Level 2 Traffic Analysis Technical Report
Part 2: Highway Capacity Analysis and Microsimulation Modeling Results

The Detroit River International Crossing Study

MDOT
Michigan Department of Transportation

February 2008

The FHWA has determined that this preliminary document is an intergovernmental exchange that may be withheld under the FOIA request. Premature release of this material to any segment of the public could give some sectors an unfair advantage and would have a chilling effect on intergovernmental coordination and the success of the cooperating agency concept. For these reasons, we respectfully request that the public not be given access to this document.

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SUMMARY

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 study will propose solutions that support the region, state, provincial and national economies while addressing civil and national defense and homeland security needs of the busiest trade corridor between the United States and Canada (Figure S-1).

Figure S-1
Detroit River International Crossing Study
Existing Detroit River International Crossings

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.

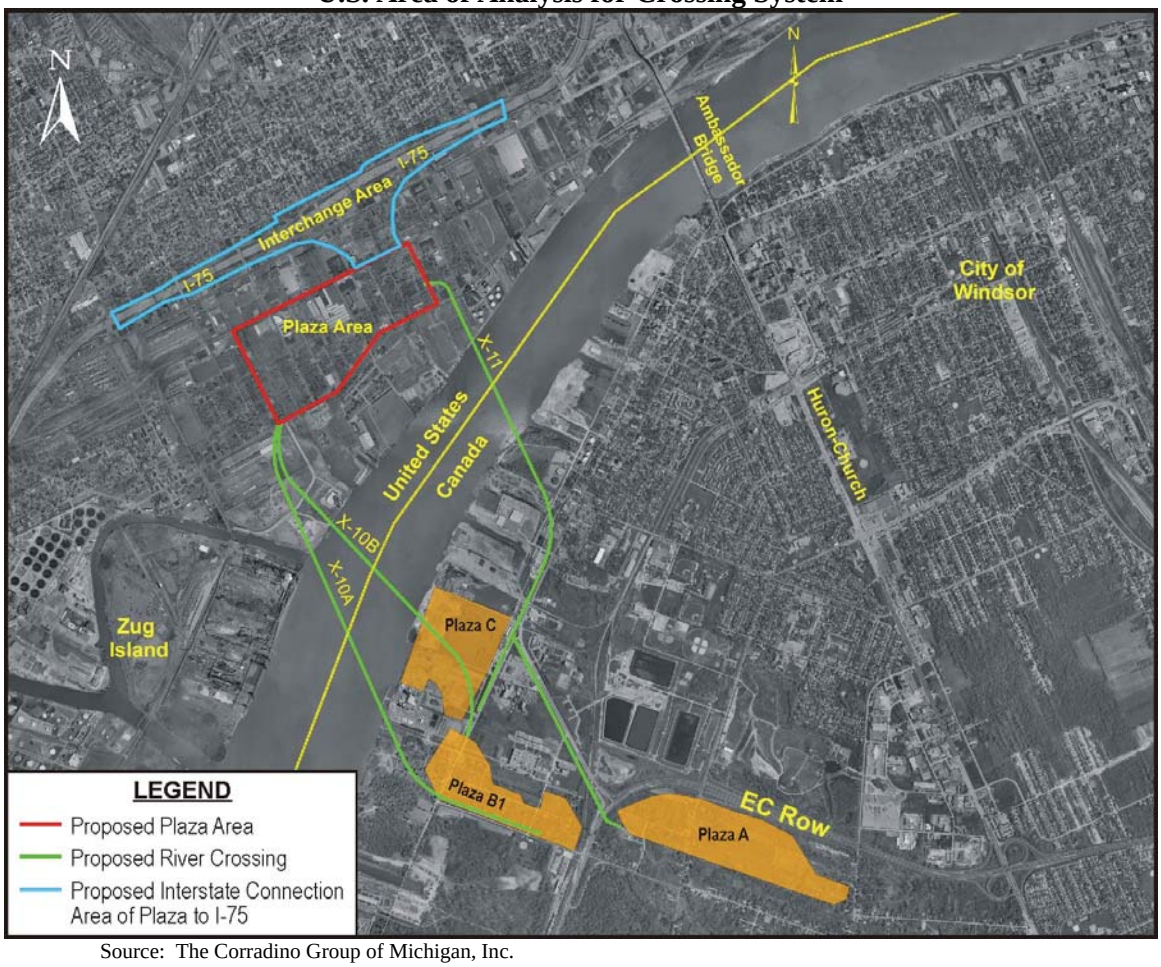
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements (i.e., at least 30 years) across the Canada-U.S. 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; and,
- Provide reasonable and secure crossing options in the event of incidents, maintenance, congestion, or other disruptions.

The Detroit River International Crossing Study (DRIC) Draft Environmental Impact Statement (DEIS) analyzes issues/impacts on the U.S. side of the border for the crossing system over the Detroit River between Detroit, Michigan, and Windsor, Ontario, Canada. The alternatives are comprised of three components: the crossing, plaza (where tolls are collected and Customs inspections take place), and interchange connecting the plaza to I-75 (Figure S-2).

Figure S-2
Detroit River International Crossing Study
U.S. Area of Analysis for Crossing System



Source: The Corradino Group of Michigan, Inc.

Purpose of the Report

The purpose of this report is to document the applications and results of the *Highway Capacity Software (HCS)* and *VISSIM* modeling software used to evaluate the potential traffic impacts on the U.S. side of the border for the proposed DRIC system. The traffic analyses were conducted for Base Year 2006 conditions with the Ambassador Bridge Gateway Project in place, the 2035 No Build traffic conditions and 2035 conditions of nine DRIC alternatives: Alternatives #1, #2, #3, #5, #7, #9, #11, #14 and #16. The DRIC alternatives are comprised of various interchange and ramp configurations connecting I-75 to the plaza and changes to the connections to the adjacent local street system. Input to the analyses includes MDOT traffic counts, counts made for the purposes of this study, and SEMCOG Travel Demand Model 2035 forecasts for the study area. Based on the traffic volumes determined for the Base Year 2006 and future 2035 forecasts, capacity analyses were conducted for three peak hours (AM, Midday, and PM) for the 2006 Base Year, 2035 No Build Condition and DRIC alternatives. 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.

Findings

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.

Tables S-1, S-2, and S-3 (PM, Midday, and AM peak hours, respectively) present the Level of Service results for the capacity analyses conducted for each condition and alternative. Level of Service is like a grade in school: A is Good; F is Failing: D is acceptable. The capacity analyses found no levels of service (LOS) on I-75 worse than LOS D as a result of any DRIC alternative and no level of service worse than LOS C for any local street intersection. For example, with the maximum traffic, the 2035 PM peak on DRIC Alternative #14 (Figure S-3), there were no levels of service worse than LOS D on I-75 and LOS C for the local road intersections. All other conditions and alternatives evaluated were found to operate at similar or better levels of service for all time periods depicted here for Alternative #14.

As presented on Tables S-1, S-2, and S-3, the LOS for each build alternative was compared to the no build LOS for the particular freeway segment(s), ramp merge/diverge area, weaving segment, or local intersection. The DRIC freeway study area includes two interchanges downstream (Springwells and Dearborn) and two interchanges upstream (Clark and Grand Boulevard) from the point of connection of the proposed plaza to I-75. Additional details of the analysis for all DRIC alternatives are provided in the main body of this Technical Report.

Table S-1A
Detroit River International Crossing Study
PM Peak Hour Levels of Service – HCS Analysis
Mainline Freeway

FREEWAYS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Northbound I-75 Freeway Segments											
Dearborn off-ramp to Springwells off-ramp	B	B	C	C	C	C	C	C	C	C	C
Springwells off-ramp to Springwells on-ramp	B	B								B	B
Springwells off-ramp to DRIC Plaza off-ramp			B	B	B	B	B	B	B		
Springwells on-ramp to Livernois off-ramp	B	B									
Springwells on-ramp to DRIC Plaza off-ramp										B	B
DRIC Plaza off-ramp to Livernois off-ramp			B		B		B		B		
DRIC Plaza off-ramp to Livernois on-ramp				B				B			
DRIC Plaza off-ramp to Dragoon on-ramp						B					
DRIC Plaza off-ramp to Dragoon off-ramp											B
DRIC Plaza off-ramp to DRIC Plaza on-ramp										B	
Livernois off-ramp to Dragoon on-ramp	B	B	A		A		B		A		
Livernois on-ramp to Junction off-ramp				A				A			
Dragoon on-ramp to Junction off-ramp						B					
Dragoon on-ramp to Clark off-ramp	B	C									
Dragoon on-ramp to DRIC Plaza on-ramp			A		B		A		B		
Dragoon off-ramp to DRIC Plaza on-ramp											B
Junction off-ramp to DRIC Plaza on-ramp				B		B		B			
Clark off-ramp to Clark on-ramp	B	C									
DRIC Plaza on-ramp to Clark on-ramp			B	B	B		B	B	B	B	A
DRIC Plaza on-ramp to Grand Blvd. off-ramp						B					
Clark on-ramp to Grand Blvd. off-ramp	C	B	B	B	B		B	B	B	B	B
Grand Blvd. off-ramp to WB I-96 off-ramp	B	B	B	B	B	B	B	B	B	B	B
Southbound I-75 Freeway Segments											
EB I-96 on-ramp to Clark off-ramp	D										
Ambassador Bridge on-ramp to Grand Blvd. on-ramp		D	C	C	C	C	C	C	C	C	C
Grand Blvd. on-ramp to Clark off-ramp		D	C	C	C	D	C	C	C	D	D
Clark off-ramp to Clark on-ramp	D	D									
Clark off-ramp to DRIC Plaza off-ramp			C	C	C	D	C	C	C	C	C
Clark on-ramp to Dragoon off-ramp	D	D									
DRIC Plaza off-ramp to Junction off-ramp			D				D				
DRIC Plaza off-ramp to Junction on-ramp				D		D		D			D
DRIC Plaza off-ramp to Dragoon off-ramp					D				D		
DRIC Plaza off-ramp to DRIC Plaza on-ramp										D	
Dragoon off-ramp to Livernois on-ramp	D	D			C				C		
Junction off-ramp to Livernois on-ramp			C				C				
Junction on-ramp to Livernois off-ramp				C				C			
Junction on-ramp to Dragoon off-ramp						C					
Junction on-ramp to DRIC Plaza on -ramp											C
Livernois on-ramp to Springwells off-ramp	D	D									
Livernois on-ramp to DRIC Plaza on-ramp			D		D		D	D	D		
Livernois off-ramp to DRIC Plaza on-ramp				D							
Dragoon off-ramp to DRIC Plaza on-ramp						D					
DRIC Plaza on-ramp to Springwells off-ramp										D	C
Springwells off-ramp to Springwells on-ramp	D	D								D	D
DRIC Plaza on-ramp to Springwells on-ramp			D	D	D	D	D	D	D		
Springwells on-ramp to Dearborn on-ramp	D	D	D	D	D	D	D	D	D	D	D

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

Table S-1B
Detroit River International Crossing Study
PM Peak Hour Levels of Service – HCS Analysis
I-75 Merge/Diverge Areas and Weaving Segments

FREEWAYS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Northbound I-75 Ramp Merge and Diverge Areas											
Dearborn off-ramp	C	C	B	B	B	B	B	B	B	B	B
Springwells off-ramp	B	B	B	B	B	B	B	B	B	B	B
Springwells on-ramp	B	B								B	B
DRIC Plaza off-ramp			A	A	A	A	A	A	A	A	A
Livernois off-ramp	B	B	A		A		A		A		
Livernois on-ramp				B				B			
Dragoon off-ramp											B
Dragoon on-ramp	B	B	B		A	B	B		B		
Junction off-ramp				A		B		A			
Clark off-ramp	B	B									
Clark on-ramp	B	B	B	B	B		B	B	B	B	B
Grand Blvd. off-ramp	B	B	B	B	B	B	B	B	B	B	B
Southbound I-75 Ramp Merge and Diverge Areas											
Service Drive on-ramp (E. of Grand Blvd.)	B	B	C	C	C	C	C	C	C	C	B
Clark off-ramp	C	C	D	D	D		D	D	D	D	C
Clark on-ramp	B	B									
DRIC Plaza off-ramp			A	A	A	A	A	A	A	A	A
Junction off-ramp			C				C				
Junction on-ramp				C		C		C			C
Dragoon off-ramp	C	C			C	C			C		
Livernois off-ramp				C				C			
Livernois on-ramp	C	C	C		C		C		C		
Springwells off-ramp	C	C								C	C
Springwells on-ramp	B	B	C	C	C	C	C	C	C	C	D
Dearborn on-ramp	B	B	C	C	C	C	C	C	C	C	C
Northbound I-75 Weaving Segments											
Springwells on-ramp to DRIC Plaza off-ramp										B	B
Livernois on-ramp to Junction off-ramp				A				A			
Dragoon on-ramp to Junction off-ramp						B					
Clark on-ramp to Grand Blvd. off-ramp	B	B	B	B	B		B	B	B	B	B
Southbound I-75 Weaving Segments											
Ambassador Bridge on-ramp to Clark off-ramp	C	D	D	D	D		D	D	C	D	D
Junction on-ramp to Dragoon off-ramp						C					
Junction on-ramp to Livernois off-ramp				C				C			
DRIC Plaza on-ramp to Springwells off-ramp										C	C

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

Table S-1C
Detroit River International Crossing Study
PM Peak Hour Levels of Service – VISSIM Analysis
Local Intersections

LOCAL INTERSECTIONS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Fort at Westend	B	A	A	A	A	A	A	A	A	A	B
Fort at Green	B	B	A	B	B	B	B	B	B	B	B
Fort at Waterman	A	B	A	A	A	A	A	A	A	B	A
Fort at Livernois	B	B	B	B	B	B	C	B	B	A	B
Fort at Dragoon	A	A	B	A	B	B	B	B	B	A	B
Fort at Junction	A	A	A	B	B	A	A	B	B	A	B
Fort at Clark	B	B	B	B	B	B	B	B	B	B	B
Southbound Service Drive at Livernois	A	A	A	A	A	A	A	A	A	A	A
Southbound Service Drive at Dragoon	B	B	A	B	A	A	A	B	A	A	B
Southbound Service Drive at Waterman					B				B		
Northbound Service Drive at Livernois	B	B	A	B	A	A	A	B	A	A	B
Northbound Service Drive at Dragoon	B	B	A	B	A	A	A	B	A	A	B
Southbound Service Drive at Springwells	B	B	A	B	B	B	A	B	B	C	B
Northbound Service Drive at Westend	B	B	B	B	B	B	B	B	B	B	B
Northbound Service Drive at Clark	B	B	B	C	C	B	B	B	C	B	C
Southbound Service Drive at Clark	B	B	B	B	B	B	B	B	B	B	B
Fort at Grand Blvd.	A	A	A	A	A	A	A	A	A	A	A
Northbound Service Drive at Grand Blvd.	B	A	B	B	A	A	B	B	B	B	B
Southbound Service Drive at Grand Blvd.	A	A	A	A	A	A	A	A	A	A	A
Fort at Post	A	A	A	A	A	A	A	A	A	A	A

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

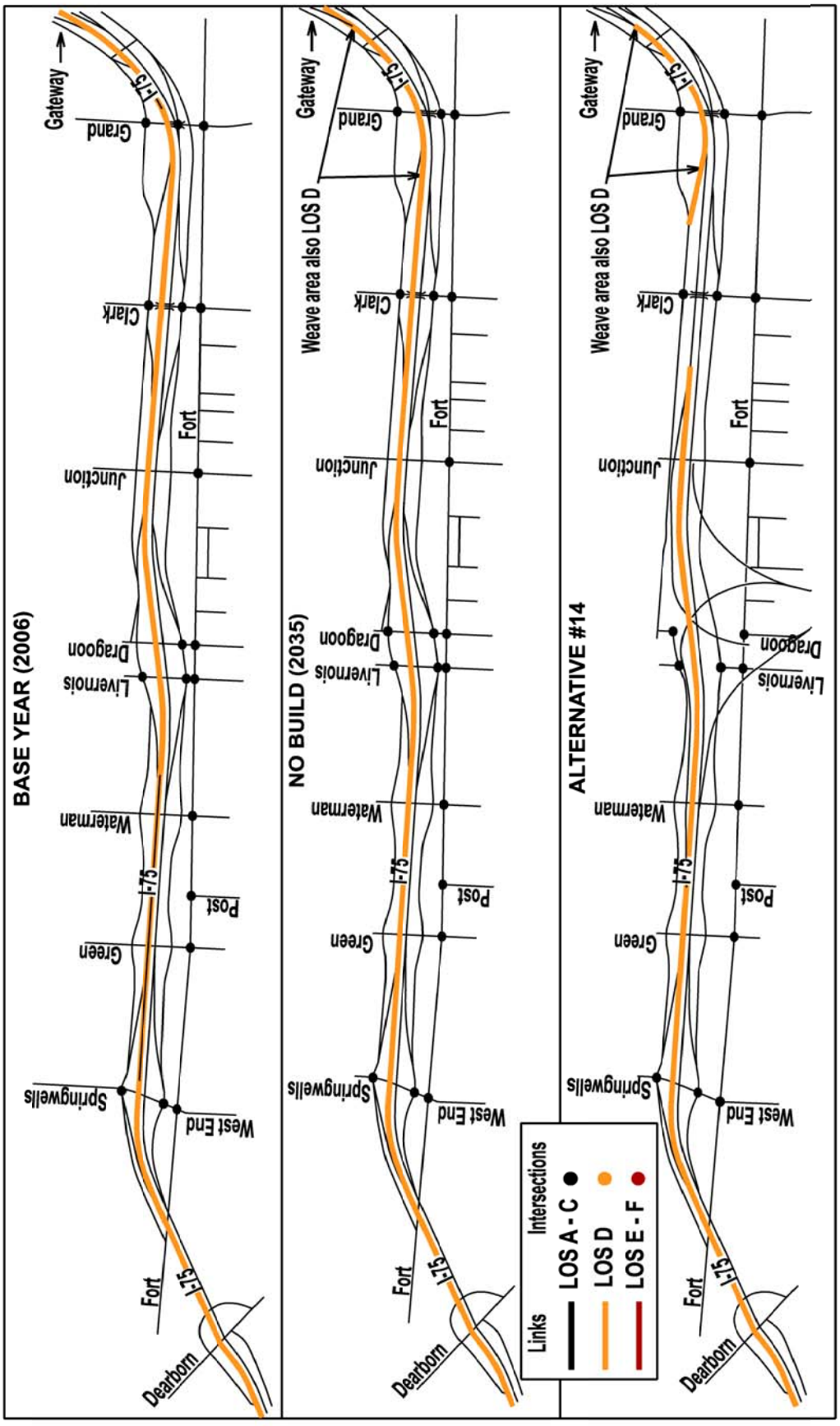


Figure S-3
Detroit River International Crossing Study
PM Peak Hour Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table S-2A
Detroit River International Crossing Study
Midday Peak Hour Levels of Service – HCS Analysis
Mainline Freeway

FREEWAYS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Northbound I-75 Freeway Segments											
Dearborn off-ramp to Springwells off-ramp	B	B	B	B	B	B	B	B	B	B	B
Springwells off-ramp to Springwells on-ramp	B	B								B	B
Springwells off-ramp to DRIC Plaza off-ramp			B	B	B	B	B	B	B		
Springwells on-ramp to Livernois off-ramp	B	B									
Springwells on-ramp to DRIC Plaza off-ramp										B	A
DRIC Plaza off-ramp to Livernois off-ramp			A		A		A		A		
DRIC Plaza off-ramp to Livernois on-ramp				A				A			
DRIC Plaza off-ramp to Dragoon on-ramp						A					
DRIC Plaza off-ramp to Dragoon off-ramp											A
DRIC Plaza off-ramp to DRIC Plaza on-ramp										A	
Livernois off-ramp to Dragoon on-ramp	B	B	A		A		A		A		
Livernois on-ramp to Junction off-ramp				A				A			
Dragoon on-ramp to Junction off-ramp						A					
Dragoon on-ramp to Clark off-ramp	B	B									
Dragoon on-ramp to DRIC Plaza on-ramp			A		A		A		A		
Dragoon off-ramp to DRIC Plaza on-ramp											A
Junction off-ramp to DRIC Plaza on-ramp				A		B		A			
Clark off-ramp to Clark on-ramp	B	B									
DRIC Plaza on-ramp to Clark on-ramp			B	A	A		B	A	A	A	A
DRIC Plaza on-ramp to Grand Blvd. off-ramp						A					
Clark on-ramp to Grand Blvd. off-ramp	B	B	A	A	A		A	A	A	A	A
Grand Blvd. off-ramp to WB I-96 off-ramp	B	A	A	A	A	A	A	A	A	A	A
Southbound I-75 Freeway Segments											
EB I-96 on-ramp to Clark off-ramp	B										
Ambassador Bridge on-ramp to Grand Blvd. on-ramp		B	B	B	B	B	B	B	B	B	B
Grand Blvd. on-ramp to Clark off-ramp		B	B	B	B	B	A	A	A	B	B
Clark off-ramp to Clark on-ramp	B	B									
Clark off-ramp to DRIC Plaza off-ramp			B	B	B	B	B	B	B	B	B
Clark on-ramp to Dragoon off-ramp	B	B									
DRIC Plaza off-ramp to Junction off-ramp			B				B				
DRIC Plaza off-ramp to Junction on-ramp				B		B		B			B
DRIC Plaza off-ramp to Dragoon off-ramp					B				B		
DRIC Plaza off-ramp to DRIC Plaza on-ramp										B	
Dragoon off-ramp to Livernois on-ramp	B	B			A				A		
Junction off-ramp to Livernois on-ramp			A				A				
Junction on-ramp to Livernois off-ramp				A				A			
Junction on-ramp to Dragoon off-ramp						B					
Junction on-ramp to DRIC Plaza on -ramp											A
Livernois on-ramp to Springwells off-ramp	B	B									
Livernois on-ramp to DRIC Plaza on-ramp			B		B		B	B	B		
Livernois off-ramp to DRIC Plaza on-ramp				B							
Dragoon off-ramp to DRIC Plaza on-ramp						B					
DRIC Plaza on-ramp to Springwells off-ramp										B	B
Springwells off-ramp to Springwells on-ramp	B	B								B	B
DRIC Plaza on-ramp to Springwells on-ramp			B	B	B	B	B	B	B		
Springwells on-ramp to Dearborn on-ramp	B	B	B	B	B	B	B	B	B	B	B

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

Table S-2B
Detroit River International Crossing Study
Midday Peak Hour Levels of Service – HCS Analysis
I-75 Merge/Diverge Areas and Weaving Segments

FREEWAYS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Northbound I-75 Ramp Merge and Diverge Areas											
Dearborn off-ramp	B	C	B	B	B	B	B	B	B	B	B
Springwells off-ramp	B	B	B	B	B	B	B	B	B	B	B
Springwells on-ramp	B	B								B	B
DRIC Plaza off-ramp			A	A	A	A	A	A	A	A	A
Livernois off-ramp	B	B	A		A		A		A		
Livernois on-ramp				A				A			
Dragoon off-ramp											B
Dragoon on-ramp	B	B	A		A	B	A		A		
Junction off-ramp				A		A		A			
Clark off-ramp	B	B									
Clark on-ramp	B	B	B	B	B		B	B	B	B	B
Grand Blvd. off-ramp	B	B	B	B	B	A	B	B	B	B	B
Southbound I-75 Ramp Merge and Diverge Areas											
Service Drive on-ramp (E. of Grand Blvd.)	B	B	B	B	B	B	B	B	A	B	B
Clark off-ramp	B	B	B	B	B		B	B	B	B	B
Clark on-ramp	B	B									
DRIC Plaza off-ramp			A	A	A	A	A	A	A	A	A
Junction off-ramp			B				B				
Junction on-ramp				B		B		B			A
Dragoon off-ramp	B	B			B	B			B		
Livernois off-ramp				B				B			
Livernois on-ramp	B	B	B		B		B		B		
Springwells off-ramp	B	B								B	B
Springwells on-ramp	B	B	B	B	B	B	B	B	B	B	B
Dearborn on-ramp	B	B	B	B	B	B	B	B	B	B	B
Northbound I-75 Weaving Segments											
Springwells on-ramp to DRIC Plaza off-ramp										B	B
Livernois on-ramp to Junction off-ramp				A				A			
Dragoon on-ramp to Junction off-ramp						B					
Clark on-ramp to Grand Blvd. off-ramp	B	B	B	B	B		B	B	B	B	B
Southbound I-75 Weaving Segments											
Ambassador Bridge on-ramp to Clark off-ramp	B	B	B	B	B		B	B	B	B	B
Junction on-ramp to Dragoon off-ramp						B					
Junction on-ramp to Livernois off-ramp				B				B			
DRIC Plaza on-ramp to Springwells off-ramp										B	B

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

Table S-2C
Detroit River International Crossing Study
Midday Peak Hour Levels of Service – VISSIM Analysis
Local Intersections

LOCAL INTERSECTIONS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Fort at Westend	B	B	A	A	A	A	A	A	A	A	A
Fort at Green	B	B	B	B	A	B	B	B	B	B	B
Fort at Waterman	B	B	B	A	A	A	B	A	A	B	B
Fort at Livernois	A	A	B	A	A	A	C	A	A	A	A
Fort at Dragoon	A	A	B	B	B	B	B	B	B	A	A
Fort at Junction	A	A	A	A	A	B	A	B	A	A	A
Fort at Clark	B	B	B	B	B	B	B	B	B	B	B
Southbound Service Drive at Livernois	A	A	C	A	A	A	C	A	A	A	A
Southbound Service Drive at Dragoon	B	B	A	B	A	A	A	B	A	A	B
Southbound Service Drive at Waterman					B				B		
Northbound Service Drive at Livernois	B	B	B	B	A	A	B	A	A	A	B
Northbound Service Drive at Dragoon	B	B	A	B	A	A	A	B	A	A	B
Southbound Service Drive at Springwells	B	B	B	B	B	B	B	C	B	B	B
Northbound Service Drive at Westend	B	B	B	B	B	B	B	B	B	B	B
Northbound Service Drive at Clark	B	B	A	B	B	B	A	B	B	B	B
Southbound Service Drive at Clark	B	B	B	B	B	B	B	B	B	B	B
Fort at Grand Blvd.	A	A	A	A	A	A	A	A	A	A	A
Northbound Service Drive at Grand Blvd.	B	B	B	B	B	B	B	B	B	B	B
Southbound Service Drive at Grand Blvd.	A	A	A	A	A	A	A	A	A	A	A
Fort at Post	A	A	A	A	A	A	A	A	A	A	A

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

Table S-3A
Detroit River International Crossing Study
AM Peak Hour Levels of Service – HCS Analysis
Mainline Freeway

FREEWAYS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Northbound I-75 Freeway Segments											
Dearborn off-ramp to Springwells off-ramp	C	C	D	D	D	D	D	D	D	D	D
Springwells off-ramp to Springwells on-ramp	C	C								D	C
Springwells off-ramp to DRIC Plaza off-ramp			C	C	C	C	C	C	C		
Springwells on-ramp to Livernois off-ramp	D	D									
Springwells on-ramp to DRIC Plaza off-ramp										C	C
DRIC Plaza off-ramp to Livernois off-ramp			C		C		C		C		
DRIC Plaza off-ramp to Livernois on-ramp				C				C			
DRIC Plaza off-ramp to Dragoon on-ramp						C					
DRIC Plaza off-ramp to Dragoon off-ramp											C
DRIC Plaza off-ramp to DRIC Plaza on-ramp										C	
Livernois off-ramp to Dragoon on-ramp	D	D	C		B		C		B		
Livernois on-ramp to Junction off-ramp				C				C			
Dragoon on-ramp to Junction off-ramp						C					
Dragoon on-ramp to Clark off-ramp	D	D									
Dragoon on-ramp to DRIC Plaza on-ramp			C		C		C		C		
Dragoon off-ramp to DRIC Plaza on-ramp											C
Junction off-ramp to DRIC Plaza on-ramp				C		C		C			
Clark off-ramp to Clark on-ramp	D	D									
DRIC Plaza on-ramp to Clark on-ramp			D	D	D		C	C	C	D	C
DRIC Plaza on-ramp to Grand Blvd. off-ramp						C					
Clark on-ramp to Grand Blvd. off-ramp	D	C	C	C	C		C	C	C	C	C
Grand Blvd. off-ramp to WB I-96 off-ramp	D	C	C	C	C	C	C	C	C	C	C
Southbound I-75 Freeway Segments											
EB I-96 on-ramp to Clark off-ramp	B										
Ambassador Bridge on-ramp to Grand Blvd. on-ramp		C	B	B	B	B	B	B	B	B	B
Grand Blvd. on-ramp to Clark off-ramp		C	B	B	B	B	A	A	A	B	B
Clark off-ramp to Clark on-ramp	B	B									
Clark off-ramp to DRIC Plaza off-ramp			B	B	B	B	B	A	B	B	B
Clark on-ramp to Dragoon off-ramp	B	B									
DRIC Plaza off-ramp to Junction off-ramp			B				B				
DRIC Plaza off-ramp to Junction on-ramp				B		B		B			B
DRIC Plaza off-ramp to Dragoon off-ramp					B				B		
DRIC Plaza off-ramp to DRIC Plaza on-ramp										B	
Dragoon off-ramp to Livernois on-ramp	B	B			A				A		
Junction off-ramp to Livernois on-ramp			A				A				
Junction on-ramp to Livernois off-ramp				A				A			
Junction on-ramp to Dragoon off-ramp						B					
Junction on-ramp to DRIC Plaza on -ramp											A
Livernois on-ramp to Springwells off-ramp	B	B									
Livernois on-ramp to DRIC Plaza on-ramp			B		B		B	B	B		
Livernois off-ramp to DRIC Plaza on-ramp				B							
Dragoon off-ramp to DRIC Plaza on-ramp						B					
DRIC Plaza on-ramp to Springwells off-ramp										B	B
Springwells off-ramp to Springwells on-ramp	B	B								B	B
DRIC Plaza on-ramp to Springwells on-ramp			B	B	B	B	B	B	B		
Springwells on-ramp to Dearborn on-ramp	B	B	B	B	B	B	B	B	B	B	B

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

Table S-3B
Detroit River International Crossing Study
AM Peak Hour Levels of Service – HCS Analysis
I-75 Merge/Diverge Areas and Weaving Segments

FREEWAYS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Northbound I-75 Ramp Merge and Diverge Areas											
Dearborn off-ramp	D	D	C	C	C	C	C	C	C	C	C
Springwells off-ramp	C	C	C	C	C	C	C	C	C	C	C
Springwells on-ramp	C	C								C	B
DRIC Plaza off-ramp			A	A	A	A	A	A	A	A	A
Livernois off-ramp	C	C	B		B		B		B		
Livernois on-ramp				C				C			
Dragoon off-ramp											C
Dragoon on-ramp	C	C	C		C	B	C		C		
Junction off-ramp				B		C		B			
Clark off-ramp	C	C									
Clark on-ramp	B	B	C	C	C		C	C	C	C	C
Grand Blvd. off-ramp	C	C	C	C	C	B	C	C	C	C	C
Southbound I-75 Ramp Merge and Diverge Areas											
Service Drive on-ramp (E. of Grand Blvd.)	B	B	B	B	B	B	B	B	B	B	B
Clark off-ramp	B	B	B	C	B		B	B	B	C	C
Clark on-ramp	B	B									
DRIC Plaza off-ramp			A	A	A	A	A	A	A	A	A
Junction off-ramp			B				B				
Junction on-ramp				B		B		B			A
Dragoon off-ramp	B	B			B	B			B		
Livernois off-ramp				B				B			
Livernois on-ramp	B	B	B		A		B		B		
Springwells off-ramp	B	B								B	B
Springwells on-ramp	B	B	B	B	B	B	B	B	B	B	B
Dearborn on-ramp	A	B	B	B	B	B	B	B	B	B	B
Northbound I-75 Weaving Segments											
Springwells on-ramp to DRIC Plaza off-ramp										C	C
Livernois on-ramp to Junction off-ramp				C				C			
Dragoon on-ramp to Junction off-ramp						C					
Clark on-ramp to Grand Blvd. off-ramp	C	C	C	C	C		C	C	C	C	C
Southbound I-75 Weaving Segments											
Ambassador Bridge on-ramp to Clark off-ramp	B	B	B	B	B		B	B	B	B	B
Junction on-ramp to Dragoon off-ramp						B					
Junction on-ramp to Livernois off-ramp				B				B			
DRIC Plaza on-ramp to Springwells off-ramp										B	B

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

Table S-3C
Detroit River International Crossing Study
AM Peak Hour Levels of Service – VISSIM Analysis
Local Intersections

LOCAL INTERSECTIONS	BASE YEAR (2006)	NO BUILD (2035)	BUILD ALTERNATIVES (2035)								
			#1	#2	#3	#5	#7	#9	#11	#14	#16
Fort at Westend	A	B	A	B	A	A	B	B	A	A	B
Fort at Green	A	A	A	A	A	A	A	A	A	A	A
Fort at Waterman	B	B	A	A	A	A	A	A	A	A	A
Fort at Livernois	B	B	B	B	A	A	B	B	A	B	B
Fort at Dragoon	A	A	A	A	A	B	A	A	B	A	A
Fort at Junction	A	A	A	A	B	B	A	A	B	A	A
Fort at Clark	B	B	B	B	B	B	B	B	B	B	B
Southbound Service Drive at Livernois	A	A	A	A	A	A	A	A	A	A	A
Southbound Service Drive at Dragoon	B	B	A	B	A	A	A	B	A	A	B
Southbound Service Drive at Waterman					B				B		
Northbound Service Drive at Livernois	B	B	A	B	A	A	A	B	A	A	B
Northbound Service Drive at Dragoon	A	A	A	B	A	A	A	B	A	A	B
Southbound Service Drive at Springwells	B	B	B	B	B	B	B	B	B	B	B
Northbound Service Drive at Westend	B	B	B	B	B	B	B	B	B	C	B
Northbound Service Drive at Clark	B	B	A	B	B	B	A	B	B	B	B
Southbound Service Drive at Clark	B	B	B	B	B	A	B	B	B	C	C
Fort at Grand Blvd.	A	A	A	A	A	A	A	A	A	A	A
Northbound Service Drive at Grand Blvd.	B	B	B	B	B	B	B	B	B	B	B
Southbound Service Drive at Grand Blvd.	A	A	A	A	A	A	A	A	A	A	A
Fort at Post	A	A	A	A	A	A	A	A	A	A	A

Legend: LOS Degraded from No Build (2035), LOS Improved from No Build (2035), No Change in LOS from No Build (2035)
Source: Parsons Transportation Group

1. 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 study proposes solutions that support the region, state, provincial and national economies while addressing civil and national defense and homeland security needs of the busiest trade corridor between the United States and Canada (Figure 1-1).

