Level 2 Traffic Analysis Technical Report
Part 1: Travel Demand Model and Results

The Detroit River International Crossing Study

MDOT
Michigan Department of Transportation

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Table of Contents

LIST OF FIGURES

LIST OF TABLES

SUMMARY

The Detroit River International Crossing (DRIC) Study is a bi-national effort to complete the environmental study processes for the United States, Michigan, Canada and Ontario governments for a new border crossing between Detroit and Windsor. The study will identify solutions that support the region, state, provincial and national economies while addressing the civil and national defense and homeland security needs of the busiest trade corridor between the United States and Canada (Figure S-1).

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

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

- Provide safe, efficient and secure movement of people and goods across the Canadian-U.S. border in the Detroit River area to support the economies of Michigan, Ontario, Canada and the U.S.

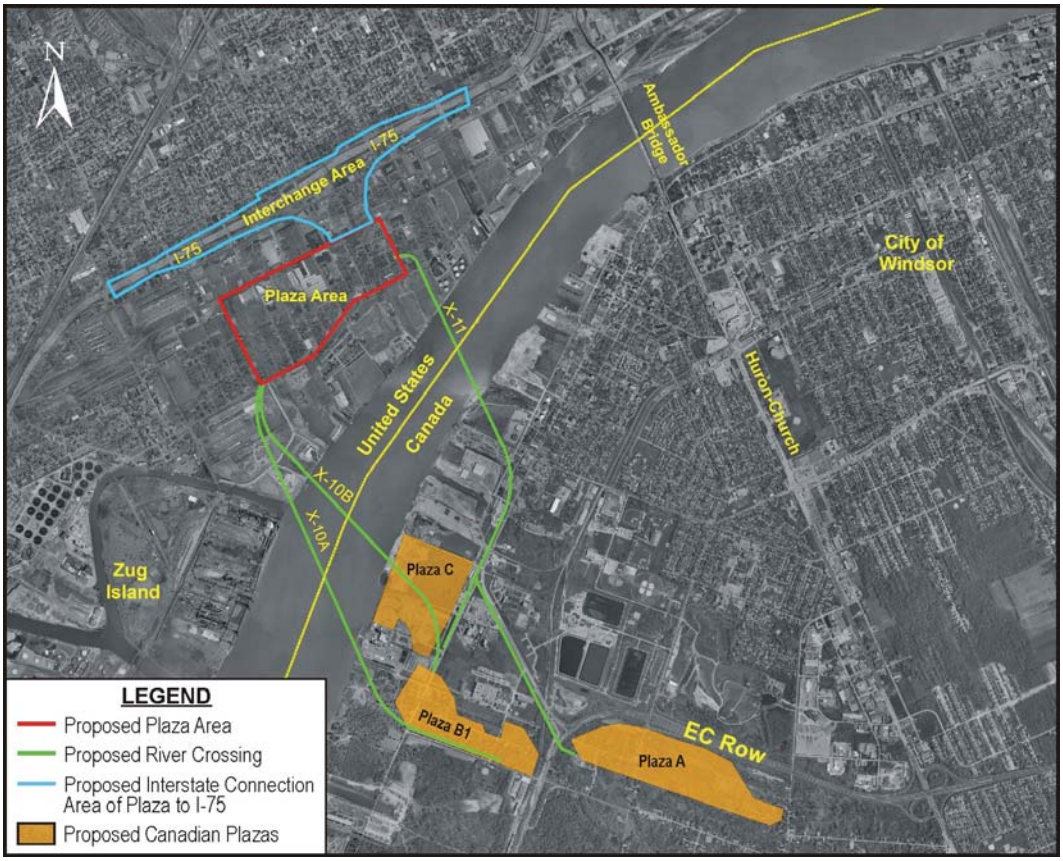
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements out to the year 2035 across the Canada-U.S. border, there is a need to:

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

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

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



Source: The Corradino Group of Michigan, Inc.

Purpose of the Report

The purpose of this report is to present travel demand forecasts for the final Practical Alternatives. These forecasts act as the basis for all technical analyses relating to overall traffic

volume, including the microsimulation of traffic operations presented in Part 2 of this Traffic Analysis Report.

Because there is no discernable difference among several Practical Alternatives from a travel demand modeling perspective, largely due to similarities of the interchanges with I-75, model forecasts have been prepared for three groups of Practical Alternatives, in addition to the No Build condition:

1) **Alternatives #1, #2, #3, #14, and #16.**
2) **Alternative #5.**
3) **Alternatives #7, #9, and #11.**

As shown in Figure S-2, there are two proposed "X-10" crossing alternatives – X-10A and X-10B. The difference in the lengths of these crossings is marginal in terms of the modeled network. Alternative Set #1/2/3/14/16 and Alternative #5, which include both X-10 crossings, are coded with a generic X-10 alternative, which approximates the average distance (1.5 miles) of both bridges.

Forecasts are presented for three peak-hour periods, AM, midday, and PM for the 2004 base year and the forecast years of 2015 and 2035. The primary focus of the forecasts is the directional traffic volumes for international cars and commercial vehicles (trucks) using the crossing, its plaza, and ramps for each alternative. In addition, a summary of statistics for Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Volume-to-Capacity Ratios (V/C) are presented for various sections and links of the U.S. network.

At the outset of the DRIC study, during the Illustrative Alternatives analysis phase, travel demand modeling was focused on which crossing(s) provided the most efficient route for time and cost over a wide area from Grosse Ile to Belle Isle.[1] However, since December 2005, when the DRIC Illustrative Alternatives analysis concluded, the number of alternatives decreased significantly. The area in which the Practical Alternatives are located lies between Zug Island and the foot of the Ambassador Bridge and between the Detroit River and I-75 (refer to Figure S-2).

As a result, the focus of the U.S. travel demand work shifted from analyzing distinct locations for crossing routes to analyzing two basic crossings located in the same general area, and their various plaza and interchange configurations. The close proximity to each other and with the Ambassador Bridge means subtle changes in the alternative configurations can have large impacts on how they share traffic with the Ambassador Bridge. Because of this, the forecasts are generated with the use of two different modeling approaches. The original methodology (single logit) uses a logit choice model to determine how much cross border traffic uses the Blue Water Bridge and how much uses the Detroit River crossings. The Detroit River cross border traffic then picks between the crossing options based on which crossing offers the shortest travel times between origins and destinations. This methodology being highly sensitive to differences in travel times resulted in imbalances in traffic between the Ambassador and the DRIC bridge with commercial traffic being most affected. Another method (nested logit) was also employed which uses a second logit model to split traffic among the Detroit River Crossings. This method results in a more even split between the DRIC alternatives and the Ambassador Bridge. The specifics of these methods are presented in Appendix A. The single-logit model forecasts support the analyses (traffic, noise, air quality, etc.) in the Draft Environmental Impact Statement. Their use

[1] The Corradino Group of Michigan, Inc., *Detroit River International Crossing Study Level 1 Traffic Analysis Report*, September 2007.

is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify those analyses in the FEIS as specifics of the project become better defined.

In respect to model networks, all Practical Alternatives most closely resemble Illustrative Alternative A26. Illustrative Alternative A26 included the "C4" plaza, which is located in the general footprint of the Practical Alternatives. It also included the "X-11" crossing. However, the modeled network for Alternative A26, as with all of the other Illustrative Alternatives, did not incorporate a detailed plaza, interchange, or crossing approach on either side of the border. Therefore, networks of the Illustrative Alternatives were very rudimentary in comparison to the much more detailed networks developed for the Practical Alternatives.

Tables S-1A, S-1B and S-1C and Figures S-3A, S-3B and S-3C compare the distribution of traffic between the X-11/C-4 Illustrative Alternative and the Practical Alternatives. While total traffic in the Detroit metro region is relatively stable across all alternatives, the introduction of the detailed plaza and interchange into the Practical Alternative networks, with the corresponding additional length and time, affects the shares of cars and trucks at the proposed DRIC crossing and Ambassador Bridge. The less detailed network for the X-11/C-4 Illustrative Alternative results in international traffic heavily favoring the proposed DRIC crossing over the Ambassador Bridge. The inclusion of the detailed networks in the Practical Alternatives results in a more balanced distribution between the two crossings.

During the Illustrative Alternatives phase, approximately 200 cars were incorrectly allocated to the U.S.-to-Canada direction during the PM peak. This has been corrected for the Practical Alternatives and accounts for the differences in total car volumes shown for Illustrative Alternative X-11/C-4 as compared to all Practical Alternatives in Tables S-1A, S-1B and S-1C.

Findings

The Practical Alternatives travel demand model produces similar river crossing traffic patterns for Alternative Set #1/2/3/14/16 and Alternative #5 (Table S-2). This is expected considering both groups use crossing X-10 and have the same plaza configuration. The length and travel time distinction between these groups is measured at 0.1 miles and between 6 and 12 seconds. On the other hand, the forecasts demonstrate a substantial difference between Alternative Set #1/2/3/14/16 and Alternative #5, and Alternative Set #7/9/11. This difference is primarily the product of a much longer crossing and plaza route via Alternative Set #7/9/11 that results in crossing times between 1 minute 30 seconds and 1 minute 54 seconds longer than the other alternatives.

Table S-1A
Detroit River International Crossing Study
2035 AM Peak Hour Total Traffic Volumes
Illustrative Alternative X-11/C4 and All Practical Alternatives

	Network	US to Canada					Canada to US				
		BWB	DWT	AMB	NEW	Total	BWB	DWT	AMB	NEW	Total
Cars	Illustrative Alt. X-11/C-4	151	155	41	310	657	169	627	468	1,902	3,166
	No Build	182	305	273	n/a	760	186	1,150	1,709	n/a	3,045
	#1, #2, #3, #14, #16	177	257	130	196	760	171	866	1,099	908	3,044
	#5	177	256	141	185	759	172	867	1,101	905	3,045
	#7, #9, #11	178	274	242	67	761	173	957	1,371	544	3,045
Trucks	Illustrative Alt. X-11/C-4	164	7	71	481	723	304	0	0	560	864
	No Build	191	78	454	n/a	723	361	63	465	n/a	889
	#1, #2, #3, #14, #16	158	26	126	413	723	319	16	2	551	888
	#5	160	26	139	398	723	321	16	2	550	889
	#7, #9, #11	168	32	277	246	723	326	19	62	483	890
Total	Illustrative Alt. X-11/C-4	315	162	112	791	1,380	473	627	468	2,462	4,030
	No Build	373	383	727	n/a	1,483	547	1,213	2,174	n/a	3,934
	#1, #2, #3, #14, #16	335	283	256	609	1,483	490	882	1,101	1,459	3,932
	#5	337	282	280	583	1,482	493	883	1,103	1,455	3,934
	#7, #9, #11	346	306	519	313	1,484	499	976	1,433	1,027	3,935

Source: The Corradino Group of Michigan, Inc.

Table S-1B
Detroit River International Crossing Study
2035 Midday Peak Hour Total Traffic Volumes
Illustrative Alternative X-11/C4 and All Practical Alternatives

	Network	US to Canada					Canada to US				
		BWB	DWT	AMB	NEW	Total	BWB	DWT	AMB	NEW	Total
Cars	Illustrative Alt. X-11/C-4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	No Build	435	555	730	n/a	1,720	332	419	656	n/a	1,407
	#1, #2, #3, #14, #16	412	566	346	396	1,720	321	355	529	200	1,405
	#5	413	560	339	407	1,719	321	354	531	198	1,404
	#7, #9, #11	415	621	453	230	1,719	323	371	563	146	1,403
Trucks	Illustrative Alt. X-11/C-4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	No Build	505	297	708	n/a	1,510	297	31	534	n/a	862
	#1, #2, #3, #14, #16	431	96	276	706	1,509	278	18	133	432	861
	#5	434	91	264	721	1,510	279	18	133	432	862
	#7, #9, #11	447	115	482	465	1,509	283	28	317	234	862
Total	Illustrative Alt. X-11/C-4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	No Build	940	852	1,438	n/a	3,230	629	450	1,190	n/a	2,269
	#1, #2, #3, #14, #16	843	662	622	1,102	3,229	599	373	662	632	2,266
	#5	847	651	603	1,128	3,229	600	372	664	630	2,266
	#7, #9, #11	862	736	935	695	3,228	606	399	880	380	2,265

Source: The Corradino Group of Michigan, Inc.

Table S-1C
Detroit River International Crossing Study
2035 PM Peak Hour Total Traffic Volumes
Illustrative Alternative X-11/C4 and All Practical Alternatives

	Network	US to Canada					Canada to US				
		BWB	DWT	AMB	NEW	Total	BWB	DWT	AMB	NEW	Total
Cars	Illustrative Alt. X-11/C-4	450	973	383	2,038	3,844	407	252	178	565	1,402
	No Build	458	1,328	1,852	n/a	3,638	490	429	664	n/a	1,583
	#1, #2, #3, #14, #16	414	997	1,072	1,155	3,638	466	367	502	250	1,585
	#5	413	982	1,028	1,215	3,638	466	369	501	247	1,583
	#7, #9, #11	417	1,080	1,221	920	3,638	471	378	532	204	1,585
Trucks	Illustrative Alt. X-11/C-4	378	31	34	932	1,375	347	1	34	404	786
	No Build	493	120	761	n/a	1,374	390	6	391	n/a	787
	#1, #2, #3, #14, #16	368	44	229	734	1,375	357	1	70	358	786
	#5	364	47	209	756	1,376	358	1	63	364	786
	#7, #9, #11	379	46	364	585	1,374	364	1	161	261	787
Total	Illustrative Alt. X-11/C-4	828	1,004	417	2,970	5,219	754	253	212	969	2,188
	No Build	951	1,448	2,613	n/a	5,012	880	435	1,055	n/a	2,370
	#1, #2, #3, #14, #16	782	1,041	1,301	1,889	5,013	823	368	572	608	2,371
	#5	777	1,029	1,237	1,971	5,014	824	370	564	611	2,369
	#7, #9, #11	796	1,126	1,585	1,505	5,012	835	379	693	465	2,372

Source: The Corradino Group of Michigan, Inc.

