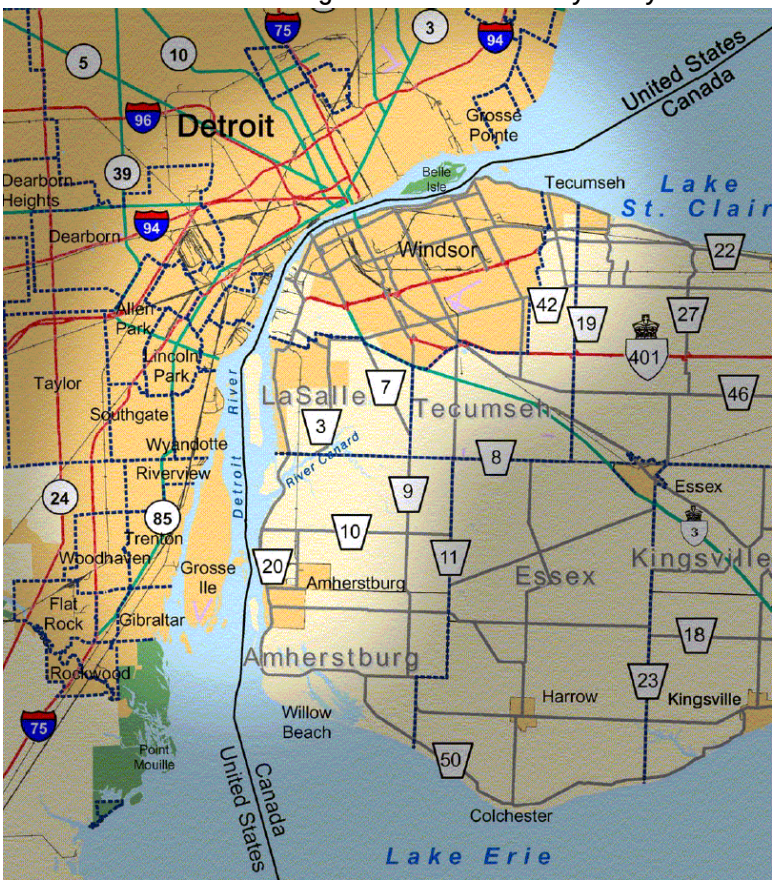
# 2. Alternatives

A new border crossing was first examined in detail in the Planning/Needs and Feasibility Study completed by the Border Transportation Partnership in 2004. That study identified several broad corridors for a new/expanded border crossing within the area shown in Figure 2-1. This section reviews the process that led to the determination of the preliminary Practical Alternatives and the Build Alternatives evaluated in this DEIS. That process was necessarily a collaboration among the United States, Canada, Ontario and Michigan. After both countries had assessed the range of alternatives from their perspective, the alternative analysis was subjected to a joint evaluation whereby each country took into account the other country's assessment of impacts. The Partnership Steering Committee then determined the Practical Alternatives.

Figure 2-1
Area of Focus for
Detroit River International Crossing Study
Based on Planning/Needs and Feasibility Study



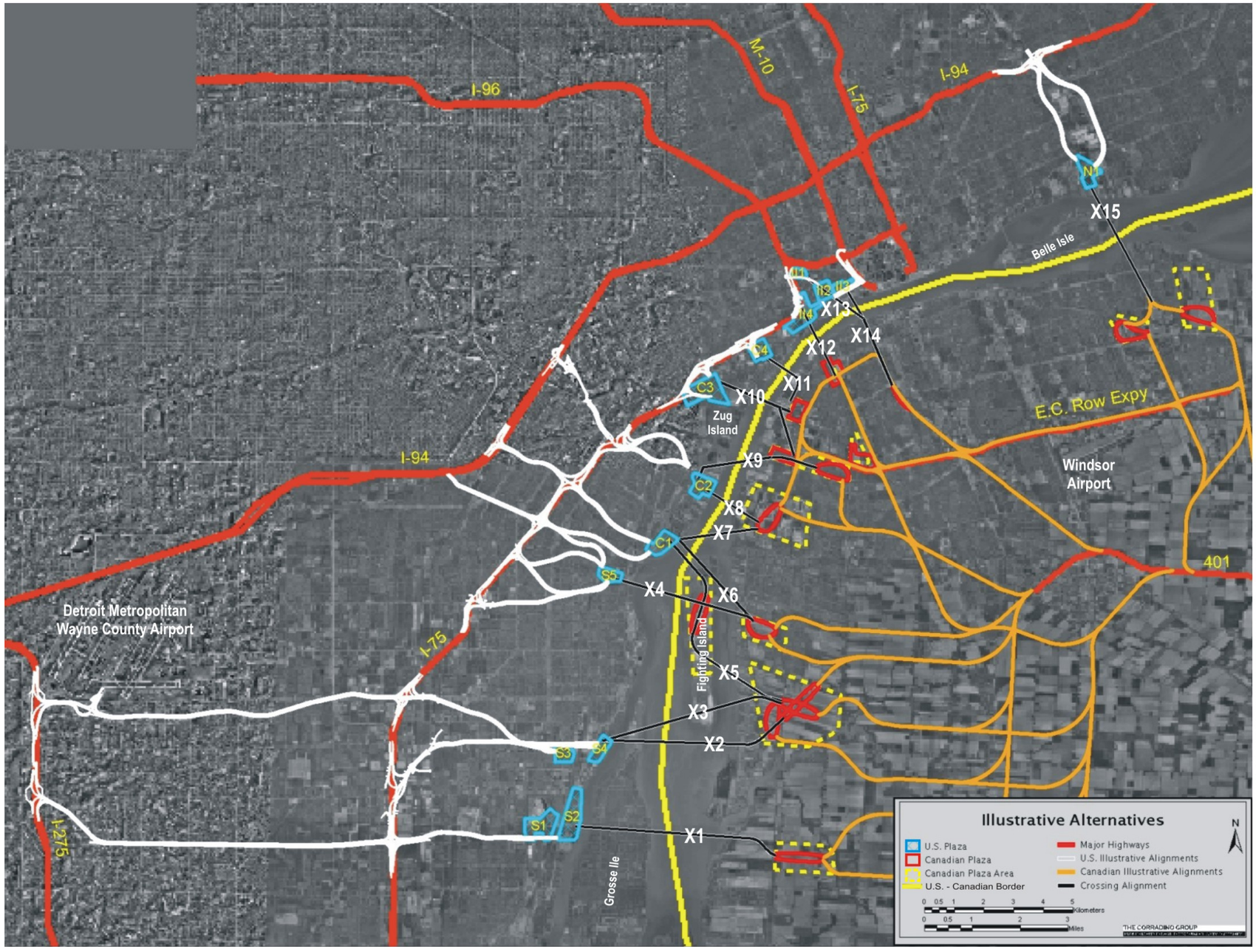
Source: The Border Transportation Partnership and URS Corporation.

## 2.1 Illustrative Alternatives

The collaborative evaluation involved establishing Illustrative Alternatives. Each crossing system alternative included connections to major highways on each side of the border, plazas in each country for federal inspections and toll collection, and a bridge or tunnel connecting the two countries. Fifty-one combinations of connectors, plazas and crossings were established to form the Illustrative Alternatives on the U.S. side of the border[1] (Figure 2-2). Those alternatives included four proposed by the private sector:

[1] The Corradino Group of Michigan, Inc., *Detroit River International Crossing Study, Evaluation of Illustrative Alternatives Technical Reports – Volume 1: Summary; Volume 2: Technical Analysis; Volume 3A: Plaza Technical Data; Volume 3B: Crossing Technical Data; Volume 3C: Route Technical Data*, October 2007.

Figure 2-2
Preliminary End-to-End Illustrative Alternatives
Detroit River International Crossing Study




**Illustrative Alternatives**
The white lines show the Illustrative alternatives in the United States.

Source: The Corradino Group of Michigan, Inc.

1. The Detroit River Tunnel Partnership conversion of two rail tunnels beneath the Detroit River to truck-only use with one lane/tunnel for each direction of travel.
2. The Ambassador Bridge proposal to build a second span adjacent to the existing bridge.
3. The Mich-Can proposal for a bridge between Zug Island and the Ambassador Bridge.
4. The Don Flynn proposal in the Downriver area near Wyandotte.

Tunnels were investigated as an alternative to bridging the Detroit River. Based on the projected travel demand, six lanes of traffic were to be provided for. This could be done in two tunnels each carrying three traffic lanes, or three tunnels each carrying two lanes. The diameter of the three-lane tunnels would be greater, 50 feet versus 38 feet. The Illustrative Alternatives analysis considered: 1) boring through the bedrock; 2) trenching across the bedrock and sediments at the bottom of the Detroit River; and, 3) boring through the sediments at the bottom of the river. The analysis found:

- The bedrock contains groundwater under pressure that can suddenly burst into a bored tunnel. The presence of unsafe gases also makes a bored tunnel dangerous and very costly.
- Trenching along the bottom of the river is environmentally disruptive and would likely pose significant environmental impacts to the point that reviewing agencies may not allow it.
- The sediments at the bottom of the river are not thick enough to bore through. It is desirable to have as much sediment over the tunnel as the diameter of the tunnel. In some places there is not enough depth and the tunnel, which is lighter than both the weight of the surrounding earth and water above, can "float" upward, out of position. Weighting down the tunnel to prevent floating carries its own environmental impacts and can interfere with navigation on the river by decreasing the river's depth.

For these reasons, tunneling was not considered practical, and no tunnel options were carried forward into the DEIS.

The initial number of Illustrative Alternatives using a bridge as the crossing was reduced to 37 after accounting for unique circumstances, or “fatal flaws.” A fatal flaw is a condition that renders a course of action not practical. Those fatal flaws included an inability to tunnel under the Detroit River in the studied area as described above, or the blockage of alternative routes by such obstacles as highly-contaminated sites (e.g., Fighting Island).

A structured process was used on both sides of the border to evaluate from end-to-end the 37 remaining Illustrative Alternatives (Figure 2-3). This process involved the community in weighting the evaluation factors along with weights established by the MDOT and Canadian Technical Teams. The evaluation factors were:

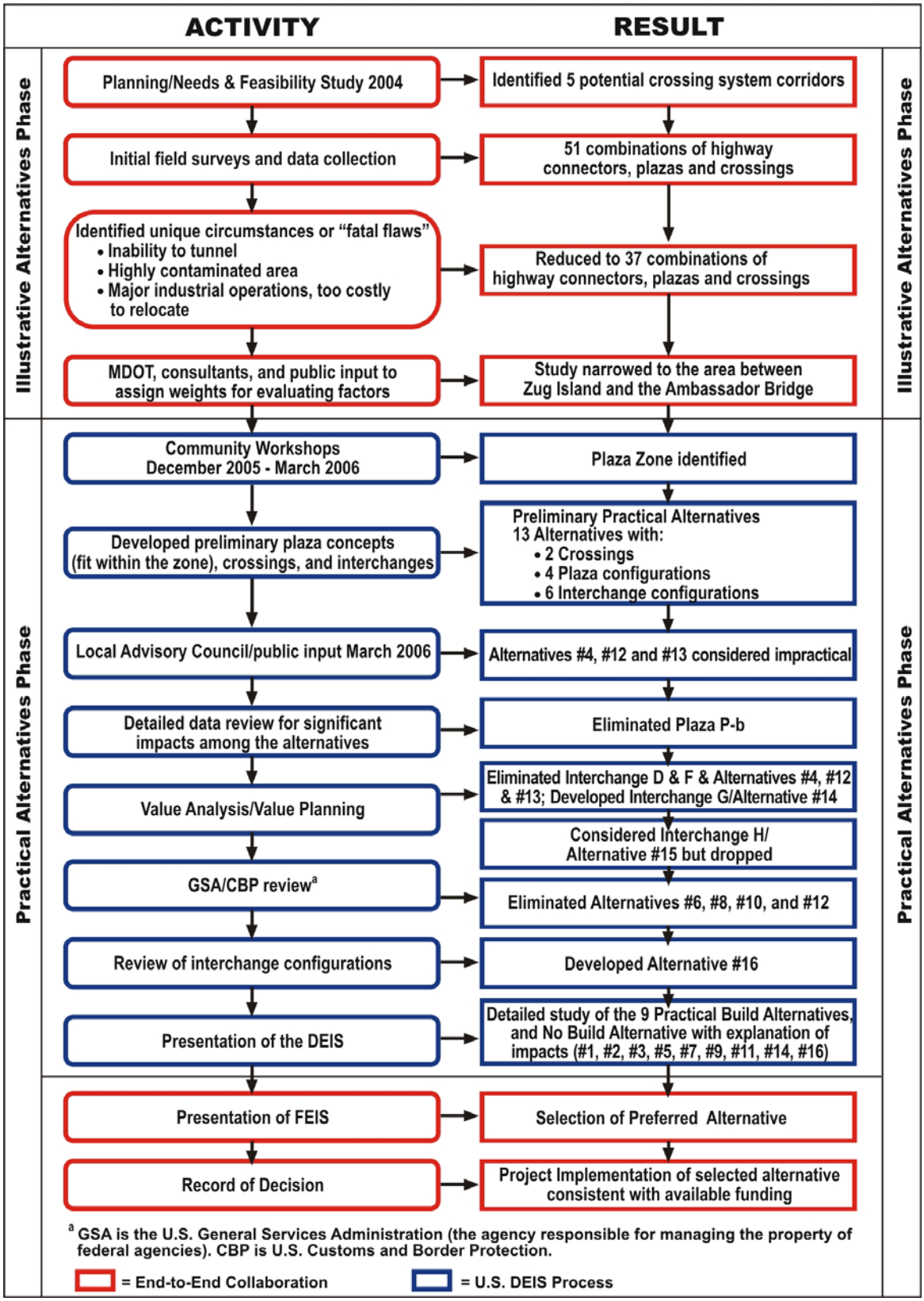
- Protect Community/Neighborhood Characteristics
- Maintain Consistency with Local Planning
- Protect Cultural Resources
- Protect the Natural Environment
- Improve Regional Mobility
- Maintain Air Quality
- Constructability

The first part of the analysis concluded that the Illustrative Alternatives in the Downriver Area (Crossings X-1, X-2, X-3 and X-4 on Figures 2-2 and 2-4) were not candidates for further study. This is attributable to performance in the bottom half of all alternatives in five of the seven evaluation areas. This included poor performances in the areas of regional mobility, protecting the natural environment and protecting neighborhoods. Crossing X-15 in the Belle Isle Area never achieved performance ratings among the top five alternatives and was in the bottom half in five of seven evaluation categories. It too was eliminated early in the analysis of Illustrative Alternatives.

The private sector DRTP proposal[2] was eliminated from further evaluation because it did not address the long-range mobility needs of the region. Specifically, based on analysis of international travel in the 2035 afternoon peak hour, the DRTP proposal (labeled “New Crossing” in Table 2-1), when added to the Ambassador Bridge and the Detroit-Windsor tunnel, would reduce vehicle hours of travel throughout the U.S./Canada road network by only one percent (yellow cell). All other Illustrative Alternatives performed at three times the vehicle hours reduction of the DRTP proposal. Further, the DRTP proposal would do little in 2035 to reduce congestion on the Ambassador Bridge or the Detroit-Windsor Tunnel as defined by the Max V/C (volume-to-capacity ratio) columns on Table 2-2.

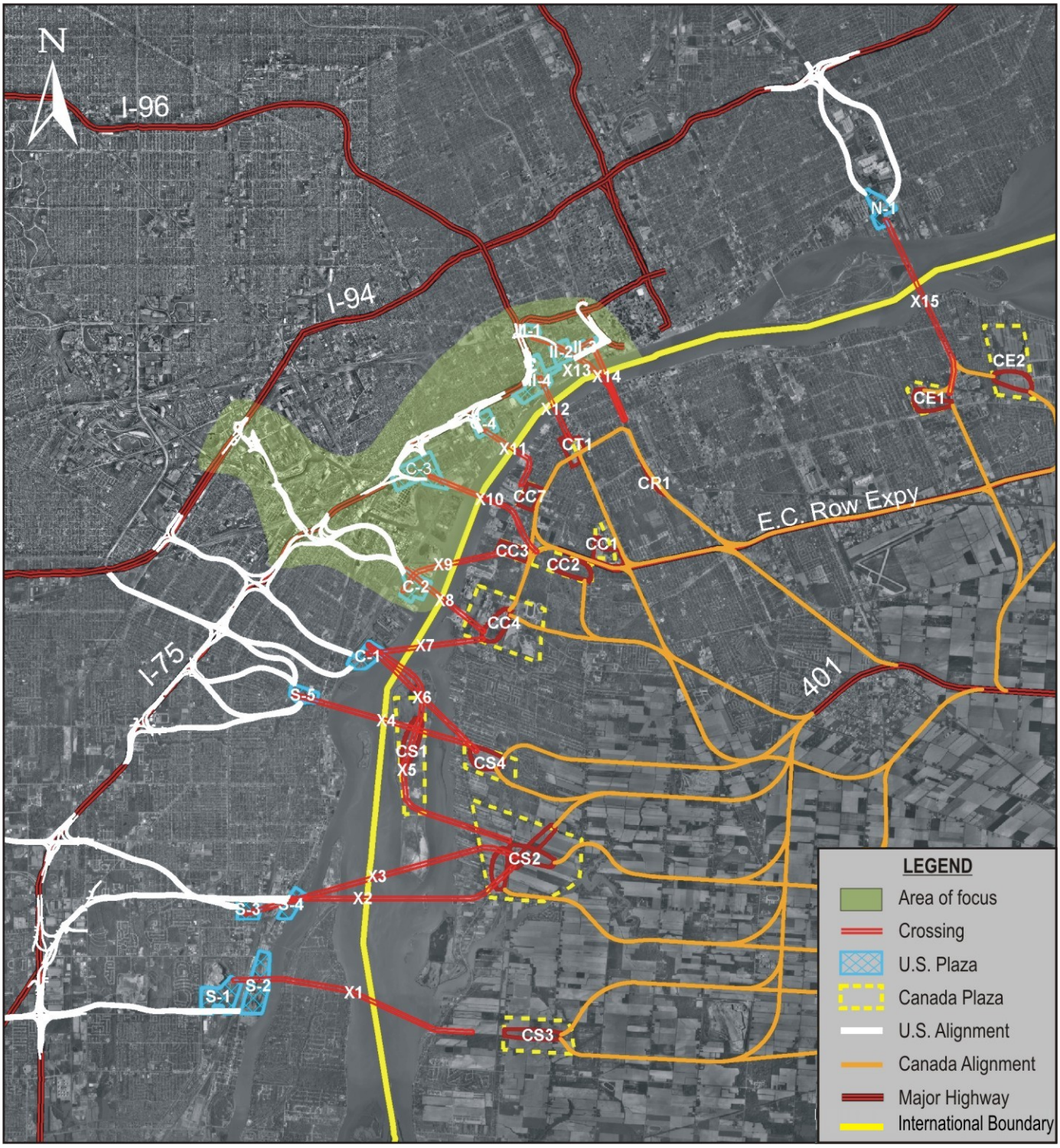
[2] The DRTP Truck Tunnel proposal discussed here has been withdrawn by its proponents.

