Level 3 Traffic Analysis Technical Report (TAR)

2040 Update

The Detroit River International Crossing Study

MDOT

Michigan Department of Transportation

This document has been prepared by WSP for the Michigan Department of Transportation in April 2018.

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EXECUTIVE SUMMARY

A new Detroit River International crossing project has been in the planning and development stages for several years. The Final Environmental Impact Statement (FEIS) was completed in 2008. The Record of Decision (ROD) was received in 2009 authorizing the project to proceed. *The Level 1 and Level 2 Traffic Analysis Reports (TAR)* were completed in conjunction with the DEIS from 2005-2008. In December 2008 a *Level 3 TAR* was conducted to present the final travel demand model assignments and traffic analysis for the Preferred crossing Alternative. The future year for the Level 1, Level 2, and Level 3 reports was 2035.

Several years have passed from when the last TAR was written and a new future horizon year of 2040 is required for evaluation to verify if recommendations from the previous TAR are still valid as this project moves closer to construction. This document updates the previous 2035 No-Build and 2035 Preferred Alternative scenario to the future build year of 2040.

This report documents the results of the *Highway Capacity Software (HCS7)* and *VISSIM* modeling software used to evaluate the potential traffic impacts on the U.S. side of the border for the No-Build and Preferred Alternative. Based on the traffic volumes determined for the future forecasts, capacity analyses were conducted for three peak periods (AM, Midday and PM) for 2040 conditions. Measures of effectiveness summarized include: traffic density along freeway segments, level of service, average delay at signalized intersections, as well as travel time along the freeway mainline. The 55 mainline, merge/diverge and weave segments previously analyzed for 2035 conditions, were analyzed under 2040 conditions. The following tables E-1, E-2, E-3, and E-4 present a comparison of the Level of Service for the Preferred Build Alternative from 2035 to 2040 for both the HCS and VISSIM analysis. LOS degraded along twenty-five segments throughout the AM, Midday and PM peak. Some segments improved slightly from the 2035 analysis. These LOS changes can be attributed to the use of the updated regional forecasting model to develop new AM and PM peak volumes. It should also be noted that a newer version of the HCS software (HCS7) was utilized. The algorithms in the software upgrade have been updated to reflect the latest research and evaluation methodology. All segments and intersections are anticipated to operate at an acceptable LOS with the exception of the westbound I-96 mainline two-lane section to Ambassador Bridge on-ramp which operates at LOS E in the AM peak (both 2035 and 2040 analysis) and eastbound I-96 from Ambassador Bridge off-ramp to SB I-75/I-96 Merge which operates at LOS E in the PM peak. Congestion at these locations is localized and does not affect adjacent interchanges and freeways.

The Preferred Build Alternative can be found in Figure E-1.

Table E-1: 2035 and 2040 HCS7 LOS for Mainline Freeway Segments for Preferred Build Alternative

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	2035 LOS	2040 LOS	2035 LOS	2040 LOS	2035 LOS	2040 LOS
Northbound I-75						
Dearborn off-ramp to Springwells off-ramp	C	**A**	B	B	B	B
Springwells off-ramp to Springwells on-ramp	C	C	A	A	B	B
Springwells on-ramp to Plaza off-ramp	B	B	A	A	A	**B**
Plaza off-ramp to Livernois off-ramp	C	C	A	A	A	**B**
Livernois off-ramp to Dragoon on-ramp	C	C	A	A	A	**B**
Dragoon on-ramp to Plaza on-ramp	C	C	A	A	A	**B**
Plaza on-ramp to Clark on-ramp	D	**C**	B	B	B	B
Clark on-ramp to Lafayette off-ramp	C	**D**	A	**B**	B	**C**
Lafayette off-ramp to NB I-75/I-96 Diverge	C	**D**	A	**B**	B	B
From NB I-75/I-96 Diverge to NB I-75 Service Drive off ramp (at Ambassador Bridge)	C	C	A	A	A	A
From NB I-75 Service Drive off-ramp (at Ambassador Bridge) to Ambassador Bridge on-ramp	C	**D**	A	**B**	B	B
From Ambassador Bridge on-ramp to C-D Road off-ramp	D	D	B	B	B	B
Southbound I-75						
From C-D Road on-ramp to Ambassador Bridge off-ramp	B	B	B	B	D	D
From Ambassador Bridge off-ramp to SB I-75/I-96 Merge	B	B	B	B	D	**C**
From SB I-75/I-96 Merge to Ambassador Bridge on-ramp	B	B	B	B	D	D
Ambassador Bridge on-ramp to Grand Blvd. on-ramp	B	B	B	B	C	C
Grand Blvd. on-ramp to Clark off-ramp	B	B	B	B	D	**C**
Clark off-ramp to Plaza off-ramp	B	B	B	B	C	C
Plaza off-ramp to Junction on-ramp	A	**B**	A	**B**	C	C
Junction on-ramp to Dragoon off-ramp	A	A	A	A	B	**C**
Dragoon off-ramp to Plaza on-ramp	A	**B**	A	**B**	C	C
Plaza on-ramp to Springwells off-ramp	A	A	A	A	B	B
Springwells off-ramp to Springwells on-ramp	B	B	B	B	C	C
Springwells on-ramp to Dearborn on-ramp	B	B	B	B	C	**D**
Westbound I-96						
From NB I-75 Diverge to 1-lane section	C	C	A	A	A	**B**
From 2-lane section to Ambassador Bridge on-ramp	**E**	**E**	B	B	C	C
From Ambassador on-ramp to Michigan off-ramp	C	C	A	**B**	B	B
Eastbound I-96						
From Michigan on-ramp to Ambassador Bridge off-ramp	B	B	B	B	C	C
From Ambassador Bridge off-ramp to SB I-75/I-96 Merge	C	C	B	B	D	**E**

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

LOS improved from 2035 Build

Table E-2: 2035 and 2040 HCS7 LOS for Ramp Merge and Diverge Areas for Preferred Build Alternative

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	2035 LOS	2040 LOS	2035 LOS	2040 LOS	2035 LOS	2040 LOS
Northbound I-75						
Dearborn off-ramp	C	C	B	B	B	B
Springwells off-ramp	C	C	B	B	B	B
Springwells on-ramp	C	**B**	B	**A**	B	B
Plaza off-ramp (E of Waterman)	B	**C**	B	B	B	B
Livernois off-ramp	B	B	A	**B**	A	**B**
Dragoon on-ramp	B	**C**	A	**B**	B	B
Plaza on-ramp (E of Junction) *	A	**B**	A	A	A	A
Clark on-ramp	C	C	B	B	B	B
Lafayette off-ramp	C	C	B	B	B	B
NB I-75/I-96 Diverge	B	**C**	A	A	A	**B**
NB I-75 Service Drive off-ramp (at Ambassador Bridge)	B	B	A	A	A	A
Ambassador Bridge on-ramp	C	C	B	B	B	B
Southbound I-75						
Ambassador Bridge off-ramp	B	B	B	B	C	**D**
Service Drive on-ramp	B	B	B	B	C	C
Clark off-ramp	A	A	A	A	B	B
Plaza off-ramp (E of Junction)	A	A	A	A	A	A
Junction on-ramp	B	B	B	B	C	C
Dragoon off-ramp	A	A	A	A	B	B
Springwells off-ramp	A	**B**	A	**B**	B	**C**
Springwells on-ramp	B	B	B	B	C	C
Dearborn on-ramp	B	B	B	B	C	C
Eastbound I-96						
Ambassador Bridge off-ramp	B	**A**	A	**B**	B	B

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

LOS improved from 2035 Build

Table E-3: 2035 and 2040 HCS7 LOS for Weaving Segments for Preferred Build Alt

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	2035 LOS	2040 LOS	2035 LOS	2040 LOS	2035 LOS	2040 LOS
Northbound I-75						
From Springwells on-ramp to Plaza off-ramp	B	**C**	B	B	B	B
From Clark on-ramp to Lafayette off-ramp	C	**D**	B	B	B	B
Southbound I-75						
From Ambassador on-ramp to Clark off-ramp	B	B	B	B	D	D
From Junction on-ramp to Dragoon off-ramp	A	**B**	A	**B**	B	**C**
From Plaza on-ramp to Springwells off-ramp	B	B	B	B	C	C

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

Table E-4: 2035 and 2040 Build VISSIM LOS for Local Intersections for Preferred Build Alternative

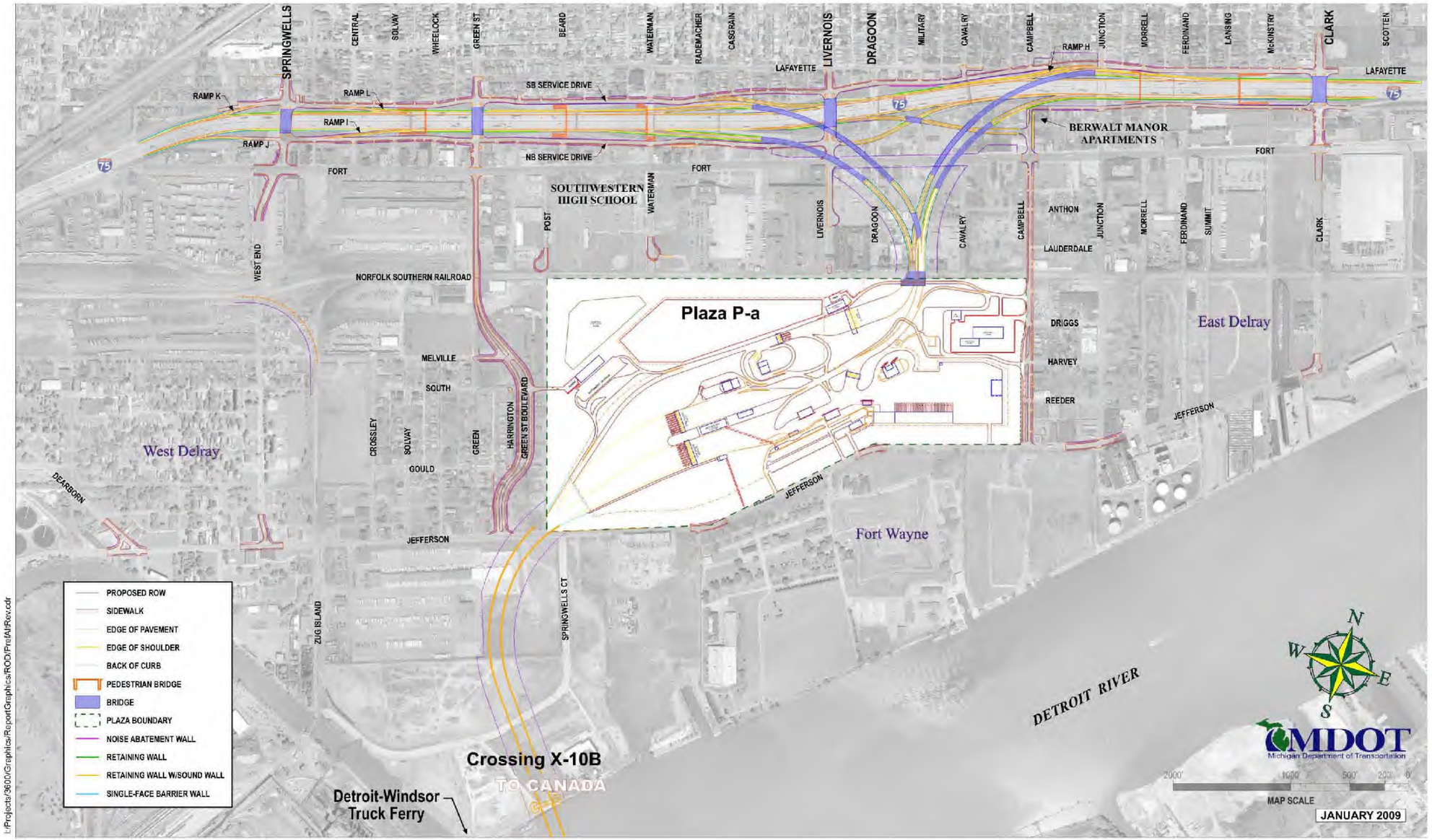
Intersection Name	AM Peak		Midday Peak		PM Peak	
	2035 LOS	2040 LOS	2035 LOS	2040 LOS	2035 LOS	2040 LOS
Fort at Westend	A	A	A	**B**	A	A
Fort at Green	A	**B**	B	B	A	**B**
Fort at Waterman	A	**B**	B	B	A	**B**
Fort at Livernois	A	A	B	B	A	A
Fort at Dragoon	N/A	N/A	N/A	N/A	N/A	N/A
Fort at Junction	B	B	A	A	B	**A**
Fort at Clark	B	B	B	B	B	B
Southbound Service Drive at Livernois	A	A	B	B	A	A
Southbound Service Drive at Dragoon	A	A	A	A	A	A
Northbound Service Drive at Livernois	A	A	B	B	A	A
Northbound Service Drive at Dragoon	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Service Drive at Springwells	B	**C**	B	**C**	A	**B**
Northbound Service Drive at Westend	B	B	B	B	B	**C**
Northbound Service Drive at Clark	A	**B**	A	**B**	B	**A**
Southbound Service Drive at Clark	C	C	B	B	B	**C**
Fort at Grand Blvd.	A	A	A	A	A	A
Northbound Service Drive at Grand Blvd.	B	B	B	B	B	B
Southbound Service Drive at Grand Blvd.	A	A	A	A	A	A
Fort at Post	N/A	N/A	N/A	N/A	N/A	N/A

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

LOS improved from 2035 Build

Figure E-1: Preferred Alternative
Detroit River International Crossing Study



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

1 INTRODUCTION

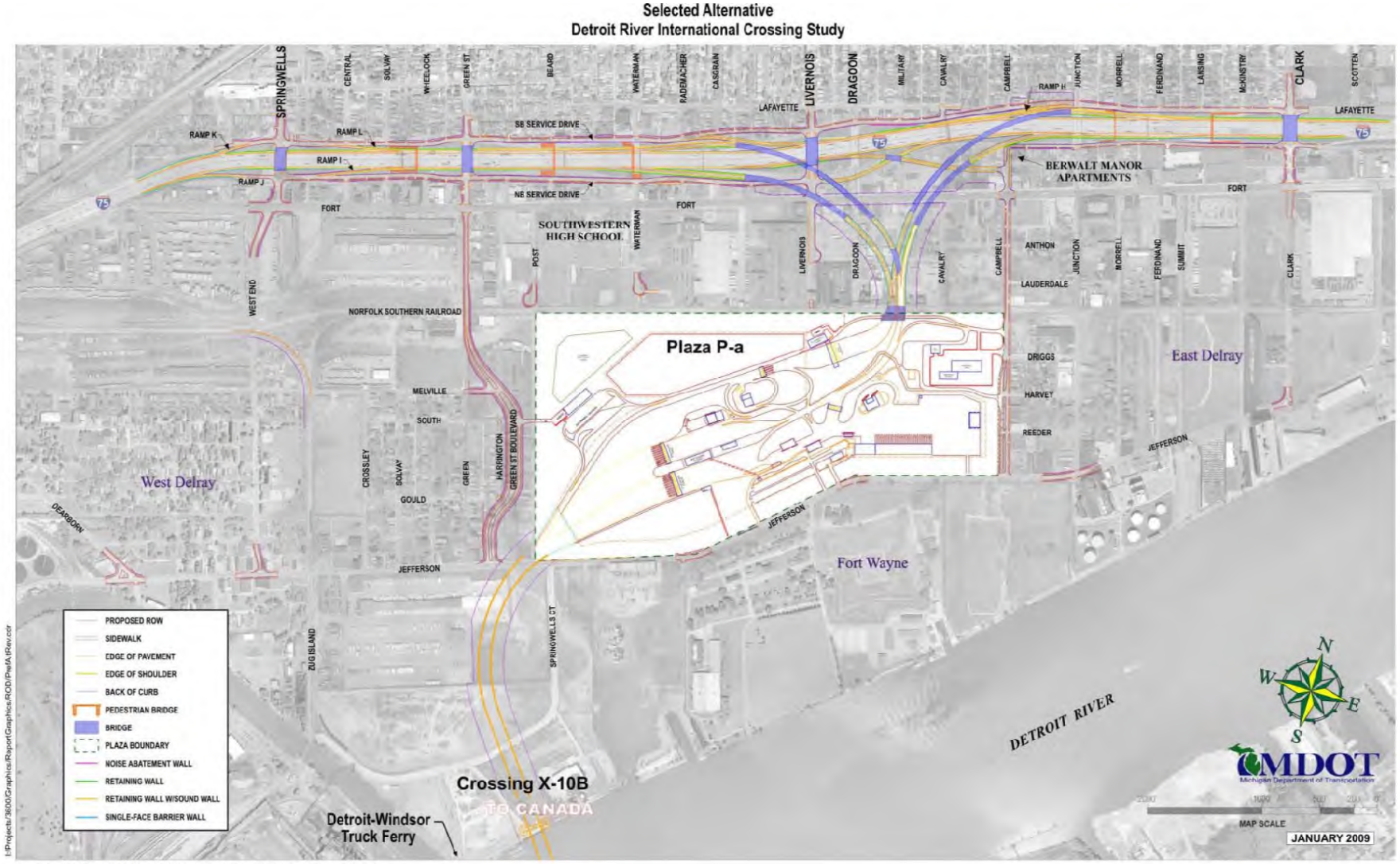
1.1 Purpose of the Report

The Detroit River International Crossing project has been in the planning and development stages for several years. The Final Environmental Impact Statement (FEIS) was completed in 2008. The Record of Decision (ROD) was received in 2009 authorizing the project to proceed. The *Level 1 and Level 2 Traffic Analysis Reports (TAR)* were completed in conjunction with the DEIS from 2005-2008. In December 2008 a *Level 3 TAR* was conducted to present the final travel demand model assignments and traffic analysis for the Preferred crossing Alternative. The future year for the Level 1, Level 2, and Level 3 reports was 2035.

Several years have passed from when the last TAR was written and a new future horizon year of 2040 is required for evaluation to verify if recommendations from the previous TAR are still valid as this project moves closer to construction. This document updates the previous 2035 No-Build and 2035 Preferred Alternative scenario to the future build year of 2040.

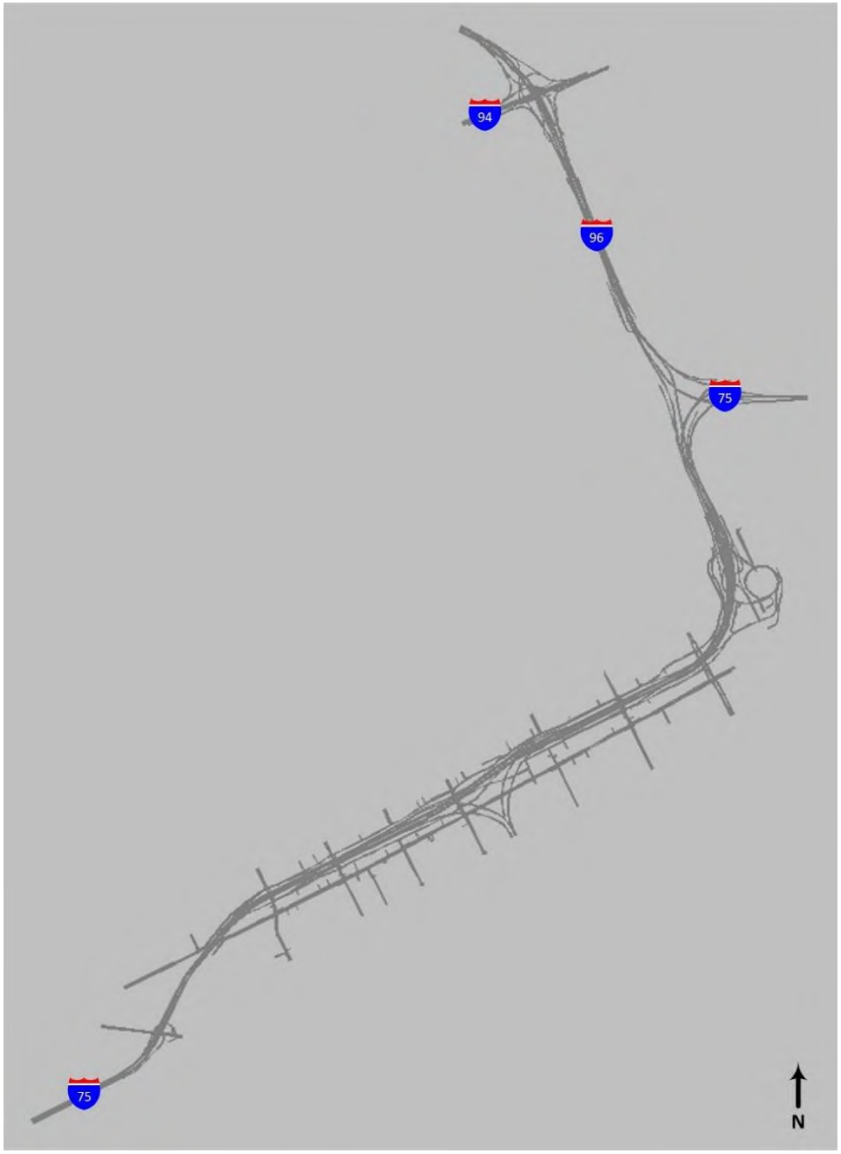
This report will document the results of the *Highway Capacity Software (HCS7)* and *VISSIM* modeling software used to evaluate the potential traffic impacts on the U.S. side of the border for the Preferred Alternative. Based on the traffic volumes determined for the future forecasts, capacity analyses were conducted for three peak periods (AM, Midday and PM) for 2040 conditions. Results include: traffic density, level of service, and, where appropriate, average delay for each freeway mainline segment, merge/diverge area, weaving segment, and local intersections. The Preferred Build Alternative can be found in Figure 1-1; the limits of the VISSIM analysis are shown in Figure 1-2.

Figure 1-1: Project Location Map



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

Figure 1-2: VISSIM Analysis Limits



Source: WSP

2 TRAVEL DEMAND FORECASTING & TRAFFIC VOLUMES

Traffic analyses were conducted for the 2040 No-Build and 2040 Preferred Alternative for AM, Midday and PM peak hour conditions. The FEIS had an existing year of 2006 and a future Build and No-Build year of 2035. This document updates the previous 2035 No-Build and 2035 Preferred Alternative scenario to the future build year of 2040. All traffic volumes can be found in Appendix A.

2.1 Computation of Traffic Volumes

Due to an ongoing major construction project, along I-75 at the Rouge River Bridge from January 2017 to anticipated end of 2018, just to the south of the study area, no new counts could be obtained for this analysis as they would not reflect normal operating volumes along I-75. The I-75 Rouge River project has southbound I-75 entirely closed south of the Springwells Street exit.

A 2015 existing conditions set of freeway and surface street volumes were developed using the FEIS Level 2, Part 2 TAR (completed February 2008). The Level 2 TAR presents 2006 existing conditions counts that were obtained in the field. Per the Level 2 TAR:

> *"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. 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."*

Using the 2006 data as a starting point, the counts were adjusted based on count changes from 2006 to 2015 obtained by MDOT via permanent traffic recorders (PTRs) on I-75 and I-94 in the area. There is no PTR present on I-96 within the study area. The I-96 mainline and ramps also do not have counts over several years to allow for the development of growth rates. Arterial counts were searched for within the available MDOT and SEMCOG databases to use as a supplement. However, both the MDOT and local roads do not have enough consistent counts over multiple years between 2006 and 2015 at the same location to develop patterns or growth rates. Peaking characteristics within the study area follow the same pattern and peak hours as the Level 3 2035 TAR. It was determined that because PTRs collected continuous data at given points within the study area that they were the most reliable way to determine growth from 2006-2015.

Table 2-1 shows the average weekday PTR volumes between 2006 and 2015 and the percent change from 2006 to 2015. Figure 2-1 shows the locations of each PTR in relation to the study area. It can be noted that there are some large traffic pattern shifts during 2008-2009 years due

to the Ambassador Bridge project, in which I-75 between Clark Street and I-96 was closed to through traffic between February 2008 and June 2009.

In addition to the PTR data collected bridge crossings on the Ambassador Bridge within the study area were obtained during the same time frame (2006-2015). The Ambassador Bridge annual total crossings show a greater decline than the PTRs at negative 28.42%. The Ambassador Bridge crossing volumes from 2006-2015 are shown in Table 2-2. The Ambassador Bridge volumes were looked at as a surrogate for the changes in I-96 volumes between 2006 and 2015 but the change in crossing volume was determined to not be indicative of mainline volumes changes.

Table 2-1: Average Weekday Volumes 2006 - 2015

Year	I-75	I-94W	I-94E
2006	110,907	133,883	158,559
2007	105,325	126,661	173,624
2008	65,584	151,728	180,169
2009	62,805	151,971	164,191
2010	102,075	131,157	153,684
2011	103,473	140,187	157,471
2012	102,977	137,224	155,225
2013	103,767	132,591	158,306
2014	105,200	133,507	157,447
2015	107,461	123,081	156,570
% Change	-3%	-8%	-1%

Source: Michigan Department of Transportation

Table 2-2: Ambassador Bridge Annual Crossings (2006-2015)

Year	Annual Crossings
2006	9,680,232
2007	9,082,435
2008	7,349,305
2009	6,494,620
2010	7,232,366
2011	7,252,916
2012	7,310,302
2013	7,246,608
2014	7,162,182
2015	6,929,199
% Change	-28.42%

Source: https://www.bridgeandtunneloperators.org/index.php/traffic

Figure 2-1: MDOT PTR Location Map

Source: Michigan Department of Transportation

The next step was to adjust the 2006 existing count data to estimate the 2015 base year counts. A 2015 base year was selected so that the 2040 future year forecasts could use growth factors from the SEMCOG E6 model with CDM Smith international trips, which had an adjusted base year of 2015. The following steps were followed:

- Adjust the freeway growth by the percentages identified in Table 2-1 above.
- Update the Ambassador Bridge counts and ramp area geometrics. In 2009 a reconstruction project to realign the ramps to and from the Ambassador Bridge was complete. This separated cars and heavy trucks into different ramps. Counts from 2015 were used to update the volumes in the base year to reflect the changes within this area.
- Balance the ramps accordingly and adjust the service streets to reflect the balance. Since no new major developments/changes have been made in this area, the relative turning-movement percentages would be like those in 2006.

2.1.1 2040 No-Build Traffic Volumes

To determine volumes for the 2040 No-Build scenario, volumes at the entry and exit points to/from I-75, I-94 and I-96 were obtained from the SEMCOG E6 model supplemented with CDM Smith international trips (No-Build scenario) and compared to the 2015 SEMCOG E6 model supplemented with CDM Smith international trips to determine growth factors between 2015 and 2040. These growth factors were used to adjust the 2015 base year counts and were balanced across the network. The ramp counts at the Ambassador Bridge were also back-checked with the CDM Smith predicted trip tables for 2040 No-Build, prepared for the Tolling and Revenue study.

2.1.2 2040 Build Traffic Volumes

To determine volumes for the 2040 Build scenario, volumes at the entry and exit points to/from I-75, I-94 and I-96 were obtained from the 2040 SEMCOG E6 model supplemented with CDM Smith international trips (Build scenario) and compared to the 2040 SEMCOG E6 model supplemented with CDM Smith international trips (No-Build scenario) to determine growth factors between No-Build and Build. These growth factors were used to adjust the 2040 No-Build counts and were balanced across the network. The ramp counts at the Ambassador Bridge and the proposed international bridge were also back-checked with the CDM Smith predicted trip tables for 2040 Build.

Some bridges within the study area are being removed/combined to make room for the new international crossing bridge ramps. Local traffic patterns will shift and route to new overpasses and on/off-ramps. Adjustment for these movements were made by dictating the shortest pathway to complete the OD pair movement and looking at which ramps predicted an increase/decrease along I-75 within the study area from the 2040 SEMCOG E6 model supplemented with CDM Smith international trips (Build scenario). Fort Street, the local east-west connector, to the south of I-75 is also experiencing some traffic pattern shifts which were accounted for by looking at growth rates from the Travel Demand forecast model and adjusting accordingly.

3 TRAFFIC ANALYSIS

This section documents the results of the *Highway Capacity Software (HCS7)* and *VISSIM* modeling software used to evaluate the potential traffic impacts on the U.S. side of the border for the No-Build and Preferred Build Alternative. Based on the traffic volumes determined for the future forecasts, capacity analyses were conducted for three peak periods (AM, Midday and PM) for 2040 No-Build and 2040 Build conditions. Measures of effectiveness include: traffic density along freeway segments, level of service, average delay at signalized intersections, as well as travel time along the freeway mainline.

No analysis or modeling was necessary for the 2015 base year as this analysis specifically looked at updating a previous 2035 forecast year (FEIS 2008 report) to a 2040 forecast year and what additional mitigation would be anticipated with the new future forecast year. Traffic data from this report is being used to supplement the air quality CO analysis (No-Build 2040 and Build 2040) where LOS inputs are required.

Traffic analysis for the 2040 No-Build and 2040 Build year were completed using the Highway Capacity Software (HCS7) to determine density and level of service (LOS). This analysis was supplemented by a VISSIM model to understand the complexity of traffic operational interactions along the I-75 freeway.

The models from the FEIS (2008) were the basis for this analysis. The FEIS models had a 2006 calibrated base year which was used to build the future year models (2035 No-Build and 2035 Build) for the FEIS and for this analysis (2040 No-Build and 2040 Build). These models were run and processed per modeling standards to average the outputs from five runs.

3.1 No-Build 2040

3.1.1 HCS7 Traffic Analysis

The freeway operations analyses provided Level of Service (LOS) as an output. Level of Service is a quantitative stratification of a facility's performance measured on an A to F scale. LOS A represents the best operating conditions while LOS F represents the worst. LOS E represents conditions approaching capacity with increased congestion and delay. LOS F represents oversaturated conditions where demand exceeds capacity. Appendix B contains the HCS7 reports for the 2040 No-Build analysis.

Mainline Segments

Table 3-1 summarizes the density output from HCS7 and corresponding level of service by mainline freeway segment along I-75 for the 2040 No-Build data. Under the No-Build 2040 condition several mainline segments show a change in LOS from 2035 No-Build conditions. In Table 3-1 respective changes in red (degraded) or green (improvement) are highlighted with the 2035 values shown parenthetically. Some segments improved slightly as well from the 2035

analysis. These LOS changes can be attributed to the use of the updated regional forecasting model to develop new AM and PM peak volumes. It should also be noted that a newer version of the HCS software (HCS7) was utilized. The algorithms have been updated in the software upgrade to reflect the latest research and evaluation methodology. See Appendix C for a side-by-side comparison of HCS+ software versus the HCS7 software at the Springwells on-ramp location. It can be noted that the same input values are used however HCS+ results in a LOS C and HCS7 results in LOS B. All segments operate at an acceptable LOS D or better, except for the westbound I-96 segment from northbound I-75 diverge to a one-lane section that operates at LOS E in the AM Peak.

Table 3-1: 2040 No-Build HCS7 Level of Service for Mainline 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						
Dearborn off-ramp to Springwells off-ramp	**34.9 (25.7)**	**D (C)**	**18.4 (16.0)**	**C (B)**	**23.0 (16.5)**	**C (B)**
Springwells off-ramp to Springwells on-ramp	25.1	C	12.9	B	16.1	B
Springwells on-ramp to Livernois off-ramp	27.4	D	14.8	B	**18.2 (17.5)**	**C (B)**
Livernois off-ramp to Dragoon on-ramp	26.7	D	14.1	B	17.4	B
Dragoon on-ramp to Clark off-ramp	28.3	D	15.4	B	19.7	C
Clark off-ramp to Clark on-ramp	27.1	D	14.9	B	19.0	C
Clark on-ramp to Lafayette off-ramp	23.4	C	13.0	B	16.7	B
Lafayette off-ramp to NB I-75/I-96 Diverge	22.0	C	10.6	A	12.3	B
From NB I-75/I-96 Diverge to NB I-75 Service Drive off ramp (at Ambassador Bridge)	**18.0 (21.0)**	**B (C)**	8.2	A	**9.0 (12.1)**	**A (B)**
From NB I-75 Service Drive off-ramp (at Ambassador Bridge) to Ambassador Bridge on-ramp	**23.9 (28.0)**	**C (D)**	**11.0 (12.4)**	**A (B)**	11.7	B
From Ambassador Bridge on-ramp to C-D Road off-ramp	26.2	D	12.0	B	12.7	B
Southbound I-75						
From C-D Road on-ramp to Ambassador Bridge off-ramp	12.2	B	12.7	B	**25.5 (32.6)**	**C (D)**
From Ambassador Bridge off-ramp to SB I-75/I-96 Merge	11.6	B	11.8	B	**22.9 (28.3)**	**C (D)**
From SB I-75/I-96 Merge to Ambassador Bridge on-ramp	14.8	B	14.3	B	26.4	D
Ambassador Bridge on-ramp to Grand Blvd. on-ramp	**14.1 (19.0)**	**B (C)**	13.8	B	**22.7 (28.1)**	**C (D)**
Grand Blvd. on-ramp to Clark off-ramp	**14.1 (21.8)**	**B (C)**	13.8	B	**23.0 (32.7)**	**C (D)**
Clark off-ramp to Clark on-ramp	15.2	B	15.6	B	26.1	D
Clark on-ramp to Dragoon off-ramp	16.3	B	16.1	B	28.2	D
Dragoon off-ramp to Livernois on-ramp	15.0	B	15.4	B	27.6	D
Livernois on-ramp to Springwells off-ramp	15.9	B	16.7	B	29.5	D
Springwells off-ramp to Springwells on-ramp	13.3	B	14.7	B	27.6	D
Springwells on-ramp to Dearborn on-ramp	15.0	B	16.5	B	31.1	D
EB I-96 on-ramp to Grand on-ramp	**14.8 (21.6)**	**B (C)**	14.3	B	26.4	D

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Westbound I-96						
From NB I-75 Diverge to 1-lane section	**36.3 (22.6)**	**E (C)**	18.0	B	**21.7 (17.7)**	**C (B)**
From 2-lane section to Ambassador Bridge on-ramp	**23.0 (11.3)**	**C (B)**	**15.3 (7.2)**	**B (A)**	**11.6 (8.8)**	**B (A)**
From Ambassador Bridge on-ramp to Michigan off-ramp	25.0	C	15.1	B	17.9	B
Eastbound I-96						
From Michigan on-ramp to Ambassador Bridge off-ramp	14.5	B	**15.3 (9.8)**	**B (A)**	20.9	C
From Ambassador Bridge off-ramp to SB I-75/I-96 Merge	**17.2 (16.9)**	**C (B)**	**9.7 (9.6)**	**B (A)**	**18.1 (17.9)**	**D (C)**

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 No-Build (Density and LOS for 2035 No-Build)

LOS improved from 2035 No-Build (Density and LOS for 2035 No-Build)

Ramp Merge, Diverge and Weave Segments

Table 3-2 and Table 3-3 summarizes the density output for HCS7 and corresponding level of service by merge or diverge and weave segment along I-75 for the 2040 No-Build data. Under the No-Build 2040 condition seven merge/diverge locations show a small degradation in LOS from 2035 No-Build conditions. All merge/diverge and weave segments operate at an acceptable LOS D or better. Any changes between the 2040 and 2035 results are highlighted in Table 3-2.

Table 3-2: 2040 No-Build HCS7 Level of Service for Ramp Merge and Diverge Areas

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						
Dearborn off-ramp	34.4	D	21.8	C	25.4	C
Springwells off-ramp	24.6	C	14.3	B	17.4	B
Springwells on-ramp	24.2	C	14.9	B	17.5	B
Livernois off-ramp	24.8	C	14.5	B	17.4	B
Dragoon on-ramp	21.2	C	12.3	B	16.1	B
Clark on-ramp	**23.6 (17.7)**	**C (B)**	14.5	B	18.0	B
Lafayette off-ramp	24.3	C	13.1	B	16.9	B
NB I-75/I-96 Diverge	**20.2 (12.8)**	**C (B)**	9.2	A	**11.3 (8.0)**	**B (A)**
NB I-75 Service Drive off-ramp (at Ambassador Bridge)	**17.8 (20.9)**	**B (C)**	6.4	A	**7.4 (11.2)**	**A (B)**
Ambassador Bridge on-ramp	**14.6 (27.5)**	**B (C)**	**9.4 (10.9)**	**A (B)**	11.1	B
Clark off-ramp	24.3	C	13.1	B	16.9	B
Southbound I-75						
Ambassador Bridge off-ramp	16.9	B	16.7	B	28.5	D
Service Drive on-ramp (N of Grand)	11.3	B	11.1	B	17.2	B
Clark off-ramp	**20.1 (19.3)**	**C (B)**	19.1	B	26.1	C
Clark on-ramp	13.0	B	12.3	B	**22.2 (18.9)**	**C (B)**

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Dragoon off-ramp	16.8	B	15.9	B	26.0	C
Livernois on-ramp	14.9	B	15.8	B	25.3	C
Springwells off-ramp	15.4	B	15.3	B	25.6	C
Springwells on-ramp	15.1	B	16.2	B	**26.5 (18.5)**	**C (B)**
Dearborn on-ramp	14.4	B	15.1	B	**25.0 (19.3)**	**C (B)**
Eastbound I-96						
Ambassador Bridge off-ramp	**11.1 (8.7)**	**B (A)**	11.8 **(6.6)**	B **(A)**	17.1	B

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 No-Build (Density and LOS for 2035 No-Build)

LOS improved from 2035 No-Build (Density and LOS for 2035 No-Build)

Table 3-3: 2040 No-Build HCS7 Level of Service for Weaving 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						
From Clark on-ramp to Lafayette off-ramp	**29.3 (25.4)**	**D (C)**	17.1	B	**27.1 (17.7)**	**C (B)**
Southbound I-75						
From Ambassador on-ramp to Clark off-ramp	14.1	B	13.3	B	27.5	C

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 No-Build (Density and LOS for 2035 No-Build)

3.1.2 VISSIM Microsimulation Results

The HCS7 analysis indicated acceptable levels of service are anticipated under the No-Build conditions in both directions of I-75 for all three peaks, except for the westbound I-96 segment from northbound I-75 diverge to a one-lane section that operates at LOS E in the AM Peak. However, due to limitations with the HCS7 software in estimating the impact of bottlenecks on upstream segment operations, a microsimulation analysis using the VISSIM software (version 4.30) was performed as a supplement to the HCS7 analysis. The purpose of the microsimulation analysis was to more accurately estimate operations in the study area. VISSIM version 4.30 was used for this updated analysis to be consistent with the same version of VISSIM used for the initial analyses that were calibrated and validated.

The previous Level 3 TAR (2035) analysis assumed a uniform density distribution across all lanes of travel for each segment when calculating the density statistics by lane. The density results presented in this updated report used the actual calculated individual lane densities on a segment. A weighted average density by lane was calculated to accurately capture the LOS of segments with uneven lane utilization. This change in methodology has resulted in some segments reporting a different LOS than the 2035 analysis presented in the previous Level 3 TAR (2035) even if volumes were similar.

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 3-4. Table 3-5 details the LOS at the local intersections. More detailed results are contained in Appendix D.

Mainline Segments

Table 3-4 summarizes the density output from VISSIM and corresponding level of service by mainline freeway segment along mainline I-75 for the 2040 No-Build data. Under the No-Build 2040 condition, eleven mainline segments show a degradation in LOS from 2035 No-Build conditions. Some segments improved marginally as well from the 2035 analysis. This is due to the lower volumes that were predicted with the updated forecasting models. The largest improvement because of the updated forecast is northbound I-75 from Ambassador Bridge ramps to Michigan Avenue. This segment improved from a LOS E to LOS C in the AM peak.

In the AM peak hour, all segments are estimated to operate at LOS D or better. Westbound I-96 from I-96/I-75 diverge to Ambassador Bridge ramps decreased from LOS C in the year 2035 to LOS D. This can be attributed to the forecasting model forecasting a shift of traffic from northbound I-75 to WB I-96/EB I-94. In the Midday peak hour, all segments are estimated to operate at LOS D or better. In the PM peak hour, all segments are estimated to operate at LOS D or better, except for one segment, eastbound I-96 from Ambassador Bridge ramps to I-96/I-75 merge, which would operate at LOS E. This segment was estimated to operate at LOS D in analysis year 2035.