Figure 1-1
Detroit River International Crossing Study
Existing Detroit River International Crossings

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.

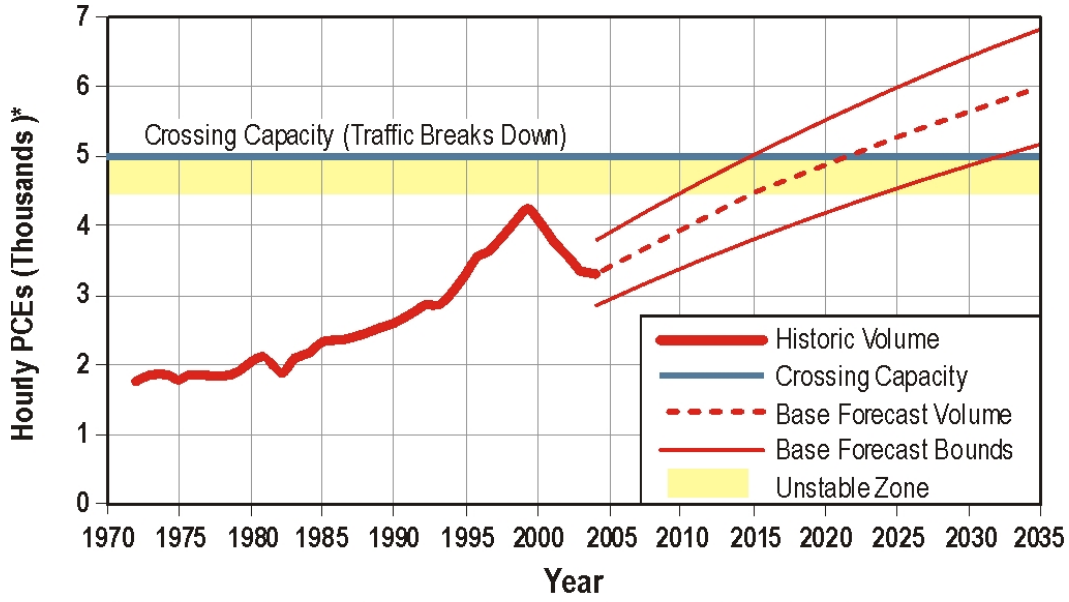
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements (i.e., at least 30 years) across the Canada-U.S. 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; and,
- Provide reasonable and secure crossing options in the event of incidents, maintenance, congestion, or other disruptions.

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 2033 (Figure 1-2). 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 1-2
Detroit River International Crossing Study
Travel Demand vs. Capacity:
Combined Detroit River Crossings



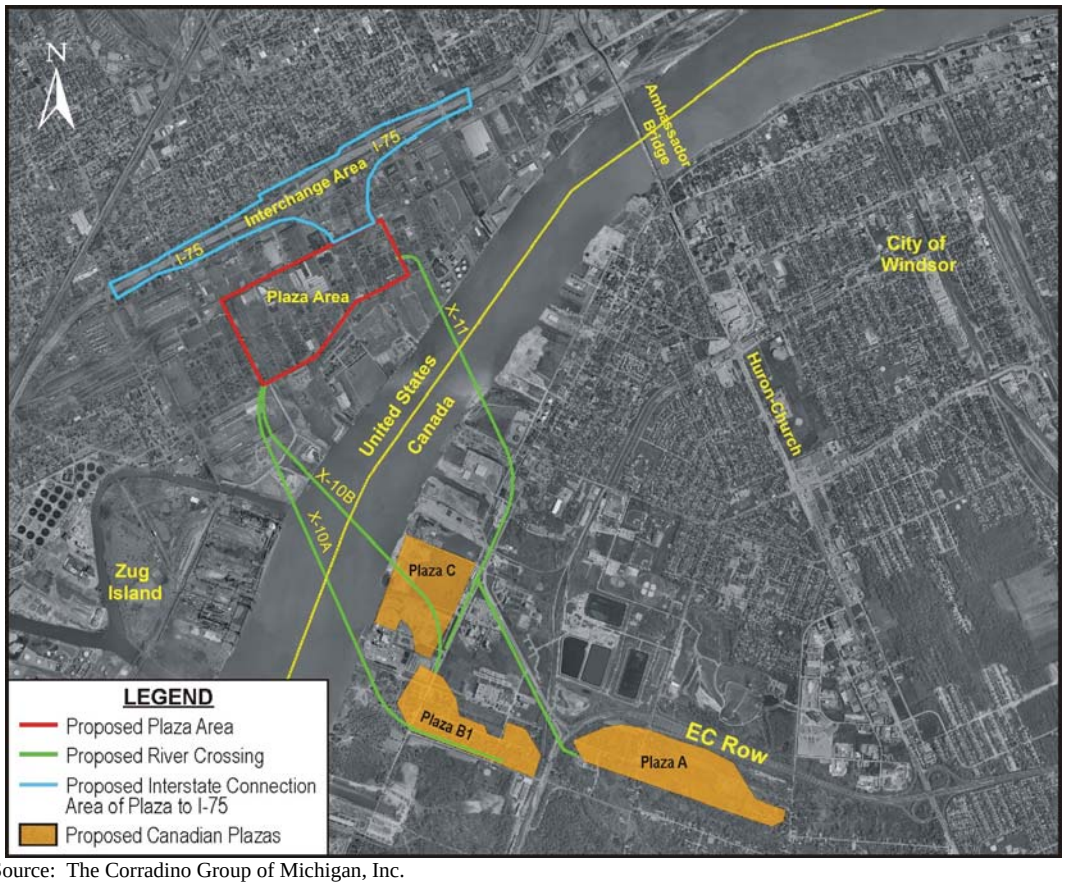
* PCE = Passenger Car Equivalents (i.e. trucks are converted to an equivalent number of cars)
Source: IBI Group
Preliminary - for Discussion Purposes Only

The forecast of capacity indicates that there will be inadequacies in: 1) the roads leading to the existing bridge and tunnel; 2) the ability to process vehicles through customs and immigration; and, 3) the capacities (number of lanes) of the Ambassador Bridge and Detroit-Windsor Tunnel themselves. So, even though incremental adjustments can and will be made to the plazas and, even though there is adequate border crossing capacity today (bridge and tunnel combined), the planning, design and construction of any major international crossing takes time. Therefore, it is

prudent to address, now, how and when the capacity need is to be satisfied at the crossing itself as well as the connecting roads.

The DRIC Draft Environmental Impact Statement (DEIS) analyzes issues/impacts on the U.S. side of the border for the crossing system over the Detroit River between Detroit, Michigan, and Windsor, Ontario, Canada. The alternatives are comprised of three components: the crossing, plaza (where tolls are collected and Customs inspections take place), and interchange connecting the plaza to I-75 (Figure 1-3). Nine Practical Alternatives exist in the U.S. These options are listed on Table 1-1 and schematically presented in Figures 1-4 and 1-5.

Figure 1-3
Detroit River International Crossing Study
U.S. Area of Analysis for Crossing System



Source: The Corradino Group of Michigan, Inc.

Table 1-1
Detroit River International Crossing Study
Crossing System Alternatives Included in DRIC DEIS

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.

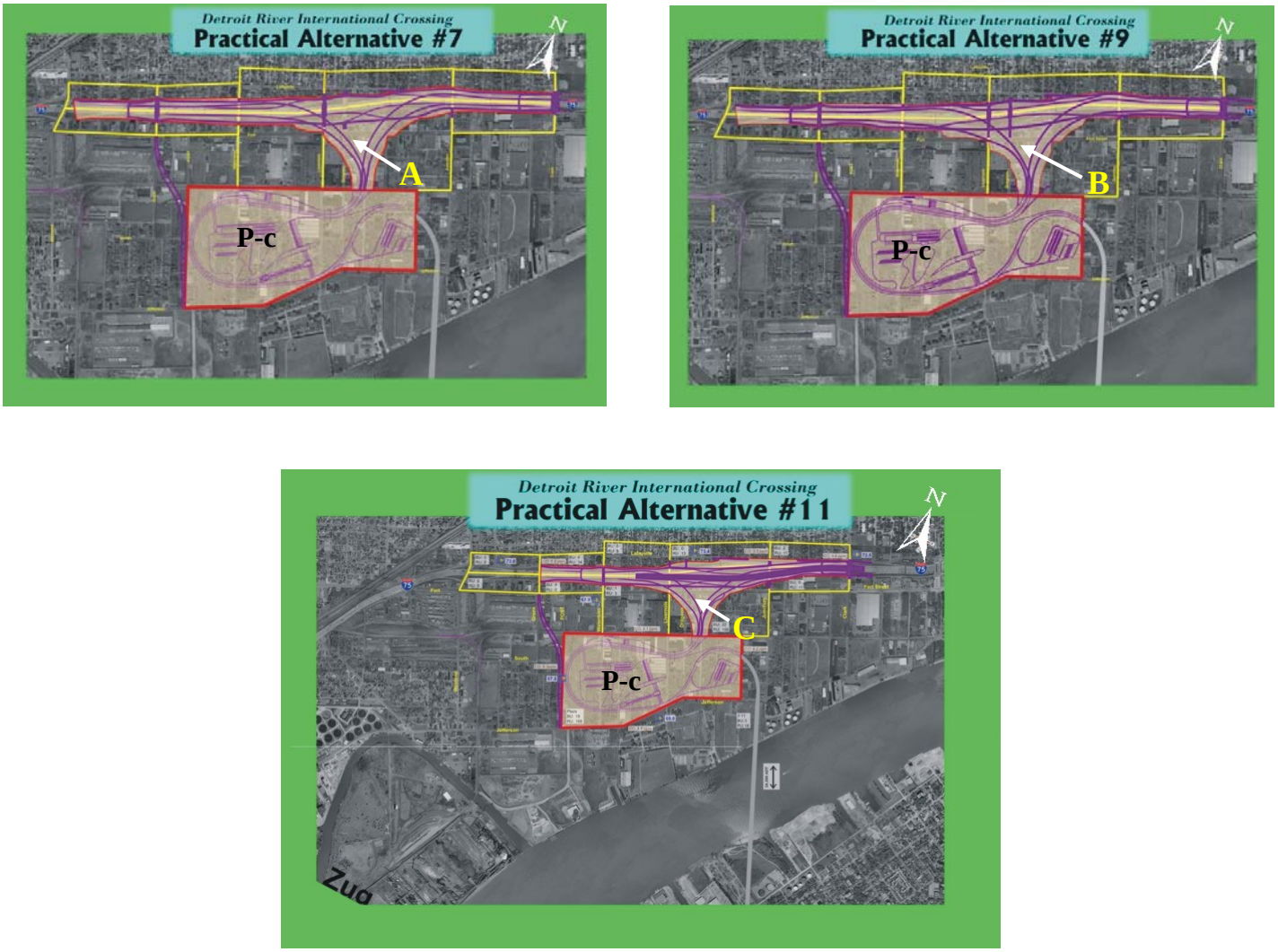
1.1 Purpose of the Report

The purpose of this report is to document the applications and results of the *Highway Capacity Software (HCS)* and *VISSIM* modeling software used to evaluate the potential traffic impacts on the U.S. side of the border for the proposed DRIC system. The traffic analyses were conducted for Base Year 2006 peak hour conditions with the Ambassador Bridge Gateway Project in place, the 2035 No Build traffic conditions and 2035 conditions of nine DRIC alternatives: Alternatives #1, #2, #3, #5, #7, #9, #11, #14 and #16. The DRIC alternatives are comprised of various interchange and ramp configurations connecting I-75 to the plaza and changes to the connections to the adjacent local street system. Input to the analyses includes MDOT traffic counts, counts made for the purposes of this study and SEMCOG Travel Demand Model 2035 forecasts for the study area. Based on the traffic volumes determined for the Base Year 2006 and future 2035 forecasts, capacity analyses were conducted for three peak-hours (AM, Midday, and PM) for the 2006 Base Year, 2035 No Build Condition and DRIC alternatives. 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.

Figure 1-4
Detroit River International Crossing Study
Schematic Representation
of
X-10 Crossing Alternatives #1, #2, #3, #5, #14 and #16

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

Figure 1-5
Detroit River International Crossing Study
Schematic Representation
of
X-11 Crossing Alternatives #7, #9, and #11



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

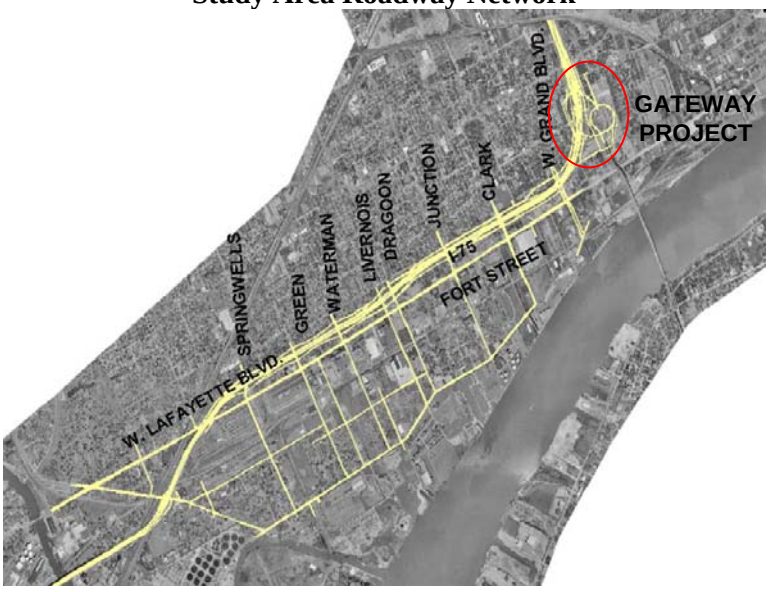
2. TRAFFIC ANALYSIS PROCEDURES

This report section documents the capacity analysis of existing and future traffic conditions within the Detroit River International Crossing (DRIC) study area. The evaluation of freeway operations was performed using both the *Highway Capacity Manual Software (HCS2000)* and the results obtained from the VISSIM models, while the local intersections were evaluated only based on the results obtained from the VISSIM models developed for this project. VISSIM is a state-of-the-art microscopic, time-step and behavior-based software for analyzing the full range of functionally-classified roadways, intersection types, vehicle populations, and transit operations. VISSIM simulates individual vehicles traveling through the network that interact with each other, with the roadway geometry, and with traffic control devices. VISSIM analyzes the entire freeway and arterial roadway system interacting and operating together in real time, rather than analyzing individual components separately. Both HCS and VISSIM utilize the standard methodology described in the *2000 Highway Capacity Manual (HCM2000)*. The analyses of 2006 traffic conditions were conducted to calibrate the VISSIM microsimulation model and to provide a baseline for comparison with future No Build conditions and Build conditions.

The study area roadway network includes ten miles of freeway, two miles of service drives, and 14 miles of arterial roads (Figure 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 2-1 also shows the new layout of the Ambassador 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 Build scenarios.

Figure 2-1
Study Area Roadway Network



2.1 Methodology

This section describes the methodology used in the data collection, model calibration, future volume projections, Highway Capacity Analyses (using HCS and VISSIM) and the VISSIM microsimulation modeling.

2.1.1 Traffic Data

Data Collection

The data collected for conducting the capacity analyses and creating the VISSIM models included aerial images, lane assignment surveys, ramp gradients, traffic signal timing, traffic volumes, origin-destination data, and field observations of traffic operations.

In early 2006, traffic volumes were counted at all intersections along the I-75 service drives and at the local street intersections within the study area. In addition, 2006 traffic counts were conducted at select locations along the mainline freeway system. These counts may be found in Appendix A. The counts provided peak hour traffic volumes for the AM peak hour (7 to 8 AM), the midday peak hour (12 to 1 PM), and the PM peak hour (4 to 5 PM). In addition, the counts distinguished between passenger cars and trucks (heavy vehicles), so the analyses using the *HCS* and *VISSIM* included the specific movement of trucks within the overall traffic streams.

While traffic counts were not collected on every segment of the freeway system, the data from a previous study of the Ambassador Bridge Gateway Project were obtained, which included 2004 traffic counts along the freeway and ramp system. Using the 2006 count locations that coincided with several of the 2004 count locations, the 2004 volumes were projected to a base year 2006 for purposes of developing the Base Year (2006) without Gateway traffic conditions. The volume diagrams for the Base Year (2006) without Gateway may be found in Appendix A.

Origin-destination data for vehicles departing from and bound for the Ambassador Bridge were collected by Skycomp Inc. by flying aircraft over the study area. Through a sequence of aerial photographs, Skycomp was able to track vehicles as they departed from the Ambassador Bridge plaza and determine whether they were bound for Fort Street, southbound I-75, northbound I-75, westbound I-96, etc. Data were collected for cars and trucks separately to determine the percentage of cars and trucks bound for the various highway facilities, as well as the percentage of cars and trucks arriving at the Ambassador Bridge from the various highways.

The gradients of the various ramps in the study area were obtained from as-built plans and coded into the *HCS* and *VISSIM* models so that traffic would be realistically affected by grade changes (especially trucks climbing grades).

Finally, travel time runs were conducted in September 2006 along the freeway system and along Fort Street during each of the three peak hours (AM, Midday, and PM). The average travel time collected in the field on successive segments of the network were summarized for comparison with the output of the VISSIM model to ensure that simulated vehicles have the correct speed and that traffic control devices have a realistic effect on traffic flow. The collected travel times may be found in Appendix A.

Base Year (2006) Traffic Volume Projections

Because the Gateway Project will be completed by 2009, the existing conditions scenario was adjusted to include it for purposes of providing a common baseline for comparison. Using the Skycomp data, the existing traffic volumes were redistributed through the new proposed Gateway ramp system to and from I-75 and I-96. The most significant change in traffic volumes occur where new truck ramps from the Ambassador Bridge Gateway Plaza allow trucks to directly access southbound I-75 and northbound I-96, rather than using Fort Street to access the freeway system at the Clark Street interchange and elsewhere. Traffic volumes remain unchanged in the study area west of Clark Street and north of Michigan Avenue (except that some trucks bound for northbound I-75 were assumed to take an alternate route to I-75 via northbound I-96). The result was a Base Year (2006) traffic condition that included the same freeway ramp system that would exist in the future No Build scenario and aided in the creation of the No Build scenario that incorporates traffic projections for the year 2035. The Base Year (2006) volume diagrams are in Appendix A.

Future (2035) Traffic Volume Projections

The SEMCOG travel demand model (TDM) was used as a basis for developing future 2035 detailed traffic volumes for the freeway and ramp system. Detailed analysis-level traffic volumes are not typically derived directly from the TDM, but rather from the relative differences (increases or decreases) in volumes between a Base model and a Future model. Thus, in order to derive the traffic volumes for the No Build (2035) scenario, the difference between the Existing Conditions TDM and the No Build (2035) TDM were calculated and added to the Base Year (2006) volumes. In this case, the volumes in the 2004 Base TDM were adjusted to an effective 2006 Base TDM set of volumes, and then compared to the 2035 No Build TDM. Due to the projected decline in many areas of Detroit in terms of population and employment, there were some instances where the relative difference produced a decline in volume that was greater than the Base Year (2006) volume; thus, it would produce a negative future volume. In those instances, a percentage difference was used instead for the particular ramp or freeway segment. Upon development of the No Build (2035) volumes, the freeway volumes were balanced by adding or subtracting the ramp volumes to the relevant freeway segments. The final step to completing the development of No Build (2035) volumes was to proportionately distribute the change in traffic volumes onto the surface streets based on the turning movement patterns present in the Base Year (2006) volumes. The No Build (2035) volume diagrams are in Appendix A.

A similar process was used to develop of the various alternatives. DRIC Alternatives #2, #5 and #9, the projected traffic volumes were derived by taking the 2035 TDM differences between the No Build and the specific DRIC alternatives and adding them to the No Build (2035) volumes. Because the ramp locations differ between the No Build and Build alternatives, the ramp volumes were manually redistributed based on apparent origin-destination patterns from the Base Year (2006) counts. Then, the freeway segments were rebalanced to account for ramp changes. Finally, the turning movements on the surface streets were distributed proportionately.

Although most traffic to and from the new plaza would directly access the I-75 freeway system, it was recognized that some traffic may have origins or destinations within the immediate vicinity of the plaza; however, the TDM was not refined to that level of detail. Thus, for purposes of accounting for this traffic, it was assumed that one percent of the traffic entering and exiting the new plaza would do so via the Plaza connections to local streets.

The construction of the new plaza would result in the removal of local businesses and homes. In order to be conservative, no reduction of the existing traffic in the study area was considered for the purpose of the analyses.

Finally, the traffic used in this report is based on a technique that assigns traffic, to the greatest extent practical, to the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

2.1.2 Highway Capacity Analysis

2.1.2.1 Freeway Operations

The Level of Service (LOS) was determined and assigned to each freeway segment based upon density criteria established in the *Highway Capacity Manual* (HCM). These criteria are summarized in Table 2-1. Levels of Service are determined based on the number of passenger cars per mile per lane (pc/mi/ln). *HCS* converts heavy vehicles into passenger cars based upon the inputs of proportion of heavy vehicles in the traffic stream and the severity of upgrade or downgrade. Level of Service D, or better, is typically considered acceptable in urban areas.

Table 2-1
Detroit River International Crossing Study
Level of Service Criteria for Freeway Segments

Level of Service (LOS)	Density (pc/mi/ln)	Description
A	$\leq$11	Free-flow operations.
B	> 11 and $\leq$ 18	Reasonably free-flow operations; freedom to maneuver within the traffic stream is only slightly restricted.
C	> 18 and $\leq$ 26	Freedom to maneuver within the traffic stream is noticeably restricted; minor incidents may still be absorbed.
D	> 26 and $\leq$ 35	Speeds begin to decline. Freedom to maneuver within the traffic stream is limited; even minor incidents will cause queuing.
E	> 35 and $\leq$ 45	Operating at capacity. Vehicles are closely spaced with little room to maneuver within the traffic stream; any disruption will cause queuing.
F	> 45	Breakdown in traffic flow. Queues form on the freeway.

Source: HCM 2000

Like freeway segments, Levels of Service for typical merge and diverge influence areas (one lane on/off ramps) and weaving segments were determined based upon density criteria established in the *Highway Capacity Manual*. The LOS criteria for ramp merge and diverge areas are summarized in Table 2-2, with the criteria for weaving segments summarized in Table 2-3. Again, the Levels of Service were determined based on the number of passenger cars per mile per

lane (pc/mi/ln) so that a common base is presented for comparison purposes. While HCS converts heavy vehicles into passenger car equivalents based upon the inputs of the proportion of heavy vehicles in the traffic stream, and the severity of upgrade or downgrade, the individual ramp grades were input into HCS for ramp merge/diverge areas. For diverge areas with long deceleration lanes, the HCS density results may be negative due to the nature of the density equation. This is especially true for the proposed two-lane plaza off ramps. Where a negative value is the result of the calculation, it has been suppressed for reporting purposes and left as a "blank" in the tables.

Table 2-2
Detroit River International Crossing Study
Level of Service Criteria for Ramp Merge and Diverge Areas

Level of Service (LOS)	Density (pc/mi/ln)	Description
A	≤10	Unrestricted operations.
B	> 10 and ≤ 20	Merging and diverging maneuvers become noticeable to through drivers; merging drivers must adjust speeds to transition smoothly.
C	> 20 and ≤ 28	Speeds begin to decline within the influence area. Both ramp and freeway vehicles begin to adjust their speeds to transition smoothly.
D	> 28 and ≤ 35	Freeway operation remains stable. All vehicles slow to accommodate merging and diverging; some ramp queues may form.
E	> 35	Approaching capacity. Speeds reduce significantly; small changes in demand or disruptions can cause both ramp and freeway queues to form.
F	Demand exceeds capacity	Breakdown in traffic flow. Queues form on both the ramp and freeway.

Source: HCM 2000

Table 2-3
Detroit River International Crossing Study
Level of Service Criteria for Weaving Segments

Level of Service (LOS)	Density (pc/mi/ln)	Description
A	≤10	Free-flow operations.
B	> 10 and ≤ 20	Reasonably free-flow operations; freedom to maneuver within the traffic stream is only slightly restricted.
C	> 20 and ≤ 28	Freedom to maneuver within the traffic stream is noticeably restricted; minor incidents may still be absorbed.
D	> 28 and ≤ 35	Speeds begin to decline. Freedom to maneuver within the traffic stream is limited; even minor incidents will cause queuing.
E	> 35 and ≤ 43	Operating at capacity. Vehicles are closely spaced with little room to maneuver within the traffic stream; any disruption will cause queuing.
F	> 43	Breakdown in traffic flow. Queues form on both the ramps and freeway.

Source: HCM 2000

Two-lane on ramps with a single-lane addition to the freeway were analyzed as major merge areas which cannot be analyzed as straightforward as typical merges with a one-lane on ramp. Therefore, the *Highway Capacity Manual* provides a set of traffic flow values to compare with the actual capacities on the approaching legs and the departing freeway. These values are displayed in Table 2-4. If the merge area does not exceed the maximum applicable flows, the major merge area is said to be operating at an acceptable Level of Service.

Table 2-4
Detroit River International Crossing Study
Capacity Values for Merge Areas

Freeway Free-Flow Speed (mph)	Maximum Downstream Freeway Flow, v (pc/h) Number of Lanes in One Direction				Max Desirable Flow Entering Influence Area, v_{R12} (pc/h)
	2	3	4	>4	
≥ 70	4800	7200	9600	2400/ln	4600
65	4700	7050	9400	2350/ln	4600
60	4600	6900	9200	2300/ln	4600
55	4500	6750	9000	2250/ln	4600

Source: HCM 2000

The projected traffic flow values that were compared with the capacity values for two-lane on ramp merge areas in Table 2-4 were calculated using the following equations:

$v = v_F + v_R$ = downstream freeway flow (pc/h)
$v_{R12} = v_{12} + v_R$ = flow entering the influence area (pc/h);

Where:

v_F = freeway demand flow immediately upstream of merge (pc/h)
v_R = on-ramp demand flow (pc/h)
$v_{12} = v_F * P_{FM}$ (pc/h)
P_{FM} = proportion of approaching freeway flow remaining in Lanes 1 and 2 immediately upstream of merge (0.209 for 2-lane on-ramps)

2.1.2.2 Local Intersections

For each peak hour analyzed, the delay experienced by each traffic movement and approach at every intersection in the *VISSIM* model has been determined. For signalized intersections, a Level of Service was determined for each approach, and for the intersection as a whole. These Levels of Service are based upon the criteria established in the *Highway Capacity Manual*, which are summarized in Table 2-5. Level of Service D is typically considered to be the minimum acceptable design Level of Service in urban areas for signalized intersections.

Table 2-5
Detroit River International Crossing Study
Level of Service Criteria for Signalized Intersections

Level of Service (LOS)	Average Total Delay (sec/veh)	Description
A	≤10	Very low delay; most vehicles do not stop at all.
B	> 10 and ≤ 20	More vehicles stop than with LOS A, increasing the average delay.
C	> 20 and ≤ 35	The number of vehicles stopping is significant; however, many still pass through the intersection without stopping.
D	> 35 and ≤ 55	Congestion is readily apparent with many vehicles stopping and individual cycle failures are noticeable (i.e., not all vehicles waiting in the intersection queue are able to get through the intersection on the first green indication).
E	> 55 and ≤ 80	Poor progression; long cycle lengths and frequent cycle failures.
F	> 80	Unacceptable operations, which include many cycle failures caused by arrival flow rates exceeding intersection capacity.

Source: HCM 2000

2.1.3 VISSIM Microsimulation

VISSIM produces output in two ways: (1) statistical data and reports that define measures of effectiveness (MOEs); and, (2) graphical animation. The first includes text-based data that contain MOEs such as travel time, delay, stops, queue lengths, speed, and flow density. VISSIM can produce these very detailed results for any location within the modeled network over any time interval.

VISSIM's graphical animation allows the user to view traffic control operations, traffic interactions, and congestion levels on the simulated roadways to verify that the model is replicating conditions realistically. VISSIM produces both 2-D and 3-D animations from "multiple camera" perspectives. These animations can be viewed in the VISSIM software or exported to the AVI format which can be played on any Windows-based computer.

Error Checking

Before calibration began, the accuracy of the input coding was verified through error checking. After one modeler coded an aspect of the simulation model, another modeler manually checked the coding to ensure that all elements of an individual aspect of the model (roadway geometry, interchange ramp grades, lane assignments, traffic control, speed zones, traffic distributions, input volumes, traffic "sources and sinks," etc.) were coded correctly.

Roadway geometry is the easiest element to check visually on the computer screen, as are certain other elements that control traffic behavior. The checker puts VISSIM into successive modes which highlight each type of element so it can easily be seen if any are missing or miscoded. For example, "Yield Point" mode is used to check the placement of yield points that create realistic traffic operations at each intersection; "Speed Zone" mode is used to ensure right and left-turn movements have the proper speeds coded; and "Stop Sign" and "Traffic Signal" modes are used to ensure all traffic control devices have been coded in the correct location.

Typically, the most common errors occur during coding of the complex traffic routing decisions in the VISSIM model. This is especially likely for this project where separate routing decisions for passenger cars and trucks were coded throughout the model. In addition, more effort is involved in checking traffic routing decisions because the beginning and end points of each route (which are in multiple directions) need to be selected individually to display the route and the coded volume. Therefore, checking of the traffic volume routing decisions goes through a more involved checking process (and is verified again later in the calibration process).