Figure 2-3
Alternatives Evaluation Process
Detroit River International Crossing Study




Source: Michigan Department of Transportation.

Figure 2-4
Area of Focus Based on Weighted Performance Analysis
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc.

Table 2-1
Evaluation of DRTP Proposal
Regional Mobility Characteristics – 2035 PM Peak Hour Traffic
Detroit River International Crossing Study

| Evaluation Factor | Performance Measure Category | | Description/Units | Traffic |
|---|---|---|---|---|
| Improve Regional Mobility | Highway Network Effectiveness | Vehicle Miles of Travel (international traffic only, PM Peak Hour for 2035) | No Action | 1,089,636 |
| | | | With New Crossing | 1,088,426 |
| | | | Difference from 2035 – No Action | -1,210 |
| | | | Percent Difference | -0.11% |
| | | Vehicle Hours of Travel (international traffic only, PM Peak Hour for 2035) | No Action | 22,113 |
| | | | With New Crossing | 21,864 |
| | | | Difference from 2035 – No Action | -249 |
| | | | Percent Difference | -1.13% |
| | | Diversion due to disruption at Ambassador Bridge | Difference of Int'l VMT without Amb Br. | -1,504 |
| | | | Difference of Int'l VHT without Amb Br. | 9,073 |

Source: The Corradino Group of Michigan, Inc.

Table 2-2
International Traffic Volume and Maximum Volume-over-Capacity Ratios (V/C)
for Key Regional Roadway Links
2035 PM Peak Hour Traffic
Detroit River International Crossing Study

| Crossing | No Build | | DRTP | |
|---|---|---|---|---|
| | Int'l Volume | Max V/C | Int'l Volume | Max V/C |
| New Crossing (DRTP) | N/A | N/A | 601 | 0.78 |
| Ambassador Bridge | 3,694 | 1.12 | 3,311 | 1.10 |
| Detroit River Tunnel | 1,914 | 1.12 | 1,825 | 1.02 |

Source: The Corradino Group of Michigan, Inc.

To measure the redundancy of the DRTP proposal, the travel model was applied with the Ambassador Bridge removed from the roadway network. If the Ambassador Bridge were closed for an extended period of time, the DRTP proposal would fail to effectively serve the diverted traffic. Specifically, closure of the Ambassador Bridge with the DRTP proposal in place would create more than 9,000 vehicle hours of additional travel in the 2035 peak hour as the regional network with the truck tunnel would not efficiently accommodate the diverted traffic (blue cell on Table 2-1).

Another test of the Regional Mobility characteristics of the DRTP proposal is a combination of it with other "new" crossings either downriver or farther upstream. Referring to Figure 2-4, the tests were applied by combining the DRTP proposal with a new crossing at X-2 (Table 2-3A) or X-4 (Table 2-3B) or X-11 (Table 2-3C). The No Action crossings of the Ambassador Bridge, the Detroit-Windsor Tunnel and the Blue Water Bridge were included in all analyses.

Table 2-3A
Analysis of DRTP with Downriver Crossing X-2 + Ambassador Bridge
+ Detroit-Windsor Tunnel + Blue Water Bridge
2035 PM Peak Hour Traffic[a]
Detroit River International Crossing Study

| New Crossing at X2/S3 and DRTP Alignment A37[b] | | New Crossings | | Existing Crossings | | | Total |
|---|---|---|---|---|---|---|---|
| | | X2 Plaza S3 | DRTP | AMB | DW Tunnel | BW Bridge | |
| U.S.-Canada | Cars | 453 | 0 | 1,670 | 1,266 | 447 | 3,836 |
| | Trucks | 660 | 179 | 120 | 30 | 354 | 1,343 |
| Canada-U.S. | Cars | 199 | 0 | 493 | 309 | 400 | 1,401 |
| | Trucks | 277 | 55 | 152 | 2 | 331 | 817 |
| Both Directions | Cars | 652 | 0 | 2,163 | 1,575 | 847 | 5,237 |
| | Trucks | 937 | 234 | 272 | 32 | 685 | 2,160 |
| Total | | 1,589 | 234 | 2,435 | 1,607 | 1,532 | 7,397 |

[a] Individual computer model assignments will vary slightly from one to another.

[b] Alignment for X2/S3 via Eureka to I-275.

Source: The Corradino Group of Michigan, Inc.

Table 2-3B
Analysis of DRTP with Downriver Crossing X-4 + Ambassador Bridge
+ Detroit-Windsor Tunnel + Blue Water Bridge
2035 PM Peak Hour Traffic[a]
Detroit River International Crossing Study

| New Crossing at X4/S5 and DRTP Alignment A36[b] | | New Crossings | | Existing Crossings | | | Total |
|---|---|---|---|---|---|---|---|
| | | X4 Plaza S5 | DRTP | AMB | DW Tunnel | BW Bridge | |
| U.S.-Canada | Cars | 550 | 0 | 1,600 | 1,237 | 449 | 3,836 |
| | Trucks | 636 | 190 | 139 | 32 | 366 | 1,363 |
| Canada-U.S. | Cars | 201 | 0 | 484 | 311 | 403 | 1,399 |
| | Trucks | 253 | 56 | 151 | 2 | 337 | 799 |
| Both Directions | Cars | 751 | 0 | 2,084 | 1,548 | 852 | 5,235 |
| | Trucks | 889 | 246 | 290 | 34 | 703 | 2,162 |
| Total | | 1,640 | 246 | 2,374 | 1,582 | 1,555 | 7,397 |

[a] Individual computer model assignments will vary slightly from one to another.

[b] Alignment for X4/S4 via Dix North to I-75.

Source: The Corradino Group of Michigan, Inc.

Table 2-3C
Analysis of DRTP with Central Crossing X-11 + Ambassador Bridge
+ Detroit-Windsor Tunnel + Blue Water Bridge
2035 PM Peak Hour Traffic[a]
Detroit River International Crossing Study

| New Crossing at X11/C4 and DRTP | | New Crossings | | Existing Crossings | | | Total All Crossing Traffic |
|---|---|---|---|---|---|---|---|
| Alignment A35 | | X11 Plaza C4 | DRTP | AMB | DW Tunnel | BW Bridge | |
| U.S.-Canada | Cars | 2,058 | 0 | 364 | 966 | 449 | 3,837 |
| | Trucks | 862 | 65 | 37 | 30 | 381 | 1,375 |
| Canada-U.S. | Cars | 559 | 0 | 177 | 258 | 406 | 1,400 |
| | Trucks | 400 | 0 | 38 | 1 | 347 | 786 |
| Both Directions | Cars | 2,617 | 0 | 541 | 1,224 | 855 | 5,237 |
| | Trucks | 1,262 | 65 | 75 | 31 | 728 | 2,161 |
| | Total | 3,879 | 65 | 616 | 1,255 | 1,583 | 7,398 |

[a] Individual computer model assignments will vary slightly from one to another.

Source: The Corradino Group of Michigan, Inc.

Under these three scenarios, the DRTP proposal would carry less than 3.5 percent of all international traffic during the 2035 afternoon peak hour. This is another indication that the Regional Mobility needs of the DRIC Study will not be met by the Detroit River Tunnel Partnership proposal, alone or in combination with other proposals. Therefore, it was eliminated from further analysis.

The analysis then focused on the practical feasibility of the end-to-end alternatives of Crossings X-5 to X-9 (refer to Figure 2-4). Both the U.S. and Canadian analyses led to the elimination of these alternatives because of the impacts to the continued operation of the U.S. Steel plant. These alternatives were also affected by the inability to construct the new Detroit River crossing in a timely manner (i.e., completion by 2013) because of the presence of known brine wells and the fact that many brine well locations remain unknown as records of solution mining were not kept for years.

The evaluation of Illustrative Alternatives work led to eliminating Crossings X-13 and X-14, which would use the Canadian Pacific rail right-of-way on both sides of the Detroit River. The impacts to neighborhoods, and plans for their future, cultural resources and air quality led to this conclusion.

The proposed second span of the Ambassador Bridge (X-12) was eliminated because, in Canada, the plaza and freeway connection leading to a second span would have unacceptable impacts. Specifically, expansion of the existing crossing and connections offers limited improvement to providing continuous/ongoing river crossing capacity, in comparison to providing a new crossing and connections. Expanding the existing plaza and constructing a new freeway in the Huron Church Road corridor has high potential for disrupting international traffic in this important trade corridor. With the Crossing X-12

alternative, the entire length of Huron Church Road up to the Ambassador Bridge would require reconstruction.

It was also recognized that expansion of the crossing and existing plaza would create high impacts to the historic Sandwich community. This alternative would have high community impacts in terms of displacements (300 residences and 80-plus businesses) and disruption (3,000 residences), plus additional impacts to built heritage features, and community character and cohesion. The community impacts associated with twinning the Ambassador Bridge, expansion of the existing bridge plaza and expansion of Huron Church Road to a freeway are notably higher than those of the other Illustrative Alternatives.

Based on a larger number of community impacts, a higher degree of disruption to international traffic on Huron Church Road and the community during construction, and the limited improvement to continuous/ongoing capacity in the network, it was recommended that twinning of the Ambassador Bridge, expansion of the Canadian plaza and a new freeway connection to Highway 401 not be carried forward as a Practical Alternative.

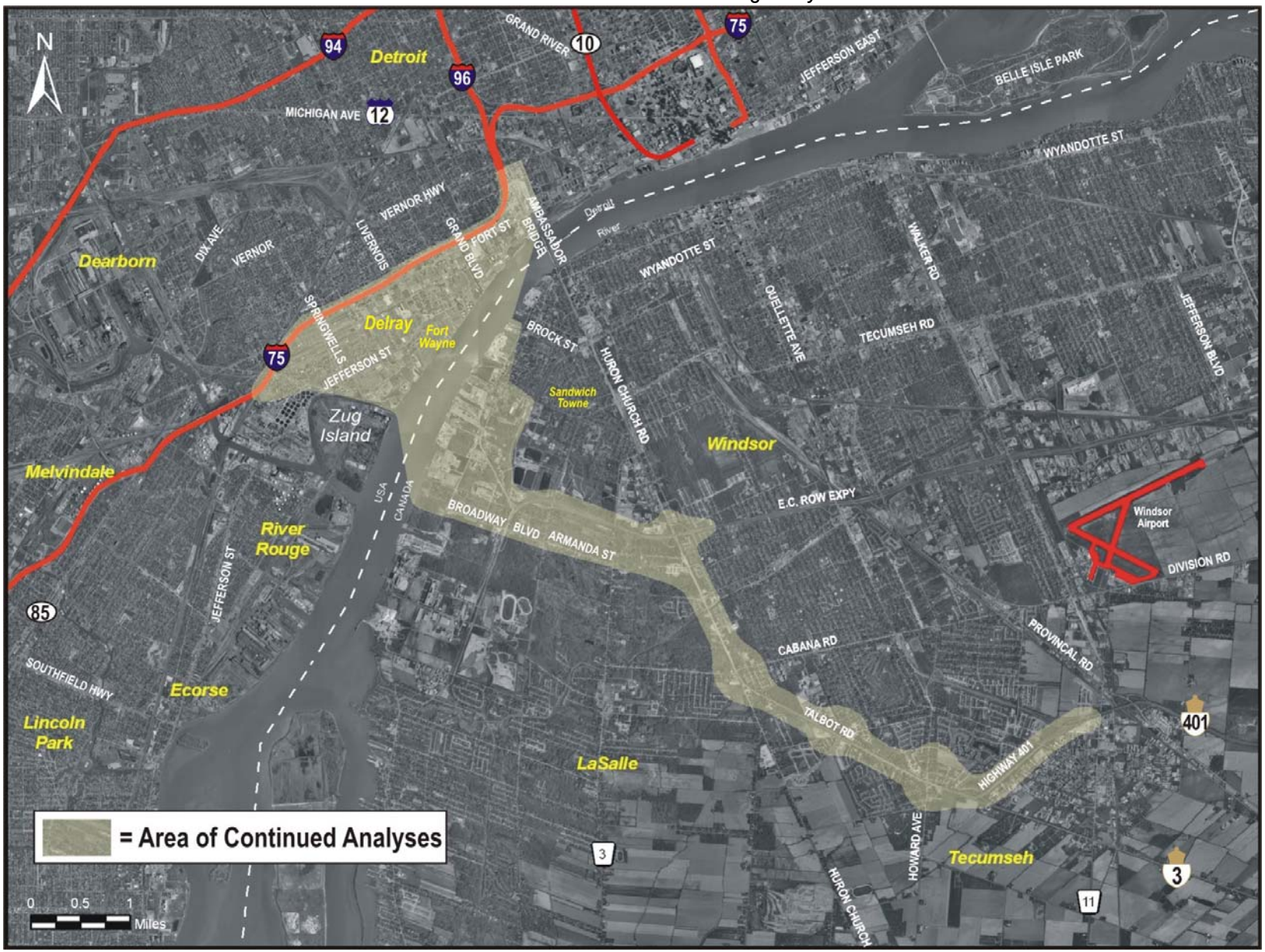
Finally, though the second span of the Ambassador Bridge (X-12) ranked well in the United States' Illustrative Alternatives ranking process, it was eventually dismissed by the Partnership as a Practical Alternative based upon further examination of its inability to satisfy the full complement of project needs (namely efficiency via freeway-to-freeway access and system availability through redundancy). Also considered by the United States in the dismissal of the second span as a Practical Alternative was the joint impact assessment conducted by the Partnership and summarized above. This collaboration is described in the FHWA "Evaluation of Studied Alternatives and Determination of Practical Alternatives" dated November 10, 2005, and included as Appendix C. [3]

The Illustrative Alternatives analysis results defined an area upstream of Zug Island to the foot of the Ambassador Bridge in the U.S., and, in Canada, from Broadway Boulevard to the vicinity of Brock Street (Figure 2-5) as the places where further analyses would be conducted to develop the Practical Alternatives.

The transition from Illustrative Alternatives to Practical Alternatives is described next.

[3] Concurrence by the Federal Highway Administration of the Illustrative Alternatives Analysis phases and results are included in Appendix C.

Figure 2-5
Area of Continued Analyses
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc.

## 2.2 Additional Screening of Alternatives

Once the Illustrative Alternatives phase was complete, and the Area of Continued Analysis defined, the Practical Alternatives were developed in several stages as depicted on Figure 2-3. Through a series of public workshops held from December 2005 to March 2006, a U.S. plaza zone was determined (Figure 2-6). Plaza layouts were developed within that area. Interchange concepts were then established to connect each plaza to I-75. Planning also addressed providing access around the plaza on its west side and a more direct rail connection into Zug Island.

Figures 2-7A through 2-7E depict the X-10 crossing alternatives. Figures 2-8A through 2-8H depict the X-11 crossing alternatives. The labeling system for the alternatives is shown in Table 2-4. Each of the 13 Preliminary Practical Alternatives, along with their potential impacts, were presented to the public in December 2006.[4]

Table 2-4
Preliminary Practical Alternatives
Labeling System
Detroit River International Crossing Study

| Practical Altern. # | Interchange | Plaza | Crossing |
|---|---|---|---|
| 1 | A | P-a | X-10 |
| 2 | B | P-a | |
| 3 | C | P-a | |
| 4 | D | P-a | |
| 5 | E | P-a | |
| 6 | A | P-b | X-11 |
| 7 | A | P-c | |
| 8 | B | P-b | |
| 9 | B | P-c | |
| 10 | C | P-b | |
| 11 | C | P-c | |
| 12 | D | P-b | |
| 13 | F | P-d | |

The interchanges were then subject to Value Analysis and Value Planning from January 29 to February 2, 2007. The General Services Administration (GSA) (the property owner of the federal government) and U.S. Customs and Border Protection (CBP) (a bureau of the U.S. Department of Homeland Security) independently reviewed the plaza layouts (Figures 2-9A through 2-9D).