Table 3-4: 2040 No-Build VISSIM Level of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS
Northbound I-75						
From West of Dearborn to Springwells	19.3	C	9.5	A	12.1	B
From Springwells to Springwells on-ramp	18.5	C	8.8	A	11.3	B
From Springwells on-ramp to Green	19.1	C	9.6	A	12.0	B
From Green to Waterman	20.8	C	10.4	A	13.2	B
From Waterman to Livernois	20.1	C	9.8	A	12.5	B
From Dragoon to Dragoon on-ramp	19.9	C	9.6	A	12.3	B
From Dragoon on-ramp to Junction	20.3	C	10.2	A	13.2	B
From Junction to Clark	21.4	C	10.8	A	14.3	B
From Clark to Clark on-ramp	23.8	C	11.8	B	16.4	B
From Clark on-ramp to Grand	21.6	C	10.4	A	21.8	C
From Porter off-ramp to NB I-75 / I-96 Diverge	21.5	C	8.4	A	10.4	A
From NB I-75/I-96 Diverge to Ambassador Bridge Ramps	18.7	C	8.5	A	10.2	A
From Ambassador Bridge Ramps to Michigan	20.9	C	9.4	A	11.1	B
Westbound I-96						
I-96 From NB I-75/I-96 Diverge to Ambassador Bridge Ramps	31.6	D	7.4	A	9.1	A
I-96 From Ambassador Bridge Ramps to Michigan	18.0	C	9.9	A	12.3	B

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS
I-96 From Michigan to C-D Road	17.1	B	10.3	A	13.3	B
I-96 From C-D Road to MLK on-ramp	**11.5**	**B**	8.2	A	**18.6**	**C**
I-96 From MLK on-ramp to I-94 off-ramp	**22.0**	**C**	9.1	A	17.4	B
I-96 From I-94 off-ramp to Warren on-ramp	3.6	A	2.2	A	10.2	A
I-96 From Warren on-ramp to I-94	3.4	A	3.0	A	10.5	A
I-96 From I-94 to I-94 on-ramp	3.8	A	3.6	A	11.5	B
Southbound I-75						
From Springwells to West of Dearborn	**9.8**	**A**	11.4	B	**24.1**	**C**
From Green to Springwells	**8.7**	**A**	**10.2**	**A**	**21.7**	**C**
From Waterman to Green	11.3	B	12.0	B	**23.4**	**C**
From Livernois on-ramp to Waterman	10.8	A	11.2	B	21.9	C
From Livernois to Livernois on-ramp	**10.3**	**A**	**10.7**	**A**	21.2	C
From Junction to Dragoon	**10.2**	**A**	**10.6**	**A**	**21.5**	**C**
From Clark on-ramp to Junction	**10.8**	**A**	**10.8**	**A**	20.8	C
From Clark to Clark on-ramp	**10.6**	**A**	**10.7**	**A**	20.5	C
From Clark off-ramp to Clark	**10.6**	**A**	10.7	A	20.5	C
From Grand to Clark off-ramp	9.8	A	9.7	A	**18.3**	**C**
From Ambassador Bridge on ramp to New Frontage Road on ramp	**9.8**	**A**	**9.3**	**A**	**17.1**	**B**
SB I-75/I-96 Merge Area	**11.5**	**B**	10.4	A	21.5	C
From Ambassador Bridge Ramps to SB I-75/I-96 Merge	**8.8**	**A**	**8.7**	**A**	18.4	C
From Michigan to Ambassador Bridge Ramps	**9.3**	**A**	**9.4**	**A**	**20.5**	**C**
Eastbound I-96						
I-96 From Ambassador Bridge Ramps to SB I-75/ I-96 Merge	**20.0**	**C**	**16.6**	**B**	**35.6**	**E**
I-96 From Michigan to Ambassador Bridge Ramps	10.9	A	10.8	A	**27.6**	**D**
I-96 From NB I-75 off-ramp to Michigan	9.8	A	9.8	A	15.7	B
I-96 From Warren on-ramp to NB I-75 off-ramp	22.2	C	8.6	A	**13.4**	**B**
I-96 From I-94 on-ramp to Warren on-ramp	16.5	B	9.2	A	**11.2**	**B**
I-96 From I-94 to I-94 on-ramp	13.0	B	3.0	A	5.7	A
I-96 From I-94 off ramp to I-94	14.4	B	4.0	A	6.4	A

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

LOS improved from 2035 Build

Local Intersections

Under the No-Build 2040 condition four intersections show a small degradation in LOS from 2035 No-Build conditions. All intersections operate at an acceptable LOS D or better.

Table 3-5: 2040 No-Build VISSIM Level of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	LOS	Intersection Delay (sec/veh)	LOS	Intersection Delay (sec/veh)	LOS
Fort at Westend	10.7	B	11.8	B	**10.3**	**B**
Fort at Green	**11.6**	**B**	15.6	B	11.9	B
Fort at Waterman	15.6	B	16.2	B	11.4	B
Fort at Livernois	11.6	B	9.2	A	17.7	B
Fort at Dragoon	6.6	A	6.8	A	7.6	A
Fort at Junction	**13.8**	**B**	**12.1**	**B**	**12.1**	**B**
Fort at Clark	15.0	B	13.3	B	16.3	B
Southbound Service Drive at Livernois	5.9	A	9.2	A	9.0	A
Southbound Service Drive at Dragoon	13.6	B	13.2	B	14.1	B
Northbound Service Drive at Livernois	12.4	B	11.8	B	13.3	B
Northbound Service Drive at Dragoon	9.2	A	10.6	B	12.1	B
Southbound Service Drive at Springwells	16.8	B	14.4	B	14.9	B
Northbound Service Drive at Westend	16.0	B	17.0	B	17.5	B
Northbound Service Drive at Clark	16.6	B	16.1	B	18.4	B
Southbound Service Drive at Clark	19.8	B	17.9	B	19.6	B
Fort at Grand Blvd.	3.6	A	5.3	A	5.1	A
Northbound Service Drive at Grand Blvd.	13.3	B	12.7	B	**11.0**	**B**
Southbound Service Drive at Grand Blvd.	8.4	A	9.0	A	7.9	A
Fort at Post	0.5	A	0.4	A	0.5	A

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

3.2 Build 2040

3.2.1 HCS7 Traffic Analysis

Mainline Segments

Table 3-6 summarizes the density output from HCS7 and corresponding level of service by mainline freeway segment along mainline I-75 for the 2040 Build data. Appendix B contains the HCS7 reports for 2040 Build analysis. Under the Build 2040 condition several mainline segments show a degradation in LOS from 2035 Build conditions.

All segments operate at an acceptable LOS D or better except for the westbound I-96 segment from northbound I-75 diverge to 1-lane section that operates at LOS E in the AM Peak. This segment operates at LOS E in the 2040 No-Build as well. The eastbound I-96 off-ramp to southbound I-75/I-96 merge now operates at LOS E in the PM Peak.

Table 3-6: 2040 Build HCS7 Level of Service for Mainline 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						
Dearborn off-ramp to Springwells off-ramp	22.1	C	11.8	B	14.3	B
Springwells off-ramp to Springwells on-ramp	20.9	C	10.8	A	13.1	B
Springwells on-ramp to Plaza off-ramp	17.9	B	9.8	A	11.8	B
Plaza off-ramp to Livernois off-ramp	21.6	C	10.1	A	**12.4 (10.7)**	**B (A)**
Livernois off-ramp to Dragoon on-ramp	19.9	C	9.0	A	**11.1 (10.5)**	**B (A)**
Dragoon on-ramp to Plaza on-ramp	21.1	C	10.2	A	**12.5 (10.6)**	**B (A)**
Plaza on-ramp to Clark on-ramp	**23.2 (30.5)**	**C (D)**	11.7	B	13.5	B
Clark on-ramp to Lafayette off-ramp	**30.9 (26.0)**	**D (C)**	16.2	B	**18.9 (14.7)**	**C (B)**
Lafayette off-ramp to NB I-75/I-96 Diverge	**29.8 (25.9)**	**D (C)**	14.3	B	15.5	B
From NB I-75/I-96 Diverge to NB I-75 Service Drive off ramp (at Ambassador Bridge)	19.9	C	9.3	A	9.8	A
From NB I-75 Service Drive off-ramp (at Ambassador Bridge) to Ambassador Bridge on-ramp	26.4	D	12.4	B	12.8	B
From Ambassador Bridge on-ramp to C-D Road off-ramp	28.3	D	13.1	B	13.6	B
Southbound I-75						
From C-D Road on-ramp to Ambassador Bridge off-ramp	12.8	B	13.1	B	27.6	D
From Ambassador Bridge off-ramp to SB I-75/I-96 Merge	12.5	B	12.4	B	25.9	D
From SB I-75/I-96 Merge to Ambassador Bridge on-ramp	15.2	B	15.0	B	29.7	D
Ambassador Bridge on-ramp to Grand Blvd. on-ramp	13.8	B	13.6	B	24.6	C
Grand Blvd. on-ramp to Clark off-ramp	14.1	B	14.0	B	**23.7 (29.1)**	**C (D)**
Clark off-ramp to Plaza off-ramp	12.0	B	12.4	B	21.7	C

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Plaza off-ramp to Junction on-ramp	11.4	B	11.5	B	20.1	C
Junction on-ramp to Dragoon off-ramp	10.6	A	10.6	A	18.4	C
Dragoon off-ramp to Plaza on-ramp	**12.2 (10.7)**	**B (A)**	13.1	B	23.0	C
Plaza on-ramp to Springwells off-ramp	9.5	A	9.8	A	16.3	B
Springwells off-ramp to Springwells on-ramp	12.0	B	13.1	B	23.9	C
Springwells on-ramp to Dearborn on-ramp	13.5	B	14.9	B	27.5	D
Westbound I-96						
From NB I-75 Diverge to 1-lane section	**37.3**	**E**	17.8	B	21.6	C
From 2-lane section to Ambassador Bridge on-ramp	19.9	C	10.1	A	11.6	B
From Ambassador on-ramp to Michigan off-ramp	23.1	C	**13.2 (10.8)**	**B (A)**	15.2	B
Eastbound I-96						
From Michigan on-ramp to Ambassador Bridge off-ramp	13.5	B	14.4	B	21.7	C
From Ambassador Bridge off-ramp to SB I-75/I-96 Merge	21.5	C	20.0	B	**37.7 (27.6)**	**E (D)**

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build (Density and LOS for 2035 Build)

Ramp Merge, Diverge and Weave Segments

Table 3-7 and Table 3-8 summarizes the density output for HCS7 and corresponding level of service by merge or diverge and weave segment along I-75 for the 2040 Build data. Under the Build 2040 condition nine merge/diverge locations show a degradation in LOS from 2035 Build conditions. All merge/diverge and weave segments operate at an acceptable LOS D or better.

Per the Level 3 TAR (2035): "For diverge areas with long deceleration lanes, the density results may be negative due to the nature of the density equation. This is especially the case 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 an asterisk (*) was placed in the table."

Table 3-7: 2040 Build HCS7 Level of Service for Ramp Merge and Diverge Areas

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						
Dearborn off-ramp	27.4	C	16.6	B	19.1	B
Springwells off-ramp	25.4	C	14.8	B	17.8	B
Springwells on-ramp	**17.9 (26.2)**	**B (C)**	**8.6 (13.3)**	**A (B)**	10.9	B
Plaza off-ramp (E of Waterman)	**20.8 (16.4)**	**C (B)**	14.3	B	15.2	B
Livernois off-ramp	18.9	B	**10.1 (8.3)**	**B (A)**	**12.8 (8.9)**	**B (A)**
Dragoon on-ramp	**21.3 (19.5)**	**C (B)**	**12.0 (9.6)**	**B (A)**	14.3	B
Plaza on-ramp (E of Junction)	***18.1 (0.6)**	**B (A)**	*7.9	A	*8.5	A

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Clark on-ramp	24.9	C	14.3	B	16.7	B
Lafayette off-ramp	24.8	C	17.5	B	19.8	B
NB I-75/I-96 Diverge	21.9	C	9.9	A	**11.3 (7.1)**	**B (A)**
NB I-75 Service Drive off-ramp (at Ambassador Bridge)	19.8	B	7.7	A	8.4	A
Ambassador Bridge on-ramp	22.6	C	10.6	B	10.9	B
Southbound I-75						
Ambassador Bridge off-ramp	17.4	B	17.1	B	**30.7 (27.9)**	**D (C)**
Service Drive on-ramp	14.3	B	14.3	B	23.6	C
Clark off-ramp	7.9	A	7.3	A	**20.6 (19.2)**	**C (B)**
Plaza off-ramp (E of Junction)	2.1	A	2.5	A	11.3	B
Junction on-ramp	12.2	B	12.3	B	22.1	C
Dragoon off-ramp	9.3	A	8.8	A	18.8	B
Springwells off-ramp	**17.8 (4.0)**	**B (A)**	**15.8 (3.0)**	**B (A)**	**23.4 (11.2)**	**C (B)**
Springwells on-ramp	15.5	B	16.9	B	27.5	C
Dearborn on-ramp	15.3	B	16.1	B	26.0	C
Eastbound I-96						
Ambassador Bridge off-ramp	**10.0 (15.7)**	**A (B)**	**10.9 (9.3)**	**B (A)**	17.8	B

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build (Density and LOS for 2035 Build)

LOS improved from 2035 Build (Density and LOS for 2035 Build)

Table 3-8: 2040 Build HCS7 Level of Service for Weaving 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						
From Springwells on-ramp to Plaza off-ramp	**22.9 (17.7)**	**C (B)**	10.9	B	13.5	B
From Clark on-ramp to Lafayette off-ramp	**32.0 (25.4)**	**D (C)**	15.5	B	20.0	B
Southbound I-75						
From Ambassador on-ramp to Clark off-ramp	15.1	B	15.0	B	28.1	D
From Junction on-ramp to Dragoon off-ramp	**11.3 (9.0)**	**B (A)**	**11.4 (9.1)**	**B (A)**	**20.9 (19.9)**	**C (B)**
From Plaza on-ramp to Springwells off-ramp	13.6	B	14.2	B	24.5	C

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build (Density and LOS for 2035 Build)

3.2.2 VISSIM Microsimulation Results

The HCS7 analysis indicated acceptable levels of service are anticipated under the Build conditions in both directions of I-75 for all three peaks except for the westbound I-96 segment from northbound I-75 diverge to 1-lane section that operates at LOS E in the AM Peak. This segment operates at LOS E in the 2040 No-Build as well. The eastbound I-96 off-ramp to southbound I-75/I-96 merge now operates at LOS E in the PM Peak. However, due to limitations with the HCS7 software in estimating the impact of bottlenecks on upstream segment operations, a microsimulation analysis using the VISSIM software (version 4.30) was performed as a supplement to the HCS7 analysis. The purpose of the microsimulation analysis was to more accurately estimate operations in the study area where bottlenecks may occur. VISSIM version 4.30 was used for this updated analysis to be consistent with the same version of VISSIM used for the initial analyses that were calibrated and validated.

The previous Level 3 TAR (2035) analysis assumed a uniform density distribution across all lanes of travel for each segment when calculating the density statistics by lane. The density results presented in this updated report used the actual calculated individual lane densities on a segment. A weighted average density by lane was calculated to accurately capture the LOS of segments with uneven lane utilization. This change in methodology has resulted in some segments reporting a different LOS than the 2035 analysis presented in the previous Level 3 TAR (2035) even if volumes were similar.

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 3-9. Table 3-10 details the LOS at the local intersections. More detailed results are contained in Appendix D.

Mainline Segments

Table 3-9 summarizes the density output from VISSIM and corresponding level of service by mainline freeway segment along mainline I-75 for the 2040 Build data. Under the Build 2040 condition eighteen mainline segments show density degradation in LOS from 2035 Build conditions. Some segments improved slightly as well from the 2035 analysis. This is due to the reduced volumes projected in the 2040 forecast year.

In the AM peak hour, all segments are estimated to operate at LOS D or better. Similar to the 2040 future No-Build model, the largest improvement from the 2035 analysis occurred at northbound I-75 from Ambassador Bridge ramps to Michigan. This segment improved from a LOS E to LOS C in the AM peak. In the Midday peak hour, all segments are estimated to operate at LOS B or better. In the PM peak hour, all segments are estimated to operate at LOS D or better, except for one segment, eastbound I-96 from Ambassador Bridge ramps to I-96/I-75 merge, which would operate at LOS E. This segment was estimated to operate at LOS C in analysis year 2035.

Eastbound I-96 from Ambassador Bridge ramps to I-96/I-75 merge is forecasted to operate at LOS E under both the No-Build and Build scenarios in the PM peak. Upon review of the VISSIM

model, the queueing on this segment was isolated and didn't extend beyond the Vernor off-ramp. Extending this segment as a two-lane ramp to I-75 is unlikely to be feasible due to constrained geometrics. The 2040 Build model shows no significant LOS degradations due to the project being implemented.

Table 3-9: 2040 Build VISSIM Level of Service for Freeway Segments

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS
Northbound I-75						
From West of Dearborn to Springwells	20.6	C	9.3	A	12.2	B
From Springwells to Springwells on-ramp	19.6	C	8.5	A	11.2	B
From Springwells on-ramp to Green	18.5	C	8.3	A	10.5	A
From Green to Waterman	20.5	C	8.8	A	11.7	B
From Waterman to Livernois	21.0	C	8.1	A	11.0	A
From Dragoon to Dragoon on-ramp	20.9	C	7.2	A	9.6	A
From Dragoon on-ramp to Junction	21.1	C	7.6	A	10.3	A
From Junction to Clark (6 lane section)	21.6	C	9.1	A	12.0	B
From Junction to Clark (5 lane section)	22.7	C	9.3	A	11.9	B
From Clark to Clark on-ramp	23.2	C	9.2	A	11.8	B
From Clark on-ramp to Grand	22.3	C	8.6	A	10.7	A
From Porter off-ramp to NB I-75 / I-96 Diverge	23.9	C	9.2	A	11.0	B
From NB I-75/I-96 Diverge to Ambassador Bridge Ramps	21.0	C	8.3	A	9.0	A
From Ambassador Bridge Ramps to Michigan	23.7	C	9.0	A	9.9	A
Westbound I-96						
I-96 From NB I-75/I-96 Diverge to Ambassador Bridge Ramps	33.2	D	11.6	B	15.7	B
I-96 From Ambassador Bridge Ramps to Michigan	17.2	B	8.4	A	11.4	B
I-96 From Michigan to C-D Road	16.5	B	7.9	A	10.9	A
I-96 From C-D Road to MLK on-ramp	11.2	B	6.6	A	16.7	B
I-96 From MLK on-ramp to I-94 off-ramp	13.5	B	8.1	A	16.3	B
I-96 From I-94 off-ramp to Warren on-ramp	2.9	A	1.6	A	9.0	A
I-96 From Warren on-ramp to I-94	2.9	A	2.5	A	9.0	A
I-96 From I-94 to I-94 on-ramp	3.3	A	2.9	A	10.1	A
Southbound I-75						
From Fort to Dearborn	10.7	A	12.0	B	25.9	C
From Springwells on ramp to Fort	9.8	A	11.2	B	24.2	C
From Springwells to West of Dearborn	10.0	A	11.2	B	24.3	C
From Springwells off ramp to Springwells	9.6	A	10.9	A	22.8	C
From Green to Springwells (6 Lane section)	12.5	B	16.2	B	21.3	C
From Green to Springwells (5 Lane section)	9.4	A	10.6	A	21.6	C
From Flyover on ramp to Green	9.4	A	9.2	A	19.8	C
From Waterman to Green	10.4	A	10.0	A	22.0	C
From Dragoon on ramp to Livernois	11.1	B	9.5	A	20.8	C
From Junction/Plaza off ramp to Dragoon on ramp	9.5	A	8.7	A	18.7	C

Freeway Segment	AM Peak		Midday Peak		PM Peak	
	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS	Density (veh/mi/ln)	LOS
From Clark off-ramp to Plaza off ramp	9.3	A	8.6	A	18.4	C
From Grand to Clark off-ramp	8.6	A	7.8	A	**16.9**	**B**
From Ambassador Bridge on ramp to New Frontage Road on ramp	8.9	A	8.1	A	**17.2**	**B**
SB I-75/I-96 Merge Area	11.2	B	10.1	A	23.0	C
From Ambassador Bridge Ramps to SB I-75/I-96 Merge	**9.4**	**A**	8.2	A	20.0	C
From Michigan to Ambassador Bridge Ramps	**9.8**	**A**	**8.7**	**A**	**21.1**	**C**
Eastbound I-96						
I-96 From Ambassador Bridge Ramps to SB I-75/ I-96 Merge	**16.1**	**B**	16.0	B	**37.5**	**E**
I-96 From Michigan to Ambassador Bridge Ramps	**12.7**	**A**	9.4	A	**33.1**	**D**
I-96 From NB I-75 off-ramp to Michigan	16.1	B	8.5	A	15.8	B
I-96 From Warren on-ramp to NB I-75 off-ramp	**21.2**	**C**	7.5	A	**13.6**	**B**
I-96 From I-94 on-ramp to Warren on-ramp	**9.1**	**B**	8.4	A	**11.3**	**B**
I-96 From I-94 to I-94 on-ramp	**9.8**	**B**	2.6	A	5.6	A
I-96 From I-94 off ramp to I-94	**16.1**	**B**	3.5	A	6.2	A

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

LOS improved from 2035 Build

Local Intersections

Under the Build 2040 condition seven intersections show a degradation in LOS from 2035 Build conditions. All intersections operate at an acceptable LOS of C or better.

Table 3-10: 2040 Build VISSIM Level of Service for Local Intersections

Intersection Name	AM Peak		Midday Peak		PM Peak	
	Intersection Delay (sec/veh)	LOS	Intersection Delay (sec/veh)	LOS	Intersection Delay (sec/veh)	LOS
Fort at Westend	10.0	A	**10.3**	**B**	9.7	A
Fort at Green	**15.8**	**B**	16.4	B	**13.3**	**B**
Fort at Waterman	**13.4**	**B**	13.8	B	**10.4**	**B**
Fort at Livernois	10.0	A	16.4	B	8.6	A
Fort at Dragoon	N/A	N/A	N/A	N/A	N/A	N/A
Fort at Junction	13.0	B	7.4	A	**7.8**	**A**
Fort at Clark	11.6	B	13.7	B	12.4	B
Southbound Service Drive at Livernois	9.8	A	19.5	B	8.5	A
Southbound Service Drive at Dragoon	0.0	A	0.0	A	2.7	A
Northbound Service Drive at Livernois	7.4	A	15.4	B	5.7	A
Northbound Service Drive at Dragoon	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Service Drive at Springwells	**22.3**	**C**	**27.6**	**C**	**15.1**	**B**
Northbound Service Drive at Westend	16.0	B	18.8	B	**20.3**	**C**
Northbound Service Drive at Clark	**10.3**	**B**	**16.2**	**B**	**9.6**	**A**
Southbound Service Drive at Clark	22.2	C	16.9	B	**21.0**	**C**
Fort at Grand Blvd.	4.7	A	4.7	A	4.9	A
Northbound Service Drive at Grand Blvd.	13.0	B	13.9	B	10.7	B
Southbound Service Drive at Grand Blvd.	7.5	A	8.2	A	7.0	A
Fort at Post	0.2	A	0.3	A	0.4	A

Source: Level 3 TAR (2035) and WSP (2040)

LOS degraded from 2035 Build

LOS improved from 2035 Build

3.3 Travel Times

The previous sections described the VISSIM density and levels of service on each segment of the road network under the 2040 No-Build and Preferred Build Alternative conditions. Beyond this segment-by-segment comparison of the alternatives, end-to-end, travel time estimates, can be used to compare the No-Build and Preferred Build Alternatives.

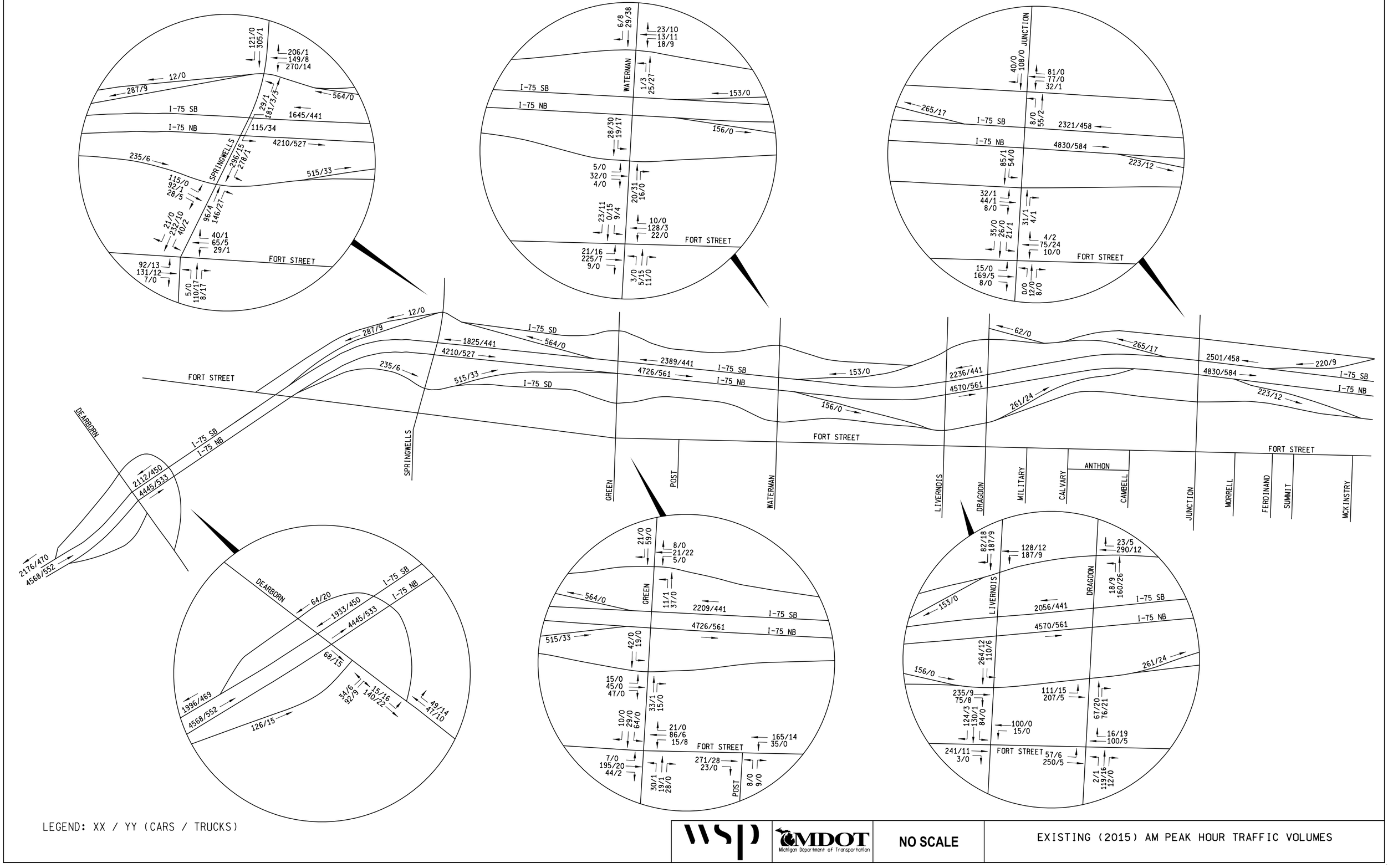
VISSIM reports the average travel time of vehicles moving through the simulation model, to indicate the efficiency, or congestion, associated with each alternative. This data was collected from the simulation on an overall corridor basis for the 2040 Preferred Alternative conditions and were compared against the 2040 No-Build. The travel time data captured for the 2040 analyses averages the travel times of vehicles traveling from end to end of the corridor and is summarized in Table 3-11.

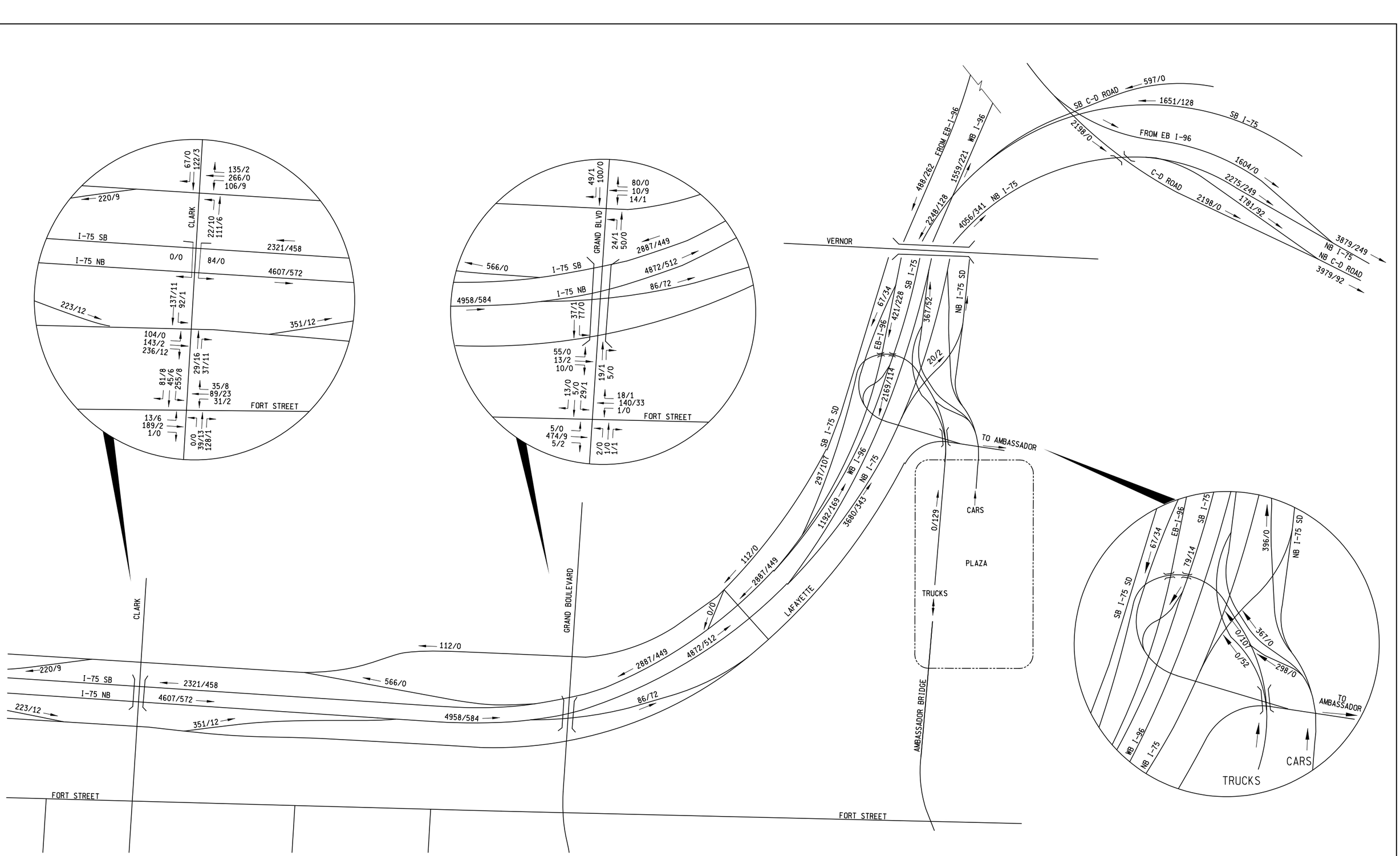
Table 3-11: No-Build and Preferred Build Alternative Total Travel Time

TIME OF DAY	ALTERNATIVE:	2040 NO-BUILD		2040 BUILD	
		Sec	Min	Sec	Min
AM	NB I-75, Dearborn Ramps to 14th	279	4.6	277	4.6
	NB I-75, Dearborn Ramps to I-94 (McGraw)	349	5.8	351	5.9
	SB I-75, Vernor to Dearborn Ramps	229	3.8	233	3.9
	SB I-75, I-94 (McGraw) to Dearborn Ramps	334	5.6	335	5.6
Midday	NB I-75, Dearborn Ramps to 14th	293	4.9	265	4.4
	NB I-75, Dearborn Ramps to I-94 (McGraw)	364	6.1	333	5.5
	SB I-75, Vernor to Dearborn Ramps	252	4.2	233	3.9
	SB I-75, I-94 (McGraw) to Dearborn Ramps	363	6.0	332	5.5
PM	NB I-75, Dearborn Ramps to 14th	293	4.9	264	4.4
	NB I-75, Dearborn Ramps to I-94 (McGraw)	353	5.9	337	5.6
	SB I-75, Vernor to Dearborn Ramps	251	4.2	240	4.0
	SB I-75, I-94 (McGraw) to Dearborn Ramps	374	6.2	362	6.0

Source: WSP

Appendix A –Traffic Volumes


SPRINGWELLS
WATERMAN
JUNCTION
I-75 SB
I-75 NB
I-75 SD
FORT STREET
DEARBORN
GREEN
POST
WATERMAN
LIVERNOIS
DRAGOON
MILITARY
CALVARY
ANTHON
CAMBELL
JUNCTION
MORRELL
FERDINAND
SUMMIT
MCKINSTRY
12/0
287/9
564/0
1825/441
4210/527
235/6
515/33
2389/441
4726/561
153/0
156/0
62/0
265/17
2501/458
220/9
4830/584
223/12
2236/441
4570/561
261/24
2112/450
4445/533
2176/410
4568/552
64/20
1933/450
1996/469
68/15
126/15
LEGEND: XX / YY (CARS / TRUCKS)
NO SCALE
EXISTING (2015) AM PEAK HOUR TRAFFIC VOLUMES
MDOT
Michigan Department of Transportation



LEGEND: XX / YY (CARS / TRUCKS)

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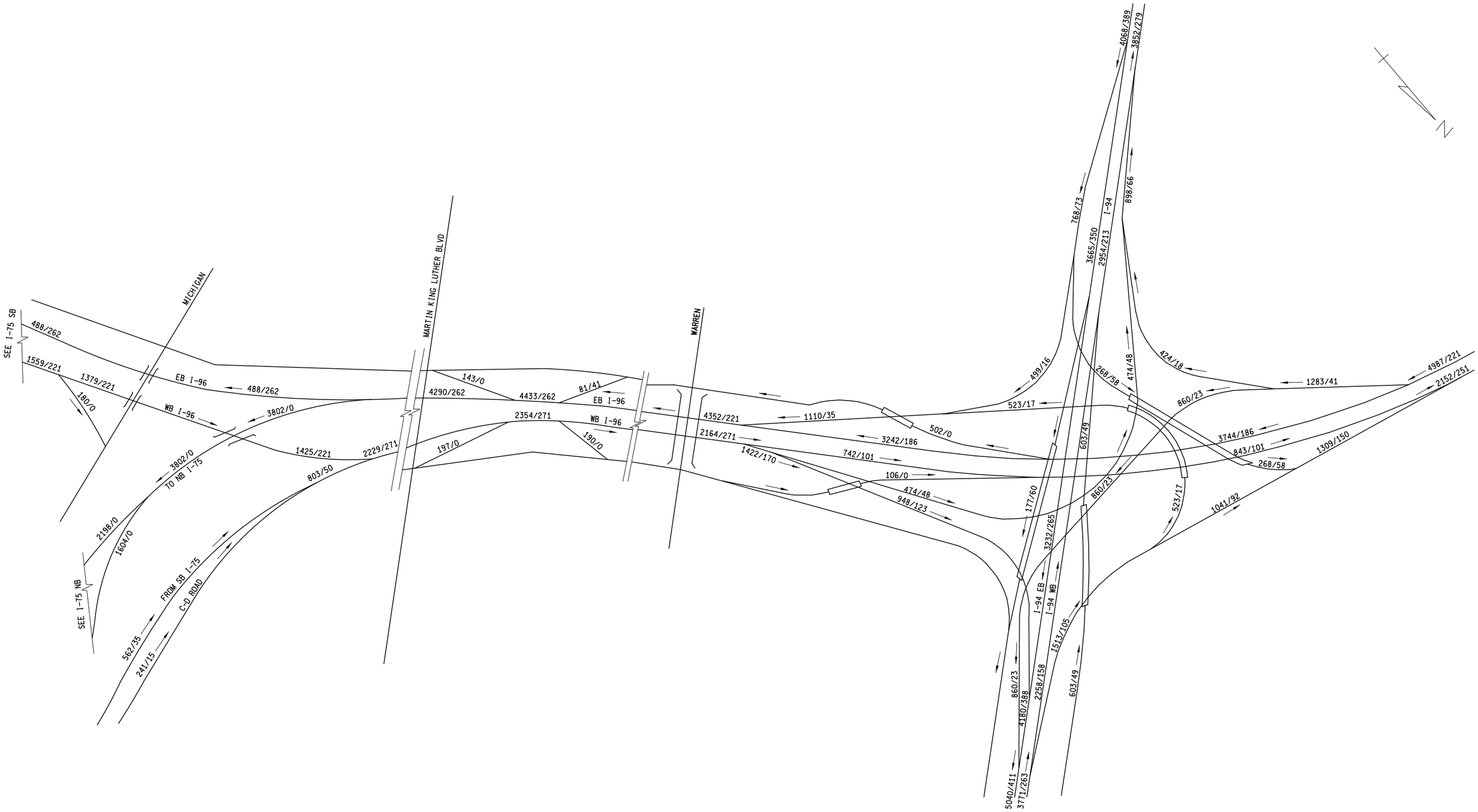
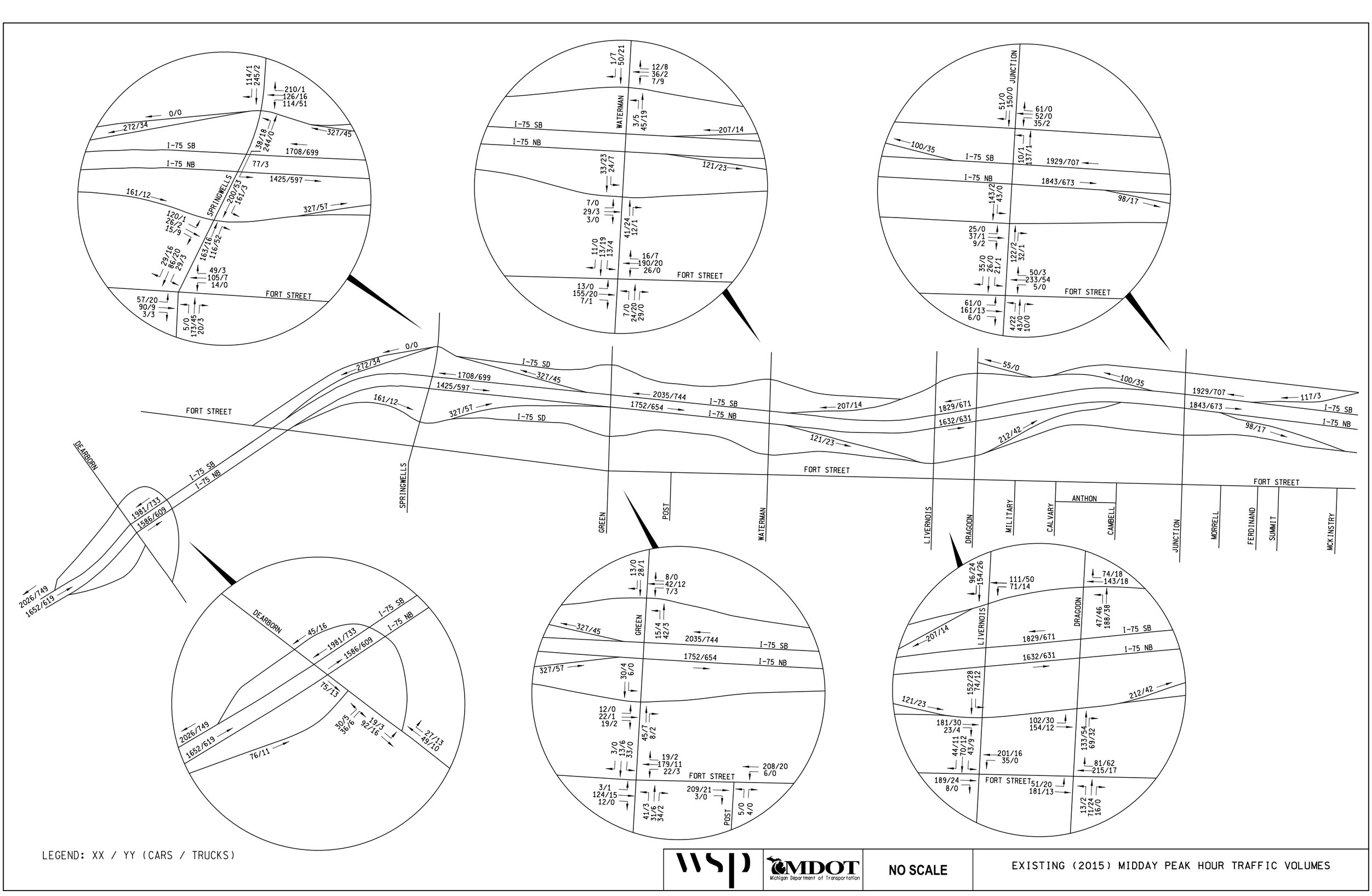
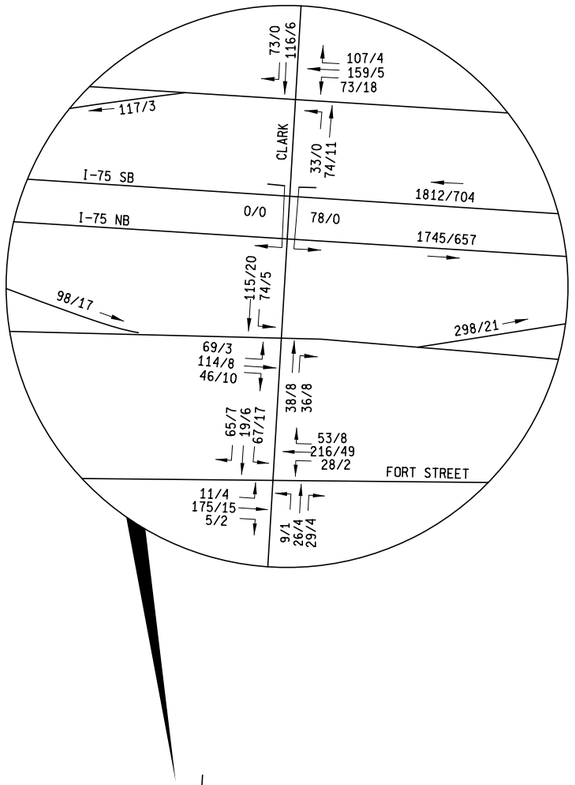