Figure S-3A
Detroit River International Crossing Study
2035 AM Peak Hour Total Traffic Volumes
Illustrative Alternative X-11/C-4 and All Practical Alternatives

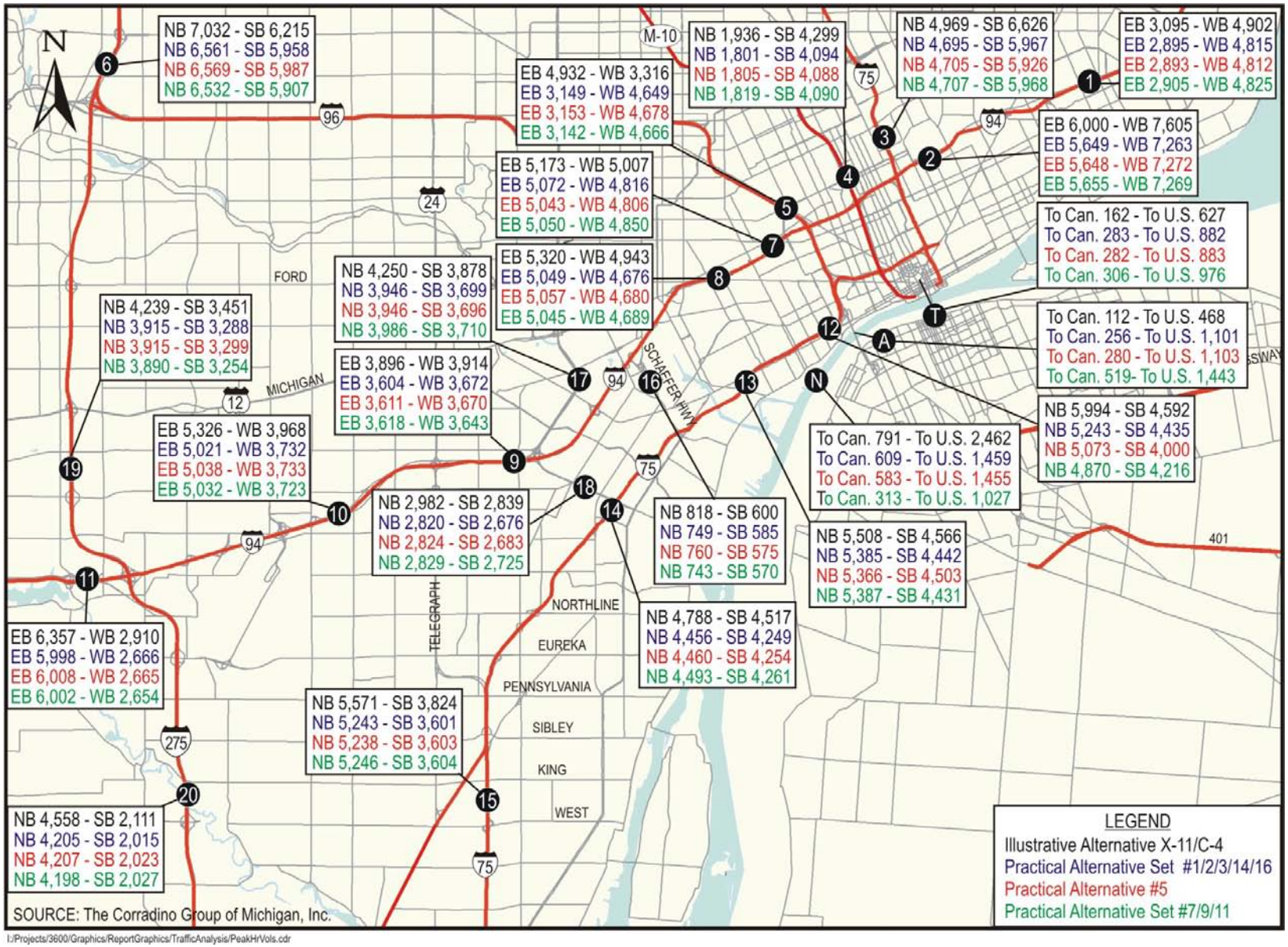
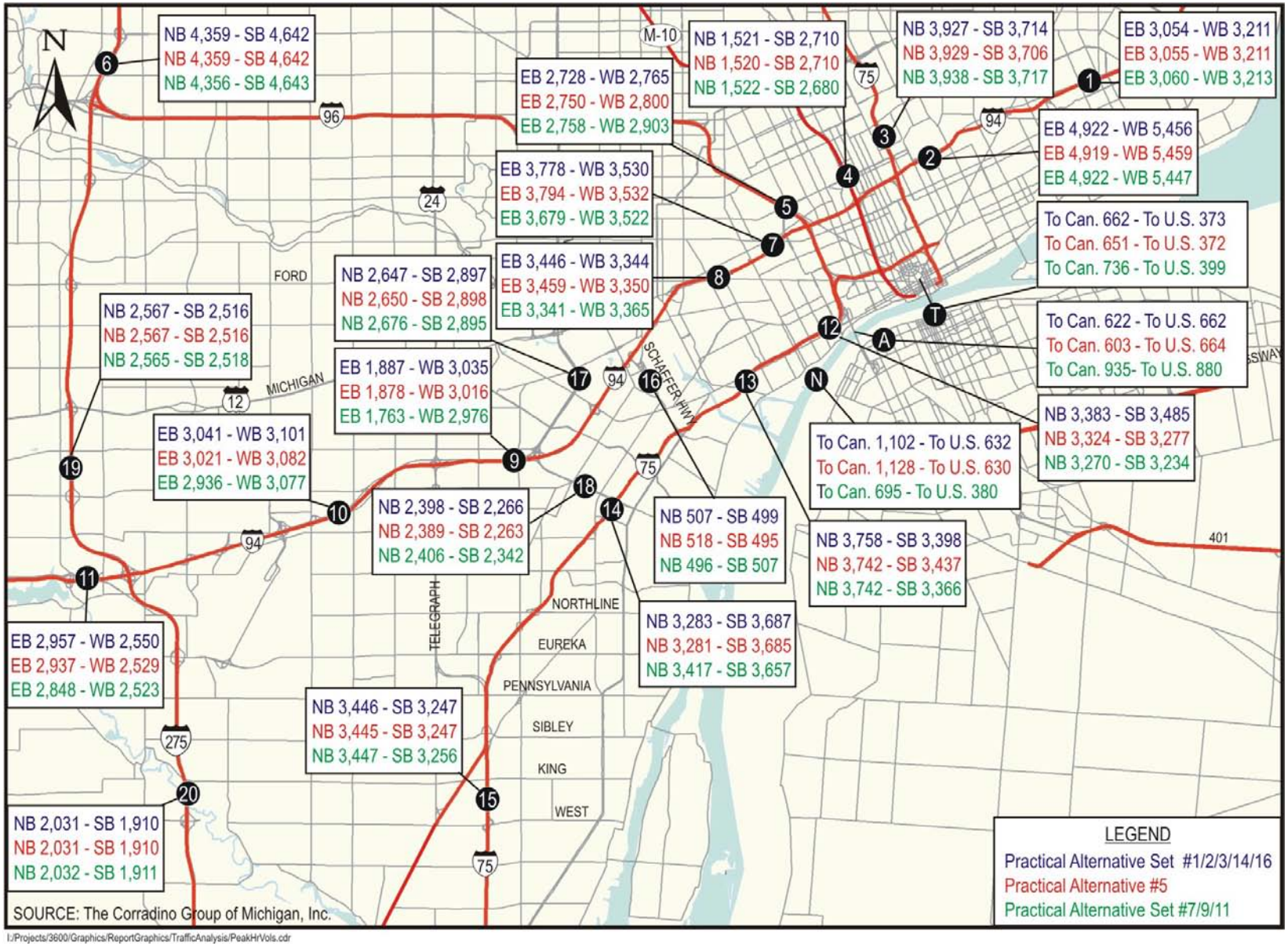


Figure S-3B
Detroit River International Crossing Study
2035 Midday Peak Hour Total Traffic Volumes
All Practical Alternatives[a]



[a] Note: No model runs were performed for the midday peak hour for Illustrative Alternatives.

Figure S-3C
Detroit River International Crossing Study
2035 PM Peak Hour Total Traffic Volumes
Illustrative Alternative X-11/C-4 and All Practical Alternatives

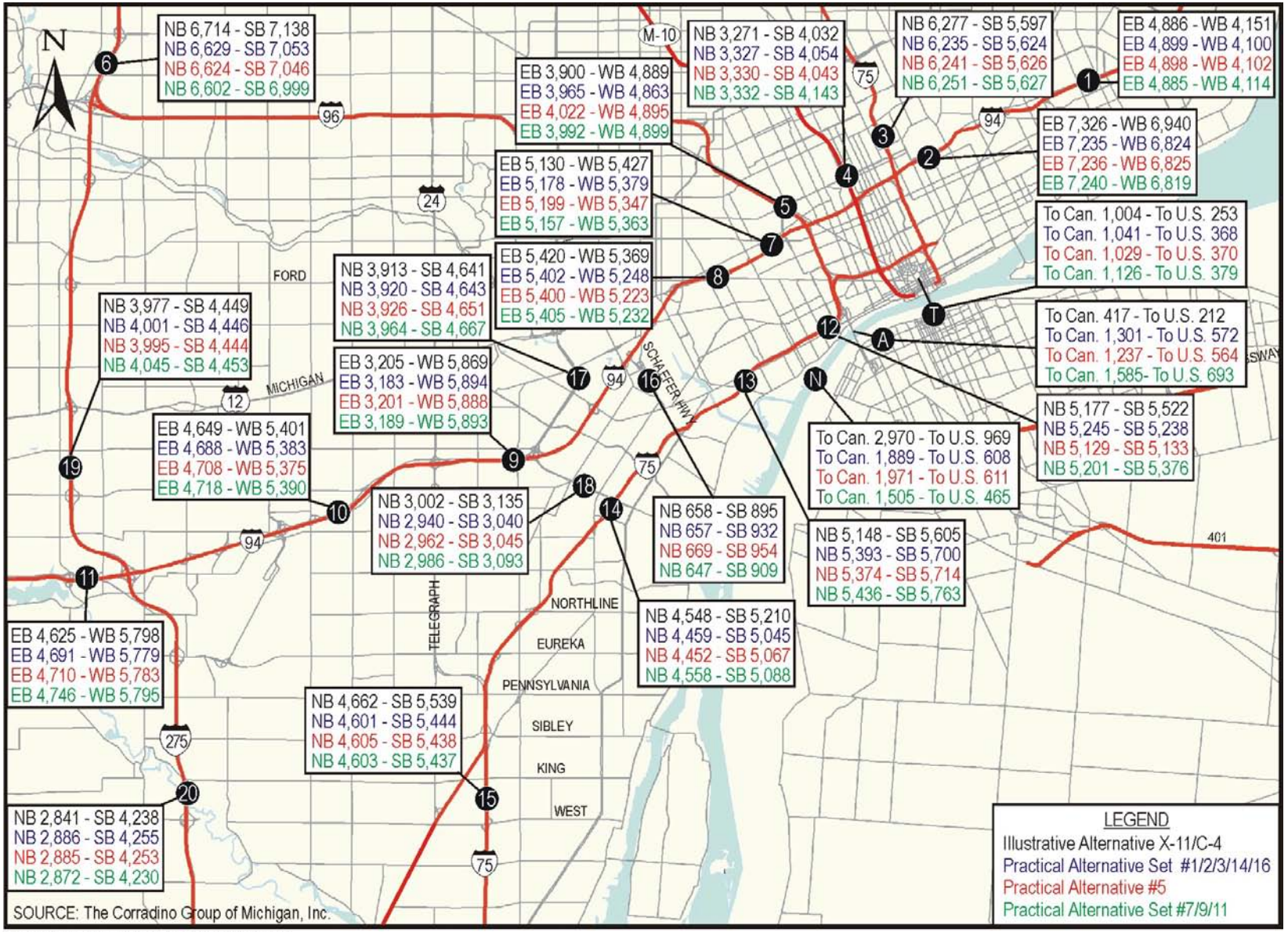


Table S-2
Detroit River International Crossing Study
Maximum Two-way Crossing Volumes: Proposed DRIC Crossing

	Alternative Group	AM		MD		PM	
		2015	2035	2015	2035	2015	2035
Cars	#1/2/3/14/16	845	1,104	559	596	1,225	1,405
	#5	848	1,090	590	605	1,262	1,462
	#7/9/11	473	611	294	376	807	1,124
Trucks	#1/2/3/14/16	602	964	746	1,138	734	1,092
	#5	604	948	718	1,153	740	1,120
	#7/9/11	395	729	322	699	512	846
Total	#1/2/3/14/16	1,447	2,068	1,305	1,734	1,959	2,497
	#5	1,452	2,038	1,308	1,758	2,002	2,582
	#7/9/11	868	1,340	616	1,075	1,319	1,970
PCEs	#1/2/3/14/16	2,350	3,514	2,424	3,441	3,060	4,135
	#5	2,358	3,460	2,385	3,488	3,112	4,262
	#7/9/11	1,461	2,434	1,099	2,124	2,087	3,239

Source: The Corradino Group of Michigan, Inc.

