Service Drive between Livernois Avenue and Springwells Street will be completed to minimize the duration of using Lafayette Avenue as a detour route.
- The "local" ramp access to I-75 will generally be completed in advance of the Plaza interchange ramps. The Plaza ramps can be constructed concurrent with all other work.
- The existing NB exit and SB entrance ramps at Clark Street will be maintained as long as possible.

Phase 1A

Traffic:

- Restrict traffic on Green Street to one lane in each direction on existing pavement.
- Lane closures at intersections with Jefferson Avenue and Fort Street as required.
- Lane closures or short-term street closures, as required, to complete the milling and overlay work.
- Close Green and Campbell Streets to through traffic and detour along adjacent city streets.

Construction:

- Construct NB lanes of the "Gateway Corridor" improvement.
- Construct portion of intersections with Jefferson Avenue and Fort Street, including necessary temporary signals to shift construction traffic for next stage.
- Begin improvements on Campbell Street, Jefferson Avenue, and other local streets.

Phase 1B

Traffic:

- Restrict traffic on "Gateway Corridor" roadway to one lane in each direction, close and detour Green, and shift to the completed NB lanes.
- Close lanes at intersections with Jefferson Avenue and Fort Street, as required, to complete the final intersections.
- Lane closures or short-term street closures, as required, to complete the milling and overlay work.

Construction:

- Construct SB lanes of the "Gateway Corridor" improvement.
- Construct portion of intersections with Jefferson Avenue and Fort Street, including permanent signals.
- Complete local street improvements.

Phase 2

Traffic:

- Maintain I-75 traffic with median shoulder and inside lane closures for median pier work and outside shoulder and lane closure for ramp work.
- Maintain traffic on Springwells Street, Waterman Street, Junction Street and Clark Street.
- Convert Dragoon Street to two-way traffic and close Livernois Avenue and Green Street.
- Maintain all ramps at Springwells Street, Clark Street, the NB entrance ramp east of Dragoon Street, and the SB exit east of Dragoon Street. Close the SB entrance and NB exit ramps between Central and Dragoon.
- Detour NB Service Drive traffic to Fort Street. Maintain traffic on the SB Service Drive from Clark Street to east of Dragoon Street detouring traffic to Lafayette Boulevard from Cavalry Street to Springwells Street with a jog at Beard Street.

Construction:

- Construct Green Street and Livernois Avenue bridges over I-75.
- Construct the NB Service Drive from west of Green Street to Livernois Avenue, and the SB Service Drive from west of Dragoon Street to east of Springwells Street.
- Begin construction of Ramp G (SB exit).

Phase 3

Traffic:

- Maintain I-75 traffic with median shoulder and inside lane closures for median pier work and outside shoulder and lane closure for ramp work. Maintenance of traffic coordinated with Plaza ramp construction.
- Maintain traffic on Springwells Street as in Phase 2 and on the west half of the Clark Street Bridge. Open Green Street and Livernois Avenue to traffic with Livernois Avenue two-way.
- Close Waterman Street, Dragoon Street, and Junction Street.
- Close the existing NB entrance and SB exit ramps at Springwells.
- Maintain the SB entrance from Springwells and the NB exit ramp to Springwells.
- Maintain traffic on the NB entrance and SB exit ramps at Clark Street during construction of the east half of the Clark Street Bridge and the Service Drive connections. Close the SB exit and NB entrance ramps east of Dragoon Street.
- Detour NB Service Drive traffic to Fort Street as in Phase 2. Maintain traffic on the SB Service Drive from Clark Street to east of Dragoon Street and detour traffic to Lafayette Boulevard from Cavalry Street to Springwells Street as in Phase 2.

Construction:

- Construct the Waterman Street and Dragoon Street intersections with the Service Drives and demolish the bridges.
- Construct the east half of the Clark Street bridge over I-75 and the Service Drives east of Clark Street.
- Construct the realigned Springwells roadway and the east half of the bridge.
- Construct Ramps I and L including portions of NB and SB Service Drives between Springwells and ramps.
- Construct the SB Service Drive from Dragoon Street to Junction Street.
- Complete construction of Ramp G (SB exit), construct Ramp F (NB exit), Ramp E (NB entrance) and Ramp H (SB entrance).

Phase 4

Traffic:

- Maintain I-75 traffic with median shoulder and inside lane closures for median pier work. Maintenance of traffic coordinated with Plaza ramp construction.
- Maintain traffic on Green Street, Livernois Avenue as in Phase 3. Shift Clark Street traffic to the completed east half of the bridge, and Springwells Street traffic to the new alignment and east half of the bridge.
- Close the SB entrance and NB exit ramps at Clark Street. Maintain traffic on the ramps east of Clark Street. Open Ramps E, F, G, H, I and L.

- Open the NB Service Drive to traffic from Springwells Street to Livernois Avenue. Detour the SB Service Drive traffic between Clark Street and Junction Street to Fort Street with the SB Service Drive open between Junction Street and Springwells Street.

Construction:

- Complete construction of the NB Service Drive between Campbell Street and Clark Street. Complete the SB Service Drive from Clark Street to Junction Street.
- Construct the west half of the Clark Street bridge over I-75.
- Complete the west half of the Springwells Street Bridge and Ramps J and K.

4.9 Practical Alternatives Cost Estimates

The grand total project cost is presented in year of construction dollars.

Unit Cost Development

The unit cost items are a compilation of various MDOT pay item average unit prices. The MDOT "Weighted Average Item Price Cost Report" including costs through the third quarter of 2008 for the Metro Region was utilized. The 2008 data was used to provide additional data on a wider variety of pay items.

Quantity Calculations

Cost items to which unit costs were assigned were developed based on the design level of detail.

4.9.1 Interchanges

Cost Items

The potential facilities that would connect the Plaza to I-75 mainly consist of road and bridge systems to provide a direct highway connection from the Plaza to the freeway, freeway entrance and exit ramps, freeway Service Drives, Service Drive ramps, local streets crossing I-75 and a local street connector carrying traffic from I-75 and Fort Street to Jefferson Avenue. The attached spreadsheets and backup documentation, in Appendix B, summarize probable opinions of cost for these potential facilities.

Other costs in addition to the construction costs for the U.S. connecting roadways are included on the spreadsheet and are outlined below. The FHWA major project cost estimating guidance[2] has been used for the development of contingencies that are applicable at this stage of the project. Items shown as yet to be determined on the spreadsheet are needed however the costs are unknown at this time. Items shown with a quantity of zero are not applicable to the specific alternates and are shown for continuity with other alternates.

The following subsections provide background for the corresponding sections of the cost opinion summary sheets. Construction cost items in Section A below that are associated with unit costs on the U.S. Roadway/Bridge Cost Estimate summary sheets are identified with *italic* text. Refer to the probable cost summary sheets.

A. Construction Cost

All roadway elements are estimated using MDOT unit costs and estimated quantities.

i. Retaining Walls

[to come]

ii. Design Contingencies (15%)

- The construction is totaled to create a construction cost subtotal. The design contingency percentage is then applied to the subtotal and added to create a new construction cost subtotal.

- Design contingency reflects the level of design completed for this particular phase of the project due to uncertainty inherent in the remaining design to be completed. As the level of completion reaches 100% (final plans) this contingency reaches 0%. The 15% design contingency was used reflecting the additional level of detail of the calculations and geometrics at this stage of the study and also the potential for economy of scale for a project of this size.

- Design contingencies also include potential work items that are not itemized with quantities and unit prices. These include but are not limited to items such as: sign structures, pavement marking, street lighting, guardrail, sidewalk, temporary and permanent erosion control, turf establishment, tree removal, fencing, aesthetic treatments, etc.

iii. Maintenance of Traffic (excluding Plaza Ramps - 5%)

- The maintenance of traffic and mobilization percentages are applied to the sum of the construction categories, design contingencies and added to create "Subtotal A – Construction".

- A five percent factor was applied to all general construction costs.

B. Construction Contingency

Construction contingency is a factor to cover risk and uncertainty in the construction of the project from factors such as material price volatility, unforeseen site conditions, project complexity and duration, environmental mitigation, etc. This item will be calculated as 10% of the final construction costs.