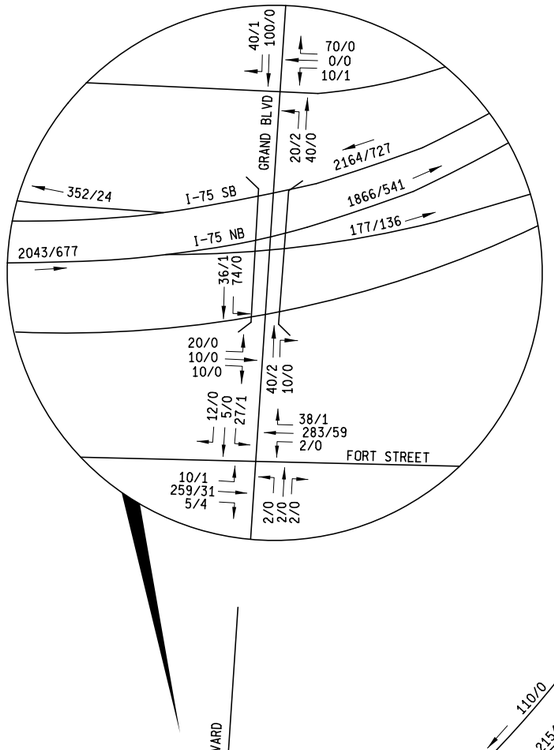
LEGEND: XX / YY (CARS / TRUCKS)

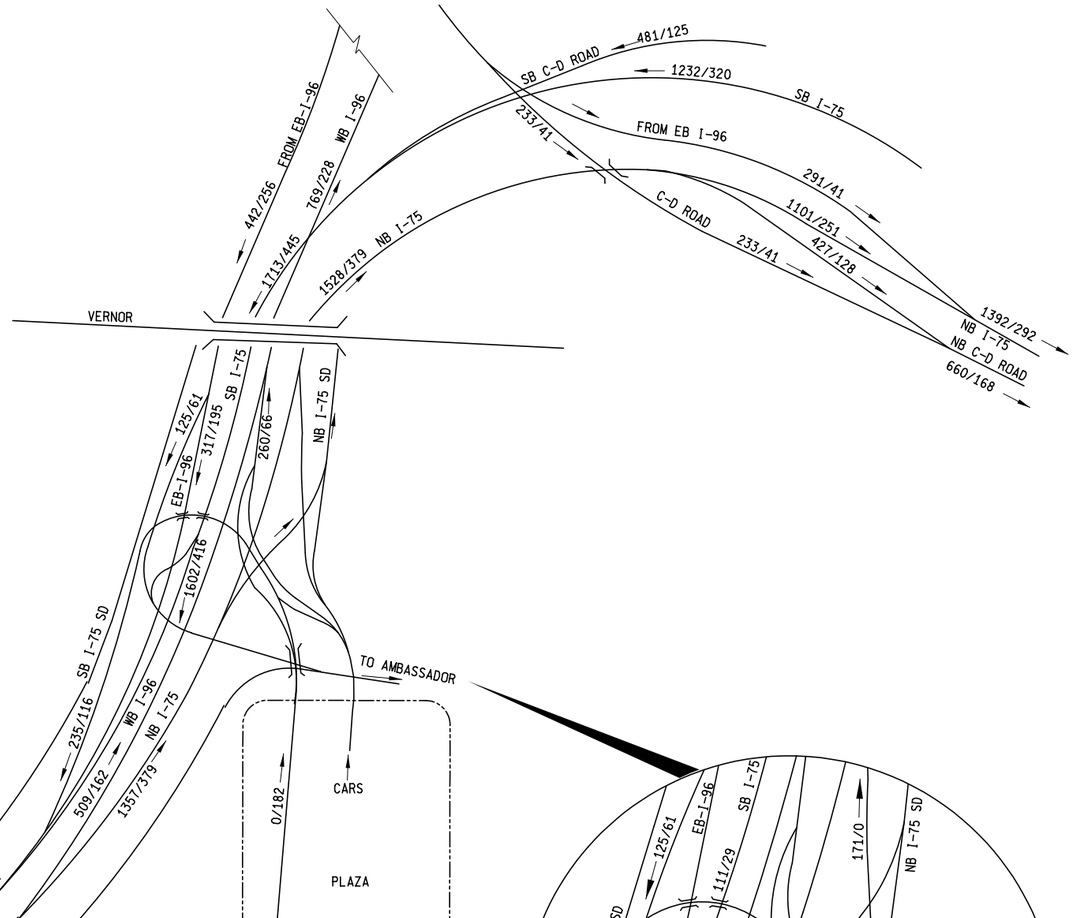
WSP | MDOT Michigan Department of Transportation | NO SCALE

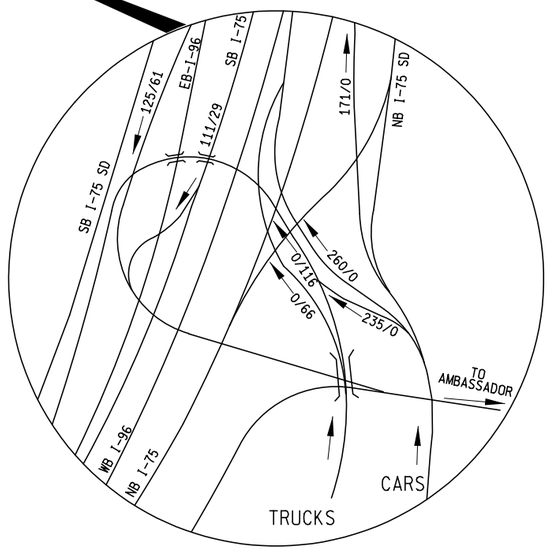
EXISTING (2015) AM PEAK HOUR TRAFFIC VOLUMES

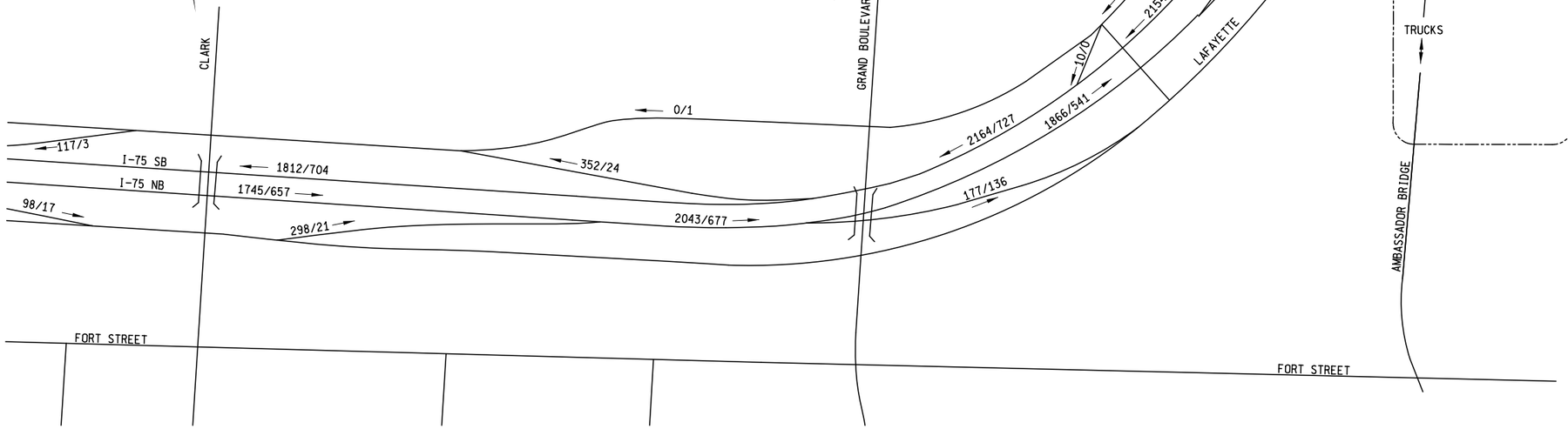

SPRINGWELLS
WATERMAN
JUNCTION
I-75 SB
I-75 NB
I-75 SD
FORT STREET
DEARBORN
GREEN
POST
WATERMAN
LIVERNOIS
DRAGOON
MILITARY
CALVARY
ANTHON
CAMBELL
JUNCTION
MORRELL
FERDINAND
SUMMIT
MCKINSTRY
0/0
272/34
327/45
1708/699
77/3
1425/597
161/12
327/57
207/14
121/23
2035/744
1752/654
1829/671
1632/631
55/0
100/35
1929/707
1843/673
98/17
117/3
212/42
1981/733
1586/609
2026/749
1652/619
45/16
75/13
76/11
LEGEND: XX / YY (CARS / TRUCKS)
NO SCALE
EXISTING (2015) MIDDAY PEAK HOUR TRAFFIC VOLUMES
MDOT
Michigan Department of Transportation











LEGEND: XX / YY (CARS / TRUCKS)

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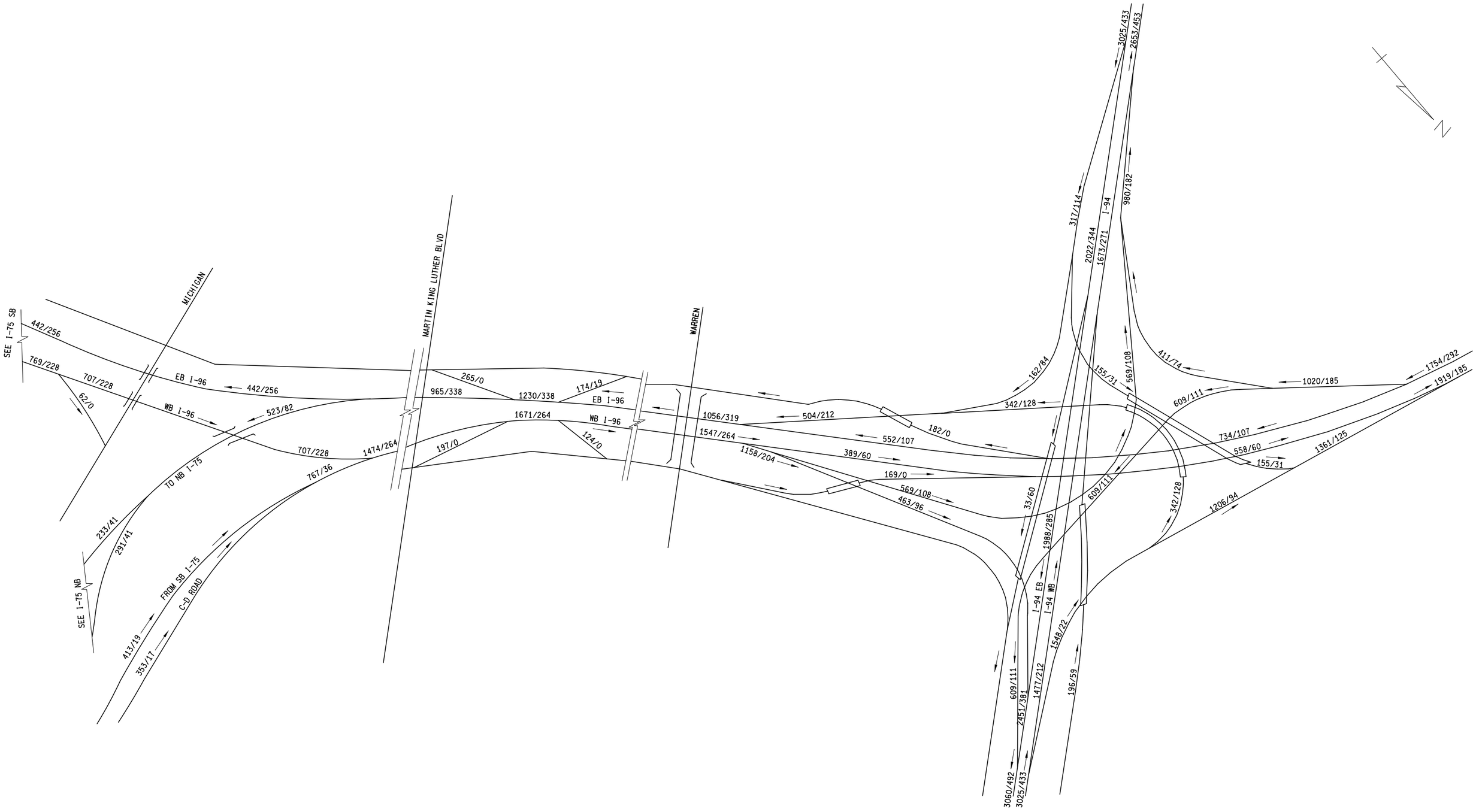

LEGEND: XX / YY (CARS / TRUCKS)

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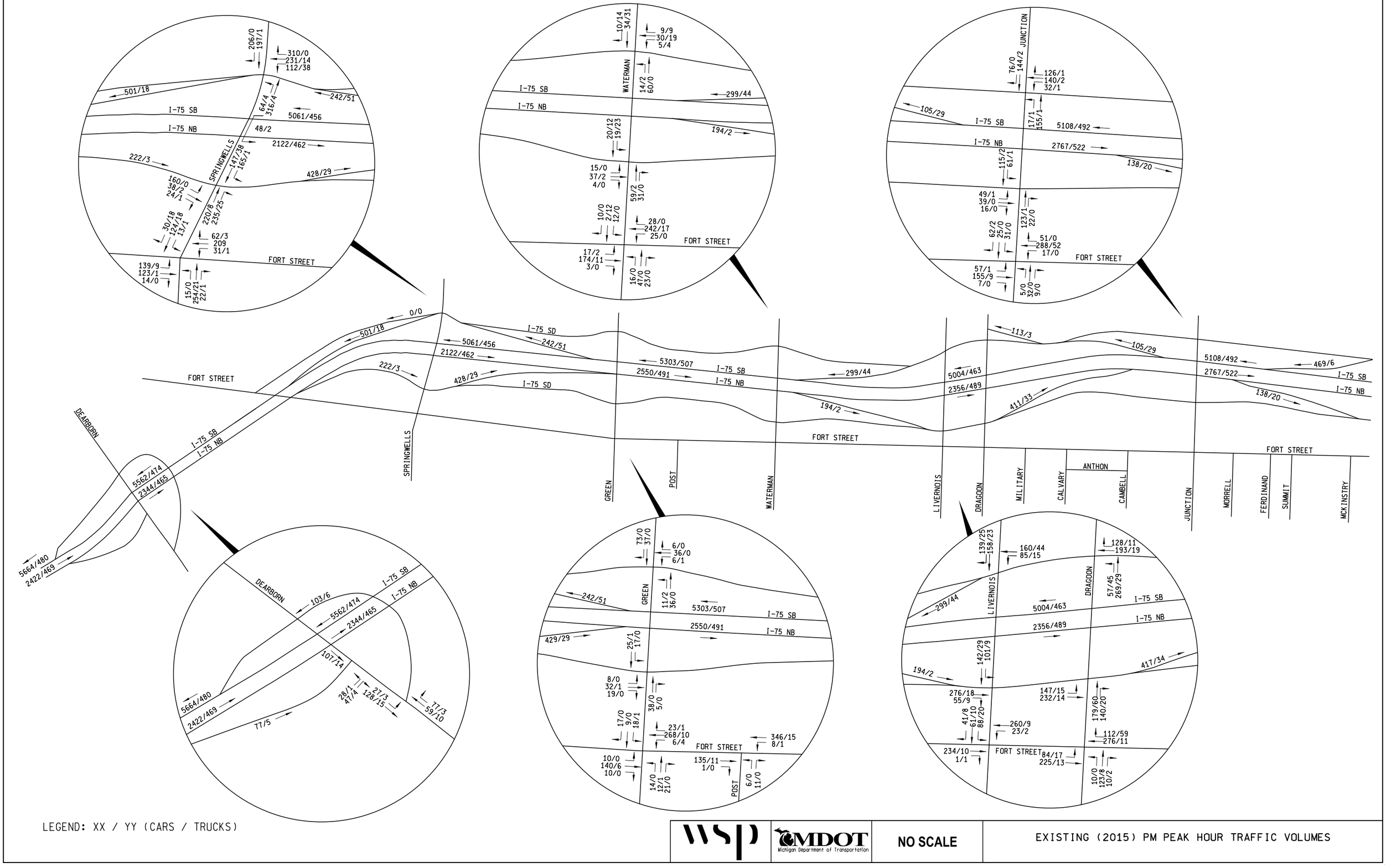
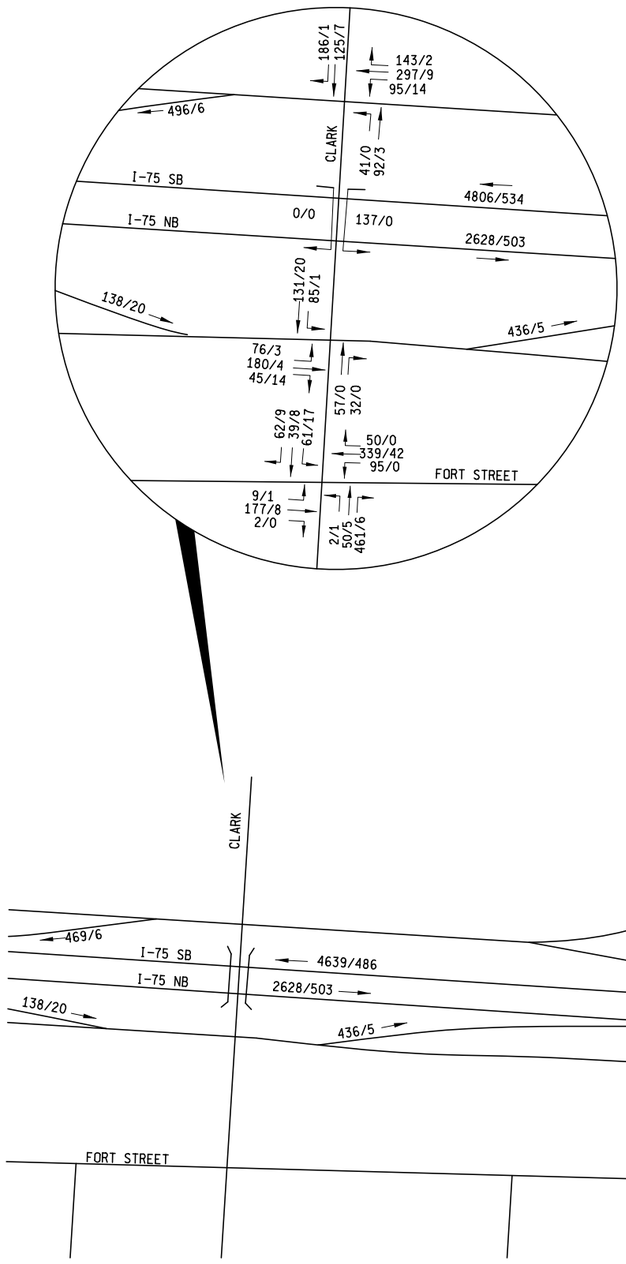
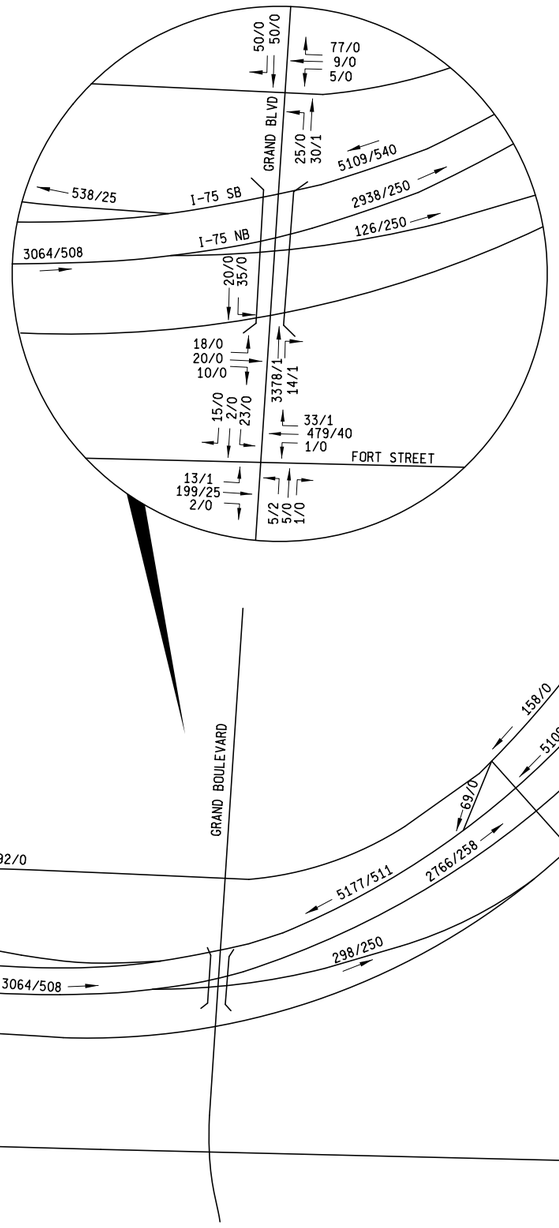
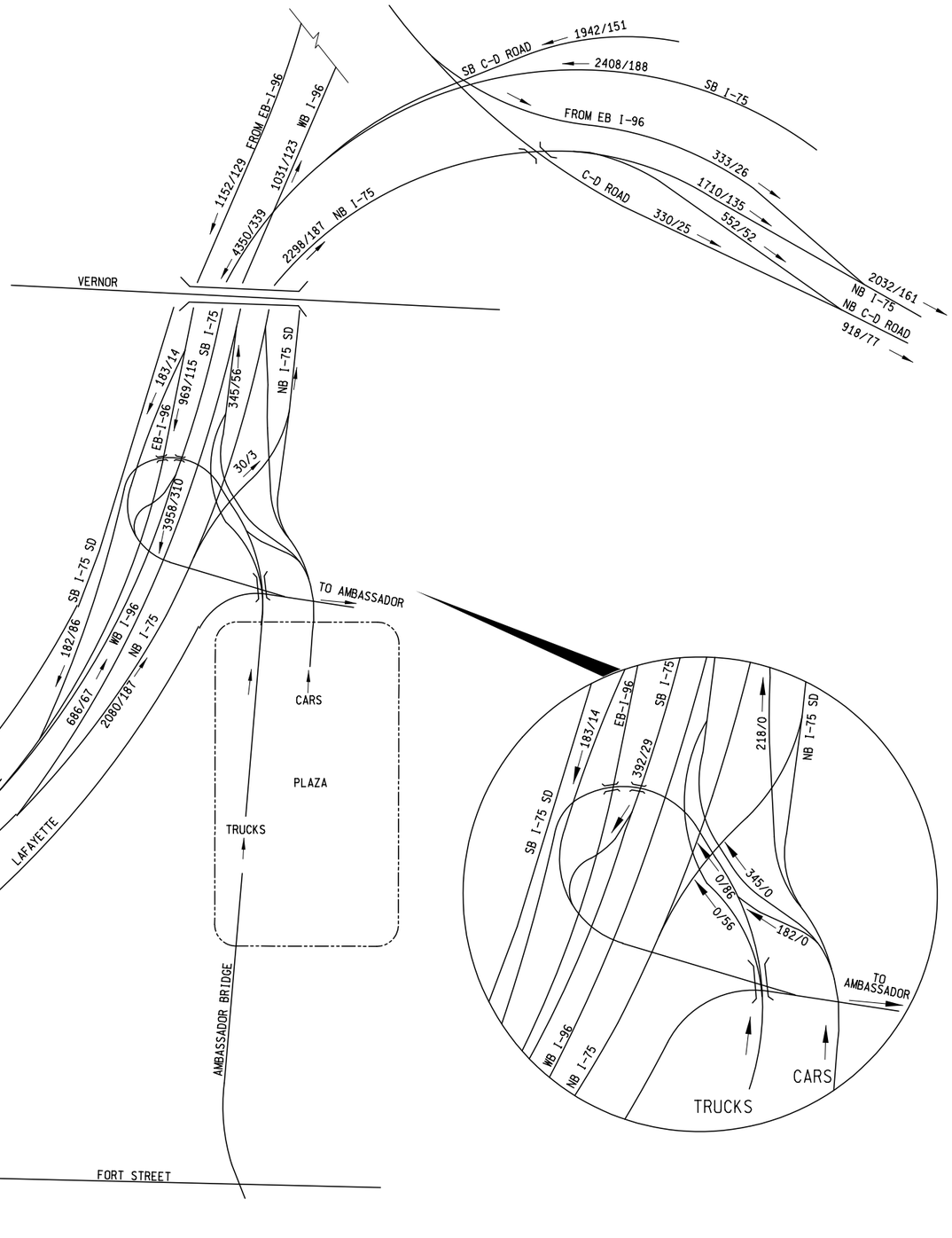


LEGEND: XX / YY (CARS / TRUCKS)

WSP | MDOT Michigan Department of Transportation | NO SCALE | EXISTING (2015) PM PEAK HOUR TRAFFIC VOLUMES







LEGEND: XX / YY (CARS / TRUCKS)

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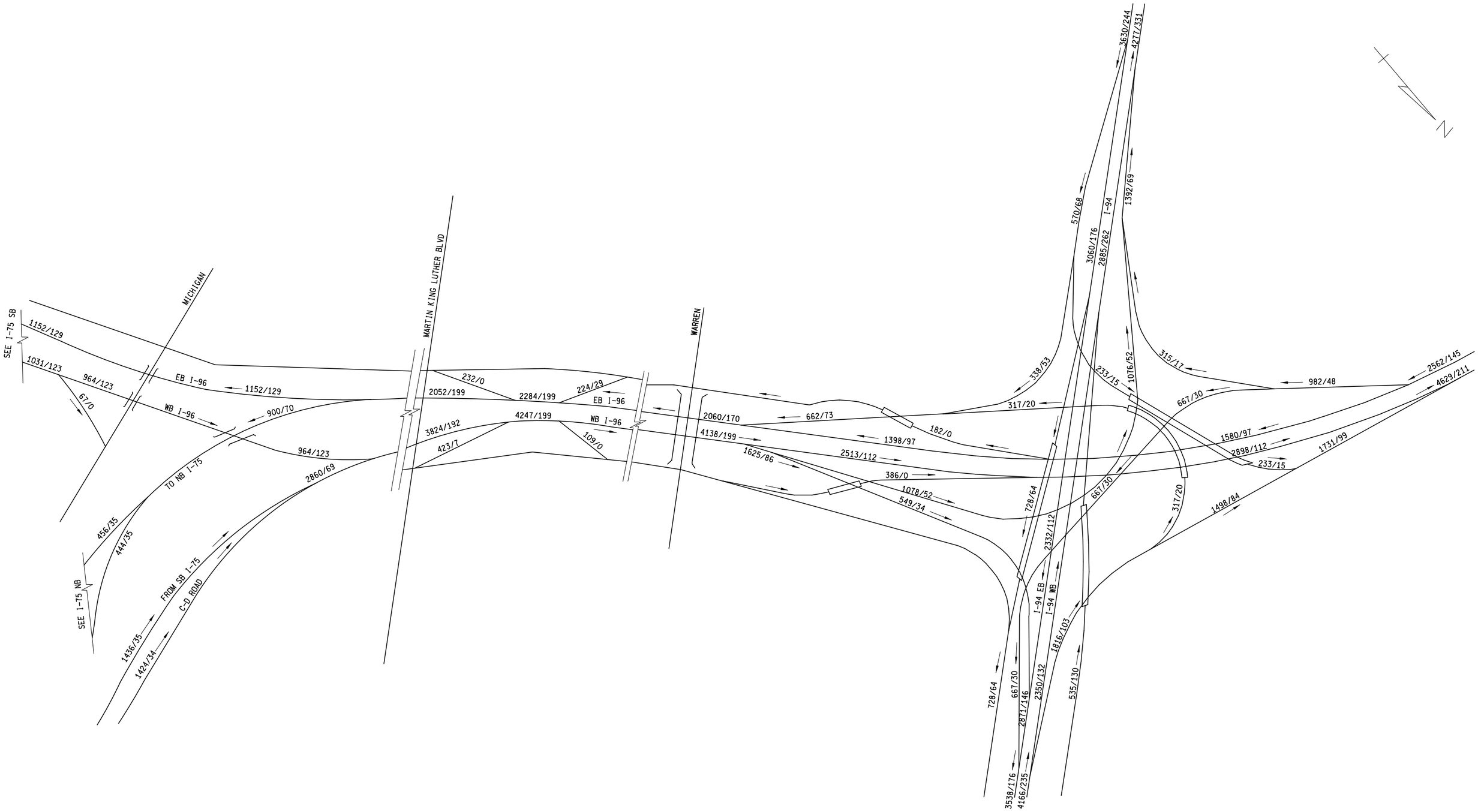

LEGEND: XX / YY (CARS / TRUCKS)

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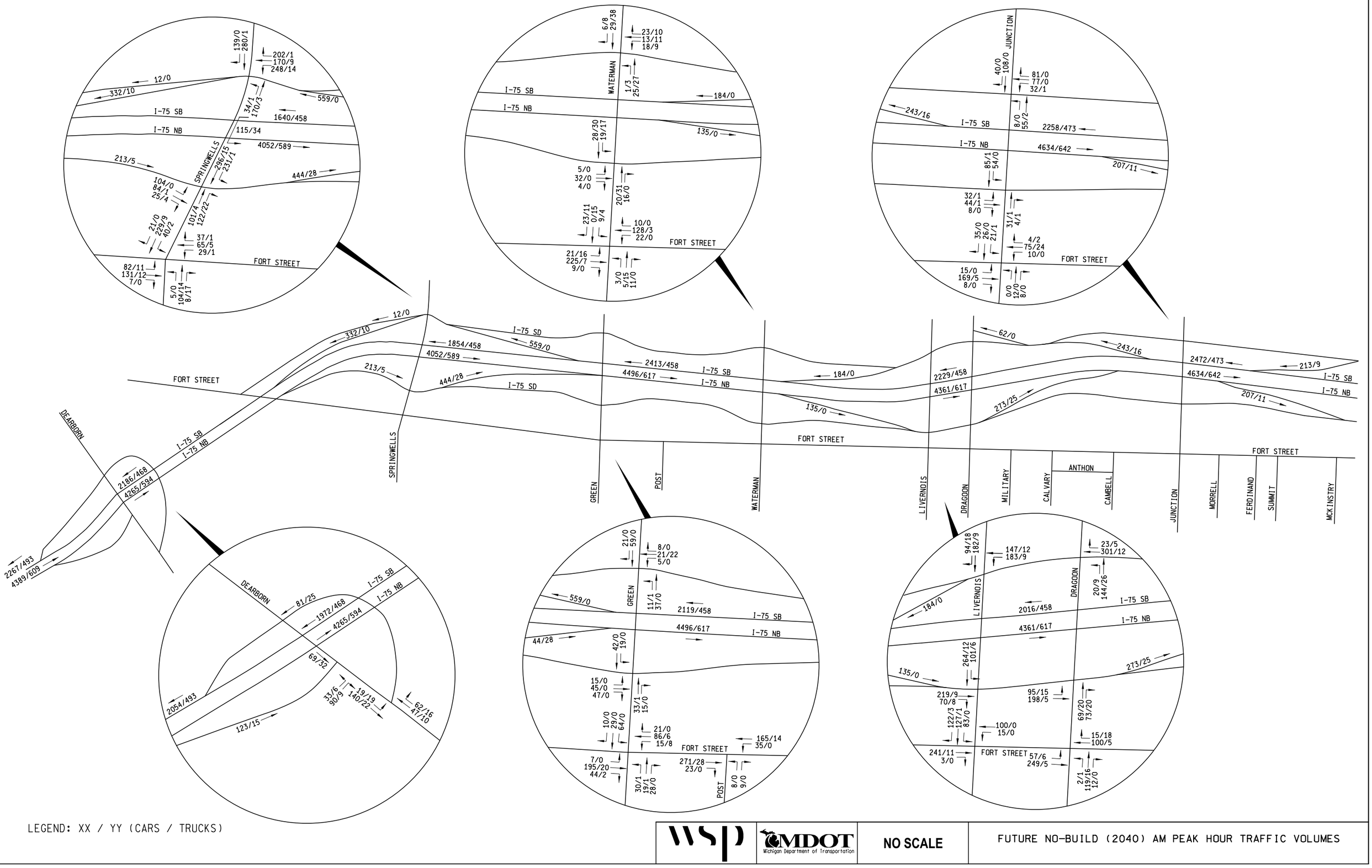
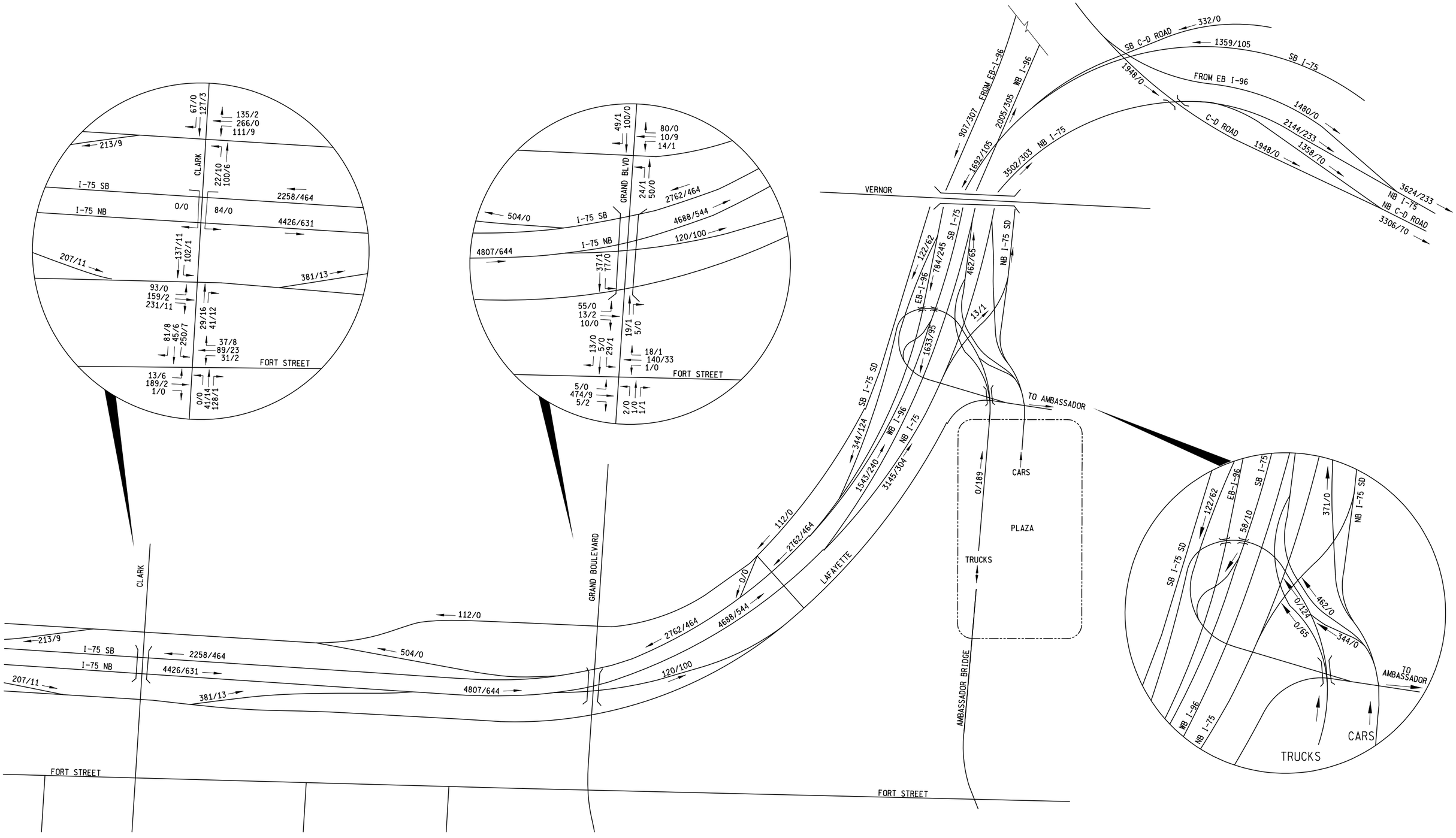


LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	FUTURE NO-BUILD (2040) AM PEAK HOUR TRAFFIC VOLUMES



LEGEND: XX / YY (CARS / TRUCKS)

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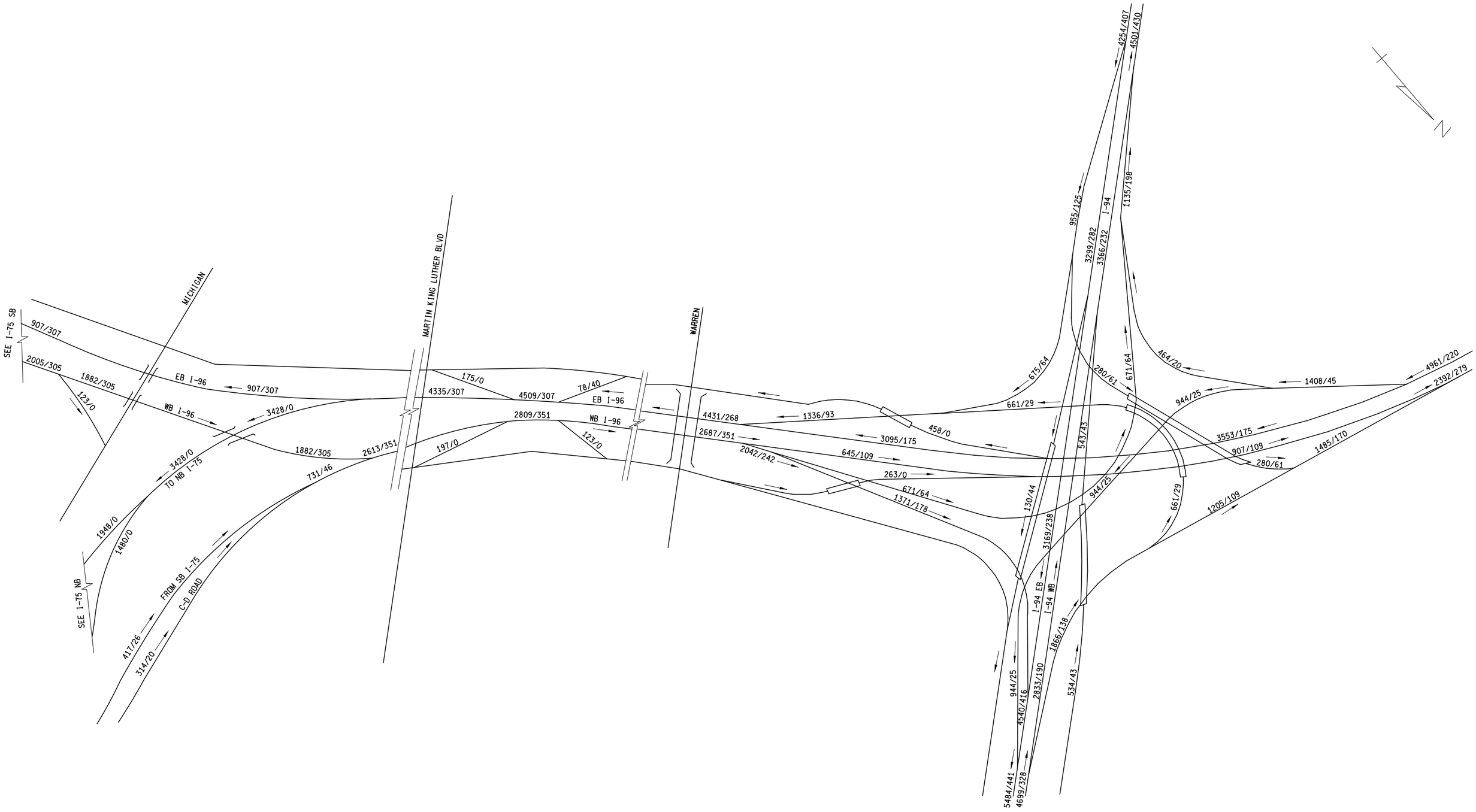

LEGEND: XX / YY (CARS / TRUCKS)