### 2.2.1 Impact Assessment

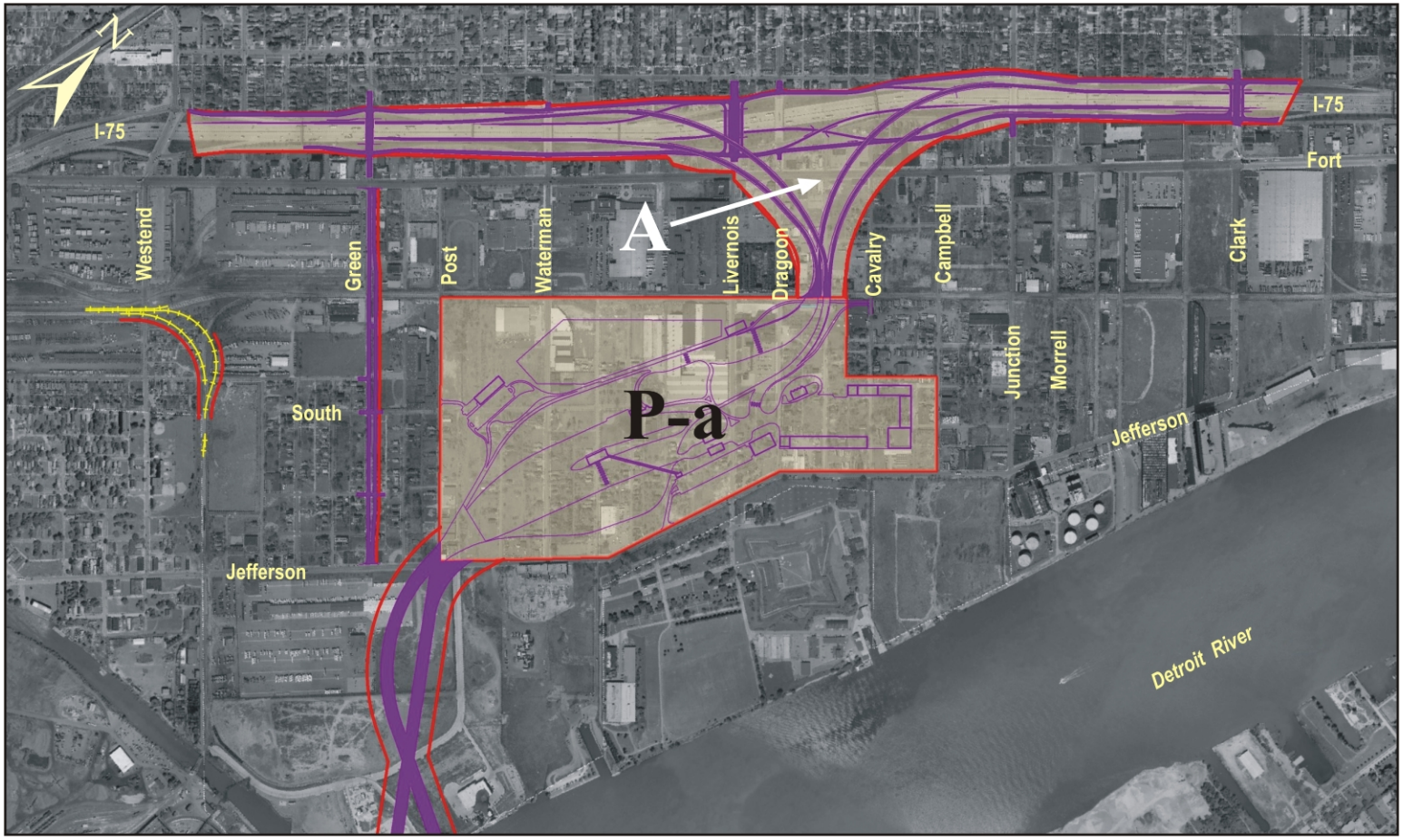
The evaluation of impact data for the preliminary Practical Alternatives indicated there was little difference among alternatives in terms of significant impacts, by type or number. The one exception was that utilities along the south edge of Plaza P-b (refer to Figure 2-9B) would take land from historic Fort Wayne, which is on the *National Register of Historic Places*. The Department of Transportation Act of 1966 states that if there is a reasonable and prudent alternative to taking this property then that avoidance alternative must be chosen. Because other alternatives avoid this impact, Plaza P-b, which is part of Alternatives #6, #8, #10 and #12, was not considered practical.

[4] Refer to U.S. Public Meetings on Web site (www.partnershipborderstudy.com)

Figure 2-6
Area of Continued Analysis – Plaza Zone
Detroit River International Crossing Study

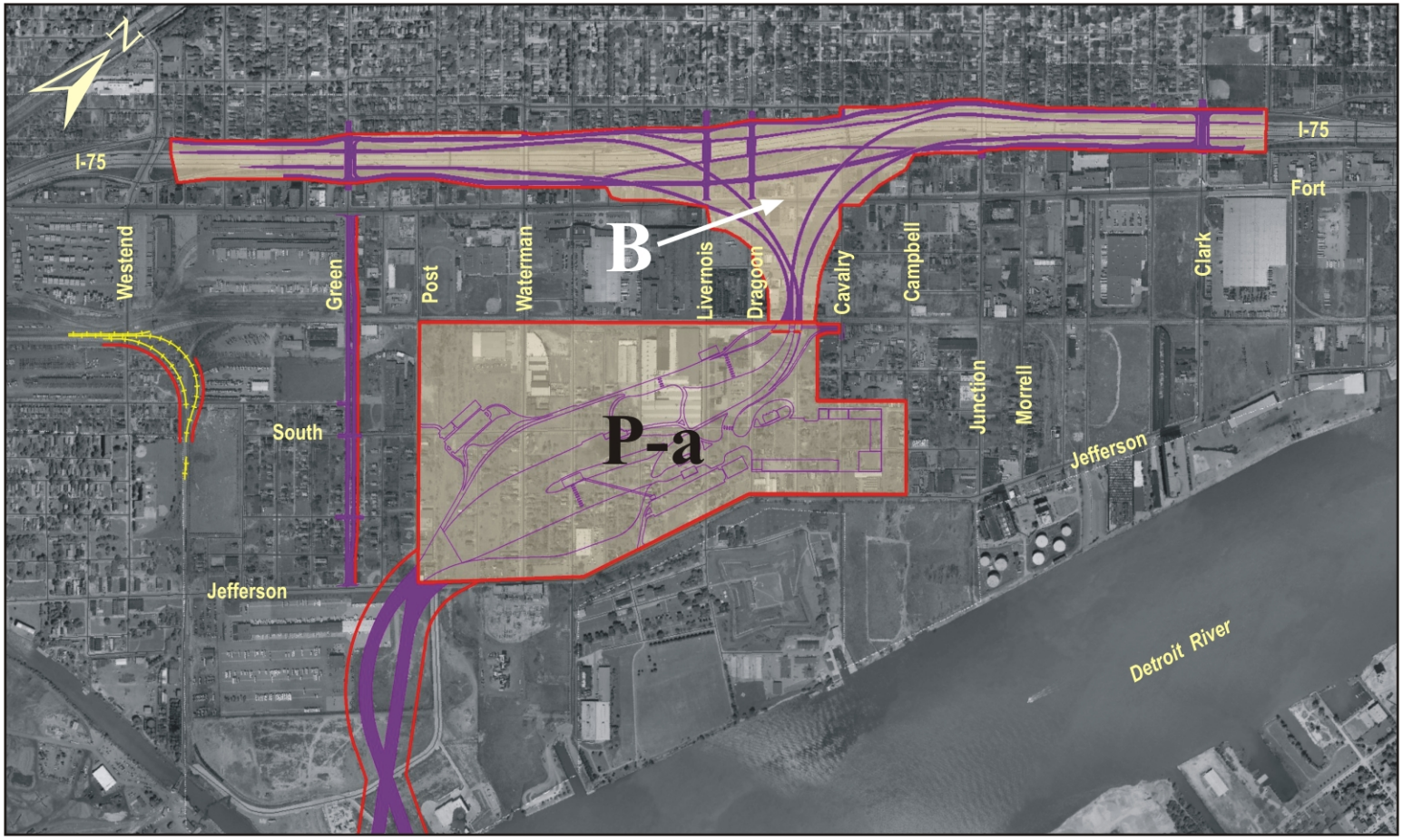

Source: The Corradino Group of Michigan, Inc.

Figure 2-7A
Crossing X-10 Preliminary Practical Alternative #1
Detroit River International Crossing Study



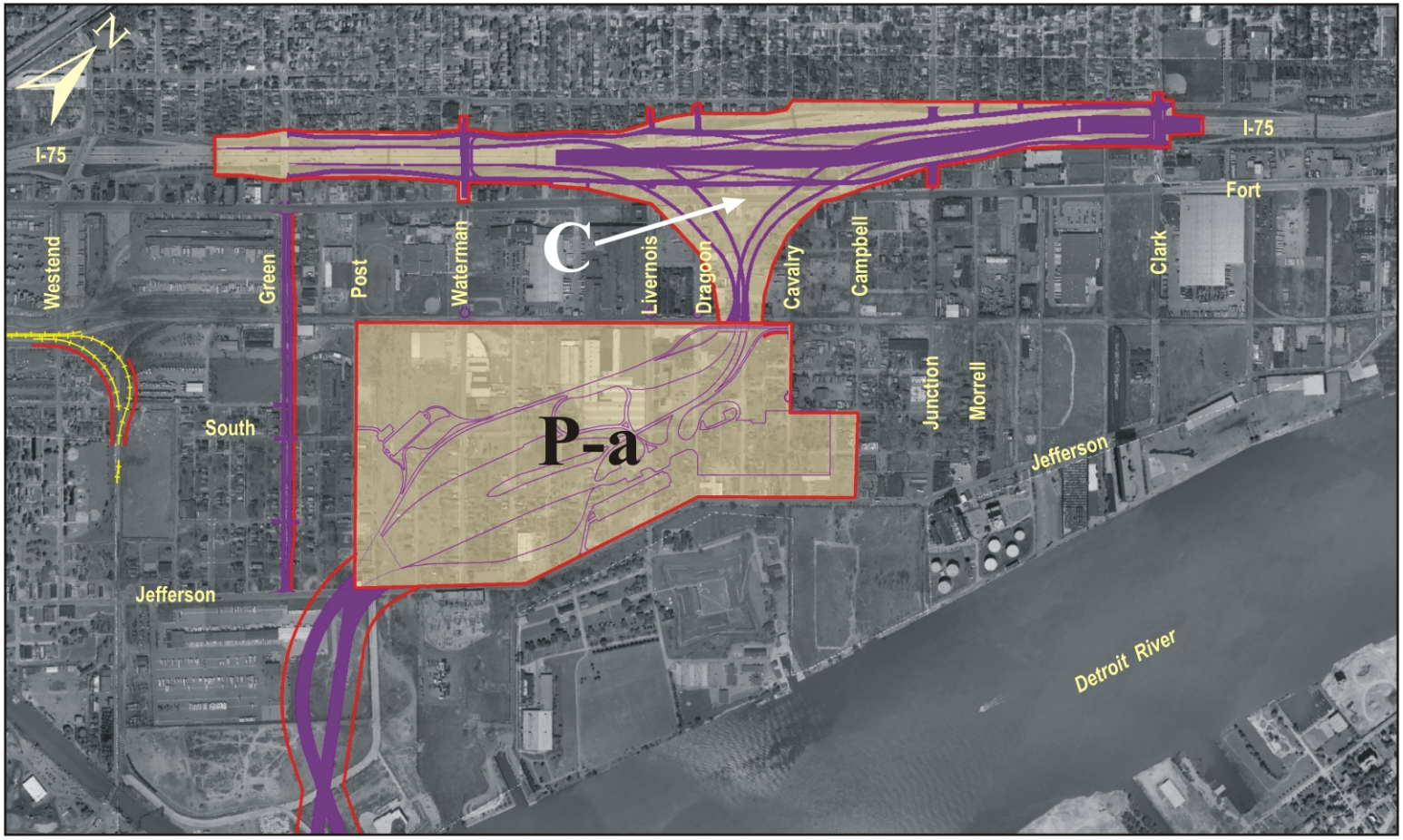

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-7B
Crossing X-10 Preliminary Practical Alternative #2
Detroit River International Crossing Study



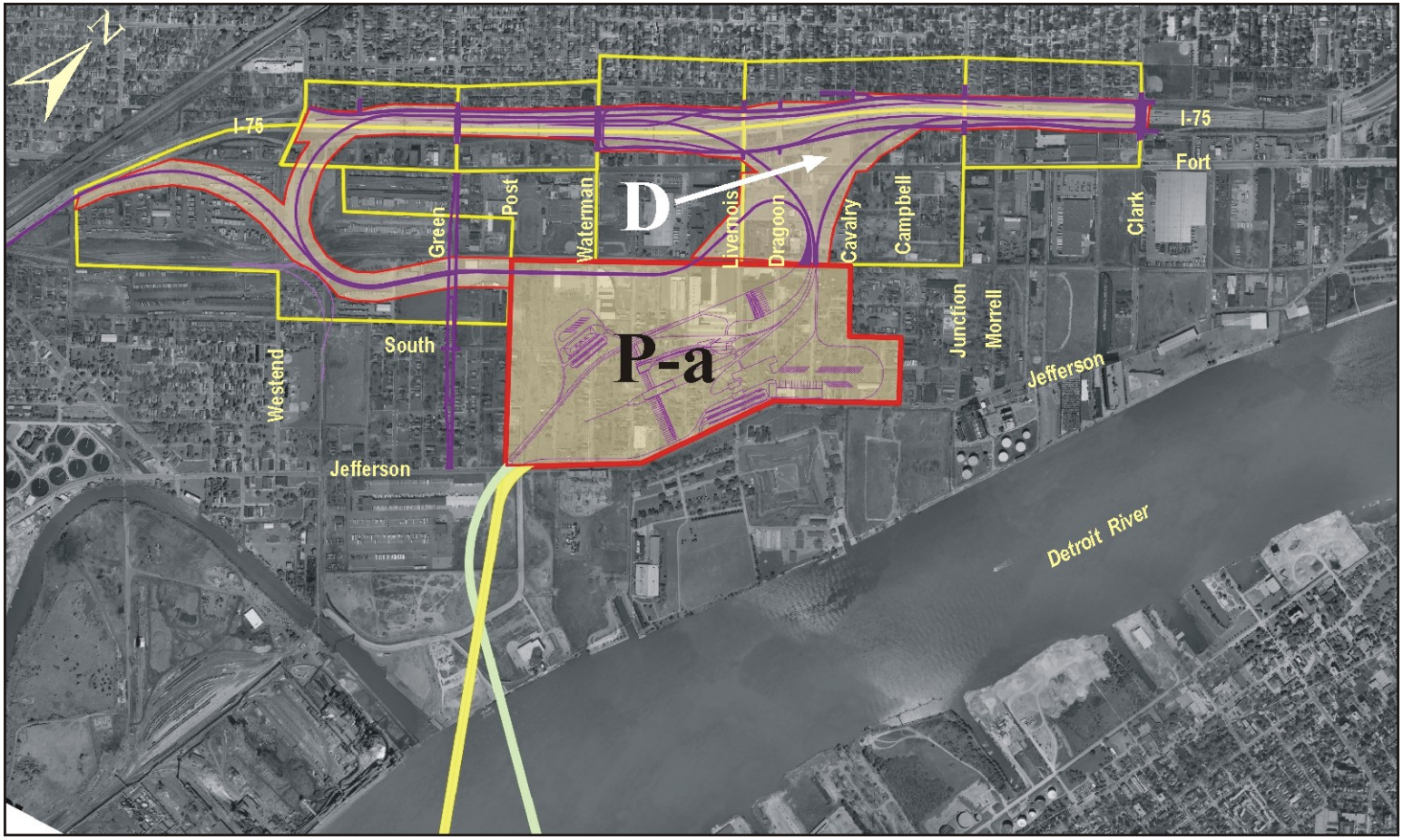

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-7C
Crossing X-10 Preliminary Practical Alternative #3
Detroit River International Crossing Study



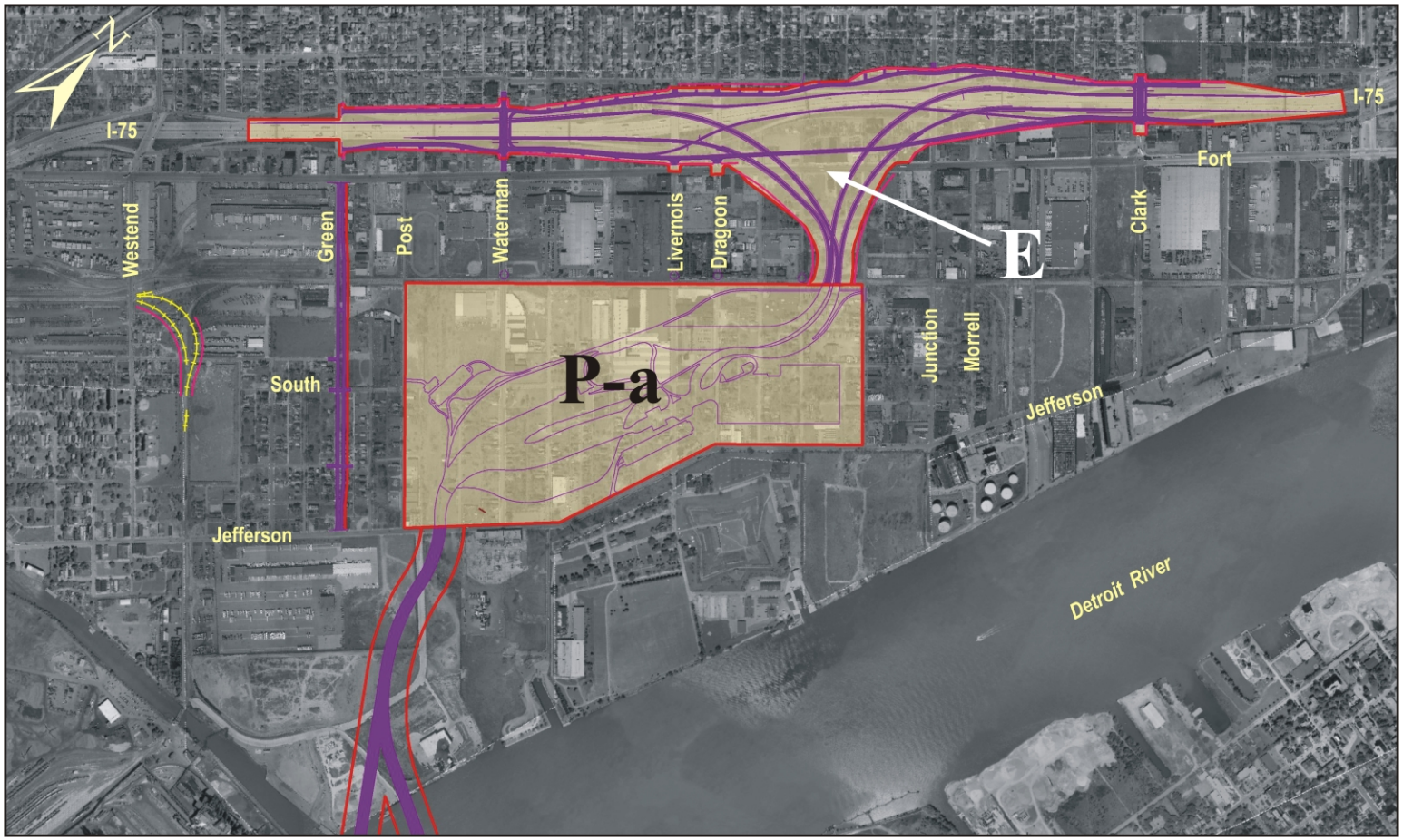

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-7D
Crossing X-10 Preliminary Practical Alternative #4
Detroit River International Crossing Study