C. Management Reserve

The management reserve factor provides for third party and other unanticipated changes, such as changes to the project scope. It is 5% of the final construction costs. Management contingency could include items such as highway enhancements, additional local road improvements, unforeseen project elements.

D. Other Cost Items

i. Right-of-Way

- This item includes cost associated with right-of-way acquisition and demolition and was prepared by MDOT Real Estate.

[2] http://www.fhwa.dot.gov/programadmin/mega/cefinal.cfm

ii. Utilities

- This item would include costs associated with utility relocation including but not limited to sanitary sewers, water mains, electric, gas, telephone and cable television. Most of the utility costs would be associated with providing a clear site for the Plaza south of I-75 between Jefferson Avenue and Fort Street.

- Utility cost estimates were developed using unit costs provided by individual utility companies. The total cost is presented which includes both public and private utility costs. Generally MDOT will be responsible for public utility costs, e.g. DWSD, and some private utility costs such as relocating the DTE substation. Private utility companies will be generally responsible for relocating utilities located in public rights-of-way although this will be negotiated between MDOT and each utility company. The utility relocation costs appear to be conservative and further refinement of both the impacts, required relocations, and unit costs will be done once the Preferred Alternative is identified.

The Construction Cost "A" and Construction Contingency "B" are summed, resulting in a total U.S. Connecting Roadways Interchange construction cost. The Management Contingency and other items are considered separately from the interchange construction cost.

4.9.2 Plazas

The Plazas were estimated by using costs developed by Gensler for the GSA facility prospectus. Other Plaza elements (e.g., Duty Free) were estimated using per square foot costs derived from the Gensler costs scaled to the type of building (e.g., maintenance or retail). The cost of the Duty Free is traditionally borne by the Duty Free operator as a cost of business however it is included in the project estimate.

4.9.3 Main River Bridge

The main river bridge costs are based on a detailed quantity estimate for the main bridge, an examination of unit costs for similar large span bridges in North America, as well as estimated prices quoted from suppliers. The estimate for the U.S. approach bridge is based on MDOT average unit prices developed in the same manner as the roadway estimate. Costs for the Canadian approach is based on a per square meter cost provided by the Canadian team in the Conceptual Engineering Report. Additional detail may be found in the separately bound Volume 5: Detroit River Bridge Structure Study.

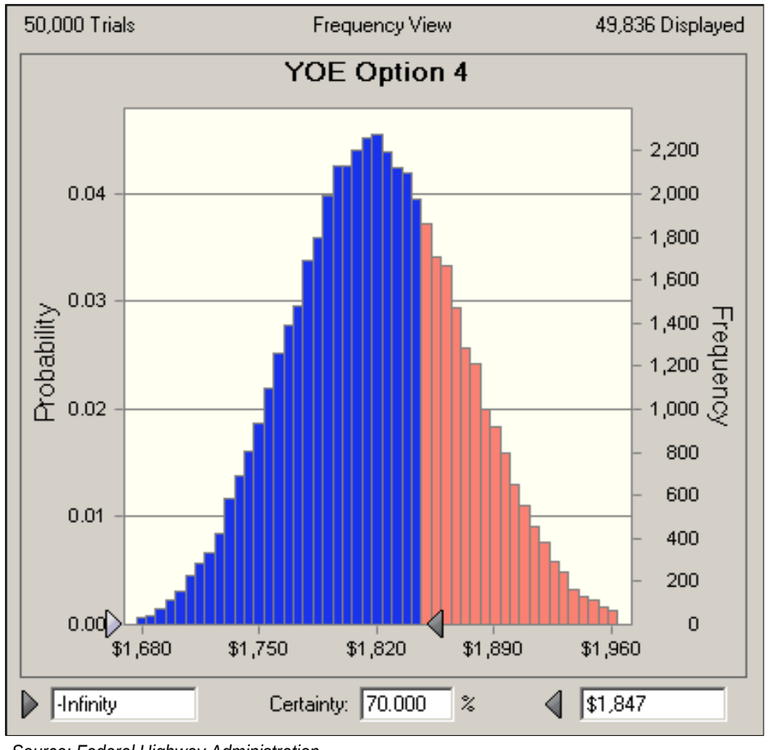
4.9.4 Construction Year Costs

The cost estimates developed are based on 2008 unit prices as discussed previously. Federal guidelines require construction estimates to be shown for the year of incurrence. For this stage of the project, this has been accomplished by developing a "weighted" inflation factor. Refer to the table in Appendix B. The table lists the major elements of the project and the estimated percent of the work which will occur in each of the construction years 2010 thru 2014. The estimated percents are based on the sequencing plan outlined in Figure 4.8-1. Several sources were researched to determine an annual rate of cost escalation to apply for this estimate. The labor and material cost data ranged from 2% to 5% annual growth, although one source indicated that the price volatility has leveled off however, price volatility is unpredictable. A 3% annual rate of price increases was assumed in the development of the weighted rate. A rounded factor of 20% was computed, and has been added to the bottom of Table 4.9-1 to develop the total cost of the Preferred Alternative.

4.9.5 Preferred Alternative Opinion of Cost

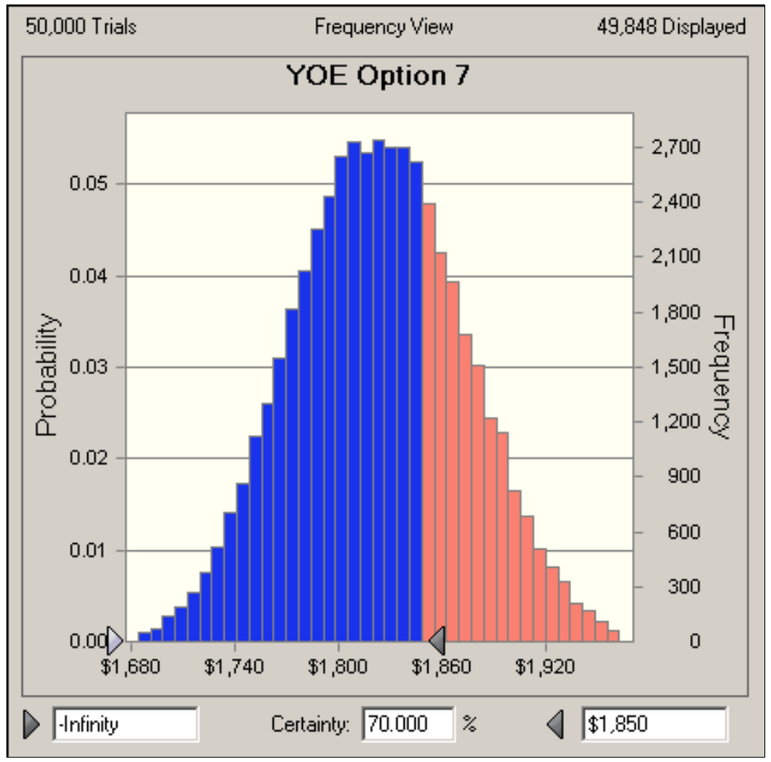
Table 4.9-1 presents the *base line* cost estimate for the U.S. portion of the Preferred Alternative in year-of-expenditure U.S. dollars. Volume 2: Appendix B presents the detail cost estimates. The project costs were reviewed by the U.S. Federal Highway Administration, in cooperation with the Project Team, which developed a risk based cost distribution to include the uncertainty associated with major cost items. The cost review used the *base line* cost estimate to produce a cost distribution for both bridge options. Figures 4.9-1 and 4.9-2 present the cost distribution curves. Using a 70% confidence level (determined by FHWA to be a reasonable risk level normally used for programming) the Preferred Alternative costs are calculated to be less than $1.847 or $1.850 billion for the cable-stay (Option 4) and suspension bridge (Option 7) options respectively.