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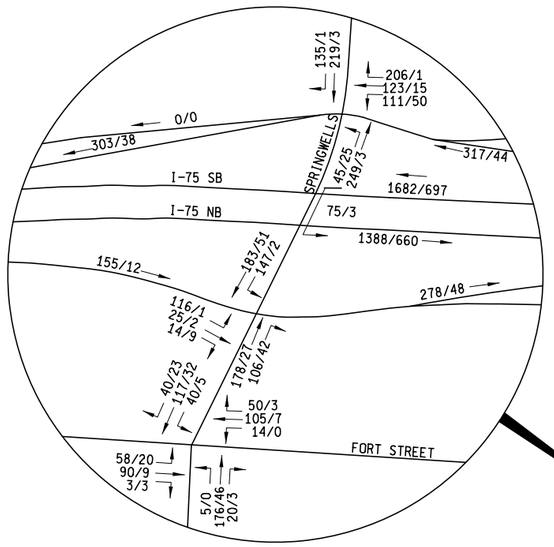
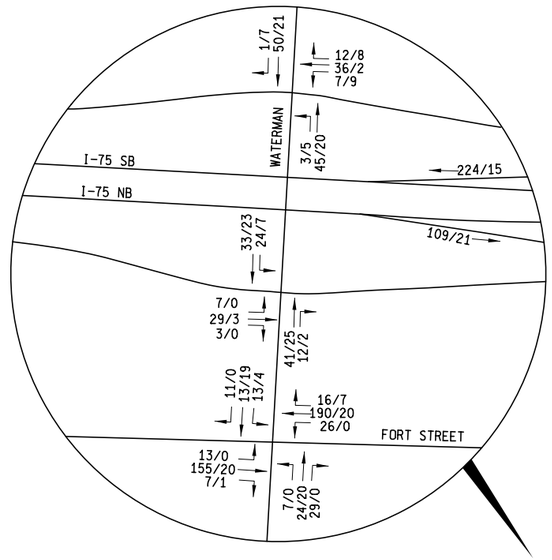
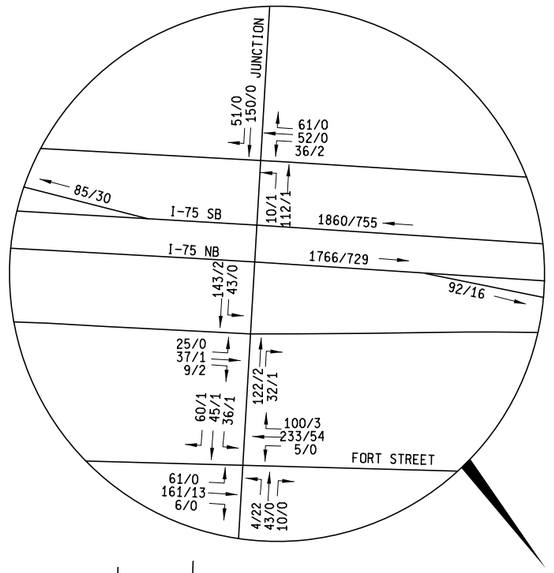
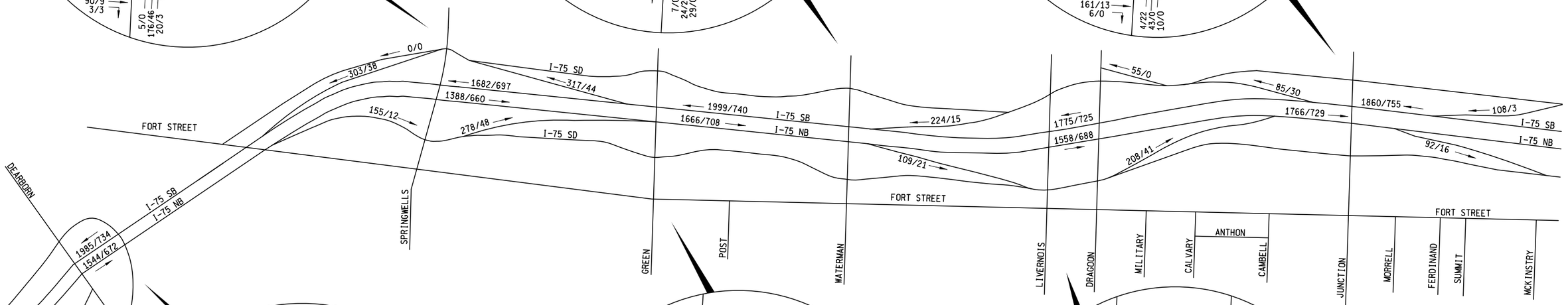
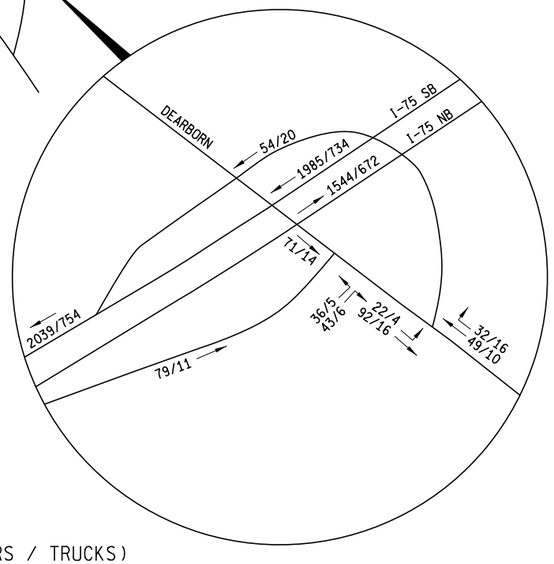
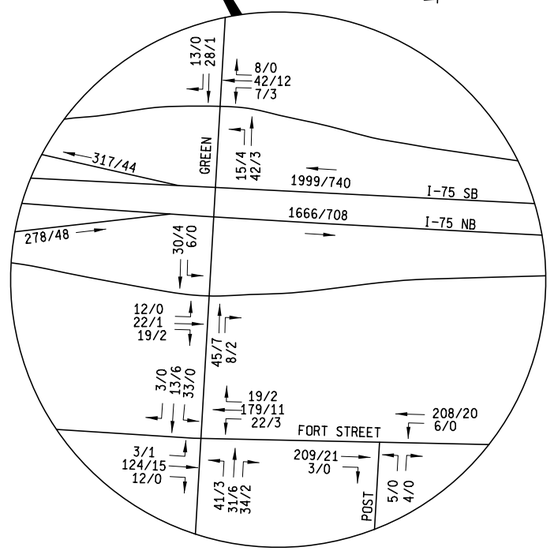


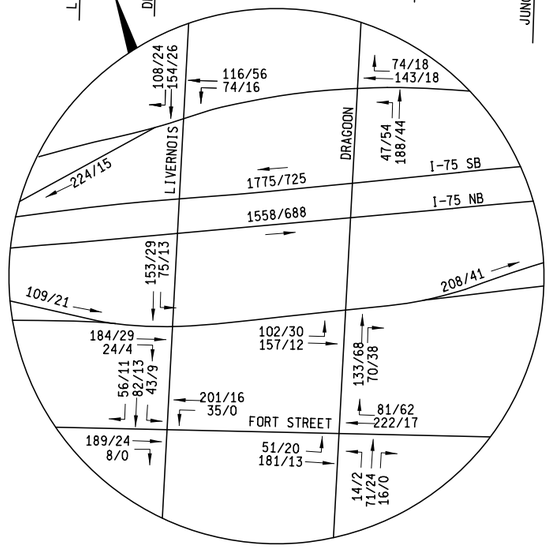






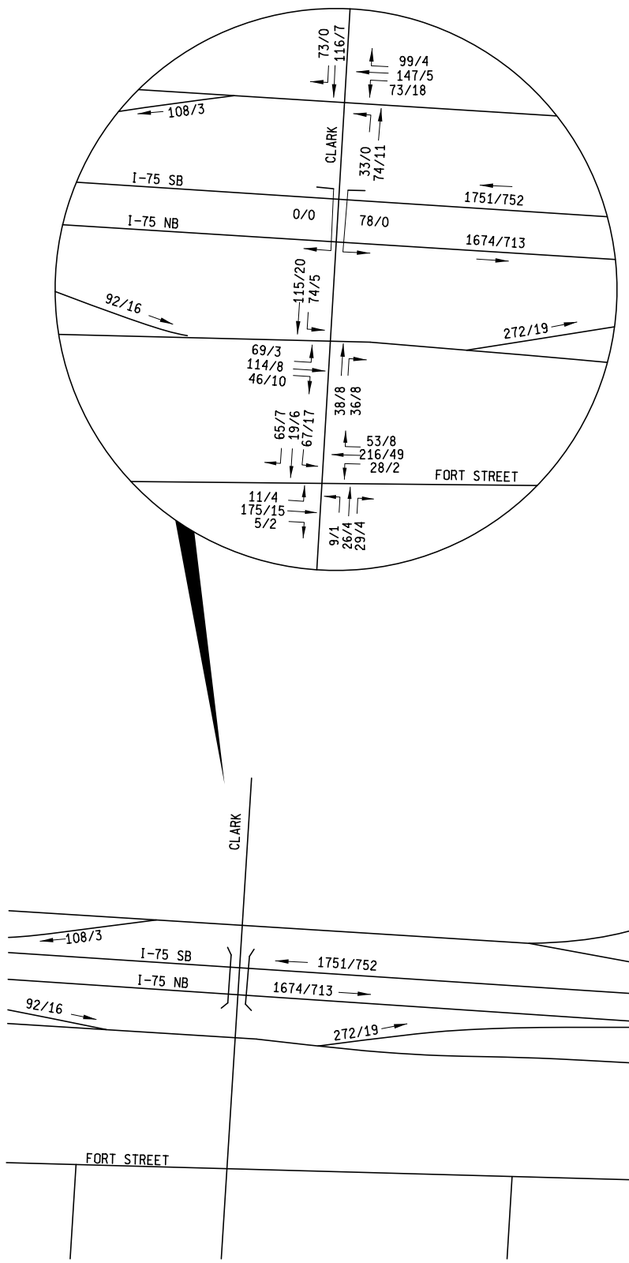


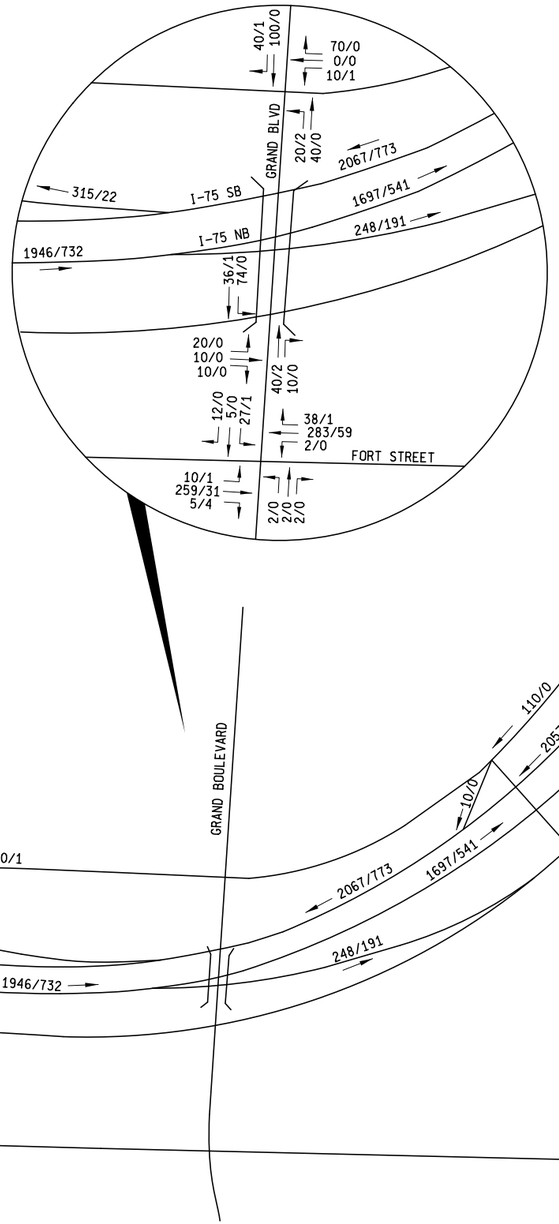


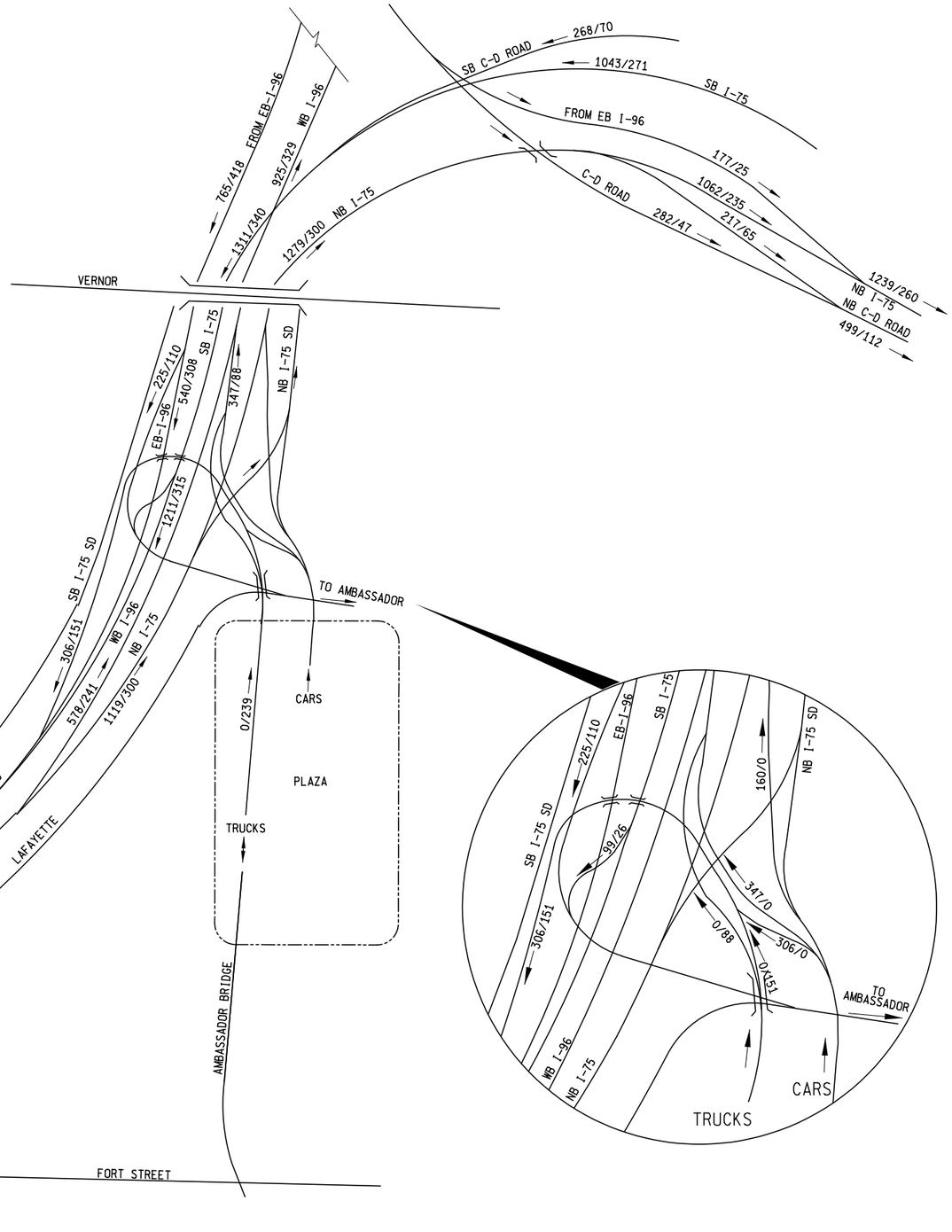


LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	FUTURE NO-BUILD (2040) MIDDAY PEAK HOUR TRAFFIC VOLUMES

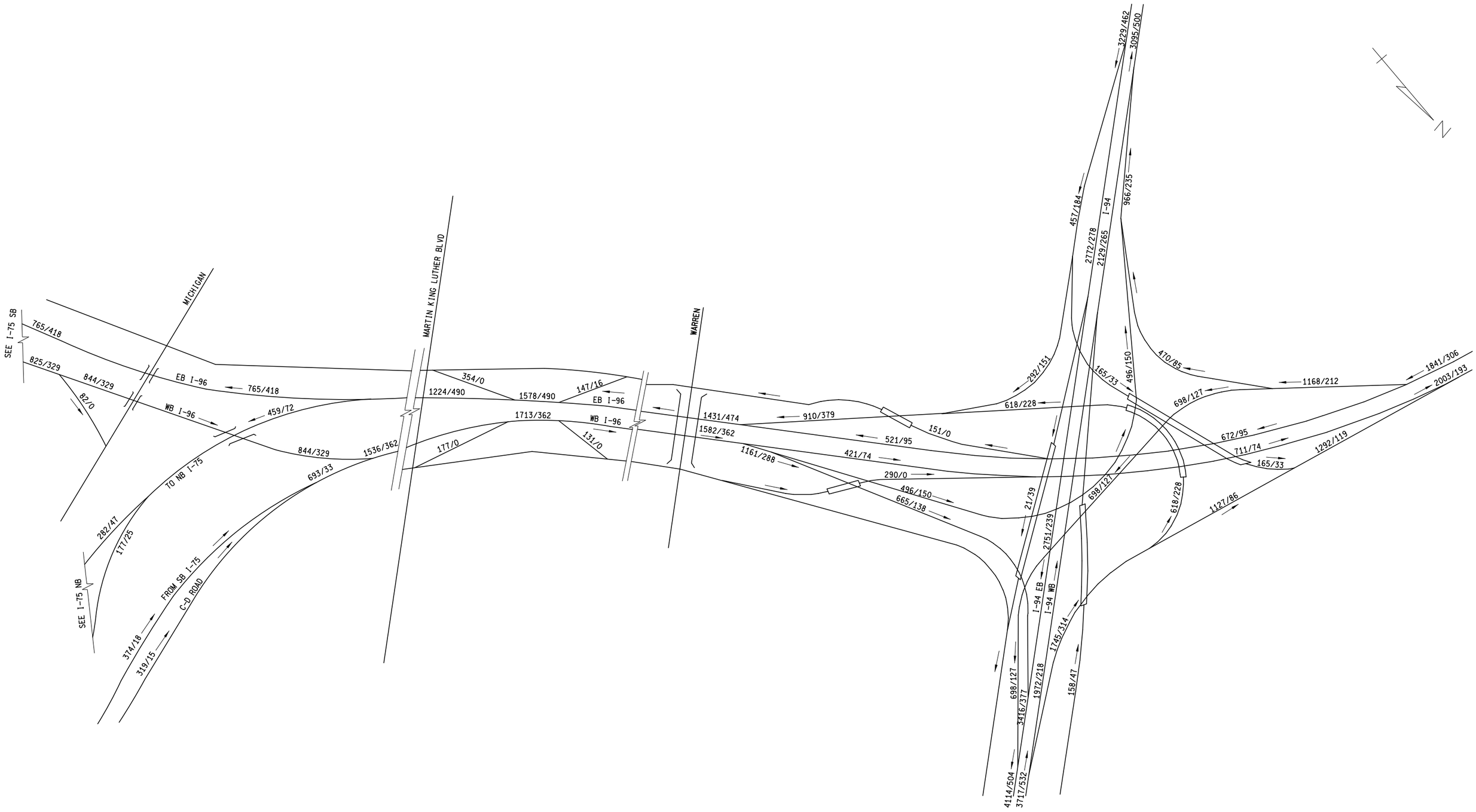






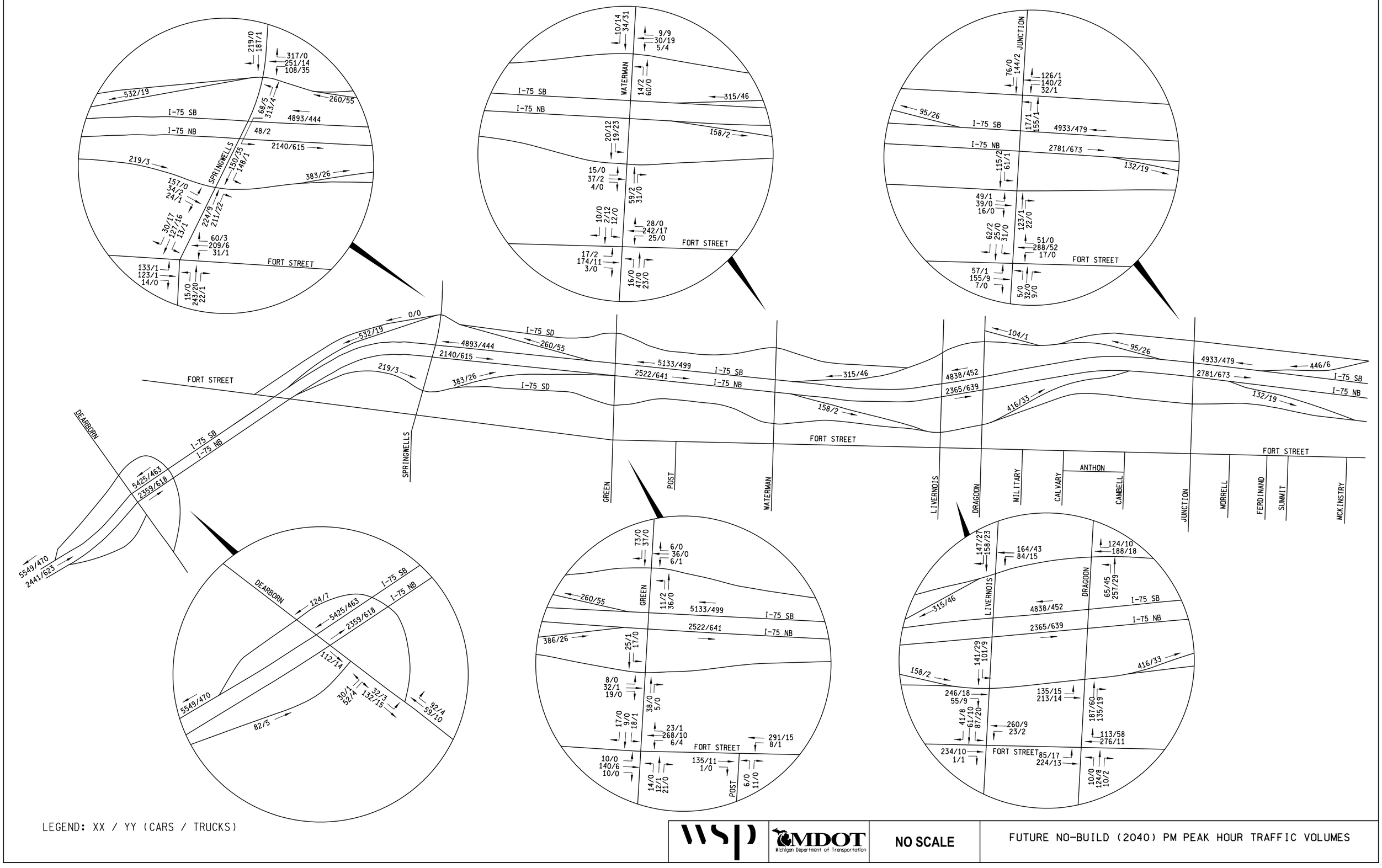
LEGEND: XX / YY (CARS / TRUCKS)

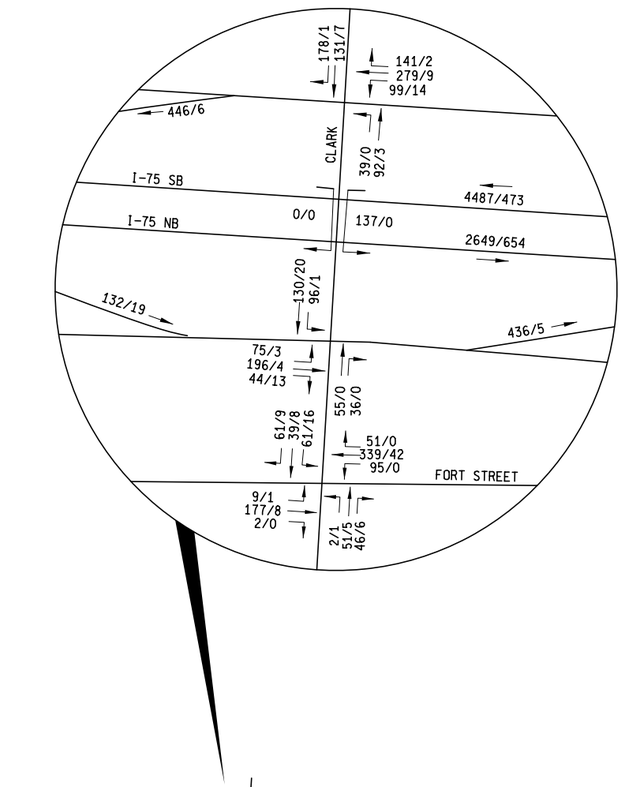
WSP	MDOT Michigan Department of Transportation	NO SCALE	FUTURE NO-BUILD (2040) MIDDAY PEAK HOUR TRAFFIC VOLUMES

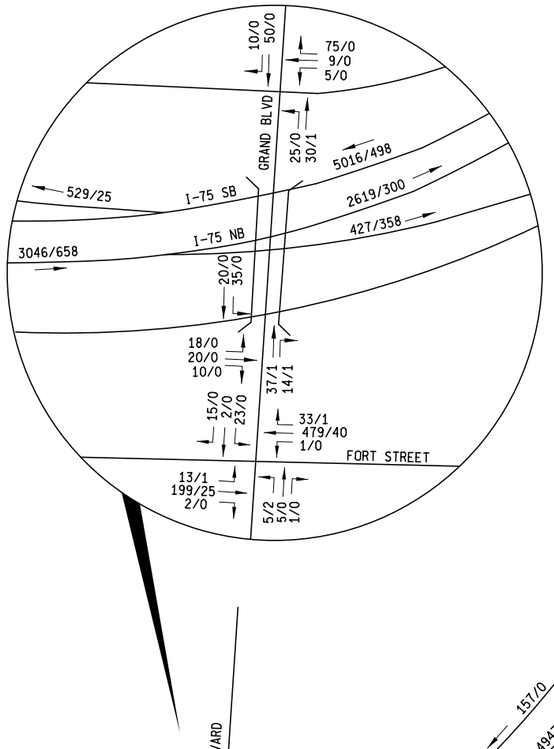


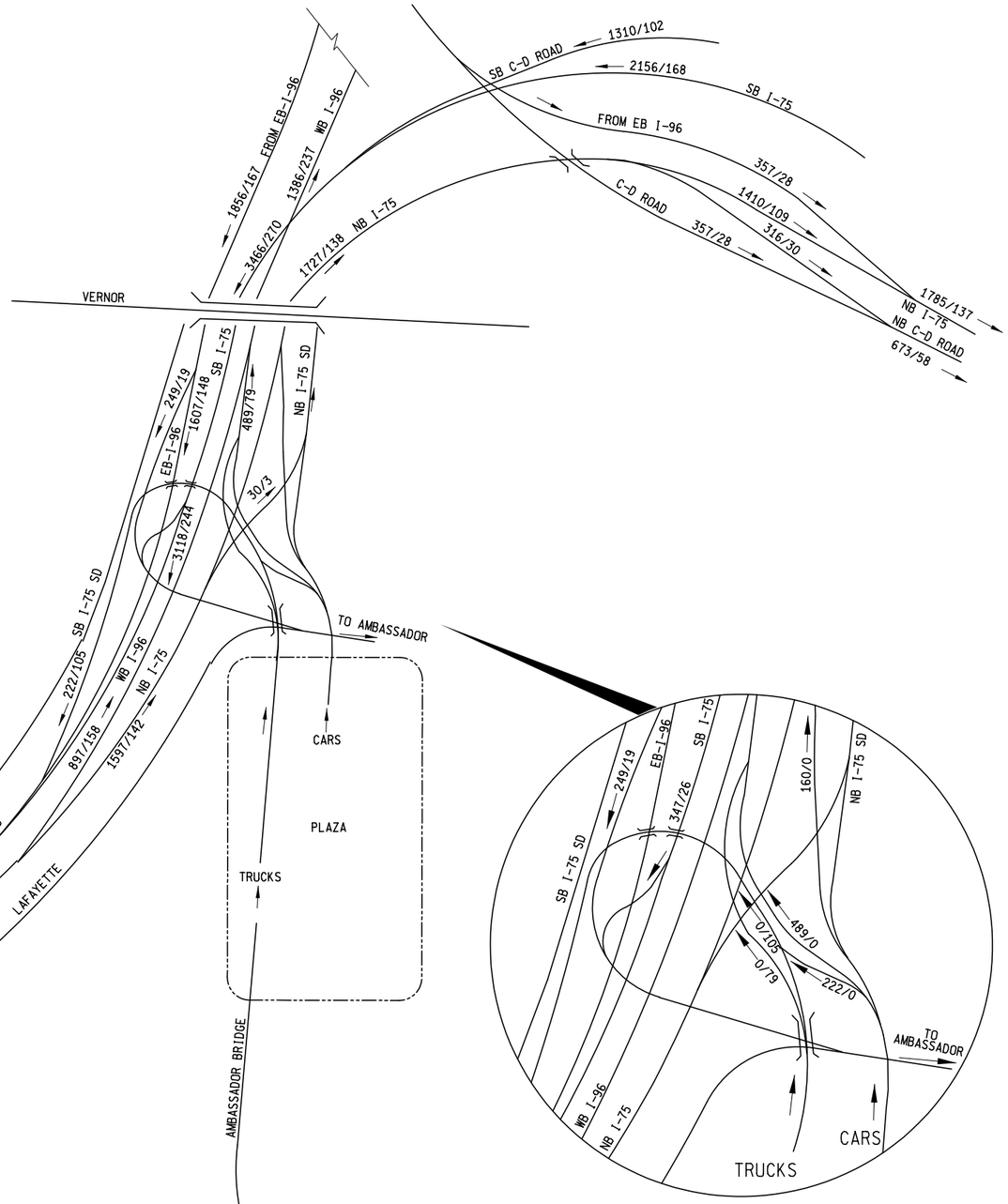
LEGEND: XX / YY (CARS / TRUCKS)

WSP | MDOT Michigan Department of Transportation | NO SCALE | FUTURE NO-BUILD (2040) MIDDAY PEAK HOUR TRAFFIC VOLUMES


FORT STREET
I-75 SB
I-75 NB
I-75 SD
SPRINGWELLS
WATERMAN
GREEN
POST
DEARBORN
JUNCTION
LIVERNOIS
DRAGOON
MILITARY
CALVARY
ANTHON
CAMPBELL
MORRELL
FERDINAND
SUMMIT
MCKINSTRY
0/0
532/19
4893/444
2140/615
219/3
383/26
260/55
5133/499
2522/641
315/46
158/2
104/1
95/26
4933/479
2781/673
132/19
446/6
4838/452
2365/639
416/33
5425/463
2359/618
5549/470
2441/623
124/7
112/14
82/5
LEGEND: XX / YY (CARS / TRUCKS)
NO SCALE
FUTURE NO-BUILD (2040) PM PEAK HOUR TRAFFIC VOLUMES
WSP
MDOT
Michigan Department of Transportation

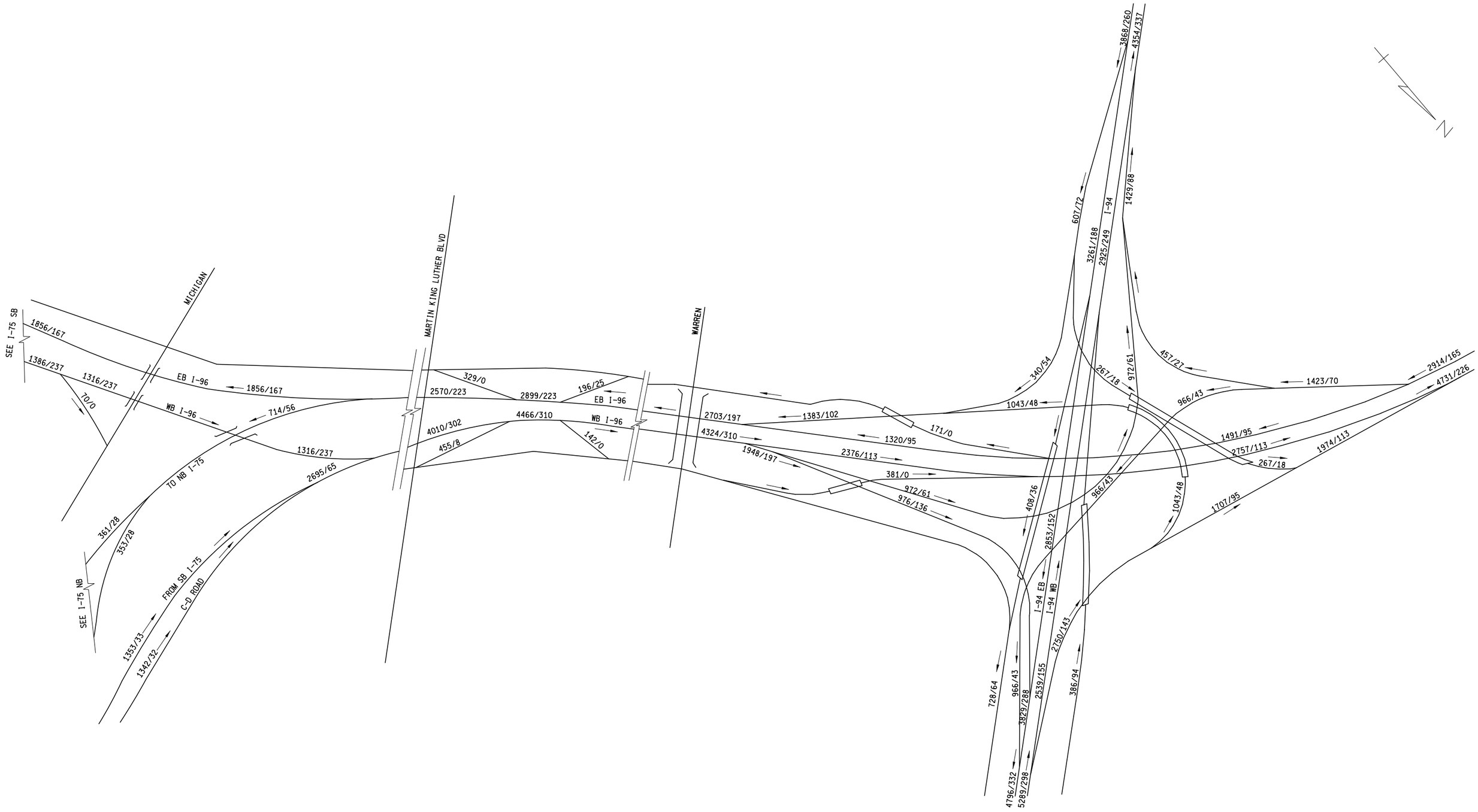






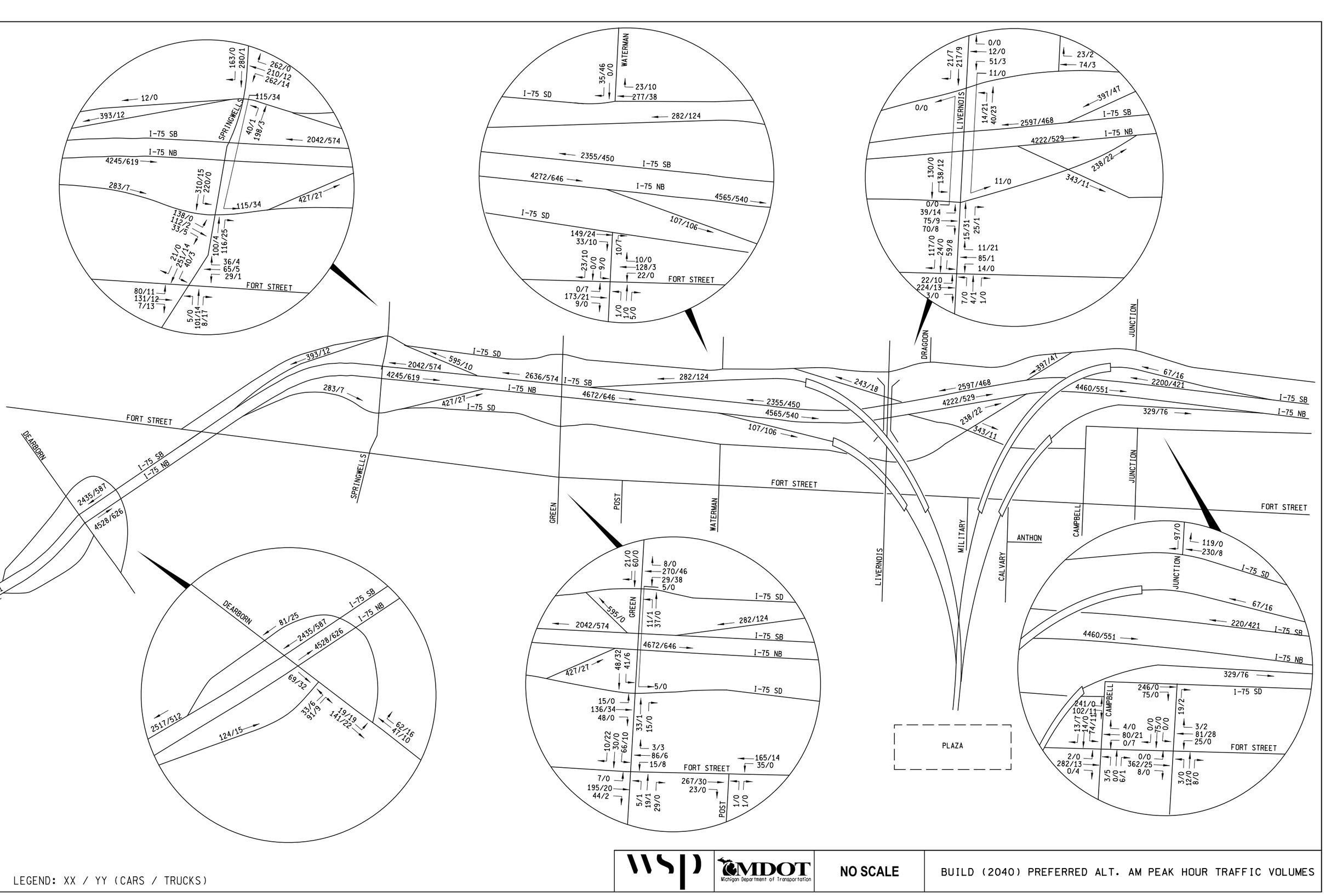
LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	FUTURE NO-BUILD (2040) PM PEAK HOUR TRAFFIC VOLUMES



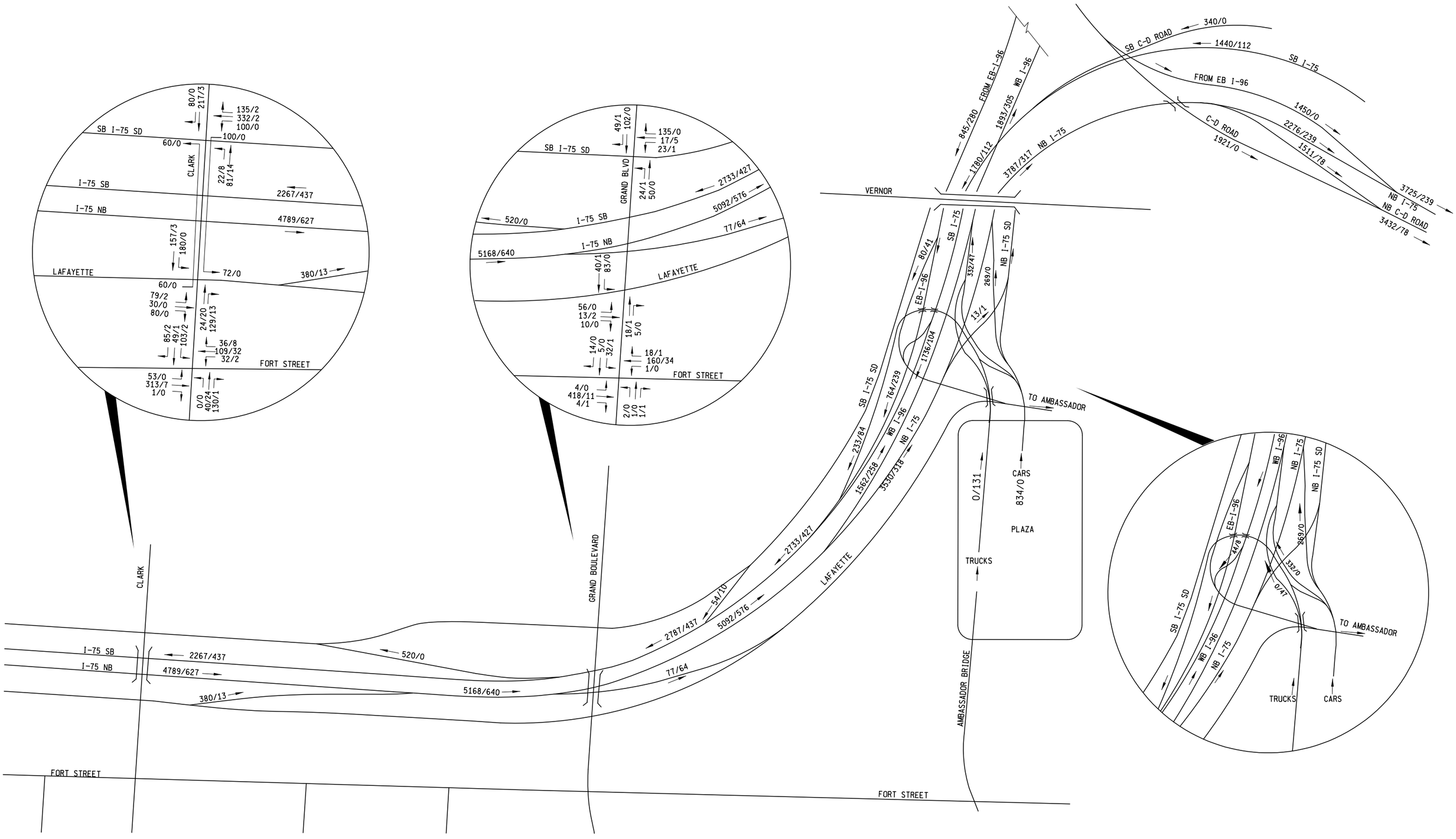
LEGEND: XX / YY (CARS / TRUCKS)

WSP | MDOT Michigan Department of Transportation | NO SCALE | FUTURE NO-BUILD (2040) PM PEAK HOUR TRAFFIC VOLUMES



LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	BUILD (2040) PREFERRED ALT. AM PEAK HOUR TRAFFIC VOLUMES



LEGEND: XX / YY (CARS / TRUCKS)