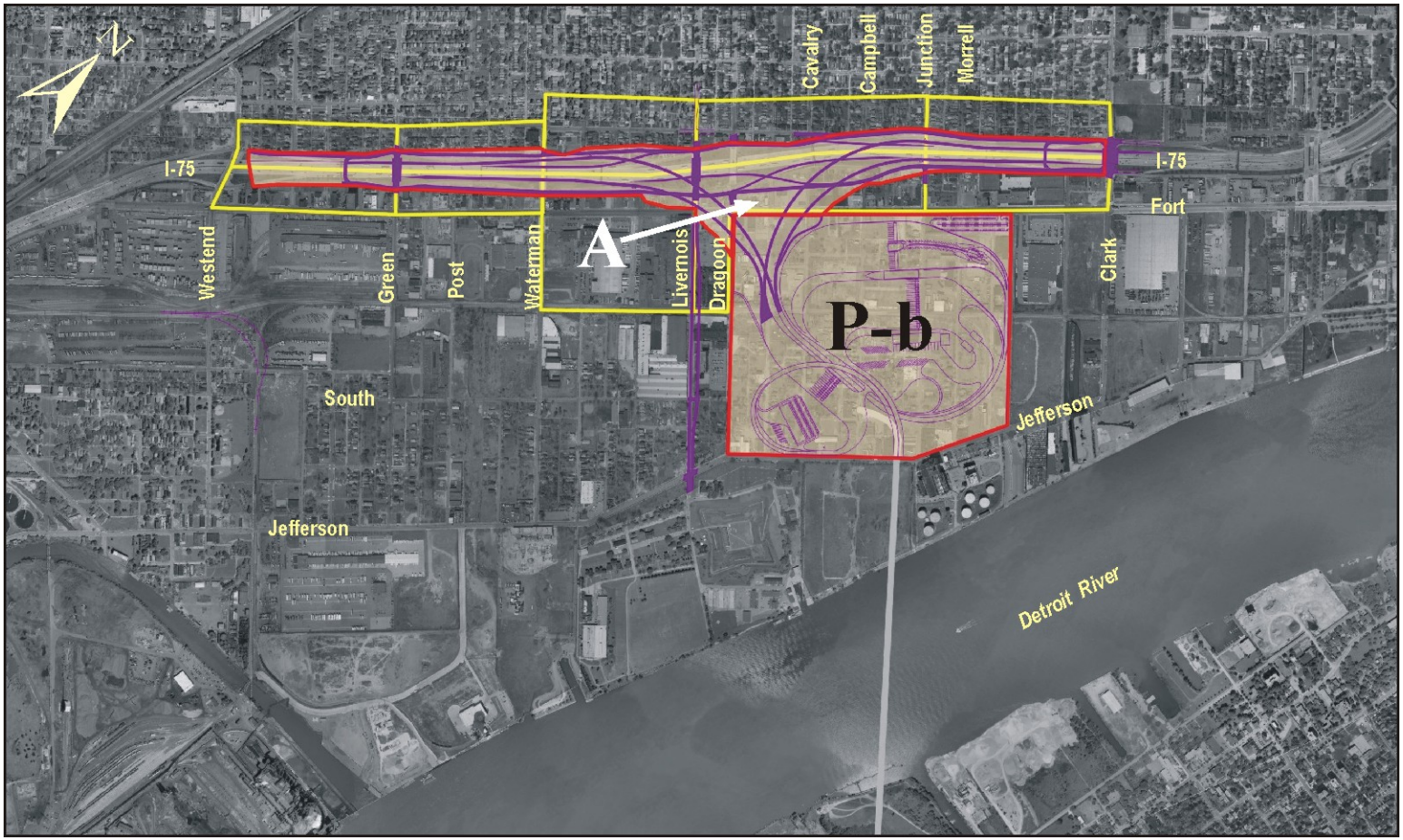

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-7E
Crossing X-10 Preliminary Practical Alternative #5
Detroit River International Crossing Study



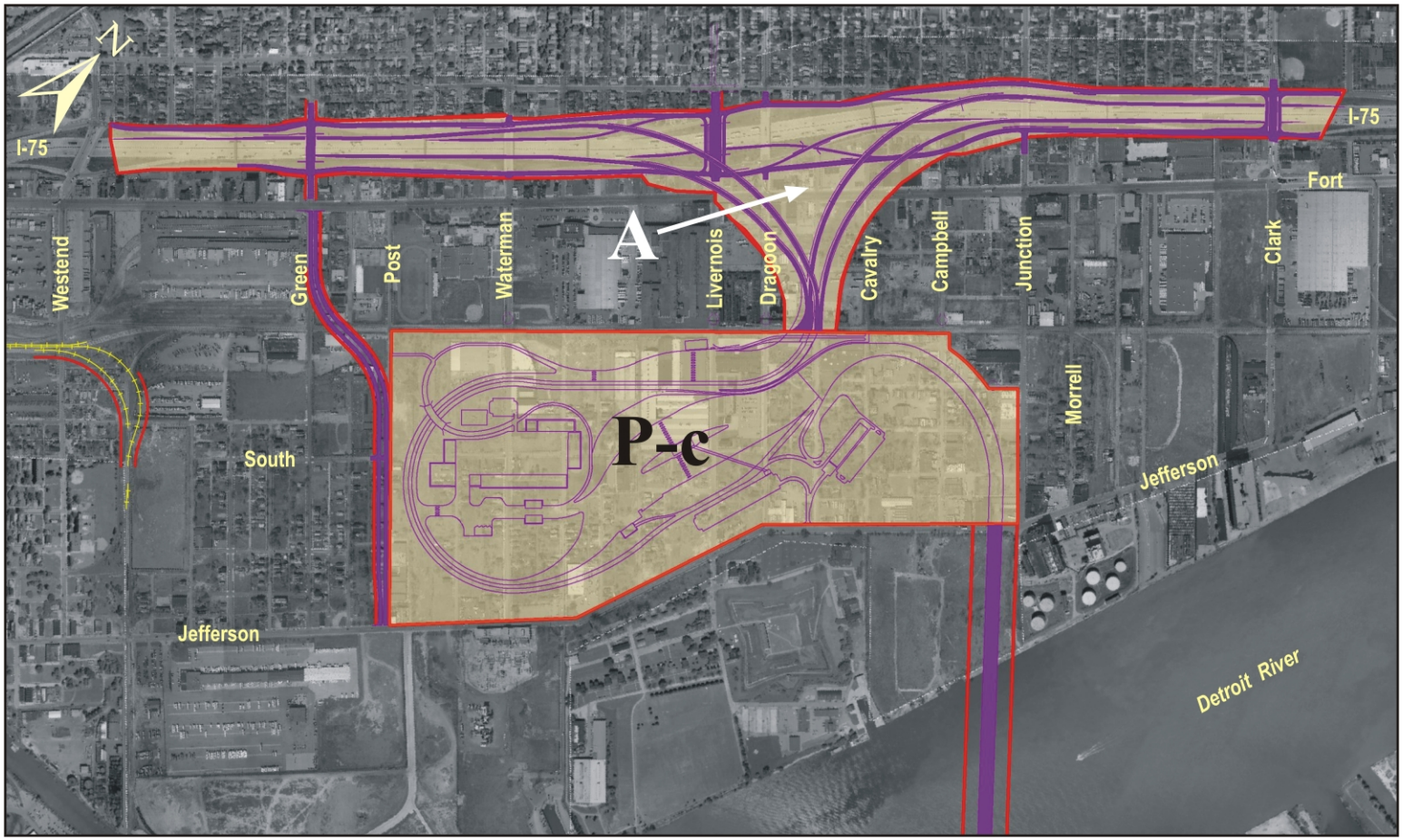

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8A
Crossing X-11 Preliminary Practical Alternative #6
Detroit River International Crossing Study



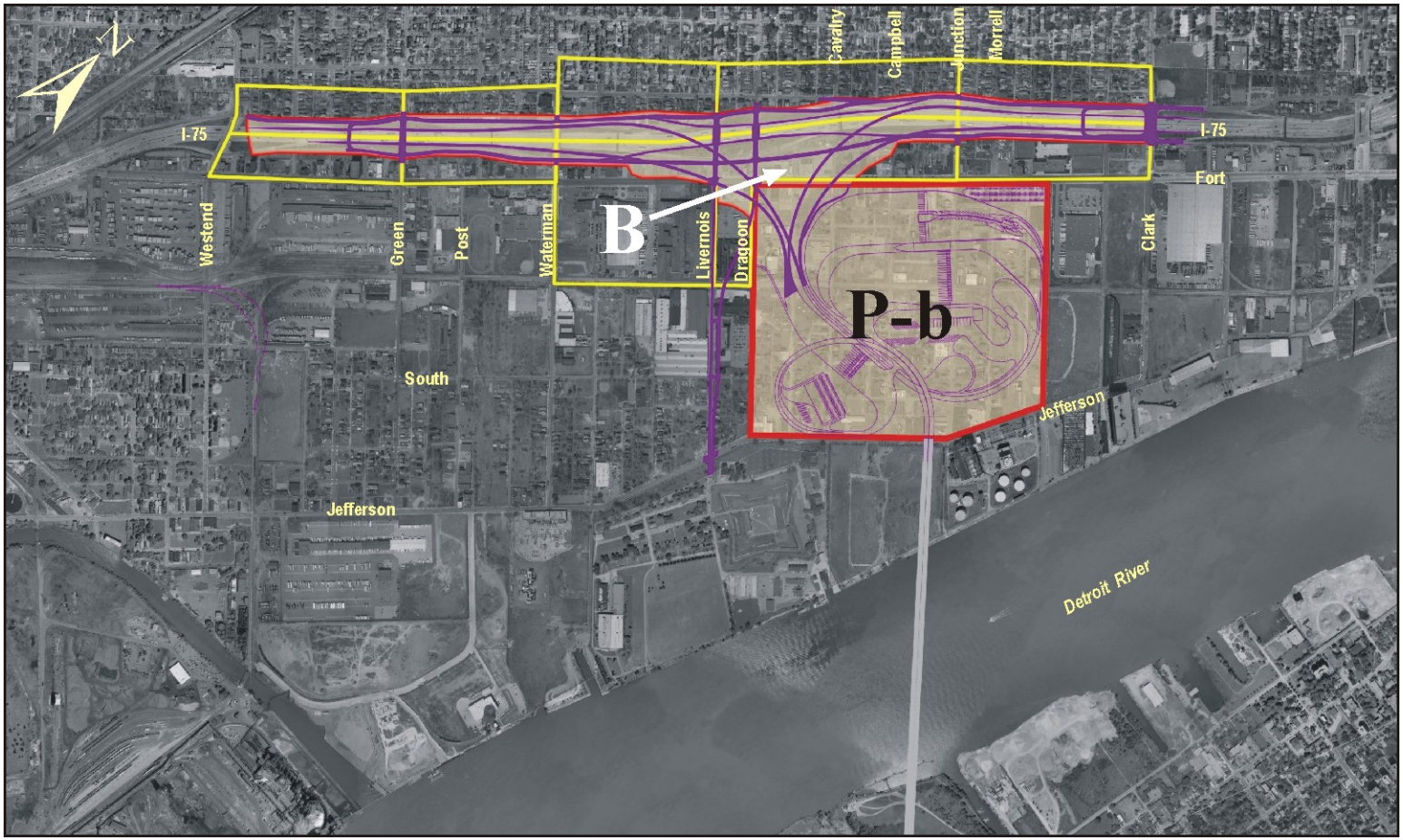

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8B
Crossing X-11 Preliminary Practical Alternative #7
Detroit River International Crossing Study



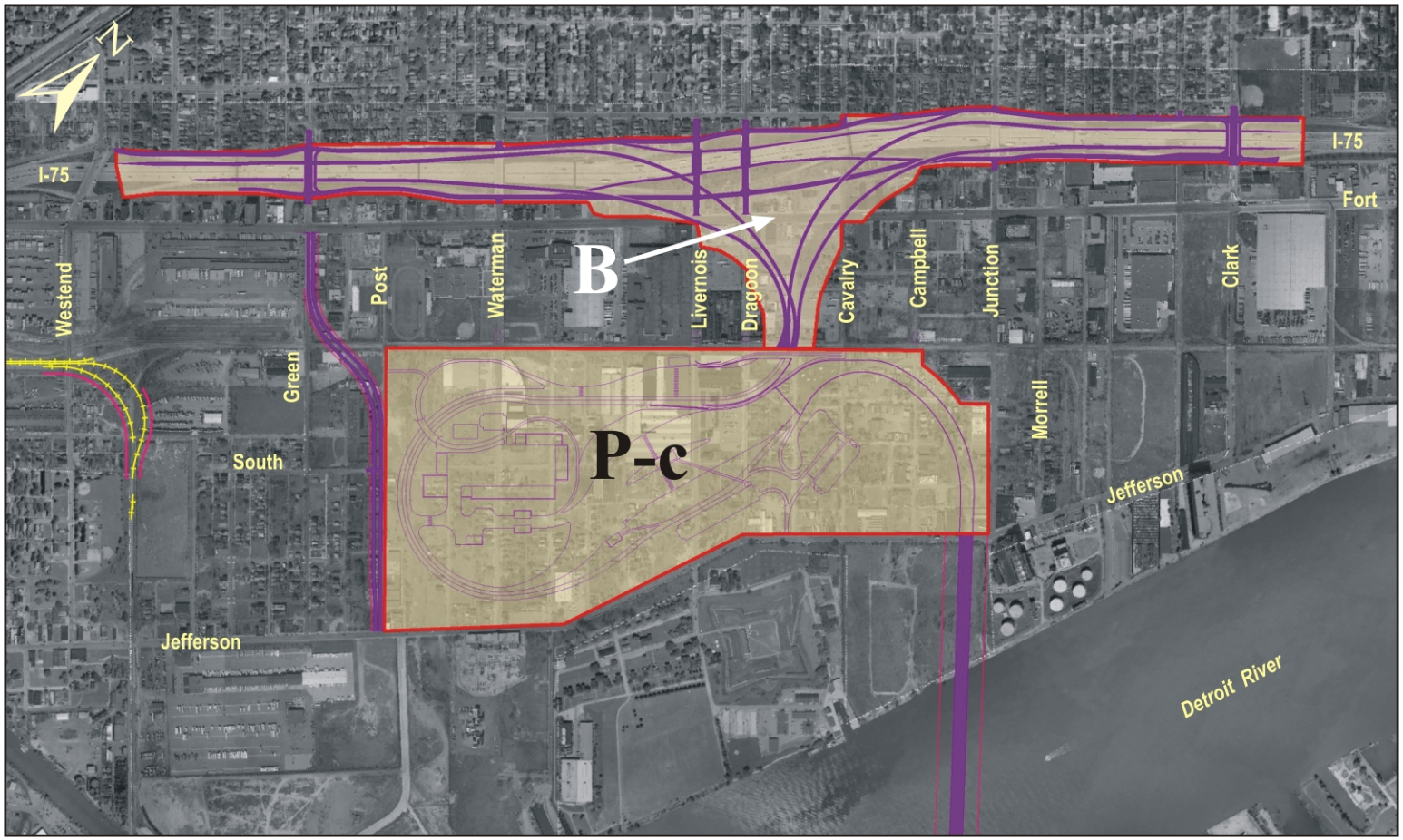

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8C
Crossing X-11 Preliminary Practical Alternative #8
Detroit River International Crossing Study