Detailed quality control records were kept while checking the traffic volumes in the model. Specifically, a copy of the input sheets showing the volumes at each junction was marked as the checker verifies each movement. Any complex, overlapping routing decisions (used to create realistic weaving situations) were drawn by the initial modeler on the traffic volume input sheets. The checker first verified that the overlapping routes will result in the proper volumes at each junction and then verified the coding in the model. Any traffic volume errors found were corrected and noted on the quality control sheets. The original modeler then reviewed each correction to ensure that all modelers agree on the coding of the routing decisions.

The next phase of error checking involved running the simulation and observing the animation. At this stage, the animation was reviewed to ensure that traffic was behaving realistically and that all forms of traffic control were operating as defined. The traffic flow was observed on every link to determine any unrealistic behavior or coding flaw. The operation of all traffic signals was observed for several cycles to ensure the model performed correctly. Unrealistic traffic or traffic control behavior led to more detailed checking of the coding of those elements and corrections, where needed.

2.1.3.1 Calibration Methodology

Once the error checking/correcting was complete, the model was calibrated to ensure that it properly replicated traffic conditions specific to the location being simulated. Calibration involves the following steps:

Capacity Comparison

The first step in the calibration process is to compare the capacity (the saturation flow rate) being simulated by the model with the capacity that is experienced in the field. However, most roads in the study area do not experience sufficient congestion during the peak periods to allow the measurement of capacity according to the procedures defined in the Highway Capacity Manual, which would require locations where a sufficient number of vehicles are consistently queued behind a traffic signal or freeway bottleneck. Therefore, a capacity comparison was not possible. So, the default VISSIM software parameters for capacity were used. They have been validated as being representative of average traffic operations in the United States. Although the model uses a default global capacity, the capacity of certain individual links was fine-tuned later in the calibration process.

Volume Comparison

Once coding of the traffic routing decisions has been checked, they must be verified to ensure the model properly simulates them. Data collection points coded within the simulation model allow VISSIM to report the traffic volume that passed through every movement at every intersection, through every ramp on the freeway system, and through any point in the model defined by the modeler. This output was imported to a spreadsheet and compared to the volumes that were

coded in the model to determine how close the throughput of each data collection point matched the inputs. Due to the nature of microscopic simulation, the traffic volumes are not the same for each simulation run, and will not match the inputs exactly. Therefore, a statistical comparison was made to determine if any throughputs in the model were deviating significantly from the traffic volume inputs by use of the GEH Statistic.

The GEH Statistic is a self-scaling formula that provides an acceptance threshold of traffic volumes. Appendix B provides a detailed description of the GEH Statistic. For an acceptable calibration, a GEH Statistic of less than five should be realized on at least 85 percent of the links in the model. Any GEH values greater than five were investigated to ensure that coding errors, if found, were corrected.

Under Base Year (2006) without Gateway conditions, each peak-hour model was run five times and the resultant traffic volume throughputs were averaged for comparison with the traffic volume inputs that were coded in the model. In each case, a few of the GEH Statistics were greater than five. Each of these errors was corrected, the model was rerun five times, and the results averaged again for comparison. By repeating this process iteratively for each peak-hour model, all instances of a GEH Statistic greater than five were eliminated. Therefore, each peak-hour model was successfully calibrated for traffic volumes. The detailed final comparison of traffic volume inputs and throughputs is also included in Appendix B.

Travel Time/Speed Comparison

For the next stage of the calibration, the average travel time reported by VISSIM on various links was compared with the travel time runs conducted in the field to ensure that simulated vehicles have the correct speed and that traffic control devices have a realistic effect on traffic flow. This is an important calibration step as there is no input value for travel time, but, instead, it is the result of the collective effect that various elements of the model have on traffic processed by the model. As such, it is a very useful test in determining whether a model produces realistic traffic conditions.

As mentioned previously, travel time runs were conducted in September 2006 along I-75, I-96, and Fort Street during each of the three peak-hour periods (AM, Midday, and PM). Each route was subdivided into successive segments so that localized variances in travel time could be detected, as well as comparing the total travel time from one end of the study area to the other. Along the freeway, travel times were recorded between easily-identifiable bridge and ramp locations. Along Fort Street, travel times were recorded between cross streets. Data points were coded in the VISSIM model at which to collect travel times for through vehicles over the same segments, as well as from one end of the study area to the other.

Multiple floating-car travel time runs were conducted during each peak hour and the average travel times collected on successive segments of the network were summarized for comparison with the output of the VISSIM model. Due to the nature of microscopic simulation, each peak hour VISSIM model was run five times and the travel times collected for each segment were averaged for comparison. To address the wide variability in travel time that can occur, especially on an arterial street with traffic signals, no specific threshold for an acceptable comparison on individual segments was established. Instead, the pattern of differences was used to determine if a significant deviation from existing conditions was occurring. For example, along a signalized arterial, if one segment has a travel time 20 percent lower than the field data, but the next segment has a travel time 20 percent greater than the field data, the overall travel time is considered correct, but there might be a signal timing difference in the model versus field conditions.

Similarly, if the travel time within a segment of the freeway deviated significantly from the field data, the weaving maneuvers within that segment may need to be adjusted.

Through this process of comparing individual travel time segments, one error in the coding of a traffic signal offset for existing conditions was discovered and corrected. In addition, the level of congestion on I-75 just east of the study area had to be simulated with reduced speed sections to properly replicate the effect on traffic within the study area approaching that area of congestion.

While no threshold was established for individual segments, a threshold was established that the overall travel time from one end of the study area to the other not differ by more than ten percent. Therefore, if a freeway trip through the study area takes an average of five minutes (300 seconds) in the field, the average travel time realized in the VISSIM model should differ by no more than 30 seconds.

Through iterative simulation runs of each peak hour model under Base Year (2006) Without Gateway conditions, the speeds assigned to freeway and arterial traffic were adjusted slightly to bring the overall travel time within the acceptable range. A summary of the overall travel time results for each peak hour is presented in Table 2-6. Detailed, segment by segment travel time comparison results are also presented in Appendix B.

Table 2-6
Detroit River International Crossing Study
Comparison of Average Travel Times

Travel Time Section	Peak Hour	Field Value (sec)	VISSIM (sec)	Difference
NB I-75 from Dearborn Ramps to 14th Street	AM	278.6	298.2	+7%
	MD	288.8	276.2	-4%
	PM	283.4	280.3	-1%
NB I-75/I-96 from Dearborn Ramps to McGraw Street (I-94)	AM	331.6	337.1	+2%
	MD	377.7	346.3	-8%
	PM	361.4	345.7	-4%
SB I-75 from Vernor to Dearborn Ramps	AM	228.0	225.4	-1%
	MD	251.1	245.2	-2%
	PM	248.6	254.2	+2%
SB I-75/I-96 from McGraw Street (I-94) to Dearborn Ramps	AM	318.3	322.2	+1%
	MD	366.4	346.5	-5%
	PM	357.4	350.1	-2%
EB Fort Street from Lawndale to Grand Blvd.	AM	339.6	342.6	+1%
	MD	352.7	356.8	+1%
	PM	363.2	373.3	+3%
WB Fort Street from Grand Blvd. to Lawndale	AM	337.4	353.0	+5%
	MD	355.4	359.8	+1%
	PM	416.7	386.8	-7%

Source: Parsons Transportation Group

As shown in Table 2-6**,** under Base Year (2006) Without Gateway conditions, VISSIM produced overall travel times for each section within the ten percent threshold, with most being within five percent of the field value. In addition, the differences are evenly distributed with half being faster

and half being slower, showing there is no persistent bias. Based on the data collected in the field, traffic travels at slightly higher average speeds in the AM and PM peak hours (most likely due to the impact of commuters), and slightly slower during the Midday peak hour. Speeds were adjusted to reflect this pattern and the overall travel times were evenly spread within an acceptable range of difference. This shows that the model is, on average, producing realistic travel times (and therefore speeds) within the study area.

Queue/Congestion Comparison

Once the previous factors that contribute to congestion were calibrated, the congestion in the model was calibrated by running the simulation model and reviewing the animation. Instances of queuing in the model were compared with field observations (for each simulated time period) to ensure that the simulation is properly replicating field conditions. Where the magnitude of the queuing that was observed in the animation did not match that observed in the field, the iterative adjustments were made until the congestion observed in the field was replicated in the model. In this case, there is relatively little significant congestion on the area roadways in the field or in the model.

On the freeway, congestion was observed both in terms of queuing and weaving. The magnitude of any queues was compared with field observations, as was the behavior of congested weaving sections. Under Base Year (2006) Without Gateway conditions, the only major congestion on the freeway system occurs in the east end of the model in the AM peak hour (on I-75 east of I-96, and on I-94). Therefore, as described previously, the simulation model parameters were adjusted so that the model replicates congestion east of I-96, but which does not backup into the study area unrealistically.

Final Review of Animation

Once the operations of the model were calibrated through numerical comparisons and observation of congestion, animation of key areas in the model was viewed to ensure that the simulations reflect real-world operations. Examples of areas requiring special attention included the high number of trucks currently using the Clark Street interchange to access I-75, and traffic on I-75 slowing as it approaches the congestion east of the study area in the AM peak hour.

The final animation review indicated that the existing conditions model properly replicates overall traffic conditions in the field. For example, trucks do line up on westbound Fort Street as they wait to turn right on Clark Street in order to access the freeway, just as they do in the field.

Calibration Results

Based on the procedures described above, the VISSIM models of Base Year (2006) Without Gateway conditions for each peak hour were considered calibrated. These calibrated models were used to create other scenarios for further analysis of future traffic conditions and different DRIC alternatives.

The VISSIM modeling files along with the animation files in the AVI format for each condition may also be found in Appendix B.

3. TRAFFIC ANALYSIS RESULTS

3.1 Existing Conditions with Gateway (Base Year 2006)

The existing conditions were modified to incorporate the geometry and traffic flow changes that will occur due to the construction of the Gateway Project, which will be complete by 2009. The analysis of these Base Year (2006) conditions provides a baseline against which to compare the results of future No Build (2035) and Build (2035) alternatives, which will all have the Gateway Project in place. The tables found in this section summarize the results of the capacity analyses conducted for the Base Year (2006) conditions. The supporting detailed HCS results may be found in Appendix C.

3.1.1 Freeway Operations

3.1.1.1 Mainline Segments

Table 3-1 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service under Base Year (2006) conditions for each peak hour analyzed.

Table 3-1
Detroit River International Crossing Study
Base Year (2006) Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	25.6	C	12.1	B	14.9	B
From Springwells off-ramp to Springwells on-ramp	24.4	C	11.1	B	13.7	B
From Springwells on-ramp to Livernois off-ramp	27.2	D	13.2	B	16.0	B
From Livernois off-ramp to Dragoon on-ramp	26.4	D	12.4	B	15.1	B
From Dragoon on-ramp to Clark off-ramp	27.9	D	13.8	B	17.3	B
From Clark off-ramp to Clark on-ramp	26.7	D	13.2	B	16.5	B
From Clark on-ramp to Grand Blvd. off-ramp	28.5	D	14.9	B	18.7	C
From Grand Blvd. off-ramp to WB I-96 off-ramp	27.9	D	12.5	B	16.2	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Clark off-ramp	17.3	B	15.9	B	29.2	D
From Clark off-ramp to Clark on-ramp	14.6	B	13.8	B	26.4	D
From Clark on-ramp to Dragoon off-ramp	14.7	B	14.5	B	28.7	D
From Dragoon off-ramp to Livernois on-ramp	13.3	B	13.7	B	28.0	D
From Livernois on-ramp to Springwells off-ramp	14.0	B	15.3	B	29.8	D
From Springwells off-ramp to Springwells on-ramp	11.3	B	13.2	B	28.3	D
From Springwells on-ramp to Dearborn on-ramp	12.7	B	14.9	B	30.8	D

Source: HCS, Parsons Transportation Group

These results show that freeway segments within the study area operate at LOS D, or better. This corresponds with field observations of the freeway system. **Northbound I-75** from the Springwells on-ramp to the WB I-96 off-ramp in the AM peak hour, and **southbound I-75** from

the Ambassador Bridge on-ramp to the Dearborn on-ramp in the PM peak hour operate at LOS D, whereas all other segments for all other time periods operate at LOS C, or better.

3.1.1.2 Ramp Merge, Diverge and Weaving Areas

Table 3-2 summarizes the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service under Base Year (2006) conditions for each peak hour analyzed.

Table 3-2
Detroit River International Crossing Study
Base Year (2006) Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	33.4	D	19.1	B	22.4	C
Springwells off-ramp	23.4	C	12.1	B	14.5	B
Springwells on-ramp	20.7	C	12.7	B	14.5	B
Livernois off-ramp	24.2	C	12.6	B	11.5	B
Dragoon on-ramp	24.7	C	12.9	B	15.9	B
Clark off-ramp	23.0	C	11.3	B	14.2	B
Clark on-ramp	17.9	B	11.0	B	13.1	B
Grand Blvd. off-ramp	22.3	C	14.7	B	17.7	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	11.8	B	11.0	B	18.6	B
Clark off-ramp	18.0	B	16.4	B	27.8	C
Clark on-ramp	10.1	B	10.1	B	18.5	B
Dragoon off-ramp	14.4	B	14.0	B	25.8	C
Livernois on-ramp	12.0	B	13.0	B	20.8	C
Springwells off-ramp	11.7	B	12.4	B	24.4	C
Springwells on-ramp	10.4	B	11.4	B	18.1	B
Dearborn on-ramp	10.0	A	10.9	B	18.8	B

Source: HCS, Parsons Transportation Group

Except for the **northbound I-75** Dearborn off-ramp in the AM peak hour, which operates at LOS D, all other ramp merge and diverge areas operate at LOS C, or better.

Table 3-3 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service under Base Year (2006) conditions for each peak hour analyzed.

All **northbound** and **southbound I-75** weaving areas operate at LOS C, or better, during all peak periods.

3.1.2 Local Intersections

Under Base Year (2006) conditions the delay output from the *VISSIM* model for each network intersection analyzed and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-4.

Table 3-3
Detroit River International Crossing Study
Base Year (2006) Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Clark on-ramp to Grand Blvd. off-ramp	24.84	C	13.06	B	16.70	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	16.07	B	13.71	B	26.77	C

Source: HCS, Parsons Transportation Group

All of the signalized intersections analyzed within the study area operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Table 3-4
Detroit River International Crossing Study
Base Year (2006) Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Fort at Westend	9.5	A	10.8	B	10.3	B
Fort at Green	9.5	A	14.1	B	10.6	B
Fort at Waterman	11.1	B	12.9	B	9.8	A
Fort at Livernois	11.6	B	9.0	A	16.0	B
Fort at Dragoon	7.7	A	8.3	A	7.9	A
Fort at Junction	10.0	A	8.8	A	9.7	A
Fort at Clark	15.3	B	12.8	B	16.1	B
Southbound Service Drive at Livernois	5.7	A	8.3	A	8.4	A
Southbound Service Drive at Dragoon	10.2	B	11.2	B	10.3	B
Northbound Service Drive at Livernois	10.4	B	11.0	B	11.5	B
Northbound Service Drive at Dragoon	9.2	A	10.8	B	13.1	B
Southbound Service Drive at Springwells	15.7	B	13.5	B	13.6	B
Northbound Service Drive at Westend	14.8	B	16.1	B	15.9	B
Northbound Service Drive at Clark	14.4	B	15.0	B	16.7	B
Southbound Service Drive at Clark	19.0	B	15.2	B	17.6	B
Fort at Grand Blvd.	3.9	A	5.2	A	5.5	A
Northbound Service Drive at Grand Blvd.	12.4	B	12.7	B	10.4	B
Southbound Service Drive at Grand Blvd.	8.0	A	8.2	A	6.6	A
Fort at Post	0.1	A	0.0	A	0.3	A

Source: VISSIM, Parsons Transportation Group

Figure 3-1 graphically displays the level of service results for the Base Year (2006) conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

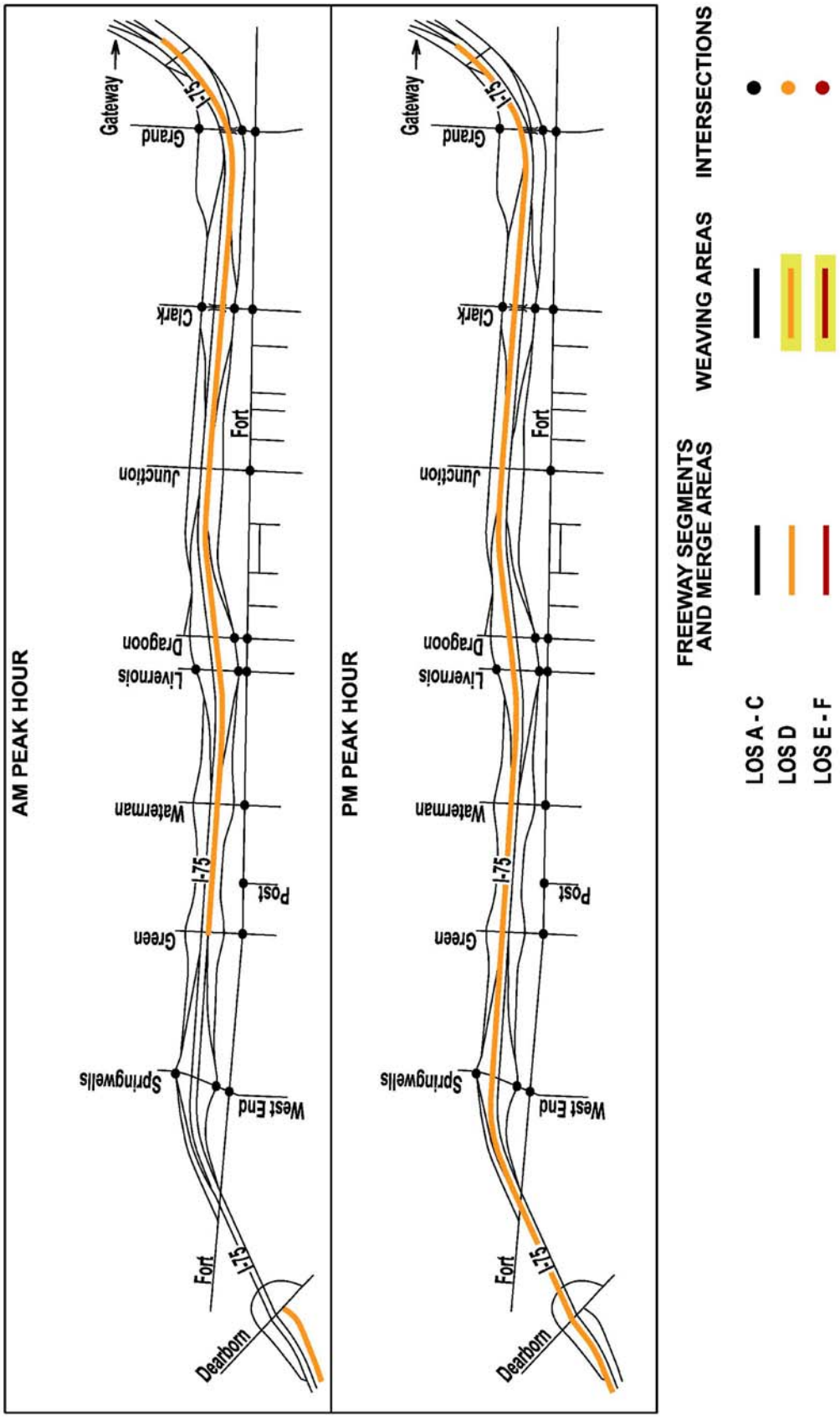


Figure 3-1
Detroit River International Crossing Study
Base Year (2006) Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

3.2 Future Conditions (2035)

3.2.1 No Build (2035) Alternative

The Base Year 2006 geometry (including the Gateway Project) was analyzed using traffic volumes projected for the year 2035 to produce a future No Build (2035) alternative. The tables found in this section summarize the results of the capacity analyses conducted for the No Build (2035) conditions. The supporting detailed HCS results may be found in Appendix D.

3.2.1.1 Freeway Operations

Mainline Segments

Table 3-5 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service under No Build (2035) conditions for each peak hour analyzed.

Table 3-5
Detroit River International Crossing Study
No Build (2035) Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	25.7	C	13.6	B	16.5	B
From Springwells off-ramp to Springwells on-ramp	24.4	C	12.6	B	15.4	B
From Springwells on-ramp to Livernois off-ramp	27.2	D	14.5	B	17.5	B
From Livernois off-ramp to Dragoon on-ramp	26.5	D	13.9	B	16.9	B
From Dragoon on-ramp to Clark off-ramp	27.4	D	15.0	B	19.1	C
From Clark off-ramp to Clark on-ramp	26.5	D	14.5	B	18.6	C
From Clark on-ramp to Grand Blvd. off-ramp	22.4	C	12.9	B	16.7	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	21.3	C	10.4	A	13.3	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	19.0	C	16.0	B	28.1	D
From Grand Blvd. on-ramp to Clark off-ramp	19.2	C	16.3	B	29.3	D
From Clark off-ramp to Clark on-ramp	17.0	B	14.5	B	27.1	D
From Clark on-ramp to Dragoon off-ramp	17.3	B	15.4	B	29.7	D
From Dragoon off-ramp to Livernois on-ramp	16.1	B	15.2	B	29.3	D
From Livernois on-ramp to Springwells off-ramp	16.7	B	16.9	B	30.6	D
From Springwells off-ramp to Springwells on-ramp	13.9	B	14.6	B	29.3	D
From Springwells on-ramp to Dearborn on-ramp	14.8	B	16.3	B	31.7	D

Source: HCS, Parsons Transportation Group

These results show that freeway segments within the study area will operate at LOS D, or better. **Northbound I-75** from the Springwells on-ramp to the Clark on-ramp in the AM peak hour, and **southbound I-75** from the Ambassador Bridge on-ramp to the Dearborn on-ramp in the PM peak

hour will operate at LOS D, whereas all other segments for all other time periods will operate at LOS C, or better.

Ramp Merge, Diverge and Weaving Areas

Table 3-6 summarizes the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service under No Build (2035) conditions for each peak hour analyzed.

Table 3-6
Detroit River International Crossing Study
No Build (2035) Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	33.4	D	20.9	C	24.1	C
Springwells off-ramp	23.4	C	13.3	B	15.8	B
Springwells on-ramp	20.7	C	13.4	B	15.2	B
Livernois off-ramp	24.1	C	13.7	B	16.2	B
Dragoon on-ramp	24.5	C	13.8	B	17.3	B
Clark off-ramp	22.6	C	12.2	B	15.6	B
Clark on-ramp	17.7	B	11.7	B	14.2	B
Grand Blvd. off-ramp	22.1	C	16.3	B	19.7	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	12.9	B	11.2	B	18.4	B
Clark off-ramp	19.3	B	16.6	B	27.7	C
Clark on-ramp	11.8	B	10.7	B	18.9	B
Dragoon off-ramp	16.5	B	14.6	B	26.5	C
Livernois on-ramp	13.5	B	13.9	B	21.4	C
Springwells off-ramp	13.9	B	13.7	B	25.1	C
Springwells on-ramp	11.1	B	11.9	B	18.5	B
Dearborn on-ramp	10.8	B	11.5	B	19.3	B

Source: HCS, Parsons Transportation Group

All ramp merge and diverge areas will operate at LOS C, or better, except for the **northbound I-75** Dearborn off-ramp in the AM peak hour which will operate at LOS D.

Table 3-7 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service under No Build (2035) conditions for each peak hour analyzed.

All weaving segments will operate at LOS C, or better, except for a LOS D in the PM peak hour for the **southbound I-75** weaving segment from the Ambassador Bridge on-ramp to the Clark Street off-ramp.

Table 3-7
Detroit River International Crossing Study
No Build (2035) Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Clark on-ramp to Grand Blvd. off-ramp	24.84	C	15.32	B	19.81	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	19.11	B	14.88	B	28.67	D

Source: HCS, Parsons Transportation Group

3.2.1.2 Local Intersections

The Levels of Service determined for the intersection as a whole are summarized in Table 3-8. Under No Build (2035) conditions, the delay output from the *VISSIM* model for each network intersection analyzed is shown.

Table 3-8
Detroit River International Crossing Study
No Build (2035) Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.4	B	10.2	B	10.0	A
Fort at Green	9.7	A	13.8	B	10.6	B
Fort at Waterman	10.9	B	12.7	B	10.1	B
Fort at Livernois	11.8	B	8.7	A	16.4	B
Fort at Dragoon	6.1	A	7.0	A	6.9	A
Fort at Junction	9.5	A	8.3	A	9.4	A
Fort at Clark	14.5	B	13.0	B	15.5	B
Southbound Service Drive at Livernois	5.9	A	9.6	A	8.8	A
Southbound Service Drive at Dragoon	10.3	B	10.3	B	10.5	B
Northbound Service Drive at Livernois	10.0	B	10.6	B	11.0	B
Northbound Service Drive at Dragoon	9.5	A	11.0	B	12.1	B
Southbound Service Drive at Springwells	13.8	B	13.0	B	12.5	B
Northbound Service Drive at Westend	14.2	B	15.4	B	16.2	B
Northbound Service Drive at Clark	12.7	B	13.3	B	13.1	B
Southbound Service Drive at Clark	16.60	B	15.6	B	17.4	B
Fort at Grand Blvd.	4.5	A	5.1	A	5.3	A
Northbound Service Drive at Grand Blvd.	11.8	B	12.5	B	9.9	A
Southbound Service Drive at Grand Blvd.	7.9	A	7.6	A	6.2	A
Fort at Post	0.1	A	0.0	A	0.4	A

Source: VISSIM, Parsons Transportation Group

All of the signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-2 graphically displays the level of service results for the No Build (2035) conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.2 Build (2035) Alternative #1

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #1 on Figure 1-4. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #1 conditions. The supporting detailed HCS results may be found in Appendix E.

3.2.2.1 Freeway Operations

Mainline Segments

Table 3-9 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service under Build (2035) Alternative #1 conditions for each peak hour analyzed.

All freeway segments will operate at LOS C, or better, except for **northbound I-75** from the Dearborn off-ramp to the Springwells off-ramp and from the DRIC Plaza on-ramp to the Clark on-ramp in the AM peak hour, and **southbound I-75** from the DRIC Plaza off-ramp to the Junction Street off-ramp, and from the Livernois on-ramp to the Dearborn on-ramp in the PM peak hour, those segments will all operate at LOS D.

Ramp Merge, Diverge and Weaving Areas

Under **Build (2035)** DRIC Alternative #1 conditions, for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized in Table 3-10 for one lane on- and off-ramps and in Table 3-11 for two lane on-ramps with an additional freeway lane.

All one lane ramp merge and diverge areas will operate at LOS C, or better, except for the **southbound** Clark off-ramp in the PM peak hour which will operate at LOS D.

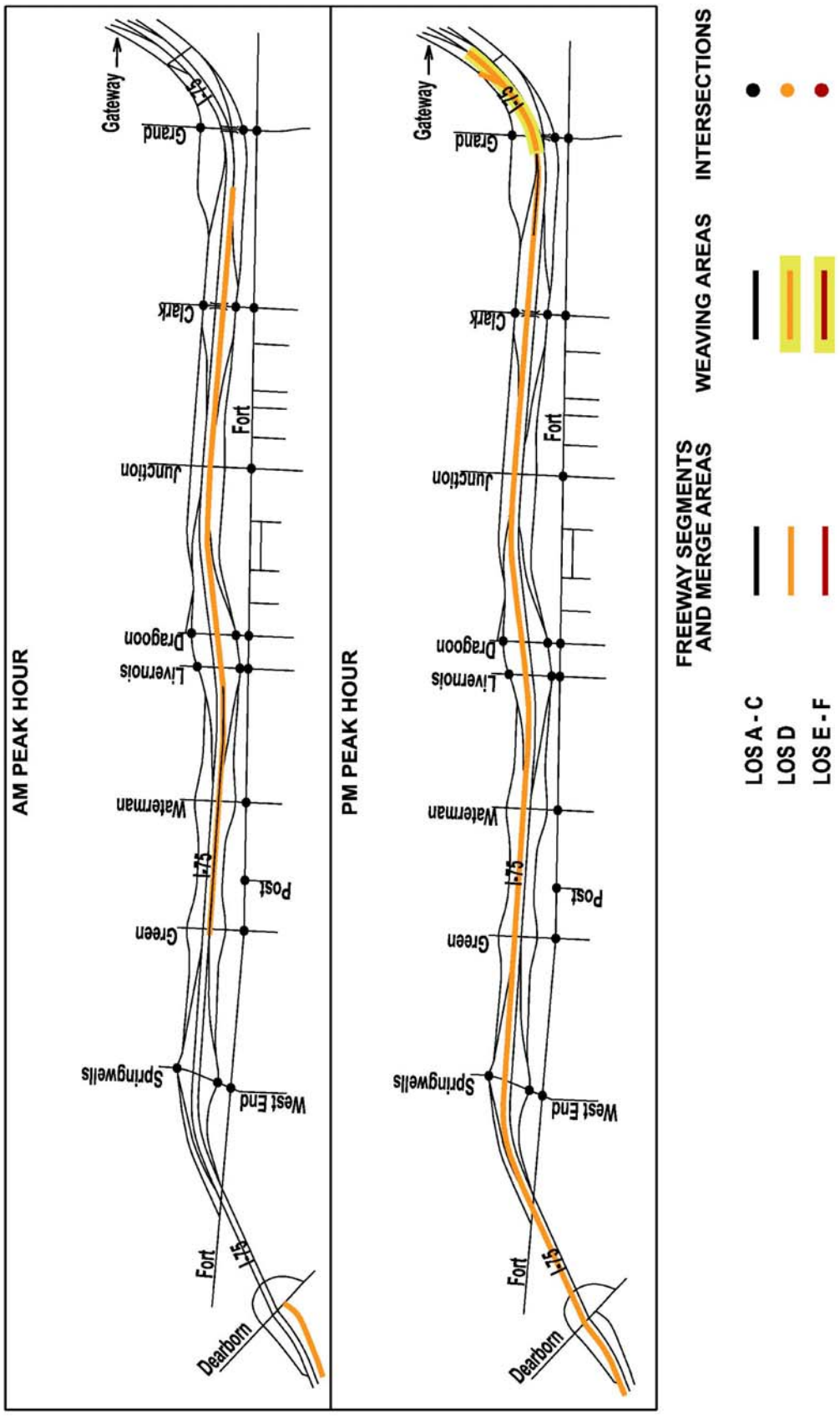


Figure 3-2
Detroit River International Crossing Study
No Build (2035) Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-9
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.6	D	14.8	B	18.3	C
From Springwells off-ramp to DRIC Plaza off-ramp	24.6	C	13.3	B	16.8	B
From DRIC Plaza off-ramp to Livernois off-ramp	21.9	C	9.5	A	11.2	B
From Livernois off-ramp to Dragoon on-ramp	21.3	C	9.3	A	10.9	A
From Dragoon on-ramp to DRIC Plaza on-ramp	18.5	C	8.4	A	10.1	A
From DRIC Plaza on-ramp to Clark on-ramp	26.8	D	11.3	B	13.5	B
From Clark on-ramp to Grand Blvd. off-ramp	22.7	C	10.2	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	22.6	C	9.2	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	13.9	B	13.1	B	24.2	C
From Grand Blvd. on-ramp to Clark off-ramp	11.7	B	11.1	B	21.8	C
From Clark off-ramp to DRIC Plaza off-ramp	12.3	B	12.3	B	25.3	C
From DRIC Plaza off-ramp to Junction off-ramp	14.1	B	13.3	B	26.8	D
From Junction off-ramp to Livernois on-ramp	9.2	A	9.6	A	20.5	C
From Livernois on-ramp to DRIC Plaza on-ramp	11.9	B	13.4	B	27.8	D
From DRIC Plaza on-ramp to Springwells on-ramp	16.4	B	16.1	B	30.7	D
From Springwells on-ramp to Dearborn on-ramp	16.9	B	17.1	B	31.7	D

Source: HCS, Parsons Transportation Group

Table 3-10
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.5	B
Springwells off-ramp	26.0	C	15.7	B	18.5	B
DRIC Plaza off-ramp (E. of Waterman)	1.7	A	*	A	2.1	A
Livernois off-ramp	17.3	B	6.6	A	8.0	A
Dragoon on-ramp	20.8	C	8.9	A	11.2	B
DRIC Plaza on-ramp (E. of Junction)	Refer to Table 3-11					
Clark on-ramp	21.0	C	11.3	B	13.6	B
Grand Blvd. off-ramp	22.1	C	14.1	B	16.5	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	14.0	B	13.4	B	23.3	C
Clark off-ramp	19.7	B	17.9	B	31.1	D
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	8.9	A
Junction off-ramp	12.8	B	10.6	B	22.0	C
Livernois on-ramp	10.2	B	11.8	B	24.9	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-11					
Springwells on-ramp	13.0	B	13.2	B	21.0	C
Dearborn on-ramp	13.2	B	13.3	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Table 3-11
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	5266	1649	Yes	2109	563	Yes	2570	634	Yes
I-75 SB DRIC Plaza on-ramp	3055	1246	Yes	2981	1012	Yes	6044	1651	Yes

The LOS is acceptable if $v < 9000$ pc/h and $v_{R12} < 4600$ pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours, the two-lane plaza on-ramp merge areas will operate at acceptable Levels of Service.