The single-logit travel demand model produces traffic volume assignments between the Ambassador Bridge and the proposed DRIC crossing that are highly sensitive to travel time. For truck traffic, a proposed DRIC crossing may carry 90 percent or more of the traffic handled by the two bridges (Table S-3).

Table S-3 focuses on the proposed DRIC crossing and the Ambassador Bridge and does not include crossing volumes for the Detroit-Windsor Tunnel or the Blue Water Bridge. The increase in traffic on the proposed DRIC crossing and the Ambassador Bridge between the No Build condition and the other alternatives is the result of a shift of traffic from the Blue Water Bridge and the Detroit-Windsor Tunnel. The trip tables for international traffic are fixed and there is no traffic demand stimulated simply by constructing a new crossing. Chapter Five and Appendices A and B address the travel dynamics of all crossings.

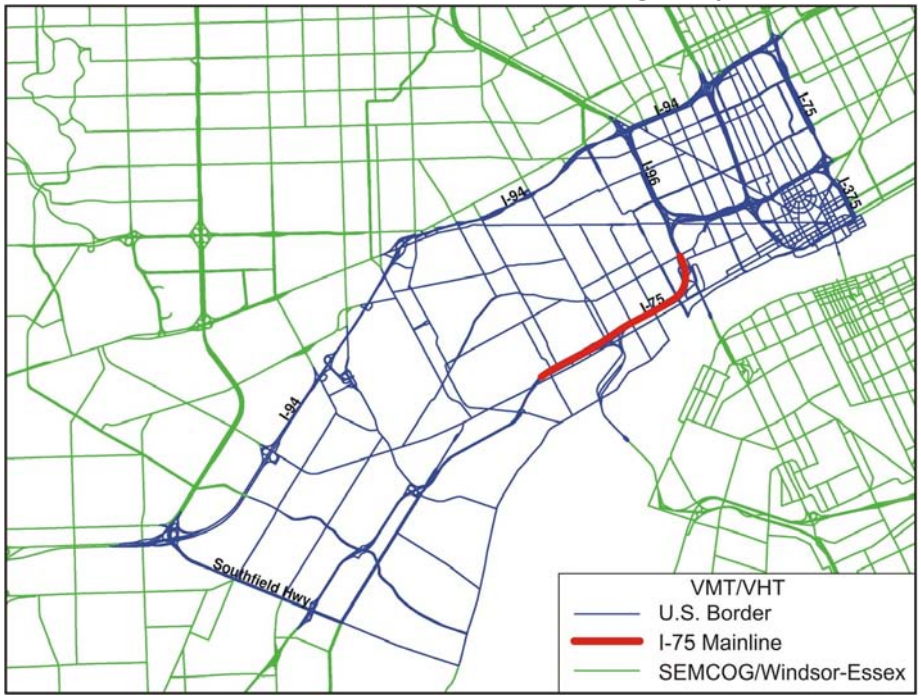
Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) define the relative efficiency of one network configuration versus another by illustrating whether an alternative actually decreases the amount of miles and hours needed to make the same number of trips. For this specific analysis, the model network was categorized into three zones (Figure S-4):

Table S-3
Detroit River International Crossing Study
Maximum Two-way Crossing Volumes
Proposed DRIC Crossing and Ambassador Bridge

	Alternative	AM				Midday				PM			
		2015		2035		2015		2035		2015		2035	
		AMB	DRIC	AMB	DRIC	AMB	DRIC	AMB	DRIC	AMB	DRIC	AMB	DRIC
Cars	No Build	1,682	n/a	1,982	n/a	1,118	n/a	1,386	n/a	2,165	n/a	2,516	n/a
	#1, #2, #3, #14, #16	1,098	845	1,229	1,104	713	559	875	596	1,302	1,225	1,574	1,405
	#5	1,094	848	1,242	1,090	685	590	870	605	1,264	1,262	1,529	1,462
	#7, #9, #11	1,394	473	1,613	611	932	294	1,016	376	1,638	807	1,753	1,124
Trucks	No Build	605	n/a	919	n/a	862	n/a	1,242	n/a	782	n/a	1,152	n/a
	#1, #2, #3, #14, #16	80	602	128	964	211	746	409	1,138	144	734	299	1,092
	#5	71	604	141	948	205	718	397	1,153	133	740	272	1,120
	#7, #9, #11	274	395	339	729	613	322	799	699	347	512	525	846
Total	No Build	2,287	n/a	2,901	n/a	1,980	n/a	2,628	n/a	2,947	n/a	3,668	n/a
	#1, #2, #3, #14, #16	1,178	1,447	1,357	2,068	924	1,305	1,284	1,734	1,446	1,959	1,873	2,497
	#5	1,165	1,452	1,383	2,038	890	1,308	1,267	1,758	1,397	2,002	1,801	2,582
	#7, #9, #11	1,668	868	1,952	1,340	1,545	616	1,815	1,075	1,985	1,319	2,278	1,970
PCEs	No Build	3,195	n/a	4,280	n/a	3,273	n/a	4,491	n/a	4,120	n/a	5,396	n/a
	#1, #2, #3, #14, #16	1,298	2,350	1,549	3,514	1,241	2,424	1,898	3,441	1,662	3,060	2,322	4,135
	#5	1,272	2,358	1,595	3,460	1,198	2,385	1,863	3,488	1,597	3,112	2,209	4,262
	#7, #9, #11	2,079	1,461	2,461	2,434	2,465	1,099	3,014	2,124	2,506	2,087	3,066	3,239

Source: The Corradino Group of Michigan, Inc.

Figure S-4
VMT/VHT Analysis Area
Detroit River International Crossing Study



Note: The SEMCOG-Windsor/Essex County Region extends beyond this graphic to the official borders of the seven Michigan counties comprising SEMCOG and Essex County, Ontario.

Source: The Corradino Group of Michigan, Inc.

1) The I-75 mainline from the I-75/I-96 split to the southwestern entrance/exit ramps to Springwells Street. The intention of this zone is to determine the actual effect of the new crossing on VMT/VHT within the core section of I-75 that bears the greatest traffic burden from the international connections.
2) The general Detroit border area, incorporating the core zone that all international traffic crossing in Detroit must pass through. This zone extends from the Detroit River to I-375 on the northeast side of the central business district, to I-94 on the west, to the Southfield Highway on the south.
3) The SEMCOG- Windsor/Essex County region, which encompasses the seven counties in SEMCOG and Essex County in Ontario.

Tables S-4 and S-5 present a comparison of the VMT and VHT for each set of alternatives for each zone against the No Build condition for 2035 PM peak hour and 2035 AM peak hour traffic. (Comparable tables of data for 2015 peak hours are provided in Appendix C.) The VMT and VHT within each zone are cumulative, i.e., they include the VMT and VHT for the zones within them. Only VMT and VHT of international traffic are analyzed, as domestic traffic by definition does not use the border-crossing link.

Comparing the total 2035 PM peak hour VMT produced by international traffic for the No Build condition to VMT created by each alternative, Table S-4 indicates that within the I-75 mainline zone, total international VMT and VHT would drop with the introduction of the proposed DRIC crossing due to truck traffic from the south diverting to the proposed DRIC crossing. Car VMT would rise slightly as drivers from downtown would divert to the new crossing, ostensibly a more efficient route overall for many origin and destination zones on the Canadian side. Within the border area, VMT and VHT would rise as the introduction of the proposed DRIC crossing diverts trips to Detroit that would otherwise cross the Blue Water Bridge under a No Build condition.

Overall within the SEMCOG region, the Practical Alternatives for the 2035 PM peak hour would be associated with an increase in VMT of two percent for cars and three percent for trucks (Table S-4). The overall increase is about two percent as more traffic is attracted to the region. On the other hand, regional VHT would decline faster than VMT would increase – by a 3:1 ratio. The introduction of a new river crossing would increase regional travel efficiency. Under No Build conditions the average speed of international traffic on the regional network in the 2035 PM peak hour would be 34.5 mph, while with every Practical Alternative, the average speed would be closer to 38 mph. This speed increase is due to the more direct connection to freeways.

Tables S-5 and S-6 show a similar pattern for international VMT and VHT during the 2035 AM and midday peak hour periods.

Table S-4
Detroit River International Crossing Study
2035 PM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,953	n/a	22,583	n/a	177,536	n/a	37	n/a	648	n/a	6,339	n/a
Alt #1/2/3/14/16	2,026	4%	24,785	10%	180,332	2%	41	11%	646	0%	5,900	-7%
Alt #5	2,095	7%	24,963	11%	180,611	2%	41	12%	640	-1%	5,894	-7%
Alt #7/9/11	1,996	2%	25,584	13%	181,392	2%	38	3%	660	2%	5,945	-6%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,115	n/a	13,721	n/a	149,008	n/a	40	n/a	323	n/a	3,117	n/a
Alt #1/2/3/14/16	1,650	-22%	14,363	5%	152,988	3%	31	-23%	356	10%	2,942	-6%
Alt #5	1,782	-16%	14,535	6%	153,348	3%	33	-19%	354	9%	2,942	-6%
Alt #7/9/11	1,487	-30%	14,947	9%	153,302	3%	27	-32%	356	10%	2,951	-5%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	4,069	n/a	36,304	n/a	326,544	n/a	77	n/a	971	n/a	9,456	n/a
Alt #1/2/3/14/16	3,676	-10%	39,148	8%	333,320	2%	71	-7%	1,002	3%	8,842	-6%
Alt #5	3,876	-5%	39,498	9%	333,959	2%	74	-4%	994	2%	8,836	-7%
Alt #7/9/11	3,482	-14%	40,531	12%	334,694	2%	65	-15%	1,016	5%	8,896	-6%

Source: The Corradino Group of Michigan, Inc.

Table S-5
Detroit River International Crossing Study
2035 AM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,387	n/a	15,846	n/a	124,197	n/a	24	n/a	420	n/a	3,410	n/a
Alt #1/2/3/14/16	1,433	3%	17,887	13%	126,079	2%	25	5%	428	2%	3,190	-6%
Alt #5	1,407	1%	17,909	13%	126,153	2%	24	2%	428	2%	3,196	-6%
Alt #7/9/11	977	-30%	17,415	10%	125,719	1%	17	-29%	430	3%	3,234	-5%
	Trucks											
	VMT	**% Diff**	**VMT**	**% Diff**	**VMT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**
No Build	1,241	n/a	9,117	n/a	103,773	n/a	21	n/a	197	n/a	1,993	n/a
Alt #1/2/3/14/16	1,085	-13%	10,440	15%	105,919	2%	19	-12%	228	16%	1,924	-3%
Alt #5	1,148	-8%	10,506	15%	105,956	2%	20	-7%	229	16%	1,926	-3%
Alt #7/9/11	869	-30%	10,610	16%	106,256	2%	15	-30%	230	16%	1,936	-3%
	Total											
	VMT	**% Diff**	**VMT**	**% Diff**	**VMT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**
No Build	2,627	n/a	24,963	n/a	227,970	n/a	45	n/a	617	n/a	5,402	n/a
Alt #1/2/3/14/16	2,518	-4%	28,328	13%	231,998	2%	44	-3%	656	6%	5,114	-5%
Alt #5	2,554	-3%	28,415	14%	232,108	2%	44	-2%	657	6%	5,121	-5%
Alt #7/9/11	1,846	-30%	28,025	12%	231,975	2%	32	-30%	660	7%	5,170	-4%

Source: The Corradino Group of Michigan, Inc.

Table S-6
Detroit River International Crossing Study
2035 Midday Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,235	n/a	12,722	n/a	122,301	n/a	21	n/a	288	n/a	2,449	n/a
Alt #1/2/3/14/16	931	-25%	13,450	6%	123,185	1%	16	-24%	303	5%	2,376	-3%
Alt #5	1,007	-19%	13,506	6%	123,297	1%	17	-18%	303	5%	2,375	-3%
Alt #7/9/11	1,014	-18%	13,543	6%	123,245	1%	17	-17%	305	6%	2,391	-2%
	Trucks											
	VMT	**% Diff**	**VMT**	**% Diff**	**VMT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**
No Build	2,062	n/a	13,426	n/a	151,671	n/a	35	n/a	300	n/a	2,714	n/a
Alt #1/2/3/14/16	1,684	-18%	15,376	15%	154,091	2%	28	-18%	324	8%	2,605	-4%
Alt #5	1,829	-11%	15,371	14%	154,308	2%	31	-11%	320	7%	2,604	-4%
Alt #7/9/11	1,385	-33%	14,887	11%	154,325	2%	23	-33%	313	5%	2,624	-3%
	Total											
	VMT	**% Diff**	**VMT**	**% Diff**	**VMT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**	**VHT**	**% Diff**
No Build	3,297	n/a	26,147	n/a	273,971	n/a	55	n/a	587	n/a	5,163	n/a
Alt #1/2/3/14/16	2,615	-21%	28,826	10%	277,275	1%	44	-20%	627	7%	4,981	-4%
Alt #5	2,835	-14%	28,877	10%	277,605	1%	48	-14%	623	6%	4,980	-4%
Alt #7/9/11	2,399	-27%	28,430	9%	277,570	1%	41	-27%	619	5%	5,016	-3%

Source: The Corradino Group of Michigan, Inc.