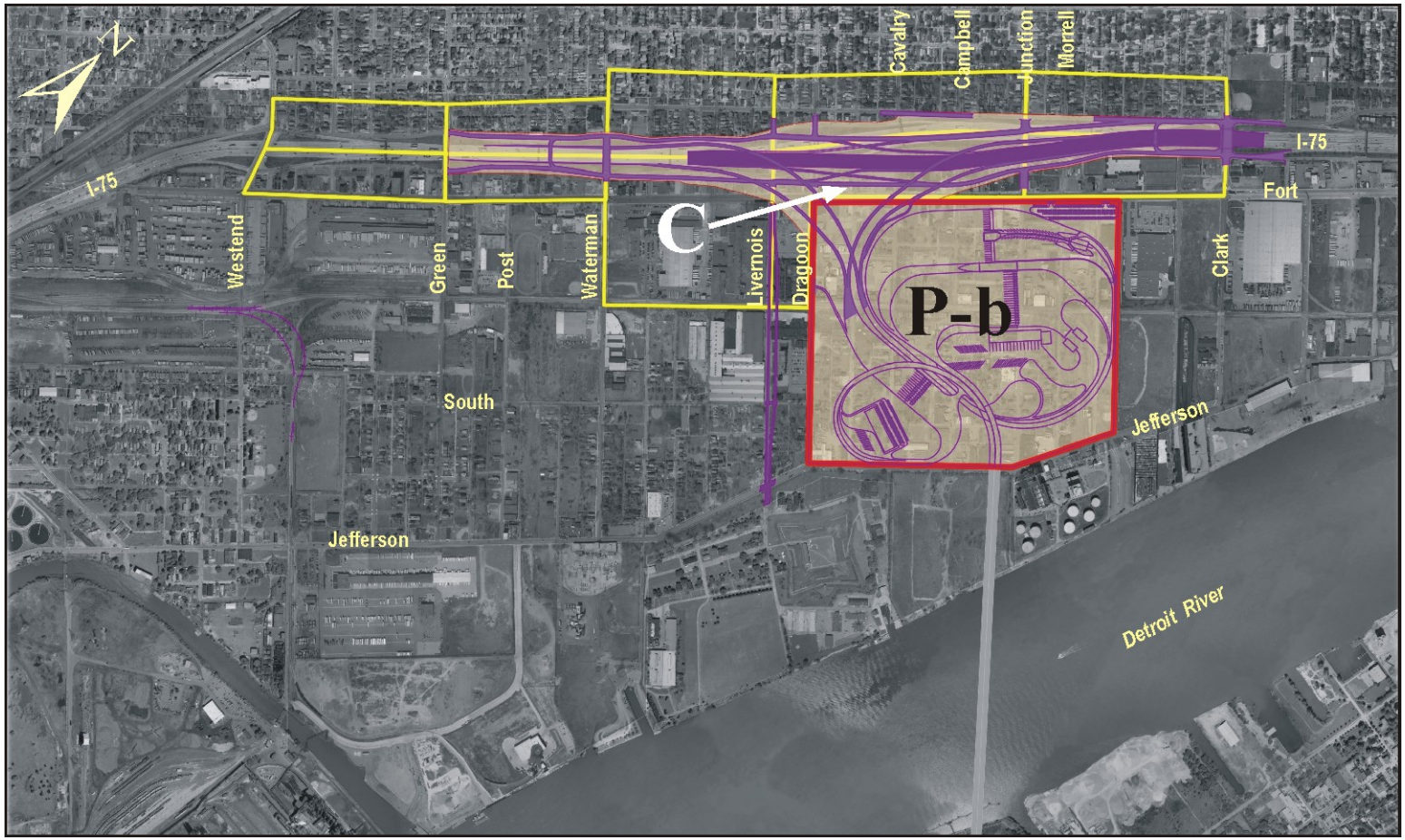

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8D
Crossing X-11 Preliminary Practical Alternative #9
Detroit River International Crossing Study



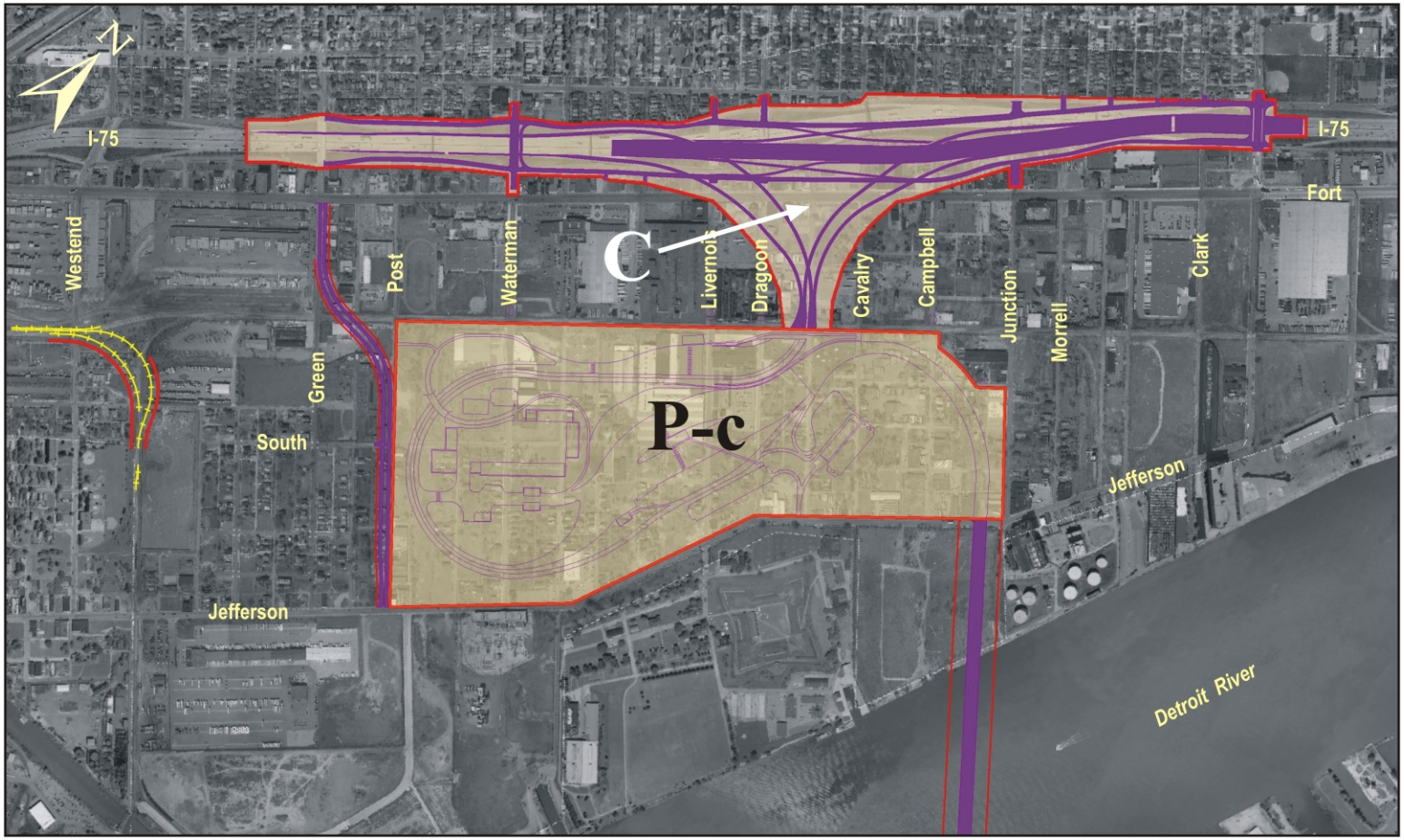

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8E
Crossing X-11 Preliminary Practical Alternative #10
Detroit River International Crossing Study



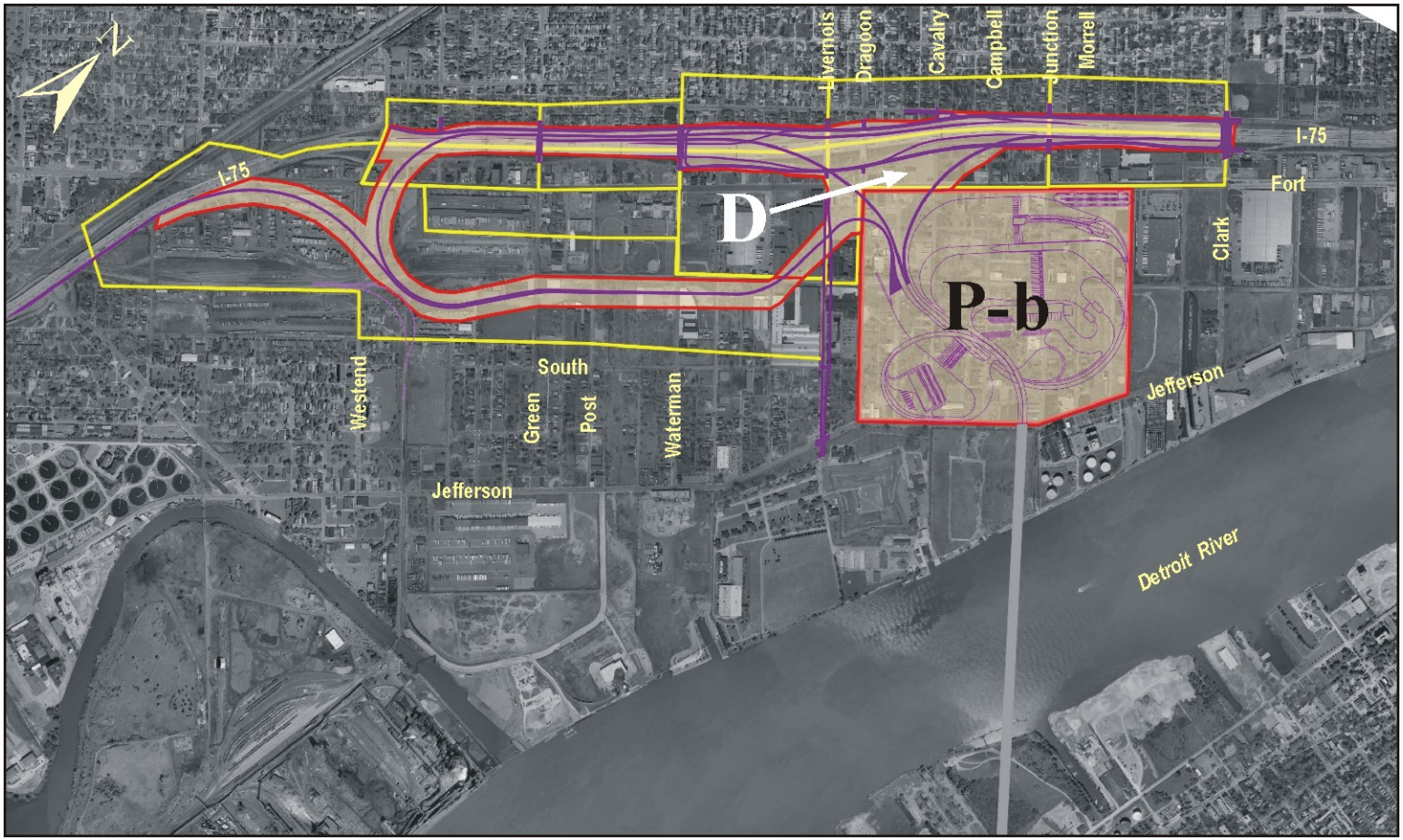

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8F
Crossing X-11 Preliminary Practical Alternative #11
Detroit River International Crossing Study



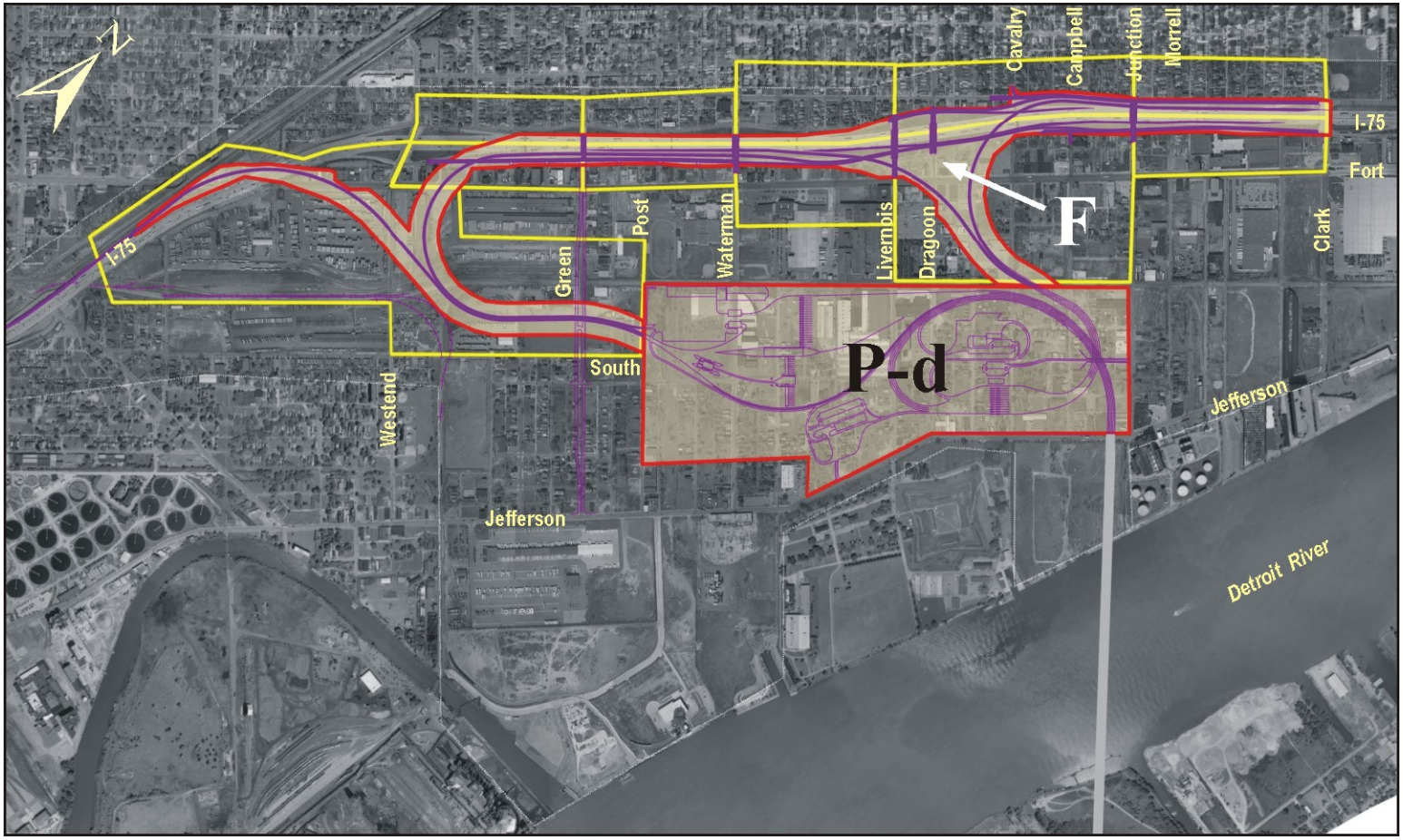

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8G
Crossing X-11 Preliminary Practical Alternative #12
Detroit River International Crossing Study



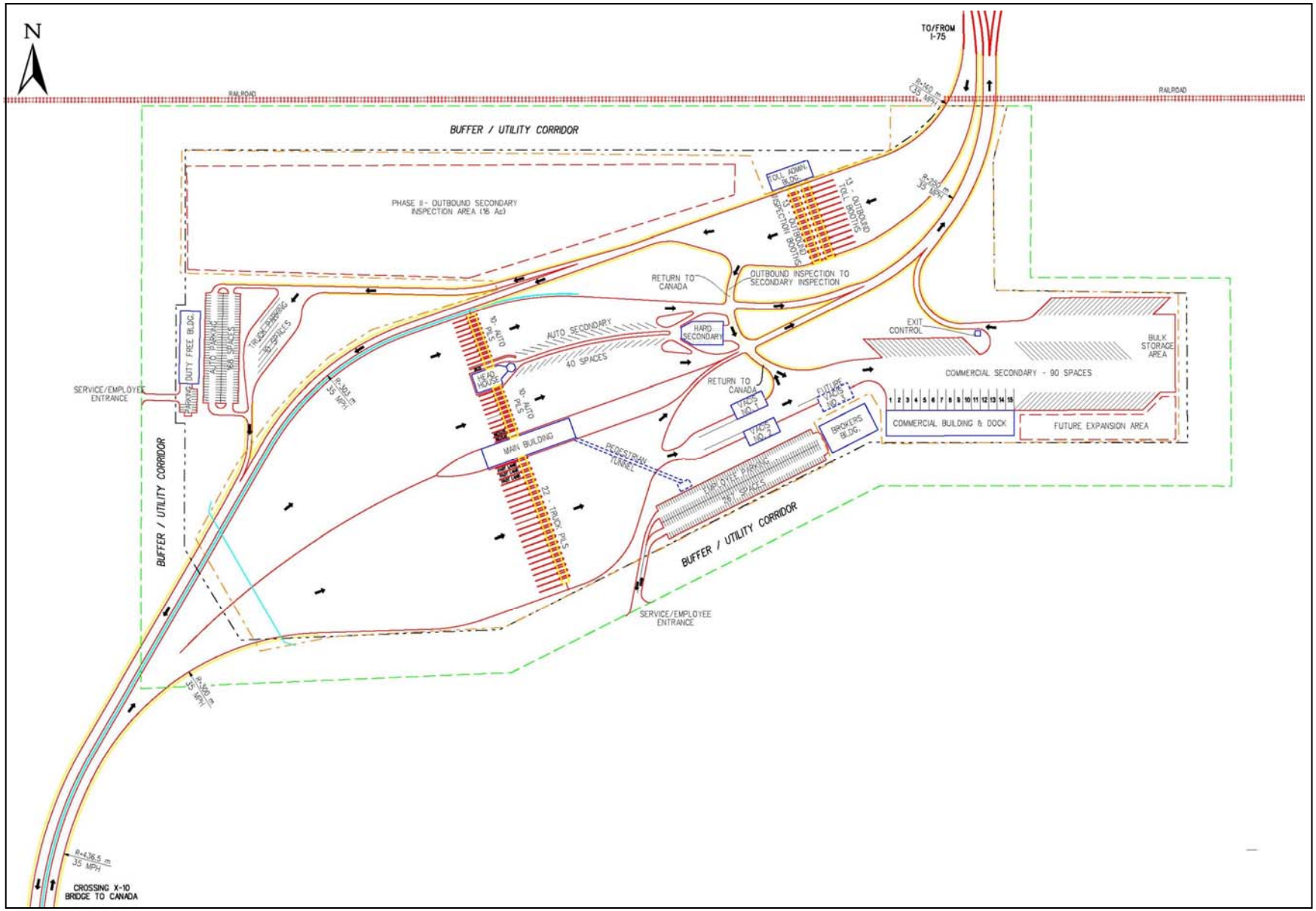

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-8H
Crossing X-11 Preliminary Practical Alternative #13
Detroit River International Crossing Study