Figure 4.9-1
Preferred Alternative Cost Estimate Distribution (Cable-Stay Bridge



Source: Federal Highway Administration

Figure 4.9-2
Preferred Alternative Cost Estimate Distribution (Suspension Bridge



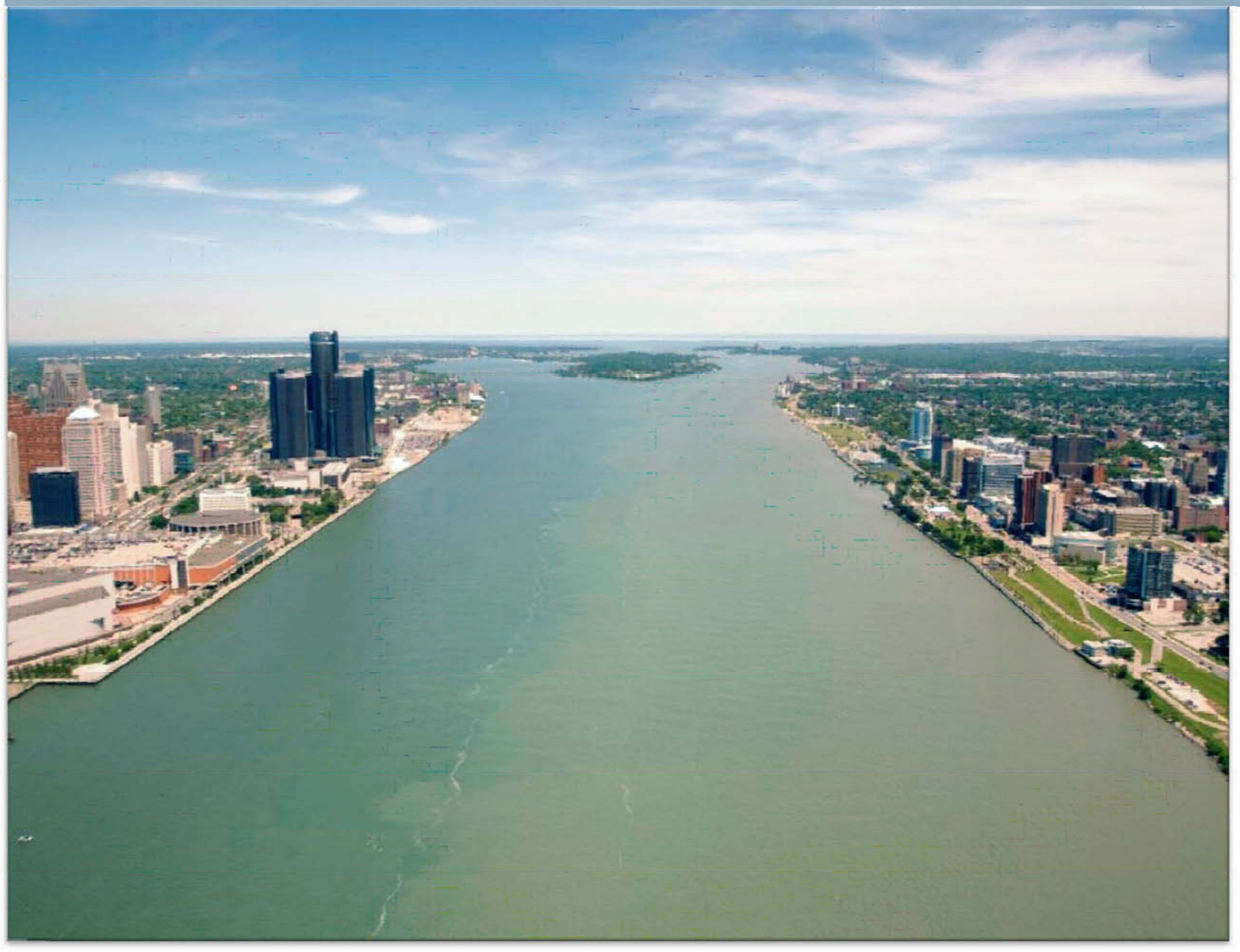
Source: Federal Highway Administration

Table 4.9-1
Baseline Cost Estimates – U.S. Portion of Project

Bridge Option:	Preferred Alt. 4	Preferred Alt. 7
Cost Detail	(million)	
MDOT Construction Costs [1]		
Detroit River Bridge	$ 395	$ 399
MDOT Toll Plaza & Plaza Site Work	$ 57	$ 57
Interchange & Local Roadways	$ 190	$ 190
Subtotal - Construction	*$ 642*	*$ 646*
Enhancements[5]	$ 21	$ 21
Utilities [2]	$ 157	$ 157
Management Reserve (5%)	$ 40	$ 40
Grand Total - Construction	**$ 860**	**$ 864**
Soft Costs[3]		
Preliminary Engineering & Permits (10%)	$ 80	$ 80
Construction Engineering (10%)	$ 80	$ 80
Grand Total - Soft Costs	**$ 160**	**$ 161**
Grand Total Alternative Cost (rounded)	**$ 1,020**	**$ 1,024**
Inflation (rounded) 17%	**$ 172**	**$ 173**
Property Acquisition/Remediation		
Property Acquisition	$ 365	$ 365
Remediation	$ 17	$ 17
Subtotal - Property	*$ 382*	*$ 382*
Inflation ROW - 9%	$ 35	$ 35
Grand Total - Property	**$ 418**	**$ 418**
GSA Plaza Costs	*$ 200*	*$ 200*
Grand Total Cost (rounded)	**$ 1,809**	**$ 1,814**

General Notes:
Grand Total Cost in year of expenditure (YOE) dollars.
Contingency format per FHWA Major Project Estimating Guidance (http://www.fhwa.dot.gov/programadmin/mega/).
Bridge Options: 4 - Cable-Stay, 7 - Suspension

Notes:
1. Construction Costs include design (15%) & construction (10%) contingencies, Maintenance of Traffic (5%) and Mobilization (10%) in 2008$.
2. Utility costs include both public and private relocation costs.
3. Final Design & Construction Engineering soft costs are 10% of Construction Subtotal and Utilities each.
4. Inflation costs weighted using cash flow for estimated year of expenditure.
5. Enhancements from "Green Sheet" as listed at the end of FEIS Section 4.
6. Property acquisition costs include demolition and all real estate contingencies.
7. Management Reserve - 5% of Construction and Utliity cost.



5. TRAFFIC ANALYSIS

5.0 TRAFFIC ANALYSIS

The Level 3 Traffic Analysis Report: Travel Demand Model Results and Highway Capacity Analysis/Microsimulation Results of the Preferred Alternative presents: 1) the final travel demand model (TDM) assignments for the Preferred Alternative, which is a hybrid of the interchanges associated with Practical Alternatives #1, #2, and #16; and, 2) the traffic analysis of the Preferred Alternative. That report documents the applications and results of the *Highway Capacity Software (HCS)* and *VISSIM* modeling software to evaluate the potential traffic impacts on the U.S. side of the border for the proposed new crossing system over the Detroit River between Detroit, Michigan, and Windsor, Ontario, Canada. This section of the Engineering Report summarizes those findings.