Table 3-12 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service under Build (2035) Alternative #1 conditions for each peak hour analyzed.

Table 3-12
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Clark on-ramp to Grand Blvd. off-ramp	24.16	C	10.86	B	13.95	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	14.61	B	13.90	B	30.11	D

Source: HCS, Parsons Transportation Group

Except for a LOS D in the PM peak hour for the **southbound I-75** weaving segment from the Ambassador Bridge on-ramp to the Clark Street off-ramp, all other weaving segments will operate at LOS C, or better.

3.2.2.2 Local Intersections

Under Build (2035) Alternative #1 conditions, the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-13.

Except for the Southbound Service Drive at Livernois during the midday peak hour which will operate at LOS C, all other signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-3 graphically displays the level of service results for the Build (2035) Alternative #1 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.3 Build (2035) Alternative #2

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #2 on Figure 1-4. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #2 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-13
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.0	A	9.3	A	9.2	A
Fort at Green	9.9	A	12.2	B	10.0	A
Fort at Waterman	9.3	A	10.5	B	8.5	A
Fort at Livernois	10.7	B	14.7	B	19.7	B
Fort at Dragoon	5.4	A	16.4	B	10.2	B
Fort at Junction	9.9	A	8.8	A	9.3	A
Fort at Clark	13.9	B	12.5	B	12.4	B
Southbound Service Drive at Livernois	6.9	A	21.5	C	8.5	A
Southbound Service Drive at Dragoon	1.4	A	0.8	A	0.6	A
Northbound Service Drive at Livernois	9.1	A	15.8	B	8.8	A
Northbound Service Drive at Dragoon	0.7	A	0.8	A	0.5	A
Southbound Service Drive at Springwells	10.8	B	10.1	B	8.7	A
Northbound Service Drive at Westend	14.8	B	16.3	B	13.0	B
Northbound Service Drive at Clark	9.3	A	9.9	A	12.42	B
Southbound Service Drive at Clark	18.5	B	12.5	B	11.6	B
Fort at Grand Blvd.	4.5	A	4.6	A	5.1	A
Northbound Service Drive at Grand Blvd.	12.6	B	12.1	B	10.8	B
Southbound Service Drive at Grand Blvd.	7.1	A	8.1	A	6.7	A
Fort at Post	0.0	A	0.0	A	0.3	A

Source: VISSIM, Parsons Transportation Group

3.2.3.1 Freeway Operations

Mainline Segments

Table 3-14 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service under Build (2035) Alternative #2 conditions for each peak hour analyzed.

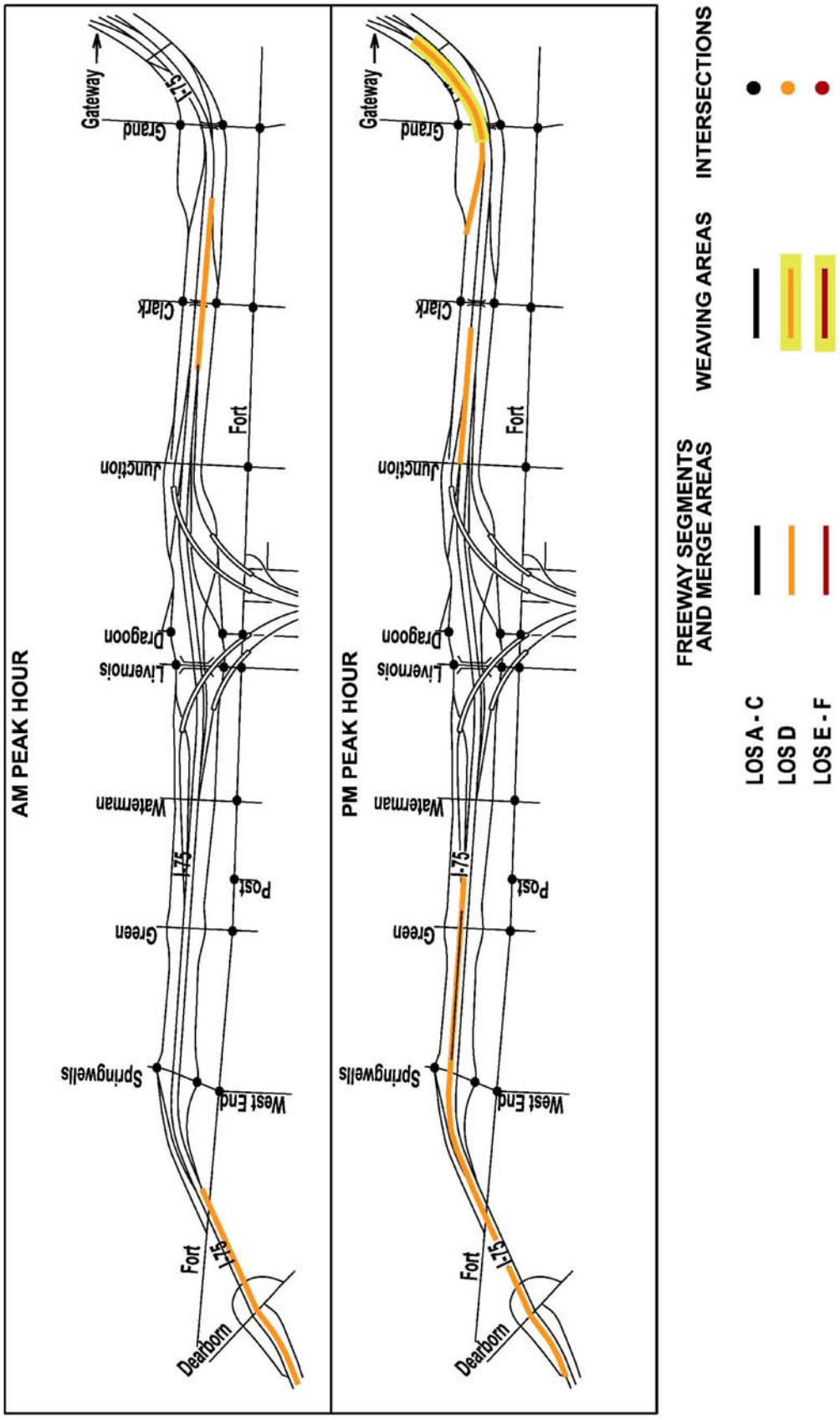


Figure 3-3
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-14
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.6	D	14.8	B	18.3	C
From Springwells off-ramp to DRIC Plaza off-ramp	24.6	C	13.3	B	16.8	B
From DRIC Plaza off-ramp to Livernois on-ramp	21.9	C	9.5	A	11.2	B
From Livernois on-ramp to Junction off-ramp	18.8	C	8.1	A	9.5	A
From Junction off-ramp to DRIC Plaza on-ramp	22.8	C	9.9	A	11.6	B
From DRIC Plaza on-ramp to Clark on-ramp	26.5	D	10.7	A	12.4	B
From Clark on-ramp to Grand Blvd. off-ramp	22.7	C	10.2	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	22.6	C	9.2	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	13.9	B	13.1	B	24.2	C
From Grand Blvd. on-ramp to Clark off-ramp	11.7	B	11.1	B	21.8	C
From Clark off-ramp to DRIC Plaza off-ramp	11.7	B	12.0	B	25.0	C
From DRIC Plaza off-ramp to Junction on-ramp	13.3	B	12.9	B	26.5	D
From Junction on-ramp to Livernois off-ramp	10.8	A	10.5	A	22.3	C
From Livernois off-ramp to DRIC Plaza on-ramp	11.7	B	12.2	B	26.9	D
From DRIC Plaza on-ramp to Springwells on-ramp	16.2	B	14.9	B	29.9	D
From Springwells on-ramp to Dearborn on-ramp	16.9	B	17.1	B	31.7	D

Source: HCS, Parsons Transportation Group

Except for **northbound I-75** in the AM peak period from the Dearborn off-ramp to the Springwells off-ramp, and from the DRIC Plaza on-ramp to the Clark on-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except from the DRIC Plaza off-ramp to the Junction Street on-ramp and from the Livernois off-ramp to the Dearborn on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #2 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized in Table 3-15 for one lane on- and off-ramps and in Table 3-16 for two lane on-ramps with an additional freeway lane.

Except for the Clark Street off-ramp in the PM peak hour, which will operate at LOS D, all other one-lane ramp merge and diverge areas will operate at LOS C, or better for all peak periods analyzed.

Table 3-15
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.5	B
Springwells off-ramp	26.0	C	15.7	B	18.5	B
DRIC Plaza off-ramp (W. of Waterman)	*	A	*	A	*	A
Livernois on-ramp	21.2	C	8.4	A	10.2	B
Junction off-ramp	18.5	B	7.1	A	8.5	A
DRIC Plaza on-ramp (E. of Junction)	Refer to Table 3-16					
Clark on-ramp	20.9	C	11.6	B	14.1	B
Grand Blvd. off-ramp	22.1	C	14.1	B	16.5	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	14.0	B	13.4	B	23.3	C
Clark off-ramp	20.5	C	18.3	B	31.5	D
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	*	A
Junction on-ramp	11.8	B	11.5	B	25.4	C
Livernois off-ramp	11.5	B	10.2	B	22.5	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-16					
Springwells on-ramp	13.0	B	13.7	B	20.8	C
Dearborn on-ramp	13.2	B	13.3	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Table 3-16
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	5203	1636	Yes	1984	536	Yes	2340	586	Yes
I-75 SB DRIC Plaza on-ramp	3020	1239	Yes	2765	967	Yes	5900	1621	Yes

[a]The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #2 conditions for each peak hour analyzed, Table 3-17 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-17
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Livernois on-ramp to Junction off-ramp	20.51	C	7.87	A	9.42	A
From Clark on-ramp to Grand Blvd. off-ramp	24.35	C	11.23	B	14.77	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	15.18	B	13.41	B	30.44	D
From Junction on-ramp to Livernois off-ramp	11.04	B	10.40	B	24.68	C

Source: HCS, Parsons Transportation Group

Except for a LOS D in the PM peak hour for the **southbound I-75** weaving segment from the Ambassador Bridge on-ramp to the Clark Street off-ramp, all other weaving segments will operate at LOS C, or better, for all time periods.

3.2.3.2 Local Intersections

Under Build (2035) Alternative #2 conditions, the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-18.

Except for the Northbound Service Drive at Clark which will operate at LOS C during the PM peak hour, all other signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-4 graphically displays the level of service results for the Build (2035) Alternative #2 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.4 Build (2035) Alternative #3

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #3 on Figure 1-4. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #3 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-18
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.2	B	7.7	A	9.7	A
Fort at Green	9.6	A	12.6	B	10.6	B
Fort at Waterman	9.6	A	9.7	A	9.3	A
Fort at Livernois	10.6	B	8.0	A	14.3	B
Fort at Dragoon	5.2	A	11.1	B	8.2	A
Fort at Junction	9.6	A	9.8	A	10.2	B
Fort at Clark	14.3	B	12.9	B	13.0	B
Southbound Service Drive at Livernois	7.1	A	9.1	A	6.2	A
Southbound Service Drive at Dragoon	10.5	B	12.2	B	10.6	B
Northbound Service Drive at Livernois	11.8	B	10.7	B	10.1	B
Northbound Service Drive at Dragoon	12.5	B	13.5	B	11.5	B
Southbound Service Drive at Springwells	11.2	B	17.8	B	12.1	B
Northbound Service Drive at Westend	14.8	B	16.1	B	14.0	B
Northbound Service Drive at Clark	11.2	B	13.1	B	24.9	C
Southbound Service Drive at Clark	19.6	B	14.3	B	13.7	B
Fort at Grand Blvd.	4.1	A	4.6	A	5.0	A
Northbound Service Drive at Grand Blvd.	12.5	B	12.6	B	10.7	B
Southbound Service Drive at Grand Blvd.	7.2	A	8.0	A	6.5	A
Fort at Post	0.0	A	0.0	A	0.2	A

Source: VISSIM, Parsons Transportation Group

3.2.4.1 Freeway Operations

Mainline Segments

Table 3-19 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service under Build (2035) Alternative #3 conditions for each peak hour analyzed.

Except for **northbound I-75** in the AM peak period from the Dearborn off-ramp to the Springwells off-ramp and from the DRIC Plaza on-ramp to the Clark on-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except for the DRIC Plaza off-ramp to the Dragoon off-ramp and from the Livernois on-ramp to the Dearborn on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

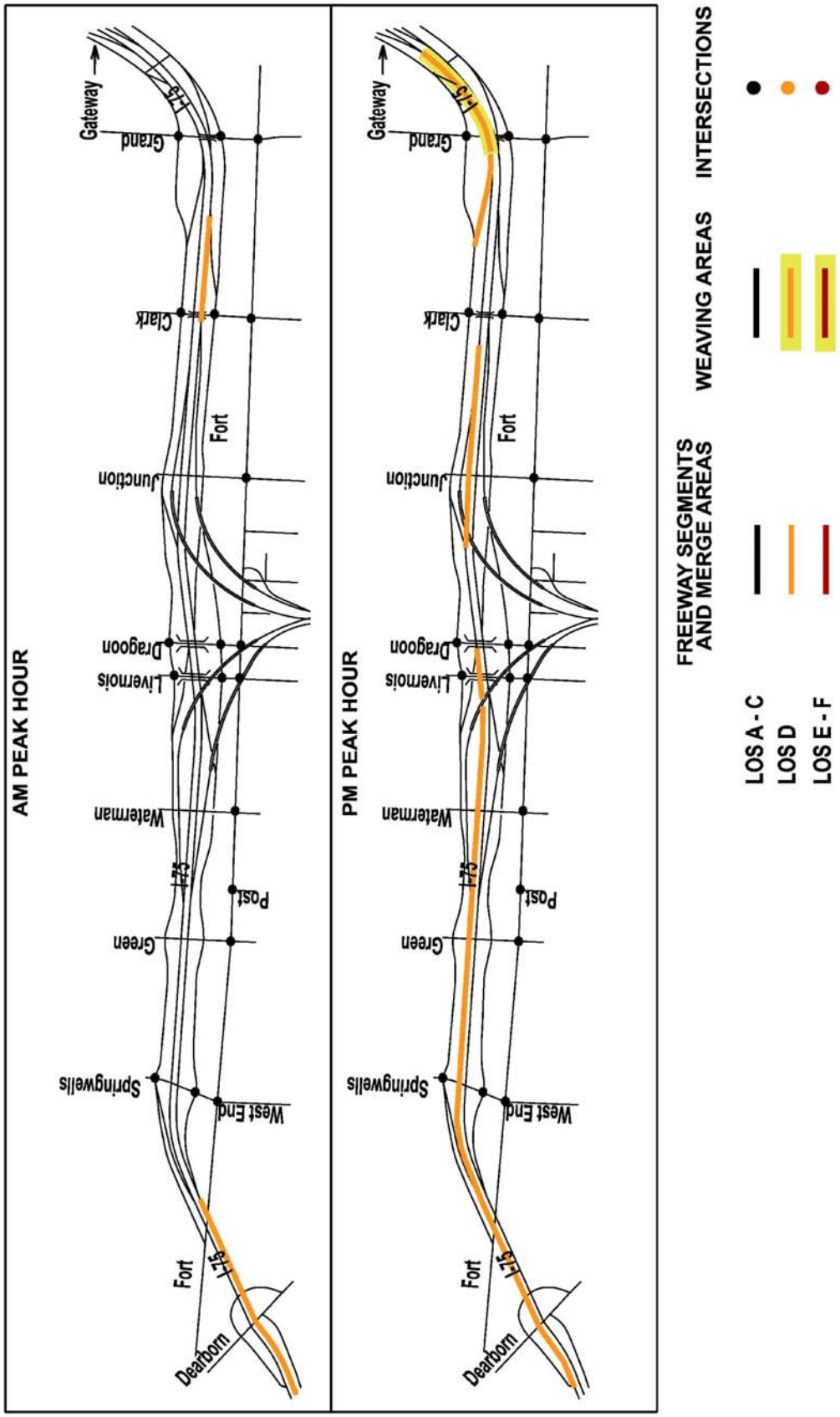


Figure 3-4
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-19
Detroit River International Crossing Study
Build (2035) Alternative #3 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.6	D	14.8	B	18.3	C
From Springwells off-ramp to DRIC Plaza off-ramp	24.6	C	13.3	B	16.8	B
From DRIC Plaza off-ramp to Livernois off-ramp	21.9	C	9.5	A	11.2	B
From Livernois off-ramp to Dragoon on-ramp	17.1	B	7.4	A	8.7	A
From Dragoon on-ramp to DRIC Plaza on-ramp	22.8	C	9.9	A	11.6	B
From DRIC Plaza on-ramp to Clark on-ramp	26.5	D	10.7	A	12.4	B
From Clark on-ramp to Grand Blvd. off-ramp	22.7	C	10.2	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	22.6	C	9.2	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	13.9	B	13.1	B	24.2	C
From Grand Blvd. on-ramp to Clark off-ramp	11.7	B	11.1	B	21.8	C
From Clark off-ramp to DRIC Plaza off-ramp	12.1	B	12.3	B	25.6	C
From DRIC Plaza off-ramp to Dragoon off-ramp	13.9	B	13.3	B	27.2	D
From Dragoon off-ramp to Livernois on-ramp	9.2	A	9.6	A	20.5	C
From Livernois on-ramp to DRIC Plaza on-ramp	11.7	B	12.2	B	26.9	D
From DRIC Plaza on-ramp to Springwells on-ramp	16.2	B	14.9	B	29.9	D
From Springwells on-ramp to Dearborn on-ramp	16.9	B	17.1	B	31.7	D

Source: HCS, Parsons Transportation Group

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #3 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized in Table 3-20 for one lane on- and off-ramps and in Table 3-21 for two lane on-ramps with an additional freeway lane.

Table 3-20
Detroit River International Crossing Study
Build (2035) Alternative #3 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.5	B
Springwells off-ramp	26.0	C	15.7	B	18.5	B
DRIC Plaza off-ramp (E. of Waterman)	1.7	A	*	A	2.1	A
Livernois off-ramp	17.3	B	6.6	A	8.0	A
Dragoon on-ramp	20.6	C	8.2	A	9.9	A
DRIC Plaza on-ramp (W. of Junction)	Refer to Table 3-21					
Clark on-ramp	20.9	C	11.6	B	14.1	B
Grand Blvd. off-ramp	22.1	C	14.1	B	16.5	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	14.0	B	13.4	B	23.3	C
Clark off-ramp	19.9	B	18.3	B	31.5	D
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	9.1	A
Dragoon off-ramp	12.5	B	10.7	B	22.6	C
Livernois on-ramp	10.0	A	10.5	B	24.6	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-21					
Springwells on-ramp	13.0	B	13.7	B	20.8	C
Dearborn on-ramp	13.2	B	13.3	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Except for the Clark off-ramp in the PM peak hour which will operate at LOS D, all other one-lane ramp merge and diverge areas will operate at LOS C, or better for all peak periods analyzed.

Table 3-21
Detroit River International Crossing Study
Build (2035) Alternative #3 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	5203	1636	Yes	1984	536	Yes	2340	586	Yes
I-75 SB DRIC Plaza on-ramp	3020	1239	Yes	2765	967	Yes	5900	1621	Yes

[a]The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #3 conditions for each peak hour analyzed, Table 3-22 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-22
Detroit River International Crossing Study
Build (2035) Alternative #3 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Clark on-ramp to Grand Blvd. off-ramp	24.35	C	11.23	B	14.77	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	14.72	B	13.28	B	29.91	D

Source: HCS, Parsons Transportation Group

Except for a LOS D in the PM peak hour for the **southbound** I-75 weaving segment from the Ambassador Bridge on-ramp to the Clark Street off-ramp, all other weaving segments will operate at LOS C or better.

3.2.4.2 Local Intersections

Under Build (2035) Alternative #3 conditions the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-23.

Except for the Northbound Service Drive at Clark during the PM peak hour which will operate at LOS C, all other signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-5 graphically displays the level of service results for the Build (2035) Alternative #3 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.5 Build (2035) Alternative #5

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #5 on Figure 1-4. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #5 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-23
Detroit River International Crossing Study
Build (2035) Alternative #3 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.0	A	9.5	A	9.4	A
Fort at Green	8.0	A	10.0	A	12.1	B
Fort at Waterman	7.7	A	8.8	A	6.9	A
Fort at Livernois	7.7	A	9.3	A	16.5	B
Fort at Dragoon	10.0	A	11.7	B	14.2	B
Fort at Junction	10.7	B	10.0	A	10.6	B
Fort at Clark	14.8	B	12.6	B	13.4	B
Southbound Service Drive at Livernois	1.7	A	4.4	A	3.4	A
Southbound Service Drive at Dragoon	0.4	A	0.1	A	0.1	A
Southbound Service Drive at Waterman	11.8	B	18.7	B	15.8	B
Northbound Service Drive at Livernois	0.3	A	0.4	A	0.3	A
Northbound Service Drive at Dragoon	0.3	A	2.0	A	0.4	A
Southbound Service Drive at Springwells	11.0	B	15.4	B	13.2	B
Northbound Service Drive at Westend	15.3	B	16.4	B	14.2	B
Northbound Service Drive at Clark	11.2	B	13.1	B	20.1	C
Southbound Service Drive at Clark	17.3	B	12.8	B	10.4	B
Fort at Grand Blvd.	4.2	A	4.5	A	5.1	A
Northbound Service Drive at Grand Blvd.	12.6	B	12.3	B	10.0	A
Southbound Service Drive at Grand Blvd.	6.8	A	7.6	A	6.5	A
Fort at Post	0.0	A	0.0	A	0.2	A

Source: VISSIM, Parsons Transportation Group

3.2.5.1 Freeway Operations

Mainline Segments

Table 3-24 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service under Build (2035) Alternative #5 conditions for each peak hour analyzed.

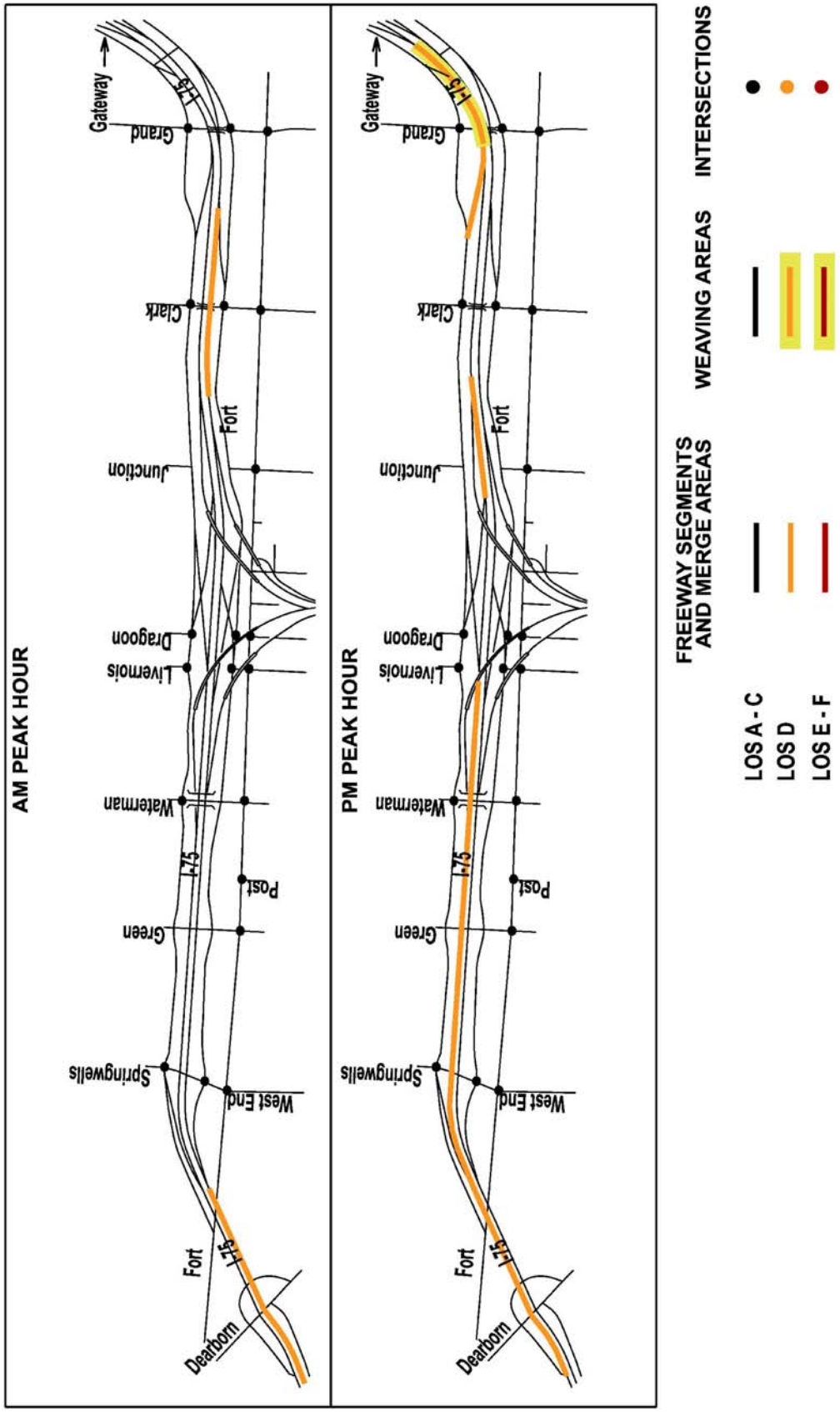


Figure 3-5
Detroit River International Crossing Study
Build (2035) Alternative #3 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-24
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.6	D	14.8	B	18.3	C
From Springwells off-ramp to DRIC Plaza off-ramp	24.6	C	13.3	B	16.8	B
From DRIC Plaza off-ramp to Dragoon on-ramp	21.9	C	9.5	A	11.2	B
From Dragoon on-ramp to Junction off-ramp	20.2	C	9.8	A	12.3	B
From Junction off-ramp to DRIC Plaza on-ramp	24.5	C	12.0	B	15.1	B
From DRIC Plaza on-ramp to Grand Blvd. off-ramp	22.7	C	10.2	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	22.6	C	9.2	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	13.9	B	13.1	B	24.2	C
From Grand Blvd. on-ramp to DRIC Plaza off-ramp	14.0	B	13.3	B	26.2	D
From DRIC Plaza off-ramp to Junction on-ramp	16.2	B	14.4	B	27.9	D
From Junction on-ramp to Dragoon off-ramp	13.1	B	11.7	B	23.5	C
From Dragoon off-ramp to DRIC Plaza on-ramp	11.7	B	12.2	B	26.9	D
From DRIC Plaza on-ramp to Springwells on-ramp	16.2	B	14.9	B	29.9	D
From Springwells on-ramp to Dearborn on-ramp	16.9	B	17.1	B	31.7	D

Source: HCS, Parsons Transportation Group

Except for **northbound I-75** in the AM peak period from the Dearborn off-ramp to the Springwells off-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except from the Grand Boulevard on-ramp to the Junction Street on-ramp and from the Dragoon off-ramp to the Dearborn on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #5 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized on Table 3-25 for one lane on- and off-ramps and on Table 3-26 for two lane on-ramps with an additional freeway lane.

Table 3-25
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.5	B
Springwells off-ramp	26.0	C	15.7	B	18.5	B
DRIC Plaza off-ramp (E. of Waterman)	1.7	A	*	A	2.1	A
Dragoon on-ramp	16.9	B	11.9	B	14.3	B
Junction off-ramp	20.0	C	8.8	A	11.5	B
DRIC Plaza on-ramp (E. of Junction)	Refer to Table 3-26					
Grand Blvd. off-ramp	17.9	B	9.9	A	12.3	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	14.0	B	13.4	B	23.3	C
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	9.5	A
Junction on-ramp	14.7	B	12.9	B	26.8	C
Dragoon off-ramp	17.0	B	13.0	B	25.2	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-26					
Springwells on-ramp	13.0	B	13.7	B	20.8	C
Dearborn on-ramp	13.2	B	13.3	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

All one-lane ramp merge and diverge areas will operate at LOS C, or better for all peak periods analyzed.

Table 3-26
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	5532	1704	Yes	2379	619	Yes	3049	734	Yes
I-75 SB DRIC Plaza on-ramp	3020	1239	Yes	2765	967	Yes	5900	1621	Yes

[a]The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #5 conditions for each peak hour analyzed, Table 3-27 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-27
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Dragoon on-ramp to Junction off-ramp	22.58	C	10.41	B	14.36	B
Southbound I-75						
From Junction on-ramp to Dragoon off-ramp	15.94	B	12.31	B	27.55	C

Source: HCS, Parsons Transportation Group

All weaving segments will operate at LOS C, or better for all peak periods analyzed.

3.2.5.2 Local Intersections

Under Build (2035) Alternative #5 conditions the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-28.

All of the signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-6 graphically displays the level of service results for the Build (2035) Alternative #5 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.6 Build (2035) Alternative #7

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #7 on Figure 1-5. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #7 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-28
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	9.9	A	8.7	A	8.7	A
Fort at Green	8.7	A	11.5	B	12.0	B
Fort at Waterman	7.7	A	8.7	A	5.3	A
Fort at Livernois	7.3	A	8.3	A	15.6	B
Fort at Dragoon	11.7	B	13.7	B	14.3	B
Fort at Junction	10.0	B	10.2	B	9.9	A
Fort at Clark	13.4	B	13.6	B	14.8	B
Southbound Service Drive at Livernois	1.2	A	3.9	A	1.5	A
Southbound Service Drive at Dragoon	0.1	A	0.1	A	0.2	A
Northbound Service Drive at Livernois	0.6	A	0.4	A	0.2	A
Northbound Service Drive at Dragoon	0.0	A	0.9	A	1.6	A
Southbound Service Drive at Springwells	10.7	B	19.2	B	14.7	B
Northbound Service Drive at Westend	15.2	B	16.6	B	14.8	B
Northbound Service Drive at Clark	10.8	B	12.6	B	11.7	B
Southbound Service Drive at Clark	10.0	A	11.4	B	10.8	B
Fort at Grand Blvd.	4.6	A	4.4	A	5.0	A
Northbound Service Drive at Grand Blvd.	12.6	B	13.0	B	9.9	A
Southbound Service Drive at Grand Blvd.	7.1	A	8.0	A	6.5	A
Fort at Post	0.0	A	0.0	A	0.1	A

Source: VISSIM, Parsons Transportation Group

3.2.6.1 Freeway Operations

Mainline Segments

Under Build (2035) Alternative #7 conditions for each peak hour analyzed, Table 3-29 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service.