1. INTRODUCTION

The Detroit River International Crossing (DRIC) Study is a bi-national effort to complete the environmental study processes for the United States, Michigan, Canada and Ontario governments for a new border crossing between Detroit and Windsor. The study proposes solutions that support the region, state, provincial and national economies while addressing the civil and national defense and homeland security needs of the busiest trade corridor between the United States and Canada (Figure 1-1).

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

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

- Provide safe, efficient and secure movement of people and goods across the Canadian-U.S. border in the Detroit River area to support the economies of Michigan, Ontario, Canada and the U.S.

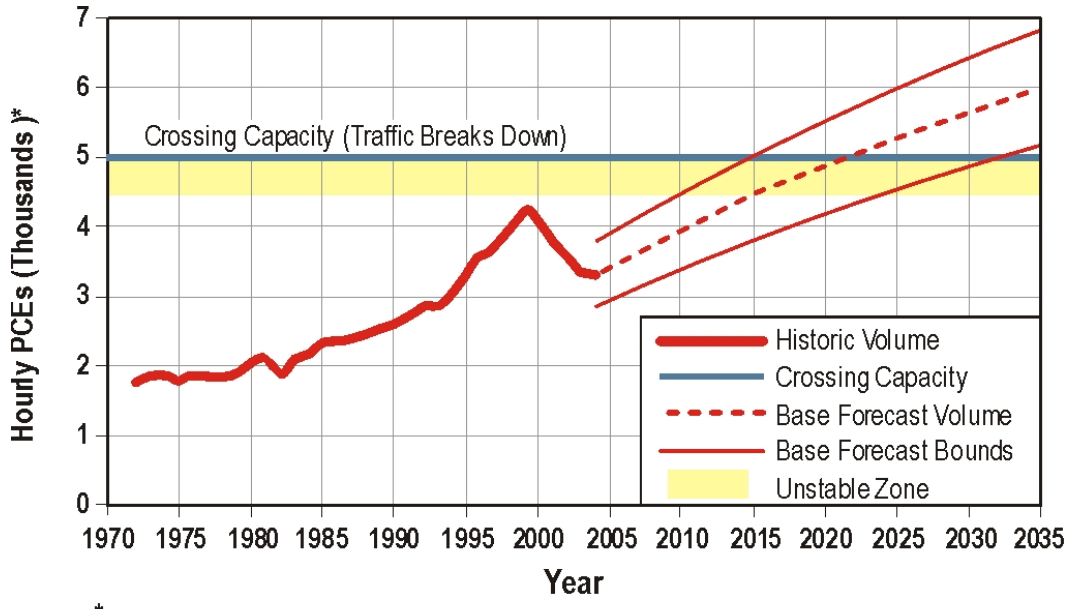
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements out to the year 2035 across the Canada-U.S. border, there is a need to:

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

Over the next 30 years, Detroit River area cross-border passenger car traffic is forecast to increase by approximately 57 percent, and movement of trucks by 128 percent. Traffic demand could exceed the cross-border roadway capacity as early as 2015 under high growth scenarios. Even under low growth projections of cross-border traffic, the roadway capacity of the existing Detroit River border crossings (bridge and tunnel combined) will be exceeded by 2033 (Figure 1-2). Additionally, the capacity of the connections and plaza operations will be exceeded in advance of the capacity constraints of the crossings themselves. Without improvements, this will result in a deterioration of operations, increased congestion and unacceptable delays to the movement of people and goods in this strategic international corridor.

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



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

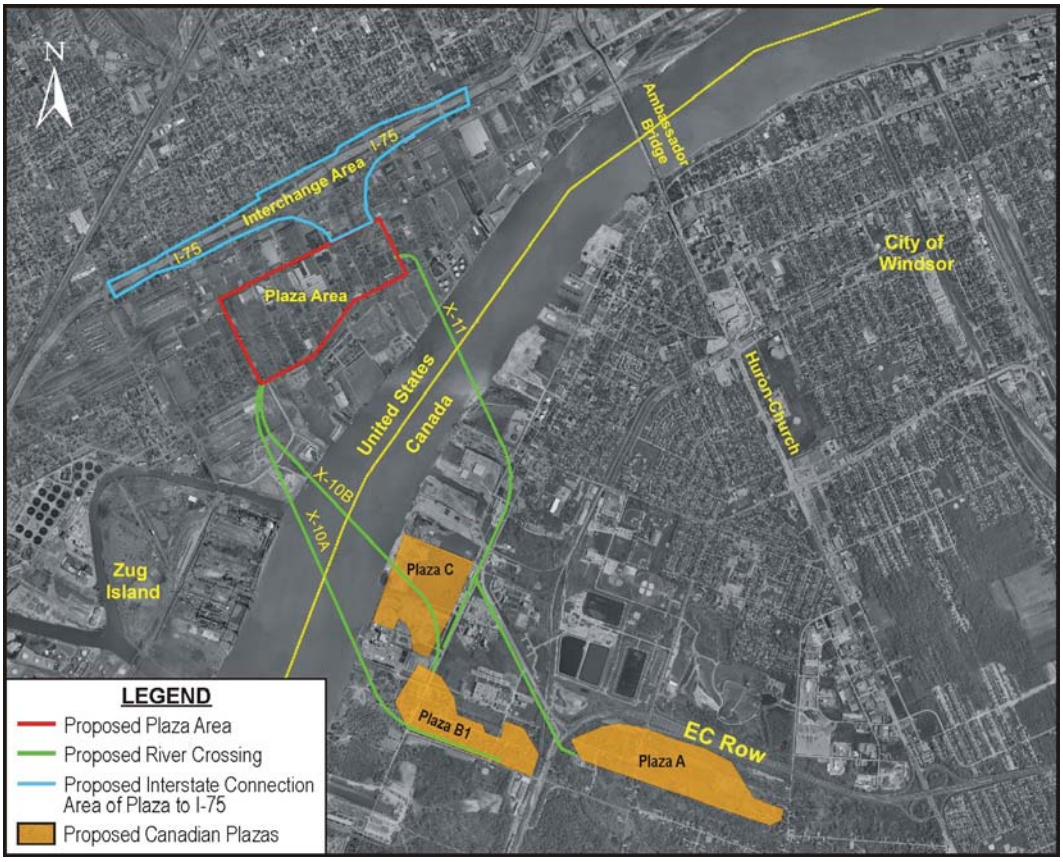
Note: Figure 1-2 is from the DRIC Travel Demand Forecast Working Paper (September 2005), prepared by the IBI Group. The Passenger Car Equivalent factor (PCE) used in that report, and in Figure 1-2, is 3.0 cars per truck to account for the grade leading to and from the bridge. SEMCOG calculates PCEs at a rate of 2.5 cars per truck in its regional roadway system. This report calculates, on the ramps, the interstate system and other roadways, PCEs at 2.5 cars per truck.

The analysis of the forecast of traffic using the border crossing system indicates that there will be inadequacies in the roads leading to the existing bridge and tunnel, the ability to process vehicles through customs and immigration, and the capacities (number of lanes) of the Ambassador Bridge and Detroit-Windsor Tunnel themselves. The planning, design and construction of any major international crossing takes time. Even though incremental adjustments can and will be made to the plazas and despite adequate border crossing capacity today (bridge and tunnel combined), it is prudent to address how and when the future capacity need is to be satisfied at the crossing itself as well as the connecting roads long before it is required.

1.1 Practical Alternatives

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

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



Source: The Corradino Group of Michigan, Inc.

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

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

Source: The Corradino Group of Michigan, Inc.

1.2 Purpose of the Report

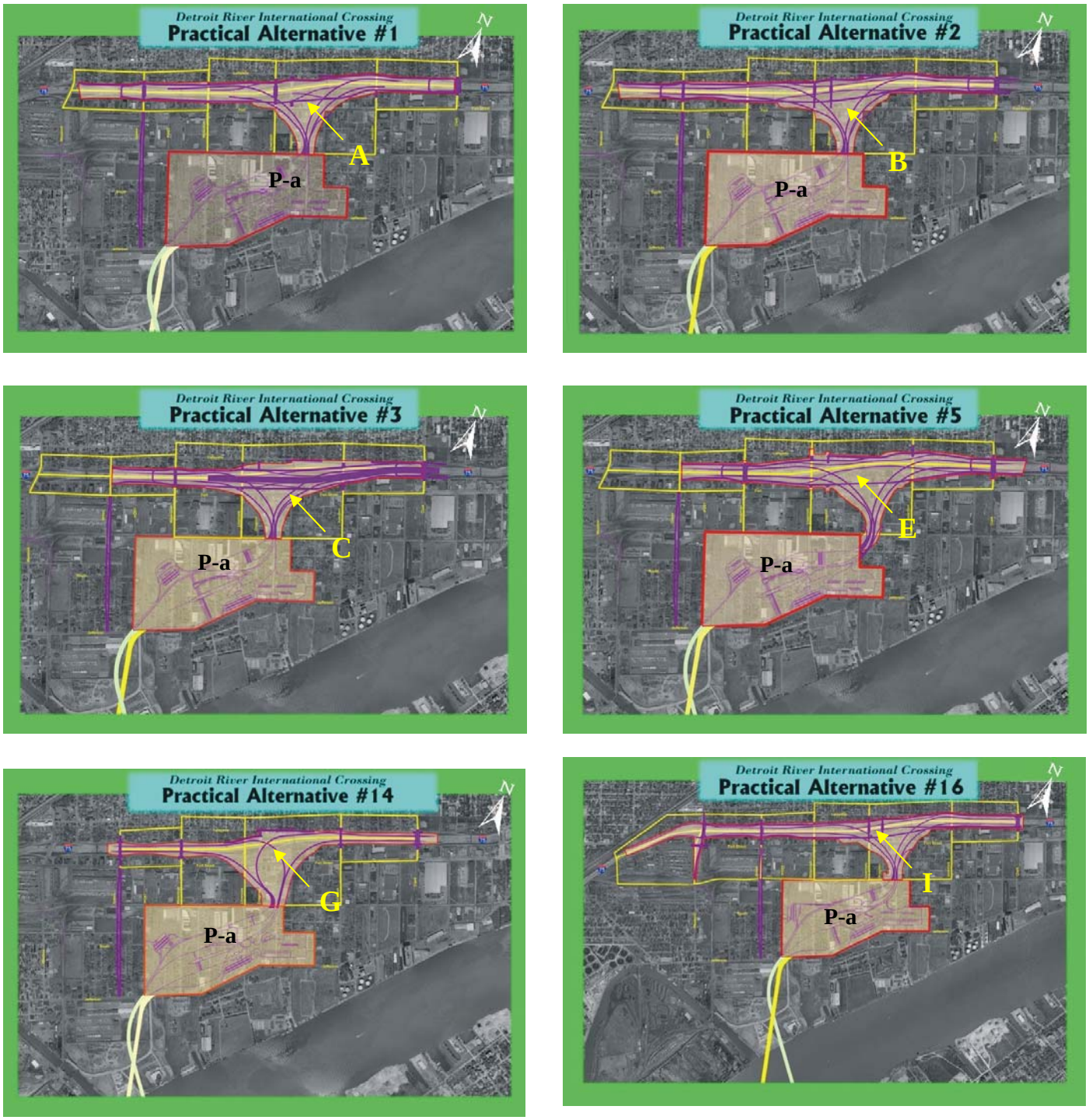
The purpose of this report is to present travel demand forecasts for the final Practical Alternatives (Table 1-1 and Figure 1-3). These forecasts act as the basis for all technical analyses relating to overall traffic volume, including the microsimulation of traffic operations presented in Part 2 of this Traffic Analysis Report (TAR).