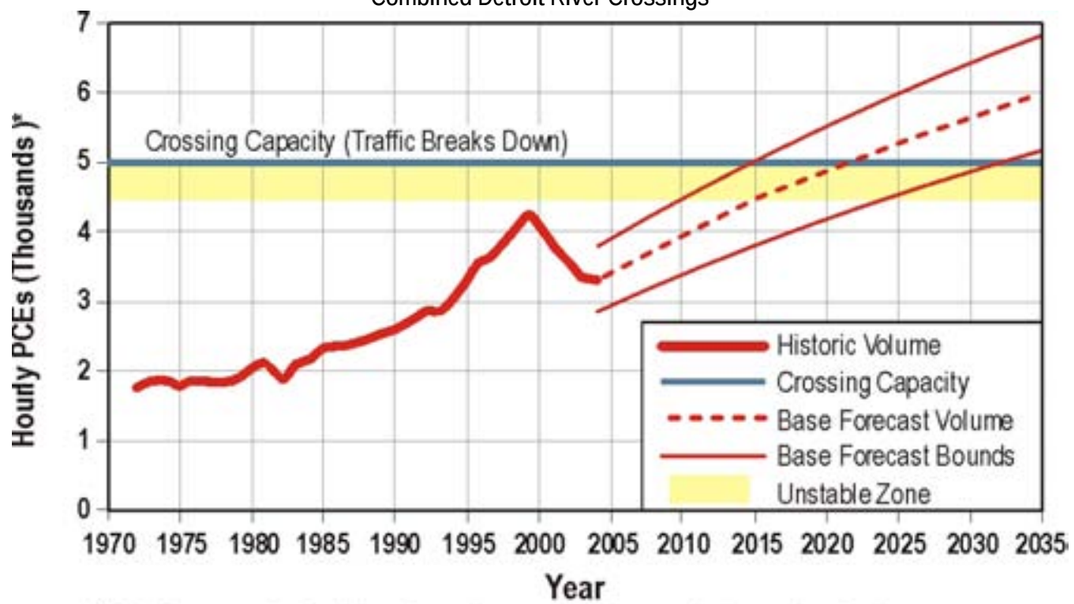
The traffic analyses were conducted for the DRIC Preferred Alternative for the year 2035. The DRIC Preferred Alternative uses the basic plaza design and interchange scheme with I-75 as Alternatives #1, #2, and #16, and connects with I-75 at the same location of Livernois and Dragoon. Based on the traffic volumes determined for the future forecasts, capacity analyses were conducted for three peak hours (AM, Midday, and PM) for 2035 conditions. Results include: traffic density, level of service, and, where appropriate, average delay for each freeway mainline segment, merge/diverge area, weaving segment, and local intersection.

In this report, only the 2035 AM and PM results for the DRIC Preferred Alternative are presented. The analyses of the 2035 Midday peak period may be found in the sections of the Level 3 Traffic Analysis Report, referenced above.

5.1 Traffic Projections

The Level 3 Traffic Analysis Report documents the traffic projections for the Preferred Alternative. Over the next 30 years, Detroit River area cross-border passenger car traffic is forecast to increase by approximately 57 percent and movement of trucks by 128 percent. Traffic demand could exceed the "breakdown" cross-border roadway capacity as early as 2015 under high growth scenarios. Even under "low" projections of cross-border traffic, the "breakdown" roadway capacity of the existing Detroit River border crossings (bridge and tunnel combined) will be exceeded by 2032 (Figure 5.1-1). Additionally, the capacity of the connections and plaza operations will be exceeded in advance of capacity constraints of the roadway. Without improvements, this will result in a deterioration of operations, increased congestion and unacceptable delays to the movement of people and goods in this strategic international corridor.

Figure 5.1-1
Travel Demand vs. Capacity:
Combined Detroit River Crossings



Source: The Corradino Group of Michigan, Inc.

5.2 Future Traffic Analysis

5.2.1 Future (2035) Build Volumes

This report section documents the future traffic conditions within the Detroit River International Crossing (DRIC) study area. The study area roadway network includes ten miles of freeway, two miles of service drives, and 14 miles of arterial roads (Figure 5.2-1). More specifically, the study area includes I-75 from southwest of Dearborn Avenue to its interchange with I-96, and I-96 from I-75 to I-94. The study area also includes the arterial roadways within the Delray neighborhood extending to an area north of I-75. This area includes the service drives along I-75 as well as Fort Street. The major north-south streets of Springwells/Westend Street, Green Street, Waterman Street, Livernois Avenue, Dragoon Street, Junction Street, Clark Street, and West Grand Boulevard from north of I-75 into Delray are included as well.

Figure 5.2-1 also shows the new layout of the Gateway plaza and interchange project currently under construction at the Ambassador Bridge. The Gateway project will be completed in 2009. Therefore, the Base (2006) traffic conditions analyses include the Gateway project so that a comparison could be made against the future No Build and Preferred Alternative scenarios.

The travel demand model (TDM) was used as a basis for development of future 2035 detailed traffic volumes for the freeway and ramp system and the local street network. The Build (2035) Preferred Alternative volume diagrams for the AM and PM peak periods are provided in Volume 2: Appendix E. Additional diagrams for the Midday volumes are in the Traffic Analysis Report.

Figure 5.2-1
Study Area Roadway Network

5.2.2 Highway Capacity Analysis

This section documents the findings of the Highway Capacity Analysis done for the Level 3 Traffic Analysis Report. The capacity analyses results included in the report for freeway mainline segments, merge/diverge areas and weaving segments, are those produced by the HCS analyses. The capacity analyses for the local intersections were derived from VISSIM modeling output.

On the following page, Tables 5.2-1 and 5.2-2 present the AM and PM level of service results for the capacity analyses conducted for the Build (2035) Preferred Alternative. The traffic report also analyzes the Midday traffic period but those results were not found to be significant, they were bounded by the AM and PM results, and therefore they are not presented here.

The capacity analyses for the DRIC Preferred Alternative found all levels of service (LOS) on I-75 and I-96 would be LOS D or better except the one-lane section of the westbound I-96 diverge; this section extends from the two-lane section of the westbound I-96 diverge to the Gateway on-ramp which would be LOS E (see Figure 5.2-2 for AM and PM). All local street study intersections would operate at LOS C or better. Additional details of the analysis for the DRIC Preferred Alternative are provided in the Traffic Analysis Report.

5.3 Pedestrians and Bicycles

The size of the proposed DRIC plaza would limit the pedestrian flow through the Delray area. Land use planning associated with the DRIC calls for a "Gateway Boulevard" west of the plaza that would provide for an enhanced north-south pedestrian linkage. On the east, the access to Fort Wayne would be enhanced along Campbell and/or Junction Streets, depending on the final DRIC alternative selected. While the study area's population is mostly north of I-75, Southwestern High School and the main bus lines serving Delray are on Fort Street south of I-75.

All bridges that remain over I-75 (or that are rebuilt) would have sidewalks. Replacement pedestrian/bicycle bridges would be constructed in those locations where warranted and where no conflict with the ramps of the proposed DRIC alternatives would occur.

Traffic operations accommodations to take into account the changes in pedestrian and bicycle patterns through the area as a result of the DRIC alternatives will be needed. The re-distribution of pedestrians and bicycles to the remaining pedestrian/bicycle bridges and to the enhanced north-south linkages, "Gateway Boulevard" to the west and Campbell and/or Junction Streets to the east, make this necessary.

Fortunately, the capacity analyses results for all DRIC alternatives during all peak periods showed that the majority of the local street intersections, including service drive intersections, will operate at levels of service (LOS) A or B. Only the Southbound Service Drive at Clark Street during the AM peak hour would operate at LOS C. The excess capacity represented by these higher levels of service provides flexibility to adapt traffic operations to meet changing pedestrian and bicycle use patterns. Traffic signal timing can be designed and timing adjustments implemented to accommodate the changes in pedestrian and bicycle use patterns that will occur with the DRIC alternatives. This can be done in a manner that facilitates the changed patterns and any future growth in pedestrian and bicycle use while still effectively managing vehicular traffic in the study area.

In addition, improvements to the local streets with the DRIC project will provide additional design opportunities to further enhance pedestrian and bicycle operations in the project area. The design will insure that the Delray area and Southwestern High School pedestrians and bicyclists are adequately served.

On the main river bridge, a 1.6 m (5 foot) sidewalk is proposed. Pedestrian access is maintained across the bridge and the pedestrians are securely moved from the bridge to the processing area of the plaza and then to the local surface streets. Bicycles could not be ridden across on the sidewalk due to limitation on pedestrian railing height related to the aerodynamic stability of long span bridges.