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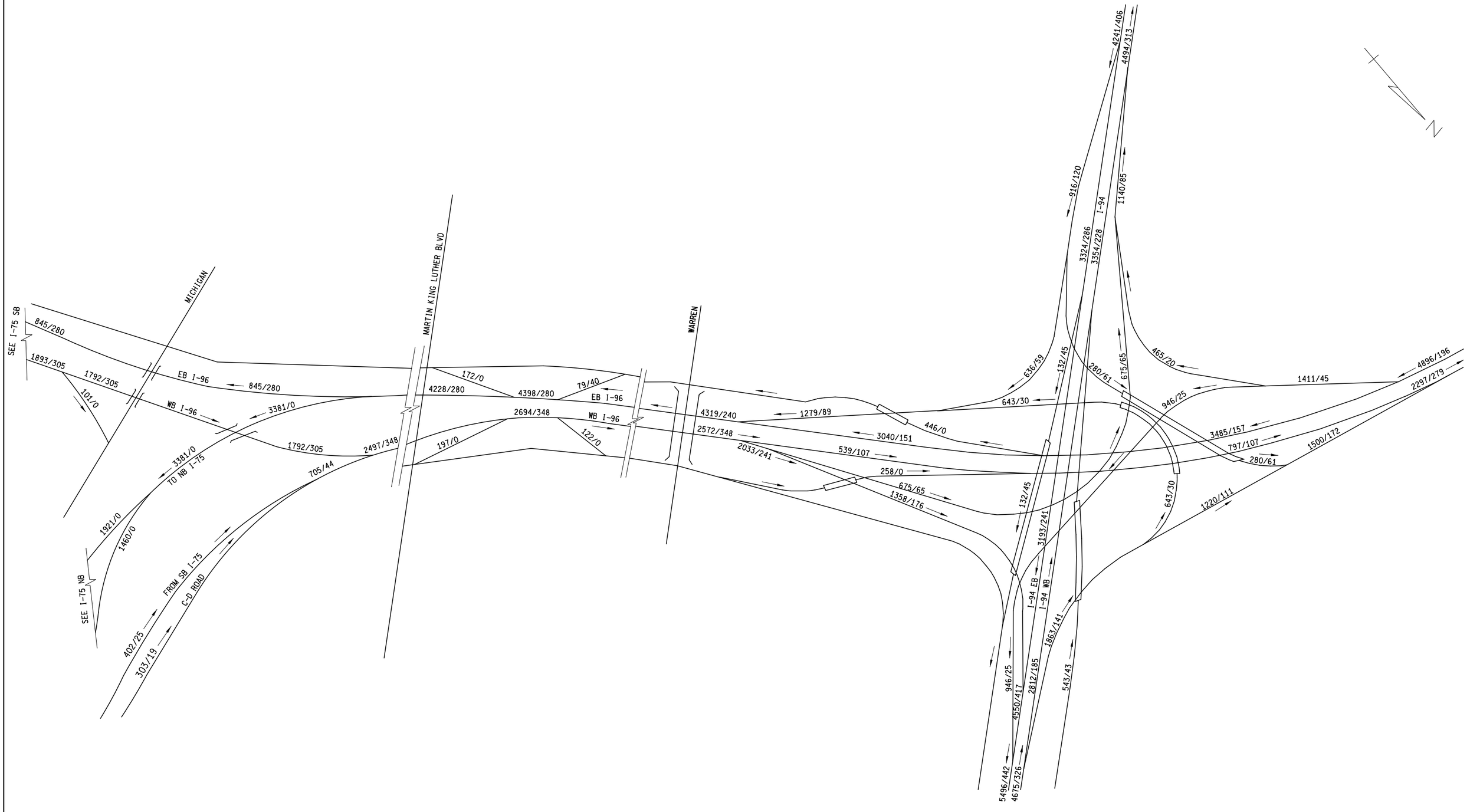
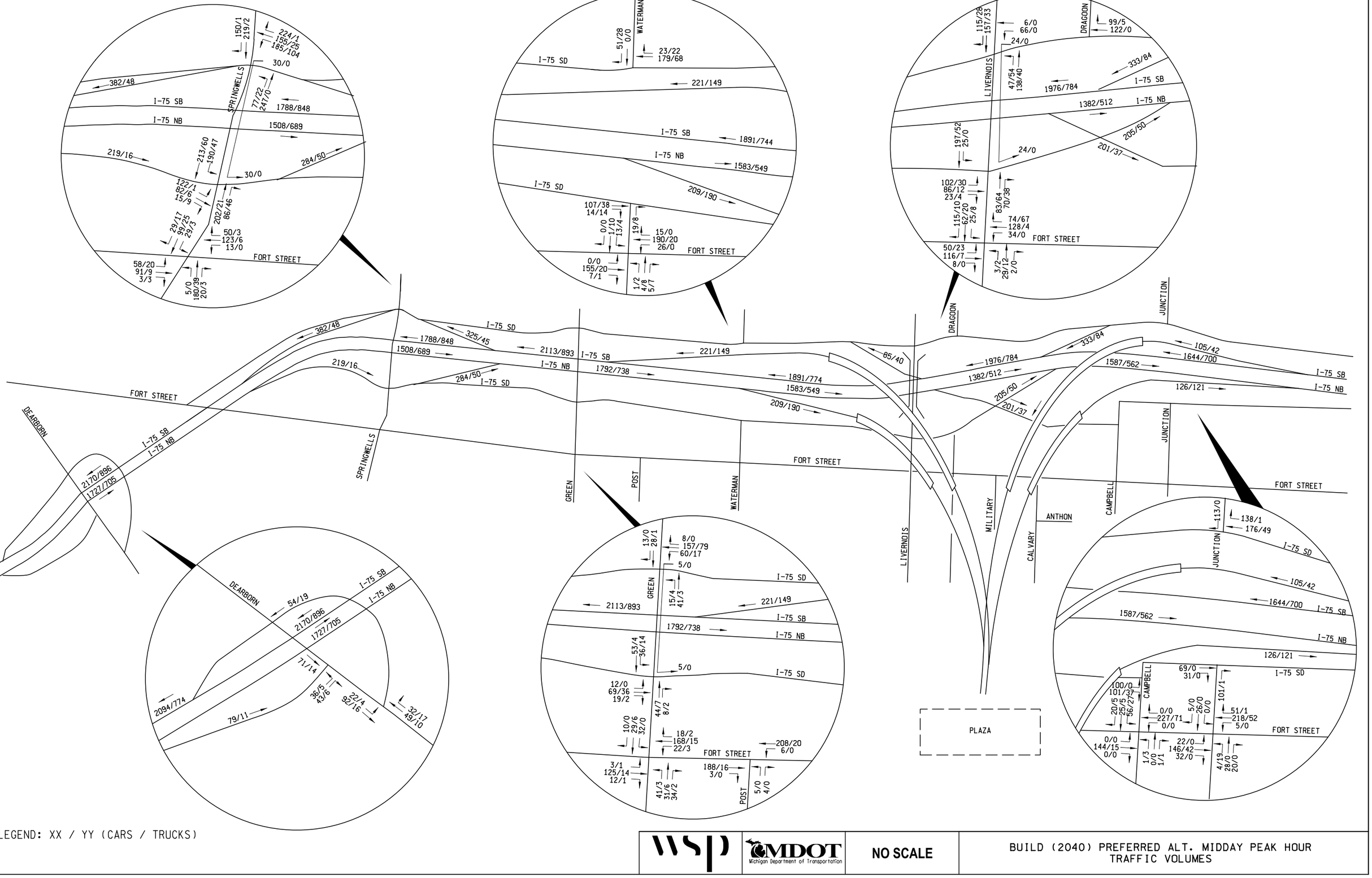


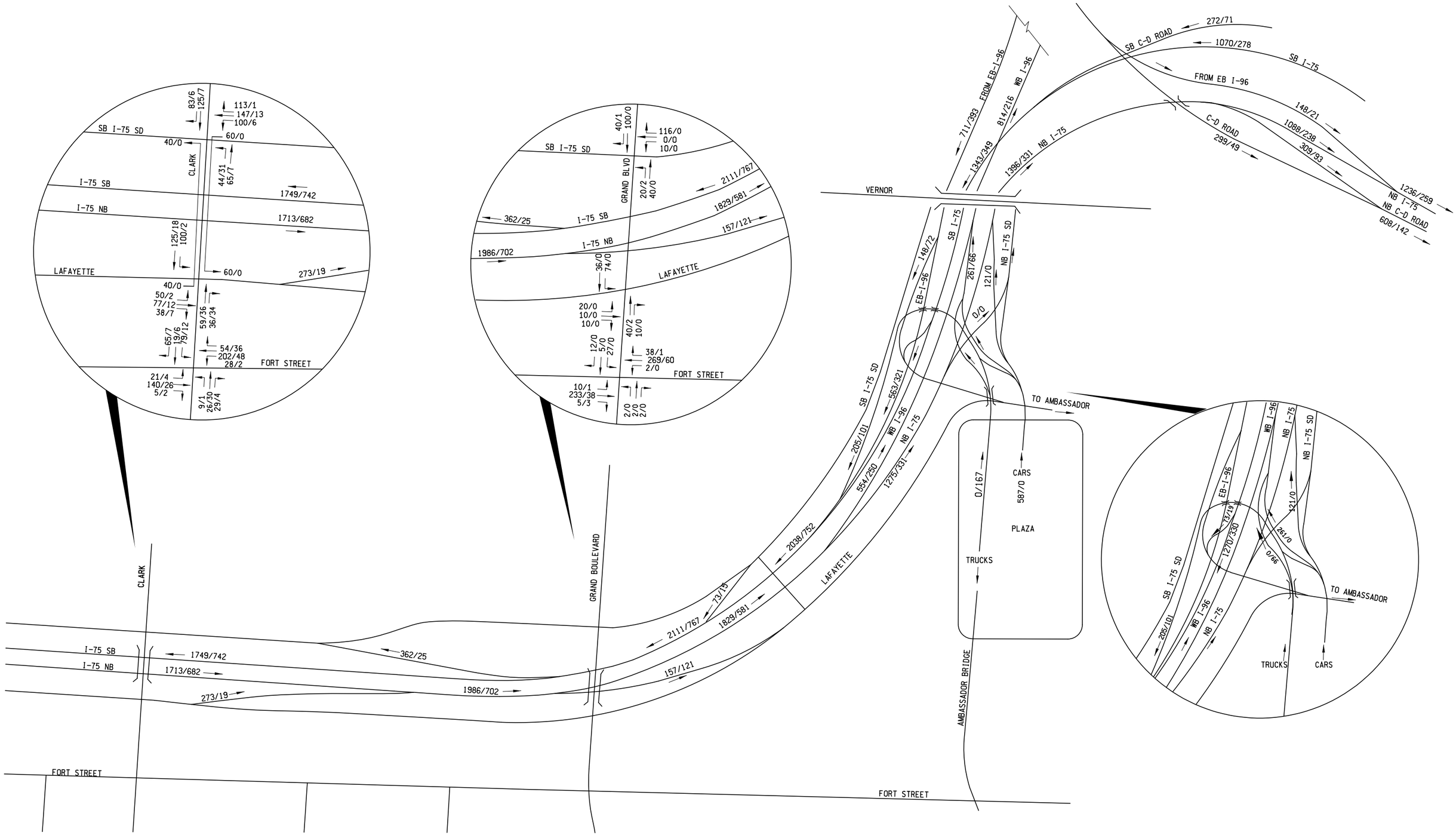
LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	BUILD (2040) PREFERRED ALT. AM PEAK HOUR TRAFFIC VOLUMES



LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	BUILD (2040) PREFERRED ALT. MIDDAY PEAK HOUR TRAFFIC VOLUMES



LEGEND: XX / YY (CARS / TRUCKS)

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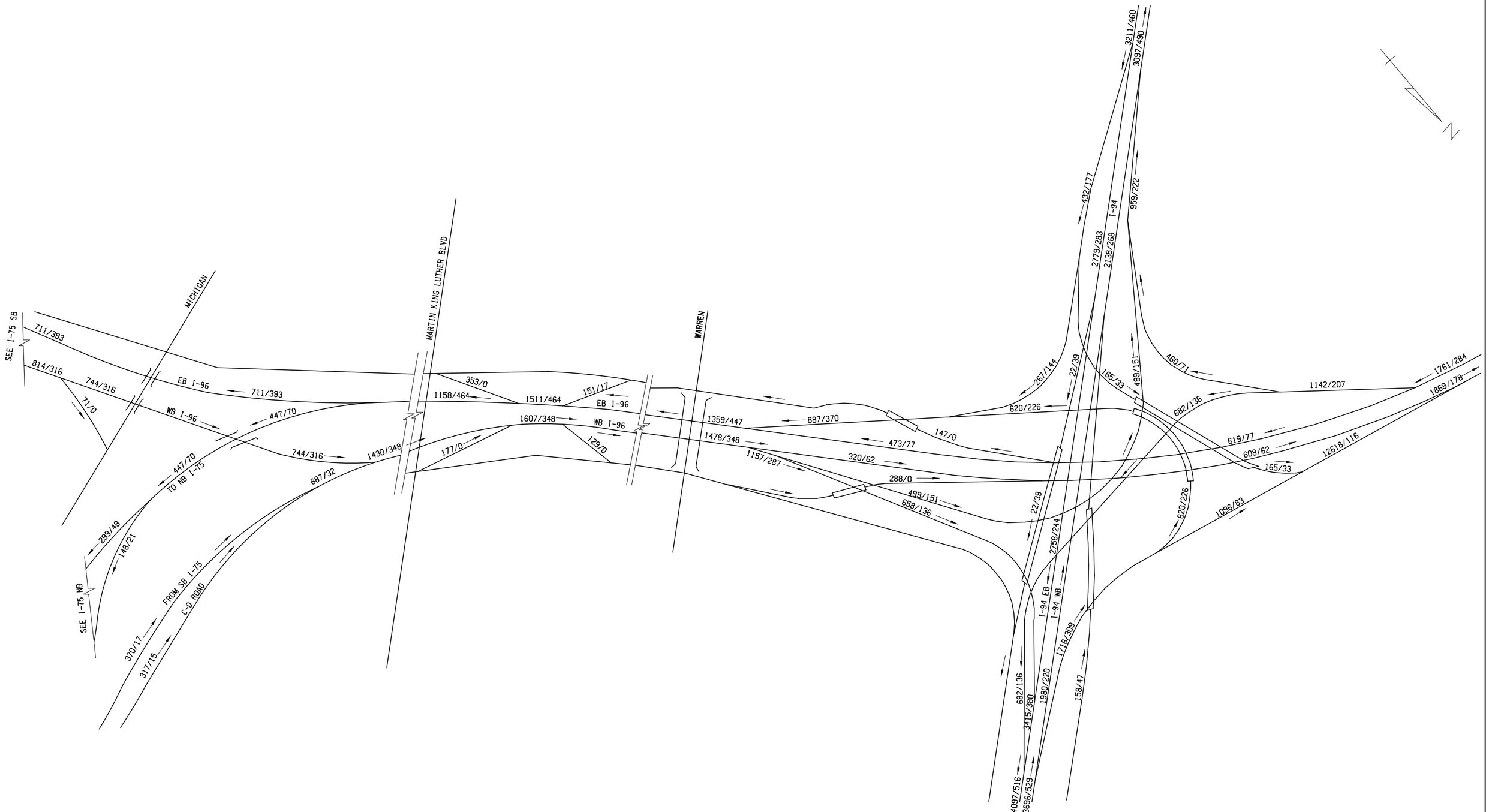
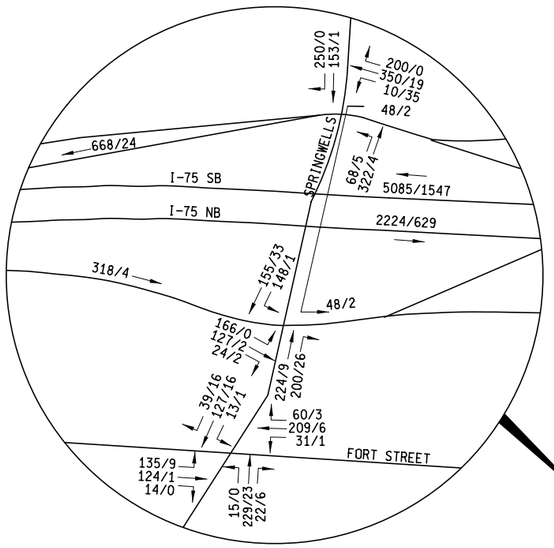
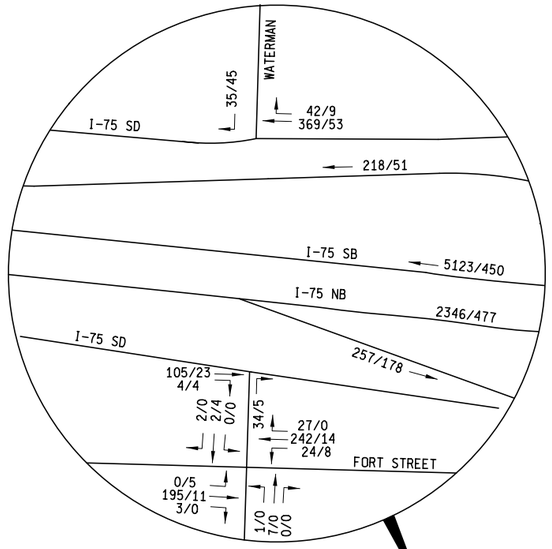


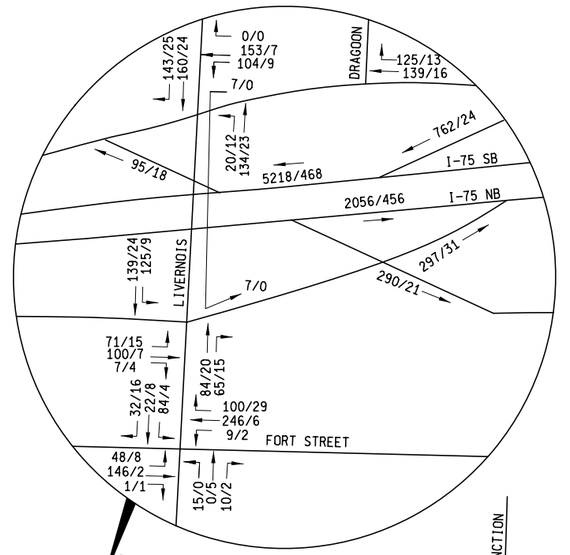
LEGEND: XX / YY (CARS / TRUCKS)

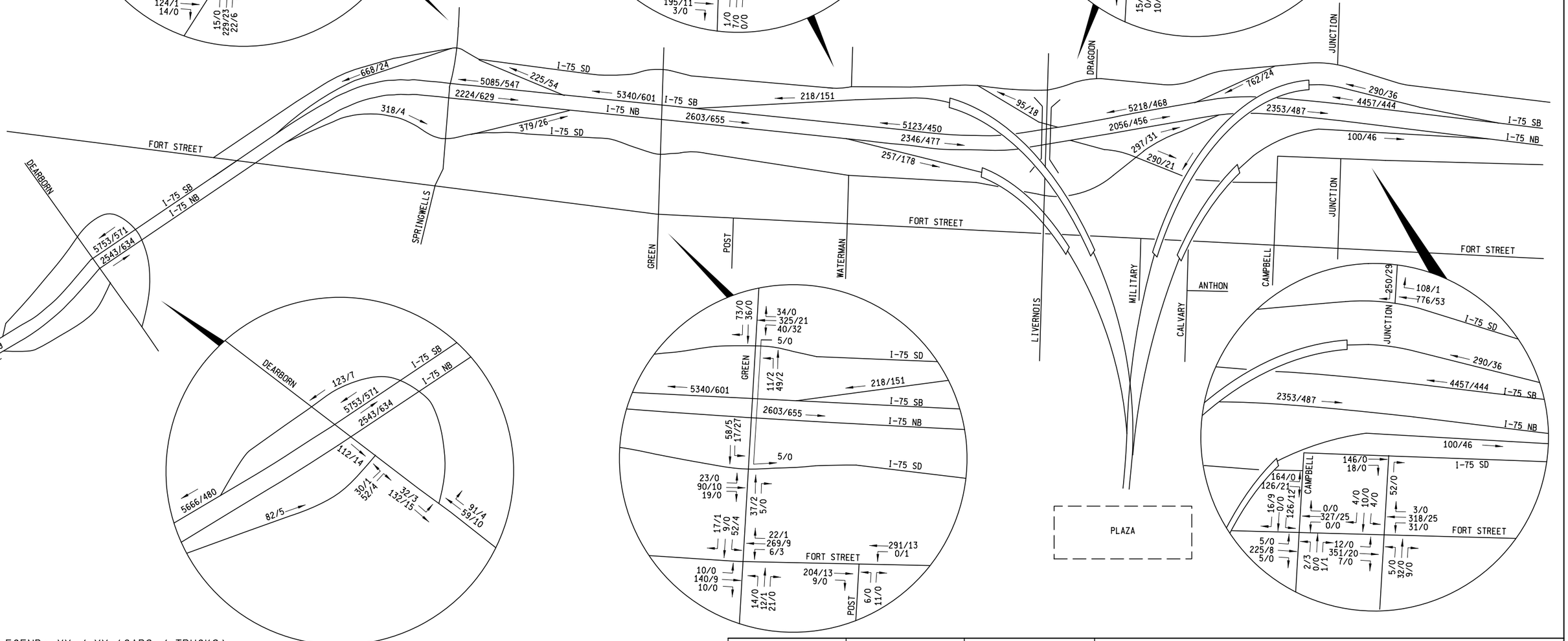
WSP | MDOT Michigan Department of Transportation | NO SCALE

BUILD (2040) PREFERRED ALT. MIDDAY PEAK HOUR
TRAFFIC VOLUMES



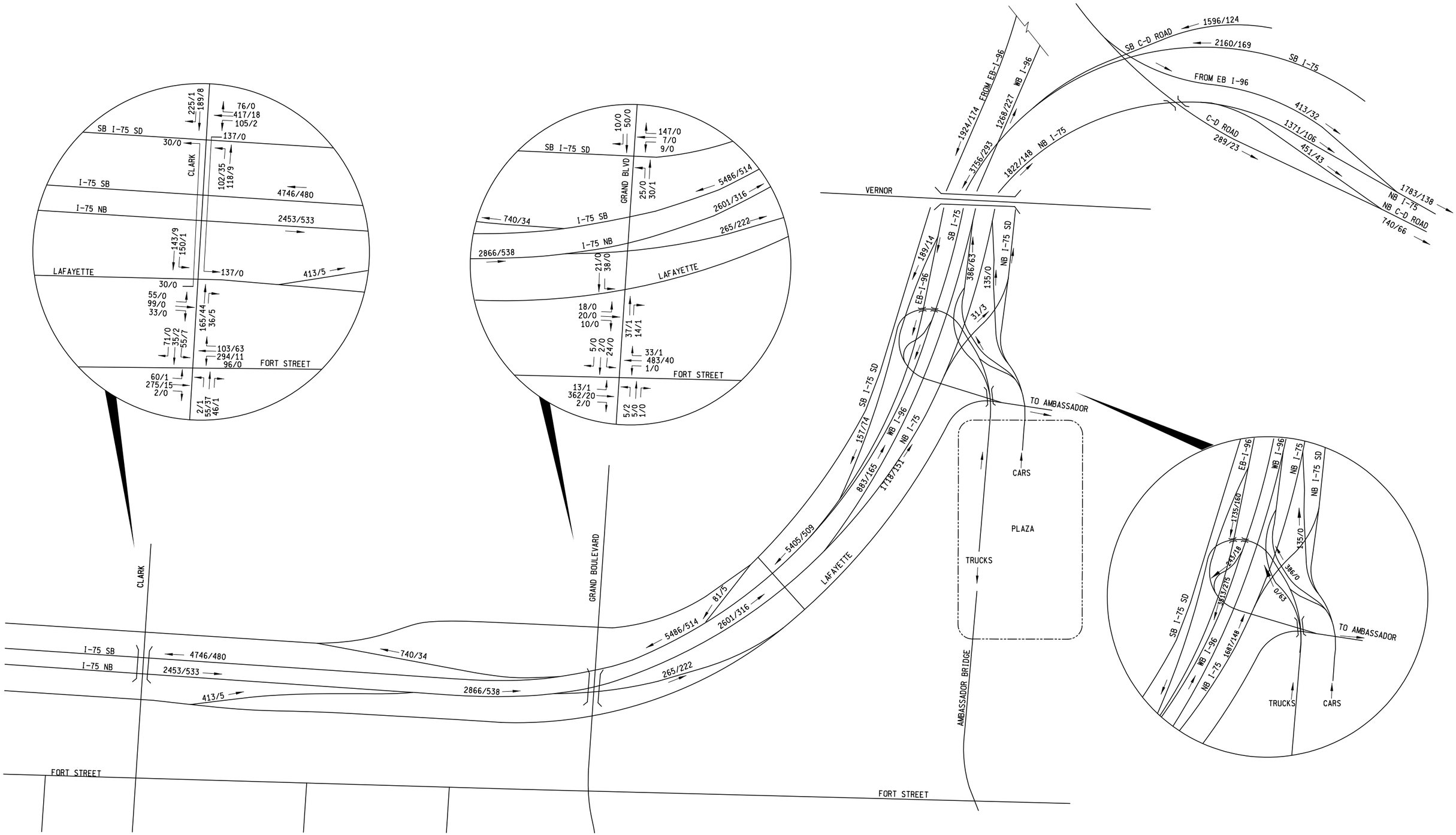






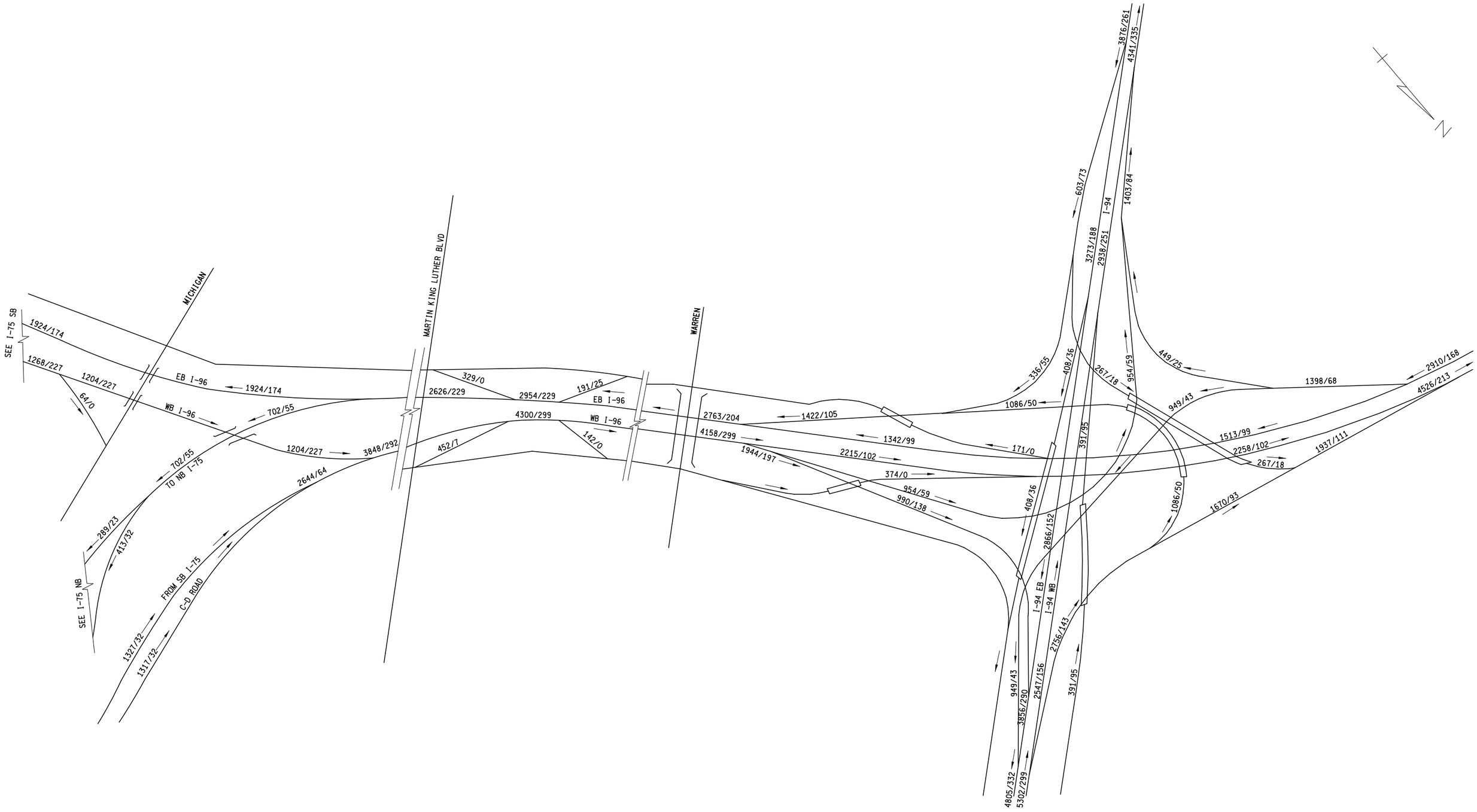
LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	BUILD (2040) PREFERRED ALT. PM PEAK HOUR TRAFFIC VOLUMES



LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	BUILD (2040) PREFERRED ALT. PM PEAK HOUR TRAFFIC VOLUMES



LEGEND: XX / YY (CARS / TRUCKS)

WSP	MDOT Michigan Department of Transportation	NO SCALE	BUILD (2040) PREFERRED ALT. PM PEAK HOUR TRAFFIC VOLUMES

Appendix B – HCS7 Reports

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Amb. Ent. to Clark Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1316	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5112	86	0	774
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	9.00	6.00	0.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.943	1.000	0.962
Flow Rate (v_i), pc/h	5868	96	0	847

Weaving Flow Rate (v_w), pc/h	943	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	5868	Density-Based Capacity (c_{IWL}), pc/h/ln	2051
Total Flow Rate (v), pc/h	6811	Demand Flow-Based Capacity (c_{IW}), pc/h	17391
Volume Ratio (VR)	0.138	Weaving Segment Capacity (c_W), veh/h	9404
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	10189
Maximum Weaving Length (L_{MAX}), ft	3912	Volume-to-Capacity Ratio (v/c)	0.67

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	257	Average Weaving Speed (S_W), mi/h	47.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	959	Average Non-Weaving Speed (S_{NW}), mi/h	48.5
Weaving Lane Change Rate (LC_W), lc/h	391	Average Speed (S), mi/h	48.4
Total Lane Change Rate (LC_{All}), lc/h	1350	Density (D), pc/mi/ln	28.1
Weaving Intensity Factor (W)	0.231	Level of Service (LOS)	D

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From JunctionEnt. to Drag.Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1140	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4759	762	0	113
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	9.00	24.00	0.00	16.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.806	1.000	0.862
Flow Rate (v_i), pc/h	5463	995	0	138

Weaving Flow Rate (v_w), pc/h	1133	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	5463	Density-Based Capacity (c_{IWL}), pc/h/ln	2162
Total Flow Rate (v), pc/h	6596	Demand Flow-Based Capacity (c_{IW}), pc/h	13953
Volume Ratio (VR)	0.172	Weaving Segment Capacity (c_W), veh/h	9913
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	11025
Maximum Weaving Length (L_{MAX}), ft	4252	Volume-to-Capacity Ratio (v/c)	0.60

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	208	Average Weaving Speed (S_W), mi/h	59.9
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	780	Average Non-Weaving Speed (S_{NW}), mi/h	63.7
Weaving Lane Change Rate (LC_W), lc/h	356	Average Speed (S), mi/h	63.0
Total Lane Change Rate (LC_{All}), lc/h	1136	Density (D), pc/mi/ln	20.9
Weaving Intensity Factor (W)	0.225	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Plaza Ent. to Spring.Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1600	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5604	692	0	309
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	10.00	3.00	0.00	17.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.909	0.971	1.000	0.855
Flow Rate (v_i), pc/h	6489	750	0	380

Weaving Flow Rate (v_w), pc/h	1130	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	6489	Density-Based Capacity (c_{IWL}), pc/h/ln	2216
Total Flow Rate (v), pc/h	7619	Demand Flow-Based Capacity (c_{IW}), pc/h	16216
Volume Ratio (VR)	0.148	Weaving Segment Capacity (c_W), veh/h	10072
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	11037
Maximum Weaving Length (L_{MAX}), ft	4011	Volume-to-Capacity Ratio (v/c)	0.69

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	346	Average Weaving Speed (S_W), mi/h	59.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1241	Average Non-Weaving Speed (S_{NW}), mi/h	62.7
Weaving Lane Change Rate (LC_W), lc/h	443	Average Speed (S), mi/h	62.2
Total Lane Change Rate (LC_{All}), lc/h	1684	Density (D), pc/mi/ln	24.5
Weaving Intensity Factor (W)	0.235	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB -		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1316	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2403	88	0	387
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	30.00	17.00	0.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.855	1.000	0.943
Flow Rate (v_i), pc/h	3289	108	0	432

Weaving Flow Rate (v_w), pc/h	540	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	3289	Density-Based Capacity (c_{IWL}), pc/h/ln	2049
Total Flow Rate (v), pc/h	3829	Demand Flow-Based Capacity (c_{IW}), pc/h	17021
Volume Ratio (VR)	0.141	Weaving Segment Capacity (c_W), veh/h	7878
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	9957
Maximum Weaving Length (L_{MAX}), ft	3942	Volume-to-Capacity Ratio (v/c)	0.38

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	144	Average Weaving Speed (S_W), mi/h	49.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	428	Average Non-Weaving Speed (S_{NW}), mi/h	51.3
Weaving Lane Change Rate (LC_W), lc/h	391	Average Speed (S), mi/h	51.1
Total Lane Change Rate (LC_{All}), lc/h	819	Density (D), pc/mi/ln	15.0
Weaving Intensity Factor (W)	0.155	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From JunctionEnt. to Drag.Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1140	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2249	417	0	95
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	31.00	20.00	0.00	11.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.763	0.833	1.000	0.901
Flow Rate (v_i), pc/h	3103	527	0	111

Weaving Flow Rate (v_w), pc/h	638	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	3103	Density-Based Capacity (c_{IWL}), pc/h/ln	2163
Total Flow Rate (v), pc/h	3741	Demand Flow-Based Capacity (c_{IW}), pc/h	14035
Volume Ratio (VR)	0.171	Weaving Segment Capacity (c_W), veh/h	8252
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	10622
Maximum Weaving Length (L_{MAX}), ft	4242	Volume-to-Capacity Ratio (v/c)	0.35

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	118	Average Weaving Speed (S_W), mi/h	63.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	294	Average Non-Weaving Speed (S_{NW}), mi/h	66.4
Weaving Lane Change Rate (LC_W), lc/h	356	Average Speed (S), mi/h	65.8
Total Lane Change Rate (LC_{All}), lc/h	650	Density (D), pc/mi/ln	11.4
Weaving Intensity Factor (W)	0.145	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Plaza Ent. to Spring.Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1600	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2636	430	0	370
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	32.00	11.00	0.00	12.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.758	0.901	1.000	0.893
Flow Rate (v_i), pc/h	3661	502	0	436

Weaving Flow Rate (v_w), pc/h	938	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	3661	Density-Based Capacity (c_{IWL}), pc/h/ln	2172
Total Flow Rate (v), pc/h	4599	Demand Flow-Based Capacity (c_{IW}), pc/h	11765
Volume Ratio (VR)	0.204	Weaving Segment Capacity (c_W), veh/h	8232
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	10467
Maximum Weaving Length (L_{MAX}), ft	4577	Volume-to-Capacity Ratio (v/c)	0.44

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	195	Average Weaving Speed (S_W), mi/h	62.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	658	Average Non-Weaving Speed (S_{NW}), mi/h	65.6
Weaving Lane Change Rate (LC_W), lc/h	443	Average Speed (S), mi/h	64.9
Total Lane Change Rate (LC_{All}), lc/h	1101	Density (D), pc/mi/ln	14.2
Weaving Intensity Factor (W)	0.168	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Amb. Ent. to Clark Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1316	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2640	64	0	520
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	16.00	16.00	0.00	0.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.862	1.000	1.000
Flow Rate (v_i), pc/h	3224	78	0	547

Weaving Flow Rate (v_w), pc/h	625	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	3224	Density-Based Capacity (c_{IWL}), pc/h/ln	2033
Total Flow Rate (v), pc/h	3849	Demand Flow-Based Capacity (c_{IW}), pc/h	14815
Volume Ratio (VR)	0.162	Weaving Segment Capacity (c_W), veh/h	8762
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	9938
Maximum Weaving Length (L_{MAX}), ft	4151	Volume-to-Capacity Ratio (v/c)	0.39

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	141	Average Weaving Speed (S_W), mi/h	49.7
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	414	Average Non-Weaving Speed (S_{NW}), mi/h	51.3
Weaving Lane Change Rate (LC_W), lc/h	391	Average Speed (S), mi/h	51.0
Total Lane Change Rate (LC_{All}), lc/h	805	Density (D), pc/mi/ln	15.1
Weaving Intensity Factor (W)	0.153	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From JunctionEnt. to Drag.Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1140	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2360	444	0	261
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	17.00	11.00	0.00	7.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.901	1.000	0.935
Flow Rate (v_i), pc/h	2906	519	0	294

Weaving Flow Rate (v_w), pc/h	813	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	2906	Density-Based Capacity (c_{IWL}), pc/h/ln	2125
Total Flow Rate (v), pc/h	3719	Demand Flow-Based Capacity (c_{IW}), pc/h	10959
Volume Ratio (VR)	0.219	Weaving Segment Capacity (c_W), veh/h	9084
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	10471
Maximum Weaving Length (L_{MAX}), ft	4731	Volume-to-Capacity Ratio (v/c)	0.36

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	110	Average Weaving Speed (S_W), mi/h	63.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	254	Average Non-Weaving Speed (S_{NW}), mi/h	66.4
Weaving Lane Change Rate (LC_W), lc/h	356	Average Speed (S), mi/h	65.7
Total Lane Change Rate (LC_{All}), lc/h	610	Density (D), pc/mi/ln	11.3
Weaving Intensity Factor (W)	0.138	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Plaza Ent. to Spring.Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1600	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2615	406	0	595
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	22.00	3.00	0.00	0.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.820	0.971	1.000	1.000
Flow Rate (v_i), pc/h	3357	440	0	626

Weaving Flow Rate (v_w), pc/h	1066	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	3357	Density-Based Capacity (c_{IWL}), pc/h/ln	2143
Total Flow Rate (v), pc/h	4423	Demand Flow-Based Capacity (c_{IW}), pc/h	9959
Volume Ratio (VR)	0.241	Weaving Segment Capacity (c_W), veh/h	8166
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	9489
Maximum Weaving Length (L_{MAX}), ft	4960	Volume-to-Capacity Ratio (v/c)	0.47

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	179	Average Weaving Speed (S_W), mi/h	62.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	596	Average Non-Weaving Speed (S_{NW}), mi/h	65.8
Weaving Lane Change Rate (LC_W), lc/h	443	Average Speed (S), mi/h	64.9
Total Lane Change Rate (LC_{All}), lc/h	1039	Density (D), pc/mi/ln	13.6
Weaving Intensity Factor (W)	0.161	Level of Service (LOS)	B

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ambassador Ent./Grand Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5886	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1351
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	24.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Grand Ent./Clark Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5672	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1302
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit/Plaza Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5198	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1193
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Exit/Junction Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4872	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1398
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	69.5
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	20.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Junction Ent./Dragoon Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5658	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1286
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.54
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	69.9
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit/Plaza Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5545	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1576
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.66
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	68.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Ent./Springwells Exit		

Geometric Data

Number of Lanes, ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5913	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1141
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.48
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5604	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1622
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.9
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Ent./Dearborn Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6296	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1807
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ambassador Ent./Grand Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2790	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	746
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.33
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Grand Ent./Clark Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2878	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	770
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit/Plaza Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2491	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	682
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.30
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Exit/Junction Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2344	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	802
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.33
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Junction Ent./Dragoon Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2760	Heavy Vehicle Adjustment Factor (f_{HV})	0.781
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	744
Total Trucks, %	28.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit/Plaza Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2636	Heavy Vehicle Adjustment Factor (f_{HV})	0.758
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	915
Total Trucks, %	32.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.38
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Ent./Springwells Exit		

Geometric Data

Number of Lanes, ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3006	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	686
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2636	Heavy Vehicle Adjustment Factor (f_{HV})	0.758
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	915
Total Trucks, %	32.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.38
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Ent./Dearborn Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3066	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1041
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.43
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ambassador Ent./Grand Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3160	Heavy Vehicle Adjustment Factor (f_{HV})	0.877
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	759
Total Trucks, %	14.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Grand Ent./Clark Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3224	Heavy Vehicle Adjustment Factor (f_{HV})	0.877
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	774
Total Trucks, %	14.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit/Plaza Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2704	Heavy Vehicle Adjustment Factor (f_{HV})	0.862
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	660
Total Trucks, %	16.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Exit/Junction Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2621	Heavy Vehicle Adjustment Factor (f_{HV})	0.862
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	800
Total Trucks, %	16.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.33
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	8/31/2017
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Junction Ent./Dragoon Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3065	Heavy Vehicle Adjustment Factor (f_{HV})	0.870
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	742
Total Trucks, %	15.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit/Plaza Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2805	Heavy Vehicle Adjustment Factor (f_{HV})	0.862
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	856
Total Trucks, %	16.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Ent./Springwells Exit		