Because there is no discernable difference among several Practical Alternatives from a modeling perspective, largely due to similarities of the interchanges with I-75, travel demand model forecasts have been prepared for three groups of Practical Alternatives, in addition to the No Build condition:

1) **Alternatives #1, #2, #3, #14 and #16;**
2) **Alternative #5; and,**
3) **Alternatives #7, #9, and #11.**

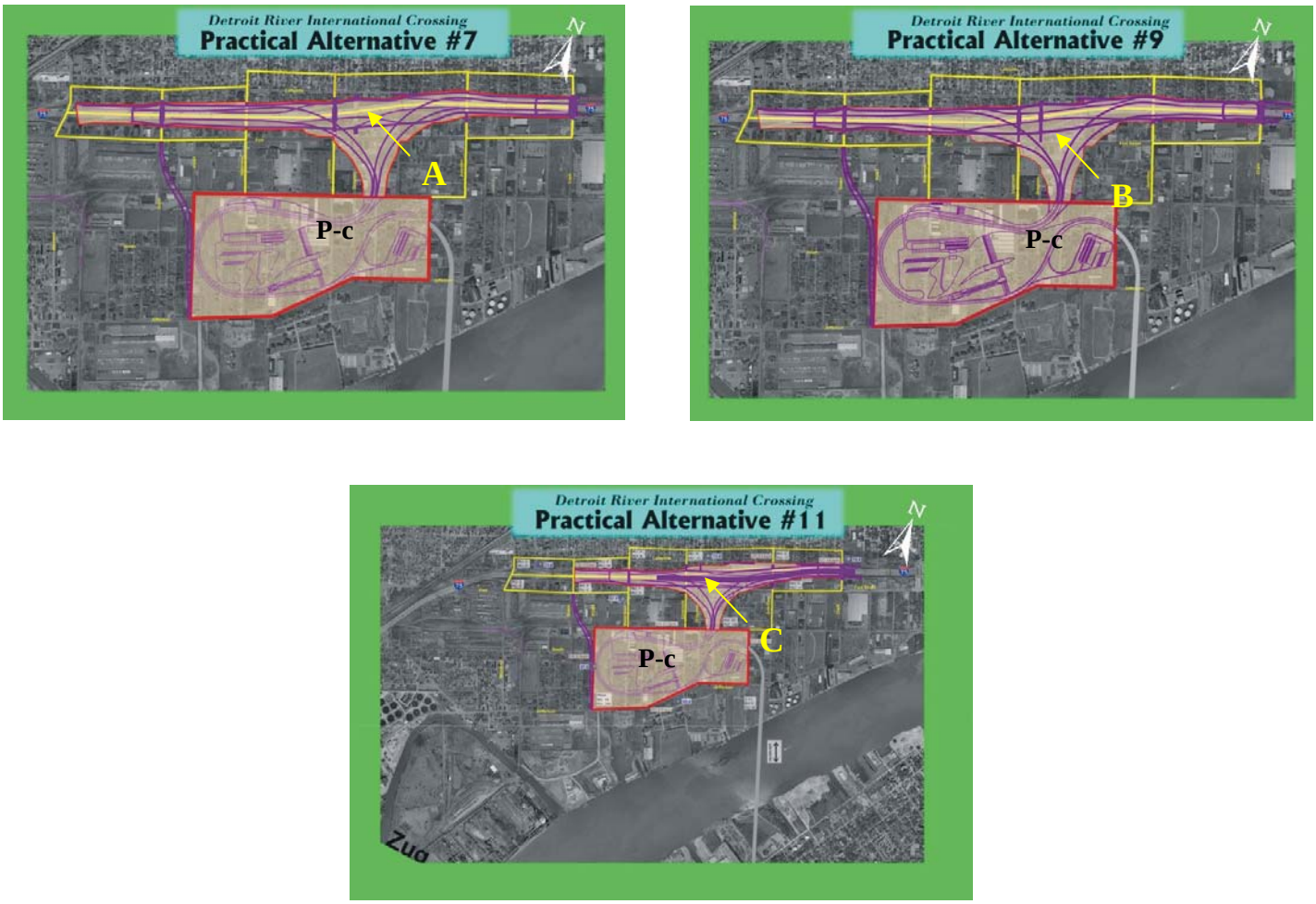
As shown in Figure 1-3, there are two proposed X-10 crossing alternatives: "X-10A" and "X-10B." The difference in length of these crossings is marginal in terms of the modeled network. Alternative Set #1/2/3/14/16 and Alternative #5, which include the X-10 crossing, are coded as generic X-10 alternatives, that approximate the average distance of both bridges, which is 1.5 miles.

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



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

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



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

Forecasts are presented for three peak-hour periods – AM, midday, and PM – for the base year of 2004 and forecast years of 2015 and 2035. The primary focus of the forecasts is the directional traffic volumes for cars and commercial vehicles (trucks) through the crossing, plaza, and ramps, for each alternative. In addition, a summary of statistics on Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Volume-to-Capacity Ratio (V/C) are provided for various links in the U.S. network.

At the outset of the DRIC study, during the Illustrative Alternatives analysis phase, travel demand modeling was focused on which crossing(s) provided the most efficient route for time and cost over a wide area from Grosse Ile to Belle Isle.[2] However, since December 2005, when the DRIC Illustrative Alternatives analysis concluded, the Area of Continued Analysis, where the Practical Alternatives are located in the U.S., decreased significantly. This area lies between Zug Island and the foot of the Ambassador Bridge and between the Detroit River and I-75 (refer to Figure 1-3). As a result, the focus of the U.S. travel demand work has shifted from analyzing distinct locations for crossing routes to analyzing two basic crossings located in the same general area, and their various plaza and interchange configurations.

[2] The Corradino Group of Michigan, Inc., Detroit River International Crossing Study Level 1 Traffic Analysis Report, September 2007.

2. SUMMARY OF MODEL COMPONENTS

2.1 Model Structure

2.1.1 Overview

The travel demand model used for the analysis of the DRIC Practical Alternatives is an update of the model used in the Planning/Needs & Feasibility (P/N & F) Study and for the Illustrative Alternatives.[3] The model is implemented using TransCAD software. It combines the networks and background domestic trip tables from the most-recent local (SEMCOG and Windsor/Essex County) models with updated trip tables for international traffic. The model produces traffic for three peak periods – AM, midday and PM – for the base year of 2004 and forecast years of 2015 and 2035.

A multi-modal, multi-class "user equilibrium" assignment routine is used to load vehicles onto the network. This allows the traffic to be segmented by commercial vehicles, cars, and international traffic. This procedure allows each segment to access a specific subset of the network with commercial vehicles constrained to truck-only routes and international traffic allocated to a particular crossing by the logit model. Within the sub-network permitted for each class, trip assignment is based on travel time. Each commercial vehicle has a passenger car equivalence (PCE) of 2.5 in the assignment model, with a PCE of 3.0 assumed for bridge/tunnel crossing facilities.

The user equilibrium assignment uses an iterative routine to balance network flows. A relationship between link travel time and volume to capacity ratios adjusts the link speeds at each iteration, with time increasing as links become more congested.

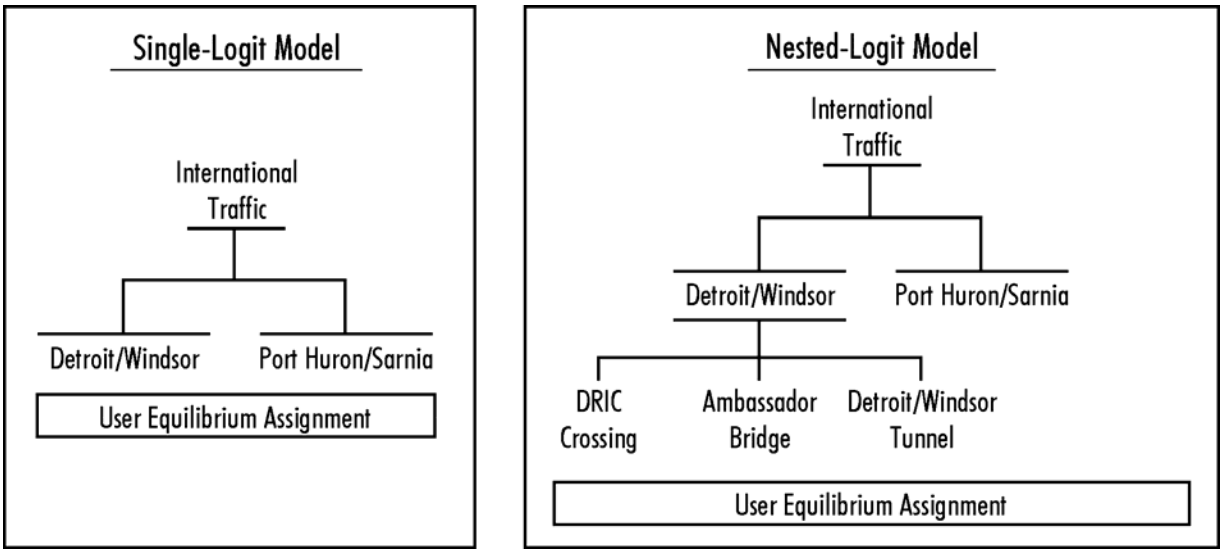
Prior to the evaluation of the Illustrative Alternatives, the model was validated to available traffic data. Information on the link-level validation conducted for the U.S. roadway system is presented in Section 3.

The DRIC model uses a multinomial single-logit model to allocate cross-border traffic between the Detroit River area and the Port Huron/Sarnia area. Then, international traffic is combined with domestic traffic and assigned to the roadway network via a user-equilibrium assignment method. A two-level nested logit model has also been developed. The nested-logit method allocates international traffic first between Port Huron/Sarnia and the Detroit River areas and then among the three Detroit River area crossings (either the Detroit-Windsor Tunnel, the Ambassador Bridge, or the proposed DRIC crossing) before using the user-equilibrium procedure to assign traffic to the rest of the network. Figure 2-1 illustrates the two model structures.

Both the single-logit model and nested-logit model have advantages and disadvantages. The single-logit model is estimated from survey data that directly describes the choice of crossing between Port Huron/Sarnia and the Detroit area, but does not allocate international trips among the crossings in Detroit. Instead, it assigns international traffic to the local crossings as it would any other link in the network, with a user-equilibrium assignment. As a result, the single-logit model produces the upper bound for a forecast range for the new DRIC crossing alternatives. The nested-logit model, however, specifically allocates international traffic to each local crossing,

[3] The Corradino Group of Michigan, Inc., *Detroit River International Crossing Study Level 1 Traffic Analysis Report*, September 2007.

Figure 2-1
Detroit River International Crossing Study
Model Structures



Source: The Corradino Group of Michigan, Inc.

but its equations borrow the long-distance time and cost coefficients from the single-logit because survey data could not produce significant coefficients to represent the local Detroit crossing choice. The nested-logit model produces more balanced splits of international traffic on individual crossings, providing a lower bound for a forecast range on the new DRIC crossing alternatives. The higher single-logit model forecasts for the DRIC crossing alternatives support the analyses (traffic, noise, air quality, etc.) in the DEIS in a manner that is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and, then, modify the analyses in the FEIS as specifics of the project become better defined. Details on the nested-logit model are included in Appendix A.

2.1.2 Single-Logit Assignment

The single-logit choice model was originally used for the production of DRIC Study forecasts in the Illustrative Alternatives analysis and is also being used to produce forecasts for the analysis of Practical Alternatives. Its basic premise is that the introduction of a new crossing in the Detroit area would have a greater impact on local crossings, specifically the Ambassador Bridge and the Detroit-Windsor Tunnel, than on the Blue Water Bridge located about 65 miles northeast of Detroit. While changes in travel time (and cost) would affect the choice between crossing at the Detroit area or at the Blue Water Bridge, this choice would precede the standard user-equilibrium procedure that assigns all traffic to the road network, and would reflect the observed balance of traffic crossing the border in each of the two distinct locations.

Table 2-1 provides the equations' parameters for the single-logit assignment model. The equations are based on available crossing data for both cars and trucks. For cars, a separate, independent cost coefficient was found to be statistically insignificant, suggesting that for cars, cost is closely dependent upon travel time. Therefore, for cars, cost was combined with time to develop a generalized time coefficient. For trucks, independent coefficients for cost and time were found to be statistically significant and are therefore included in the equation separately. Separate tolls for each crossing are still included into the model for both cars and trucks. For

cars, these tolls, along with operating costs, are incorporated into the calculation of generalized time. For trucks, these tolls are incorporated in the calculation of cost.

Table 2-1
Detroit River International Crossing Study
Single-Logit Parameters

Passenger Vehicles (Cars)			
	Constant	**Generalized Time Coeff. (includes cost)**	
Port Huron / Sarnia	0	-0.0625	
Detroit / Windsor	0.9234	-0.0625	
Commercial Vehicles (Trucks)			
	Constant	**Time Coeff.**	**Cost Coeff.**
Port Huron / Sarnia	0	-0.0486	-0.0323
Detroit / Windsor	0.704	-0.0486	-0.0323

Source: IBI Group

The single-logit equation for passenger cars is:

VijD = 0.9234 - 0.0625 *(GijD–Gij0)
VijC = -0.0625 *(GijC–Gij0)

The single-logit model equation for commercial vehicles is as follows:

VijD = 0.704 - 0.0486*(TijD–Tij0) - 0.0323*(CijD–Cij0)
VijC = -0.0486*(TijC–Tij0) - 0.0323*(CijC–Cij0)

where:
Tij0 = total travel time via the shortest route from zone *i* to zone *j* (including border crossing)
TijD = total travel time via the Detroit River crossings from zone *i* to zone *j* (including border crossing)
TijC = total travel time via the Port Huron/St. Clair River crossing from zone *i* to zone *j* (including border crossing)
Cij0 = total cost via the cheapest route from zone *i* to zone *j* (including tolls)
CijD = total cost via the Detroit River crossings from zone *i* to zone *j* (including tolls)
CijC = total cost via the Port Huron/St. Clair River crossing from zone *i* to zone *j* (including tolls)
Gij0 = total generalized time via the shortest route from zone *i* to zone *j* (Value of time=$25/veh/h)
GijD = total generalized time via the Detroit River crossings from zone *i* to zone *j* (Value of time=$25/veh/h)
GijC total generalized time via the Port Huron/St. Clair River crossing from zone *i* to zone *j* (Value of time=$25/veh/h)

During the DRIC Illustrative Alternative analysis, the evaluation of each alternative was focused on which crossing provided the most-efficient route for travel time and cost over a wide area. The single-logit methodology was well suited for this evaluation as each alternative crossing was in a

different location along the Detroit River between Belle Isle and Grosse Ile, having substantially different costs in terms of time.