Table 5.2-1
Detroit River International Crossing Study
Build (2035) Preferred Alternative
Peak Hour Levels of Service for I-75 Freeway Segments, Merge/Diverge Areas, and Weaving Segments

FREEWAYS	LOS	
	AM Peak	PM Peak
Northbound I-75 Freeway Segments		
From Dearborn off-ramp to Springwells off-ramp	C	B
From Springwells off-ramp to Springwells on-ramp	C	B
Springwells on-ramp to DRIC Plaza off-ramp	B	A
From DRIC Plaza off-ramp to Livernois off-ramp	C	A
From Livernois off-ramp to Dragoon on-ramp	C	A
From Dragoon on-ramp to DRIC Plaza on-ramp	C	A
From DRIC Plaza on-ramp to Clark on-ramp	D	B
From Clark on-ramp to Lafayette off-ramp	C	B
From Lafayette off-ramp to WB I-96 off-ramp	C	B
From NB I-75/I-96 Diverge to NB I-75 Service Drive off-ramp (at Gateway)	C	A
From NB I-75 Service Drive off-ramp (at Gateway) to Gateway on-ramp	C	B
From Gateway on-ramp to C-D Road off-ramp	D	B
Southbound I-75 Freeway Segments		
From C-D Road on-ramp to Gateway off-ramp	B	D
From Gateway off-ramp to SB I-75/I-96 Merge	B	D
From SB I-75/I-96 Merge to Gateway on-ramp	B	D
From Gateway on-ramp to Grand Blvd. on-ramp	B	C
From Grand Blvd. on-ramp to Clark off-ramp	B	D
From Clark off-ramp to DRIC Plaza off-ramp	B	C
From DRIC Plaza off-ramp to Junction on-ramp	A	C
From Junction on-ramp to Dragoon off-ramp	A	B
From Dragoon off-ramp to DRIC Plaza on-ramp	A	C
From DRIC Plaza on-ramp to Springwells off-ramp	A	B
From Springwells off-ramp to Springwells on-ramp	B	C
From Springwells on-ramp to Dearborn on-ramp	B	C
Westbound I-96 Freeway Segments		
From NB I-75 Diverge to 1-lane section	C	A
From 2-lane section to Gateway on-ramp	E	C
From Gateway on-ramp to Michigan off-ramp	C	B
Eastbound I-96 Freeway Segments		
From Michigan on-ramp to Gateway off-ramp	B	C
From Gateway off-ramp to SB I-75/I-96 Merge	C	D
Northbound I-75 Ramp Merge and Diverge Areas		
Dearborn off-ramp	C	B
Springwells off-ramp	C	B
Springwells on-ramp	C	B
DRIC Plaza off-ramp	B	B
Livernois off-ramp	B	A
Dragoon on-ramp	B	B
DRIC Plaza on-ramp	A	A
Clark on-ramp	C	B
Lafayette off-ramp	C	B
NB I-75/I-96 Diverge	B	A
NB I-75 Service Drive off-ramp (at Gateway)	B	A
Gateway on-ramp	C	B

Legend: Not Congested (LOS A-B), Near Congested (LOS C-D), Congested (LOS E-F)
Source: Parsons Transportation Group

Table 5.2-1 (continued)
Detroit River International Crossing Study
Build (2035) Preferred Alternative
Peak Hour Levels of Service for I-75 Freeway Segments, Merge/Diverge Areas, and Weaving Segments

FREEWAYS	LOS	
	AM Peak	PM Peak
Southbound I-75 Ramp Merge and Diverge Areas		
Gateway off-ramp	B	C
Service Drive on-ramp (E of Grand)	B	C
Clark off-ramp	A	B
DRIC Plaza off-ramp	A	A
Junction on-ramp	B	C
Dragoon off-ramp	A	B
Springwells off-ramp	A	B
Springwells on-ramp	B	C
Dearborn on-ramp	B	C
Eastbound I-96 Ramp Merge and Diverge Areas		
Gateway off-ramp	B	B
Northbound I-75 Weaving Segments		
From Springwells on-ramp to DRIC Plaza off-ramp	B	B
From Clark on-ramp to Lafayette off-ramp	C	B
Southbound I-75 Weaving Segments		
From Ambassador on-ramp to Clark off-ramp	B	D
From Junction on-ramp to Dragoon off-ramp	A	B
From DRIC Plaza on-ramp to Springwells off-ramp	B	C

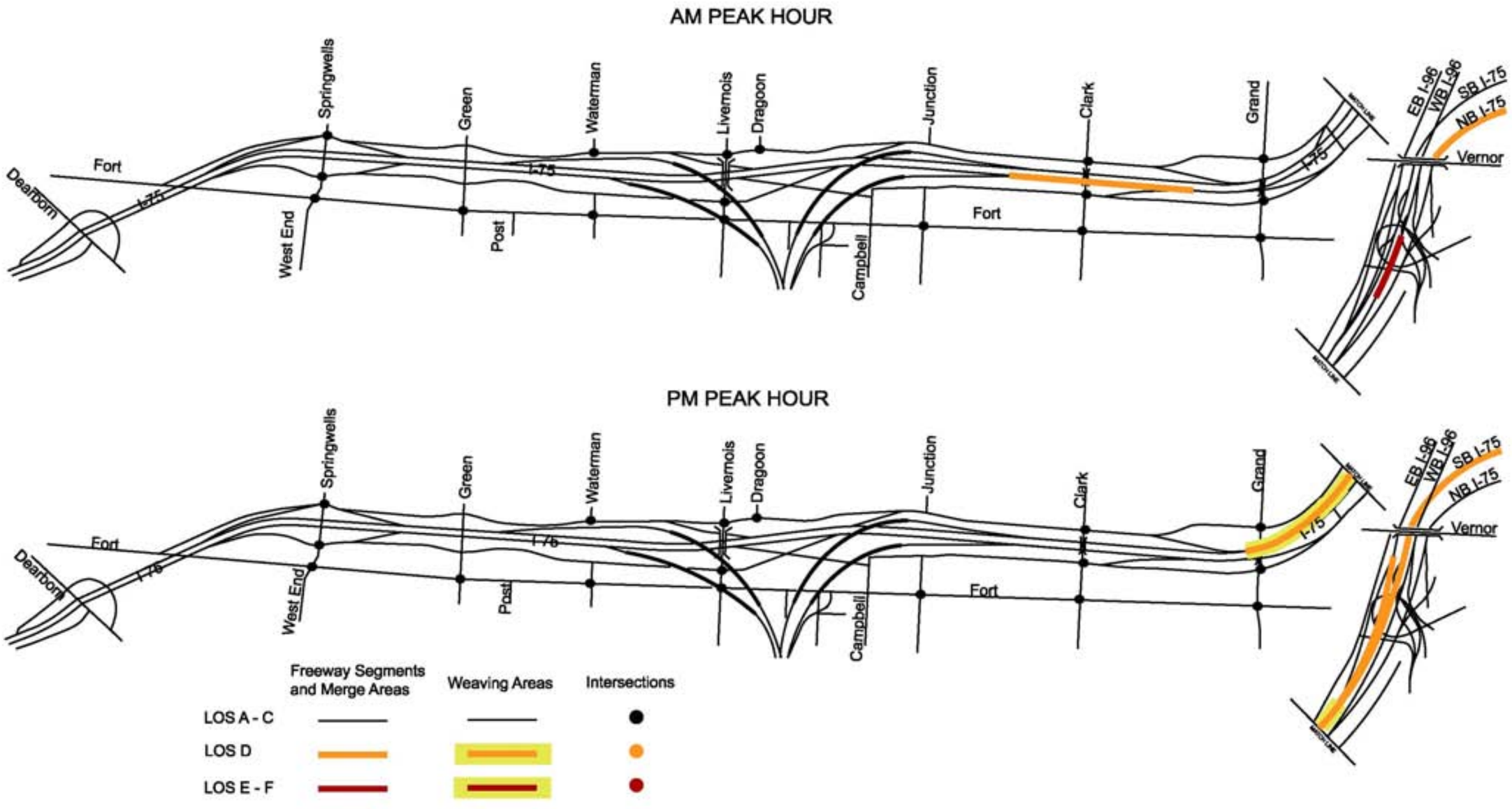
Legend: Not Congested (LOS A-B), Near Congested (LOS C-D), Congested (LOS E-F)
Source: Parsons Transportation Group