Except for **northbound I-75** in the AM peak period from the Dearborn Avenue off-ramp to the Springwells off-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except from the DRIC Plaza off-ramp to the Junction Street off-ramp and from the Livernois on-ramp to the Dearborn on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

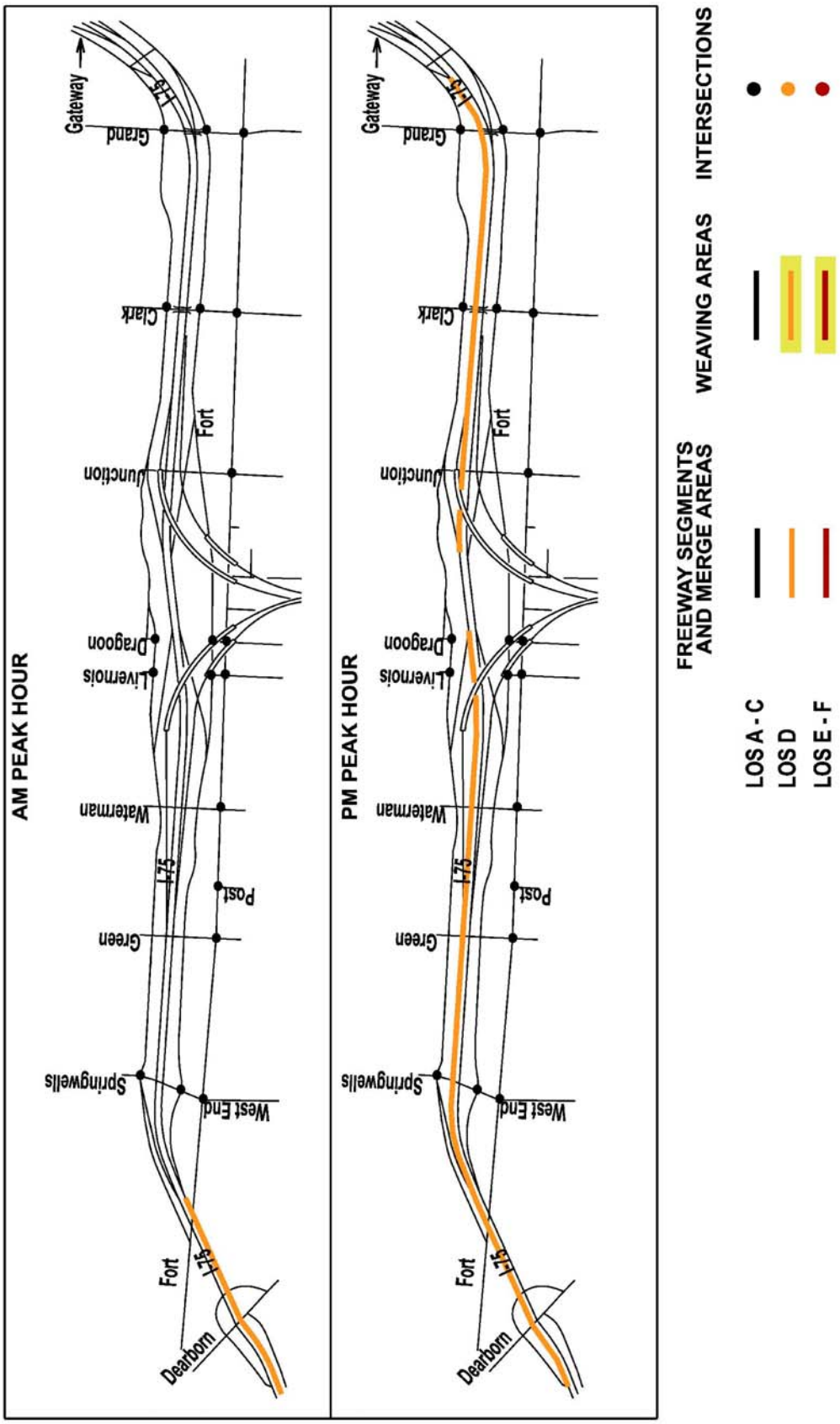


Figure 3-6
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-29
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.5	D	14.7	B	18.5	C
From Springwells off-ramp to DRIC Plaza off-ramp	24.7	C	13.4	B	17.0	B
From DRIC Plaza off-ramp to Livernois off-ramp	22.6	C	10.2	A	11.8	B
From Livernois off-ramp to Dragoon on-ramp	21.9	C	9.9	A	11.4	B
From Dragoon on-ramp to DRIC Plaza on-ramp	19.0	C	9.0	A	10.4	A
From DRIC Plaza on-ramp to Clark on-ramp	25.7	C	11.4	B	13.4	B
From Clark on-ramp to Grand Blvd. off-ramp	21.6	C	10.1	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	21.4	C	9.1	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	12.9	B	12.1	B	23.1	C
From Grand Blvd. on-ramp to Clark off-ramp	10.8	A	10.1	A	20.6	C
From Clark off-ramp to DRIC Plaza off-ramp	11.4	B	11.3	B	24.0	C
From DRIC Plaza off-ramp to Junction off-ramp	14.3	B	13.6	B	26.9	D
From Junction off-ramp to Livernois on-ramp	9.4	A	9.7	A	20.5	C
From Livernois on-ramp to DRIC Plaza on-ramp	12.1	B	13.7	B	28.3	D
From DRIC Plaza on-ramp to Springwells on-ramp	16.2	B	15.6	B	30.6	D
From Springwells on-ramp to Dearborn on-ramp	16.7	B	16.7	B	31.8	D

Source: HCS, Parsons Transportation Group

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #7 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized on Table 3-30 for one lane on- and off-ramps and on Table 3-31 for two lane on-ramps with an additional freeway lane.

Table 3-30
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.7	B
Springwells off-ramp	25.8	C	15.5	B	18.6	B
DRIC Plaza off-ramp (E. of Waterman)	1.1	A	*	A	1.7	A
Livernois off-ramp	18.0	B	7.2	A	8.6	A
Dragoon on-ramp	21.4	C	9.7	A	11.4	B
DRIC Plaza on-ramp (E. of Junction)	Refer to Table 3-31					
Clark on-ramp	20.2	C	11.0	B	13.7	B
Grand Blvd. off-ramp	21.2	C	13.9	B	16.6	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	13.1	B	12.4	B	22.4	C
Clark off-ramp	18.5	B	16.6	B	29.5	D
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	5.6	A
Junction off-ramp	12.9	B	11.1	B	22.1	C
Livernois on-ramp	10.4	B	12.1	B	25.1	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-31					
Springwells on-ramp	12.9	B	13.1	B	21.0	C
Dearborn on-ramp	13.1	B	13.0	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Except for the Clark Street off-ramp in the PM peak hour which will operate at LOS D, all other one-lane ramp merge and diverge areas operate at LOS C, or better for all peak periods analyzed.

Table 3-31
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	5022	1300	Yes	2120	463	Yes	2566	585	Yes
I-75 SB DRIC Plaza on-ramp	3034	1197	Yes	2906	888	Yes	6057	1585	Yes

[a] The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #7 conditions for each peak hour analyzed, Table 3-32 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-32
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Clark on-ramp to Grand Blvd. off-ramp	22.90	C	10.36	B	14.10	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	13.46	B	12.11	B	28.15	D

Source: HCS, Parsons Transportation Group

Except for the **southbound I-75** weaving area from the Ambassador Bridge on-ramp to the Clark off-ramp that will operate at LOS D, all other weaving segments will operate at LOS C or better for all peak periods.

3.2.6.2 Local Intersections

Under Build (2035) Alternative #7 conditions, the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-33.

Except for Fort at Livernois during the midday and PM peak hours and the Southbound Service Drive at Livernois during the midday peak hour which will operate at LOS C, all other signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-7 graphically displays the level of service results for the Build (2035) Alternative #7 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.7 Build (2035) Alternative #9

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #9 on Figure 1-5. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #9 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-33
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.1	B	9.3	A	9.4	A
Fort at Green	9.2	A	12.9	B	10.0	B
Fort at Waterman	9.1	A	11.2	B	8.1	A
Fort at Livernois	10.3	B	21.4	C	20.2	C
Fort at Dragoon	5.6	A	11.3	B	10.5	B
Fort at Junction	10.0	A	9.9	A	9.4	A
Fort at Clark	13.9	B	12.3	B	12.6	B
Southbound Service Drive at Livernois	6.9	A	21.8	C	8.6	A
Southbound Service Drive at Dragoon	1.5	A	0.9	A	0.6	A
Northbound Service Drive at Livernois	8.8	A	16.3	B	8.6	A
Northbound Service Drive at Dragoon	0.9	A	0.7	A	0.5	A
Southbound Service Drive at Springwells	10.6	B	10.3	B	9.3	A
Northbound Service Drive at Westend	14.7	B	16.4	B	13.0	B
Northbound Service Drive at Clark	9.2	A	8.1	A	12.9	B
Southbound Service Drive at Clark	18.7	B	11.3	B	11.3	B
Fort at Grand Blvd.	4.6	A	5.0	A	5.2	A
Northbound Service Drive at Grand Blvd.	12.4	B	12.6	B	10.7	B
Southbound Service Drive at Grand Blvd.	6.8	A	8.0	A	6.4	A
Fort at Post	0.0	A	0.0	A	0.3	A

Source: VISSIM, Parsons Transportation Group

3.2.7.1 Freeway Operations

Mainline Segments

Under Build (2035) Alternative #9 conditions for each peak hour analyzed, Table 3-34 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of service.

Except for **northbound I-75** in the AM peak period from the Dearborn off-ramp to the Springwells off-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except from the DRIC Plaza off-ramp to the Junction Street on-ramp and from the Livernois off-ramp to the Dearborn Avenue on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

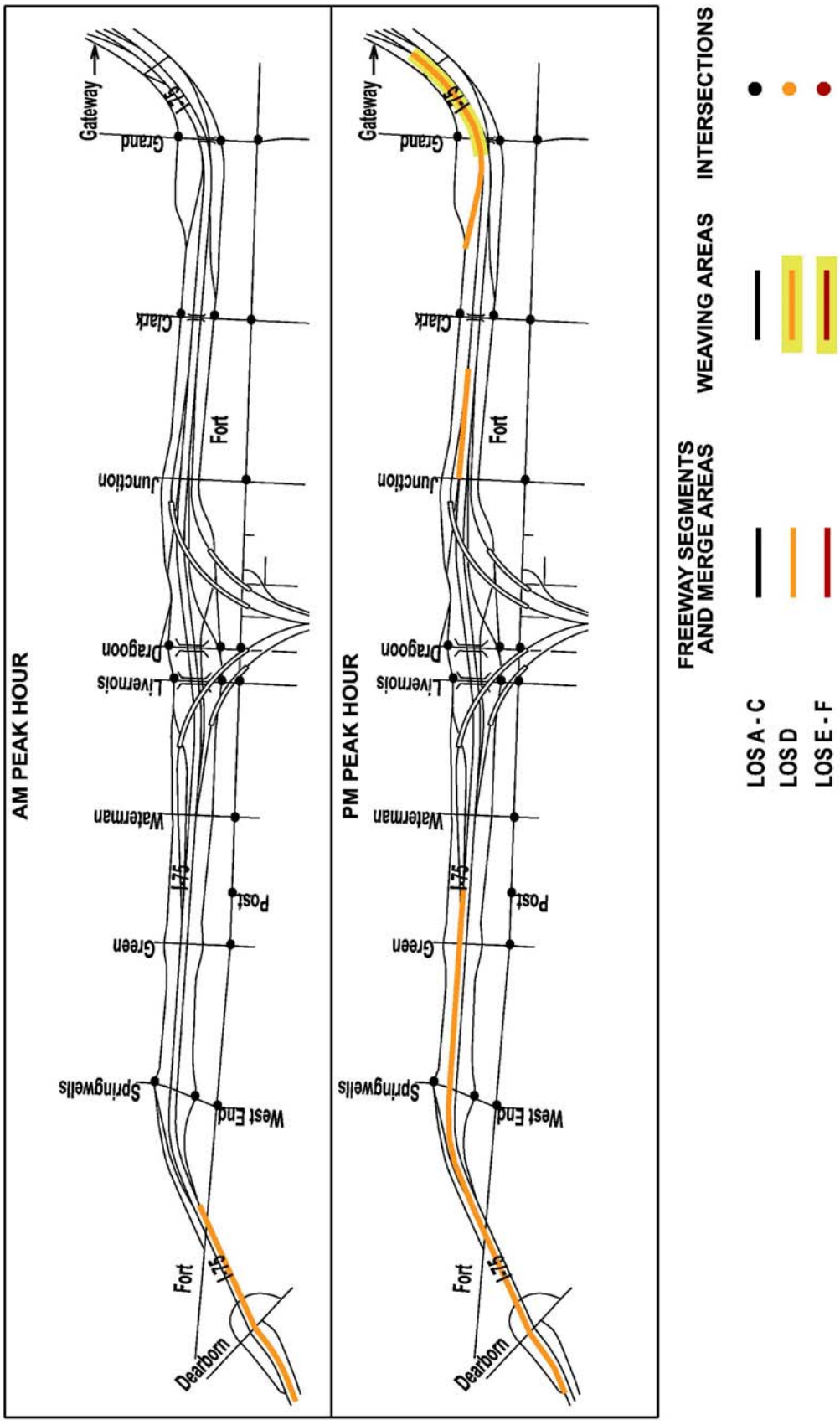


Figure 3-7
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-34
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.5	D	14.7	B	18.5	C
From Springwells off-ramp to DRIC Plaza off-ramp	24.7	C	13.4	B	17.0	B
From DRIC Plaza off-ramp to Livernois on-ramp	22.6	C	10.2	A	11.8	B
From Livernois on-ramp to Junction off-ramp	19.4	C	8.8	A	9.8	A
From Junction off-ramp to DRIC Plaza on-ramp	23.5	C	10.7	A	11.8	B
From DRIC Plaza on-ramp to Clark on-ramp	25.4	C	10.8	A	12.3	B
From Clark on-ramp to Grand Blvd. off-ramp	21.6	C	10.1	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	21.4	C	9.1	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	12.9	B	12.1	B	23.1	C
From Grand Blvd. on-ramp to Clark off-ramp	10.8	A	10.1	A	20.6	C
From Clark off-ramp to DRIC Plaza off-ramp	10.9	A	11.1	B	23.7	C
From DRIC Plaza off-ramp to Junction on-ramp	13.5	B	13.3	B	26.6	D
From Junction on-ramp to Livernois off-ramp	11.0	A	10.9	A	22.7	C
From Livernois off-ramp to DRIC Plaza on-ramp	11.9	B	12.5	B	27.3	D
From DRIC Plaza on-ramp to Springwells on-ramp	16.0	B	14.4	B	29.7	D
From Springwells on-ramp to Dearborn on-ramp	16.7	B	16.7	B	31.8	D

Source: HCS, Parsons Transportation Group

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #9 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized on Table 3-35 for one lane on- and off-ramps and on Table 3-36 for two lane on-ramps with an additional freeway lane.

Table 3-35
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.7	B
Springwells off-ramp	25.8	C	15.5	B	18.6	B
DRIC Plaza off-ramp (W. of Waterman)	*	A	*	A	*	A
Livernois on-ramp	21.9	C	9.4	A	10.5	B
Junction off-ramp	19.4	B	7.9	A	8.9	A
DRIC Plaza on-ramp (E. of Junction)	Refer to Table 3-36					
Clark on-ramp	20.1	C	11.3	B	14.2	B
Grand Blvd. off-ramp	21.2	C	13.9	B	16.6	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	13.1	B	11.3	B	22.4	C
Clark off-ramp	19.2	B	16.8	B	29.9	D
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	5.4	A
Junction on-ramp	12.0	B	11.9	B	25.6	C
Livernois off-ramp	11.8	B	10.8	B	23.0	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-36					
Springwells on-ramp	12.9	B	13.6	B	20.7	C
Dearborn on-ramp	13.1	B	13.0	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Except for **southbound I-75** at the Clark off-ramp in the PM peak hour which will operate at LOS D, all other one-lane ramp merge and diverge areas will operate at LOS C, or better for all peak periods analyzed.

Table 3-36
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	4964	1287	Yes	2014	441	Yes	2327	535	Yes
I-75 SB DRIC Plaza on-ramp	3000	1189	Yes	2682	841	Yes	5892	1551	Yes

[a]The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #9 conditions for each peak hour analyzed, Table 3-37 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-37
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Livernois on-ramp to Junction off-ramp	21.55	C	8.73	A	9.63	A
From Clark on-ramp to Grand Blvd. off-ramp	23.06	C	10.81	B	14.99	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	13.98	B	12.19	B	28.29	D
From Junction on-ramp to Livernois off-ramp	11.29	B	10.92	B	25.45	C

Source: HCS, Parsons Transportation Group

Except for the **southbound I-75** weaving area from the Ambassador Bridge on-ramp to the Clark off-ramp that will operate at LOS D, all other weaving segments will operate at LOS C or better for all periods.

3.2.7.2 Local Intersections

Under Build (2035) Alternative #9 conditions the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-38.

Except for the Southbound Service Drive at Springwells which will operate at LOS C during the midday peak hour, all other signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-8 graphically displays the level of service results for the Build (2035) Alternative #9 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.8 Build (2035) Alternative #11

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #11 on Figure 1-5. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses

conducted for Build (2035) Alternative #11 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-38
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.1	B	8.9	A	9.7	A
Fort at Green	9.4	A	12.8	B	12.9	B
Fort at Waterman	9.8	A	9.7	A	5.3	A
Fort at Livernois	11.1	B	7.9	A	13.3	B
Fort at Dragoon	5.0	A	10.8	B	10.7	B
Fort at Junction	9.3	A	10.1	B	10.1	B
Fort at Clark	14.4	B	13.2	B	12.2	B
Southbound Service Drive at Livernois	8.1	A	9.5	A	6.3	A
Southbound Service Drive at Dragoon	11.2	B	12.4	B	10.6	B
Northbound Service Drive at Livernois	10.4	B	9.5	A	11.4	B
Northbound Service Drive at Dragoon	11.2	B	13.6	B	12.0	B
Southbound Service Drive at Springwells	10.7	B	22.8	C	14.9	B
Northbound Service Drive at Westend	14.6	B	16.5	B	14.5	B
Northbound Service Drive at Clark	10.6	B	11.3	B	16.4	B
Southbound Service Drive at Clark	18.4	B	13.1	B	13.5	B
Fort at Grand Blvd.	4.1	A	4.7	A	5.0	A
Northbound Service Drive at Grand Blvd.	12.2	B	12.4	B	10.4	B
Southbound Service Drive at Grand Blvd.	7.3	A	7.7	A	6.5	A
Fort at Post	0.0	A	0.0	A	0.2	A

Source: VISSIM, Parsons Transportation Group

3.2.8.1 Freeway Operations

Mainline Segments

Under Build (2035) Alternative #11 conditions for each peak hour analyzed, Table 3-39 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service.

Except for **northbound I-75** in the AM peak period from the Dearborn Avenue off-ramp to the Springwells off-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except from the DRIC Plaza off-ramp to the Dragoon off-ramp and from the Livernois on-ramp to the Dearborn on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

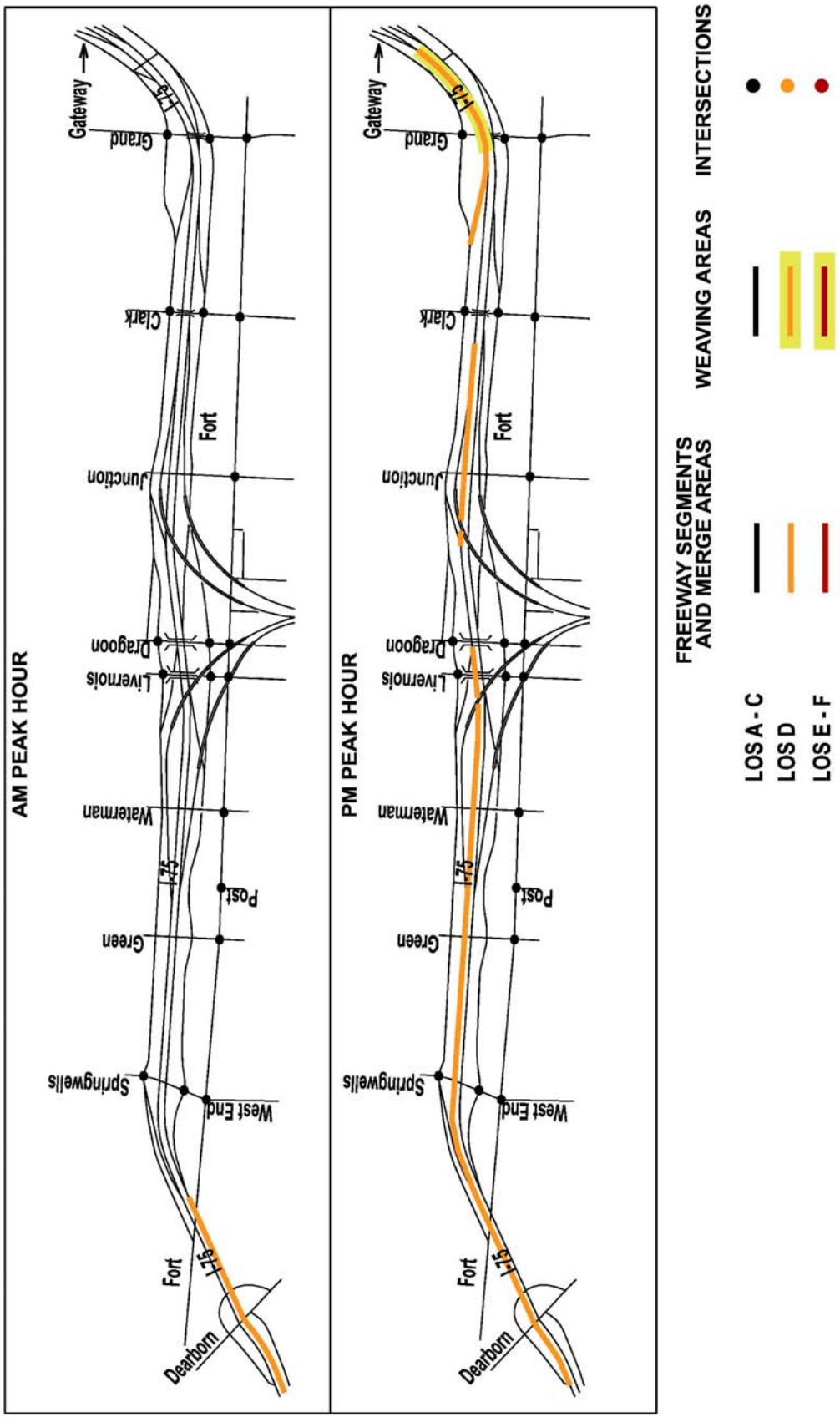


Figure 3-8
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-39
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.5	D	14.7	B	18.5	C
From Springwells off-ramp to DRIC Plaza off-ramp	24.7	C	13.4	B	17.0	B
From DRIC Plaza off-ramp to Livernois off-ramp	22.6	C	10.2	A	11.8	B
From Livernois off-ramp to Dragoon on-ramp	17.5	B	7.9	A	9.1	A
From Dragoon on-ramp to DRIC Plaza on-ramp	23.5	C	10.7	A	11.8	B
From DRIC Plaza on-ramp to Clark on-ramp	25.4	C	10.8	A	12.3	B
From Clark on-ramp to Grand Blvd. off-ramp	21.6	C	10.1	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	21.4	C	9.1	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	12.9	B	12.1	B	23.1	C
From Grand Blvd. on-ramp to Clark off-ramp	10.8	A	10.1	A	20.6	C
From Clark off-ramp to DRIC Plaza off-ramp	11.3	B	11.3	B	24.2	C
From DRIC Plaza off-ramp to Dragoon off-ramp	14.1	B	13.6	B	27.2	D
From Dragoon off-ramp to Livernois on-ramp	9.4	A	9.7	A	20.5	C
From Livernois on-ramp to DRIC Plaza on-ramp	11.9	B	12.5	B	27.3	D
From DRIC Plaza on-ramp to Springwells on-ramp	16.0	B	14.4	B	29.7	D
From Springwells on-ramp to Dearborn on-ramp	16.7	B	16.7	B	31.8	D

Source: HCS, Parsons Transportation Group

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #11 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized on Table 3-40 for one lane on- and off-ramps and on Table 3-41 for two lane on-ramps with an additional freeway lane.

Table 3-40
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.7	B
Springwells off-ramp	25.8	C	15.5	B	18.6	B
DRIC Plaza off-ramp (E. of Waterman)	1.1	A	*	A	1.7	A
Livernois off-ramp	18.0	B	7.2	A	8.6	A
Dragoon on-ramp	21.3	C	9.1	A	10.2	B
DRIC Plaza on-ramp (W. of Junction)	Refer to Table 3-41					
Clark on-ramp	20.1	C	11.3	B	14.2	B
Grand Blvd. off-ramp	21.2	C	13.9	B	16.6	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	13.1	B	12.4	B	22.4	C
Clark off-ramp	18.6	B	16.5	B	29.2	D
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	5.8	A
Dragoon off-ramp	12.7	B	11.1	B	22.7	C
Livernois on-ramp	10.2	B	10.8	B	24.8	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-41					
Springwells on-ramp	12.9	B	13.6	B	20.7	C
Dearborn on-ramp	13.1	B	13.0	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Except for **southbound I-75** at the Clark off-ramp in the PM peak hour which will operate at LOS D, all other one-lane ramp merge and diverge areas will operate at LOS C, or better for all peak periods analyzed.

Table 3-41
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	4964	1287	Yes	2014	441	Yes	2327	535	Yes
I-75 SB DRIC Plaza on-ramp	3000	1189	Yes	2682	841	Yes	5892	1551	Yes

[a]The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #11 conditions for each peak hour analyzed, Table 3-42 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-42
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Clark on-ramp to Grand Blvd. off-ramp	23.06	C	10.81	B	14.99	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	13.51	B	12.10	B	27.85	C

Source: HCS, Parsons Transportation Group

For all weaving segments analyzed during the peak periods the Levels of Service were found to be LOS C, or better.

3.2.8.2 Local Intersections

Under Build (2035) Alternative #11 conditions, the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-43.

All of the signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-9 graphically displays the level of service results for the Build (2035) Alternative #11 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.9 Build (2035) Alternative #14

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #14 on Figure 1-4. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #14 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-43
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	9.9	A	9.3	A	9.5	A
Fort at Green	8.0	A	10.5	B	11.9	B
Fort at Waterman	7.9	A	9.6	A	6.8	A
Fort at Livernois	6.7	A	8.5	A	16.8	B
Fort at Dragoon	11.0	B	12.8	B	14.3	B
Fort at Junction	10.2	B	9.8	A	10.7	B
Fort at Clark	14.3	B	13.2	B	13.7	B
Southbound Service Drive at Livernois	2.4	A	4.5	A	4.9	A
Southbound Service Drive at Dragoon	0.5	A	0.0	A	0.1	A
Southbound Service Drive at Waterman	11.4	B	17.1	B	14.5	B
Northbound Service Drive at Livernois	0.1	A	0.1	A	0.1	A
Northbound Service Drive at Dragoon	0.3	A	2.8	A	0.4	A
Southbound Service Drive at Springwells	11.0	B	18.3	B	13.9	B
Northbound Service Drive at Westend	15.1	B	16.5	B	14.3	B
Northbound Service Drive at Clark	10.1	B	10.8	B	22.4	C
Southbound Service Drive at Clark	16.6	B	11.9	B	10.3	B
Fort at Grand Blvd.	4.0	A	4.6	A	5.0	A
Northbound Service Drive at Grand Blvd.	12.7	B	12.9	B	10.2	B
Southbound Service Drive at Grand Blvd.	7.0	A	7.6	A	6.6	A
Fort at Post	0.0	A	0.0	A	0.2	A

Source: VISSIM, Parsons Transportation Group

3.2.9.1 Freeway Operations

Mainline Segments

Under Build (2035) Alternative #14 conditions for each peak hour analyzed, Table 3-44 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service.

Except for **northbound I-75** in the AM peak period from the Dearborn Avenue off-ramp to the Springwells off-ramp and from the DRIC Plaza on-ramp to the Clark Street on-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except from the Grand Boulevard on-ramp to the Clark

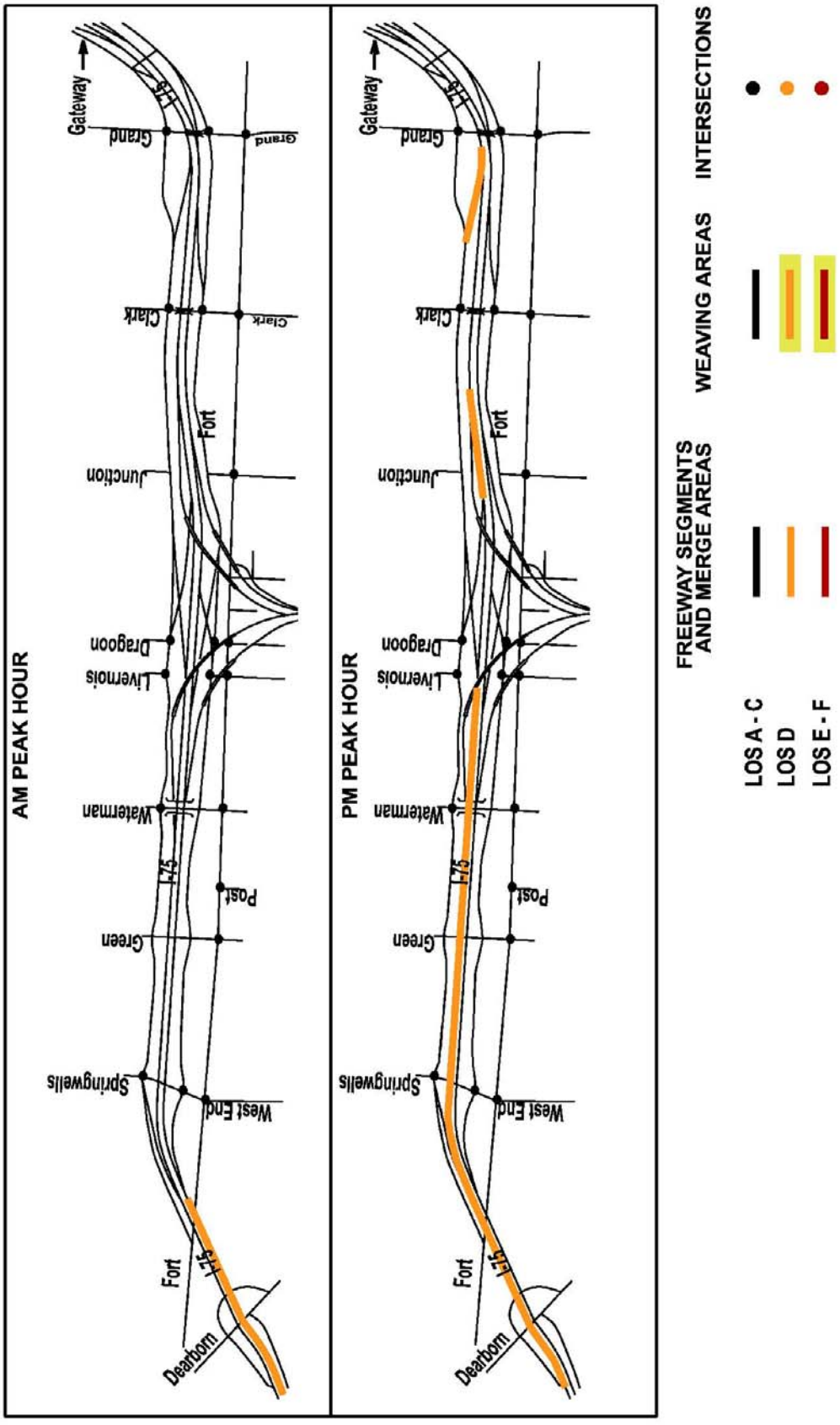


Figure 3-9
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

off-ramp and from the DRIC Plaza off-ramp to the Dearborn on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

Table 3-44
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.6	D	14.8	B	18.3	C
From Springwells off-ramp to Springwells on-ramp	24.0	C	13.1	B	16.4	B
From Springwells on-ramp to DRIC Plaza off-ramp	25.1	C	13.5	B	16.9	B
From DRIC Plaza off-ramp to DRIC Plaza on-ramp	22.4	C	9.7	A	11.3	B
From DRIC Plaza on-ramp to Clark on-ramp	26.1	D	10.5	A	12.1	B
From Clark on-ramp to Grand Blvd. off-ramp	22.7	C	10.2	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	22.6	C	9.2	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	13.9	B	13.1	B	24.2	C
From Grand Blvd. on-ramp to Clark off-ramp	14.0	B	13.3	B	26.2	D
From Clark off-ramp to DRIC Plaza off-ramp	11.4	B	11.9	B	24.8	C
From DRIC Plaza off-ramp to DRIC Plaza on-ramp	13.0	B	12.7	B	26.2	D
From DRIC Plaza on-ramp to Springwells off-ramp	17.5	B	15.3	B	29.2	D
From Springwells off-ramp to Springwells on-ramp	16.1	B	14.6	B	28.6	D
From Springwells on-ramp to Dearborn on-ramp	16.9	B	17.1	B	31.7	D

Source: HCS, Parsons Transportation Group

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #14 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized on Table 3-45 for one lane on- and off-ramps and on Table 3-46 for two lane on-ramps with an additional freeway lane.