Following the evaluation of the Illustrative Alternatives, the area of analysis narrowed, with all Practical Alternatives located in close proximity to each other and the Ambassador Bridge (Figure 1-3). This close proximity of alternatives substantially diminished the time and cost differences of a new crossing alternative in comparison to other alternatives. Further, the interaction of traffic with I-75 operations between the Ambassador Bridge and the new crossing became a factor in traffic assignments for the Practical Alternatives evaluation.

The preliminary results of model runs of the Practical Alternatives using the single-logit model illustrate a high sensitivity to the travel times associated with U.S. plaza and interchange configurations. This causes imbalances in traffic assignments between the Ambassador Bridge and the proposed new crossing. For example, in the case of traffic traveling from Canada to the U.S., during the AM peak hour for one new crossing alternative, the single-logit model assigned all truck traffic to the new crossing, and zero trucks to the Ambassador Bridge. While this example represents the most extreme case, it demonstrates that the high sensitivity of the single-logit model needed to be addressed, as it was with the nested-logit model (Appendix A).

Nonetheless, the single-logit model is the primary forecast method for the evaluation of the Practical Alternatives on both sides of the border. The single-logit model forecasts support the analyses (traffic, noise, air quality, etc.) required for the Draft Environmental Impact Statement. Their use is consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary analyses and then modify those analyses in the FEIS as specifics of the project become more defined.

2.2 Networks

For the U.S. portion of the model, networks were provided by MDOT and SEMCOG. Within the region, the SEMCOG networks for 2005 base conditions and for the 2030 Regional Transportation Plan (RTP) were used throughout the analyses. SEMCOG's 2030 RTP contains a relatively small number of major capacity-increasing projects. Thus, using the RTP 2030 network for the 2035 model runs is acceptable, as it represents the roadways that are most likely to be in place between 2030 and 2035, according to SEMCOG's current plan.

For the Canadian part of the model, networks were developed by the Canadian DRIC consultant from files provided by Windsor/Essex County and the Ontario Ministry of Transport.

The traffic analysis zone (TAZ) system was constructed to fit the network. In the U.S., TAZs were assembled from the SEMCOG and MDOT Statewide models. Within the SEMCOG region, SEMCOG's TAZs were used directly for Wayne County. Outside Wayne County, some contiguous TAZs, located away from international crossings and served by a relatively sparse road network, were combined to reduce their number and the processing time of the model. The combination of TAZs outside of Wayne County does not materially affect the forecast of crossing volumes as the individual constituent TAZs share common network paths to and from the crossings and the rest of the extended network. Statewide model TAZs were used outside the SEMCOG region. In Canada, the TAZs were developed from the Ontario Ministry of Transport and Windsor/Essex County models.

2.3 Trip Tables

The 2000 base year international trip tables were updated to 2004 conditions from those used in the Planning Needs and Feasibility Study (P/N & F Study) as described in detail in the report titled: *Detroit River International Crossing Study Travel Model Update*. This document is available at www.partnershipborderstudy.com. The estimation of future international trip tables is described in the report titled: *Detroit River International Crossing Study Travel Demand Forecasts*. It can also be found on the DRIC Web site. Subsequent sections of this report contain summaries and excerpts from these two reports.

2.3.1 International Passenger Cars

The international trip tables include all passenger car trips that use the Ambassador Bridge, the Detroit-Windsor Tunnel, and the Blue Water Bridge. Origins and destinations extend throughout North America. As noted earlier, trip tables were developed for the AM peak hour, PM peak hour and the midday peak hour. Introduction of a new crossing does not change those trip tables.

The Ontario-Michigan Border Crossing Traffic Study of August 2000[4] was the source of cross-border passenger car origin-destination data and travel characteristics. It provided the basis for establishing the 2000 base year travel demand in the P/N&F Study. The dataset consists of trip characteristics obtained from 22,310 roadside surveys of passenger-vehicles crossing the Ambassador, Blue Water and International (Sault Ste. Marie) Bridges, as well as the Detroit-Windsor Tunnel, which were coded and expanded to represent the total auto volumes at each crossing. This passenger-car travel database, geocoded as described in the P/N&F report, formed the basis of passenger-car travel matrices for the 2004 model update. As described in the Travel Model Update Report, growth and adjustment factors by trip purpose were applied to update the passenger-car travel matrices by purpose for a 2004 Fall Thursday-Friday average weekday period.

Forecasts to the target years of 2015 and 2035 were established for three categories of passenger demand: 1) same-day work/business trips; 2) same-day discretionary/recreation trips; and, 3) overnight/vacation trips, by country of destination. This classification of passenger car travel was made possible through the use of the travel survey data as noted above. Forecasts of future passenger-car traffic were based on projections of the key causal factors affecting the behavior of travel by trip purpose. Growth rates were determined from projections of factors such as GDP, population, employment, currency exchange rate, etc. The growth rates for each of the 2015 and 2035 horizon years were applied directly to the number of passenger cars related to each trip purpose. Growth by category is as follows:

Work/business trips – Growth in cross-border commuting is expected to continue as the regional economies of SEMCOG and Windsor/Essex County continue to integrate as a primary effect of NAFTA and other influences. However, such growth could be dampened by shifts in exchange rates and potential border processing delays and inconveniences due to increased security measures. However, for forecasting purposes, the Essex-Windsor labor force remains a reasonable indicator of future growth in cross-border commuting, with future commuting growth increasing at the same rate as the general Essex-Windsor labor force. This assumes that the proportion of the Essex-Windsor labor force working in the US will remain constant in the future at its 2001 level of 4.7%, compared to the pre-2001 historic range of 2.2% to 3.1%.

[4] Paradigm & Stantec for the Ministry of Transportation Ontario, *The Ontario-Michigan Border Crossing Traffic Study*, August 2000.

The 2035 forecast calls for a 36 percent increase in cross-border work/business trips, which is an annual growth of 1.0 percent. While this growth rate is larger than the originally projected SEMCOG area employment growth rate of 0.4 percent per year, it is a reasonable assumption that the additional Canadian workers could be absorbed into the SEMCOG regional economy given the very small proportion that Canadian workers represent and their specialized areas of employment. Conversely, American residents working in the Greater Windsor Area are assumed to increase at the similar rate as Canadians working in the U.S., given that both groups of commuters work in the same regionally integrated industries and represent a very small proportion of the combined regional workforce.

Other same-day trips - The outlook for same-day discretionary travel is highly uncertain because the long-term effects of the catastrophe that occurred on September 11, 2001, are difficult to anticipate. Historically, there have been no other extreme events of such magnitude against which to gauge the timing and extent of a potential recovery of discretionary travel at a border crossing. While discretionary trips have declined by about 50 percent since 2000, an assumption has been made that one-half of these trips would resume over the next ten years, but it is unclear as to when in this period this recovery might begin. Between 2015 and 2035, growth in discretionary traffic is assumed to increase in relation to population: Canadian same-day discretionary travel is forecast to increase in relation to Windsor-Essex population, and U.S. traffic is forecast to increase in relation to SEMCOG area population. Therefore, between 2004 and 2035, same-day discretionary travel is projected to increase by 84 percent, or an annual growth of 2.0 percent. This growth in same-day discretionary travel assumes that the economy, entertainment and recreation venues, and other factors will continue to provide an incentive for same-day discretionary travel by both Americans and Canadians. Marketing to promote Detroit-Windsor as a destination is expected to help in the recovery. Drinking age laws, no taxation on casino winnings, the quality of entertainment venues and safety in the downtown area will attract Americans to the Windsor area over the long term. Nonetheless, the rate of growth is forecast to be lower than experienced over the past 30 years, which was affected by the cross-border shopping and the Windsor Casino phenomena, which have since run their course.

Overnight trips – Because the border delay represents a much smaller proportion of the travel time for longer-distance overnight trips, overnight/vacation travel has been much less affected by events such as 9/11, SARS, the Iraq War and the overall heightened-security levels at the border, as compared to same-day discretionary trips. The events of 9/11 do not appear to have significantly affected tourism in Ontario, with 2002 visitation being higher than 2001 for trips using the Detroit River crossings. It is estimated that overnight/vacation trips decreased by less than 10 percent between 2002 and 2004. That decline is attributed to Toronto's SARS crisis in 2003, which had a devastating effect on Toronto tourism with significant impacts throughout southern Ontario. For forecasting purposes, it is assumed that the approximate 10 percent decrease in overnight/vacation travel will be fully recovered by 2008. Beyond 2008 it is assumed that trips by Canadian residents to the U.S. will grow in proportion to Ontario's population growth, while trips by American residents to Canada will grow at the same rate as the population growth of Michigan and Ohio. From 2004 to the study horizon of 2035, overnight/vacation trips at the Detroit River crossings are projected to increase by 30 percent, or 0.8 percent per year.

Total Passenger-car Forecast - Between 2004 and 2035 horizon, annual total passenger-car trips are expected to increase from 12.0 million to 18.7 million, representing a total growth of 57 percent and an annual growth of 1.5 percent. Overall, the passenger car projections represent modest growth compared to 30-year trends for the Detroit River crossings. Even with the

assumed levels of recovery from 9/11 and SARS, the projected 2035 traffic level is only slightly higher than the 1999 level.

2.3.2 International Commercial Vehicles

The international trip tables include all commercial vehicle trips that use the Ambassador Bridge, the Detroit-Windsor Tunnel, and the Blue Water Bridge with origins and destinations extending throughout North America. Trip tables were developed for the AM, PM and Midday peak hours.

The Commercial Vehicle Survey database provided by the Ontario Ministry of Transportation (MTO) was the primary source of information for developing cross-border commercial vehicle trip tables for the P/N&F study. It is based on the 1999 National Roadside Survey (NRS), combined with results from the 2000 MTO Commercial Vehicle Survey (CVS) that provides a sample of more than 13,500 records of truck trips crossing between Ontario and Michigan. This represents the most comprehensive and recent dataset on commercial vehicle travel characteristics for crossings between Michigan and Ontario. Thus, it was used as the basis for the model update to 2004 conditions. Adjustments were made to reflect changes in overall truck freight flows, trends for different commodity types, and interactions with other modes, as described in the Travel Model Update Report. The U.S. Bureau of Transportation Statistics Transborder Freight Database and other sources were also used to update the trip tables from 2000 to 2004.

Projections of future commercial vehicle traffic are based on forecasts of Canadian trade by commodity type. Growth rates were determined from national projections of trade, expressed in value by commodity group, as prepared by Informetrica Limited in November 2004.[5] The commodity trade growth rates for each of the 2015 and 2035 horizon years were applied directly to the number of commercial vehicles estimated to be carrying each commodity and to the weight of goods transported by truck and rail. The assumptions that are made, or that are implicit to this method, include:

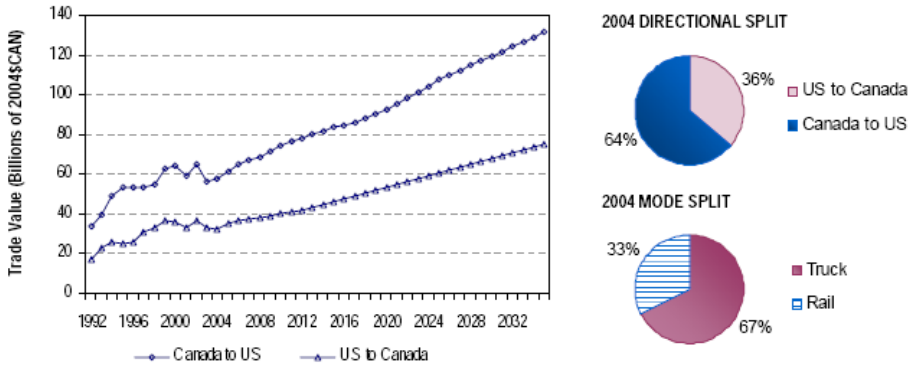
- The 2004 rail mode share by commodity type and direction will be maintained over the study horizon.
- The value-to-weight/truck relationships by commodity type will be maintained over the study horizon.
- The current Canada-to-U.S. proportion of empties (trucks with no load, a measure of the efficiency of the goods movement industry) will not change as maximum efficiency has been attained.

These growth rates were used to develop the peak-hour truck trip matrices for the travel demand model. The rates were applied to commodity-specific and direction-specific trip matrices, which were then summed to create a single, international truck trip table. It was assigned to the network, with the proportion using each Detroit River area crossing or the Blue Water Bridge determined with a discrete-choice single-logit model, based on travel time and cost as noted earlier. Following is a summary of growth assumptions by sector.