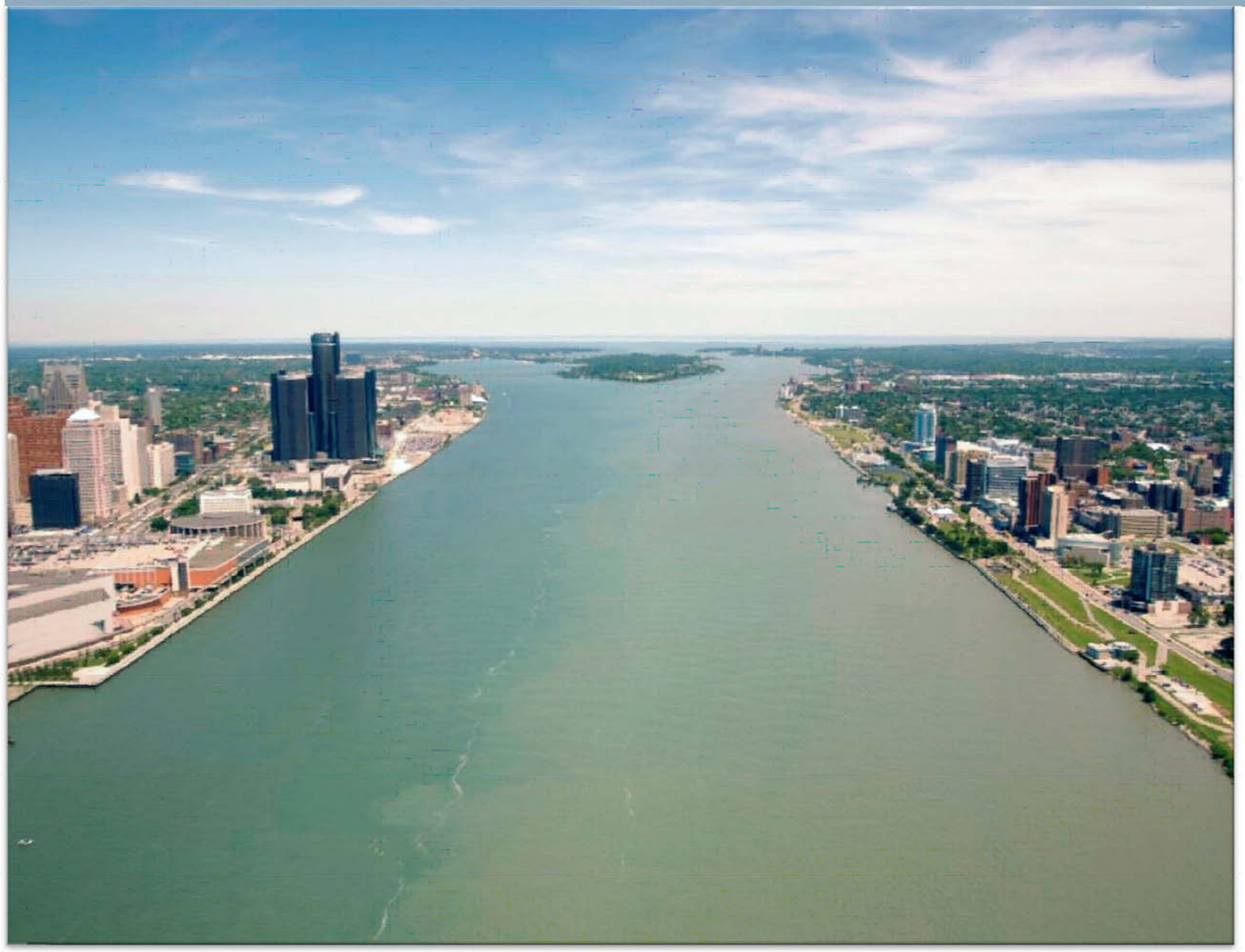
Table 5.2-2
Detroit River International Crossing Study
Build (2035) Preferred Alternative
Peak Hour Levels of Service for Local Intersections

Intersection Name	LOS	
	AM Peak	PM Peak
Fort at Westend	A	A
Fort at Green	A	A
Fort at Waterman	A	A
Fort at Livernois	A	A
Fort at Junction	B	B
Fort at Clark	B	B
Southbound I-75 Service Drive at Livernois	A	A
Southbound I-75 Service Drive at Dragoon	A	A
Southbound I-75 Service Drive at Waterman	A	A
Northbound I-75 Service Drive at Livernois	A	A
Southbound I-75 Service Drive at Springwells	B	A
Northbound I-75 Service Drive at Westend	B	B
Northbound I-75 Service Drive at Clark	A	B
Southbound I-75 Service Drive at Clark	C	B
Fort at Grand Blvd.	A	A
Northbound I-75 Service Drive at Grand Blvd.	B	B
Southbound I-75 Service Drive at Grand Blvd.	A	A

Legend: Not Congested (LOS A-B), Near Congested (LOS C-D), Congested (LOS E-F)
Source: Parsons Transportation Group

Figure 5.2-2
Detroit River International Crossing Study
Build (2035) Preferred Alternative Peak Hour Levels of Service





6. VALUE PLANNING STUDY

6.0 VALUE PLANNING STUDY

A Value Planning (VP) study was held January 29, 2007 through February 2, 2007 to review the new Detroit River International Crossing (DRIC) project between the U.S. and Canada. The scope of the VP study was focused on the interchange connecting the plaza on the U.S. side to I-75. The study did not include the plaza or the bridge crossing the Detroit River into Canada.

The VP Team organized the workshop into two distinct parts: the first to review, analyze and evaluate the alternatives (Value Analysis) that the DRIC Early Preliminary Study (EPE) Study Team had developed; and the second, to speculate on improvements to these alternatives or propose new alternatives (Value Planning).

6.1 Developed Interchange Alternatives

The VP Team considered seven alternative interchanges developed by the DRIC EPE Study Team that would connect the plaza to I-75 (Figures 6.2-1 through 6.2-7). Because of the proximity of I-75 and the Detroit River, the plaza is a relatively short distance from I-75, limiting the available space to develop connecting ramp geometries. Adding ramps to and from I-75 to the plaza will make it impossible to maintain all cross roads because of conflicting elevations.

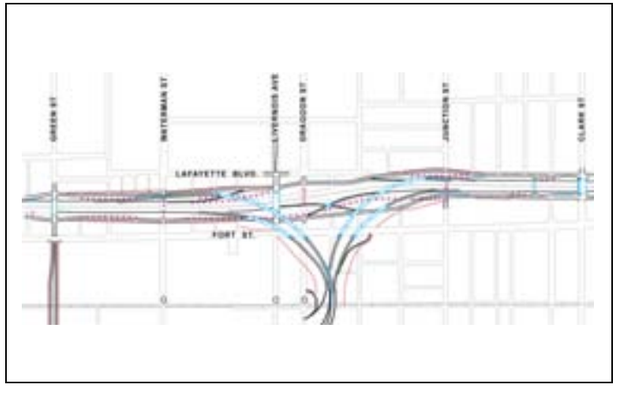
6.2 Summary of Alternatives

Interchange alternatives consist of three general configurations:

- Connecting I-75 exit and entrance ramps to a plaza in the same location.
- Splitting the I-75 connection to the plaza with exit ramps more easterly and the entrance ramps more westerly.
- Splitting the I-75 connection to the plaza with entrance ramps more easterly and the exit ramps more westerly.

Interchange Alternative A

Figure 6.2-1 Interchange Alternative A



Interchange Alternative A is a directional three-legged interchange. Key elements of this interchange are listed below:

- Reconfigures location of existing ramps along I-75.
- Closure of Dragoon Street bridge over I-75 due to eastbound ramp from the service drive through the Dragoon intersection with the northbound I-75 service drive (existing one-way pair).
- Closure of Waterman and Junction Street bridges over I-75 due to grade issues.
- Because of the closure of the Dragoon Street bridge, Livernois Avenue is turned into a two-way road between Fort Street and Lafayette Boulevard in order to maintain access across I-75.
- Introduces braided ramps.

Interchange Alternative B

Figure 6.2-2 Interchange Alternative B

Interchange Alternative B is a directional three-legged interchange. Key elements of this interchange are listed below:

- Reconfigures location of existing ramps along I-75.
- Eliminates braided ramps, introduces auxiliary lanes along I-75.
- Closure of Waterman and Junction Street bridges over I-75 due to grade issues.
- Maintains Livernois Avenue and Dragoon Street bridges over I-75.