Geometric Data

Number of Lanes, ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3211	Heavy Vehicle Adjustment Factor (f_{HV})	0.847
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	665
Total Trucks, %	18.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.28
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2616	Heavy Vehicle Adjustment Factor (f_{HV})	0.820
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	840
Total Trucks, %	22.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Ent./Dearborn Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3022	Heavy Vehicle Adjustment Factor (f_{HV})	0.840
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	947
Total Trucks, %	19.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Service Dr Ent Ramp E of Grand		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5886	86
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.943
Flow Rate (v_i), pc/h	6757	96
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.76	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	23.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.344
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2027
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.206	Outer Lanes Freeway Speed (S_O), mi/h	49.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2703	Ramp Junction Speed (S), mi/h	49.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2799	Average Density (D), pc/mi/ln	34.3
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp E of Clark		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5972	774
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.962
Flow Rate (v_i), pc/h	6855	847
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.76	0.42

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	20.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.504
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1695
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	57.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3466	Ramp Junction Speed (S), mi/h	52.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	32.6
Level of Service (LOS)	C		

Managed Lane Geometric Data

Managed Lane Type	Continuous Access	Free-Flow Speed (FFS), mi/h	75.4
Number of Managed Lanes, ln	1	Terrain Type	Level
Managed Lane Length, ft	5280	Percent Grade, %	-
Managed Lane Adjustment Factors			
Driver Population	All Familiar	Driver Population CAF	1.000
Weather Type	Non-Severe Weather	Weather Type CAF	1.000
Driver Population SAF	1.000	Final Speed Adjustment Factor (SAF)	1.000
Weather Type SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Demand Adjustment Factor (DAF)	1.000		
Managed Lane Demand and Capacity			
Volume (V_{ML}), veh/h	0	Heavy Vehicle Adjustment Factor (f_{HV})	1.000
Peak Hour Factor	0.94	Flow Rate ($V_{p,ML}$), pc/h/ln	0
Total Trucks, %	0.00	Capacity (c), pc/h/ln	1804
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	1804
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.00
Passenger Car Equivalent (E_T)	2.000		
Managed Lane Speed and Density			
Breakpoint (BP_{ML})	501	Indicator Variable	0
Speed 1 (S_1), mi/h	75.4	Average Speed (S_{ML}), mi/h	75.4
Speed 2 (S_2), mi/h	0.0	Density (D_{ML}), pc/mi/ln	0.0
Speed 2 (S_3), mi/h	0.0	Level of Service (LOS)	A

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Exit Ramp E of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5198	325
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.901
Flow Rate (v_i), pc/h	5967	380
Capacity (c), pc/h	9600	4200
Volume-to-Capacity Ratio (v/c)	0.62	0.09

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	11.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.332
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1790
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	60.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.260	Outer Lanes Freeway Speed (S_O), mi/h	73.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2387	Ramp Junction Speed (S), mi/h	67.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	22.0
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ent. Ramp W of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	4872	786
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.971
Flow Rate (v_i), pc/h	5593	852
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.67	0.43

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	22.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.327
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1678
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	60.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.111	Outer Lanes Freeway Speed (S_O), mi/h	65.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	2237	Ramp Junction Speed (S), mi/h	63.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3089	Average Density (D), pc/mi/ln	25.5
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp at Dragoon		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5658	113
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	16.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.862
Flow Rate (v_i), pc/h	6432	138
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.67	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	18.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.440
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1775
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	73.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	2882	Ramp Junction Speed (S), mi/h	65.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	24.5
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp E of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5913	309
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	10.00	17.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.909	0.855
Flow Rate (v_i), pc/h	6847	380
Capacity (c), pc/h	12000	2000
Volume-to-Capacity Ratio (v/c)	0.57	0.19

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	23.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.462
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1534
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	74.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2752	Ramp Junction Speed (S), mi/h	65.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	21.0
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Entrance Ramp W of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5604	692
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	10.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.909	0.971
Flow Rate (v_i), pc/h	6489	750
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.75	0.38

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	27.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.390
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1947
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	59.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.124	Outer Lanes Freeway Speed (S_O), mi/h	64.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	2596	Ramp Junction Speed (S), mi/h	62.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3346	Average Density (D), pc/mi/ln	29.2
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Entrance Ramp W of Dearborn		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	6296	131
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.943
Flow Rate (v_i), pc/h	7227	146
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.77	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	26.0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.367
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2168
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	59.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.200	Outer Lanes Freeway Speed (S_O), mi/h	64.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	2891	Ramp Junction Speed (S), mi/h	62.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3037	Average Density (D), pc/mi/ln	29.6
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Service Dr Ent Ramp E of Grand		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2790	88
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	17.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	0.855
Flow Rate (v_i), pc/h	3732	108
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.43	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.299
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1120
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.204	Outer Lanes Freeway Speed (S_O), mi/h	52.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1493	Ramp Junction Speed (S), mi/h	52.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1601	Average Density (D), pc/mi/ln	18.4
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp E of Clark		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2878	386
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	0.943
Flow Rate (v_i), pc/h	3849	431
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.43	0.22

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	7.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.467
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	964
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1921	Ramp Junction Speed (S), mi/h	54.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	17.8
Level of Service (LOS)	A		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Exit Ramp E of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Highway/CD Roadway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2491	148
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	29.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.775
Flow Rate (v_i), pc/h	3410	201
Capacity (c), pc/h	8800	4200
Volume-to-Capacity Ratio (v/c)	0.39	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	2.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.316
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1023
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	61.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.260	Outer Lanes Freeway Speed (S_O), mi/h	76.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1364	Ramp Junction Speed (S), mi/h	69.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.2
Level of Service (LOS)	A		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ent. Ramp W of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2344	417
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	20.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.833
Flow Rate (v_i), pc/h	3209	527
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.39	0.26

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	12.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.265
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	963
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	62.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.152	Outer Lanes Freeway Speed (S_O), mi/h	68.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1284	Ramp Junction Speed (S), mi/h	65.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1811	Average Density (D), pc/mi/ln	14.3
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp at Dragoon		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2760	125
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	28.00	32.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.781	0.758
Flow Rate (v_i), pc/h	3720	174
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.39	0.09

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	8.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.444
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1000
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1720	Ramp Junction Speed (S), mi/h	66.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	14.0
Level of Service (LOS)	A		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/132018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp E of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3006	370
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	12.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.893
Flow Rate (v_i), pc/h	4115	436
Capacity (c), pc/h	12000	2000
Volume-to-Capacity Ratio (v/c)	0.34	0.22

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.467
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	921
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1861	Ramp Junction Speed (S), mi/h	65.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.6
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Entrance Ramp W of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2636	430
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	32.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.758	0.901
Flow Rate (v_i), pc/h	3661	502
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.43	0.25

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.307
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1099
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.155	Outer Lanes Freeway Speed (S_O), mi/h	67.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1464	Ramp Junction Speed (S), mi/h	64.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1966	Average Density (D), pc/mi/ln	16.1
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Entrance Ramp W of Dearborn		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3066	74
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	26.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.794
Flow Rate (v_i), pc/h	4164	98
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.44	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.309
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1249
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.206	Outer Lanes Freeway Speed (S_O), mi/h	67.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1666	Ramp Junction Speed (S), mi/h	64.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1764	Average Density (D), pc/mi/ln	16.5
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2017
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Service Dr Ent Ramp E of Grand		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3160	64
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	14.00	16.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.877	0.862
Flow Rate (v_i), pc/h	3793	78
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.43	0.04

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.299
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1138
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.208	Outer Lanes Freeway Speed (S_O), mi/h	52.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1517	Ramp Junction Speed (S), mi/h	52.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1595	Average Density (D), pc/mi/ln	18.6
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp E of Clark		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Highway/CD Roadway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3224	520
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	14.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.877	1.000
Flow Rate (v_i), pc/h	3870	547
Capacity (c), pc/h	8400	2000
Volume-to-Capacity Ratio (v/c)	0.46	0.27

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	7.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.477
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	937
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1996	Ramp Junction Speed (S), mi/h	53.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	18.0
Level of Service (LOS)	A		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Plaza Exit Ramp E of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2704	83
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	16.00	19.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.840
Flow Rate (v_i), pc/h	3302	104
Capacity (c), pc/h	9600	4200
Volume-to-Capacity Ratio (v/c)	0.34	0.02

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	2.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.307
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	991
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	61.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.260	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1321	Ramp Junction Speed (S), mi/h	69.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	11.8
Level of Service (LOS)	A		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ent. Ramp W of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2621	444
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	16.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.901
Flow Rate (v_i), pc/h	3201	519
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.39	0.26

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	12.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.265
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	961
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	62.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.153	Outer Lanes Freeway Speed (S_O), mi/h	68.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1280	Ramp Junction Speed (S), mi/h	65.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1799	Average Density (D), pc/mi/ln	14.2
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp at Dragoon		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3065	261
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	15.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.935
Flow Rate (v_i), pc/h	3708	294
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.39	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	9.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.454
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	963
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1783	Ramp Junction Speed (S), mi/h	66.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	14.0
Level of Service (LOS)	A		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp E of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3211	595
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	18.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.847	1.000
Flow Rate (v_i), pc/h	3991	626
Capacity (c), pc/h	12000	2000
Volume-to-Capacity Ratio (v/c)	0.33	0.31

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.484
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	949
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	2093	Ramp Junction Speed (S), mi/h	64.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.4
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Entrance Ramp W of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2616	406
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	22.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.820	0.971
Flow Rate (v_i), pc/h	3358	440
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.40	0.22

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.302
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1008
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.163	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	1343	Ramp Junction Speed (S), mi/h	64.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1783	Average Density (D), pc/mi/ln	14.6
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Entrance Ramp W of Dearborn		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3022	107
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	19.00	24.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.840	0.806
Flow Rate (v_i), pc/h	3787	140
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.41	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.306
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1136
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.200	Outer Lanes Freeway Speed (S_O), mi/h	67.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1515	Ramp Junction Speed (S), mi/h	64.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1655	Average Density (D), pc/mi/ln	15.1
Level of Service (LOS)	B		

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Springwells Ent/PlazaExit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1850	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2418	405	0	436
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	19.00	6.00	0.00	41.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.840	0.943	1.000	0.709
Flow Rate (v_i), pc/h	3030	452	0	647

Weaving Flow Rate (v_w), pc/h	1099	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	3030	Density-Based Capacity (c_{IWL}), pc/h/ln	2142
Total Flow Rate (v), pc/h	4129	Demand Flow-Based Capacity (c_{IW}), pc/h	9023
Volume Ratio (VR)	0.266	Weaving Segment Capacity (c_W), veh/h	7579
Minimum Lane Change Rate (LC_{MIN}), lc/h	647	Adjusted Weaving Area Capacity, pc/h	9122
Maximum Weaving Length (L_{MAX}), ft	5222	Volume-to-Capacity Ratio (v/c)	0.45

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	187	Average Weaving Speed (S_W), mi/h	60.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	664	Average Non-Weaving Speed (S_{NW}), mi/h	61.4
Weaving Lane Change Rate (LC_W), lc/h	1130	Average Speed (S), mi/h	61.0
Total Lane Change Rate (LC_{All}), lc/h	1794	Density (D), pc/mi/ln	13.5
Weaving Intensity Factor (W)	0.221	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Clark Ent. to Grand Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1100	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2499	418	0	487
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	12.00	1.00	0.00	46.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.990	1.000	0.685
Flow Rate (v_i), pc/h	2946	444	0	748

Weaving Flow Rate (v_w), pc/h	1192	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	2946	Density-Based Capacity (c_{IWL}), pc/h/ln	1917
Total Flow Rate (v), pc/h	4138	Demand Flow-Based Capacity (c_{IW}), pc/h	8333
Volume Ratio (VR)	0.288	Weaving Segment Capacity (c_W), veh/h	7442
Minimum Lane Change Rate (LC_{MIN}), lc/h	1496	Adjusted Weaving Area Capacity, pc/h	8594
Maximum Weaving Length (L_{MAX}), ft	5456	Volume-to-Capacity Ratio (v/c)	0.48

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	108	Average Weaving Speed (S_W), mi/h	44.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	240	Average Non-Weaving Speed (S_{NW}), mi/h	40.3
Weaving Lane Change Rate (LC_W), lc/h	1843	Average Speed (S), mi/h	41.3
Total Lane Change Rate (LC_{All}), lc/h	2083	Density (D), pc/mi/ln	20.0
Weaving Intensity Factor (W)	0.374	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Springwells Ent/PlazaExit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1850	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	1798	334	0	399
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	28.00	15.00	0.00	48.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.781	0.870	1.000	0.676
Flow Rate (v_i), pc/h	2423	404	0	621

Weaving Flow Rate (v_w), pc/h	1025	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	2423	Density-Based Capacity (c_{IWL}), pc/h/ln	2117
Total Flow Rate (v), pc/h	3448	Demand Flow-Based Capacity (c_{IW}), pc/h	8081
Volume Ratio (VR)	0.297	Weaving Segment Capacity (c_W), veh/h	6311
Minimum Lane Change Rate (LC_{MIN}), lc/h	404	Adjusted Weaving Area Capacity, pc/h	8168
Maximum Weaving Length (L_{MAX}), ft	5552	Volume-to-Capacity Ratio (v/c)	0.42

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	149	Average Weaving Speed (S_W), mi/h	61.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	539	Average Non-Weaving Speed (S_{NW}), mi/h	63.8
Weaving Lane Change Rate (LC_W), lc/h	887	Average Speed (S), mi/h	63.1
Total Lane Change Rate (LC_{All}), lc/h	1426	Density (D), pc/mi/ln	10.9
Weaving Intensity Factor (W)	0.184	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Clark Ent. to Grand Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1100	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2117	292	0	278
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	26.00	7.00	0.00	43.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.794	0.935	1.000	0.699
Flow Rate (v_i), pc/h	2807	329	0	419

Weaving Flow Rate (v_w), pc/h	748	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	2807	Density-Based Capacity (c_{IWL}), pc/h/ln	1979
Total Flow Rate (v), pc/h	3555	Demand Flow-Based Capacity (c_{IW}), pc/h	11429
Volume Ratio (VR)	0.210	Weaving Segment Capacity (c_W), veh/h	7857
Minimum Lane Change Rate (LC_{MIN}), lc/h	838	Adjusted Weaving Area Capacity, pc/h	9875
Maximum Weaving Length (L_{MAX}), ft	4639	Volume-to-Capacity Ratio (v/c)	0.36

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	103	Average Weaving Speed (S_W), mi/h	46.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	211	Average Non-Weaving Speed (S_{NW}), mi/h	45.6
Weaving Lane Change Rate (LC_W), lc/h	1185	Average Speed (S), mi/h	45.8
Total Lane Change Rate (LC_{All}), lc/h	1396	Density (D), pc/mi/ln	15.5
Weaving Intensity Factor (W)	0.273	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Springwells Ent/PlazaExit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1850	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5162	455	0	214
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	10.00	6.00	0.00	50.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.909	0.943	1.000	0.667
Flow Rate (v_i), pc/h	5978	508	0	338

Weaving Flow Rate (v_w), pc/h	846	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	5978	Density-Based Capacity (c_{IWL}), pc/h/ln	2253
Total Flow Rate (v), pc/h	6824	Demand Flow-Based Capacity (c_{IW}), pc/h	19355
Volume Ratio (VR)	0.124	Weaving Segment Capacity (c_W), veh/h	10240
Minimum Lane Change Rate (LC_{MIN}), lc/h	508	Adjusted Weaving Area Capacity, pc/h	11385
Maximum Weaving Length (L_{MAX}), ft	3774	Volume-to-Capacity Ratio (v/c)	0.60

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	369	Average Weaving Speed (S_W), mi/h	58.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1271	Average Non-Weaving Speed (S_{NW}), mi/h	59.8
Weaving Lane Change Rate (LC_W), lc/h	991	Average Speed (S), mi/h	59.6
Total Lane Change Rate (LC_{All}), lc/h	2262	Density (D), pc/mi/ln	22.9
Weaving Intensity Factor (W)	0.265	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Clark Ent. to Grand Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1100	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5275	393	0	141
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	11.00	3.00	0.00	46.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.971	1.000	0.685
Flow Rate (v_i), pc/h	6163	426	0	217

Weaving Flow Rate (v_w), pc/h	643	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	6163	Density-Based Capacity (c_{IWL}), pc/h/ln	2188
Total Flow Rate (v), pc/h	6806	Demand Flow-Based Capacity (c_{IW}), pc/h	37234
Volume Ratio (VR)	0.094	Weaving Segment Capacity (c_W), veh/h	9857
Minimum Lane Change Rate (LC_{MIN}), lc/h	852	Adjusted Weaving Area Capacity, pc/h	10971
Maximum Weaving Length (L_{MAX}), ft	1915	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	226	Average Weaving Speed (S_W), mi/h	44.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	903	Average Non-Weaving Speed (S_{NW}), mi/h	42.3
Weaving Lane Change Rate (LC_W), lc/h	1199	Average Speed (S), mi/h	42.5
Total Lane Change Rate (LC_{All}), lc/h	2102	Density (D), pc/mi/ln	32.0
Weaving Intensity Factor (W)	0.377	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit/Springwells Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3176	Heavy Vehicle Adjustment Factor (f_{HV})	0.833
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1003
Total Trucks, %	20.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.42
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2854	Heavy Vehicle Adjustment Factor (f_{HV})	0.820
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	916
Total Trucks, %	22.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.38
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Ent./Plaza Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3258	Heavy Vehicle Adjustment Factor (f_{HV})	0.833
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	823
Total Trucks, %	20.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Exit/Campbell Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2822	Heavy Vehicle Adjustment Factor (f_{HV})	0.855
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	868
Total Trucks, %	17.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Campbell Exit/Livernois Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2512	Heavy Vehicle Adjustment Factor (f_{HV})	0.847
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	780
Total Trucks, %	18.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.33
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Ent./Plaza Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2840	Heavy Vehicle Adjustment Factor (f_{HV})	0.855
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	874
Total Trucks, %	17.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Ent./Clark Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2986	Heavy Vehicle Adjustment Factor (f_{HV})	0.847
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	742
Total Trucks, %	18.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.33
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

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Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Ent./Lafayette Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3404	Heavy Vehicle Adjustment Factor (f_{HV})	0.862
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1039
Total Trucks, %	16.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.46
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

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Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Lafayette Exit/I-96 WB Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2917	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	852
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.38
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit/Springwells Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2432	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	826
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2197	Heavy Vehicle Adjustment Factor (f_{HV})	0.763
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	758
Total Trucks, %	31.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

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Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Ent./Plaza Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2530	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	687
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Exit/Campbell Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2132	Heavy Vehicle Adjustment Factor (f_{HV})	0.794
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	706
Total Trucks, %	26.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

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Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Campbell Exit/Livernois Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1894	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	633
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.26
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	8/31/2017
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Ent./Plaza Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2149	Heavy Vehicle Adjustment Factor (f_{HV})	0.794
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	712
Total Trucks, %	26.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.30
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Ent./Clark Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2396	Heavy Vehicle Adjustment Factor (f_{HV})	0.781
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	646
Total Trucks, %	28.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Ent./Lafayette Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2688	Heavy Vehicle Adjustment Factor (f_{HV})	0.794
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	891
Total Trucks, %	26.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.40
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Lafayette Exit/I-96 WB Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2410	Heavy Vehicle Adjustment Factor (f_{HV})	0.806
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	787
Total Trucks, %	24.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit/Springwells Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5153	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1518
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	68.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/218
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4863	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1446
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	69.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	20.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Ent./Plaza Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5318	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1254
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.52
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Exit/Campbell Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5105	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1491
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.62
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	69.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Campbell Exit/Livernois Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4751	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1388
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	69.6
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Ent./Plaza Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5010	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1463
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.61
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	69.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Ent./Clark Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5416	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1277
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Ent./Lafayette Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5809	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1697
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	30.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Lafayette Exit/I-96 WB Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5668	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1641
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.73
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	29.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp W of Dearborn		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	120
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3264	88
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	20.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.943
Flow Rate (v_i), pc/h	4125	98
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.43	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	19.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.437
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1136
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1854	Ramp Junction Speed (S), mi/h	66.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	15.5
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp W of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	350
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3176	323
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	20.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.990
Flow Rate (v_i), pc/h	4013	343
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.42	0.17

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.459
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1035
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1943	Ramp Junction Speed (S), mi/h	65.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	15.2
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2854	405
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	22.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.820	0.943
Flow Rate (v_i), pc/h	3664	452
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.43	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	10.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.243
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1099
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	63.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.161	Outer Lanes Freeway Speed (S_O), mi/h	67.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1466	Ramp Junction Speed (S), mi/h	65.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1918	Average Density (D), pc/mi/ln	15.7
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Exit Ramp E of Waterman		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	200
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3258	436
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	20.00	41.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.709
Flow Rate (v_i), pc/h	4117	647
Capacity (c), pc/h	12000	4200
Volume-to-Capacity Ratio (v/c)	0.34	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.356
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1112
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.260	Outer Lanes Freeway Speed (S_O), mi/h	76.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	1482	Ramp Junction Speed (S), mi/h	68.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.0
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp at Campbell		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	687
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2822	310
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	17.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.935
Flow Rate (v_i), pc/h	3474	349
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.36	0.17

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	12.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.459
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	881
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1712	Ramp Junction Speed (S), mi/h	65.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	13.2
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Livernois		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2512	328
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	18.00	10.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.847	0.909
Flow Rate (v_i), pc/h	3122	380
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.36	0.19

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.299
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	937
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.170	Outer Lanes Freeway Speed (S_O), mi/h	68.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	1249	Ramp Junction Speed (S), mi/h	65.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1629	Average Density (D), pc/mi/ln	13.4
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Ent. Ramp E of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2840	146
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	17.00	32.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.758
Flow Rate (v_i), pc/h	3496	203
Capacity (c), pc/h	9600	4200
Volume-to-Capacity Ratio (v/c)	0.39	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	8.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.205
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1049
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	64.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.209	Outer Lanes Freeway Speed (S_O), mi/h	68.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	1398	Ramp Junction Speed (S), mi/h	66.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1601	Average Density (D), pc/mi/ln	13.9
Level of Service (LOS)	A		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Clark		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2986	418
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	18.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.847	0.990
Flow Rate (v_i), pc/h	3711	444
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.46	0.22

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.7
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.307
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1114
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.162	Outer Lanes Freeway Speed (S_O), mi/h	52.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1484	Ramp Junction Speed (S), mi/h	51.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1928	Average Density (D), pc/mi/ln	20.0
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp Eof Grand(Lafayette)		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	235
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3404	487
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	16.00	46.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.685
Flow Rate (v_i), pc/h	4157	748
Capacity (c), pc/h	11250	2000
Volume-to-Capacity Ratio (v/c)	0.37	0.37

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	19.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.495
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	844
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2053	Ramp Junction Speed (S), mi/h	53.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	15.6
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp W of Dearborn		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	120
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2523	91
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	13.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.885
Flow Rate (v_i), pc/h	3454	108
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.36	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.438
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	944
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1567	Ramp Junction Speed (S), mi/h	66.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.9
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp W of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	350
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2432	236
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.935
Flow Rate (v_i), pc/h	3303	266
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.34	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.452
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	857
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1590	Ramp Junction Speed (S), mi/h	66.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.5
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2197	334
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	31.00	15.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.763	0.870
Flow Rate (v_i), pc/h	3031	404
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.36	0.20

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	8.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.236
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	910
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	63.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.167	Outer Lanes Freeway Speed (S_O), mi/h	68.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	1212	Ramp Junction Speed (S), mi/h	66.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1616	Average Density (D), pc/mi/ln	13.0
Level of Service (LOS)	A		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Exit Ramp E of Waterman		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	200
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2530	399
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	48.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.676
Flow Rate (v_i), pc/h	3436	621
Capacity (c), pc/h	12000	4200
Volume-to-Capacity Ratio (v/c)	0.29	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.354
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1031
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	60.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.260	Outer Lanes Freeway Speed (S_O), mi/h	76.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1374	Ramp Junction Speed (S), mi/h	69.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	9.9
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp at Campbell		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	687
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2132	238
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	26.00	15.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.794	0.870
Flow Rate (v_i), pc/h	2826	288
Capacity (c), pc/h	12000	2000
Volume-to-Capacity Ratio (v/c)	0.24	0.14

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	10.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.454
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	716
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1395	Ramp Junction Speed (S), mi/h	65.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	8.6
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Livernois		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1894	255
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	19.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	0.840
Flow Rate (v_i), pc/h	2533	320
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.30	0.16

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	12.0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.294
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	760
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.178	Outer Lanes Freeway Speed (S_O), mi/h	69.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	1013	Ramp Junction Speed (S), mi/h	65.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1333	Average Density (D), pc/mi/ln	10.9
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/218
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Ent. Ramp E of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2149	247
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	26.00	49.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.794	0.671
Flow Rate (v_i), pc/h	2849	387
Capacity (c), pc/h	9600	4200
Volume-to-Capacity Ratio (v/c)	0.34	0.09

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	7.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.204
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	855
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	64.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.209	Outer Lanes Freeway Speed (S_O), mi/h	68.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1140	Ramp Junction Speed (S), mi/h	66.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1527	Average Density (D), pc/mi/ln	12.1
Level of Service (LOS)	A		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Clark		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2396	292
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	28.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.781	0.935
Flow Rate (v_i), pc/h	3229	329
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.40	0.16

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.299
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	969
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.177	Outer Lanes Freeway Speed (S_O), mi/h	53.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1292	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1621	Average Density (D), pc/mi/ln	17.0
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp Eof Grand(Lafayette)		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	235
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2688	278
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	26.00	43.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.794	0.699
Flow Rate (v_i), pc/h	3564	419
Capacity (c), pc/h	11250	2000
Volume-to-Capacity Ratio (v/c)	0.32	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.466
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	887
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1790	Ramp Junction Speed (S), mi/h	54.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	13.2
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp W of Dearborn		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	120
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5293	139
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.901
Flow Rate (v_i), pc/h	6239	162
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.65	0.08

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	27.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.443
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1714
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	74.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	2812	Ramp Junction Speed (S), mi/h	65.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	23.8
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp W of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	350
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5153	290
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.980
Flow Rate (v_i), pc/h	6074	311
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.63	0.16

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	25.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.456
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1625
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	74.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2824	Ramp Junction Speed (S), mi/h	65.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	23.3
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Springwells		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	4863	455
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	13.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.943
Flow Rate (v_i), pc/h	5784	508
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.66	0.25

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.282
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1735
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	62.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.154	Outer Lanes Freeway Speed (S_O), mi/h	65.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2314	Ramp Junction Speed (S), mi/h	64.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2822	Average Density (D), pc/mi/ln	24.6
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Exit Ramp E of Waterman		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	200
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5318	214
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	50.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.667
Flow Rate (v_i), pc/h	6269	338
Capacity (c), pc/h	12000	4200
Volume-to-Capacity Ratio (v/c)	0.52	0.08

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	20.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.328
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1599
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	60.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.260	Outer Lanes Freeway Speed (S_O), mi/h	74.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2131	Ramp Junction Speed (S), mi/h	68.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	18.4
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp at Campbell		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	687
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	5105	354
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	11.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.971
Flow Rate (v_i), pc/h	5964	384
Capacity (c), pc/h	12000	2000
Volume-to-Capacity Ratio (v/c)	0.50	0.19

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	18.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.463
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1321
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	75.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2427	Ramp Junction Speed (S), mi/h	65.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	18.3
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/218
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Livernois		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	4751	260
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	11.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.917
Flow Rate (v_i), pc/h	5551	298
Capacity (c), pc/h	9600	2000
Volume-to-Capacity Ratio (v/c)	0.61	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	21.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.327
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1666
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	60.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.181	Outer Lanes Freeway Speed (S_O), mi/h	65.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	2220	Ramp Junction Speed (S), mi/h	63.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2518	Average Density (D), pc/mi/ln	23.0
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Plaza Ent. Ramp E of Junction		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	2
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5010	405
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	11.00	19.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.840
Flow Rate (v_i), pc/h	5853	508
Capacity (c), pc/h	9600	4200
Volume-to-Capacity Ratio (v/c)	0.66	0.12

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	18.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.253
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1756
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	62.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.209	Outer Lanes Freeway Speed (S_O), mi/h	65.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2341	Ramp Junction Speed (S), mi/h	64.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2849	Average Density (D), pc/mi/ln	24.7
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/12/218
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp E of Clark		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5416	393
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.971
Flow Rate (v_i), pc/h	6384	426
Capacity (c), pc/h	9000	2000
Volume-to-Capacity Ratio (v/c)	0.76	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	24.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.356
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1915
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.165	Outer Lanes Freeway Speed (S_O), mi/h	49.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	2554	Ramp Junction Speed (S), mi/h	50.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2980	Average Density (D), pc/mi/ln	34.0
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/12/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp Eof Grand(Lafayette)		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	235
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5809	141
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	11.00	46.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.685
Flow Rate (v_i), pc/h	6787	217
Capacity (c), pc/h	11250	2000
Volume-to-Capacity Ratio (v/c)	0.60	0.11

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	24.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.448
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1565
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	58.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	2638	Ramp Junction Speed (S), mi/h	53.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	25.3
Level of Service (LOS)	C		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - I-75 Split / 1 Lane Merge		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1047	Heavy Vehicle Adjustment Factor (f_{HV})	0.862
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	640
Total Trucks, %	16.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.28
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - Amb. Ent. / Michigan Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1362	Heavy Vehicle Adjustment Factor (f_{HV})	0.855
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	838
Total Trucks, %	17.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Michigan Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2098	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1192
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	2	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2098	203
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.935
Flow Rate (v_i), pc/h	2385	229
Capacity (c), pc/h	4500	2000
Volume-to-Capacity Ratio (v/c)	0.53	0.11

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.449
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	2385	Ramp Junction Speed (S), mi/h	49.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	24.2
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - C-D Road Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4049	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1519
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Amb. Exit / EB I-96 Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3788	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1422
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent. / Amb. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5683	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1631
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	29.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	785
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5683	203
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	37.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.730
Flow Rate (v_i), pc/h	6460	293
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.96	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	30.7
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.454
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2559
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.585	Outer Lanes Freeway Speed (S_O), mi/h	54.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	3901	Ramp Junction Speed (S), mi/h	51.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	42.2
Level of Service (LOS)	D		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-96 WB Exit/I-75 NB S.D. Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1894	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	538
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.24
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-75 NB S.D. Exit/Amb. Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1860	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	705
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Amb. Ent./C-D Road Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1970	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	746
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.33
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp to NB I-75 S.D.		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1000
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1894	34
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.917
Flow Rate (v_i), pc/h	2153	39
Capacity (c), pc/h	6750	2200
Volume-to-Capacity Ratio (v/c)	0.32	0.02

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	8.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.172
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	626
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	52.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.704	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1527	Ramp Junction Speed (S), mi/h	54.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	13.1
Level of Service (LOS)	A		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp from Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	870
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1860	110
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	1.000
Flow Rate (v_i), pc/h	2114	116
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.33	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	10.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.276
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	841
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.602	Outer Lanes Freeway Speed (S_O), mi/h	53.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1273	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1389	Average Density (D), pc/mi/ln	14.2
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 WB - I-75 Split / 1 Lane Merge		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	804	Heavy Vehicle Adjustment Factor (f_{HV})	0.763
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	554
Total Trucks, %	31.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.25
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 WB - Amb. Ent. / Michigan Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1060	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	726
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Michigan Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1104	Heavy Vehicle Adjustment Factor (f_{HV})	0.735
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	790
Total Trucks, %	36.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	2	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1104	220
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	36.00	33.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.735	0.752
Flow Rate (v_i), pc/h	1581	308
Capacity (c), pc/h	4500	2000
Volume-to-Capacity Ratio (v/c)	0.35	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	10.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.456
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	1581	Ramp Junction Speed (S), mi/h	49.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	16.1
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - C-D Road Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1691	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	718
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Amb. Exit / EB I-96 Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1600	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	680
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.30
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent. / Amb. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2484	Heavy Vehicle Adjustment Factor (f_{HV})	0.794
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	823
Total Trucks, %	26.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	785
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2484	306
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	26.00	33.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.794	0.752
Flow Rate (v_i), pc/h	3293	428
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.49	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.467
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	980
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.658	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2313	Ramp Junction Speed (S), mi/h	51.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	21.2
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-96 WB Exit/I-75 NB S.D. Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1606	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	512
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.23
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-75 NB S.D. Exit/Amb. Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1606	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	682
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.30
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Amb. Ent./C-D Road Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1727	Heavy Vehicle Adjustment Factor (f_{HV})	0.840
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	721
Total Trucks, %	19.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp to NB I-75 S.D.		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1000
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1606	0
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	21.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.826	1.000
Flow Rate (v_i), pc/h	2047	0
Capacity (c), pc/h	6750	2200
Volume-to-Capacity Ratio (v/c)	0.30	0.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	7.7
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.168
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	596
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	52.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.709	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1451	Ramp Junction Speed (S), mi/h	54.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.5
Level of Service (LOS)	A		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp from Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	870
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1606	121
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	21.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.826	1.000
Flow Rate (v_i), pc/h	2047	127
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.32	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	10.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.275
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	815
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.602	Outer Lanes Freeway Speed (S_O), mi/h	53.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	1232	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1359	Average Density (D), pc/mi/ln	13.9
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - I-75 Split / 1 Lane Merge		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1819	Heavy Vehicle Adjustment Factor (f_{HV})	0.877
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1092
Total Trucks, %	14.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.49
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - Amb. Ent. / Michigan Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2096	Heavy Vehicle Adjustment Factor (f_{HV})	0.870
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1268
Total Trucks, %	15.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/218
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Michigan Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1124	Heavy Vehicle Adjustment Factor (f_{HV})	0.800
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	740
Total Trucks, %	25.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.33
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	2	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1124	121
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	25.00	34.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.800	0.746
Flow Rate (v_i), pc/h	1479	171
Capacity (c), pc/h	4500	2000
Volume-to-Capacity Ratio (v/c)	0.33	0.09

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	10.0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.443
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	1479	Ramp Junction Speed (S), mi/h	49.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	15.0
Level of Service (LOS)	A		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - C-D Road Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1892	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	704
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Amb. Exit / EB I-96 Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1840	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	685
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.30
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent. / Amb. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2843	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	838
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	785
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2843	317
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	26.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.794
Flow Rate (v_i), pc/h	3351	420
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.50	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.466
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1005
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.657	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2346	Ramp Junction Speed (S), mi/h	51.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	21.6
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction		Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-96 WB Exit/I-75 NB S.D. Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3849	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1094
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.49
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction		Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-75 NB S.D. Exit/Amb. Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3835	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1453
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Amb. Ent./C-D Road Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4104	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1555
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.69
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	28.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction		Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp to NB I-75 S.D.		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1000
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3849	14
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.917
Flow Rate (v_i), pc/h	4375	16
Capacity (c), pc/h	6750	2200
Volume-to-Capacity Ratio (v/c)	0.65	0.01

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	19.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.169
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1526
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	52.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.650	Outer Lanes Freeway Speed (S_O), mi/h	58.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2849	Ramp Junction Speed (S), mi/h	54.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	26.7
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/13/2018
Agency	WSP	Analysis Year	2040 Hybrid
Jurisdiction		Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp from Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	870
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3835	269
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	1.000
Flow Rate (v_i), pc/h	4359	283
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.69	0.14

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	22.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.331
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1735
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.602	Outer Lanes Freeway Speed (S_O), mi/h	50.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2624	Ramp Junction Speed (S), mi/h	50.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2907	Average Density (D), pc/mi/ln	30.5
Level of Service (LOS)	C		

2040 HCM V6 Calculations

Analysis Type	Location	Peak Hour	V (veh/h)	% Trucks	Speed (mph)	f_{HV}	V_F (pc/h/ln)	D (pc/mi/ln)	LOS	OLD LOS
Major Diverge	NB I-75 / WB I-96 Diverge	AM	5668	10	-	0.952	1253	21.9	C	C
		Midday	2410	24	-	0.893	568	9.9	A	A
		PM	2917	11	-	0.948	648	11.3	B	B
1-Lane Segment	WB I-96 from WB I-96 (2-1 lane) merge to Gateway on-ramp	AM	1819	14	55	0.935	2049	37.3	E	E
		Midday	804	31	55	0.866	977	17.8	B	B
		PM	1047	16	55	0.926	1190	21.6	C	C
1-Lane Segment	EB I-96 from Gateway off-ramp to SB I-75	AM	1003	24	55	0.893	1182	21.5	C	C
		Midday	884	36	55	0.847	1098	20.0	B	C
		PM	1895	8	55	0.962	2075	37.7	E	D

HCM Equations:

$$f_{HV} = \frac{1}{1 + P_T(E_T - 1)}$$

$$V_F = \frac{V}{PHF * N * f_{HV} * f_P}$$

$$D = 0.0175 * V_F \quad \text{(Major Diverge)}$$

$$D = \frac{V_F}{S} \quad \text{(Freeway Segment)}$$

LOS	Density (pc/mi/ln)
A	≤10
B	>10–20
C	>20–28
D	>28–35
E	>35
F	Demand exceeds capacity

Exhibit 14-3
LOS Criteria for Freeway Merge and Diverge Segments

A	10
B	20
C	28
D	35
E	35
F	

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Amb. Ent. to Clark Exit		

Geometric Data

Number of Lanes (N), ln	6	Segment Type	Freeway
Short Length (L_S), ft	1316	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4633	327	0	553
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	18.00	32.00	0.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.847	0.758	1.000	0.962
Flow Rate (v_i), pc/h	5758	454	0	605

Weaving Flow Rate (v_w), pc/h	1059	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	5758	Density-Based Capacity (c_{IWL}), pc/h/ln	2038
Total Flow Rate (v), pc/h	6817	Demand Flow-Based Capacity (c_{IW}), pc/h	15484
Volume Ratio (VR)	0.155	Weaving Segment Capacity (c_W), veh/h	10357
Minimum Lane Change Rate (LC_{MIN}), lc/h	1210	Adjusted Weaving Area Capacity, pc/h	12166
Maximum Weaving Length (L_{MAX}), ft	4081	Volume-to-Capacity Ratio (v/c)	0.56

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	253	Average Weaving Speed (S_W), mi/h	44.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	744	Average Non-Weaving Speed (S_{NW}), mi/h	40.8
Weaving Lane Change Rate (LC_W), lc/h	1773	Average Speed (S), mi/h	41.3
Total Lane Change Rate (LC_{All}), lc/h	2517	Density (D), pc/mi/ln	27.5
Weaving Intensity Factor (W)	0.377	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Amb. Ent. to Clark Exit		

Geometric Data

Number of Lanes (N), ln	6	Segment Type	Freeway
Short Length (L_S), ft	1316	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2047	456	0	337
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	26.00	33.00	0.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.794	0.752	1.000	0.943
Flow Rate (v_i), pc/h	2714	638	0	376

Weaving Flow Rate (v_w), pc/h	1014	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	2714	Density-Based Capacity (c_{IWL}), pc/h/ln	1946
Total Flow Rate (v), pc/h	3728	Demand Flow-Based Capacity (c_{IW}), pc/h	8824
Volume Ratio (VR)	0.272	Weaving Segment Capacity (c_W), veh/h	7006
Minimum Lane Change Rate (LC_{MIN}), lc/h	752	Adjusted Weaving Area Capacity, pc/h	8737
Maximum Weaving Length (L_{MAX}), ft	5285	Volume-to-Capacity Ratio (v/c)	0.43

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	118	Average Weaving Speed (S_W), mi/h	47.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	117	Average Non-Weaving Speed (S_{NW}), mi/h	46.6
Weaving Lane Change Rate (LC_W), lc/h	1314	Average Speed (S), mi/h	46.8
Total Lane Change Rate (LC_{All}), lc/h	1431	Density (D), pc/mi/ln	13.3
Weaving Intensity Factor (W)	0.241	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - From Amb. Ent. to Clark Exit		

Geometric Data

Number of Lanes (N), ln	6	Segment Type	Freeway
Short Length (L_S), ft	1316	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2254	468	0	504
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	12.00	26.00	0.00	0.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.794	1.000	1.000
Flow Rate (v_i), pc/h	2657	620	0	531

Weaving Flow Rate (v_w), pc/h	1151	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	2657	Density-Based Capacity (c_{IWL}), pc/h/ln	1922
Total Flow Rate (v), pc/h	3808	Demand Flow-Based Capacity (c_{IW}), pc/h	7947
Volume Ratio (VR)	0.302	Weaving Segment Capacity (c_W), veh/h	7097
Minimum Lane Change Rate (LC_{MIN}), lc/h	1062	Adjusted Weaving Area Capacity, pc/h	7958
Maximum Weaving Length (L_{MAX}), ft	5605	Volume-to-Capacity Ratio (v/c)	0.48

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	117	Average Weaving Speed (S_W), mi/h	46.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	105	Average Non-Weaving Speed (S_{NW}), mi/h	44.3
Weaving Lane Change Rate (LC_W), lc/h	1625	Average Speed (S), mi/h	44.9
Total Lane Change Rate (LC_{All}), lc/h	1730	Density (D), pc/mi/ln	14.1
Weaving Intensity Factor (W)	0.280	Level of Service (LOS)	B

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Service Dr Ent Ramp N of Grand		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5445	68
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	1.000
Flow Rate (v_i), pc/h	6250	72
Capacity (c), pc/h	11250	2200
Volume-to-Capacity Ratio (v/c)	0.56	0.03