[5] Informetrica Limited, as prepared for Transport Canada, July 2002.

Automotive & Metal - The automotive sector is the dominant industry in Southeast Michigan and Southwestern Ontario, representing approximately 35 percent of commercial vehicle traffic at the Detroit River and St. Clair River crossings when the models were built. "Metal" is combined with automotive products trade for analysis purposes because a high proportion of the metal crossing the border within the study area is related to the auto industry. Automotive/metal, as a combined category, represented approximately 43 percent of the total commercial vehicle traffic when the models were built. The government of Canada projections of merchandise trade indicated that all aspects of the automotive and metal commodity groups will grow throughout the horizon period, with growth in total Canadian exports slightly outpacing total imports through the next decade, after which the growth of Canadian imports will slightly outpace exports. The combined automotive/metal sector is projected to increase in the current decade and next two decades of the 21st Century at annual rates of 3.5 percent, 2.5 percent and 2.0 percent, respectively, for Canadian exports, and at annual growth rates of 3.3 percent, 2.7 percent and 2.1 percent, respectively, for Canadian imports.

Figure 2-2
Detroit River International Crossing Study
Historic and Forecast Automotive & Metal Commodity Trade
at Detroit River and St. Clair River Crossings, All Modes

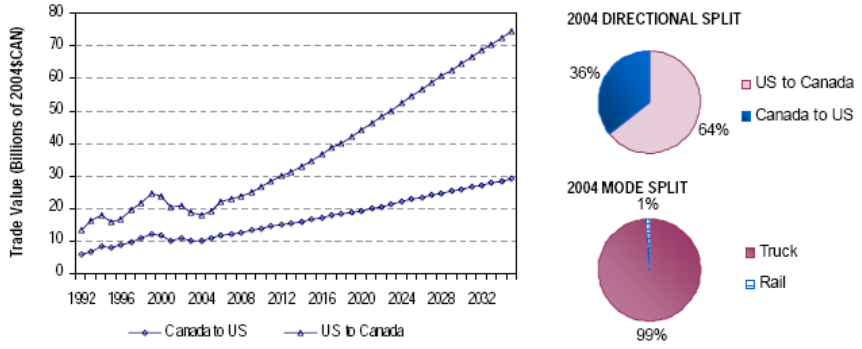


Note: Application of forecast trade growth to current trade between ON and MI/IN/IL/OH/WI.
Source: Industry Canada and analysis of Informetrica Limited trade forecasts, BTS Transborder Surface Trade data for mode splits

Source: IBI Group

Machinery and Equipment - At the time the models were built, this commodity group was responsible for approximately five percent of commercial vehicle traffic at Detroit River crossings, although its share, in terms of value, is much higher given that the type of the goods being transported include aircraft and locomotive engines, electronics and household and industrial equipment. After a steep climb during the 1990s, trade in this area since then has been depressed following the collapse of the high-tech sector, particularly for Canadian exports to the U.S. (Figure 2-3). Total trade growth was 9.5 percent annually during the 1992 to 1999 period, and then declined by 5.1 percent annually between 1999 and 2004. Going forward, machinery and equipment are projected to represent the fastest growing sector, with the dominant direction of trade continuing to be from the U.S. to Canada. This growth is expected to be spurred by relatively low interest rates over the next 30 years, aging capital equipment and strong demand for information technology products. The trade gap is projected to widen further given large growth in Canadian imports that are forecast, which the government of Canada projects at annual growth rates of 6.2 percent, 4.7 percent and 3.1 percent in each of the first three decades of the 21st Century, respectively. Canadian exports are expected to be almost as strong, growing at annual rates of 4.6 percent, 3.3 percent and 2.4 percent, annually, in each decade, respectively. This growth is consistent with strong global demand for manufacturing equipment and robust commodity prices.

Figure 2-3
Detroit River International Crossing Study
Historic and Forecast Machinery & Equipment Trade
at Detroit River and St. Clair River Crossings, All Modes



Note: Application of forecast trade growth to current trade between ON and MI/IN/IL/OH/WI.
Source: Industry Canada and analysis of Informetrica Limited trade forecasts, BTS Transborder Surface Trade data for mode splits

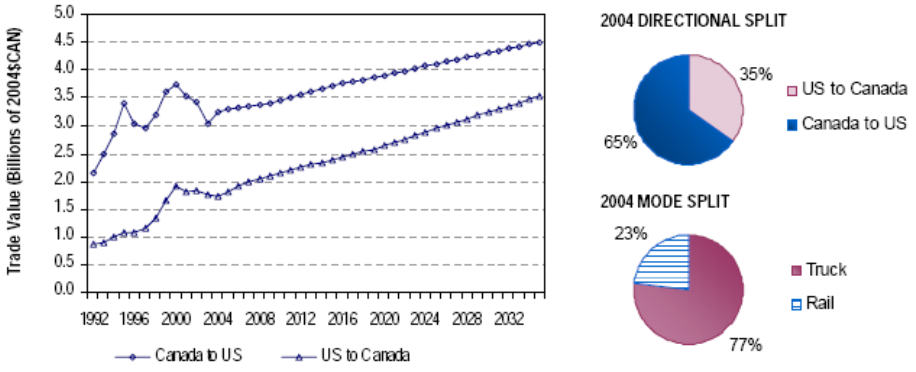
Source: IBI Group

Forest - At present, forestry products represent approximately nine percent of truck volumes at Detroit River crossings. This sector consists of raw and semi-processed wood material including: pulp, scrap paper and paperboard, wood charcoal, and both hardwood and softwood lumber. This sector also experienced a downturn since 2000 following strong growth in the 1990s, with an annual growth of 8.1 percent between 1992 and 2000 before declining by 3.0 percent annually through 2003 (Figure 2-4). The dominant direction of flow of forest products is from Canada-to-U.S., although the relative proportions of directional traffic are more balanced within the study area than at the national level.

Shipments of pulp and paper are dominated by the newspaper industry, and it tends to move in cycles with consumer spending that is driven by advertising and changing price and volume. Demand for pulp and paper has continued despite increases in electronic communications. The other large component of forest products is lumber and related products. In the late 1990s, this component experienced considerable growth, although the growth was curtailed, resulting in declines in trade with the imposition of duties that increased the price of Canadian softwood lumber by approximately 30 percent.

In addition to trade disputes and electronic media competition, a further cause for uncertainty in the forestry sector are potential changes in Canadian environmental legislation that could have an impact on the costs of production for pulp and paper as well as lumber products. In recent years, the industry has had to use new technology to keep abreast of policies regarding sustainability of the environment. Given uncertain demand and volatile prices, a consolidation of this industry may occur to better address the need for new capital investments. Rising electricity prices, the value of the Canadian dollar and high wood fiber costs introduce additional challenges. Nonetheless, the prospects for growth are strengthened by rising prices and continued demand. The government of Canada projects low-to-moderate growth for forestry products and a narrowing of the trade gap with the U.S., with Canadian exports growing at annual rates of 1.3 percent, 1.0 percent and 0.9 percent, and Canadian imports growing at annual growth rates of 2.9 percent, 2.2 percent and 1.8 percent in the first three decades of the 21st Century, respectively. This is the lowest growth among the sectors discussed in this report.

Figure 2-4
Detroit River International Crossing Study
Historic and Forecast Forest Commodity Trade
at Detroit River and St. Clair River Crossings, All Modes

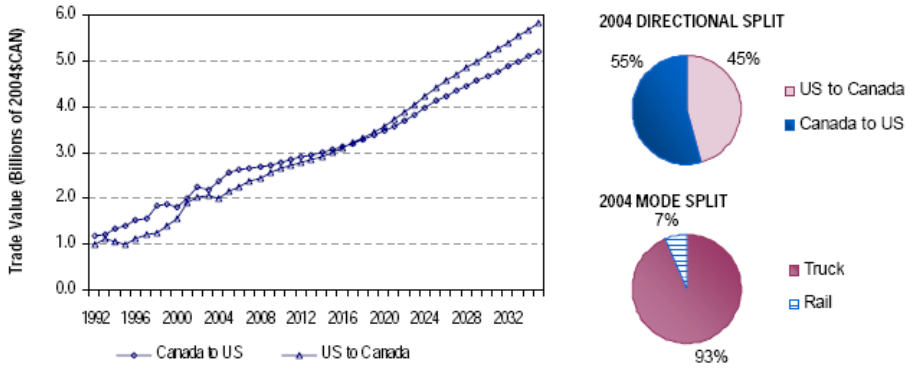


Note: Application of forecast trade growth to current trade between ON and MI/IN/IL/OH/WI.
Source: Industry Canada and analysis of Informetrica Limited trade forecasts, BTS Transborder Surface Trade data for mode splits

Source: IBI Group

Agriculture - Approximately nine percent of commercial vehicles at Detroit River crossings carried agricultural products at the time the models were built. This sector includes livestock, although livestock makes up just 5% of this sector and just 0.3% of all commodities entering Michigan. This sector did not experience the recent decline in trade of the previous three commodity groups, showing moderate-to-strong annual growth of 5.9 percent over 13 years ending in 2005 when the DRIC models were built (Figure 2-5). The agricultural sector has been affected by ongoing trade disputes in beef, pork and chicken. However, strong economic activity and employment in the U.S. has increased demand for prepared-food and beverages. The direction of trade has been, and is projected to continue to be, fairly even throughout the study horizon. The government of Canada projects annual growth of Canadian imports at rates of 3.8 percent, 3.9 percent and 2.8 percent relative to export growth rates of 2.3 percent, 3.0 percent and 2.3 percent in each of the first three decades of the 21st Century, respectively.

Figure 2-5
Detroit River International Crossing Study
Historic and Forecast Agricultural Commodity Trade
at Detroit River and St. Clair River Crossings, All Modes

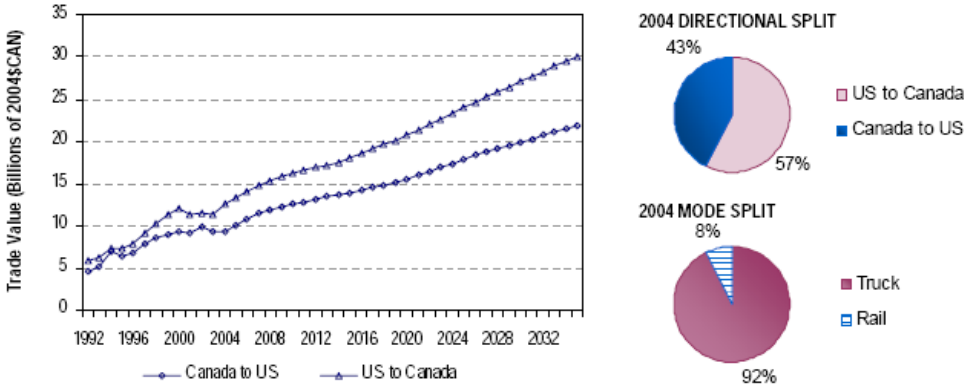


Note: Application of forecast trade growth to current trade between ON and MI/IN/IL/OH/WI.
Source: Industry Canada and analysis of Informetrica Limited trade forecasts, BTS Transborder Surface Trade data for mode splits

Source: IBI Group

Other Commodities - This sector consists of items such as chemicals and plastics, energy, minerals, textiles and other consumer products not included in the previous sectors. While this sector has experienced a decline between 2000 and 2005, overall it has grown by 6.4 percent annually since 1992 (Figure 2-6). "Other" commodities represent approximately 22 percent of the commercial vehicle flows at the Detroit River crossings. U.S.-to-Canada is the dominant direction of trade. Over the next two decades, the government of Canada projects strong growth for Canadian imports with annual growth rates of 3.7 percent, while exports are expected to grow at an annual rate of 3.3 percent thus widening the trade gap.

Figure 2-6
Detroit River International Crossing Study
Historic and Forecast Other Commodity Trade
at Detroit River and St. Clair River Crossings, All Modes



Note: Application of forecast trade growth to current trade between ON and MI/IN/IL/OH/WI.
Source: Industry Canada and analysis of Informetrica Limited trade forecasts, BTS Transborder Surface Trade data for mode splits

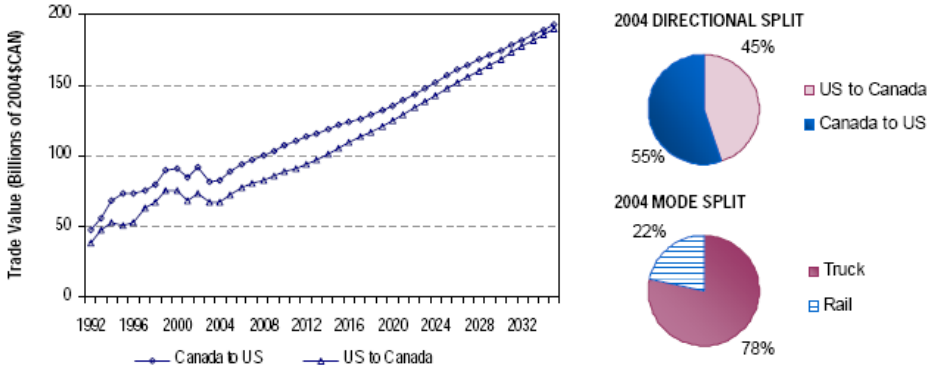
Source: IBI Group

Total Commercial Vehicle Demand Forecast - Based on the above forecasts by commodity group applied to the values of each commodity at the Detroit River and St. Clair River crossings, total imports from the U.S. to Canada will continue to grow at a faster rate than total Canadian exports to the U.S. As a result, the trade value gap between the U.S. and Canada will continue to narrow over the study horizon, with much of this occurring in the later two decades of the planning period (Figure 2-7). Over the long term, Canada is expected to narrowly remain a net exporter of goods in terms of value within the study area, due to increases in the value of the Canadian dollar and increasing integration of the U.S. and Canadian economies. The projected narrowing of the trade gap will result in a lower proportion of empty trucks traveling from the U.S. to Canada. Total commercial vehicle trips, including empty vehicles from Canada-to-the-U.S., are now and forecast to remain greater than U.S.-to-Canada, given "triangulation" in commercial vehicle routing, i.e., vehicles entering the U.S. via the Ambassador Bridge and returning to Canada via other crossings (e.g. Peace Bridge, International Bridge at Sault Ste. Marie).