Interchange Alternative C

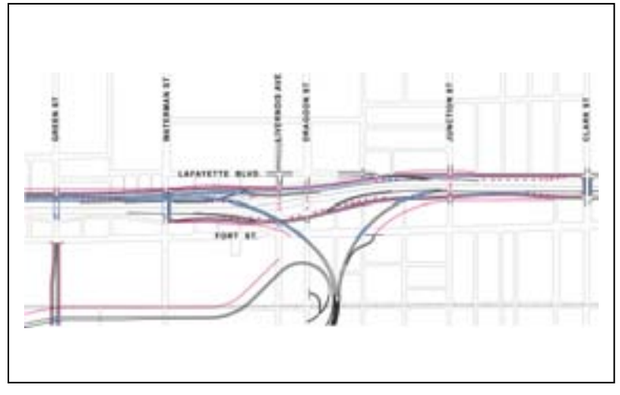
Figure 6.2-3 Interchange Alternative C

Interchange Alternative C is a directional three-legged interchange. Key elements of this interchange are listed below:

- Shifts I-75 southerly to minimize impacts to residences on north side.
- Reconfigures location of existing ramps along I-75.
- Closure of Livernois Avenue and Dragoon Street bridges over I-75 due to conflicts with the eastbound ramp from the service drive.
- Closure of Junction Avenue bridge over I-75 due to grade issues.
- Waterman Street over I-75 can be kept open with grade raise.

Interchange Alternative D

Figure 6.2-4 Interchange Alternative D



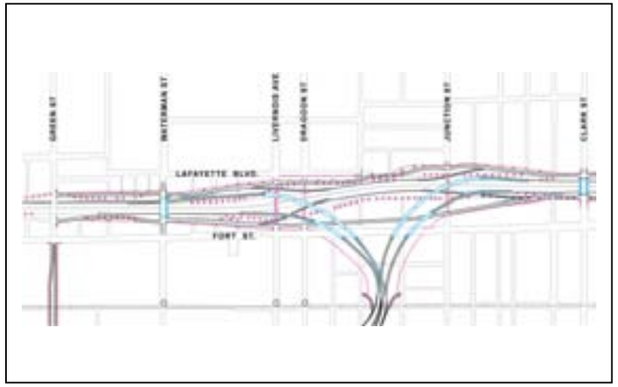
Interchange Alternative D is a split interchange. Ramp terminals for traffic from the U.S. to Canada are located west of Springwells Street. Ramp terminals for traffic from Canada to the U.S. are located at Livernois/Dragoon. Key elements of this interchange are listed below:

- Reconfigures location of existing ramps along I-75.
- Closure of Livernois Avenue and Dragoon bridges over I-75 due to impacts with Plaza Ramp D.
- Ramp D is on bridge structure from

Livernois Avenue through Green Street.
- Waterman Street over I-75 can be kept open.
- Closure of Junction Avenue bridge over I-75 due to grade issues.
- It may be possible to create a hybrid option by combining the plaza ramp with the service drive.

Interchange Alternative E

Figure 6.2-5 Interchange Alternative E



Interchange Alternative E is a three-legged directional interchange. Key elements of this interchange are listed below:

- Interchange shifted to the east to maximize the distance from Southwestern High School.
- Reconfigures location of existing ramps along I-75.
- Introduces auxiliary lanes along I-75.
- Closure of Livernois Avenue and Dragoon Street bridges over I-75 due to conflicts with the local ramps.
- Closure of Junction Avenue bridge over I-75 due to grade issues.
- Waterman Street over I-75 remains open.
- This option appears to be one of the better options for permanent signing.

Interchange Alternative F

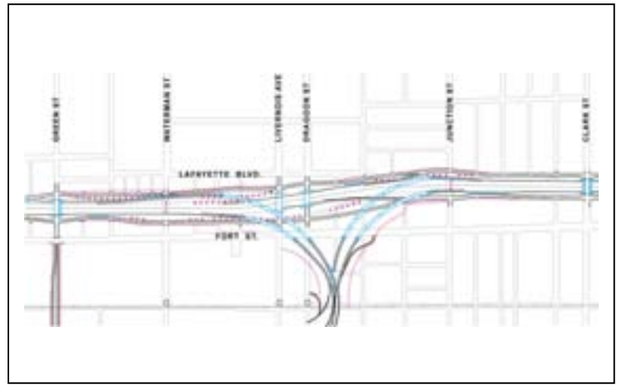
Figure 6.2-6 Interchange Alternative F

Interchange Alternative F is a split interchange. Ramp terminals for traffic from the U.S. to Canada are located west of Springwells Street. Ramp terminals for traffic from Canada to the U.S. are located at Livernois/Dragoon. Key elements of this interchange are listed below:

- Reconfigures location of existing ramps along I-75.
- Livernois Avenue and Dragoon Street over I-75 remain open.
- Waterman Street and Junction Avenue over I-75 remain open.
- The northbound service drive merges with Ramp A and is depressed under Livernois Avenue and Dragoon Street.
- The northbound service drive exit ramp weaves with Ramp A.
- The design speed for ramps is 70 km/hr (45 mph) in the gore area. The tighter curve in the plaza entrance ramp to northbound I-75 away from the freeway can have a 50 km/hr (30 mph) design speed.
- A separate service drive may not be needed. It may be possible to combine Ramp A with the service drive and merge them together sooner. It would need to be determined if it is acceptable to provide trucks access to local streets as they exit the plaza.

Interchange Alternative I

Figure 6.2-7 Interchange Alternative I



Interchange Alternative I Modified is a three-legged directional interchange. Key elements of this interchange are listed below:

- All of the other concepts include maintaining an interchange (Service Drive ramps) in between the Clark Street and Springwells Street interchanges. This concept includes removing the Livernois/Dragoon interchange and providing service drive access to Clark/Junction and Springwells Streets.
- The plaza ramps are similar to Interchange Alternative A.
- The service drives are similar to Interchange Alternative B.
- Six of the eight Service Drive entrance and exit ramps to I-75 at the Springwells Street and Clark Street interchanges are anticipated to be two lane ramps. The northbound I-75 exit ramp to Clark Street are anticipated to be one lane ramps.
- Livernois Avenue and Dragoon Street over I-75 remain open.
- Closure of Junction Avenue and Waterman Street bridges over I-75 due to grade issues.

6.3 Value Analysis

Performance and Acceptance criteria were developed from the Function Logic diagram which was then used to rank each of the seven alternatives developed by the DRIC EPE Study Team.

The criteria for Performance included: Access to/from Plaza, Traffic operations on I-75, Local access within corridor, Local traffic operations and Bridge geometry/retaining wall. The Acceptance criteria included: Protect community/neighborhood characteristics, impact to N/S neighborhood, constructability, Impact to Utilities, Driver Comfort and Impact to Delray.

The criteria for both the Performance and Acceptance were analyzed for importance by the VP Team. Using these criteria the evaluation teams scored each of the alternatives. The scoring for each criterion was based on a 0 to 5 rating, 5 being the highest and 0 being unacceptable. The seven alternatives ranked between (3.0) good to (4.0) very good for Performance. The high rankings were expected due to the level of previous review and refinement by the DRIC EPE Study Team. Using the same procedure each of the alternatives were evaluated and ranked using the Acceptance criteria. The seven alternatives ranked between 2.43 (Interchange D) and 3.72 (Interchange I). Interchanges D and F both impact the Delray Community to a higher degree then the others, substantially impacting the Acceptance of either of these two alternatives.

Conceptual level cost estimates were prepared by the Study Team. The costs included construction, right-of-way acquisition and remediation for significant environmental impacts. The cost estimates range from $178 million to $255 million. The VP Team assigned scores to each of these by utilizing a graphical method as defined in the report.

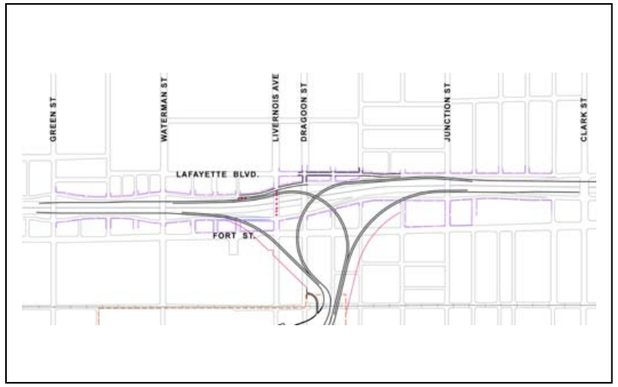
The VP Team found that all seven alternatives were feasible. Alternatives that ranked lower in either Acceptance or Cost may be improved through further refinement as they are developed in greater detail.