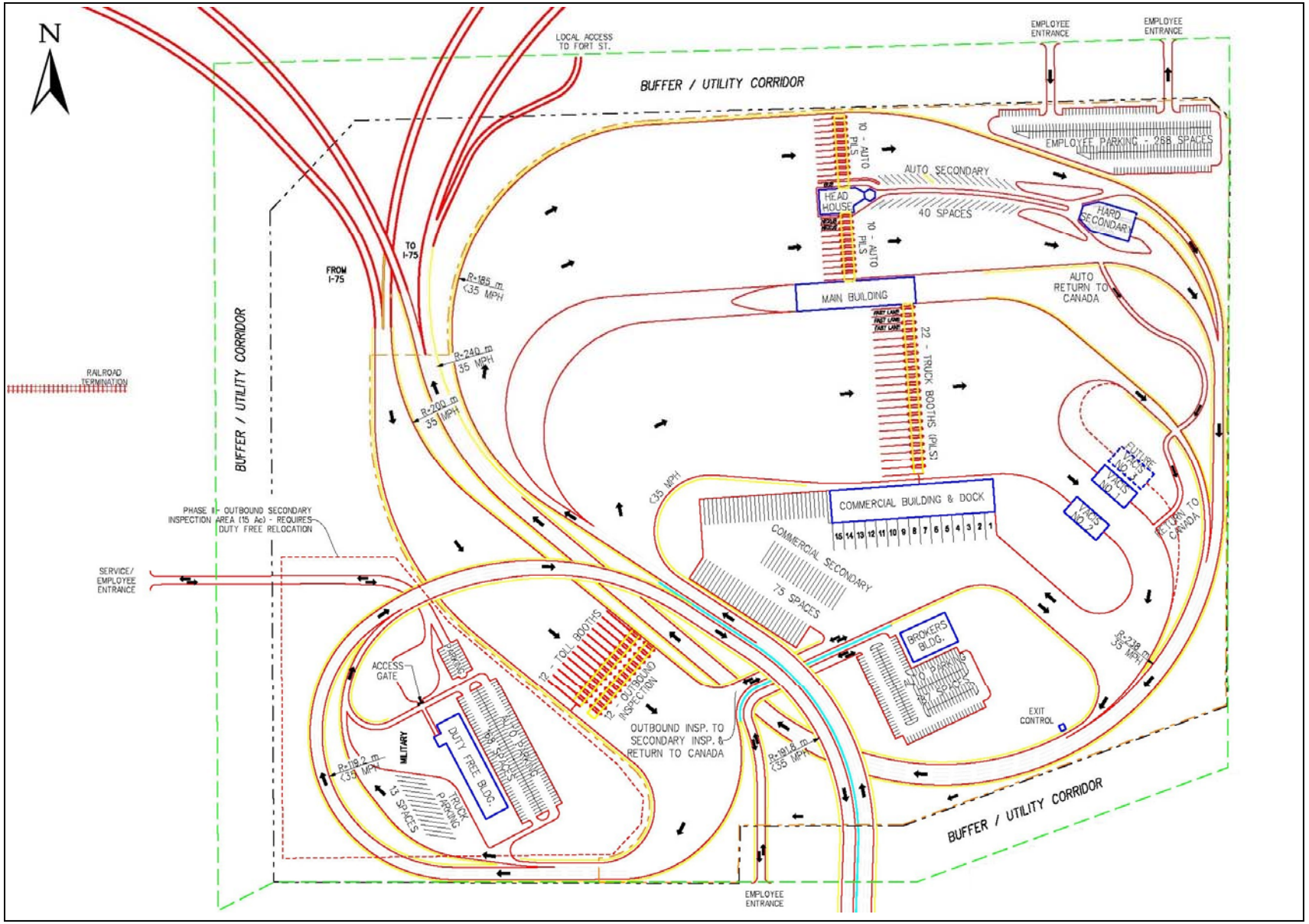

Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-9A
Preliminary Alternative Plaza Layout P-a
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

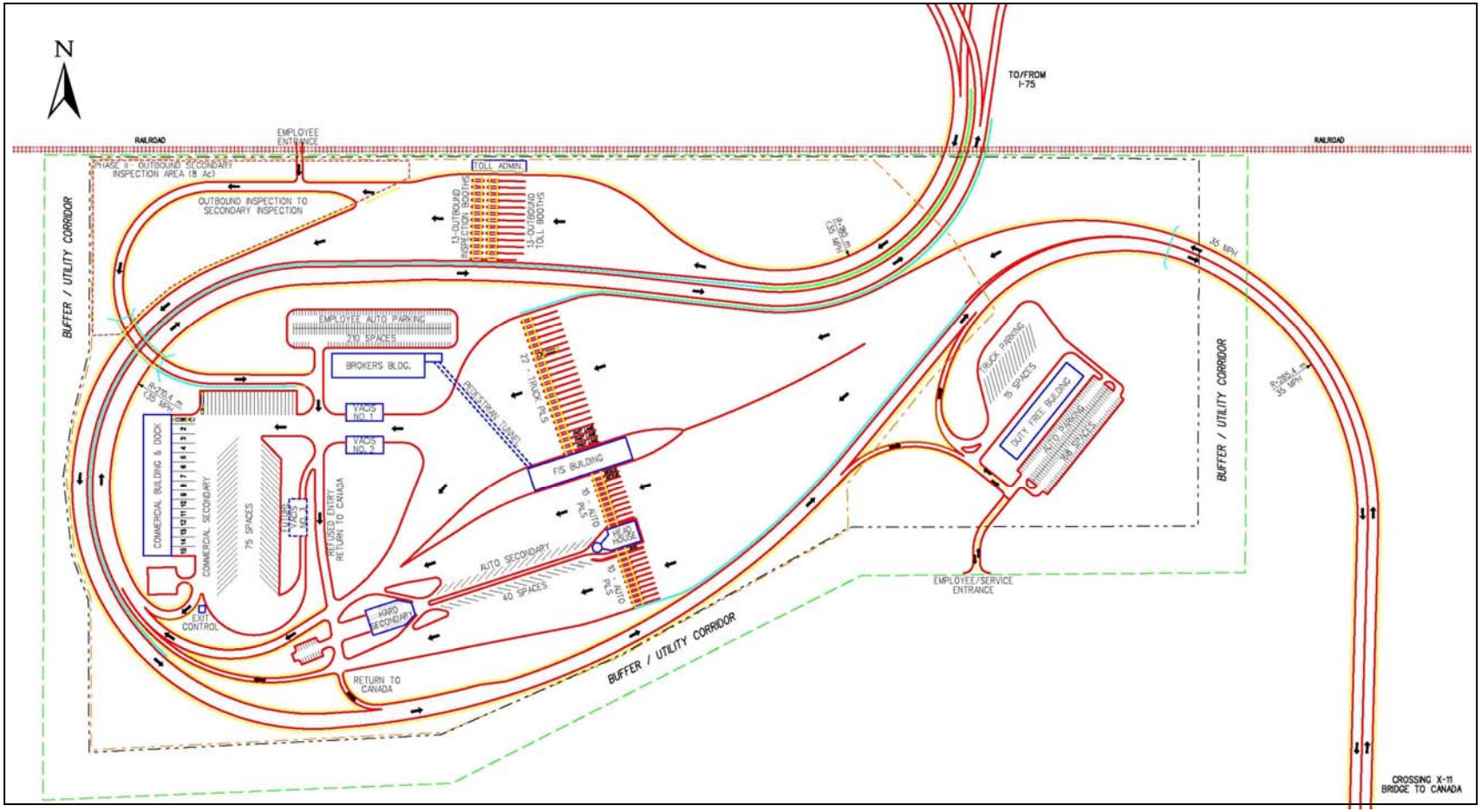
Figure 2-9B
Preliminary Alternative Plaza Layout P-b
Detroit River International Crossing Study




Note: The western half of this plaza would intrude more than 150 feet into Fort Wayne.

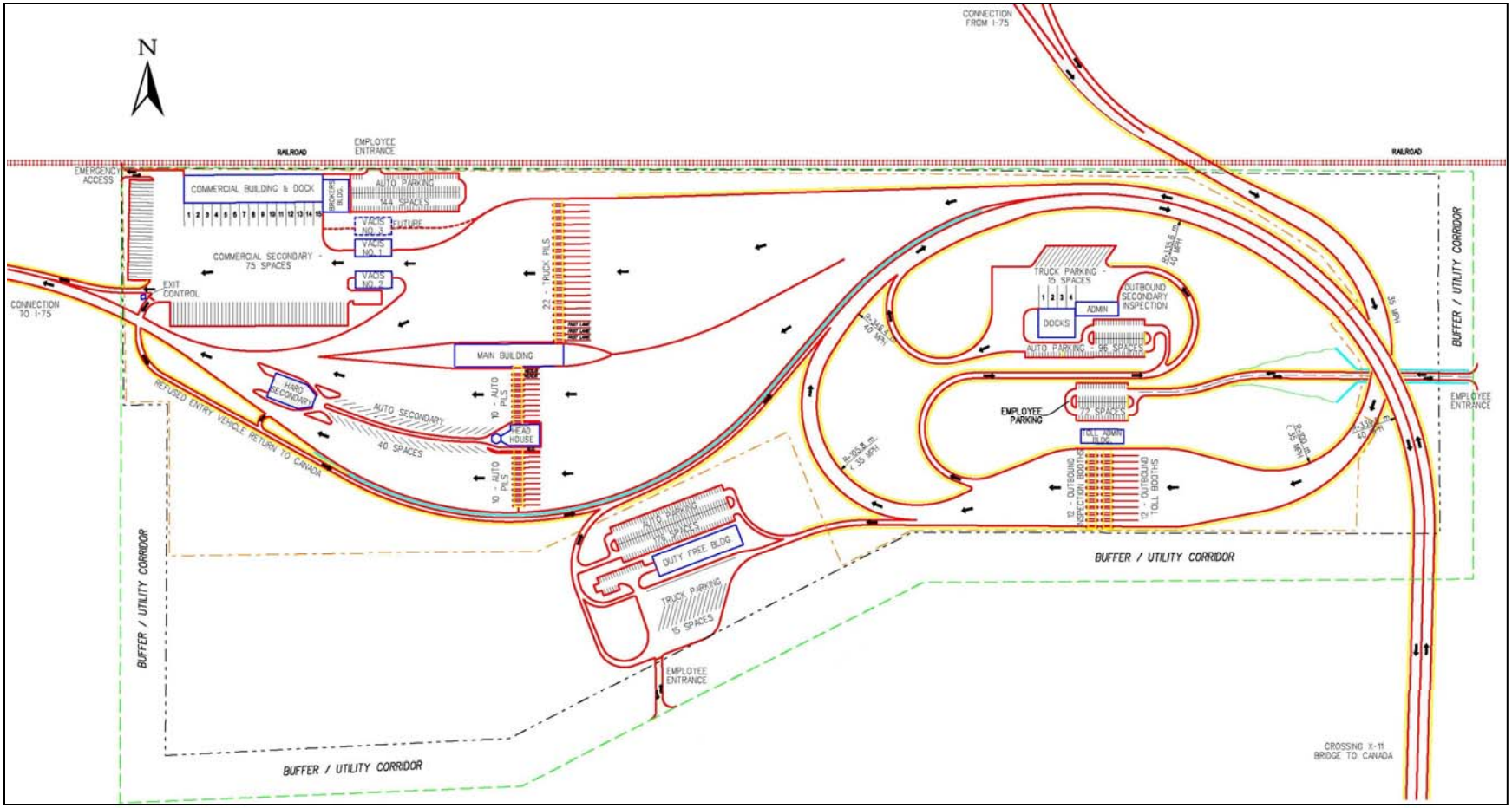
Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-9C
Preliminary Alternative Plaza Layout P-c
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-9D
Preliminary Alternative Plaza Layout P-d
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

The most directly affected community, Delray, spoke out at the Local Advisory Council and public meetings in March 2006. These comments stressed that the interchanges of Alternatives #4, #12 and #13 were unacceptable because they would "isolate" the most viable residential area remaining in Delray. These alternatives would also affect the block-long Detroit Union Produce Terminal, which is potentially eligible for listing on the *National Register of Historic Places*. Because there are other reasonable options, Alternatives #4, #12 and #13 were not considered practical.

## 2.2.2 Value Analysis (VA)/Value Planning (VP) Results

Further screening of alternatives took place through the weeklong Value Analysis/Value Planning workshop. This process focused on the proposed interchanges connecting the plaza to I-75 in the U.S. These interchanges were examined in terms of performance (access, operations, geometry), acceptance (relationship to the community, utilities, constructability), and cost. The result was elimination of Interchanges D and F, which confirmed views of the affected community that Alternatives #4, #12 and #13 would isolate Delray. Concept G was developed during Value Planning to minimize property acquisition impacts on the community. It became Alternative #14 (Figure 2-10). Interchange Concept H/Alternative #15 was also developed (Figure 2-10A). Further evaluation indicated the "braided ramps" of this concept were not buildable because there wasn't enough space at this location. So, it was dropped.

**What is Value Analysis/Value Planning?**

This process brings together outside experienced engineers and planners to make sure all possible engineering options are being explored and that those being considered will work through "fresh eyes."

## 2.2.3 Plaza Analysis

### 2.2.3.1 Operation

Cars and commercial vehicles would be separated from each other as they enter the plaza from I-75. Once on the plaza, vehicles would line up in one of the lanes provided to pay a toll – cars to the left and commercial vehicles to the right. After paying tolls, vehicles would go directly to Canada or stop at the duty-free area, where certain limited quantities of goods could be purchased without paying the federal excise tax.

Allowance has been made in plaza layout for outbound inspection of selected trucks prior to crossing the border. CBP inspections are generally associated with the act of entering the country. However, the CBP is also authorized to inspect

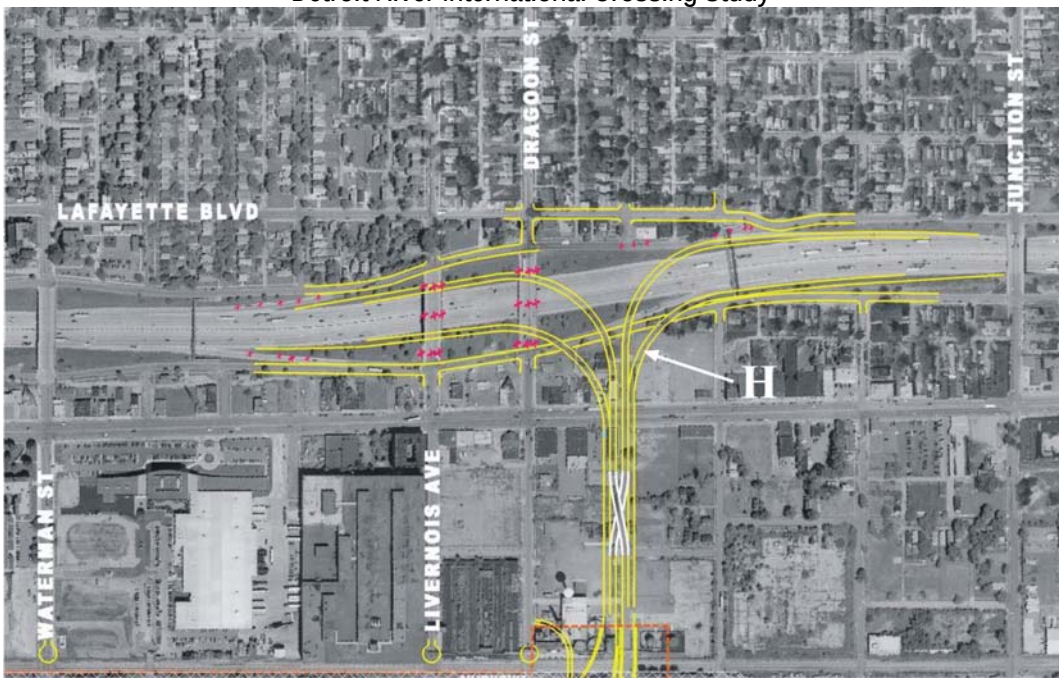
**What is a Plaza? What Occurs There?**

Plazas provide the space for toll collection and federal inspections. For autos, inspections check for citizenship and goods being brought into the country. Trucks go through a separate inspection area. Papers stating their cargo and destination are checked. Plazas include an area for more intensive, or secondary, inspections of autos and trucks.

Figure 2-10
Alternative #14 - Interchange Concept G Developed Through Value Planning
Detroit River International Crossing Study


Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 2-10A
Alternative #15 – Interchange Concept H Developed Through Value Planning
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

people and cargo as they leave the country (this practice is called outbound inspection). Historically, the practice of outbound inspections has been infrequent, and generally associated with the suspicion of specific illegal activity. In recent years there have been a number of discussions regarding increasing the frequency of outbound inspections. If there are issues, the truck may be returned to the U.S.

Passenger vehicles traveling in the opposite direction (i.e., entering the U.S. from Canada) would be guided to the left of the plaza where they approach U.S. Customs booths. Agents would review passports (or other legally-recognized documents) and goods brought into the country. These agents would also conduct other inspections deemed necessary. All these functions are called Primary Inspection.

All trucks are now required to provide paperwork electronically to U.S. Customs and Border Protection 45 minutes in advance of arrival at the border. All trucks must first go through Primary Inspection. If the paperwork is in order, they may be allowed to proceed to I-75.

Cars and trucks could be required to go to Secondary Inspection during which truck drivers turn off their engines. Trucks may be weighed, unloaded, sent through the Gamma Ray Inspection Technology (GRIT) building, inspected for hazardous material, or sent to the Animal and Plant Health Inspection Service (APHIS) facility. APHIS is part of the U.S. Department of Agriculture. At any point, a commercial vehicle can be denied entry to the U.S. and securely returned to Canada.

FAST and NEXUS programs provide expedited crossing of the border for those who qualify. The proposed DRIC alternatives would facilitate use of these programs by providing uncongested access to the special booths that process such vehicles. Access to the special booths is often blocked at the Detroit-Windsor Tunnel and Ambassador Bridge by general traffic waiting to clear Customs inspection. Therefore, FAST and NEXUS use is not as widespread as was hoped when the programs were established.