Table 3-45
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.5	B
Springwells off-ramp	26.7	C	16.0	B	18.8	B
Springwells on-ramp	23.0	C	13.2	B	16.0	B
DRIC Plaza off-ramp (W. of Waterman)	1.9	A	*	A	2.2	A
DRIC Plaza on-ramp (E. of Junction)	Refer to Table 3-46					
Clark on-ramp	20.8	C	11.7	B	14.2	B
Grand Blvd. off-ramp	22.1	C	14.1	B	16.5	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	14.0	B	13.4	B	23.3	C
Clark off-ramp	20.9	C	18.5	B	31.8	D
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	8.6	A
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-46					
Springwells off-ramp	14.4	B	12.6	B	20.1	C
Springwells on-ramp	13.1	B	13.8	B	20.5	C
Dearborn on-ramp	13.2	B	13.3	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Except for **southbound I-75** at the Clark off-ramp in the PM peak hour which will operate at LOS D, all other one-lane ramp merge and diverge areas will operate at LOS C, or better for all peak periods analyzed.

Table 3-46
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	5124	1619	Yes	1948	529	Yes	2296	576	Yes
I-75 SB DRIC Plaza on-ramp	3289	1295	Yes	2851	985	Yes	5727	1585	Yes

[a]The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #14 conditions for each peak hour analyzed, Table 3-47 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-47
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Springwells on-ramp to DRIC Plaza off-ramp	21.09	C	12.01	B	15.72	B
From Clark on-ramp to Grand Blvd. off-ramp	23.85	C	11.35	B	14.98	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	15.46	B	13.48	B	30.70	D
From DRIC Plaza on-ramp to Springwells off-ramp	16.14	B	13.04	B	25.23	C

Source: HCS, Parsons Transportation Group

Except for the **southbound I-75** weaving area from the Ambassador Bridge on-ramp to the Clark off-ramp that will operate at LOS D, all other weaving segments will operate at LOS C or better for all peak periods analyzed.

3.2.9.2 Local Intersections

Under Build (2035) Alternative #14 conditions, the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-48.

All of the signalized intersections analyzed within the study area will operate at LOS C, or better for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-10 graphically displays the level of service results for the Build (2035) Alternative #14 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

3.2.10 Build (2035) Alternative #16

The geometry of the No Build (2035) alternative was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #16 on Figure 1-4. The HCS analyses uses traffic volumes projected for the year 2035 based on the new bridge and changes in local ramps to the I-75 service drives. The tables found in this section summarize the results of the capacity analyses conducted for Build (2035) Alternative #16 conditions. The supporting detailed HCS results may be found in Appendix E.

Table 3-48
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	9.8	A	9.3	A	9.3	A
Fort at Green	7.4	A	12.9	B	13.2	B
Fort at Waterman	9.3	A	13.3	B	14.2	B
Fort at Livernois	12.3	B	6.3	A	5.5	A
Fort at Dragoon	4.7	A	8.4	A	7.8	A
Fort at Junction	8.8	A	8.2	A	7.3	A
Fort at Clark	14.8	B	12.4	B	12.0	B
Southbound Service Drive at Livernois	1.6	A	3.2	A	2.3	A
Southbound Service Drive at Dragoon	0.5	A	0.7	A	0.8	A
Northbound Service Drive at Livernois	0.2	A	0.1	A	0.1	A
Northbound Service Drive at Dragoon	0.0	A	0.0	A	0.0	A
Southbound Service Drive at Springwells	11.8	B	13.3	B	24.2	C
Northbound Service Drive at Westend	21.2	C	15.7	B	14.0	B
Northbound Service Drive at Clark	15.4	B	18.9	B	16.9	B
Southbound Service Drive at Clark	20.5	C	14.9	B	15.1	B
Fort at Grand Blvd.	4.1	A	5.1	A	5.2	A
Northbound Service Drive at Grand Blvd.	12.4	B	12.4	B	10.6	B
Southbound Service Drive at Grand Blvd.	7.6	A	7.8	A	6.2	A
Fort at Post	0.0	A	0.0	A	0.2	A

Source: VISSIM, Parsons Transportation Group

3.2.10.1 Freeway Operations

Mainline Segments

Under Build (2035) Alternative #16 conditions for each peak hour analyzed, Table 3-49 summarizes the density output from HCS by selected segments of the mainline freeway system and the corresponding Level of Service.

Except for **northbound I-75** in the AM peak period from the Dearborn off-ramp to the Springwells off-ramp that will operate at LOS D, all other **northbound I-75** segments will operate at LOS C, or better. For **southbound I-75** in the PM peak period, except from the Grand Boulevard on-ramp to the Clark Street off-ramp, from the DRIC Plaza off-ramp to the Junction Street on-ramp, and from the Springwells off-ramp to the Dearborn on-ramp that will operate at LOS D, all other **southbound** segments will operate at LOS C, or better.

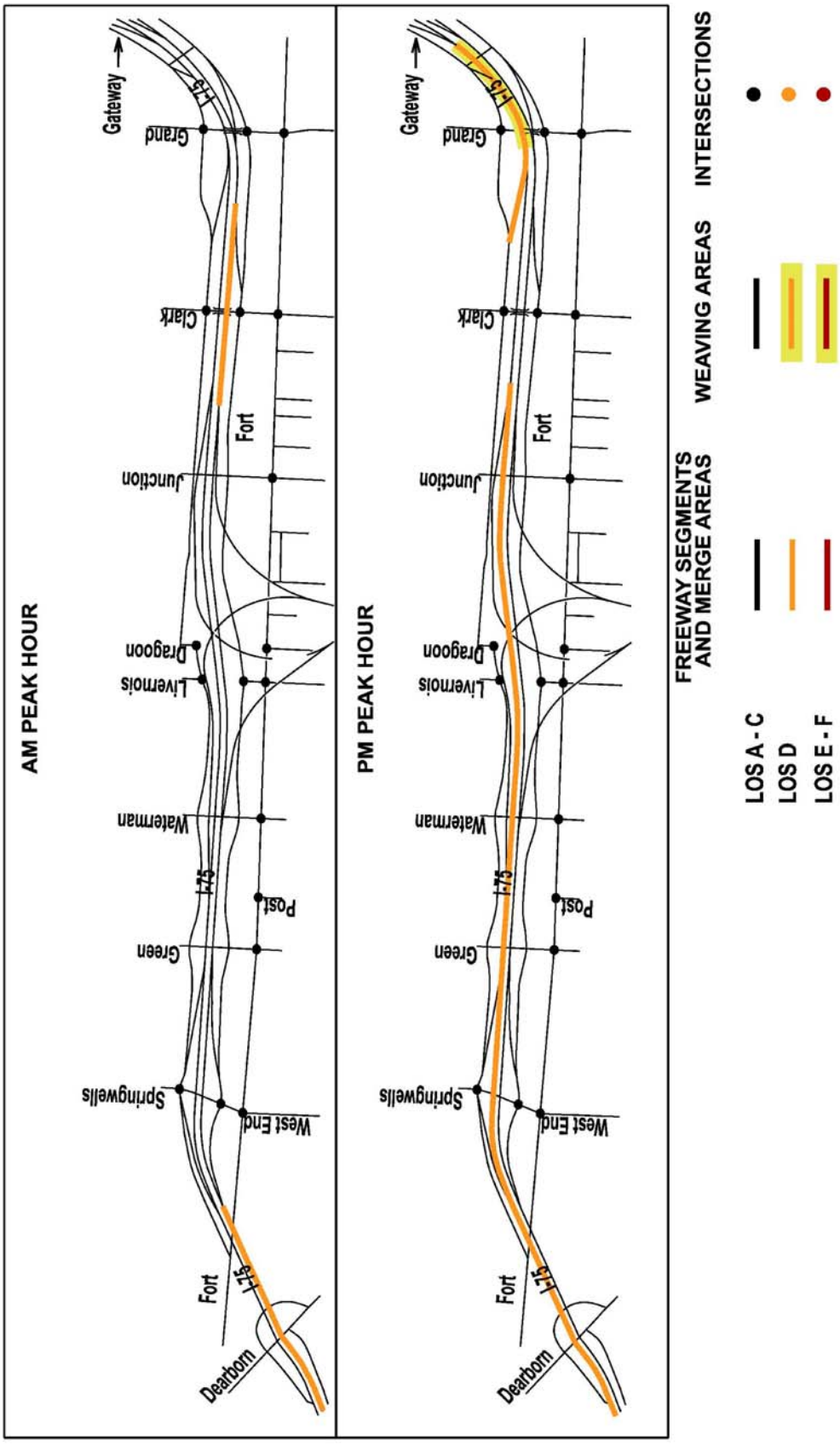


Figure 3-10
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

Table 3-49
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75 Main Lanes						
From Dearborn off-ramp to Springwells off-ramp	26.6	D	14.8	B	18.3	C
From Springwells off-ramp to Springwells on-ramp	24.6	C	13.3	B	16.8	B
From Springwells on-ramp to DRIC Plaza off-ramp	20.6	C	11.0	A	13.8	B
From DRIC Plaza off-ramp to Dragoon off-ramp	23.1	C	9.9	A	11.6	B
From Dragoon off-ramp to DRIC Plaza on-ramp	22.4	C	9.7	A	11.4	B
From DRIC Plaza on-ramp to Clark on-ramp	20.9	C	8.4	A	9.7	A
From Clark on-ramp to Grand Blvd. off-ramp	22.7	C	10.2	A	12.8	B
From Grand Blvd. off-ramp to WB I-96 off-ramp	22.6	C	9.2	A	11.8	B
Southbound I-75 Main Lanes						
From Ambassador Bridge on-ramp to Grand Blvd. on-ramp	13.9	B	13.1	B	24.2	C
From Grand Blvd. on-ramp to Clark off-ramp	14.0	B	13.3	B	26.2	D
From Clark off-ramp to DRIC Plaza off-ramp	11.4	B	11.9	B	24.9	C
From DRIC Plaza off-ramp to Junction on-ramp	13.0	B	12.7	B	26.3	D
From Junction on-ramp to DRIC Plaza on-ramp	10.5	A	10.4	A	22.2	C
From DRIC Plaza on-ramp to Springwells off-ramp	14.1	B	12.5	B	24.5	C
From Springwells off-ramp to Springwells on-ramp	16.2	B	14.9	B	29.9	D
From Springwells on-ramp to Dearborn on-ramp	16.9	B	17.1	B	31.7	D

Source: HCS, Parsons Transportation Group

Ramp Merge, Diverge and Weaving Areas

Under Build (2035) Alternative #16 conditions for each peak hour analyzed, the density output from HCS in the selected ramp merge and diverge areas and the corresponding Level of Service are summarized on Table 3-50 for one lane on- and off-ramps and on Table 3-51 for two lane on-ramps with an additional freeway lane.

Table 3-50
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service for Ramp Merge and Diverge Areas

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
Dearborn off-ramp	26.0	C	15.8	B	18.5	B
Springwells off-ramp	22.4	C	12.6	B	15.4	B
Springwells on-ramp	19.4	B	11.4	B	13.8	B
DRIC Plaza off-ramp (E. of Green)	2.2	A	*	A	2.1	A
Dragoon off-ramp	22.5	C	11.2	B	12.7	B
DRIC Plaza on-ramp (E. of Junction)	Refer to Table 3-51					
Clark on-ramp	20.8	C	11.6	B	14.2	B
Grand Blvd. off-ramp	22.1	C	14.1	B	16.4	B
Southbound I-75						
Service Drive on-ramp (E. of Grand Blvd.)	11.3	B	10.9	B	18.6	B
Clark off-ramp	20.9	C	18.5	B	26.3	C
DRIC Plaza off-ramp (E. of Junction)	*	A	*	A	8.7	A
Junction on-ramp	9.0	A	8.9	A	20.9	C
DRIC Plaza on-ramp (E. of Green)	Refer to Table 3-51					
Springwells off-ramp	13.3	B	12.0	B	24.5	C
Springwells on-ramp	15.1	B	15.2	B	28.8	D
Dearborn on-ramp	13.2	B	13.3	B	21.8	C

*Intentionally left blank; see Section 2.12.1, paragraph 2, page 2-4 for explanation.
Source: HCS, Parsons Transportation Group

Except for **southbound I-75** at the Springwells on-ramp in the PM peak hour which will operate at LOS D, all other one-lane ramp merge and diverge areas will operate at LOS C, or better for all peak periods analyzed.

Table 3-51
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service for Major Merge Areas
(Two-Lane On-Ramps with an Additional Freeway Lane)

Location	AM Peak			Midday Peak			PM Peak		
	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]	Actual v (pc/h)	Actual v_{R12} (pc/h)	Acceptable LOS?[a]
I-75 NB DRIC Plaza on-ramp	5127	1620	Yes	1951	530	Yes	2300	577	Yes
I-75 SB DRIC Plaza on-ramp	3323	1302	Yes	2901	995	Yes	6042	1650	Yes

[a]The LOS is acceptable if v < 9000 pc/h and v_{R12} < 4600 pc/h.
Source: HCS, Parsons Transportation Group

For all peak hours the two-lane plaza on ramp merge areas will operate at acceptable Levels of Service.

Under Build (2035) Alternative #16 conditions for each peak hour analyzed, Table 3-52 summarizes the density output from HCS for the selected weave segments and the corresponding Level of Service.

Table 3-52
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service for Weaving Segments

Location	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Northbound I-75						
From Springwells on-ramp to DRIC Plaza off-ramp	20.70	C	11.61	B	14.96	B
From Clark on-ramp to Grand Blvd. off-ramp	24.54	C	11.33	B	14.93	B
Southbound I-75						
From Ambassador Bridge on-ramp to Clark off-ramp	15.47	B	13.46	B	30.59	D
From DRIC Plaza on-ramp to Springwells off-ramp	16.38	B	13.33	B	26.85	C

Source: HCS, Parsons Transportation Group

Except for the **southbound I-75** weaving area from the Ambassador Bridge on-ramp to the Clark Street off-ramp that will operate at LOS D, all other weaving segments will operate at LOS C or better for all peak periods analyzed.

3.2.10.2 Local Intersections

Under Build (2035) Alternative #16 conditions, the delay output from the *VISSIM* model for each network intersection analyzed, and the Levels of Service assigned to the intersection as a whole, are summarized in Table 3-53.

Except for the Southbound Service Drive at Clark in the AM peak hour and the Northbound Service Drive at Clark in the PM peak hour that will operate at LOS C, all other signalized intersections analyzed will operate at LOS B, or better for all peak hours. A more detailed discussion of these VISSIM results is presented in Section 3.5.

Figure 3-11 graphically displays the level of service results for the Build (2035) Alternative #16 conditions for each freeway segment, merge/diverge area, weave area, and intersection studied.

Table 3-53
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.2	B	8.8	A	10.6	B
Fort at Green	9.0	A	12.3	B	12.3	B
Fort at Waterman	9.2	A	11.3	B	5.4	A
Fort at Livernois	10.6	B	9.7	A	13.3	B
Fort at Dragoon	5.3	A	7.0	A	10.4	B
Fort at Junction	9.1	A	9.0	A	10.3	B
Fort at Clark	14.7	B	12.8	B	13.6	B
Southbound Service Drive at Livernois	6.1	A	9.2	A	6.2	A
Southbound Service Drive at Dragoon	10.8	B	12.5	B	10.8	B
Northbound Service Drive at Livernois	13.1	B	11.4	B	11.8	B
Northbound Service Drive at Dragoon	13.9	B	14.5	B	11.6	B
Southbound Service Drive at Springwells	11.3	B	12.5	B	10.5	B
Northbound Service Drive at Westend	14.6	B	14.1	B	12.9	B
Northbound Service Drive at Clark	13.4	B	14.4	B	22.2	C
Southbound Service Drive at Clark	21.1	C	15.6	B	14.3	B
Fort at Grand Blvd.	4.6	A	4.6	A	5.4	A
Northbound Service Drive at Grand Blvd.	12.8	B	13.0	B	10.5	B
Southbound Service Drive at Grand Blvd.	7.3	A	7.7	A	6.0	A
Fort at Post	0.0	A	0.0	A	0.2	A

Source: VISSIM, Parsons Transportation Group

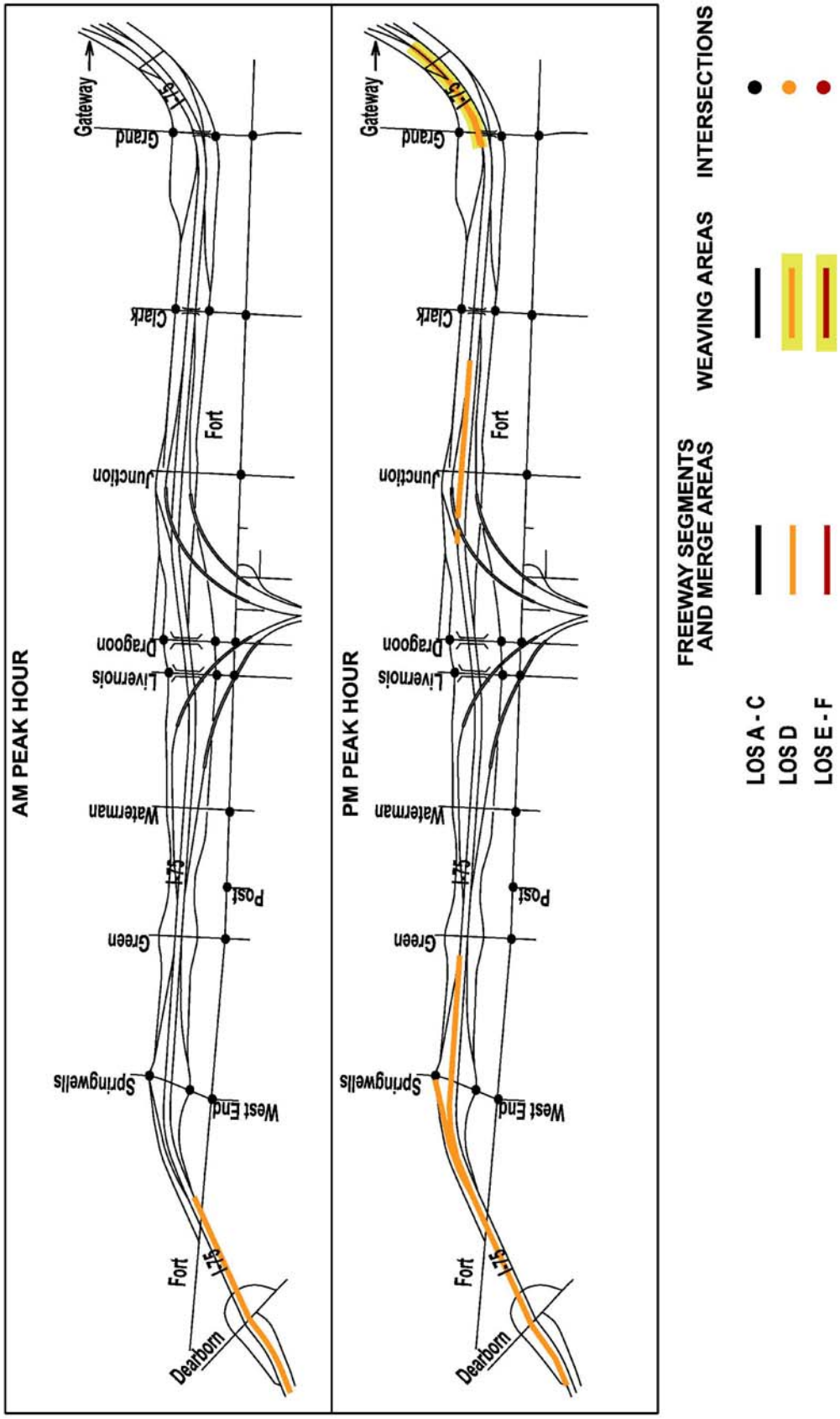


Figure 3-11
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service
I-75 Grand Boulevard to Dearborn Avenue

3.3 VISSIM Microsimulation Results

This report section summarizes the results of the analysis of existing and future traffic conditions within the DRIC study area using VISSIM microsimulation. VISSIM analyzes the entire freeway and arterial roadway system interacting and operating together in real time, rather than analyzing individual components separately. The methodology for the VISSIM simulation analysis was described in Section 2.1. The VISSIM results for the local intersections are reported in Sections 3.1 and 3.2, while the VISSIM results for the freeway operations presented here are a supplement to the HCS analysis reported in those sections. In addition, VISSIM's animation output provides a visualization of the entire network's operations/interactions as a system in each No Build and Build scenario.

3.3.1 Existing Conditions (Base Year 2006 without Gateway)

The analysis of existing conditions observed in the field in 2006 serves to calibrate the microsimulation model for use in the analysis of future conditions and to provide a starting point against which to compare the results of future No Build and Build alternatives. The calibration of the VISSIM simulation model was described in Section 2.1.3 above.

3.3.1.1 Local Intersections

For each peak hour analyzed, the delay and level of service experienced at the local intersections in the VISSIM model are summarized in Table 3-54. More detailed results are contained in Appendix F. The VISSIM results indicate that all of the signalized intersections within the study area operate at LOS A or B in all three peak hours. The intersection with the highest level of delay in all three peak hours is at Fort and Clark Streets. This is due to the high number of trucks from the Ambassador Bridge making a westbound right-turn at this intersection in order to access the freeway system. Consequently, the westbound right-turn movement (and the westbound approach as a whole) experiences LOS C, but the intersection as a whole still operates at LOS B due to the lower levels of delay experienced on the other approaches.

This may seem to go against the general perception of traffic conditions at the intersection of Fort and Clark Streets, where the heavy truck activity might lead observers to believe the approach level of service would be worse than LOS C. The perception stems from the fact that a queue of eight trucks can be 600 feet long compared to a 200-foot queue of eight cars. If the trucks eventually make it through the traffic signal either on a green indication or by turning right-on-red without having to wait through an additional cycle of the traffic signal, the level of service should be better than LOS D.

Field observations of the intersection during the three peak hours in question show the simulation to be properly replicating its traffic conditions. Although up to ten trucks might be queued at the intersection waiting to turn right at any given moment, it was observed that none of these trucks had to wait through more than one cycle of the traffic signal to make the turn. In addition, there were some cycles where no trucks were queued on the westbound approach at all. In total, these conditions average to a LOS C for the right-turn movement and for the approach.

This is not to say that the heavy truck activity at Fort and Clark Streets is not a traffic issue in the area. Due to their length, trucks do occasionally temporarily fill up the space between the I-75 service drives and Fort Street as they travel north on Clark Street. However, this queue clears out as soon as the traffic signal at the service drive turns green.

Table 3-54
Detroit River International Crossing Study
Base Year (2006) without Gateway Levels of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS	Intersection Delay (sec/veh)	Intersection LOS
Fort at Westend	10.6	B	10.9	B	10.7	B
Fort at Green	9.8	A	14.0	B	10.6	B
Fort at Waterman	11.0	B	12.8	B	9.8	A
Fort at Livernois	11.7	B	9.0	A	15.8	B
Jefferson at Livernois	8.1	A	8.5	A	9.2	A
Fort at Dragoon	7.5	A	8.2	A	8.2	A
Fort at Junction	10.0	A	8.9	A	9.8	A
Fort at Clark	18.1	B	18.1	B	18.5	B
Southbound Service Drive at Livernois	5.6	A	8.3	A	8.1	A
Southbound Service Drive at Dragoon	10.3	B	11.5	B	10.5	B
Northbound Service Drive at Livernois	10.4	B	10.8	B	11.6	B
Northbound Service Drive at Dragoon	9.4	A	11.5	B	12.8	B
Southbound Service Drive at Springwells	16.2	B	13.4	B	13.9	B
Northbound Service Drive at Westend	14.8	B	16.1	B	16.5	B
Northbound Service Drive at Clark	13.5	B	13.3	B	15.4	B
Southbound Service Drive at Clark	17.9	B	16.6	B	19.0	B
Fort at Grand Blvd.	4.4	A	6.0	A	6.5	A
Northbound Service Drive at Grand Blvd.	12.4	B	12.1	B	10.8	B
Southbound Service Drive at Grand Blvd.	8.1	A	8.1	A	7.2	A
Jefferson at Post	0.0	A	0.0	A	0.1	A
Fort at Post	0.0	A	0.0	A	0.3	A
Dearborn at Harbaugh	11.1	B	9.4	A	9.6	A
Jefferson at Zug Island	8.0	A	7.6	A	8.0	A
Jefferson at Employee & Truck Entrance	0.1	A	0.1	A	0.3	A
Jefferson at Dearborn	7.1	A	6.9	A	5.6	A

Source: VISSIM, Parsons Transportation Group

3.3.1.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-55A and 3-55B. More detailed results are contained in Appendix F. The VISSM results indicate that freeway segments within the study area generally operate at LOS C or better, with just one segment operating at LOS E in the AM peak hour as it approaches the congested portion of I-75 at the east end of the study area. This corresponds with field observations of the freeway system.

In the AM peak hour, northbound I-75 generally operates at LOS C from Dearborn Avenue to the interchange with I-96. As the northbound main lanes split between I-96 and I-75, I-75 experiences more congestion as it approaches downtown Detroit, with the segment between the Ambassador Bridge ramps and Michigan Avenue experiencing LOS E. The remainder of northbound I-75 is outside the DRIC study area. In contrast, westbound I-96 experiences LOS A as it continues north.

Also in the AM peak hour, southbound I-75 generally operates at LOS A or B, depending on the segment. Eastbound I-96 operates at LOS B or C as it approaches the I-75 interchange due to the fact that traffic bound for northbound I-75 will run into the congestion approaching downtown. However, once downtown-bound traffic splits off, I-96 operates at LOS A before merging with southbound I-75.

In the Midday peak hour, both directions of I-75 and I-96 operate at LOS A or B.

In the PM peak hour, northbound I-75 and I-96 operate at LOS A or B. In the other direction, eastbound I-96 operates at LOS A or B before merging with southbound I-75, which operates at LOS D as it merges with I-96. Southbound I-75 then generally operates at LOS C, with a couple segments operating at LOS D (between Waterman and Green, and south of Springwells).

3.3.1.3 Animation of Traffic Operations

VISSIM's graphical animation allows the user to view traffic control operations, traffic interactions, and congestion levels on the simulated roadways. VISSIM produces both 2-D and 3-D graphical animation files, which can be created using multiple "camera" perspectives. These animations can be viewed in the VISSIM software or exported to the AVI format which can be played on any Windows-based computer.

Several AVIs that show the existing conditions in each of the peak hours have been created and are provided on a DVD (Appendix B). A primary AVI file for each peak hour provides a view that essentially flies above the network, giving a general sense of the scope of the model while briefly focusing on various points of interest, such as Clark Street between Fort Street and I-75, which most trucks from the Ambassador Bridge currently use to access the freeway system.

Table 3-55A
Detroit River International Crossing Study
Base Year (2006) without Gateway Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.21	C	11.0	A	12.6	B
From Springwells to Springwells on-ramp	20.18	C	10.1	A	11.7	B
From Springwells on-ramp to Green	18.65	C	9.9	A	11.3	B
From Green to Waterman	22.93	C	12.2	B	13.8	B
From Waterman to Livernois	22.18	C	11.5	B	13.0	B
From Dragoon to Dragoon on-ramp	21.95	C	11.3	B	12.8	B
From Dragoon on-ramp to Junction	19.03	C	10.3	A	12.2	B
From Junction to Clark	23.74	C	12.4	B	14.7	B
From Clark to Clark on-ramp	26.52	D	12.5	B	15.0	B
From Clark on-ramp to Grand	21.03	C	11.7	B	14.2	B
From Porter off-ramp to NB I-75 / I-96 Diverge	18.99	C	9.4	A	11.6	B
From NB I-75/I-96 Diverge to Ambassador Plaza Ramps	24.27	C	10.7	A	13.8	B
From Ambassador Plaza Ramps to Michigan	40.93	E	11.4	B	14.9	B
I-96 From NB I-75 / I-96 Diverge to Ambassador Plaza Ramps	11.49	B	7.3	A	7.9	A
I-96 From Ambassador Plaza Ramps to Michigan	13.19	B	8.4	A	9.3	A
I-96 From Michigan to C-D Road	13.25	B	8.6	A	9.7	A
I-96 From C-D Road to MLK On Ramp	9.85	A	7.9	A	17.4	B
I-96 From MLK on-ramp to I-94 off-ramp	8.61	A	7.0	A	15.8	B
I-96 From I-94 off-ramp to Warren On Ramp	3.46	A	2.0	A	11.2	B
I-96 From Warren on-ramp to I-94	3.06	A	2.0	A	10.6	A
I-96 From I-94 to I-94 on-ramp	3.86	A	2.5	A	13.0	B

Source: VISSIM, Parsons Transportation Group

Table 3-55B
Detroit River International Crossing Study
Base Year (2006) without Gateway Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Springwells to West of Dearborn	10.29	A	13.7	B	28.3	D
From Green to Springwells	9.07	A	12.3	B	25.7	C
From Waterman to Green	11.42	B	14.3	B	28.0	D
From Livernois on-ramp to Waterman	9.16	A	11.6	B	22.7	C
From Livernois to Livernois on-ramp	10.79	A	12.4	B	25.2	C
From Junction to Dragoon	11.12	B	12.6	B	25.9	C
From Clark on-ramp to Junction	10.17	A	11.0	A	22.3	C
From Clark to Clark on-ramp	10.79	A	11.1	B	22.4	C
From Clark off-ramp to Clark	10.82	A	11.1	B	22.4	C
From Grand to Clark off-ramp	10.78	A	10.6	A	20.4	C
From Future Frontage Road on-ramp to Grand	9.76	A	10.0	A	18.8	C
SB I-75/I-96 Merge Area	10.14	A	10.4	A	19.5	C
From Ambassador Plaza Ramps to SB I-75/I-96 Merge	12.13	B	13.4	B	26.1	D
From Michigan to Ambassador Plaza Ramps	12.74	B	14.8	B	28.1	D
I-96 From Ambassador Plaza Ramps to SB I-75/I-96 Merge	6.71	A	5.5	A	9.2	A
I-96 From Michigan to Ambassador Plaza Ramps	9.02	A	7.6	A	13.8	B
I-96 From NB I-75 off-ramp to Michigan	9.99	A	8.1	A	15.1	B
I-96 From Warren on-ramp to NB I-75 off-ramp	22.27	C	6.9	A	10.5	A
I-96 From I-94 on-ramp to Warren on-ramp	16.97	B	6.4	A	8.8	A
I-96 From I-94 to I-94 on-ramp	16.04	B	4.3	A	7.2	A
I-96 From I-94 off-ramp to I-94	17.87	B	5.1	A	7.8	A

Source: VISSIM, Parsons Transportation Group

3.3.2 Existing Conditions with Gateway (Base Year 2006)

The existing conditions were modified to incorporate the geometry and traffic flow changes that will occur due to the construction of the Gateway Project, which will be complete by 2009. The analysis of these Base Year 2006 conditions provides a baseline against which to compare the results of future No Build and Build alternatives, which will all have the Gateway Project in place.