6.4 Value Planning

As part of the Value Planning process, the VP Team developed 124 ideas. From these ideas the VP Team proposed four new interchange concepts, two of which were recommended for further study. The four alternatives along with their identified advantages and disadvantages are listed below (Figures 6.4-1 through 6.4-4).

VP Interchange 1

Figure 6.4-1 VP Interchange 1



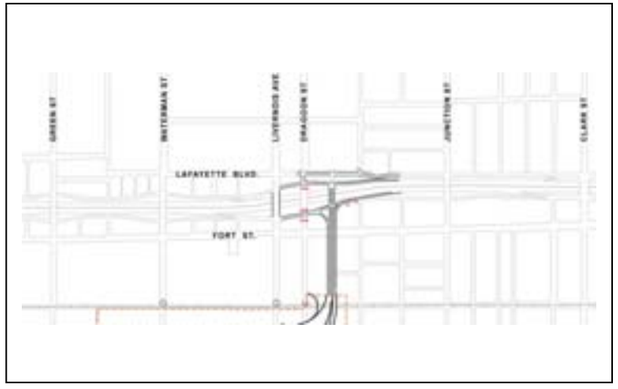
Circular three-legged directional interchange.

Advantages:
- Maintains Clark and Springwells interchanges
- Localizes the impacts to service drives
- Requires less right-of-way
- Reduces impacts north of I-75
- Slows traffic entering the plaza

Disadvantages:
- Design speed of 50 km/h (30 mph) in circle
- Close Livernois Bridge
- Close Livernois/Dragoon interchange

VP Interchange 2A

Figure 6.4-2 VP Interchange 2A



Signalized three-legged interchange.

Advantages:
- Maintains Clark and Springwells interchanges
- Localizes the impacts to service drives
- Requires less right-of-way
- Reduces impacts north of I-75
- Localizes impact to Delray
- Less bridge area
- Reduces bridges over Fort Street

Disadvantages:
- Stop condition for southbound traffic to and from the Plaza (twice)
- Close Dragoon Bridge
- Mixes local and bridge traffic
- Discontinuity in service drives
- Air Quality and Noise impact on north side of I-75

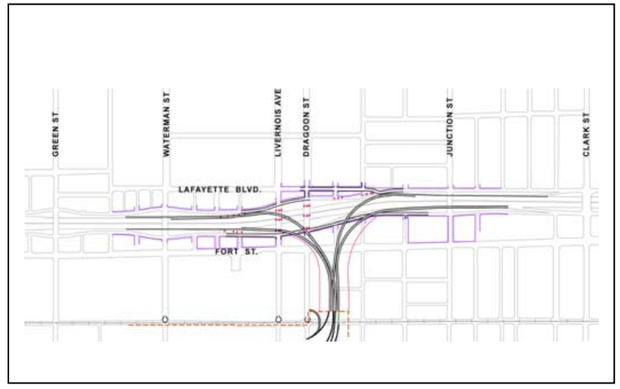
VP Interchange 2B

Figure 6.4-3 VP Interchange 2B

The proposed VP Interchange 2B is a variation of VP Interchange 2A except that the northbound service drive goes under the ramps to and from the plaza. As such VP Interchange 2B has the same advantages and disadvantages as VP Interchange 2A with the exception that only one signal will be required for 2B.

VP Interchange 3

Figure 6.4-4 VP Interchange 3



Three-legged interchange.

Advantages:
- Maintain Clark and Springwells interchanges
- Localizes impacts to service drives
- Requires less right-of-way
- Reduces impacts north of I-75
- Localizes impact to Delray
- Less bridge area
- Reduces bridges over Fort Street
- Slows traffic entering the plaza

Disadvantages:
- Design speed 50 km/h (30 mph)
- Close Dragoon and Livernois bridges
- Close Livernois/Dragoon interchange
- Discontinuity in service drives

6.5 Cost Model

Prior to the VP Study, the DRIC EPE Study Team prepared a conceptual level cost estimate which was reviewed by the VP Team. The VP Team found the estimate to be reasonable for the level of detail available at this stage of the planning process. The VP Team suggested that the cost estimate be further developed in the ASTM format as the alternatives are revised to reflect the outcome of the VP suggestions. The VP Team also suggested that cost estimates be prepared for the two interchanges recommended for additional study as they are further developed.

6.6 Summary

MDOT's letter dated March 6, 2007 listed the following items presented by the VP Team and MDOT's decision for their implementation:

- New Interchange Concept VP1 at I-75: Circular Interchange
  - Decision: Accept for Further Study
  - Current Status: Concept VP1 is included in the report as Alternative #14.

- New Interchange Concept VP3 at I-75: Diamond Interchange
  - Decision: Accept for Further Study
  - Current Status: Concept VP3 was eliminated from further consideration after the Value Planning process due primarily to the geometric constraints of the railroad.

- Reduce Proposed Ramp Design Speed to 60 km/h (35 mph), from EPE-proposed 70 km/h (45 mph)
  - Decision: Accept for Further Study
  - Current Status: The reduced design speed of 60 km/h (35 mph) has been incorporated with Alternative #14.

- MDOT questioned the truck rollover safety factor of all ramps leading to the DRIC Plaza, for any Ramp Design Speed
  - Decision: Accept for Further Study
  - Current Status: The issues involved with this recommendation will be addressed during development of the Preferred Alternative.

- MDOT questioned the desirability to construct, operate, and maintain ramp bridges with tightly-curved alignments, for any Ramp Design Speed
  - Decision: Accept for Further Study
  - Current Status: The bridges shown for all alternatives are feasible for the design criteria and horizontal alignments.

- Consider Reconstructing I-75 Pavement with all Interchange Alternatives
  - Decision: Accept for Further Study
  - Current Status: Alternatives #3 and #11 require a shifting of I-75 to minimize impacts on the north side. Adding the reconstruction of I-75 to the other alternatives would affect the evaluation of a Preferred Alternative. Adding the reconstruction of I-75 to the project scope can be evaluated at a later time.

- Add Items to Improve Public Acceptance of Interchange Alternative D, and others
  - Decision: Accept for Further Study
  - Current Status: Although this interchange has been eliminated from further consideration, the suggestion to review the alternatives for potential improvements to minimize impacts will be addressed during development of the Preferred Alternative.

- Close I-75 during constructing whichever new DRIC interchange
  - Decision: Reject
  - Current Status: Not Applicable

Table 6.6-1
Disposition of Recommendations – Preferred Alternative

MDOT Recommendations	Disposition
New Interchange Concept VP1 at I-75: Circular Interchange	Concept VP1 was included in as Alternative #14, which was dropped from further consideration, see Section 3.
New Interchange Concept VP3 at I-75: Diamond Interchange	Eliminated due to railroad geometric constraints.
Reduce Proposed Ramp Design Speed to 35 mph from EPE proposed 45 mph	Incorporated in Alternative 14 which was not selected as the Preferred Alternative.
MDOT questioned the truck rollover safety factor of all ramps leading to the DRIC Plaza, for any ramp design speed	Ramps were designed in accordance with MDOT standards for superelevation. Ramp alignments meet all MDOT requirements for minimum radius curvature.
MDOT questioned the desirability to construct, operate, and maintain ramp bridges with tightly-curved alignments, for any ramp design speed	Bridge constructability was reviewed and determined feasible for each component of the remaining alternatives.
Consider Reconstructing I-75 pavement with all interchange alternatives	The preferred alternative does not require a shift of I-75, therefore the reconstruction of I-75 as part of this project has no environmental impacts on the Preferred Alternative and can be a financial decision at a later date.
Add items to improve public acceptance of interchange Alternative D, and others	As described in Section 3 and 4 many of the requested improvements have been evaluated and incorporated into the Preferred Alternative.