#### 2.2.3.2 GSA/CBP Analysis of Plazas

In February and March 2007, the General Services Administration, in combination with U.S. Customs and Border Protection, analyzed each of the four DRIC plaza layouts (refer to Figures 2-9A through 2-9D). Plaza P-b (Figure 2-9B) was eliminated because it would straddle an existing rail line in Delray. Trains cannot be allowed to run through, over or under the plaza due to the security threat of such operations. The rail line cannot be abandoned (permanently closed), as the railroads refuse to give up this asset, even if no traffic uses it. Plaza P-b also had circuitous traffic flow patterns and limited flexibility and expandability. Plaza P-b, attached to Alternatives #6, #8, #10 and #12, was eliminated from further consideration.

Plaza P-d (refer to Figure 2-9D) was eliminated because it was connected to I-75 with the "split" interchange (Interchange F) to which the Delray community objected and which was proposed for elimination in Value Analysis/Value Planning. The GSA/CBP analysis reinforced the need to eliminate this plaza because of:

- The large separation between inbound and outbound vehicle inspection functions;
- The plaza's secondary commercial inspection area's proximity to Southwestern High School; and,
- The plaza's limited flexibility.

Alternative #13, which included Plaza P-d, was therefore eliminated from further consideration.

## 2.2.4 Practical Alternatives

### 2.2.4.1 No Build Alternative

The No Build Alternative is also a Practical Alternative. It does not include a new crossing built by government. It does consider the proposal by the private-sector owners of the Ambassador Bridge to build a six-lane span to replace the existing, four-lane bridge as a variation of the No Build Alternative.

### 2.2.4.2 Build Alternatives

As discussed in Sections 2.2 through 2.2.3.2, Alternatives #4, #6, #8, #10, #12, #13, and #15 were eliminated based on input from the public, the impact assessment (Section 2.2.1), the Value Analysis/Value Planning Study (Section 2.2.2), and analysis of GSA/CBP (Section 2.2.3.2). This information was reviewed and accepted by the Border Partnership. It was also reviewed with the public in June 2006. Another alternative was then added with approval of the Border Partnership – i.e., #16. It was developed in response to public input received at the June public meetings to provide better local community connectivity to the areas north and south of I-75. It is very similar to Alternatives #1, #2, #3, #5 and #14 in that it includes Crossing X-10 and Plaza P-a. It would also have a trumpet-type interchange in the vicinity of Livernois Avenue and Dragoon Street. It would retain full access to I-75 at Springwells Street and full, but indirect access to I-75 at Clark Street.

There are nine Practical Alternatives in the U.S. analyzed as Build Alternatives in the DEIS. These are listed on Table 2-5 and shown in Figures 2-11A through 2-11F for the set of X-10 alternatives and Figures 2-12A through 2-12C for the set of X-11 alternatives. The No Build Alternative is also included in this DEIS as a Practical Alternative.

Table 2-5
Crossing System Alternatives
Included in DRIC DEIS
Detroit River International Crossing Study

| Alternative | Interchange | Plaza | Crossing |
|---|---|---|---|
| #1 | A | P-a | X-10 |
| #2 | B | P-a | |
| #3 | C | P-a | |
| #5 | E | P-a | |
| #14 | G | P-a | |
| #16 | I | P-a | |
| #7 | A | P-c | X-11 |
| #9 | B | P-c | |
| #11 | C | P-c | |

Source: The Corradino Group of Michigan, Inc.

## 2.2.5 What Rules Guide Project Engineering?

The criteria that guide the layout/engineering of the border-crossing system are based on information provided by the Federal Highway Administration, Michigan Department of Transportation, U.S. Customs and Border Protection, and the General Services Administration (and other agencies that would occupy the plaza, such as the U.S. Department of Agriculture). The *Conceptual Engineering Technical Report*[5] provides details on these criteria. Summaries follow in Section 2.2.5.1.

### 2.2.5.1 Roadway-Engineering Criteria

The DRIC Practical Alternatives meet or exceed the desirable roadway-engineering criteria, covering such issues as:

- Horizontal and vertical clearances
- Horizontal and vertical curves
- Sight distance
- Superelevation
- Grades
- Lane and shoulder widths
- Acceleration and deceleration lane lengths

**What are Engineering Criteria?**

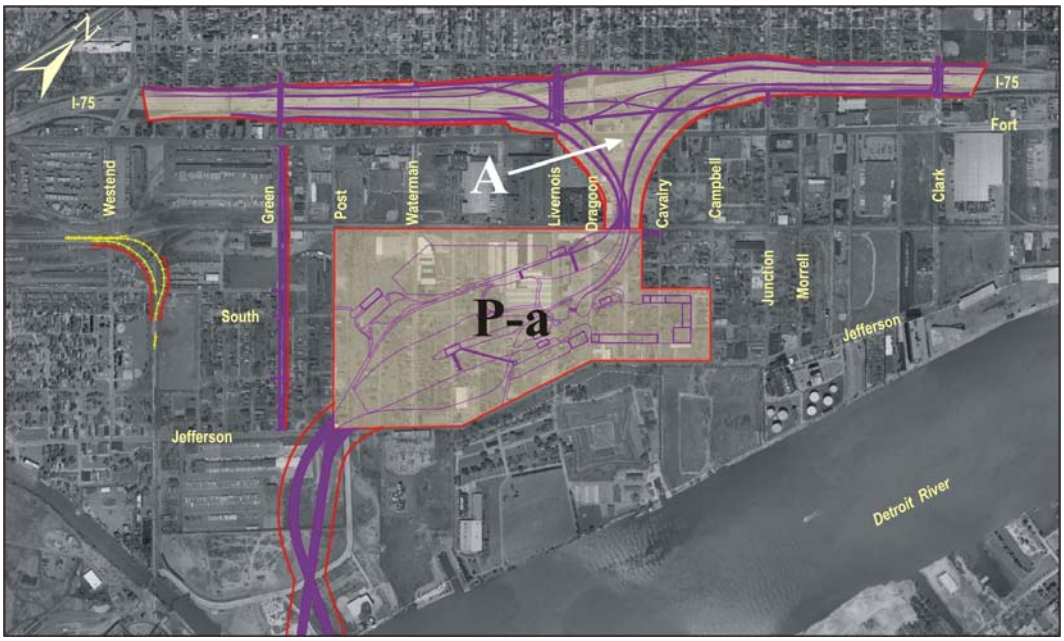
Engineering criteria for the DRIC cover roads and bridges with special criteria for the plaza.

Engineering criteria have been developed over the years to provide for safe roads and bridges, guiding everything from how strong a bridge must be to where signs go.

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

[5] Parsons Transportation Group, *Detroit River International Crossing Study Conceptual Engineering Technical Report*, February 2008.

Figure 2-11A
Crossing X-10 Practical Alternative #1
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchange
- Parts of lost interchange access will be replaced with new ramps in new location

Crossings

- Includes X-10A and X-10B

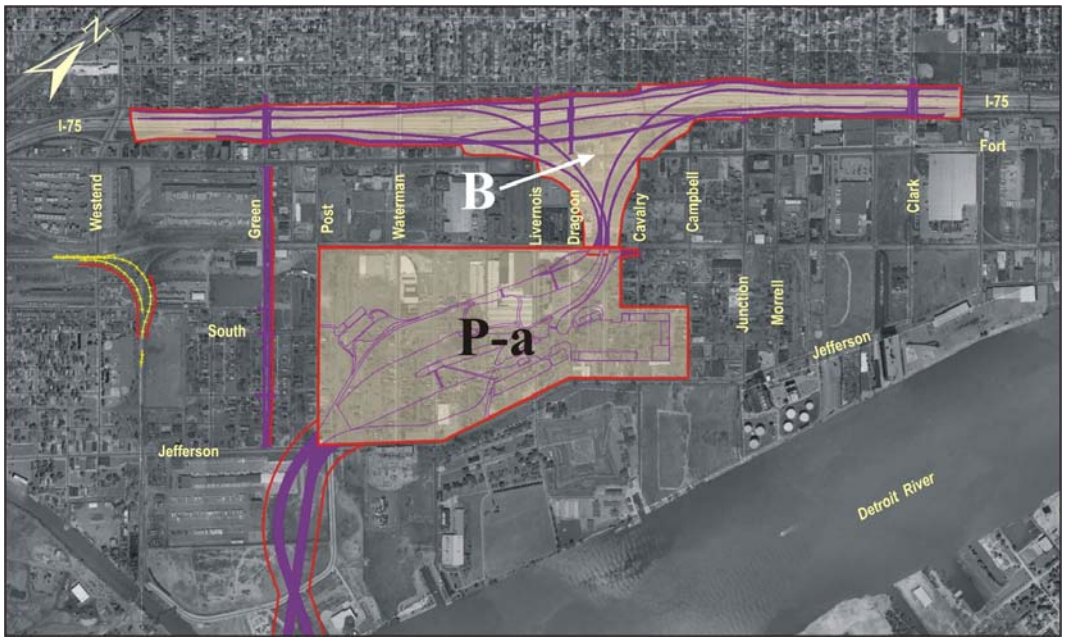
Streets Crossing I-75

- Three of seven removed
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Four of five removed

Figure 2-11B
Crossing X-10 Practical Alternative #2
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchanges
- Closed ramps will be replaced with new ramps in new location

Crossings

- Includes X-10A and X-10B

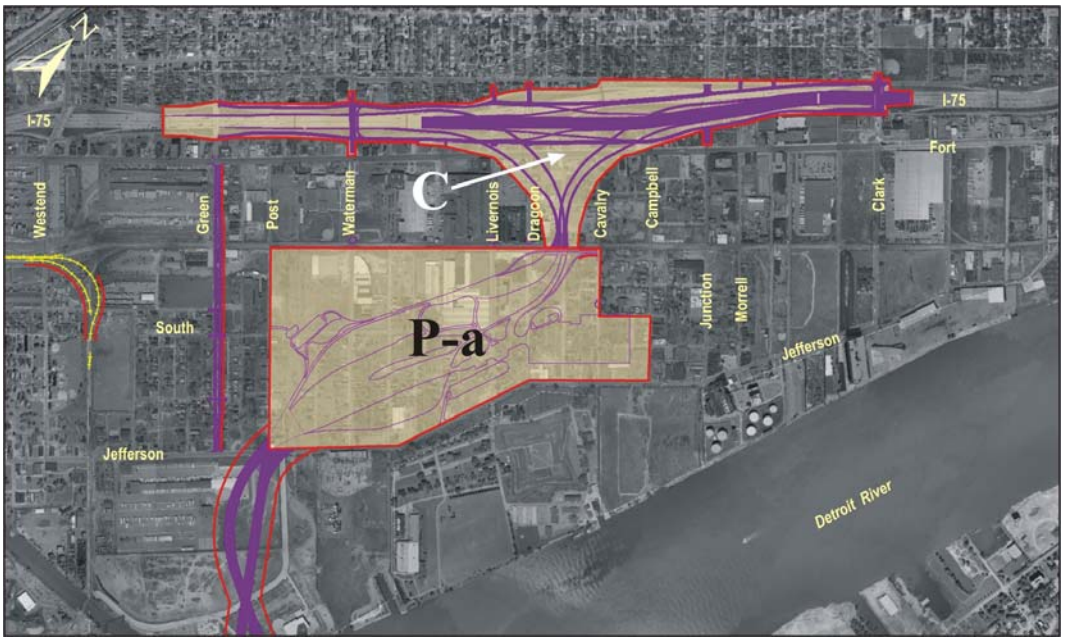
Streets Crossing I-75

- Two of seven removed
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Four of five removed

Figure 2-11C
Crossing X-10 Practical Alternative #3
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchanges
- Closed ramps will be replaced with new ramps in new location

Crossings

- Includes X-10A and X-10B

Streets Crossing I-75

- Three of seven removed, including Livernois and Dragoon
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Three of five removed

Figure 2-11D
Crossing X-10 Practical Alternative #5
Detroit River International Crossing Study


Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchanges
- Closed ramps will be replaced with new ramps in new location

Crossings

- Includes X-10A and X-10B

Streets Crossing I-75

- Three of seven removed, including Livernois and Dragoon
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Three of five removed

Figure 2-11E
Crossing X-10 Practical Alternative #14
Detroit River International Crossing Study


Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchanges
- Closed ramps will not be replaced

Crossings

- Includes X-10A and X-10B

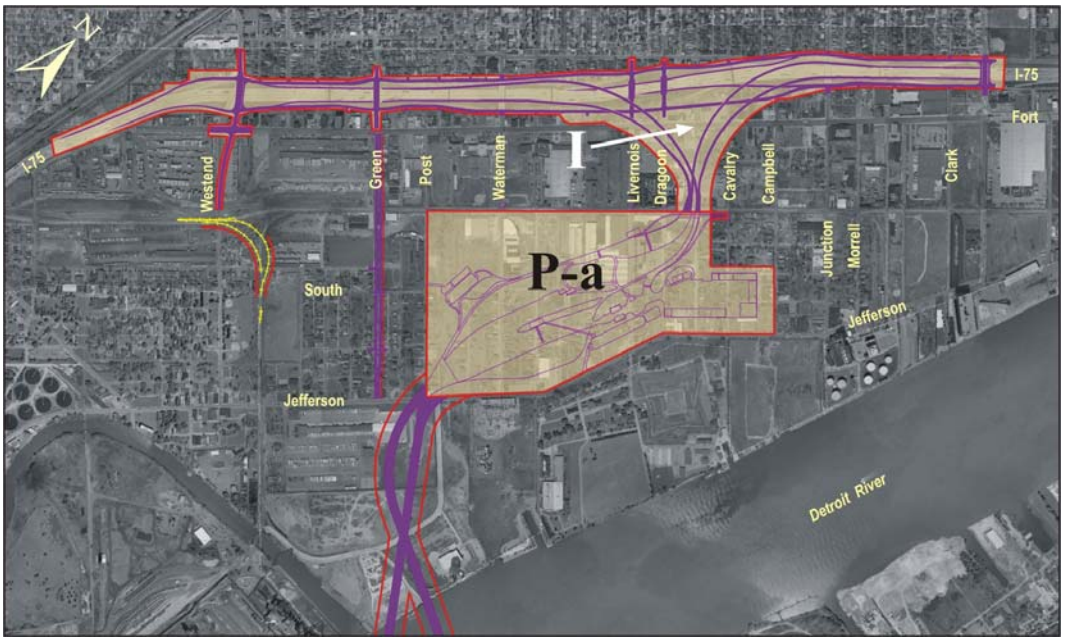
Streets Crossing I-75

- Two of seven removed; Livernois and Dragoon
- Only build alternative that keeps Junction open
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Two of five removed

Figure 2-11F
Crossing X-10 Practical Alternative #16
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes part of Clark interchange
- Closed ramps will be replaced with new ramps in new location

Crossings

- Includes X-10A and X-10B

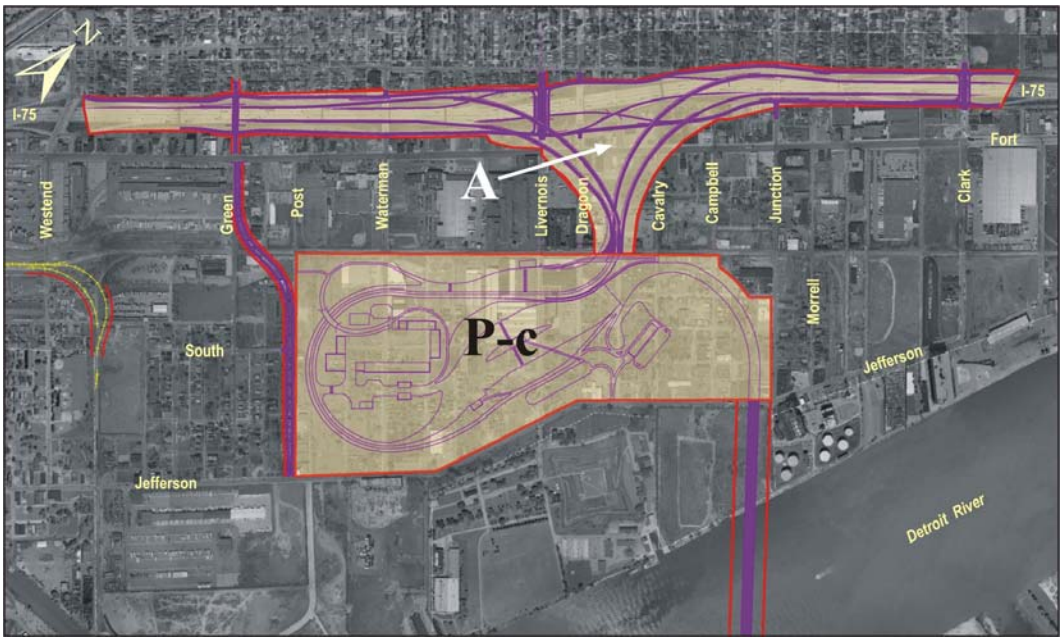
Streets Crossing I-75

- Two of seven removed
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Four of five removed

Figure 2-12A
Crossing X-11 Practical Alternative #7
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchanges
- Closed ramps will be replaced with new ramps in new location

Crossing

- X-11 only

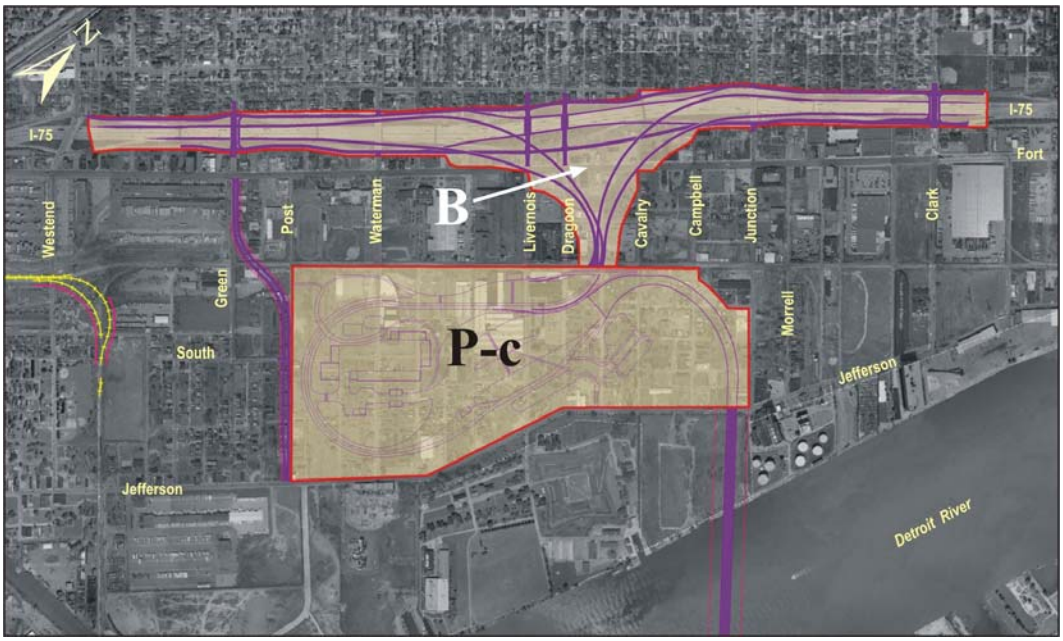
Streets Crossing I-75

- Three of seven removed
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Four of five removed