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.284
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1425
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.209	Outer Lanes Freeway Speed (S_O), mi/h	51.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1900	Ramp Junction Speed (S), mi/h	51.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1972	Average Density (D), pc/mi/ln	24.6
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dearborn Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5888	131
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.943
Flow Rate (v_i), pc/h	6693	146
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.76	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	25.0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.343
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2008
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.200	Outer Lanes Freeway Speed (S_O), mi/h	49.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2677	Ramp Junction Speed (S), mi/h	50.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2823	Average Density (D), pc/mi/ln	34.2
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	370
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5337	551
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.971
Flow Rate (v_i), pc/h	6067	597
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.74	0.27

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	26.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.361
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1820
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.143	Outer Lanes Freeway Speed (S_O), mi/h	50.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	2427	Ramp Junction Speed (S), mi/h	50.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3024	Average Density (D), pc/mi/ln	33.2
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5513	553
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.962
Flow Rate (v_i), pc/h	6328	605
Capacity (c), pc/h	11250	1900
Volume-to-Capacity Ratio (v/c)	0.56	0.32

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	26.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.547
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1346
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	47.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	59.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	2686	Ramp Junction Speed (S), mi/h	52.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	23.9
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	775
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	4960	452
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	10.00	1.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.909	0.984
Flow Rate (v_i), pc/h	5744	484
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.69	0.22

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	22.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.299
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1723
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.157	Outer Lanes Freeway Speed (S_O), mi/h	50.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2298	Ramp Junction Speed (S), mi/h	50.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2782	Average Density (D), pc/mi/ln	30.6
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Livernois Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	375
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	5290	362
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	13.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.878
Flow Rate (v_i), pc/h	6072	434
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.72	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	25.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.367
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1822
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.164	Outer Lanes Freeway Speed (S_O), mi/h	50.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	2429	Ramp Junction Speed (S), mi/h	50.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2863	Average Density (D), pc/mi/ln	32.4
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	260
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	5412	122
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	22.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.822
Flow Rate (v_i), pc/h	6212	156
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.69	0.08

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	26.0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.507
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1708
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	57.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2796	Ramp Junction Speed (S), mi/h	53.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	29.2
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	535
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	5652	315
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	17.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.852
Flow Rate (v_i), pc/h	6488	389
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.72	0.20

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	25.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.528
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1720
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	57.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3048	Ramp Junction Speed (S), mi/h	52.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	30.8
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Service Dr Ent Ramp N of Grand		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2830	10
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	1.000
Flow Rate (v_i), pc/h	3785	11
Capacity (c), pc/h	11250	2200
Volume-to-Capacity Ratio (v/c)	0.34	0.01

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	11.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.269
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	886
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.336	Outer Lanes Freeway Speed (S_O), mi/h	53.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	1181	Ramp Junction Speed (S), mi/h	52.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1192	Average Density (D), pc/mi/ln	14.4
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dearborn Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2719	74
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	26.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	0.794
Flow Rate (v_i), pc/h	3637	98
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.42	0.04

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.295
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1091
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.287	Outer Lanes Freeway Speed (S_O), mi/h	52.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	1455	Ramp Junction Speed (S), mi/h	52.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1553	Average Density (D), pc/mi/ln	17.9
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	370
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2379	340
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.901
Flow Rate (v_i), pc/h	3231	397
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.40	0.18

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.301
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	970
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.243	Outer Lanes Freeway Speed (S_O), mi/h	53.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1292	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1689	Average Density (D), pc/mi/ln	17.3
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2840	337
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	0.943
Flow Rate (v_i), pc/h	3799	376
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.42	0.20

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	19.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.527
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	966
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1868	Ramp Junction Speed (S), mi/h	53.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	17.7
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	260
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2614	114
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	26.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.799
Flow Rate (v_i), pc/h	3550	150
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.39	0.08

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.506
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	959
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1632	Ramp Junction Speed (S), mi/h	54.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	16.4
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Livernois Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	375
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2500	239
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	6.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.931
Flow Rate (v_i), pc/h	3396	270
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.41	0.14

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.318
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1019
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.184	Outer Lanes Freeway Speed (S_O), mi/h	53.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	1358	Ramp Junction Speed (S), mi/h	52.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1628	Average Density (D), pc/mi/ln	17.6
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	775
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2503	111
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	3.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.957
Flow Rate (v_i), pc/h	3426	122
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.39	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	12.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.253
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1028
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.360	Outer Lanes Freeway Speed (S_O), mi/h	53.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	1370	Ramp Junction Speed (S), mi/h	52.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1492	Average Density (D), pc/mi/ln	16.9
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	535
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2739	361
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	12.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	0.885
Flow Rate (v_i), pc/h	3663	429
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.41	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.532
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	912
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1839	Ramp Junction Speed (S), mi/h	53.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	17.1
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Service Dr Ent Ramp N of Grand		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3227	0
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	14.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.877	1.000
Flow Rate (v_i), pc/h	3873	0
Capacity (c), pc/h	11250	2200
Volume-to-Capacity Ratio (v/c)	0.34	0.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	11.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.269
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	906
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.337	Outer Lanes Freeway Speed (S_O), mi/h	53.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	1208	Ramp Junction Speed (S), mi/h	52.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1208	Average Density (D), pc/mi/ln	14.7
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dearborn Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2654	107
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	18.00	24.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.847	0.806
Flow Rate (v_i), pc/h	3298	140
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.38	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.294
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	990
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.281	Outer Lanes Freeway Speed (S_O), mi/h	53.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	1319	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1459	Average Density (D), pc/mi/ln	16.4
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	140
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	3227	504
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	14.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.877	1.000
Flow Rate (v_i), pc/h	3873	531
Capacity (c), pc/h	11250	1900
Volume-to-Capacity Ratio (v/c)	0.34	0.28

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	20.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.541
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	943
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1988	Ramp Junction Speed (S), mi/h	53.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	14.5
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	370
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2311	342
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	20.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.971
Flow Rate (v_i), pc/h	2920	371
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.37	0.17

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.298
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	876
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.246	Outer Lanes Freeway Speed (S_O), mi/h	53.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	1168	Ramp Junction Speed (S), mi/h	52.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1539	Average Density (D), pc/mi/ln	15.7
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	260
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2945	258
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	16.00	6.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.931
Flow Rate (v_i), pc/h	3596	292
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.40	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.519
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	932
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1733	Ramp Junction Speed (S), mi/h	53.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	16.7
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Livernois Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	375
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2687	184
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	17.00	0.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	1.000
Flow Rate (v_i), pc/h	3308	194
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.39	0.10

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.316
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	993
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.194	Outer Lanes Freeway Speed (S_O), mi/h	53.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	1323	Ramp Junction Speed (S), mi/h	52.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1517	Average Density (D), pc/mi/ln	16.8
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	775
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2723	222
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	17.00	4.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.948
Flow Rate (v_i), pc/h	3352	247
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.40	0.11

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	13.0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.255
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1006
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.344	Outer Lanes Freeway Speed (S_O), mi/h	53.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	1341	Ramp Junction Speed (S), mi/h	52.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1588	Average Density (D), pc/mi/ln	17.1
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	535
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2870	559
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	16.00	0.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	1.000
Flow Rate (v_i), pc/h	3505	588
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.39	0.31

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	15.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.546
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	823
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	47.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1860	Ramp Junction Speed (S), mi/h	53.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	16.5
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit/Clark Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4960	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1436
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Livernois Ent/Springwells Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5652	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1622
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	29.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ent N. of Grand/Clark Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5513	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1266
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ent N. of Grand/Clark Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5412	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1553
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.69
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	28.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5337	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1517
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent/Grand Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5118	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1454
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit/Livernois Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5290	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1518
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Ent/Dearborn Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6019	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1710
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	31.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ambsssador Entry/Grand Entry		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5445	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1250
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit/Clark Entry		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2503	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	856
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.38
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	15.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Livernois Ent/Springwells Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2739	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	916
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.41
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ent N. of Grand/Clark Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2840	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	760
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2379	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	808
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Entry/Grand Entry		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2374	Heavy Vehicle Adjustment Factor (f_{HV})	0.794
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	787
Total Trucks, %	26.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	14.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ambassador Ent./Grand Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2830	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	757
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit/Livernois Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2500	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	849
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.38
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Ent/Dragoon Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2614	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	888
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Ent/Dearborn Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2719	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	909
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.40
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Exit/Clark Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2723	Heavy Vehicle Adjustment Factor (f_{HV})	0.855
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	838
Total Trucks, %	17.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Livernois Ent/Springwells Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2870	Heavy Vehicle Adjustment Factor (f_{HV})	0.862
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	876
Total Trucks, %	16.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Clark Ent/Dragoon Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2945	Heavy Vehicle Adjustment Factor (f_{HV})	0.862
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	899
Total Trucks, %	16.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.40
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ent N. of Grand/Clark Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3227	Heavy Vehicle Adjustment Factor (f_{HV})	0.877
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	775
Total Trucks, %	14.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	9/3/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Dragoon Exit/Livernois Entry		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2687	Heavy Vehicle Adjustment Factor (f_{HV})	0.855
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	827
Total Trucks, %	17.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Ambassador Ent./Grand Ent.		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3227	Heavy Vehicle Adjustment Factor (f_{HV})	0.877
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	775
Total Trucks, %	14.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent/Grand Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2758	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	813
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Ent/Dearborn Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2654	Heavy Vehicle Adjustment Factor (f_{HV})	0.847
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	824
Total Trucks, %	18.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2311	Heavy Vehicle Adjustment Factor (f_{HV})	0.833
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	730
Total Trucks, %	20.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Clark Ent. to Grand Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1251	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2517	402	0	786
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	20.00	1.00	0.00	46.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.990	1.000	0.685
Flow Rate (v_i), pc/h	3181	427	0	1208

Weaving Flow Rate (v_w), pc/h	1635	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	3181	Density-Based Capacity (c_{IWL}), pc/h/ln	2006
Total Flow Rate (v), pc/h	4816	Demand Flow-Based Capacity (c_{IW}), pc/h	10324
Volume Ratio (VR)	0.339	Weaving Segment Capacity (c_W), veh/h	8355
Minimum Lane Change Rate (LC_{MIN}), lc/h	2416	Adjusted Weaving Area Capacity, pc/h	10317
Maximum Weaving Length (L_{MAX}), ft	4440	Volume-to-Capacity Ratio (v/c)	0.47

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	131	Average Weaving Speed (S_W), mi/h	42.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	370	Average Non-Weaving Speed (S_{NW}), mi/h	33.0
Weaving Lane Change Rate (LC_W), lc/h	2794	Average Speed (S), mi/h	35.6
Total Lane Change Rate (LC_{All}), lc/h	3164	Density (D), pc/mi/ln	27.1
Weaving Intensity Factor (W)	0.470	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Clark Ent. to Grand Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1251	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	1948	291	0	439
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	30.00	7.00	0.00	43.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.935	1.000	0.699
Flow Rate (v_i), pc/h	2666	328	0	661

Weaving Flow Rate (v_w), pc/h	989	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	2666	Density-Based Capacity (c_{IWL}), pc/h/ln	2062
Total Flow Rate (v), pc/h	3655	Demand Flow-Based Capacity (c_{IW}), pc/h	12915
Volume Ratio (VR)	0.271	Weaving Segment Capacity (c_W), veh/h	7928
Minimum Lane Change Rate (LC_{MIN}), lc/h	1322	Adjusted Weaving Area Capacity, pc/h	10279
Maximum Weaving Length (L_{MAX}), ft	3709	Volume-to-Capacity Ratio (v/c)	0.36

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	111	Average Weaving Speed (S_W), mi/h	45.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	264	Average Non-Weaving Speed (S_{NW}), mi/h	42.0
Weaving Lane Change Rate (LC_W), lc/h	1700	Average Speed (S), mi/h	42.8
Total Lane Change Rate (LC_{All}), lc/h	1964	Density (D), pc/mi/ln	17.1
Weaving Intensity Factor (W)	0.323	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - From Clark Ent. to Grand Exit		

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Short Length (L_S), ft	1251	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4838	394	0	220
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	12.00	3.00	0.00	46.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.971	1.000	0.685
Flow Rate (v_i), pc/h	5703	427	0	338

Weaving Flow Rate (v_w), pc/h	765	Freeway Max Capacity (c_{IFL}), pc/h/ln	2250
Non-Weaving Flow Rate (v_{NW}), pc/h	5703	Density-Based Capacity (c_{IWL}), pc/h/ln	2181
Total Flow Rate (v), pc/h	6468	Demand Flow-Based Capacity (c_{IW}), pc/h	29661
Volume Ratio (VR)	0.118	Weaving Segment Capacity (c_W), veh/h	9738
Minimum Lane Change Rate (LC_{MIN}), lc/h	676	Adjusted Weaving Area Capacity, pc/h	10975
Maximum Weaving Length (L_{MAX}), ft	2149	Volume-to-Capacity Ratio (v/c)	0.59

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	238	Average Weaving Speed (S_W), mi/h	45.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	890	Average Non-Weaving Speed (S_{NW}), mi/h	43.9
Weaving Lane Change Rate (LC_W), lc/h	1054	Average Speed (S), mi/h	44.1
Total Lane Change Rate (LC_{All}), lc/h	1944	Density (D), pc/mi/ln	29.3
Weaving Intensity Factor (W)	0.320	Level of Service (LOS)	D

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3303	402
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	20.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.990
Flow Rate (v_i), pc/h	4174	427
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.51	0.19

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	18.0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.288
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1252
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.164	Outer Lanes Freeway Speed (S_O), mi/h	52.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1670	Ramp Junction Speed (S), mi/h	51.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2097	Average Density (D), pc/mi/ln	22.2
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	120
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3064	87
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	20.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.943
Flow Rate (v_i), pc/h	3872	97
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.57	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	25.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.502
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1287
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.659	Outer Lanes Freeway Speed (S_O), mi/h	59.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	2585	Ramp Junction Speed (S), mi/h	51.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	25.0
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	25.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	250
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2977	222
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	21.00	1.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.826	0.984
Flow Rate (v_i), pc/h	3794	237
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.42	0.12

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.579
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1003
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	47.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1788	Ramp Junction Speed (S), mi/h	53.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	17.7
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	300
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	3163	159
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	20.00	1.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.833	0.984
Flow Rate (v_i), pc/h	3997	170
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.44	0.09

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.508
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1079
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	1839	Ramp Junction Speed (S), mi/h	54.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	18.5
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	500
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	3454	151
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	19.00	13.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.840	0.878
Flow Rate (v_i), pc/h	4328	181
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.48	0.10

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.509
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1170
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	59.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1989	Ramp Junction Speed (S), mi/h	53.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	20.1
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dragoon Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	830
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3004	450
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	21.00	7.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.826	0.922
Flow Rate (v_i), pc/h	3828	514
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.48	0.27

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.301
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1149
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.154	Outer Lanes Freeway Speed (S_O), mi/h	52.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1531	Ramp Junction Speed (S), mi/h	51.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2045	Average Density (D), pc/mi/ln	20.9
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	25.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	390
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2755	409
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	22.00	6.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.820	0.931
Flow Rate (v_i), pc/h	3537	462
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.44	0.24

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.327
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1061
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.160	Outer Lanes Freeway Speed (S_O), mi/h	53.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	1415	Ramp Junction Speed (S), mi/h	51.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1877	Average Density (D), pc/mi/ln	19.3
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Grand Blvd Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	235
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	3704	786
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	18.00	46.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.847	0.691
Flow Rate (v_i), pc/h	4603	1197
Capacity (c), pc/h	11250	1900
Volume-to-Capacity Ratio (v/c)	0.41	0.63

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	23.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.601
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	831
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	47.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2481	Ramp Junction Speed (S), mi/h	51.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	17.8
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2387	291
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.935
Flow Rate (v_i), pc/h	3267	328
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.40	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.276
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	980
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.296	Outer Lanes Freeway Speed (S_O), mi/h	53.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1307	Ramp Junction Speed (S), mi/h	52.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1635	Average Density (D), pc/mi/ln	17.2
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	120
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2306	91
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	13.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.885
Flow Rate (v_i), pc/h	3157	108
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.47	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	21.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.503
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	988
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.676	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2169	Ramp Junction Speed (S), mi/h	51.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	20.4
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dragoon Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	830
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2245	250
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	31.00	17.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.763	0.852
Flow Rate (v_i), pc/h	3097	309
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.38	0.16

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	12.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.290
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	929
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.179	Outer Lanes Freeway Speed (S_O), mi/h	53.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	1239	Ramp Junction Speed (S), mi/h	52.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1548	Average Density (D), pc/mi/ln	16.2
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Grand Blvd Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	235
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	2678	439
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	27.00	43.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.787	0.706
Flow Rate (v_i), pc/h	3582	655
Capacity (c), pc/h	11250	1900
Volume-to-Capacity Ratio (v/c)	0.32	0.34

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	18.7
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.552
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	826
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	47.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1931	Ramp Junction Speed (S), mi/h	52.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	13.6
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	25.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	250
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2215	167
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	7.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.922
Flow Rate (v_i), pc/h	3032	191
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.34	0.10

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.575
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	801
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	47.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1430	Ramp Junction Speed (S), mi/h	53.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	14.2
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	300
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2375	130
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	30.00	16.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.769	0.859
Flow Rate (v_i), pc/h	3251	159
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.36	0.08

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.507
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	872
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1507	Ramp Junction Speed (S), mi/h	54.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	15.0
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	25.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	390
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2048	326
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	32.00	15.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.758	0.865
Flow Rate (v_i), pc/h	2844	397
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.36	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.320
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	853
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.168	Outer Lanes Freeway Speed (S_O), mi/h	53.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	1138	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1535	Average Density (D), pc/mi/ln	15.5
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	500
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2495	108
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	15.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.865
Flow Rate (v_i), pc/h	3389	131
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.38	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	13.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.505
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	919
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1551	Ramp Junction Speed (S), mi/h	54.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	15.6
Level of Service (LOS)	B		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB -		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	590
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5058	394
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.971
Flow Rate (v_i), pc/h	5962	427
Capacity (c), pc/h	9000	2200
Volume-to-Capacity Ratio (v/c)	0.71	0.19

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	23.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.321
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1789
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.164	Outer Lanes Freeway Speed (S_O), mi/h	50.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2385	Ramp Junction Speed (S), mi/h	50.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2812	Average Density (D), pc/mi/ln	31.6
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	120
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	4998	138
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.901
Flow Rate (v_i), pc/h	5891	161
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.87	0.08

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	34.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.507
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2263
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.605	Outer Lanes Freeway Speed (S_O), mi/h	55.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3628	Ramp Junction Speed (S), mi/h	50.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	38.6
Level of Service (LOS)	D		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	300
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	5113	135
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	0.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	1.000
Flow Rate (v_i), pc/h	6027	142
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.67	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	24.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.506
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1660
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	57.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	2708	Ramp Junction Speed (S), mi/h	53.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	28.3
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dragoon Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	830
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	4978	298
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	8.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.914
Flow Rate (v_i), pc/h	5868	343
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.69	0.18

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	21.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.329
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1761
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.175	Outer Lanes Freeway Speed (S_O), mi/h	50.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2347	Ramp Junction Speed (S), mi/h	50.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2690	Average Density (D), pc/mi/ln	30.7
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Grand Blvd Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	5	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	235
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	5451	220
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	46.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.691
Flow Rate (v_i), pc/h	6425	335
Capacity (c), pc/h	11250	1900
Volume-to-Capacity Ratio (v/c)	0.57	0.18

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	24.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.523
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1446
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	58.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2570	Ramp Junction Speed (S), mi/h	53.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	24.2
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	25.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	250
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	4860	219
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	2.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.969
Flow Rate (v_i), pc/h	5729	238
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.64	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	24.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.579
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1549
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	47.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	58.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	2632	Ramp Junction Speed (S), mi/h	52.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	27.2
Level of Service (LOS)	C		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Exit Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	500
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

	Freeway	Ramp
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

	Freeway	Ramp
Demand Volume (V_i), veh/h	5276	219
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	5.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.939
Flow Rate (v_i), pc/h	6219	246
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.69	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	24.3
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.515
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1685
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	57.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2850	Ramp Junction Speed (S), mi/h	53.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	29.3
Level of Service (LOS)	C		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Entrance Ramp		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	25.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	390
Terrain Type	Level	Specific Grade
Percent Grade, %	-	0.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	4641	472
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	13.00	6.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.931
Flow Rate (v_i), pc/h	5520	534
Capacity (c), pc/h	9000	1900
Volume-to-Capacity Ratio (v/c)	0.67	0.28

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	24.2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.362
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1656
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	50.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.151	Outer Lanes Freeway Speed (S_O), mi/h	50.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	2208	Ramp Junction Speed (S), mi/h	50.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2742	Average Density (D), pc/mi/ln	29.9
Level of Service (LOS)	C		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Exit/Clark Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3303	Heavy Vehicle Adjustment Factor (f_{HV})	0.833
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1044
Total Trucks, %	20.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.46
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Ent/Grand Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3704	Heavy Vehicle Adjustment Factor (f_{HV})	0.847
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	921
Total Trucks, %	18.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.41
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dragoon Ent/Clark Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3454	Heavy Vehicle Adjustment Factor (f_{HV})	0.840
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1082
Total Trucks, %	19.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.48
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2755	Heavy Vehicle Adjustment Factor (f_{HV})	0.820
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	884
Total Trucks, %	22.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	16.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Exit/Dragoon Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3004	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	957
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.43
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	17.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Ent/Livernois Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3163	Heavy Vehicle Adjustment Factor (f_{HV})	0.833
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	999
Total Trucks, %	20.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.44
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit/Springwells Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2977	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1265
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PA0)
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Grand Exit/WB I-96 Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2919	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	676
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.30
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Ent/Grand Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2678	Heavy Vehicle Adjustment Factor (f_{HV})	0.787
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	716
Total Trucks, %	27.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Exit/Clark Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2387	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	817
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2048	Heavy Vehicle Adjustment Factor (f_{HV})	0.758
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	711
Total Trucks, %	32.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit/Springwells Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2215	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1011
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.45
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dragoon Ent/Clark Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2495	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	847
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.38
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Ent/Livernois Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2375	Heavy Vehicle Adjustment Factor (f_{HV})	0.769
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	813
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Exit/Dragoon Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2245	Heavy Vehicle Adjustment Factor (f_{HV})	0.763
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	774
Total Trucks, %	31.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Grand Exit/WB I-96 Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2239	Heavy Vehicle Adjustment Factor (f_{HV})	0.806
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	585
Total Trucks, %	24.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.26
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Exit/Clark Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5058	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1490
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.66
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Clark Ent/Grand Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5451	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1285
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dragoon Ent/Clark Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5276	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1555
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.69
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	28.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Ent/Livernois Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5113	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1507
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Grand Exit/WB I-96 Exit		

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5232	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1212
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.54
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	9/3/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Springwells Exit/Spring. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4641	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1380
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.61
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Livernois Exit/Dragoon Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4978	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1467
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 (PAO)
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Dearborn Exit/Springwells Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4860	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1910
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	54.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	34.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - Amb. Ent. / Michigan Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1623	Heavy Vehicle Adjustment Factor (f_{HV})	0.870
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	982
Total Trucks, %	15.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.44
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - I-75 Split/Amb. Ent. (2-lanes)		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1055	Heavy Vehicle Adjustment Factor (f_{HV})	0.870
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	638
Total Trucks, %	15.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.28
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Michigan Exit / Amb. Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2024	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1150
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.51
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	20.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/19/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	2	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2024	268
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.935
Flow Rate (v_i), pc/h	2301	302
Capacity (c), pc/h	4500	2000
Volume-to-Capacity Ratio (v/c)	0.51	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.455
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	2301	Ramp Junction Speed (S), mi/h	49.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	23.4
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent. / Amb. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5118	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1454
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.4
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - C-D Road Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3736	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1402
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.62
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Amb. Exit / EB I-96 Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3363	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1262
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/19/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	785
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	5118	327
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	32.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.758
Flow Rate (v_i), pc/h	5818	454
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.86	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	28.5
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.469
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2178
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.594	Outer Lanes Freeway Speed (S_O), mi/h	55.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	3640	Ramp Junction Speed (S), mi/h	51.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	37.9
Level of Service (LOS)	D		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Amb. Ent./C-D Road Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1865	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	700
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-75 NB S.D. Exit/Amb. Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1706	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	646
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-96 WB Exit/I-75 NB S.D. Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1739	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	494
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.22
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp from Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	870
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1055	568
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	15.00	14.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.877
Flow Rate (v_i), pc/h	1276	682
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.29	0.34

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	11.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.277
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	508
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.602	Outer Lanes Freeway Speed (S_O), mi/h	55.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	768	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1450	Average Density (D), pc/mi/ln	12.5
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	PM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp to NB I-75 S.D.		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1000
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1739	33
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	8.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.926	0.917
Flow Rate (v_i), pc/h	1977	38
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.29	0.02

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	7.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.431
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	564
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.709	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1413	Ramp Junction Speed (S), mi/h	52.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.6
Level of Service (LOS)	A		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 WB - Amb. Ent. / Michigan Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1255	Heavy Vehicle Adjustment Factor (f_{HV})	0.794
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	832
Total Trucks, %	26.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 WB - I-75 Split/Amb. Ent. (2-lanes)		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	820	Heavy Vehicle Adjustment Factor (f_{HV})	0.775
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	557
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.25
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	10.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Michigan Exit / Amb. Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1183	Heavy Vehicle Adjustment Factor (f_{HV})	0.741
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	840
Total Trucks, %	35.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/19/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	2	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1183	335
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	35.00	33.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.741	0.752
Flow Rate (v_i), pc/h	1681	469
Capacity (c), pc/h	4500	2000
Volume-to-Capacity Ratio (v/c)	0.37	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	11.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.470
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	1681	Ramp Junction Speed (S), mi/h	48.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	17.2
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent. / Amb. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2374	Heavy Vehicle Adjustment Factor (f_{HV})	0.794
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	787
Total Trucks, %	26.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Amb. Exit / EB I-96 Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1526	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	648
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - C-D Road Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1651	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	701
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.7
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/19/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	785
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2374	456
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	26.00	33.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.794	0.752
Flow Rate (v_i), pc/h	3147	638
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.47	0.32

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.7
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.485
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	873
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.652	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2274	Ramp Junction Speed (S), mi/h	51.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	20.4
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Amb. Ent./C-D Road Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1579	Heavy Vehicle Adjustment Factor (f_{HV})	0.840
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	660
Total Trucks, %	19.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-75 NB S.D. Exit/Amb. Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1419	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	603
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.27
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-96 WB Exit/I-75 NB S.D. Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1419	Heavy Vehicle Adjustment Factor (f_{HV})	0.826
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	452
Total Trucks, %	21.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.20
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	8.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp from Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	870
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	820	435
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	29.00	20.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.833
Flow Rate (v_i), pc/h	1114	550
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.25	0.28

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	9.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.273
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	443
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.602	Outer Lanes Freeway Speed (S_O), mi/h	55.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	671	Ramp Junction Speed (S), mi/h	52.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1221	Average Density (D), pc/mi/ln	10.6
Level of Service (LOS)	A		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	Midday Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp to NB I-75 S.D.		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1000
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1419	0
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	21.00	0.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.826	1.000
Flow Rate (v_i), pc/h	1808	0
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.27	0.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	6.4
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.428
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	515
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.715	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	1293	Ramp Junction Speed (S), mi/h	52.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	11.6
Level of Service (LOS)	A		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - Amb. Ent. / Michigan Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2310	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1374
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.61
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 WB - I-75 Split/Amb. Ent. (2-lanes)		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1783	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1060
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.47
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.3
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Michigan Exit / Amb. Exit		

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1214	Heavy Vehicle Adjustment Factor (f_{HV})	0.800
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	798
Total Trucks, %	25.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.5
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/19/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-96 EB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	2	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1214	184
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	25.00	34.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.800	0.746
Flow Rate (v_i), pc/h	1597	260
Capacity (c), pc/h	4500	2000
Volume-to-Capacity Ratio (v/c)	0.35	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	11.1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.451
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	1597	Ramp Junction Speed (S), mi/h	49.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	16.3
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Amb. Exit / EB I-96 Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1728	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	637
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.28
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.6
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2019
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - C-D Road Ent. / Amb. Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	1797	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	669
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.30
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - EB I-96 Ent. / Amb. Ent.		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2758	Heavy Vehicle Adjustment Factor (f_{HV})	0.893
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	813
Total Trucks, %	12.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.8
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/19/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 SB - Exit Ramp to Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	785
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2758	344
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	12.00	26.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.893	0.794
Flow Rate (v_i), pc/h	3251	456
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.48	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	16.9
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.469
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	956
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	48.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.658	Outer Lanes Freeway Speed (S_O), mi/h	60.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2295	Ramp Junction Speed (S), mi/h	51.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	20.9
Level of Service (LOS)	B		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Amb. Ent./C-D Road Exit		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3805	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1442
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-75 NB S.D. Exit/Amb. Ent.		

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3435	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1314
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Basic Freeway Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - I-96 WB Exit/I-75 NB S.D. Exit		

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	55.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	55.0
Right-Side Lateral Clearance, ft	6		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3449	Heavy Vehicle Adjustment Factor (f_{HV})	0.917
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	990
Total Trucks, %	9.00	Capacity (c), pc/h/ln	2250
Single-Unit Trucks (SUT), %	-	Adjusted Cpacity (c_{adj}), pc/h/ln	2250
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.44
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.0
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	55.0		

HCS7 Freeway Merge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Entrance Ramp from Ambassador		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	870
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	1783	527
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	13.00	12.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.893
Flow Rate (v_i), pc/h	2121	621
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.41	0.31

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	14.6
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.286
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	844
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	51.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.602	Outer Lanes Freeway Speed (S_O), mi/h	53.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1277	Ramp Junction Speed (S), mi/h	52.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1898	Average Density (D), pc/mi/ln	17.6
Level of Service (LOS)	B		

HCS7 Freeway Diverge Report

Project Information

Analyst	WSP	Date	3/9/2018
Agency	WSP	Analysis Year	2040 No Build
Jurisdiction	MDOT	Time Period Analyzed	AM Peak
Project Description	Detroit River International Crossing Project - I-75 NB - Exit Ramp to NB I-75 S.D.		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	1000
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3449	14
Peak Hour Factor (PHF)	0.95	0.95
Total Trucks, %	9.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.917	0.917
Flow Rate (v_i), pc/h	3959	16
Capacity (c), pc/h	6750	2000
Volume-to-Capacity Ratio (v/c)	0.59	0.01

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	17.8
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.429
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1341
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	49.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.660	Outer Lanes Freeway Speed (S_O), mi/h	59.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	2618	Ramp Junction Speed (S), mi/h	52.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	25.2
Level of Service (LOS)	B		

2040 No Build HCM V6 Calculations

Analysis Type	Location	Peak Hour	V (veh/h)	% Trucks	Speed (mph)	f_{HV}	V_F (pc/h/ln)	D (pc/mi/ln)	LOS	OLD LOS
Major Diverge	NB I-75 / WB I-96 Diverge	AM	5232	10	-	0.952	1157	20.2	C	C
		Midday	2239	24	-	0.893	528	9.2	A	B
		PM	2919	10	-	0.952	645	11.3	B	B
1-Lane Segment	WB I-96 from WB I-96 (2-1 lane) merge to Gateway on-ramp	AM	1783	13	55	0.939	1999	36.3	E	C
		Midday	820	29	55	0.873	988	18.0	B	B
		PM	1055	15	55	0.930	1194	21.7	C	B
1-Lane Segment	EB I-96 from Gateway off-ramp to SB I-75	AM	1030	24	55	0.893	1214	22.1	C	B
		Midday	848	36	55	0.847	1053	19.2	B	A
		PM	1756	8	55	0.962	1922	35.0	D	C

HCM Equations:

$$f_{HV} = \frac{1}{1 + P_T(E_T - 1)}$$

$$V_F = \frac{V}{PHF * N * f_{HV} * f_P}$$

$$D = 0.0175 * V_F \quad \text{(Major Diverge)}$$

$$D = \frac{V_F}{S} \quad \text{(Freeway Segment)}$$

LOS	Density (pc/mi/ln)
A	≤10
B	>10–20
C	>20–28
D	>28–35
E	>35
F	Demand exceeds capacity

Exhibit 14-3
LOS Criteria for Freeway Merge and Diverge Segments

A	10
B	20
C	28
D	35
E	35
F	

Appendix C – HCM+ vs HCM7

HCS+: Ramps and Ramp Junctions Release 5.2

PTG
26777 Central Park Blvd
Southfield, MI 48076

Phone: 248-936-1147 Fax: 248-936-1176
E-mail: catherine.hartner@parsons.com

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/08
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Entrance Ramp E of Springwells
Jurisdiction:	MDOT
Analysis Year:	2035 Hybrid
Description:	Detroit River International Crossing Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4739	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	333	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4739	333		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1247	88		v
Trucks and buses	17	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5412	368	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.650 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 3516 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5780	9600	No
v_{R12}	3884	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 26.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.406	
Space mean speed in ramp influence area,	S_R = 58.6	mph
Space mean speed in outer lanes,	S_O = 68.4	mph
Space mean speed for all vehicles,	S = 61.5	mph

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	CH	Freeway/Dir of Travel	I-75 NB
Agency or Company	PARSONS	Junction	Entrance Ramp E of Springwells
Date Performed	8/15/08	Jurisdiction	MDOT
Analysis Time Period	AM Peak	Analysis Year	2035 Hybrid

Project Description: Detroit River International Crossing Project

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	4	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A	1500	☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	4739	V_D =	veh/h
		Ramp Volume, V_R	333		
		Freeway Free-Flow Speed, S_{FF}	70.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4739	0.95	Level	17	0	0.922	1.00	5412
Ramp	333	0.95	Level	10	0	0.952	1.00	368
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.172 using Equation (Exhibit 13-6)

V_{12} = 930 pc/h

V_3 or V_{av34} = 2241 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 2164 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5780	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2532	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.265 (Exibit 13-11)

S_R = 62.6 mph (Exhibit 13-11)

S_0 = 66.0 mph (Exhibit 13-11)

S = 64.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

Appendix D – VISSIM Results

Entry	Approach	Turn
N-NE	SB	Left 3
N-E	SB	Left 2
N-SE	SB	Left 1
N-S	SB	Through
N-SW	SB	Right 1
N-W	SB	Right 2
N-NW	SB	Right 3
N-N	SB	U-Turn
NE-E	SWB	Left 3
NE-SE	SWB	Left 2
NE-S	SWB	Left 1
NE-SW	SWB	Through
NE-W	SWB	Right 1
NE-NW	SWB	Right 2
NE-N	SWB	Right 3
NE-NE	SWB	U-Turn
E-SE	WB	Left 3
E-S	WB	Left 2
E-SW	WB	Left 1
E-W	WB	Through
E-NW	WB	Right 1
E-N	WB	Right 2
E-NE	WB	Right 3
E-E	WB	U-Turn
SE-S	NWB	Left 3
SE-SW	NWB	Left 2
SE-W	NWB	Left 1
SE-NW	NWB	Through
SE-N	NWB	Right 1
SE-NE	NWB	Right 2
SE-E	NWB	Right 3
SE-SE	NWB	U-Turn
S-SW	NB	Left 3
S-W	NB	Left 2
S-NW	NB	Left 1
S-N	NB	Through
S-NE	NB	Right 1
S-E	NB	Right 2
S-SE	NB	Right 3
S-S	NB	U-Turn
SW-W	NEB	Left 3
SW-NW	NEB	Left 2
SW-N	NEB	Left 1
SW-NE	NEB	Through
SW-E	NEB	Right 1
SW-SE	NEB	Right 2
SW-S	NEB	Right 3
SW-SW	NEB	U-Turn
W-NW	EB	Left 3
W-N	EB	Left 2
W-NE	EB	Left 1
W-E	EB	Through
W-SE	EB	Right 1
W-S	EB	Right 2
W-SW	EB	Right 3
W-W	EB	U-Turn
NW-N	SEB	Left 3
NW-NE	SEB	Left 2
NW-E	SEB	Left 1
NW-SE	SEB	Through

Signalized Intersection LOS

Delay	LOS
10	A
20	B
35	C
55	D
80	E
	F

TWSC Intersection LOS* per lane or approach only

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

AWSC Intersection LOS* per approach and intersection wide

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

RAB Intersection LOS* per approach and intersection wide

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

Turn	Sorted
Left 3	1
Left 2	2
Left 1	3
Through	4
Right 1	5
Right 2	6
Right 3	7

Direction	Sorted
EB	1
WB	2
NB	3
SB	4

NW-S	SEB	Right 1
NW-SW	SEB	Right 2
NW-W	SEB	Right 3
NW-NW	SEB	U-Turn

Entry	Approach	Turn
N-NE	SB	Left 3
N-E	SB	Left 2
N-SE	SB	Left 1
N-S	SB	Through
N-SW	SB	Right 1
N-W	SB	Right 2
N-NW	SB	Right 3
N-N	SB	U-Turn
NE-E	SWB	Left 3
NE-SE	SWB	Left 2
NE-S	SWB	Left 1
NE-SW	SWB	Through
NE-W	SWB	Right 1
NE-NW	SWB	Right 2
NE-N	SWB	Right 3
NE-NE	SWB	U-Turn
E-SE	WB	Left 3
E-S	WB	Left 2
E-SW	WB	Left 1
E-W	WB	Through
E-NW	WB	Right 1
E-N	WB	Right 2
E-NE	WB	Right 3
E-E	WB	U-Turn
SE-S	NWB	Left 3
SE-SW	NWB	Left 2
SE-W	NWB	Left 1
SE-NW	NWB	Through
SE-N	NWB	Right 1
SE-NE	NWB	Right 2
SE-E	NWB	Right 3
SE-SE	NWB	U-Turn
S-SW	NB	Left 3
S-W	NB	Left 2
S-NW	NB	Left 1
S-N	NB	Through
S-NE	NB	Right 1
S-E	NB	Right 2
S-SE	NB	Right 3
S-S	NB	U-Turn
SW-W	NEB	Left 3
SW-NW	NEB	Left 2
SW-N	NEB	Left 1
SW-NE	NEB	Through
SW-E	NEB	Right 1
SW-SE	NEB	Right 2
SW-S	NEB	Right 3
SW-SW	NEB	U-Turn
W-NW	EB	Left 3
W-N	EB	Left 2
W-NE	EB	Left 1
W-E	EB	Through
W-SE	EB	Right 1
W-S	EB	Right 2
W-SW	EB	Right 3
W-W	EB	U-Turn
NW-N	SEB	Left 3
NW-NE	SEB	Left 2
NW-E	SEB	Left 1
NW-SE	SEB	Through

Signalized Intersection LOS

Delay	LOS
10	A
20	B
35	C
55	D
80	E
	F

TWSC Intersection LOS* per lane or approach only

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

AWSC Intersection LOS* per approach and intersection wide

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

RAB Intersection LOS* per approach and intersection wide

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

Turn	Sorted
Left 3	1
Left 2	2
Left 1	3
Through	4
Right 1	5
Right 2	6
Right 3	7

Direction	Sorted
EB	1
WB	2
NB	3
SB	4

NW-S	SEB	Right 1
NW-SW	SEB	Right 2
NW-W	SEB	Right 3
NW-NW	SEB	U-Turn

MOVEMEN	Approach		Movement	VEHDELAY	STOPDELA	QLENMAX	QLEN			
Intersectio	Approach	ApproachS	Movement	Delay (sec)	Delay Stop	Queue Len	Queue Len	LOS	Approach Delay	
1	NWB		Right 2	16.04	12.24	118.92	17.7	B	15.73808	Node 1: Fort at Westend
1	NWB		Right 1	15.72	10.38	118.92	18.24	B	15.73808	Node 2: Fort at Green
1	NWB		Left 2	15.7	10.4	118.92	18.24	B	15.73808	Node 3: Fort at Waterman
1	SWB		Left 2	3.4	1.16	22.68	0.16	A	2.485478	Node 4: Fort at Livernois
1	SWB		Right 3	3.42	0.72	47.5	0.3	A	2.485478	Node 5: Fort at Dragoon
1	SWB		Through	2.06	0.84	27.58	1.04	A	2.485478	Node 6: Fort at Junction
1	SB	4	Right 1	10.76	3.94	193.86	14.08	B	13.51012	Node 7: Fort at Clark
1	SB	4	Left 1	13.8	7.58	169.04	13.18	B	13.51012	Node 8: Fort at Grand Blvd
1	SB	4	Left 3	20.16	11.18	169.04	13.18	C	13.51012	Node 9: NB SD at Grand Blvd
1	NEB		Left 1	15	7.56	99.16	7.28	B	10.91398	Node 10: SB SD at Grand Blvd
1	NEB		Right 2	2.78	0.24	40.76	0.26	A	10.91398	Node 11: ND SD at Clark
1	NEB		Through	7.6	4.74	58.96	3.28	A	10.91398	Node 12: SB SD at Clark
2	NEB		Left 2	24.36	16.88	23.28	0.78	C	16.23044	Node 13: NB SD at Dragoon
2	NEB		Right 2	3.7	0.14	37.74	0.22	A	16.23044	Node 14: SB SD at Dragoon
2	NEB		Through	16.58	12.08	86.76	8.44	B	16.23044	Node 15: NB SD at Livernois
2	SEB		Right 2	18.2	4.06	74.5	2.28	B	22.90529	Node 16: SB SD at Livernois
2	SEB		Left 2	27.52	12.62	50.04	1.86	C	22.90529	Node 17: NB SD at West End
2	SEB		Through	20.68	9.26	50.04	1.86	C	22.90529	Node 18: SB SD at Springwells
2	NWB		Right 2	3.42	0.32	82.26	0.78	A	7.899915	Node 19: Fort at Post
2	NWB		Left 2	9.16	5.7	63.56	1.48	A	7.899915	
2	NWB		Through	13.7	9.5	63.56	1.48	B	7.899915	
2	SWB		Left 2	12.68	5.8	85.5	0.94	B	8.680161	
2	SWB		Right 2	1.64	0.1	0	0	A	8.680161	
2	SWB		Through	9.18	6.1	132.16	10.42	A	8.680161	
3	NEB		Left 2	15.98	10.38	54.94	0.96	B	14.12495	
3	NEB		Right 2	11.6	8.46	17.2	0.22	B	14.12495	
3	NEB		Through	14.02	9.82	122.22	8.98	B	14.12495	
3	SEB		Right 2	25.92	4.22	120.62	0.96	C	28.17984	
3	SEB		Through	38.34	12.04	118.92	2.8	D	28.17984	
3	SEB		Left 2	24.46	11.92	118.92	2.8	C	28.17984	
3	NWB		Right 2	6.14	2.2	105.1	4.02	A	12.45494	
3	NWB		Left 2	14.7	10.6	81.38	4.8	B	12.45494	
3	NWB		Through	14.32	9.64	81.38	4.8	B	12.45494	
3	SWB		Left 2	7.1	4.44	26.46	0.5	A	6.697646	
3	SWB		Right 2	3.4	0.22	60.26	0.66	A	6.697646	
3	SWB		Through	7.04	4.56	132.34	8.16	A	6.697646	
4	NEB		Right 2	8.44	0.74	140.36	7.84	A	11.60304	
4	NEB		Through	11.64	6.3	121.34	9.32	B	11.60304	
4	SEB		Right 2	4.84	0.86	145.22	4.42	A	9.630526	
4	SEB		Left 2	13.98	8.8	122.82	10.12	B	9.630526	
4	SEB		Through	6.96	4.58	122.82	10.12	A	9.630526	
4	SWB		Through	28.32	22.66	158.78	28.74	C	28.74955	
4	SWB		Left 2	33.44	25.06	80.86	4.28	C	28.74955	
5	NEB		Left 2	11.12	4.78	164.04	4.56	B	4.690729	
5	NEB		Through	2.16	1.14	157.86	4.18	A	4.690729	
5	SWB		Right 2	6.46	0.22	60.56	0.22	A	8.094878	
5	SWB		Through	9.1	3.56	133.96	7.18	A	8.094878	
5	NWB		Right 2	5	0.78	113.56	9.38	A	12.30504	
5	NWB		Left 2	13.4	10.02	102.46	8.96	B	12.30504	
5	NWB		Through	12.8	9.26	102.46	8.96	B	12.30504	
6	NEB		Left 2	17.12	8.68	73.94	2.66	B	12.30832	
6	NEB		Right 2	4.44	0.18	21.3	0.06	A	12.30832	
6	NEB		Through	10.98	5.14	88.8	5.48	B	12.30832	
6	SWB		Right 2	3.42	0.14	60.92	0.82	A	9.507143	
6	SWB		Left 2	0.94	0.02	11.46	0	A	9.507143	
6	SWB		Through	10.78	5.46	166.36	15.66	B	9.507143	
6	NWB		Right 2	8.06	5.62	26.36	0.3	A	8.923237	
6	NWB		Through	8.84	5.4	51.92	1.48	A	8.923237	
6	NWB		Left 2	11.14	7.94	51.92	1.48	B	8.923237	