3.3.2.1 Local Intersections

For each peak hour analyzed, Appendix C contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-4 in Section 3.1.2. All of the signalized intersections within the study area operate at LOS A or B in all three peak hours. These results are very similar to those from the existing conditions. For the intersection of Fort and Clark Streets, total intersection delay decreases in each peak hour based on a large number of trucks no longer going through that intersection. (But it should be noted that the intersection operates at LOS B in all peak hours in both alternatives.)

3.3.2.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-56A and 3-56B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) are generally the same as that observed in the existing conditions scenario. The only significant change occurs on westbound I-96 in the PM peak hour between the new Gateway ramps and the merge with I-75. While the equivalent area operated at LOS A under existing conditions, it operates at LOS C with the Gateway Project in place. This is due to the fact that the Gateway Project reduces this segment of freeway (the connection from I-96 to southbound I-75) from its existing two lanes to just one lane.

3.3.2.3 Animation of Traffic Operations

AVI animation files that show the Gateway Project incorporated into the existing conditions in each of the peak hours have been created and are provided on a DVD (Appendix B). Rather than giving an overview of the entire VISSIM model, these AVIs focus on the new Gateway Project and how its ramps connect to the freeway system and eliminate the need for so many trucks to use Fort Street and Clark Street.

Table 3-56A
Detroit River International Crossing Study
Base Year (2006) Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.21	C	11.0	A	12.6	B
From Springwells to Springwells on-ramp	20.18	C	10.1	A	11.7	B
From Springwells on-ramp to Green	18.74	C	9.9	A	11.3	B
From Green to Waterman	22.96	C	12.2	B	13.8	B
From Waterman to Livernois	22.18	C	11.5	B	13.0	B
From Dragoon to Dragoon on-ramp	21.94	C	11.4	B	12.7	B
From Dragoon on-ramp to Junction	18.96	C	10.3	A	12.2	B
From Junction to Clark	23.71	C	12.4	B	14.7	B
From Clark to Clark on-ramp	26.19	D	12.5	B	15.0	B
From Clark on-ramp to Grand	20.58	C	11.2	B	13.5	B
From Porter off-ramp to NB I-75 / I-96 Diverge	18.79	C	9.0	A	11.1	B
From NB I-75/I-96 Diverge to Gateway Ramps	23.86	C	10.5	A	13.6	B
From Gateway Ramps to Michigan	38.69	E	11.3	B	14.7	B
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	11.21	B	6.9	A	7.3	A
I-96 From Gateway Ramps to Michigan	13.47	B	8.5	A	9.4	A
I-96 From Michigan to C-D Road	13.63	B	8.8	A	9.8	A
I-96 From C-D Road to MLK on-ramp	10.03	A	8.0	A	17.5	B
I-96 From MLK on-ramp to I-94 off-ramp	10.93	A	7.1	A	15.8	B
I-96 From I-94 off-ramp to Warren on-ramp	3.51	A	2.0	A	11.2	B
I-96 From Warren on-ramp to I-94	3.09	A	2.0	A	10.6	A
I-96 From I-94 to I-94 on-ramp	3.90	A	2.5	A	13.0	B

Source: VISSIM, Parsons Transportation Group

Table 3-56B
Detroit River International Crossing Study
Base Year (2006) Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Springwells to West of Dearborn	10.28	A	13.7	B	28.2	D
From Green to Springwells	9.06	A	12.4	B	25.5	C
From Waterman to Green	11.38	B	14.5	B	27.7	D
From Livernois on-ramp to Waterman	9.11	A	11.7	B	22.5	C
From Livernois to Livernois on-ramp	10.66	A	12.4	B	25.1	C
From Junction to Dragoon	10.86	A	12.6	B	25.4	C
From Clark on-ramp to Junction	9.68	A	10.6	A	21.0	C
From Clark to Clark on-ramp	11.75	B	12.5	B	23.5	C
From Clark off-ramp to Clark	9.46	A	10.1	A	19.0	C
From Grand to Clark off-rmp	9.62	A	9.7	A	17.7	B
From Gateway on-ramp to New Frontage Road on-ramp	10.73	A	10.7	A	19.4	C
SB I-75/I-96 Merge Area	10.28	A	10.5	A	19.8	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.21	B	13.4	B	26.2	D
From Michigan to Gateway Ramps	12.76	B	14.8	B	28.2	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	14.72	B	11.6	B	19.4	C
I-96 From Michigan to Gateway Ramps	10.89	A	9.3	A	16.9	B
I-96 From NB I-75 off-ramp to Michigan	10.02	A	8.1	A	15.1	B
I-96 From Warren on-ramp to NB I-75 off-ramp	23.45	C	6.9	A	10.5	A
I-96 From I-94 on-ramp to Warren on-ramp	16.97	B	6.4	A	8.8	A
I-96 From I-94 to I-94 on-ramp	16.04	B	4.3	A	7.2	A
I-96 From I-94 off-ramp to I-94	17.87	B	5.1	A	7.8	A

Source: VISSIM, Parsons Transportation Group

3.3.3 No Build (2035) Alternative

The Base Year 2006 geometry (including the Gateway Project) was analyzed using traffic volumes projected for the year 2035 to produce a future No Build alternative. In addition, improvements that are planned for eastbound I-94 were incorporated into the model.

3.3.3.1 Local Intersections

For each peak hour analyzed, Appendix D contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-8 in Section 3.2.1.2.

All of the signalized intersections within the study area operate at LOS A or B in all three peak hours. These results are very similar to those from the existing conditions with Gateway (Base Year 2006).

3.3.3.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-57A and 3-57B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) are generally similar as that observed in the existing conditions with Gateway scenario (Base Year 2006). In the Midday peak hour, all segments would continue to operate at LOS A or B. In the PM peak hour, most segments would continue to operate at LOS C or better with a few more LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS A or B in the southbound direction and most segments would continue to operate at LOS C or better in the northbound direction.

It should be noted that initial VISSIM testing showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area under all No Build and Build Alternatives.

3.3.3.3 Animation of Traffic Operations

AVI animation files that show the study network operating with projected 2035 No Build traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B).

Table 3-57A
Detroit River International Crossing Study
No Build (2035) Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.17	C	12.75	B	13.99	B
From Springwells to Springwells on-ramp	20.17	C	12.08	B	13.33	B
From Springwells on-ramp to Green	18.99	C	11.27	B	12.26	B
From Green to Waterman	23.31	C	13.94	B	15.18	B
From Waterman to Livernois	22.30	C	13.25	B	14.52	B
From Dragoon to Dragoon on-ramp	22.06	C	13.10	B	14.39	B
From Dragoon on-ramp to Junction	18.53	C	11.50	B	13.45	B
From Junction to Clark	23.12	C	14.10	B	16.60	B
From Clark to Clark on-ramp	24.62	C	14.57	B	18.22	C
From Clark on-ramp to Grand	20.16	C	13.85	B	25.76	C
From Porter off-ramp to NB I-75 / I-96 Diverge	19.15	C	9.61	A	11.94	B
From NB I-75/I-96 Diverge to Gateway Ramps	17.97	B	11.53	B	13.93	B
From Gateway Ramps to Michigan	37.47	E	12.30	B	14.88	B
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	21.55	C	6.22	A	7.56	A
I-96 From Gateway Ramps to Michigan	14.71	B	9.18	A	10.68	A
I-96 From Michigan to C-D Road	13.74	B	10.06	A	11.03	B
I-96 From C-D Road to MLK on-ramp	4.51	A	8.19	A	16.61	B
I-96 From MLK on-ramp to I-94 off-ramp	3.82	A	7.47	A	15.65	B
I-96 From I-94 off-ramp to Warren on-ramp	3.29	A	2.94	A	9.86	A
I-96 From Warren on-ramp to I-94	2.76	A	2.95	A	9.40	A
I-96 From I-94 to I-94 on-ramp	3.51	A	3.63	A	11.53	B

Source: VISSIM, Parsons Transportation Group

Table 3-57B
Detroit River International Crossing Study
No Build (2035) Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Springwells to West of Dearborn	12.05	B	14.77	B	28.67	D
From Green to Springwells	11.07	B	13.59	B	26.42	D
From Waterman to Green	13.63	B	15.98	B	28.42	D
From Livernois on-ramp to Waterman	10.88	A	12.89	B	22.89	C
From Livernois to Livernois on-ramp	13.07	B	13.98	B	25.99	C
From Junction to Dragoon	13.25	B	14.09	B	26.25	D
From Clark on-ramp to Junction	11.39	B	11.45	B	21.60	C
From Clark to Clark on-ramp	13.89	B	13.44	B	24.07	C
From Clark off-ramp to Clark	11.28	B	10.90	A	19.63	C
From Grand to Clark off-ramp	10.87	A	10.15	A	17.57	B
From Gateway on-ramp to New Frontage Road on-ramp	12.09	B	11.20	B	18.78	C
SB I-75/I-96 Merge Area	10.30	A	10.16	A	18.31	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.54	B	13.50	B	24.81	C
From Michigan to Gateway Ramps	12.94	B	15.56	B	28.93	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	14.35	B	8.88	A	15.02	B
I-96 From Michigan to Gateway Ramps	10.10	A	9.33	A	17.06	B
I-96 From NB I-75 off-ramp to Michigan	9.40	A	8.39	A	15.06	B
I-96 From Warren on-ramp to NB I-75 off-ramp	20.85	C	6.85	A	9.87	A
I-96 From I-94 on-ramp to Warren on-ramp	17.86	B	7.18	A	9.55	A
I-96 From I-94 to I-94 on-ramp	14.97	B	4.68	A	6.85	A
I-96 From I-94 off-ramp to I-94	15.88	B	5.27	A	7.01	A

Source: VISSIM, Parsons Transportation Group

3.3.4 Build (2035) Alternative #1

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #1. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-10) and changes in local ramps to the I-75 service drives.

3.3.4.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-13 in Section 3.2.2.2.

All of the signalized intersections within the study area operate at LOS C or better in all three peak hours.

3.3.4.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-58A and 3-58B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #1 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B, with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in the southbound direction, but a few segments on eastbound I-96 would degrade to LOS D (due to increased traffic volumes on northbound I-75 east of I-96). In the northbound direction, most segments would continue to operate at LOS C or better, but one segment would degrade to LOS E and another would degrade to LOS F.

The levels of service E and F experienced in the northbound direction result when AM peak hour traffic encounters a connection from northbound I-75 to westbound I-96 which is one lane (today, it is two lanes). While this reduction in lanes did not cause an appreciable difference in the No Build alternative, under the increased traffic volumes of Alternative #1, the one-lane ramp operates at LOS F. This is because the future traffic volume projections of DRIC alternatives using the X-10 crossing place 1,802 vehicles per hour on this one-lane ramp to I-96. While a one-lane ramp should be able to handle 1,802 vehicles, it causes turbulence on I-75 as cars and trucks must weave into position to enter the single lane. The most turbulence is caused by vehicles weaving from the northbound on-ramp from Clark Street. This extends the turbulence upstream of the on-ramp which causes this segment to operate at LOS E. This situation will be looked at in greater detail during the selection process for the preferred alternative. A resolution for this issue will be identified in the FEIS.

Also, as with the 2035 No Build alternative, initial VISSIM testing showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify

Table 3-58A
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.71	C	12.43	B	14.72	B
From Springwells to Springwells on-ramp	20.27	C	11.63	B	14.09	B
From Green to Waterman	16.00	B	8.92	A	10.74	A
From Waterman to New Plaza off-ramp	18.45	C	7.93	A	9.12	A
From New Plaza off-ramp to Livernois	18.56	C	7.86	A	9.02	A
From Dragoon to Dragoon on-ramp	14.25	B	6.16	A	7.05	A
From Dragoon on-ramp to Junction	19.60	C	8.83	A	10.47	A
From Junction to New Plaza on-ramp	15.25	B	6.33	A	7.31	A
From New Plaza on-ramp to Clark	21.18	C	7.76	A	8.92	A
From Clark to Clark on-ramp	35.56	E	9.73	A	11.10	B
From Clark on-ramp to Grand	31.95	D	8.95	A	10.63	A
From Porter off-ramp to NB I-75 / I-96 Diverge	30.40	D	7.48	A	9.61	A
From NB I-75/I-96 Diverge to Gateway Ramps	16.63	B	9.05	A	10.34	A
From Gateway Ramps to Michigan	29.86	D	9.66	A	10.89	A
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	49.91	F	5.10	A	8.60	A
I-96 From Gateway Ramps to Michigan	18.76	C	6.94	A	9.72	A
I-96 From Michigan to C-D Road	16.36	B	7.61	A	9.42	A
I-96 From C-D Road to MLK on-ramp	5.34	A	6.68	A	15.84	B
I-96 From MLK on-ramp to I-94 off-ramp	4.40	A	6.36	A	14.66	B
I-96 From I-94 off-ramp to Warren on-ramp	3.62	A	1.99	A	9.37	A
I-96 From Warren on-ramp to I-94	3.02	A	2.14	A	8.75	A
I-96 From I-94 to I-94 on-ramp	3.85	A	2.62	A	10.95	A

Source: VISSIM, Parsons Transportation Group

Table 3-58B
Detroit River International Crossing Study
Build (2035) Alternative #1 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	13.68	B	14.19	B	26.92	D
From Springwells on-ramp to Fort	10.88	A	11.45	B	21.98	C
From Springwells to West of Dearborn	13.18	B	13.18	B	26.00	C
From Springwells off-ramp to Springwells	13.30	B	13.28	B	26.43	D
From Green to Springwells	10.37	A	10.55	A	20.83	C
From Flyover on-ramp to Green	8.44	A	8.64	A	16.93	B
From Livernois to New Plaza ramp	7.68	A	8.89	A	19.19	C
From Waterman to Green	9.18	A	9.49	A	20.97	C
From Junction to off-ramp	9.68	A	9.82	A	21.42	C
From off-ramp to Dragoon	9.14	A	8.49	A	17.91	B
From Clark on-ramp to Junction	9.85	A	9.95	A	21.35	C
From Clark off-ramp to lane drop prior to Clark	10.04	A	10.14	A	22.10	C
From Grand to Clark off-ramp	9.58	A	8.94	A	18.63	C
From Gateway on-ramp to New Frontage Road on-ramp	10.56	A	9.88	A	18.78	C
SB I-75/I-96 Merge Area	11.13	B	10.51	A	20.07	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.44	B	12.47	B	25.17	C
From Michigan to Gateway Ramps	12.62	B	13.85	B	27.85	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	19.56	C	14.51	B	23.50	C
I-96 From Michigan to Gateway Ramps	17.19	B	9.13	A	17.54	B
I-96 From NB I-75 off-ramp to Michigan	15.16	B	8.45	A	15.37	B
I-96 From Warren on-ramp to NB I-75 off-ramp	27.08	D	6.47	A	9.85	A
I-96 From I-94 on-ramp to Warren on-ramp	26.81	D	6.75	A	9.47	A
I-96 From I-94 to I-94 on-ramp	17.20	B	3.84	A	6.98	A
I-96 From I-94 off-ramp to I-94	18.10	C	4.36	A	7.14	A

Source: VISSIM, Parsons Transportation Group

those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

3.3.4.3 Animation of Traffic Operations

AVI animation files that show the Alternative #1 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps. In addition, the AVI for the AM peak hour shows the congestion on the one-lane ramp to westbound I-96 and the turbulence it causes upstream on northbound I-75.

3.3.5 Build (2035) Alternative #2

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #2. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-10) and changes in local ramps to the I-75 service drives.

3.3.5.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-18 in Section 3.2.3.2. All of the signalized intersections within the study area operate at LOS A or B or better in all three peak hours.

3.3.5.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-59A and 3-59B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #2 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B, with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in the southbound direction, but one segment on eastbound I-96 would degrade to LOS D (due to increased traffic volumes on northbound I-75, similar to Alternative #1). In the northbound direction, most segments would continue to operate at LOS C or better, but two segments would degrade to LOS E and one would degrade to LOS F.

As in Alternative #1, the levels of service E and F experienced in the northbound direction result when AM peak hour traffic encounters a connection from northbound I-75 to westbound I-96 which is one lane (today, it is two lanes). The one-lane ramp operates at LOS F because the future traffic volume projections of DRIC alternatives using the X-10 crossing alternatives place 1,802 vehicles per hour on this one-lane ramp to I-96. While a one-lane ramp should be able to

Table 3-59A
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.71	C	12.43	B	14.72	B
From Springwells to Springwells on-ramp	20.34	C	11.66	B	14.13	B
From Springwells on-ramp to Green	15.93	B	9.04	A	10.92	A
From Green to Waterman	13.31	B	7.56	A	9.13	A
From Waterman to Livernois	14.57	B	6.28	A	7.25	A
From Dragoon to Dragoon on-ramp	14.52	B	6.14	A	7.16	A
From Dragoon on-ramp to Junction	19.12	C	8.12	A	9.45	A
From Junction to New Plaza on-ramp	17.00	B	5.92	A	6.70	A
From New Plaza on-ramp to Clark	30.12	D	7.23	A	8.16	A
From Clark to Clark on-ramp	42.29	E	9.08	A	10.13	A
From Clark on-ramp to Grand	35.31	E	9.08	A	10.96	A
From Porter off-ramp to NB I-75 / I-96 Diverge	31.12	D	7.56	A	10.02	A
From NB I-75/I-96 Diverge to Gateway Ramps	15.95	B	9.15	A	10.71	A
From Gateway Ramps to Michigan	29.94	D	9.70	A	11.20	B
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	52.13	F	5.06	A	8.94	A
I-96 From Gateway Ramps to Michigan	21.66	C	6.91	A	9.97	A
I-96 From Michigan to C-D Road	16.35	B	7.56	A	9.64	A
I-96 From C-D Road to MLK on-ramp	10.20	A	6.65	A	15.92	B
I-96 From MLK on-ramp to I-94 off-ramp	9.67	A	6.33	A	14.73	B
I-96 From I-94 off-ramp to Warren on-ramp	3.65	A	1.98	A	9.47	A
I-96 From Warren on-ramp to I-94	3.04	A	2.13	A	8.84	A
I-96 From I-94 to I-94 on-ramp	3.86	A	2.61	A	11.04	B

Source: VISSIM, Parsons Transportation Group

Table 3-59B
Detroit River International Crossing Study
Build (2035) Alternative #2 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	13.75	B	14.34	B	27.04	D
From Springwells on-ramp to Fort	10.97	A	12.03	B	23.15	C
From Springwells to West of Dearborn	13.10	B	12.17	B	25.01	C
From Springwells off-ramp to Springwells	13.21	B	12.24	B	25.37	C
From Green to Springwells (5 lanes)	10.29	A	9.70	A	20.04	C
From Green to Springwells (6 lanes)	8.23	A	7.78	A	15.97	B
From Flyover on-ramp to Green	8.37	A	7.92	A	16.16	B
From Waterman to Green	9.40	A	9.85	A	22.47	C
From Junction to Green	8.82	A	8.55	A	18.75	C
From Junction Dragoon	10.92	A	10.50	A	22.36	C
From Clark on-ramp to Junction	9.27	A	9.66	A	21.02	C
From Clark off-ramp to lane drop prior to Clark	9.50	A	9.90	A	21.87	C
From Grand to Clark off-ramp	9.60	A	8.98	A	18.73	C
From Gateway on-ramp to New Frontage Road on-ramp	10.67	A	9.90	A	18.80	C
SB I-75/I-96 Merge Area	11.37	B	10.57	A	20.10	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.45	B	12.48	B	25.20	C
From Michigan to Gateway Ramps	12.62	B	13.85	B	27.89	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	21.31	C	14.91	B	23.68	C
I-96 From Michigan to Gateway Ramps	21.65	C	9.27	A	17.40	B
I-96 From NB I-75 off-ramp to Michigan	15.04	B	8.46	A	15.35	B
I-96 From Warren on-ramp to NB I-75 off-ramp	26.53	D	6.47	A	9.83	A
I-96 From I-94 on-ramp to Warren on-ramp	24.59	C	6.74	A	9.43	A
I-96 From I-94 to I-94 on-ramp	17.20	B	3.84	A	6.96	A
I-96 From I-94 off-ramp to I-94	18.10	C	4.36	A	7.13	A

Source: VISSIM, Parsons Transportation Group

handle 1,802 vehicles, it causes turbulence on I-75 as cars and trucks must weave into position to enter the single lane. The most turbulence is caused by vehicles weaving from the northbound on-ramp from Clark Street. This extends the turbulence upstream of the on-ramp which causes this segment to operate at LOS E. This situation will be looked at in greater detail during the selection process for the preferred alternative. A resolution for this issue will be identified in the FEIS.

Also, initial VISSIM testing showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

3.3.5.3 Animation of Traffic Operations

AVI animation files that show the Alternative #2 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps. In addition, the AVI for the AM peak hour shows the congestion on the one-lane ramp to westbound I-96 and the turbulence it causes upstream on northbound I-75.

3.3.6 Build (2035) Alternative #3

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #3. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-10) and changes in local ramps to the I-75 service drives.

3.3.6.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-23 in Section 3.2.4.2. All of the signalized intersections within the study area will operate at LOS A or B or better in all three peak hours.

3.3.6.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-60A and 3-60B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #3 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B,

Table 3-60A
Detroit River International Crossing
Build (2035) Alternative #3 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.71	C	12.43	B	14.72	B
From Springwells to Springwells on-ramp	20.34	C	11.66	B	14.13	B
From Springwells on-ramp to Green	15.93	B	9.04	A	10.92	A
From Green to Waterman	16.60	B	8.98	A	10.84	A
From Waterman to Livernois	20.70	C	7.95	A	9.18	A
From Livernois to Dragoon	22.31	C	7.60	A	8.76	A
From new plaza ramp to lane drop before Junction	20.69	C	6.53	A	7.63	A
From lane drop to Junction	27.11	D	8.13	A	9.49	A
From Junction to Clark	25.53	C	5.81	A	6.60	A
From Junction to Clark	36.29	E	7.21	A	8.19	A
From Clark to Clark on-ramp	47.75	F	9.00	A	10.17	A
From Clark on-ramp to Grand	38.60	E	9.03	A	10.85	A
From Porter off-ramp to NB I-75/I-96 Diverge	35.73	E	7.52	A	9.44	A
From NB I-75/I-96 Diverge to Gateway Ramps	15.50	B	9.11	A	10.12	A
From Gateway Ramps to Michigan	27.48	D	9.68	A	10.73	A
I-96 From NB I-75/I-96 Diverge to Gateway Ramps	49.35	F	5.11	A	8.39	A
I-96 From Gateway Ramps to Michigan	20.18	C	6.94	A	9.47	A
I-96 From Michigan to C-D Road	15.77	B	7.57	A	9.15	A
I-96 From C-D Road to MLK on-ramp	9.94	A	6.24	A	15.74	B
I-96 From on-ramp to I-94 off-ramp	10.31	A	5.98	A	14.51	B
I-96 From I-94 Off Ramp to Warren on-ramp	3.60	A	1.88	A	9.35	A
I-96 From Warren on-ramp to I-94	3.00	A	2.05	A	8.74	A
I-96 From I-94 to I-94 on-ramp	3.81	A	2.51	A	10.93	A

Source: VISSIM, Parsons Transportation Group

Table 3-60B
Detroit River International Crossing Study
Build (2035) Alternative #3 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	13.03	B	13.41	B	26.92	D
From Springwells on-ramp to Fort	16.08	B	11.15	B	22.73	C
From Springwells to West of Dearborn	19.30	C	11.30	B	24.84	C
From Springwells off-ramp to Springwells	13.50	B	11.31	B	25.02	C
From Green to Springwells	5.61	A	9.17	A	19.83	C
From Flyover on-ramp to Green	6.71	A	8.06	A	16.65	B
From Livernois off-ramp to new plaza on ramp	16.54	B	9.87	A	22.73	C
From Livernois on-ramp to Livernois	7.37	A	7.74	A	17.79	B
From Junction off-ramp to Livernois on ramp	10.95	A	9.61	A	21.45	C
From new plaza off-ramp to Junction on ramp	9.68	A	8.64	A	18.62	C
From Clark to new plaza off-ramp	6.07	A	8.49	A	18.84	C
From Clark off-ramp to Clark	9.92	A	10.14	A	22.53	C
From Grand to Clark off-ramp	9.54	A	8.96	A	18.63	C
From Gateway On Ramp to New Frontage Road on-ramp	10.63	A	9.89	A	18.86	C
SB I-75/I-96 Merge Area	11.31	B	10.56	A	20.16	C
From Gateway Ramps to SB I-75/I-96 Merge	12.43	B	12.49	B	25.16	C
From Michigan to Gateway Ramps	10.06	A	13.85	B	27.88	D
I-96 From Gateway Ramps to SB I-75/I-96 Merge	21.20	C	14.92	B	24.27	C
I-96 From Michigan to Gateway Ramps	26.38	D	9.27	A	18.21	C
I-96 From NB I-75 off-ramp to Michigan	19.01	C	8.44	A	15.43	B
I-96 From Warren on-ramp to NB I-75 off-ramp	26.52	D	6.46	A	9.90	A
I-96 From I-94 on-ramp to Warren on-ramp	25.75	C	6.74	A	9.44	A
I-96 From I-94 to I-94 on-ramp	6.46	A	3.84	A	6.96	A
I-96 From I-94 off-ramp to I-94	18.10	C	4.36	A	7.13	A

Source: VISSIM, Parsons Transportation Group

with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in the southbound direction, but one segment on eastbound I-96 would degrade to LOS D (due to increased traffic volumes on northbound I-75, similar to Alternatives #1 and #2). In the northbound direction, most segments would continue to operate at LOS C or better, but three segments would degrade to LOS E and two would degrade to LOS F.

As in the previous alternatives, the levels of service E and F experienced in the northbound direction result when AM peak hour traffic encounters a connection from northbound I-75 to westbound I-96 which is one lane (today, it is two lanes). The one-lane ramp operates at LOS F because the future traffic volume projections of DRIC alternatives using the X-10 crossing alternatives place 1,802 vehicles per hour on this one-lane ramp to I-96. While a one-lane ramp should be able to handle 1,802 vehicles, it causes turbulence on I-75 as cars and trucks must weave into position to enter the single lane. The most turbulence is caused by vehicles weaving from the northbound on-ramp from Clark Street. This extends the turbulence upstream of the on-ramp which causes several segments to operate at LOS E and one to operate at LOS F. This situation will be looked at in greater detail during the selection process for the preferred alternative. A resolution for this issue will be identified in the FEIS.

Also, initial VISSIM testing showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

3.3.6.3 Animation of Traffic Operations

AVI animation files that show the Alternative #3 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps. In addition, the AVI for the AM peak hour shows the congestion on the one-lane ramp to westbound I-96 and the turbulence it causes upstream on northbound I-75.

3.3.7 Build (2035) Alternative #5

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #5. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-10) and changes in local ramps to the I-75 service drives.

3.3.7.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-28 in Section 3.2.5.2. All of the signalized intersections within the study area operate at LOS A or B in all three peak hours.

3.3.7.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-61A and 3-61B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #5 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B, with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in the southbound direction, but a few segments on eastbound I-96 would degrade to LOS D (due to increased traffic volumes on northbound I-75, similar to the previous alternatives). In the northbound direction, most segments would continue to operate at LOS C or better, but three segments would degrade to LOS F.

As in the previous alternatives, the levels of service E and F experienced in the northbound direction result when AM peak hour traffic encounters a connection from northbound I-75 to westbound I-96 which is one lane (today, it is two lanes). The one-lane ramp operates at LOS F because the future traffic volume projections of DRIC alternatives using the X-10 crossing alternatives place 1,802 vehicles per hour on this one-lane ramp to I-96. While a one-lane ramp should be able to handle 1,802 vehicles, it causes turbulence on I-75 as cars and trucks must weave into position earlier to enter the single lane. In contrast to the previous alternatives, Alternative #5 does not have a northbound on-ramp from Clark Street. Therefore, there is no weaving operation near the entry of the one-lane ramp, but instead the congestion on the one-lane ramp extends directly into the immediate upstream segments and is concentrated at LOS F. This situation will be looked at in greater detail during the selection process for the preferred alternative. A resolution for this issue will be identified in the FEIS.

Also, initial VISSIM testing showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

Table 3-61A
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.71	C	12.43	B	14.72	B
From Springwells to Green	20.21	C	11.45	B	13.91	B
From Green to decel. lane before Waterman	20.01	C	11.43	B	13.90	B
From Waterman to Flyover off-ramp	16.11	B	9.08	A	10.96	A
From Flyover off-ramp to Dragoon on-ramp	18.86	C	7.91	A	9.13	A
From Dragoon on-ramp to Junction off-ramp	18.81	C	8.19	A	10.31	A
From Junction off-ramp to Flyover on- ramp	24.97	C	9.83	A	12.35	B
From Flyover on-ramp to Clark	25.24	C	6.84	A	8.38	A
From Clark to Grand	49.18	F	8.63	A	10.43	A
From Porter off-ramp to NB I-75 / I-96 Diverge	46.70	F	7.17	A	9.13	A
From NB I-75/I-96 Diverge to Gateway Ramps	15.23	B	8.78	A	9.99	A
From Gateway Ramps to Michigan	28.32	D	9.43	A	10.70	A
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	46.57	F	4.82	A	8.25	A
I-96 From Gateway Ramps to Michigan	19.28	C	6.74	A	9.49	A
I-96 From Michigan to C-D Road	15.11	B	7.41	A	9.18	A
I-96 From C-D Road to MLK on-ramp	9.67	A	6.60	A	15.69	B
I-96 From MLK on-ramp to I-94 off-ramp	8.88	A	6.29	A	14.58	B
I-96 From I-94 off-ramp to Warren on-ramp	3.51	A	1.94	A	9.37	A
I-96 From Warren on-ramp to I-94	2.92	A	2.10	A	8.77	A
I-96 From I-94 to I-94 on-ramp	3.72	A	2.58	A	10.94	A

Source: VISSIM, Parsons Transportation Group

Table 3-61B
Detroit River International Crossing Study
Build (2035) Alternative #5 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	13.71	B	14.25	B	27.27	D
From Springwells on-ramp to Fort	10.94	A	11.94	B	23.01	C
From Springwells to West of Dearborn	13.05	B	12.19	B	25.20	C
From Springwells decel. lane to Springwells	13.06	B	12.17	B	25.40	C
From Green to Springwells decel. lane	9.91	A	9.32	A	19.84	C
From Flyover on-ramp to Green	8.37	A	7.88	A	16.36	B
From Dragoon to Flyover on-ramp	9.45	A	9.83	A	22.82	C
From Junction to Dragoon	11.06	B	9.58	A	19.93	C
From Flyover on-ramp to Junction	13.56	B	11.77	B	24.26	C
From Clark to Flyover on-ramp	10.95	A	10.45	A	23.33	C
From Clark off-ramp to lane drop prior to Clark	11.57	B	10.90	A	22.86	C
From Grand to Clark off-ramp	9.45	A	8.87	A	18.38	C
From Gateway on-ramp to New Frontage Road on-ramp	10.58	A	9.88	A	18.88	C
SB I-75/I-96 Merge Area	11.23	B	10.53	A	20.14	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.35	B	12.45	B	25.13	C
From Michigan to Gateway Ramps	12.61	B	13.85	B	27.87	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	21.39	C	14.91	B	24.31	C
I-96 From Michigan to Gateway Ramps	21.78	C	9.27	A	18.32	C
I-96 From NB I-75 off-ramp to Michigan	15.16	B	8.46	A	15.46	B
I-96 From Warren on-ramp to NB I-75 off-ramp	27.17	D	6.47	A	9.90	A
I-96 From I-94 on-ramp to Warren on-ramp	27.63	D	6.74	A	9.46	A
I-96 From I-94 to I-94 on-ramp	17.20	B	3.84	A	6.96	A
I-96 From I-94 off-ramp to I-94	18.10	C	4.36	A	7.13	A

Source: VISSIM, Parsons Transportation Group

3.3.7.3 Animation of Traffic Operations

AVI animation files that show the Alternative #5 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps. In addition, the AVI for the AM peak hour shows the congestion on the one-lane ramp to westbound I-96 and the turbulence it causes upstream on northbound I-75.

3.3.8 Build (2035) Alternative #7

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #7. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-11) and changes in local ramps to the I-75 service drives.