Figure 2-12B
Crossing X-11 Practical Alternative #9
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchanges
- Closed ramps will be replaced with new ramps in new location

Crossing

- X-11 only

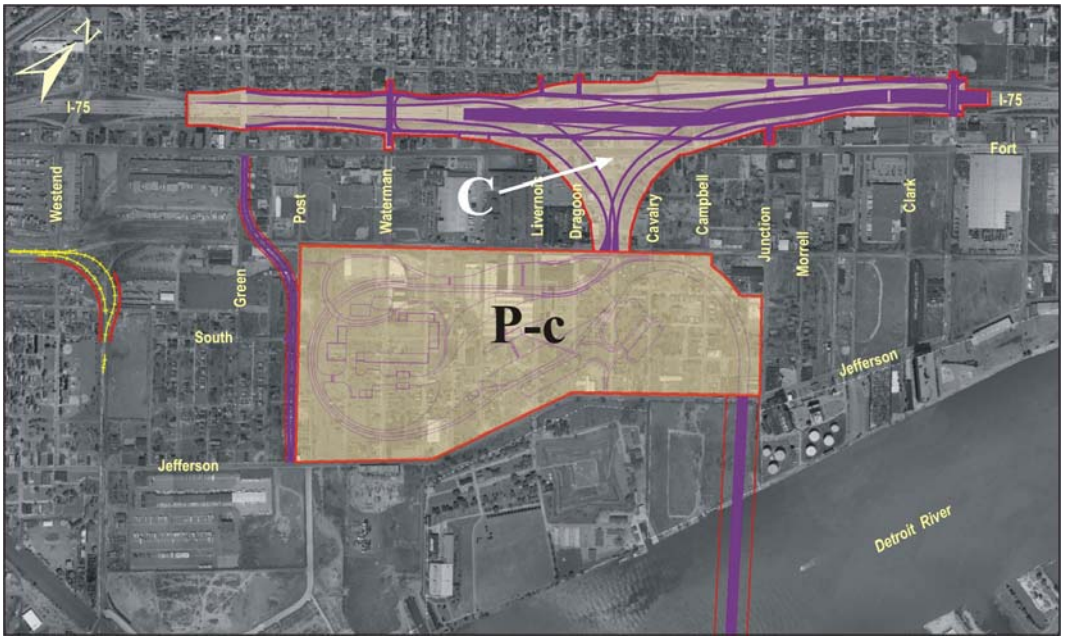
Streets Crossing I-75

- Two of seven removed
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Four of five removed

Figure 2-12C
Crossing X-11 Practical Alternative #11
Detroit River International Crossing Study




Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

## Characteristics

Interchanges

- Eliminates Livernois-Dragoon interchange
- Closes parts of Clark and Springwells interchanges
- Closed ramps will be replaced with new ramps in new location

Crossing

- X-11 only

Streets Crossing I-75

- Three of seven removed, including Livernois and Dragoon
- Green Street becomes a local access boulevard

Pedestrian/Bicycle Crossings of I-75

- Three of five removed

Horizontal clearance means the distance between the drivers' lane and an obstruction. The greater the clearance, the greater the safe operation of vehicles.

Vertical clearance means the distance from the road surface to the lowest point of a bridge overhead. Vertical clearance allows for large, special vehicles.

Curves in the roadway, both horizontal and vertical, cannot be too sharp or steep. They are set based on how fast vehicles are allowed to drive. Curves too sharp contribute to safety issues. Roads too steep create issues during inclement weather for all vehicles and for trucks at all times.

Sight distance criteria address the driver's need to see over hills and around curves. They must be able to see other vehicles at intersections and on ramps.

Superelevation is the slant of a road around a curve. This allows safe and comfortable travel. It also allows water to flow off the road.

Grade refers to the slope of a roadway. A five percent grade means that the road rises or falls five feet for every 100 feet of length. Roads cannot be too steep because vehicles, especially heavy trucks, would slow to a point at which they would interfere with other traffic or lose traction in rain or snow conditions.

Lane widths are how wide the travel lane is built. Higher-speed roads have wider lanes to provide a greater safety margin in the case of driver error.

Shoulders are the areas off the travel lanes where vehicles can stop. They provide an area of refuge in emergencies.

Acceleration and deceleration lanes allow a vehicle to get up to speed before merging or to safely stop before the end of a ramp.

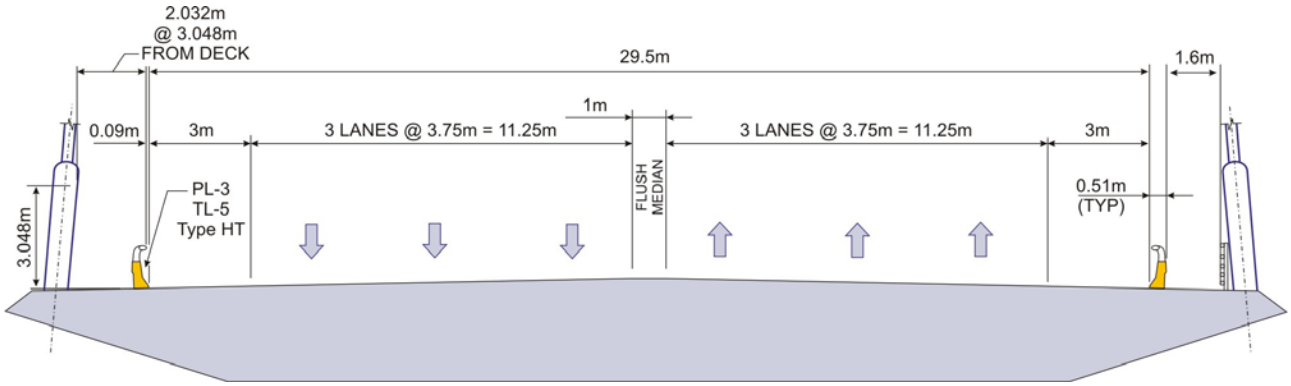
#### 2.2.5.2 Bridge Engineering Criteria

The DRIC project includes typical highway bridges plus the long-span bridge over the Detroit River. The highway bridges would cross existing railroad tracks, local roads, Fort Street (M-85), and I-75.

## Bridge Types Considered for Detroit River Crossing

The bridge types considered for the crossing of the Detroit River are explained in detail in the Bridge-Type Section of the *Conceptual Engineering Technical Report*. Either bridge type will be a six-lane structure with three lanes and shoulders in each direction (Figure 2-13).

Figure 2-13
Proposed Bridge Typical Cross Section[a]
Detroit River International Crossing Study



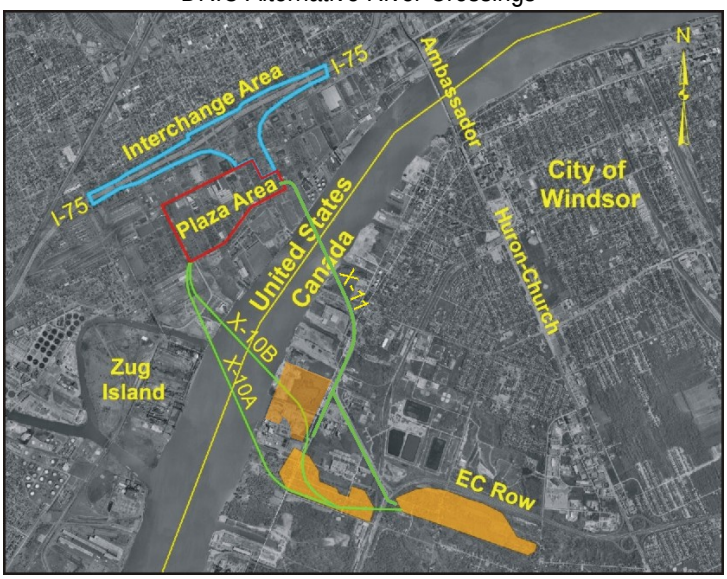

[a] Dimensions are in metrics.

Source: Parsons Transportation Group

For the main structure crossing the river, the design codes of both U.S. and Canada apply. The project will be developed using the International System of Units (SI) (metric).

The Detroit River varies in width from 1,900 to 2,600 feet in the vicinity of Corridors X-10 and X-11. It is a major commercial shipping channel with many shoreline industries in the project area receiving materials delivered by ship. Discussions with the U.S. and Canadian Coast Guards and organizations representing ship owners and captains led to the conclusion that none of the Practical Alternatives can include piers (bridge supports) in the Detroit River. Piers would interfere with safe navigation. All supports for the bridge will be on land.

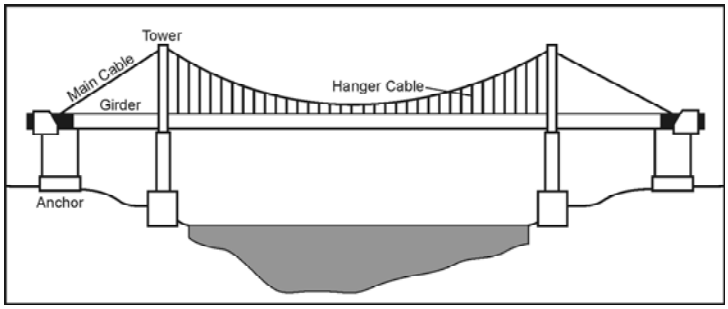
DRIC Alternative River Crossings




Source: The Corradino Group of Michigan, Inc.

Span lengths would range between 2,820 and 4,260 feet. This range is because the proposed DRIC bridges do not go straight across the narrowest part of the river. Only two bridge types are candidates for a crossing of this length: suspension and cable-stay (Figure 2-14). Suspension bridges can be used in either corridor. Cable-stay bridges have a practical span limit of about 3,300 feet, so they are only considered at the X-10B and X-11 crossings.

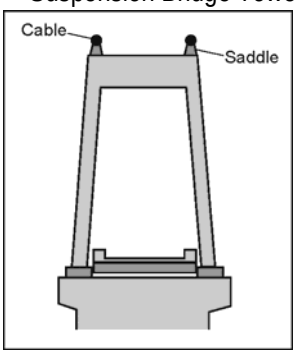
Suspension Bridge




Source: Parsons Transportation Group

A typical suspension bridge is a continuous girder with one or more towers erected above the piers. Large anchors, or counterweights, are placed to hold the ends of the cables at both ends of the bridge. The main cables are stretched from one anchor over the tops of the tower(s) and attached to the opposite anchor. The cables pass over a special structure, known as a saddle, that is part of the tower. The saddle allows the main cables to slide, transferring the load from the cables to the tower. Long-span suspension bridges are engineered to ensure that they do not vibrate or sway excessively under heavy loads.

Suspension Bridge Tower

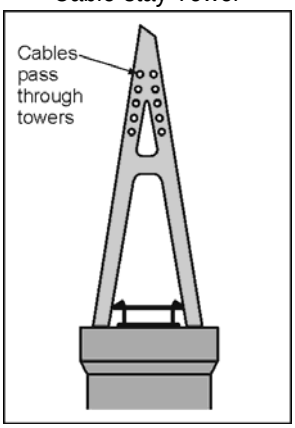



Source: Parsons Transportation Group

Vertical cables, called Hanger Cables, hang from the main cables to support the girder. The majority of the weight of the bridge, and vehicles on it, is supported by the hanger cables which, in turn, are supported by the main cable.

A typical cable-stay bridge has a continuous girder with one or more towers erected on foundations. Cables stretch diagonally from these towers and support the girder. Individual cables connect from the bridge deck, through the tower and back to the bridge deck. The towers of a cable-stay bridge are substantially taller than the equivalent suspension bridge. Long-span cable-stay bridges are also engineered to ensure stability in the wind. The relative difference in tower heights between suspension and cable-stay bridge types for spans in this area of the Detroit River vary from approximately 260 feet to 360 feet.

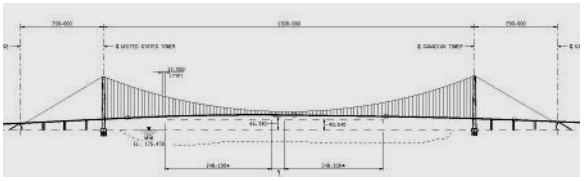
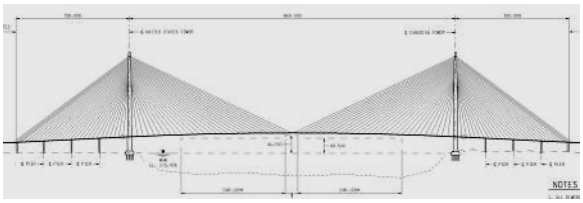
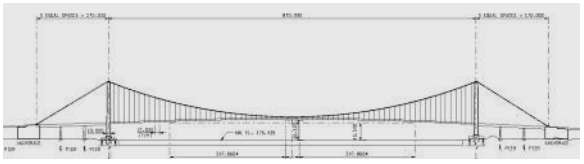
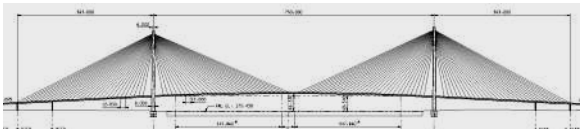
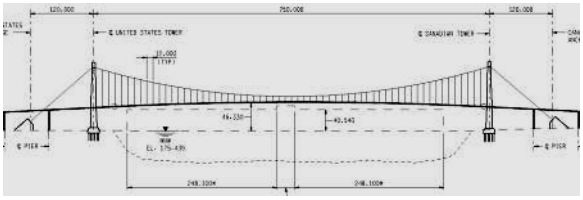
Cable-stay Tower




Source: Parsons Transportation Group

The bridge height over the Detroit River varies by alternative. Each concept meets vertical clearance criteria of the U.S. Coast Guard (minimum vertical clearance at the shorelines of 133 feet and 152 feet for 100 feet at the center of the navigation channel).

Figure 2-14
Bridge Type Study – Final Bridge Options
Detroit River International Crossing Study

| Final Bridge Options | Main Span Length (feet) |
|---|---|
| Crossing Location: X-10A | |
|  | 4,260 |
| Crossing Location: X-10B | |
|  | 2,820 |
|  | 2,850 |
| Crossing Location: X-11C | |
|  | 2,460 |
|  | 2,460 |

Source: Parsons Transportation Group

The proposed bridges have been checked against the flight clearance needs of the Detroit/Metro Wayne International Airport, the Windsor Airport, the Coleman Young Airport and Grosse Ile Municipal Airport. The bridge tower heights of all candidate bridges fall below the regulated flight paths of these airports.

All structure types under consideration would be engineered to mitigate safety and security risks. There are presently no safety or security issues, either natural or manmade, that differentiate between the bridge types being considered on each alignment.

The two bridge-type options at Crossings X-10B and X-11 will be retained through the environmental impact assessment stage of the project. Only a suspension bridge will be considered at Crossing X-10A. While a choice will be made among Crossings X-10A, X-10B and X-11 in the DEIS, a choice of bridge type will be made by the Partnership in the design phase of the project.

Crossing X-10(A), was developed in the DRIC Bridge Type Study to avoid the area near a known sinkhole that developed from historical brine mining in Canada. The Bridge Type Study demonstrated that Crossing X-10(A) is not optimal from a bridge engineering perspective. Therefore, advancing conceptual engineering and geotechnical work of bridge options at Crossing X-10(A) was postponed until results were obtained from the Brine Well Cavity Investigation Program. Recommendations from the geotechnical investigation, reached on February 13, 2008, indicate Crossings X-10B and X-11 are cleared to accept a new bridge.

#### 2.2.5.3 Plaza Facilities/Security Engineering Criteria

The U.S. General Services Administration (GSA) has developed basic engineering guidelines for plaza facilities and their safety and security needs (The *Land Port of Entry Design Guide*). The U.S. Department of Homeland Security, Customs and Border Protection Agency (CBP), in cooperation with GSA, developed a specific Program of Requirements (POR) for the DRIC Study that includes:

- A minimum of 80 acres of building, inspection and circulation space for the Federal Inspection Station;
- Approximately 58,000 square feet of inspection office buildings and 25,000 square feet of docks to inspect and unload cargo;
- 20 inspection booths for cars and trucks (additional space has been included for expansion to 40 booths);
- Space for two non-intrusive inspections buildings and one mobile non-intrusive inspection operations facility;

- Provision for inspection of outbound vehicles in the Inbound Secondary Inspection area;
- Space for a future self-contained Outbound Inspection area;
- Space for impounding vehicles, inspecting trucks, and for hazardous materials containment;
- A 5,000-square-foot facility for the observation, inspection and unloading of animals;
- Space for Radiation Detection Portal monitors and License Plate Readers; and,
- Space for future large kennel for the care of dogs used in security/inspection activities.

Besides the core area established for CBP of 80 acres and related functions (another 10 acres), an additional 20 to 25 acres is needed. This latter space would accommodate the Duty Free and Toll Collection area and provide for brokers and general circulation. Another 40 to 45 acres would be provided for a utility corridor and buffer for expansion. This places the plaza in the range of 150 to 160 acres.