6	SEB	Right 2	18.04	2.12	35.32	0.34	B	21.55787
6	SEB	Through	22.44	7.52	56.74	2.5	C	21.55787
6	SEB	Left 2	27.32	10.56	56.74	2.5	C	21.55787
7	SWB	Right 2	19.04	12.5	104.66	5.8	B	19.22397
7	SWB	Left 2	20.56	12.62	133.3	8	C	19.22397
7	SWB	Through	18.94	12.26	203.18	27.42	B	19.22397
7	SEB	Right 2	18.16	12.8	165.66	17.94	B	19.54197
7	SEB	Left 2	21.96	14.1	165.66	17.94	C	19.54197
7	SEB	Through	17.2	11.82	165.66	17.94	B	19.54197
7	NEB	Right 2	4.04	0.16	35.42	0.06	A	7.444139
7	NEB	Left 2	15.9	10.24	57.46	0.54	B	7.444139
7	NEB	Through	6.98	4.1	89.78	4.54	A	7.444139
7	NWB	Right 2	4.82	0.18	100.12	2.54	A	12.08406
7	NWB	Through	18.36	14.24	66.74	4.94	B	12.08406
7	NWB	Left 2	11.6	7.62	66.74	4.94	B	12.08406
8	NWB	Right 2	30.9	27.92	54.38	1.24	C	22.98333
8	NWB	Through	23.9	19.72	54.38	1.24	C	22.98333
8	NWB	Left 2	21.4	16.72	54.38	1.24	C	22.98333
8	SEB	Right 2	4.72	0.56	54.38	0.58	A	18.43866
8	SEB	Left 2	28.14	23.76	44.1	2.3	C	18.43866
8	SEB	Through	32.42	27.9	44.1	2.3	C	18.43866
8	SWB	Right 2	6.3	3.36	130.64	9.18	A	4.938153
8	SWB	Left 2	9.5	4.72	130.64	9.18	A	4.938153
8	SWB	Through	4.82	2.76	130.64	9.18	A	4.938153
8	NEB	Right 2	1.52	0.06	115.1	0.24	A	3.021889
8	NEB	Left 2	4.02	1.68	38.36	0.18	A	3.021889
8	NEB	Through	2.98	2.04	68.38	2.96	A	3.021889
9	NEB	Right 2	2.68	0.34	66.28	0.4	A	8.522222
9	NEB	Through	10.06	6.32	42.4	1.56	B	8.522222
9	NEB	Left 2	10.02	6.44	42.4	1.56	B	8.522222
9	NWB	Right 2	3.84	0.36	94.62	3.9	A	8.141343
9	NWB	Through	10.18	7.34	59.64	1.68	B	8.141343
9	SEB	Left 2	16.24	10.06	57.4	3.36	B	16.18974
9	SEB	Through	16.1	10.46	57.4	3.36	B	16.18974
10	NWB	Left 2	14.04	9.52	55.74	3.08	B	13.57888
10	NWB	Through	13.2	9.18	55.74	3.08	B	13.57888
10	SWB	Right 2	2.86	0.1	74.24	1.38	A	3.734299
10	SWB	Through	7.34	4.28	46.68	0.52	A	3.734299
10	SWB	Left 2	8.22	5.1	46.68	0.52	A	3.734299
10	SEB	Right 2	4.48	0.86	88.52	2.38	A	8.375792
10	SEB	Through	12.48	9.52	54.72	2.84	B	8.375792
10	NEB	Right 2	0	0	0	0	A	
11	NWB	Right 2	3.08	0.12	87.34	1.3	A	7.175746
11	NWB	Through	10.04	6.82	54	2.6	B	7.175746
11	SEB	Through	5.58	2	123.22	5.18	A	5.966133
11	SEB	Left 2	6.56	2.36	123.22	5.18	A	5.966133
11	NEB	Right 2	20.1	9.68	157.98	37.68	C	30.65697
11	NEB	Through	32.68	22.68	138.2	27.68	C	30.65697
11	NEB	Left 2	32.98	23.76	138.2	27.68	C	30.65697
12	NWB	Through	8.58	4.48	104.44	4.86	A	9.388178
12	NWB	Left 2	11.5	6.2	104.44	4.86	B	9.388178
12	SWB	Right 2	15.88	7.06	297.92	58.02	B	28.53898
12	SWB	Left 2	34.24	24.52	271.8	51.84	C	28.53898
12	SWB	Through	32.64	23.3	271.8	51.84	C	28.53898
12	SEB	Right 2	4.68	0.2	170.88	15	A	9.428746
12	SEB	Through	15.46	10.82	150.3	11.96	B	9.428746
13	NEB	Left 2	14.46	9.92	154.64	21.4	B	13.98664
13	NEB	Through	13.7	9.5	154.64	21.4	B	13.98664
13	NWB	Right 2	8.34	3.66	244.56	11.3	A	10.34233
13	NWB	Through	11.5	7.14	91.9	13.56	B	10.34233
14	NWB	Through	8.64	5.16	190.58	23.88	A	11.74398

14	NWB		Left 2	18.82	12.24	190.58	23.88	B	11.74398
14	SWB		Right 2	12.26	2.18	157.3	13.5	B	16.87882
14	SWB		Through	20.18	10.14	141.66	13.42	C	16.87882
15	SEB		Through	5.48	2.14	122.02	5.3	A	5.541961
15	SEB		Left 2	5.64	2.08	122.02	5.3	A	5.541961
15	NEB		Right 2	12.3	3.52	153.88	18.72	B	19.77668
15	NEB		Through	21.44	11.58	137.38	18.62	C	19.77668
16	SEB		Right 2	7.38	1.82	121.02	6.76	A	8.453145
16	SEB		Through	9.5	5.74	121.02	6.76	A	8.453145
16	SWB		Through	10	6.02	146.76	14.76	A	9.610053
16	SWB		Left 2	8.82	5.82	146.76	14.76	A	9.610053
17	SB	4	Left 3	17.74	7.22	202.36	23.28	B	15.41463
17	SB	4	Through	13.58	6.34	202.36	23.28	B	15.41463
17	NB	3	Right 1	14.26	8.1	211.2	28.58	B	17.02023
17	NB	3	Through	19.84	14.68	70.22	7.22	B	17.02023
17	EB	1	Right 2	9.42	0.3	68	0.64	A	21.43991
17	EB	1	Left 1	25.56	11.66	148.72	17.96	C	21.43991
17	EB	1	Left 2	22.12	11.86	148.72	17.96	C	21.43991
18	NB	3	Left 1	3.6	2.28	99.04	10.3	A	5.351662
18	NB	3	Left 3	12.52	8.86	99.04	10.3	B	5.351662
18	WB	2	Right 1	15.4	3.5	288.42	35.78	B	22.40713
18	WB	2	Left 2	25.42	13.06	80.04	18.04	C	22.40713
18	WB	2	Left 1	29.36	16.58	80.04	18.04	C	22.40713
18	SEB		Right 2	5.84	0.22	58.86	0.22	A	11.06443
18	SEB		Right 1	17.28	12.3	158.72	16.78	B	11.06443
19	NEB		Right 2	0.12	0	0	0	A	0.02071
19	NEB		Through	0.02	0	0	0	A	0.02071
19	SWB		Left 2	0.5	0	4	0	A	0.382152
19	SWB		Through	0.38	0.02	0	0	A	0.382152
19	NWB		Right 2	7.1	3.1	30.4	0.56	A	7.224878
19	NWB		Left 2	7.42	2.84	30.4	0.56	A	7.224878

MOVEMEN	Approach		Movement	VEHDELAY(	STOPDELA\	QLENMAX	QLEN				
Intersectio	Approach	ApproachS	Movement	Delay (sec)	Delay Stop	Queue Len	Queue Len	LOS	Type	Approach Delay	
1	SB	4	Right 1	8.3	3.48	178.9	14	A	Signal	12.03004	Node 1: Fort at Wester
1	SB	4	Through	12.0	6.2	154.8	14.88	B	Signal	12.03004	Node 2: Fort at Green
1	SB	4	Left 3	14.0	6.88	154.8	14.88	B	Signal	12.03004	Node 3: Fort at Waterr
1	SWB		Left 1	5.6	2.22	51.54	0.62	A	Signal	3.810741	Node 4: Fort at Livernc
1	SWB		Right 3	2.0	0.06	74.98	0.38	A	Signal	3.810741	Node 6: Fort at Junctio
1	SWB		Through	3.9	1.96	67.36	1.4	A	Signal	3.810741	Node 7: Fort at Clark
1	NB	3	Right 1	15.1	9.76	146.28	11.6	B	Signal	14.58425	Node 8: Fort at Grand
1	NB	3	Through	14.4	10.44	146.28	11.6	B	Signal	14.58425	Node 9: NB SD at Gran
1	NB	3	Left 3	16.4	11.72	146.28	11.6	B	Signal	14.58425	Node 10: SB SD at Grar
1	NEB		Left 1	8.8	4.48	112.6	3.28	A	Signal	8.48382	Node 11: ND SD at Clar
1	NEB		Right 3	4.2	0.3	69.86	0.58	A	Signal	8.48382	Node 12: SB SD at Clar
1	NEB		Through	8.9	5.1	110.92	4.76	A	Signal	8.48382	Node 15: NB SD at Live
2	SEB		Right 2	35.6	7.92	134.06	8.7	D	Signal	33.28631	Node 16: SB SD at Live
2	SEB		Left 2	31.6	11.52	113.5	6.08	C	Signal	33.28631	Node 17: NB SD at Wes
2	SEB		Through	33.5	12.16	113.5	6.08	C	Signal	33.28631	Node 18: SB SD at Spri
2	NWB		Right 2	4.0	0.6	77.02	0.92	A	Signal	6.565909	Node 19: SB SD at Drag
2	NWB		Left 2	8.0	5.24	58.28	1.12	A	Signal	6.565909	Node 20: Fort at Post
2	NWB		Through	9.9	6.18	58.28	1.12	A	Signal	6.565909	
2	SWB		Left 2	19.3	12.44	83.82	2.16	B	Signal	14.00827	
2	SWB		Right 2	1.8	0.08	0	0	A	Signal	14.00827	
2	SWB		Through	13.4	9.52	73.28	5.44	B	Signal	14.00827	
2	NEB		Left 2	8.1	4.16	26.66	0.22	A	Signal	6.677447	
2	NEB		Right 2	2.8	0.12	80.04	0.84	A	Signal	6.677447	
2	NEB		Through	7.5	4.76	85.14	6.12	A	Signal	6.677447	
3	NEB		Left 2	18.6	8.62	68.4	1.2	B	Signal	16.03213	
3	NEB		Right 2	13.8	9.78	34.8	0.52	B	Signal	16.03213	
3	NEB		Through	16.0	9.42	131.44	9.96	B	Signal	16.03213	
3	SEB		Right 2	17.2	3.38	98.04	1.46	B	Signal	19.0877	
3	SEB		Through	22.6	6.9	70.52	0.52	C	Signal	19.0877	
3	SEB		Left 2	20.9	8.52	70.52	0.52	C	Signal	19.0877	
3	NWB		Right 2	4.1	0.3	44.64	0.14	A	Signal	6.55	
3	NWB		Left 2	12.9	10.12	17.5	0.14	B	Signal	6.55	
3	NWB		Through	5.3	2.52	17.5	0.14	A	Signal	6.55	
3	SWB		Left 2	9.3	6.04	27.62	0.62	A	Signal	6.387157	
3	SWB		Right 2	1.7	0.08	49.5	0.18	A	Signal	6.387157	
3	SWB		Through	6.4	4.36	55.6	3.7	A	Signal	6.387157	
4	NWB		Right 2	1.7	0.08	77.92	0.72	A	Signal	5.471892	
4	NWB		Left 2	6.1	3.22	49.14	0.36	A	Signal	5.471892	
4	NWB		Through	4.4	1.36	49.14	0.36	A	Signal	5.471892	
4	NEB		Right 2	9.1	3.34	191.14	12.96	A	Signal	13.75137	
4	NEB		Through	12.9	7.04	166.02	12.48	B	Signal	13.75137	
4	NEB		Left 2	16.9	7.94	166.02	12.48	B	Signal	13.75137	
4	SEB		Right 2	3.0	0.58	134.1	7.86	A	Signal	4.570028	
4	SEB		Left 2	6.9	4.12	110.38	4.06	A	Signal	4.570028	
4	SEB		Through	5.6	3.64	110.38	4.06	A	Signal	4.570028	
4	SWB		Right 2	13.0	7.08	102.42	5.88	B	Signal	11.48545	
4	SWB		Through	10.5	6.64	102.42	5.88	B	Signal	11.48545	
4	SWB		Left 2	13.7	7.66	33.08	0.54	B	Signal	11.48545	
6	NEB		Left 2	30.9	8.94	89.1	3.8	C	Signal	19.15577	
6	NEB		Right 2	19.0	4.9	36.08	0.16	B	Signal	19.15577	
6	NEB		Through	16.7	10.06	128.36	14.3	B	Signal	19.15577	
6	SWB		Right 2	2.7	0.1	47.62	0.08	A	Signal	8.05646	
6	SWB		Left 2	0.0	0	12.72	0	A	Signal	8.05646	
6	SWB		Through	9.9	6	92.52	5.96	A	Signal	8.05646	
6	NWB		Right 2	10.9	8.26	22.86	0.32	B	Signal	10.85064	
6	NWB		Through	11.4	7.44	31.92	0.68	B	Signal	10.85064	
6	NWB		Left 2	7.7	4.86	31.92	0.68	A	Signal	10.85064	
6	SEB		Right 2	2.6	1.62	0	0	A	Signal	3.30743	
6	SEB		Through	9.6	6.68	69.64	3.1	A	Signal	3.30743	

6	SEB	Left 2	26.9	20.28	69.64	3.1	C	Signal	3.30743
7	SWB	Right 2	12.6	8.42	90.34	3.3	B	Signal	11.75315
7	SWB	Left 2	10.2	5.78	69	1.56	B	Signal	11.75315
7	SWB	Through	11.9	6.98	116.98	8.28	B	Signal	11.75315
7	SEB	Right 2	16.4	12.14	146.32	16.16	B	Signal	17.65059
7	SEB	Left 2	18.7	11.86	146.32	16.16	B	Signal	17.65059
7	SEB	Through	17.6	12.48	146.32	16.16	B	Signal	17.65059
7	NEB	Right 2	1.3	0.06	13.28	0	A	Signal	7.154044
7	NEB	Left 2	8.6	5.22	54.88	1.3	A	Signal	7.154044
7	NEB	Through	6.9	4.44	101.08	5.28	A	Signal	7.154044
7	NWB	Right 2	4.5	0.2	133.3	5.28	A	Signal	9.86598
7	NWB	Through	20.8	14.54	126.34	8.76	C	Signal	9.86598
7	NWB	Left 2	0.0	0	126.34	8.76	A	Signal	9.86598
8	NWB	Right 2	19.1	15.2	49.68	0.8	B	Signal	22.9175
8	NWB	Through	4.2	2.92	49.68	0.8	A	Signal	22.9175
8	NWB	Left 2	32.6	27.52	49.68	0.8	C	Signal	22.9175
8	SEB	Right 2	4.6	0.26	70.4	1.08	A	Signal	19.15524
8	SEB	Left 2	25.6	21.06	66.5	4.76	C	Signal	19.15524
8	SEB	Through	19.2	15.72	66.5	4.76	B	Signal	19.15524
8	SWB	Right 2	4.2	1.94	90.52	4.1	A	Signal	4.685532
8	SWB	Left 2	6.4	3.18	90.52	4.1	A	Signal	4.685532
8	SWB	Through	4.7	2.84	90.52	4.1	A	Signal	4.685532
8	NEB	Right 2	3.3	0.56	121.72	0.34	A	Signal	2.2017
8	NEB	Left 2	1.0	0.06	12.06	0	A	Signal	2.2017
8	NEB	Through	2.2	1.22	82.24	3.04	A	Signal	2.2017
9	NEB	Right 2	3.0	0.12	116.62	2.14	A	Signal	9.354633
9	NEB	Through	7.8	3.9	92.24	3.36	A	Signal	9.354633
9	NEB	Left 2	10.9	6.68	92.24	3.36	B	Signal	9.354633
9	NWB	Right 2	3.9	0.38	88.5	2.44	A	Signal	9.88062
9	NWB	Through	12.1	8.88	53.5	1.22	B	Signal	9.88062
9	SEB	Left 2	16.7	9.9	97.5	7.42	B	Signal	16.29088
9	SEB	Through	15.5	9.66	97.5	7.42	B	Signal	16.29088
10	NWB	Left 2	10.3	7.04	60.18	3.58	B	Signal	10.66422
10	NWB	Through	10.8	8.68	60.18	3.58	B	Signal	10.66422
10	SWB	Right 2	3.1	0.1	105.74	3.2	A	Signal	4.403894
10	SWB	Through	8.3	4.36	82.48	2.18	A	Signal	4.403894
10	SWB	Left 2	7.7	4.44	82.48	2.18	A	Signal	4.403894
10	SEB	Right 2	5.4	1.58	105.64	3.84	A	Signal	9.778457
10	SEB	Through	11.9	8.64	72	4.98	B	Signal	9.778457
10	NEB	Right 2	0.0	0	0	0	A	Signal	
11	NEB	Right 2	6.0	0.3	122.94	3.28	A	Signal	21.0433
11	NWB	Right 2	4.0	0.36	161.12	5.18	A	Signal	5.566385
11	NWB	Through	11.2	7.58	128.46	4.68	B	Signal	5.566385
11	SEB	Through	4.6	1.66	94.3	4.74	A	Signal	5.098715
11	SEB	Left 2	5.6	1.92	94.3	4.74	A	Signal	5.098715
11	NEB	Left 2	32.5	23.86	190.28	22.26	C	Signal	21.0433
11	NEB	Through	28.4	21.74	190.28	22.26	C	Signal	21.0433
12	NWB	Through	14.5	6.34	152.12	8.12	B	Signal	12.38105
12	NWB	Left 2	3.0	0.68	152.12	8.12	A	Signal	12.38105
12	SWB	Right 2	17.9	8.64	273.8	55.98	B	Signal	28.68432
12	SWB	Left 2	35.0	26.54	247.68	47.5	C	Signal	28.68432
12	SWB	Through	31.3	23.14	247.68	47.5	C	Signal	28.68432
12	SEB	Right 2	4.4	0.3	219.82	22.96	A	Signal	13.87122
12	SEB	Through	17.3	12	199.28	19.48	B	Signal	13.87122
15	SEB	Through	5.8	2.46	119.68	6.26	A	Signal	6.585321
15	SEB	Left 2	7.2	2.94	119.68	6.26	A	Signal	6.585321
15	NWB	Right 2	2.5	0.96	136.92	3.76	A	Signal	6.01942
15	NWB	Through	8.1	3	123.9	3.7	A	Signal	6.01942
15	NEB	Left 2	0.0	0	42.52	0.18	A	Signal	8.859007
15	NEB	Right 2	5.5	0.48	117.5	4.88	A	Signal	8.859007
15	NEB	Left 2	11.9	5.62	95.76	5.84	B	Signal	8.859007

15	NEB		Through	10.5	5.28	95.76	5.84	B	Signal	8.859007
16	SEB		Right 2	7.6	2.42	119.98	3.92	A	Signal	9.36817
16	SEB		Through	9.6	5.7	107.88	6.96	A	Signal	9.36817
16	SWB		Right 2	0.0	0	69.08	0.44	A	Signal	4.8224
16	SWB		Left 2	5.0	2.86	57.38	1.26	A	Signal	4.8224
16	SWB		Through	3.8	2.72	57.38	1.26	A	Signal	4.8224
16	NWB		Left 2	19.1	9.18	128.28	9.56	B	Signal	13.47303
16	NWB		Through	10.3	5.38	128.28	9.56	B	Signal	13.47303
16	NWB		Left 2	0.0	0	0	0	A	Signal	13.47303
17	SEB		Left 2	16.2	7.08	194.22	28.72	B	Signal	14.37522
17	SEB		Through	13.1	5.94	194.22	28.72	B	Signal	14.37522
17	NWB		Right 2	8.2	3.38	111.86	6.84	A	Signal	11.83175
17	NWB		Through	16.6	12.58	69.46	5.58	B	Signal	11.83175
17	NEB		Right 2	14.5	1.2	85.42	1.18	B	Signal	22.48025
17	NEB		Through	24.5	10.22	219.76	21.2	C	Signal	22.48025
17	NEB		Left 2	22.9	10.9	219.76	21.2	C	Signal	22.48025
18	NWB		Through	0.8	0.42	72.7	2.54	A	Signal	2.38151
18	NWB		Left 2	9.1	5.54	72.7	2.54	A	Signal	2.38151
18	WB	2	Right 1	25.8	7.28	367.22	52.62	C	Signal	32.7409
18	WB	2	Left 3	34.2	15.12	76.3	14.22	C	Signal	32.7409
18	WB	2	Left 1	39.6	18.3	76.3	14.22	D	Signal	32.7409
18	SEB		Right 2	6.6	0.72	144.94	1.18	A	Signal	15.20045
18	SEB		Through	20.1	13.58	170.56	29.84	C	Signal	15.20045
19	SWB		Right 2	0.0	0	0	0	A	Signal	0
19	SWB		Through	0.0	0	0	0	A	Signal	0
20	NEB		Right 2	0.0	0	0	0	A	Signal	0
20	NEB		Through	0.0	0	0	0	A	Signal	0
20	SWB		Left 2	2.1	0.42	32.9	0.22	A	Signal	0.461685
20	SWB		Through	0.1	0	0	0	A	Signal	0.461685
20	NWB		Right 2	6.4	3.42	18.46	0.06	A	Signal	5.505714
20	NWB		Left 2	3.2	1.48	18.46	0.06	A	Signal	5.505714

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MOVEMEN	Approach		Movement	VEHDELAY(	STOPDELA\	QLENMAX	QLEN				
Intersectio	Approach	ApproachS	Movement	Delay (sec)	Delay Stop	Queue Len	Queue Len	LOS	Type	Approach Delay	
1	SB	4	Right 1	7.22	1.94	166.86	9.6	A	Signal	11.10486	Node 1: Fort at Wester
1	SB	4	Through	11.1	5.1	142.62	9.44	B	Signal	11.10486	Node 2: Fort at Green
1	SB	4	Left 3	15.64	7.64	142.62	9.44	B	Signal	11.10486	Node 3: Fort at Waterr
1	NB	3	Through	13.92	9.12	135.82	15.88	B	Signal	14.04498	Node 4: Fort at Livernc
1	NB	3	Left 3	14.12	9.14	135.82	15.88	B	Signal	14.04498	Node 6: Fort at Junctio
1	NB	3	Right 1	15.42	11.52	135.82	15.88	B	Signal	14.04498	Node 7: Fort at Clark
1	SWB		Left 1	6.88	2.7	29.32	0.28	A	Signal	5.863407	Node 8: Fort at Grand
1	SWB		Right 3	3.96	0.32	72.14	0.8	A	Signal	5.863407	Node 9: NB SD at Gran
1	SWB		Through	6.48	2.04	68.68	2.2	A	Signal	5.863407	Node 10: SB SD at Grar
1	NEB		Left 1	11.26	5.08	121.16	4.4	B	Signal	9.805083	Node 11: ND SD at Clar
1	NEB		Right 3	8.32	4.96	41.28	0.4	A	Signal	9.805083	Node 12: SB SD at Clar
1	NEB		Through	8.68	5.06	82.34	3.28	A	Signal	9.805083	Node 15: NB SD at Live
2	SEB		Right 2	42.42	16.44	117.58	4.74	D	Signal	38.75578	Node 16: SB SD at Live
2	SEB		Left 2	41.8	19.08	93.08	3.78	D	Signal	38.75578	Node 17: NB SD at Wes
2	SEB		Through	33.54	11.86	93.08	3.78	C	Signal	38.75578	Node 18: SB SD at Spri
2	NWB		Right 2	4.62	1.16	139.66	3.3	A	Signal	9.169565	Node 19: SB SD at Drag
2	NWB		Left 2	11.22	7.04	121.28	4.72	B	Signal	9.169565	Node 20: Fort at Post
2	NWB		Through	11.46	6.32	121.28	4.72	B	Signal	9.169565	
2	SWB		Left 2	19.44	13.04	68.48	1.96	B	Signal	17.90782	
2	SWB		Right 2	3.72	0.2	0	0	A	Signal	17.90782	
2	SWB		Through	19.38	13.7	106.24	11.92	B	Signal	17.90782	
2	NEB		Left 2	4.6	2.12	21.5	0.04	A	Signal	6.670734	
2	NEB		Right 2	2.28	0.08	60.58	0.18	A	Signal	6.670734	
2	NEB		Through	7.18	4.2	76.74	4.08	A	Signal	6.670734	
3	NEB		Left 2	0	0	0	0	A	Signal	13.48464	
3	NEB		Right 2	14.82	11.08	31.64	0.52	B	Signal	13.48464	
3	NEB		Through	13.42	7.72	114.88	7.94	B	Signal	13.48464	
3	SEB		Right 2	39.98	18.06	97.78	0.78	D	Signal	27.8164	
3	SEB		Through	29.9	8.84	74.3	2.72	C	Signal	27.8164	
3	SEB		Left 2	25.12	12.52	74.3	2.72	C	Signal	27.8164	
3	NWB		Right 2	7.7	1.2	96.78	1.02	A	Signal	13.39235	
3	NWB		Left 2	18.46	12.26	111.9	2.8	B	Signal	13.39235	
3	NWB		Through	18.66	11.88	111.9	2.8	B	Signal	13.39235	
3	SWB		Left 2	13.28	8.24	40.7	1.08	B	Signal	9.645731	
3	SWB		Right 2	1.58	0.1	43.5	0.2	A	Signal	9.645731	
3	SWB		Through	9.8	6.32	98.34	6.54	A	Signal	9.645731	
4	NWB		Right 2	5.02	0.2	150.76	5.8	A	Signal	11.82229	
4	NWB		Left 2	15.2	9.68	122	3.74	B	Signal	11.82229	
4	NWB		Through	11.64	7.16	122	3.74	B	Signal	11.82229	
4	NEB		Right 2	9.28	6.24	209.62	25.18	A	Signal	26.17231	
4	NEB		Through	23.26	18.7	189.92	25.32	C	Signal	26.17231	
4	NEB		Left 2	32.7	22.44	189.92	25.32	C	Signal	26.17231	
4	SEB		Right 2	2.86	0.78	227.34	10.08	A	Signal	3.153963	
4	SEB		Left 2	3.86	1.88	203.64	7.06	A	Signal	3.153963	
4	SEB		Through	3.4	1.9	203.64	7.06	A	Signal	3.153963	
4	SWB		Right 2	20.42	15.88	94.56	11.28	C	Signal	21.07111	
4	SWB		Through	14.86	8.92	94.56	11.28	B	Signal	21.07111	
4	SWB		Left 2	25.12	16.58	176.6	24.74	C	Signal	21.07111	
6	NEB		Left 2	31.46	9.9	120.08	5.54	C	Signal	16.51659	
6	NEB		Right 2	13.98	2.7	62.44	0.48	B	Signal	16.51659	
6	NEB		Through	7.42	5.1	81.9	4.02	A	Signal	16.51659	
6	SWB		Right 2	2.5	0.1	57.8	0.72	A	Signal	9.042875	
6	SWB		Left 2	0.06	0	0	0	A	Signal	9.042875	
6	SWB		Through	10.38	6.12	147.34	11.58	B	Signal	9.042875	
6	NWB		Right 2	10.84	8.32	31.02	0.98	B	Signal	11.30064	
6	NWB		Through	11.14	6.4	114.96	3.6	B	Signal	11.30064	
6	NWB		Left 2	11.9	5.52	114.96	3.6	B	Signal	11.30064	
6	SEB		Right 2	0.46	0.24	19.78	0.04	A	Signal	0.824466	
6	SEB		Through	11.6	8.82	44.7	1.86	B	Signal	0.824466	

6	SEB	Left 2	2.82	1.24	44.7	1.86	A	Signal	0.824466
7	SWB	Right 2	17.34	10.46	199.62	11.26	B	Signal	13.63298
7	SWB	Left 2	10.44	6	77.36	1.54	B	Signal	13.63298
7	SWB	Through	12.66	7.3	138.66	13.36	B	Signal	13.63298
7	SEB	Right 2	18.12	13.32	162.24	17.42	B	Signal	18.63083
7	SEB	Left 2	19.38	12.24	162.24	17.42	B	Signal	18.63083
7	SEB	Through	17.1	11.28	162.24	17.42	B	Signal	18.63083
7	NEB	Right 2	0.6	0.02	13.7	0.02	A	Signal	4.277248
7	NEB	Left 2	7.9	5.04	44.16	0.66	A	Signal	4.277248
7	NEB	Through	3.82	2.6	56.68	1.88	A	Signal	4.277248
7	NWB	Right 2	3.9	0.14	113.42	2.02	A	Signal	15.98133
7	NWB	Through	23.32	16.02	110.26	9.9	C	Signal	15.98133
7	NWB	Left 2	18.12	13.86	110.26	9.9	B	Signal	15.98133
8	NWB	Right 2	20.8	17.38	21.22	0.6	C	Signal	22.61786
8	NWB	Through	23.72	19.66	21.22	0.6	C	Signal	22.61786
8	NWB	Left 2	24.1	19.74	21.22	0.6	C	Signal	22.61786
8	SEB	Right 2	5.16	0.48	65.6	1.38	A	Signal	20.22218
8	SEB	Left 2	27.7	23.26	53.44	4.04	C	Signal	20.22218
8	SEB	Through	16.84	13.64	53.44	4.04	B	Signal	20.22218
8	SWB	Right 2	5.34	2.66	113.04	6.8	A	Signal	4.820266
8	SWB	Left 2	7.44	3.66	113.04	6.8	A	Signal	4.820266
8	SWB	Through	4.74	2.66	113.04	6.8	A	Signal	4.820266
8	NEB	Right 2	1.94	0.08	102.24	0.14	A	Signal	0.886898
8	NEB	Left 2	0.82	0.52	15.6	0.02	A	Signal	0.886898
8	NEB	Through	0.86	0.76	64.58	1.36	A	Signal	0.886898
9	NEB	Right 2	2.66	0.32	69.62	0.64	A	Signal	10.34875
9	NEB	Through	10.54	6.84	45.24	1.62	B	Signal	10.34875
9	NEB	Left 2	13.64	9.82	45.24	1.62	B	Signal	10.34875
9	NWB	Right 2	5.1	1.88	83.12	4.2	A	Signal	9.235702
9	NWB	Through	10.34	7.5	52.7	1.88	B	Signal	9.235702
9	SEB	Left 2	17.72	10.46	80.76	6.64	B	Signal	17.13152
9	SEB	Through	15.98	9.86	80.76	6.64	B	Signal	17.13152
10	NWB	Left 2	14.94	9.34	61.32	2.84	B	Signal	13.25315
10	NWB	Through	12.32	8.38	61.32	2.84	B	Signal	13.25315
10	SWB	Right 2	3.08	0.1	79.72	2.32	A	Signal	3.569611
10	SWB	Through	0	0	52.18	0.52	A	Signal	3.569611
10	SWB	Left 2	9.02	4.88	52.18	0.52	A	Signal	3.569611
10	SEB	Right 2	5.78	1.76	107.42	3.36	A	Signal	10.22108
10	SEB	Through	12.1	9.02	73.62	4.94	B	Signal	10.22108
10	NEB	Right 2	0	0	0	0	A	Signal	
11	NEB	Right 2	9.74	0.32	155.58	4.3	A	Signal	29.58307
11	NWB	Right 2	5.24	0.2	157.4	4.6	A	Signal	8.524265
11	NWB	Through	10.84	6.26	123.92	7.24	B	Signal	8.524265
11	SEB	Through	6.32	2.5	125.78	5.24	A	Signal	7.084928
11	SEB	Left 2	8.04	2.98	125.78	5.24	A	Signal	7.084928
11	NEB	Left 2	35.82	24.26	263.6	38.4	D	Signal	29.58307
11	NEB	Through	36.66	24.52	263.6	38.4	D	Signal	29.58307
12	NWB	Through	10.4	4.52	126.62	4	B	Signal	7.073793
12	NWB	Left 2	2.98	0.38	126.62	4	A	Signal	7.073793
12	SWB	Right 2	13.08	4.14	236.42	32.86	B	Signal	23.87987
12	SWB	Left 2	29.48	21.4	210.28	34.34	C	Signal	23.87987
12	SWB	Through	28.34	20.66	210.28	34.34	C	Signal	23.87987
12	SEB	Right 2	4.54	0.24	194.96	12.58	A	Signal	11.28487
12	SEB	Through	15.74	10.66	174.36	10.92	B	Signal	11.28487
15	SEB	Left 2	4.02	1.92	68.12	2.54	A	Signal	4.943503
15	SEB	Through	5.04	1.84	68.12	2.54	A	Signal	4.943503
15	NWB	Right 2	5.18	2.2	172.02	4.56	A	Signal	9.661612
15	NWB	Through	13.14	7.44	70.84	5.72	B	Signal	9.661612
15	NEB	Left 2	0	0	209.18	14.08	A	Signal	29.82341
15	NEB	Right 2	14.24	8.12	209.18	14.08	B	Signal	29.82341
15	NEB	Left 2	34.24	24.74	105.02	27.44	C	Signal	29.82341

15	NEB		Through	28.86	21.58	105.02	27.44	C	Signal	29.82341
16	SEB		Right 2	21.16	12.32	250.74	40.86	C	Signal	26.59074
16	SEB		Through	30.62	23.04	239.08	39.86	C	Signal	26.59074
16	SWB		Right 2	0	0	73.06	5.36	A	Signal	25.85901
16	SWB		Left 2	25.98	23.04	61.36	7.74	C	Signal	25.85901
16	SWB		Through	24.32	20.38	61.36	7.74	C	Signal	25.85901
16	NWB		Left 2	12.42	4.42	154	6.74	B	Signal	7.702343
16	NWB		Through	5.46	1.66	154	6.74	A	Signal	7.702343
16	NWB		Left 2	0	0	0	0	A	Signal	7.702343
17	SEB		Left 2	22.06	9.5	216.5	49.42	C	Signal	19.05154
17	SEB		Right 1	16.42	7.42	216.5	49.42	B	Signal	19.05154
17	NB	3	Right 1	14.14	7.4	218.94	23.28	B	Signal	18.87465
17	NB	3	Left 1	21.6	15.5	67.26	7.42	C	Signal	18.87465
17	NEB		Right 3	11.9	1.48	94.9	1.04	B	Signal	18.32128
17	NEB		Left 2	19.5	11.88	184.56	17.38	B	Signal	18.32128
17	NEB		Through	18.46	8.7	184.56	17.38	B	Signal	18.32128
18	NB	3	Left 1	1.42	0.66	102.02	7.94	A	Signal	3.955428
18	NB	3	Left 3	10.2	6.42	102.02	7.94	B	Signal	3.955428
18	WB	2	Right 1	33.74	10.8	725.56	124.46	C	Signal	47.3821
18	WB	2	Left 2	60.78	30.7	77.92	21.72	E	Signal	47.3821
18	WB	2	Left 1	44.92	19.18	77.92	21.72	D	Signal	47.3821
18	SEB		Right 2	5.82	0.52	53.4	0.32	A	Signal	13.87393
18	SEB		Right 1	19.26	13.02	169.98	22.52	B	Signal	13.87393
19	SWB		Right 2	0	0	0	0	A	Signal	0
19	SWB		Through	0	0	0	0	A	Signal	0
20	NEB		Right 2	0.06	0	0	0	A	Signal	0.000605
20	NEB		Through	0	0	0	0	A	Signal	0.000605
20	SWB		Left 2	0.96	0	17.64	0.02	A	Signal	0.181705
20	SWB		Through	0.16	0	0	0	A	Signal	0.181705
20	NWB		Right 2	9.08	3.24	69.82	0.84	A	Signal	7.985
20	NWB		Left 2	6.16	1.88	69.82	0.84	A	Signal	7.985

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Entry	Approach	Turn
N-NE	SB	Left 3
N-E	SB	Left 2
N-SE	SB	Left 1
N-S	SB	Through
N-SW	SB	Right 1
N-W	SB	Right 2
N-NW	SB	Right 3
N-N	SB	U-Turn
NE-E	SWB	Left 3
NE-SE	SWB	Left 2
NE-S	SWB	Left 1
NE-SW	SWB	Through
NE-W	SWB	Right 1
NE-NW	SWB	Right 2
NE-N	SWB	Right 3
NE-NE	SWB	U-Turn
E-SE	WB	Left 3
E-S	WB	Left 2
E-SW	WB	Left 1
E-W	WB	Through
E-NW	WB	Right 1
E-N	WB	Right 2
E-NE	WB	Right 3
E-E	WB	U-Turn
SE-S	NWB	Left 3
SE-SW	NWB	Left 2
SE-W	NWB	Left 1
SE-NW	NWB	Through
SE-N	NWB	Right 1
SE-NE	NWB	Right 2
SE-E	NWB	Right 3
SE-SE	NWB	U-Turn
S-SW	NB	Left 3
S-W	NB	Left 2
S-NW	NB	Left 1
S-N	NB	Through
S-NE	NB	Right 1
S-E	NB	Right 2
S-SE	NB	Right 3
S-S	NB	U-Turn
SW-W	NEB	Left 3
SW-NW	NEB	Left 2
SW-N	NEB	Left 1
SW-NE	NEB	Through
SW-E	NEB	Right 1
SW-SE	NEB	Right 2
SW-S	NEB	Right 3
SW-SW	NEB	U-Turn
W-NW	EB	Left 3
W-N	EB	Left 2
W-NE	EB	Left 1
W-E	EB	Through
W-SE	EB	Right 1
W-S	EB	Right 2
W-SW	EB	Right 3
W-W	EB	U-Turn
NW-N	SEB	Left 3
NW-NE	SEB	Left 2
NW-E	SEB	Left 1
NW-SE	SEB	Through

Signalized Intersection LOS

Delay	LOS
10	A
20	B
35	C
55	D
80	E
	F

TWSC Intersection LOS* per lane or approach only

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

AWSC Intersection LOS* per approach and intersection wide

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

RAB Intersection LOS* per approach and intersection wide

Delay	LOS
10	A
15	B
25	C
35	D
50	E
	F

Turn	Sorted
Left 3	1
Left 2	2
Left 1	3
Through	4
Right 1	5
Right 2	6
Right 3	7

Direction	Sorted
EB	1
WB	2
NB	3
SB	4

NW-S	SEB	Right 1
NW-SW	SEB	Right 2
NW-W	SEB	Right 3
NW-NW	SEB	U-Turn