3.3.8.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-33 in Section 3.2.6.2. Except for Fort at Livernois during the midday and PM peak hours and the Southbound Service Drive at Livernois during the midday peak hour which will operate at LOS C, all other signalized intersections analyzed within the study area will operate at LOS A or B for all peak hours.

3.3.8.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-62A and 3-62B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #7 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B, with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in both directions, but two segments would degrade to LOS D in the northbound direction.

As described in the previous alternatives, the planned Gateway Interchange reduces the connection from northbound I-75 to westbound I-96 from two lanes to just one lane, which causes several segments of the freeway to operate with poor levels of service in the X-10 crossing alternatives. However, this one-lane ramp operates at LOS D in Alternative #7 because the future traffic volume projections for the X-11 crossing alternatives are lower than the volumes for the X-10 crossings, thereby lowering traffic on I-75 northbound that wants to use this ramp.

As with the previous alternatives, initial VISSIM testing of Alternative #7 showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

Table 3-62A
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.76	C	12.43	B	14.88	B
From Springwells to Springwells on-ramp	14.14	B	11.63	B	14.26	B
From Green to Waterman	16.19	B	8.92	A	10.87	A
From Waterman to New Plaza off-ramp	11.04	B	7.93	A	9.68	A
From New Plaza off-ramp to Livernois	18.99	C	7.86	A	9.62	A
From Dragoon to Dragoon on-ramp	14.62	B	6.16	A	7.49	A
From Dragoon on-ramp to Junction	20.42	C	8.83	A	10.85	A
From Junction to New Plaza on-ramp	14.64	B	6.33	A	7.40	A
From New Plaza on-ramp to Clark	18.60	C	7.76	A	9.04	A
From Clark to Clark on-ramp	23.84	C	9.73	A	11.22	B
From Clark on-ramp to Grand	19.94	C	8.95	A	10.87	A
From Porter off-ramp to NB I-75 / I-96 Diverge	20.69	C	7.48	A	9.36	A
From NB I-75/I-96 Diverge to Gateway Ramps	16.23	B	9.05	A	10.31	A
From Gateway Ramps to Michigan	30.36	D	9.66	A	11.17	B
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	33.20	D	5.10	A	7.92	A
I-96 From Gateway Ramps to Michigan	15.86	B	6.94	A	9.85	A
I-96 From Michigan to C-D Road	11.23	B	7.61	A	9.35	A
I-96 From C-D Road to MLK on-ramp	4.49	A	6.68	A	15.48	B
I-96 From MLK on-ramp to I-94 off-ramp	4.28	A	6.36	A	14.52	B
I-96 From I-94 off-ramp to Warren on-ramp	4.77	A	1.99	A	9.36	A
I-96 From Warren on-ramp to I-94	3.00	A	2.14	A	8.79	A
I-96 From I-94 to I-94 on-ramp	3.62	A	2.62	A	10.96	A

Source: VISSIM, Parsons Transportation Group

Table 3-62B
Detroit River International Crossing Study
Build (2035) Alternative #7 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	13.20	B	14.19	B	27.11	D
From Springwells on-ramp to Fort	15.56	B	11.50	B	22.02	C
From Springwells to West of Dearborn	10.57	A	13.24	B	25.94	C
From Springwells off-ramp to Springwells	13.46	B	13.28	B	26.15	D
From Green to Springwells (5 lanes)	4.29	A	10.55	A	20.87	C
From Flyover on-ramp to Green	6.90	A	8.64	A	17.26	B
From Livernois to New Plaza ramp	11.97	B	8.89	A	19.91	C
From Waterman to Green	9.79	A	9.49	A	21.23	C
From Junction to off-ramp	11.23	B	9.82	A	21.61	C
From off-ramp to Dragoon	9.23	A	8.49	A	17.97	B
From Clark on-ramp to Junction	7.38	A	9.91	A	20.11	C
From Clark off-ramp to lane drop prior to Clark	9.44	A	10.14	A	20.73	C
From Grand to Clark off-ramp	8.98	A	8.94	A	17.33	B
From Gateway on-ramp to New Frontage Road on-ramp	9.89	A	9.88	A	17.95	B
SB I-75/I-96 Merge Area	10.23	A	10.51	A	18.99	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.61	B	12.47	B	24.74	C
From Michigan to Gateway Ramps	10.55	A	13.85	B	28.07	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	13.68	B	14.51	B	19.40	C
I-96 From Michigan to Gateway Ramps	22.81	C	9.13	A	16.43	B
I-96 From NB I-75 off-ramp to Michigan	18.43	C	8.45	A	14.68	B
I-96 From Warren on-ramp to NB I-75 off-ramp	20.78	C	6.47	A	9.46	A
I-96 From I-94 on-ramp to Warren on-ramp	17.34	B	6.75	A	9.25	A
I-96 From I-94 to I-94 on-ramp	6.06	A	3.84	A	6.79	A
I-96 From I-94 off-ramp to I-94	16.13	B	4.36	A	6.93	A

Source: VISSIM, Parsons Transportation Group

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

3.3.8.3 Animation of Traffic Operations

AVI animation files that show the Alternative #7 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps.

3.3.9 Build (2035) Alternative #9

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #9. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-11) and changes in local ramps to the I-75 service drives.

3.3.9.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-38 in Section 3.2.7.2. All of the signalized intersections within the study area operate at LOS A or B in all three peak hours, with just one operating at LOS C.

3.3.9.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-63A and 3-63B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #9 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B, with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in both directions, but two segments would degrade to LOS D in the northbound direction.

As described in the previous alternatives, the planned Gateway Interchange reduces the connection from northbound I-75 to westbound I-96 from two lanes to just one lane, which causes several segments of the freeway to operate with poor levels of service in the X-10 crossing alternatives. However, as with Alternative #7, this one-lane ramp operates at LOS D in Alternative #9 because the future traffic volume projections for the X-11 crossing alternatives are

Table 3-63A
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.76	C	12.46	B	14.88	B
From Springwells to Springwells on-ramp	20.42	C	11.68	B	14.29	B
From Springwells on-ramp to Green	16.02	B	9.09	A	11.04	B
From Green to Waterman	13.34	B	7.56	A	9.19	A
From Waterman to Livernois	14.99	B	6.82	A	7.67	A
From Dragoon to Dragoon on-ramp	15.19	B	6.81	A	7.38	A
From Dragoon on-ramp to Junction	19.77	C	8.95	A	9.72	A
From Junction to New Plaza on-ramp	14.29	B	6.07	A	6.71	A
From New Plaza on-ramp to Clark	18.13	C	7.42	A	8.21	A
From Clark to Clark on-ramp	23.15	C	9.27	A	10.17	A
From Clark on-ramp to Grand	19.45	C	8.85	A	10.96	A
From Porter off-ramp to NB I-75 / I-96 Diverge	22.81	C	7.49	A	9.47	A
From NB I-75/I-96 Diverge to Gateway Ramps	16.90	B	9.22	A	10.40	A
From Gateway Ramps to Michigan	31.92	D	9.99	A	11.24	B
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	34.51	D	4.75	A	7.93	A
I-96 From Gateway Ramps to Michigan	15.69	B	7.05	A	10.15	A
I-96 From Michigan to C-D Road	16.44	B	7.58	A	9.64	A
I-96 From C-D Road to MLK on-ramp	10.21	A	6.63	A	15.60	B
I-96 From MLK on-ramp to I-94 off-ramp	12.14	B	6.28	A	14.92	B
I-96 From I-94 off-ramp to Warren on-ramp	3.60	A	1.87	A	10.02	A
I-96 From Warren on-ramp to I-94	3.00	A	2.04	A	9.30	A
I-96 From I-94 to I-94 on-ramp	3.82	A	2.50	A	11.63	B

Source: VISSIM, Parsons Transportation Group

Table 3-63B
Detroit River International Crossing Study
Build (2035) Alternative #9 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	13.65	B	14.15	B	27.45	D
From Springwells on-ramp to Fort	10.89	A	12.05	B	23.66	C
From Springwells to West of Dearborn	12.96	B	11.95	B	25.04	C
From Springwells off-ramp to Springwells	13.08	B	11.97	B	25.23	C
From Green to Springwells (5 lanes)	10.15	A	9.43	A	20.03	C
From Green to Springwells (6 lanes)	8.10	A	7.57	A	15.95	B
From Flyover on-ramp to Green	8.23	A	7.69	A	16.12	B
From Waterman to Green	9.54	A	10.18	A	22.83	C
From Junction to Green	8.96	A	9.00	A	19.02	C
From Junction Dragoon	11.09	B	10.98	A	22.38	C
From Clark on-ramp to Junction	8.71	A	9.01	A	19.82	C
From Clark off-ramp to lane drop prior to Clark	8.88	A	9.19	A	20.34	C
From Grand to Clark off-ramp	9.01	A	8.24	A	17.56	B
From Gateway on-ramp to New Frontage Road on-ramp	9.89	A	9.20	A	18.01	C
SB I-75/I-96 Merge Area	10.26	A	9.51	A	19.11	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.61	B	12.65	B	24.80	C
From Michigan to Gateway Ramps	13.08	B	14.25	B	28.06	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	13.89	B	8.55	A	19.84	C
I-96 From Michigan to Gateway Ramps	9.46	A	7.78	A	17.17	B
I-96 From NB I-75 off-ramp to Michigan	9.04	A	7.15	A	15.07	B
I-96 From Warren on-ramp to NB I-75 off-ramp	20.85	C	5.98	A	9.42	A
I-96 From I-94 on-ramp to Warren on-ramp	17.43	B	6.40	A	9.24	A
I-96 From I-94 to I-94 on-ramp	15.21	B	4.00	A	6.79	A
I-96 From I-94 off-ramp to I-94	16.13	B	4.49	A	6.93	A

Source: VISSIM, Parsons Transportation Group

lower than the volumes for the X-10 crossings, thereby lowering traffic on I-75 northbound that wants to use this ramp.

As with the previous alternatives, initial VISSIM testing of Alternative #9 showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

3.3.9.3 Animation of Traffic Operations

AVI animation files that show the Alternative #9 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps.

3.3.10 Build (2035) Alternative #11

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #11. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-11) and changes in local ramps to the I-75 service drives.

3.3.10.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-43 in Section 3.2.8.2. All of the signalized intersections within the study area operate at LOS C or better in all three peak hours.

3.3.10.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-64A and 3-64B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #11 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B, with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in both directions, but two segments would degrade to LOS D in the northbound direction.

Table 3-64A
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.76	C	12.38	B	14.88	B
From Springwells to Springwells on-ramp	20.42	C	11.64	B	14.29	B
From Springwells on-ramp to Green	16.02	B	9.06	A	11.04	B
From Green to Waterman	16.03	B	9.02	A	10.95	A
From Waterman to Livernois	18.95	C	8.59	A	9.72	A
From Livernois to Dragoon	18.14	C	8.19	A	9.24	A
From new plaza ramp to lane drop before Junction	16.00	B	7.18	A	7.82	A
From lane drop to Junction	20.01	C	8.93	A	9.74	A
From Junction to Clark	14.04	B	5.95	A	6.59	A
From Junction to Clark	18.10	C	7.38	A	8.18	A
From Clark to Clark on-ramp	23.09	C	9.19	A	10.15	A
From Clark on-ramp to Grand	19.33	C	8.80	A	11.05	B
From Porter off-ramp to NB I-75/I-96 Diverge	19.45	C	7.43	A	9.52	A
From NB I-75/I-96 Diverge to Gateway Ramps	15.82	B	9.05	A	10.42	A
From Gateway Ramps to Michigan	30.79	D	9.84	A	11.24	B
I-96 From NB I-75/I-96 Diverge to Gateway Ramps	34.45	D	4.93	A	8.08	A
I-96 From Gateway Ramps to Michigan	15.99	B	7.22	A	9.95	A
I-96 From Michigan to C-D Road	16.44	B	7.75	A	9.38	A
I-96 From C-D Road to MLK on-ramp	10.12	A	6.74	A	15.54	B
I-96 From MLK on-ramp to I-94 off-ramp	9.60	A	6.30	A	14.51	B
I-96 From I-94 off-ramp to Warren on-ramp	3.60	A	1.91	A	9.34	A
I-96 From on-ramp to I-94	3.00	A	2.08	A	8.76	A
I-96 From I-94 to I-94 on-ramp	3.81	A	2.54	A	10.94	A

Source: VISSIM, Parsons Transportation Group

Table 3-64B
Detroit River International Crossing Study
Build (2035) Alternative #11 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	12.97	B	14.03	B	27.04	D
From Springwells on-ramp to Fort	15.53	B	11.75	B	23.15	C
From Springwells to West of Dearborn	19.42	C	11.88	B	24.74	C
From Springwells off-ramp to Springwells	13.44	B	11.90	B	24.76	C
From Green to Springwells	4.32	A	9.41	A	19.62	C
From Flyover on-ramp to Green	6.82	A	7.91	A	16.54	B
From Livernois off-ramp to new plaza on-ramp	14.91	B	10.24	A	23.04	C
From Livernois on-ramp to Livernois	7.53	A	8.03	A	17.98	B
From Junction off-ramp to Livernois on-ramp	11.10	B	9.89	A	21.37	C
From new plaza off-ramp to Junction on ramp	9.18	A	8.94	A	18.39	C
From Clark to new plaza off-ramp	6.13	A	7.70	A	17.20	B
From Clark off-ramp to Clark	9.30	A	9.35	A	20.84	C
From Grand to Clark off-ramp	8.93	A	8.20	A	17.31	B
From Gateway on-ramp to New Frontage Road on-ramp	9.88	A	9.18	A	17.93	B
SB I-75/I-96 Merge Area	10.26	A	9.49	A	19.02	C
From Gateway Ramps to SB I-75/I-96 Merge	12.59	B	12.66	B	24.73	C
From Michigan to Gateway Ramps	10.54	A	14.25	B	28.07	D
I-96 From Gateway Ramps to SB I-75/I-96 Merge	14.03	B	8.41	A	19.65	C
I-96 From Michigan to Gateway Ramps	22.84	C	7.68	A	16.82	B
I-96 From NB 75 Off Ramp to Michigan	18.46	C	7.08	A	14.69	B
I-96 From Warren on-ramp to NB I-75 off-ramp	20.84	C	5.93	A	9.46	A
I-96 From I-94 on-ramp to Warren on-ramp	17.38	B	6.35	A	9.22	A
I-96 From I-94 to I-94 on-ramp	6.06	A	3.95	A	6.79	A
I-96 From I-94 off-ramp to I-94	16.13	B	4.47	A	6.93	A

Source: VISSIM, Parsons Transportation Group

As described in the previous alternatives, the planned Gateway Interchange reduces the connection from northbound I-75 to westbound I-96 from two lanes to just one lane, which causes several segments of the freeway to operate with poor levels of service in the X-10 crossing alternatives. However, as with Alternatives #7 and #9, this one-lane ramp operates at LOS D in Alternative #11 because the future traffic volume projections for the X-11 crossing alternatives are lower than the volumes for the X-10 crossings, thereby lowering traffic on I-75 northbound that wants to use this ramp.

As with the previous alternatives, initial VISSIM testing of Alternative #11 showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

3.3.10.3 Animation of Traffic Operations

AVI animation files that show the Alternative #11 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps.

3.3.11 Build (2035) Alternative #14

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #14. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-10) and changes in local ramps to the I-75 service drives.

3.3.11.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-48 in Section 3.2.9.2. All of the signalized intersections within the study area operate at LOS C or better in all three peak hours.

3.3.11.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-65A and 3-65B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #14 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B,

Table 3-65A
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.65	C	12.41	B	14.69	B
From Springwells to Springwells on-ramp	19.65	C	11.38	B	13.83	B
From Springwells on-ramp to Green	16.31	B	9.17	A	11.09	B
From Green to Waterman	13.66	B	7.64	A	9.24	A
From Waterman to Livernois	14.92	B	6.40	A	7.40	A
From Dragoon to Dragoon on-ramp	14.85	B	6.36	A	7.35	A
From Dragoon on-ramp to Junction	18.67	C	7.89	A	9.14	A
From Junction to New Plaza on-ramp	13.14	B	5.27	A	6.10	A
From New Plaza on-ramp to Clark	22.06	C	6.81	A	7.66	A
From Clark to Clark on-ramp	60.01	F	8.88	A	9.94	A
From Clark on-ramp to Grand	46.04	F	9.17	A	10.97	A
From Porter off-ramp to NB I-75 / I-96 Diverge	39.82	E	7.64	A	9.54	A
From NB I-75/I-96 Diverge to Gateway Ramps	16.12	B	9.22	A	9.99	A
From Gateway Ramps to Michigan	27.91	D	9.80	A	10.60	A
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	49.77	F	5.11	A	8.75	A
I-96 From Gateway Ramps to Michigan	20.32	C	6.94	A	9.83	A
I-96 From Michigan to C-D Road	15.42	B	7.58	A	9.45	A
I-96 From C-D Road to MLK on-ramp	9.75	A	6.69	A	15.89	B
I-96 From MLK on-ramp to I-94 off-ramp	9.24	A	6.34	A	14.68	B
I-96 From I-94 off-ramp to Warren on-ramp	3.54	A	1.98	A	9.40	A
I-96 From Warren on-ramp to I-94	2.96	A	2.14	A	8.80	A
I-96 From I-94 to I-94 on-ramp	3.76	A	2.62	A	10.99	A

Source: VISSIM, Parsons Transportation Group

Table 3-65B
Detroit River International Crossing Study
Build (2035) Alternative #14 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	13.72	B	14.48	B	27.43	D
From Springwells on-ramp to Fort	10.82	A	12.23	B	24.03	C
From Springwells to West of Dearborn	12.91	B	12.04	B	23.92	C
From Springwells off-ramp to Springwells	13.13	B	12.09	B	24.19	C
From Green to Springwells (5 lanes)	11.45	B	10.18	A	20.05	C
From Green to Springwells (6 lanes)	8.60	A	8.06	A	16.20	B
From Flyover on-ramp to Green	7.02	A	6.83	A	14.69	B
From Waterman to Green	13.99	B	12.54	B	24.29	C
From Junction to Green	8.39	A	8.19	A	17.63	B
From Junction Dragoon	10.51	A	10.30	A	22.17	C
From Clark on-ramp to Junction	9.10	A	9.67	A	21.12	C
From Clark off-ramp to lane drop prior to Clark	9.17	A	9.71	A	21.47	C
From Grand to Clark off-ramp	9.65	A	9.03	A	18.63	C
From Gateway on-ramp to New Frontage Road on-ramp	10.71	A	9.91	A	18.85	C
SB I-75/I-96 Merge Area	11.46	B	10.59	A	20.19	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.47	B	12.51	B	25.20	C
From Michigan to Gateway Ramps	12.62	B	13.86	B	27.88	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	21.72	C	14.89	B	24.16	C
I-96 From Michigan to Gateway Ramps	21.98	C	9.26	A	18.11	C
I-96 From NB I-75 off-ramp to Michigan	15.13	B	8.45	A	15.46	B
I-96 From Warren on-ramp to NB I-75 off-ramp	26.57	D	6.47	A	9.93	A
I-96 From I-94 on-ramp to Warren on-ramp	24.69	C	6.74	A	9.49	A
I-96 From I-94 to I-94 on-ramp	17.20	B	3.84	A	6.96	A
I-96 From I-94 off-ramp to I-94	18.10	C	4.36	A	7.13	A

Source: VISSIM, Parsons Transportation Group

with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in the southbound direction, but one segment on eastbound I-96 would degrade to LOS D (due to increased traffic volumes on northbound I-75, similar to the previous X-10 alternatives). In the northbound direction, most segments would continue to operate at LOS C or better, but one segment would degrade to LOS E and three segments would degrade to LOS F.

As in the previous X-10 alternatives, the levels of service E and F experienced in the northbound direction result when AM peak hour traffic encounters a connection from northbound I-75 to westbound I-96 which is one lane (today, it is two lanes). The one-lane ramp operates at LOS F because the future traffic volume projections of DRIC alternatives using the X-10 crossing alternatives place 1,802 vehicles per hour on this one-lane ramp to I-96. While a one-lane ramp should be able to handle 1,802 vehicles, it causes turbulence on I-75 as cars and trucks must weave into position to enter the single lane. The most turbulence is caused by vehicles weaving from the northbound on-ramp from Clark Street. This extends the turbulence upstream of the on-ramp which causes one segment to operate at LOS E and two others to operate at LOS F. This situation will be looked at in greater detail during the selection process for the preferred alternative. A resolution for this issue will be identified in the FEIS.

Also, initial VISSIM testing showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

3.3.11.3 Animation of Traffic Operations

AVI animation files that show the Alternative #14 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps. In addition, the AVI for the AM peak hour shows the congestion on the one-lane ramp to westbound I-96 and the turbulence it causes upstream on northbound I-75.

3.3.12 Build (2035) Alternative #16

The geometry of the 2035 No Build VISSIM model was modified to incorporate the new bridge and interchange with I-75 shown in Alternative #16. The new model uses traffic volumes projected for the year 2035 based on the new bridge (X-10) and changes in local ramps to the I-75 service drives.

3.3.12.1 Local Intersections

For each peak hour analyzed, Appendix E contains a table that summarizes the delay experienced by each movement and approach at every intersection in the VISSIM model. These results are also summarized in Table 3-53 in Section 3.2.10.2. Most of the signalized intersections within the study area operate at LOS A or B in all three peak hours, with just one operating at LOS C.

3.3.12.2 Freeway Operations

For each peak hour analyzed, the density and level of service experienced by various segments of the freeway system in the VISSIM model are summarized in Tables 3-66A and 3-66B. More detailed results are contained in Appendix F. The VISSIM results show that freeway operations (levels of service) for Alternative #16 are generally similar to that observed in the 2035 No Build conditions. In the Midday peak hour, all segments would continue to operate at LOS A or B, with most segments in the northbound direction improving from LOS B to LOS A. In the PM peak hour, most segments would continue to operate at LOS C or better with a few LOS D segments in the southbound direction. In the AM peak hour, most segments would continue to operate at LOS C or better in the southbound direction, but one segment on eastbound I-96 would degrade to LOS D (due to increased traffic volumes on northbound I-75, similar to the previous X-10 alternatives). In the northbound direction, most segments would continue to operate at LOS C or better, but one segment would degrade to LOS E and five segments would degrade to LOS F.

As in the previous X-10 alternatives, the levels of service E and F experienced in the northbound direction result when AM peak hour traffic encounters a connection from northbound I-75 to westbound I-96 which is one lane (today, it is two lanes). The one-lane ramp operates at LOS F because the future traffic volume projections of DRIC alternatives using the X-10 crossing alternatives place 1,802 vehicles per hour on this one-lane ramp to I-96. While a one-lane ramp should be able to handle 1,802 vehicles, it causes turbulence on I-75 as cars and trucks must weave into position to enter the single lane. The most turbulence is caused by vehicles weaving from the northbound on-ramp from Clark Street. This extends the turbulence upstream of the on-ramp which causes one segment to operate at LOS E and four others to operate at LOS F. In fact, Alternative #16 has the most number of segments operating with poor levels of service. This situation will be looked at in greater detail during the selection process for the preferred alternative. A resolution for this issue will be identified in the FEIS.

Also, initial VISSIM testing showed that the improvements planned for I-94 are critical to the efficient handling of traffic in this area. These issues will be studied in more detail when the Preferred Alternative is selected.

As noted earlier, the traffic used in this report is based on a technique that assigns traffic that emphasizes the new crossing. This is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined. Those forecasts are supplemented with projections provided by a second method (known as a nested-logit model) to provide a reasonable range for crossing volumes for each alternative. The latter technique assigns more traffic to the Ambassador Bridge for all DRIC alternatives. The two techniques and their results are documented in the **Level 2 Traffic Analysis Technical Report, Part 1: Travel Demand Model.**

Table 3-66A
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service for Freeway Segments
Northbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From West of Dearborn to Springwells	21.70	C	12.43	B	14.70	B
From Springwells to Springwells on-ramp	20.32	C	11.65	B	14.07	B
From Springwells on-ramp to Green	16.75	B	9.48	A	11.39	B
From Green to Waterman	13.78	B	7.77	A	9.32	A
From Waterman to Livernois	17.32	B	6.59	A	7.64	A
From Dragoon to Dragoon on-ramp	20.08	C	6.09	A	7.07	A
From Dragoon on-ramp to Junction	30.77	D	8.01	A	9.27	A
From Junction to New Plaza on-ramp	40.73	E	5.84	A	6.58	A
From New Plaza on-ramp to Clark	56.33	F	7.13	A	8.04	A
From Clark to Clark on-ramp	64.85	F	8.92	A	9.98	A
From Clark on-ramp to Grand	51.55	F	9.03	A	10.75	A
From Porter off-ramp to NB I-75 / I-96 Diverge	50.26	F	7.80	A	9.32	A
From NB I-75/I-96 Diverge to Gateway Ramps	15.27	B	9.47	A	9.98	A
From Gateway Ramps to Michigan	26.50	D	10.04	A	10.56	A
I-96 From NB I-75 / I-96 Diverge to Gateway Ramps	46.98	F	5.12	A	8.33	A
I-96 From Gateway Ramps to Michigan	18.81	C	7.45	A	9.39	A
I-96 From Michigan to C-D Road	14.61	B	8.24	A	9.09	A
I-96 From C-D Road to MLK on-ramp	9.42	A	6.95	A	15.65	B
I-96 From MLK on-ramp to I-94 off-ramp	8.89	A	6.63	A	14.66	B
I-96 From I-94 off-ramp to Warren on-ramp	3.42	A	2.02	A	9.34	A
I-96 From Warren on-ramp to I-94	2.86	A	2.16	A	8.74	A
I-96 From I-94 to I-94 on-ramp	3.65	A	2.66	A	10.91	A

Source: VISSIM, Parsons Transportation Group

Table 3-66B
Detroit River International Crossing Study
Build (2035) Alternative #16 Levels of Service for Freeway Segments
Southbound I-75 / I-96

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS	Density (pc/mi/ln)	Intersection LOS
From Fort to Dearborn	20.16	C	16.42	B	32.33	D
From Springwells on-ramp to Fort	15.77	B	12.73	B	24.55	C
From Springwells to West of Dearborn	19.95	C	11.97	B	25.45	C
From Springwells off-ramp to Springwells	14.50	B	11.99	B	25.97	C
From Green to Springwells (5 lanes)	5.99	A	10.01	A	21.16	C
From Green to Springwells (6 lanes)	13.97	B	8.00	A	16.48	B
From Flyover on-ramp to Green	11.66	B	8.17	A	16.67	B
From Waterman to Green	10.73	A	10.24	A	23.33	C
From Junction to Green	8.46	A	8.35	A	18.85	C
From Junction Dragoon	11.14	B	10.31	A	22.33	C
From Clark on-ramp to Junction	6.67	A	9.49	A	21.92	C
From Clark off-ramp to lane drop prior to Clark (4 lanes)	13.37	B	12.10	B	26.41	D
From Clark off-ramp to lane drop prior to Clark (5 lanes)	9.18	A	9.70	A	21.34	C
From Grand to Clark off-ramp	9.68	A	9.06	A	18.90	C
From Gateway on-ramp to New Frontage Road on-ramp	10.70	A	9.90	A	18.87	C
SB I-75/I-96 Merge Area	11.41	B	10.55	A	20.19	C
From Gateway Ramps to SB I-75/ I-96 Merge	12.47	B	12.50	B	25.19	C
From Michigan to Gateway Ramps	9.36	A	13.85	B	27.88	D
I-96 From Gateway Ramps to SB I-75/ I-96 Merge	21.39	C	14.64	B	24.28	C
I-96 From Michigan to Gateway Ramps	26.71	D	9.10	A	18.27	C
I-96 From NB I-75 off-ramp to Michigan	19.05	C	8.39	A	15.50	B
I-96 From Warren on-ramp to NB I-75 off-ramp	26.68	D	6.35	A	9.92	A
I-96 From I-94 on-ramp to Warren on-ramp	25.16	C	6.68	A	9.46	A
I-96 From I-94 to I-94 on-ramp	6.29	A	3.84	A	6.96	A
I-96 From I-94 off-ramp to I-94	18.10	C	4.35	A	7.13	A

Source: VISSIM, Parsons Transportation Group

3.3.12.3 Animation of Traffic Operations

AVI animation files that show the Alternative #16 study network operating with projected 2035 traffic volumes in each of the peak hours have been created and are provided on a DVD (Appendix B). The AVI shows how the new plaza's interchange on I-75 will operate as well as the changes in local ramps. In addition, the AVI for the AM peak hour shows the congestion on the one-lane ramp to westbound I-96 and the turbulence it causes upstream on northbound I-75.

3.3.13 Comparison of Travel Time

The previous sections described the VISSIM density and levels of service on each segment of the highway under each alternative, which showed that the alternatives based on the X-11 crossing generally performed with better levels of service than those based on the X-10 crossing. Specifically, the X-11 alternatives did not experience any LOS E or LOS F segments, while the X-10 alternatives experienced varying numbers of segments operating at these poor levels of service. Beyond this segment by segment comparison of the alternatives, there is a way to compare them based on one overall measure of effectiveness: travel time.

VISSIM can report the average travel time of vehicles moving through the simulation model, which is an overall indication of the efficiency or congestion of each alternative. This data was collected from the simulation on a segment by segment basis, as well as an overall corridor basis. The detailed, segment by segment results are presented in Appendix F while Table 3-67 summarizes the overall travel time for the corridor as a whole.

Data on Table 3-67 indicate travel time during the midday and afternoon peak hours is slightly less for the Build Alternatives than the No Build Alternative. All Build Alternatives are about equal in the travel time on I-75 in the study area. During the AM Peak, in the southbound direction, travel times for Alternatives #7, #9, and #11 are about five percent faster than the other Build Alternatives. In the northbound direction, travel times for Alternatives #7, #9, and #11 are five to eighteen percent faster than the other Build Alternatives.

Table 3-67
Detroit River International Crossing Study
No Build & Build (2035) Alternatives Total Travel Time (seconds)

Crossing Type:	--	X-10	X-10	X-10	X-10	X-11	X-11	X-11	X-10	X-10
Alternative:	No Build	Alt #1	Alt #2	Alt #3	Alt #5	Alt #7	Alt #9	Alt #11	Alt #14	Alt #16
AM Peak Hour										
NB I-75, Dearborn Ramps to 14th	294	301	311	336	329	**286**	289	**286**	332	384
NB I-75, Dearborn Ramps to I-94 (McGraw)	340	384	404	444	456	347	350	**346**	448	524
SB I-75, Vernor to Dearborn Ramps	226	225	225	**224**	225	225	225	**224**	226	227
SB I-75, I-94 (McGraw) to Dearborn Ramps	327	346	355	356	360	**323**	**323**	**323**	358	357
Midday Peak Hour										
NB I-75, Dearborn Ramps to 14th	276	262	262	261	262	262	262	261	262	262
NB I-75, Dearborn Ramps to I-94 (McGraw)	351	325	325	324	324	325	325	324	325	326
SB I-75, Vernor to Dearborn Ramps	249	226	226	**225**	226	226	226	**225**	227	228
SB I-75, I-94 (McGraw) to Dearborn Ramps	347	320	322	321	322	**318**	319	**318**	323	323
PM Peak Hour										
NB I-75, Dearborn Ramps to 14th	295	264	264	263	263	264	263	264	263	263
NB I-75, Dearborn Ramps to I-94 (McGraw)	359	328	328	328	328	329	329	328	328	328
NB I-75, Vernor to Dearborn Ramps	255	238	238	239	240	238	238	**237**	238	244
NB I-75, I-94 (McGraw) to Dearborn Ramps	353	333	333	335	336	**331**	332	332	334	341

Source: VISSIM, Parsons Transportation Group

Appendices

A	Traffic Data
B	Model Calibration, VISSIM Model, and AVI Files
C	Capacity Analysis Worksheets – Base Year (2006)
D	Capacity Analysis Worksheets – No Build (2035) Conditions
E	Capacity Analysis Worksheets – Build (2035) Conditions (Alternatives #1, 2, 3, 5, 7, 9, 11, 14, 16)
F	VISSIM Microsimulation Results – Capacity Analysis & Travel Time Results

Available Under Separate Cover