Of the total Detroit River area and St. Clair River crossings demand, 66 percent of commercial vehicles presently use the Detroit River area crossings. This proportion is projected to remain stable in the future, given the anticipated travel demand growth and assumed infrastructure improvements. In the near-term, a diversion toward the Detroit River area crossings is expected with the easing of border delay following the opening of new customs booths at the Ambassador Bridge. But, this benefit will erode in time as congestion builds on the access roads.

The results of the analysis of trade show a 128 percent increase in truck traffic at the Detroit River area crossings over the study period from 3.5 million trips in 2004 to 8.1 million by 2035, or an annual growth of 2.8 percent. The effect of the narrowing trade gap is apparent, as the 55 percent-to-45 percent directional split in 2004 is reduced to a 52 percent-to-48 percent split by 2035, with the balance still in favor of the Canada-to-U.S. direction.

Figure 2-7
Detroit River International Crossing Study
Historic and Forecast Total Trade
at Detroit River and St. Clair River Crossings, All Modes



Note: Application of forecast trade growth to current trade between ON and MI/IN/IL/OH/WI.
Source: Industry Canada and analysis of Informetrica Limited trade forecasts, BTS Transborder Surface Trade data for mode splits

Source: IBI Group

2.3.3 U.S. Domestic Trips

U.S. domestic trip tables were developed from SEMCOG's 2005 base year and 2030 Regional Transportation Plan trip tables. SEMCOG provided separate vehicle trip tables for AM, midday, PM and off-peak (night) time periods, which when added represent travel for a 24-hour day for 2005 and 2030. Each matrix file contained four tables: passenger cars, light trucks, medium trucks, and heavy trucks. In order to provide trip tables for other than "modeled years," data were developed by linear interpolation or extrapolation, as appropriate, to estimate trip tables for 2004, 2015 and 2035.

Steps in developing the trip tables were:

- Aggregate all matrices from the SEMCOG TAZ system (1,505 TAZs) to the DRIC TAZ system (960 TAZs) using TransCAD's matrix aggregate routine.
- Remove all trips using the Ambassador Bridge, Detroit-Windsor Tunnel and the Blue Water Bridge, because these trips would be accounted for in the international trip tables developed separately for the DRIC Study. This was done by setting the value of all cells beginning or ending at the international crossings to zero.
- Interpolate and extrapolate, as appropriate, the matrices to 2004, 2015, and 2035.
- Apply hourly factors (as published in SEMCOG model documentation), to convert the tables from peak periods to peak hours.

The resulting tables provided the U.S. background traffic for the modeling.

2.3.4 Canadian Domestic Trips

Canadian trip tables were developed by the Canadian DRIC consultant from Windsor/Essex County and Ontario Ministry of Transport models. The Canadian domestic trip tables represented the same years and peak hours as the U.S. trip tables, but were classified only as passenger cars and commercial vehicles.

2.3.5 SEMCOG Demographic Forecasts

In April 2007, SEMCOG reduced its forecasts of population and employment growth. The effects of these changes on international traffic are reported upon in Section 6 of this report.

3. BASE YEAR VALIDATION

3.1 Introduction

A link-level validation of 2004 model results was compared to three sets of traffic counts provided by MDOT:

- The Michigan Intelligent Transportation Systems Center (MITSC) freeway counts. These counts were provided by MDOT to the consultant in an Access database.
- MDOT's 2004 ADT traffic count map as posted on MDOT's website: http://www.michigan.gov/documents/detmetro_19640_7.pdf.
- MDOT's "Sufficiency File," which has MDOT's best estimate of average daily traffic volumes for all trunkline roads. A digital file was provided to the consultant by MDOT.

This comparison effort was essentially a validation of the SEMCOG model. Except for international travel, trip tables provided by SEMCOG were the basis of the model on the U.S. side of the border.

All comparisons were made on a daily basis, as the count sources were for 24-hour periods. Because the DRIC model is set up to produce volumes for AM, PM and midday peak hours, factors were developed from SEMCOG's model documentation and applied to develop 24-hour traffic.

Link volumes were compared to counts to produce percent root-mean-square error (RMSE) summaries and "cutline" summaries. The DRIC model does a solid job of replicating available Trunkline, ADT map, and MITSC traffic counts/estimates as noted below.

3.2 Comparison of Map Volumes

3.2.1 Comparison of MITSC and MDOT ADT Map Volumes

Because the MITSC count locations are freeways, comparisons between MDOT's ADT traffic counts and the MITSC counts were limited to 34 locations. Comparisons were made only for locations where corresponding MDOT ADT traffic volumes from the map posted on the Internet could be identified. The percent RMSE for these links is 39.63 percent. This comparison does not suggest which source is the most reliable, as these count sources represent two fundamentally different metrics: raw counts from a single daily count, and calculated Daily Annual Average Traffic.

3.2.2 Comparison of DRIC Model Results and MDOT ADT Map Volumes

The DRIC model results were compared to the MDOT ADT map volumes for the same 34 links. The percent RMSE for this comparison is 39.04 percent, which is virtually the same as the comparison of MITSC and MDOT ADT map volumes.

3.2.3 Comparison of DRIC Model Results and MITSC Volumes

Percent RMSE for this comparison is 28.41 percent, which means the variation between the MITSC traffic counts and the model assignments is less than the variation between the MITSC traffic counts and the MDOT ADTS.

All of these comparisons are of freeway data. The concept behind the calculation of percent RMSE is to ensure that the model is estimating travel demand within the daily capacity of a lane. The RMSE, in terms of daily vehicles, is 16,885, which is less than the daily capacity of a freeway lane. Under this definition, the model meets this goal when comparing it to the MITSC data.

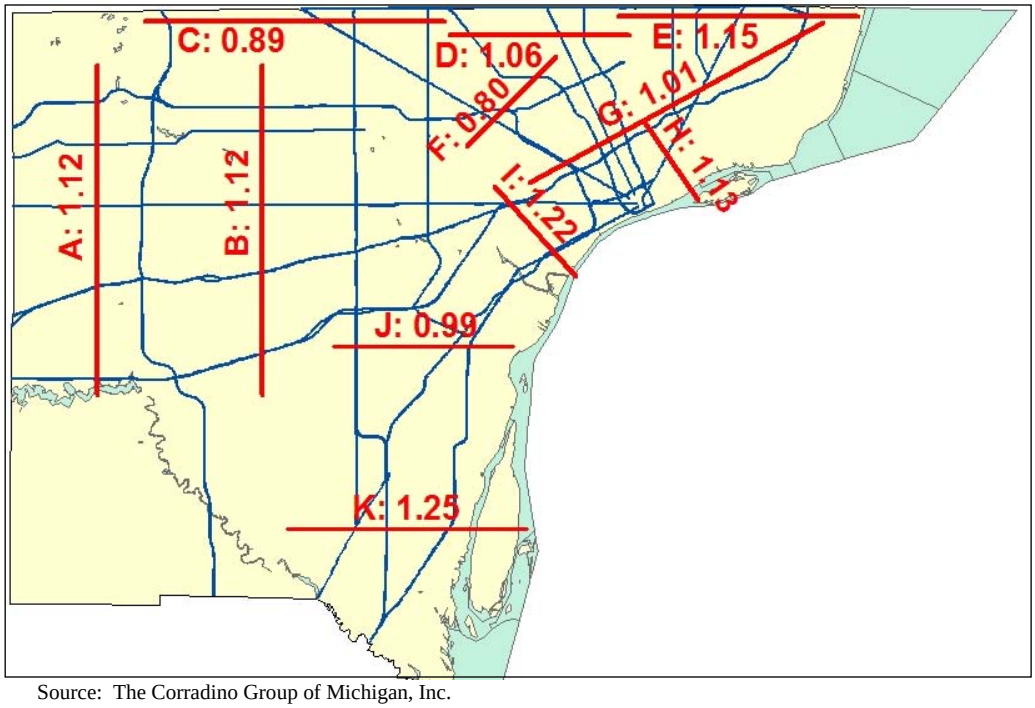
3.2.4 Comparison of DRIC Model Results to Sufficiency File Volumes

To provide a broader test, the model results were compared to MDOT's Sufficiency file, which contains MDOT's best traffic estimates for all Trunkline roads. The overall percent RMSE for 591 Trunkline links is 30.5 percent. For freeways only, the percent RMSE is better, at 25.7 percent. The RMSE is 15,200 vehicles per day (VPD), which is less than the daily capacity of a freeway lane. For Trunkline arterials, the percent RMSE is 38.58 percent or 8,600 VPD, which is near the capacity of a lane on an interrupted-flow arterial roadway.

3.3 Cutlines

To display the ability of the model to estimate traffic flow in major corridors, "cutline" comparisons were prepared for 11 locations that include significant intra-regional traffic corridors within Wayne County (Figure 3-1). Similar to a regional "screenline" which aggregates all traffic crossing a designated regional axis, a cutline aggregates traffic on all alternative roadways within a particular travel corridor, typically consisting of three to seven facilities. A general rule-of-thumb is that each cutline should have an error of 15 percent or less (i.e., the ratio of model predicted volumes to actual count volumes should be between 0.85 and 1.15). Figure 3-1 shows that all but three of the cutlines meet this standard.

Figure 3-1
Detroit River International Crossing Study
2004 DRIC Model
Daily Cutline Comparison
Model vs. Sufficiency Volumes



Source: The Corradino Group of Michigan, Inc.

4. DESCRIPTION OF PRACTICAL ALTERNATIVES

During the evaluation of Illustrative Alternatives, the focus was on the effectiveness and efficiency of distinct and separate locations for crossing route systems. For this reason, simple network connections to represent the various components of the crossing route systems provided an adequate level of detail necessary for comparison of alternatives. With the creation of a very small Area of Continued Analysis (refer to Figure 1-3), the focus of the travel demand analysis shifted to a comparison of more-detailed configurations of crossings, plaza layouts, and interchange ramps.

Due to the very small difference in the configuration of some alternatives, and the limited ability of the models to discern subtle differences between crossing configurations, similar alternatives with the same plazas and crossings, and fundamentally similar interchanges with I-75, were grouped to reduce the number of model runs required for analysis.

4.1 Development of Retained Practical Alternatives

Through a series of public meetings held from December 2005 to March 2006, public input was solicited to choose an area within which the plaza alternatives were developed. Once the plaza area was defined, plaza configurations were developed to fit within it. Then, interchange concepts were established to connect each plaza to I-75. This resulted in 13 alternatives consisting of two crossings, four plaza variations, and six interchange configurations. Table 4-1 presents the combinations of crossings, plazas, and interchanges for the 13 original Practical Alternatives.

Table 4-1
Detroit River International Crossing Study
Practical Alternative

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

Impacts of the thirteen alternatives were measured and the resulting data displayed for public review in March 2006. Subsequently, the plazas and interchanges were refined and, along with their impacts, were presented to the public in December 2006. Following the December 2006 public meetings, the interchanges were subject to a detailed "peer group" review for Value Analysis/Value Planning. Additionally, the General Services Administration and the U.S. Customs and Border Protection Agency reviewed the four original plaza layouts. A screening process was then applied based on the impact assessment information, the results of the Value Analysis/Value Planning and the input from CBP/GSA to eliminate the least-practical configurations from the final analysis of impacts. Details of the screening process and its conclusions are presented in the Draft Report: *Additional Screening of Alternatives*, June 2007 (available online at www.partnershipborderstudy.com) and are discussed in the Draft Environmental Impact Statement (DEIS).

4.2 Retained Practical Alternatives

The result of the screening process was to retain seven of the thirteen original Practical Alternatives and add two new alternatives, Alternatives #14 and #16 (Table 4-2 and Figures 4-1 and 4-2). The latter were included to improve local access across I-75 compared to the other options. The nine Practical Alternatives, #1, #2, #3, #5, #7, #9, #11, #14, and #16 were consolidated into three modeling groups for continued analysis:

- **Alternatives #1, 2, 3, 14 and 16**
- **Alternative #5**
- **Alternatives #7, 9, and 11.**

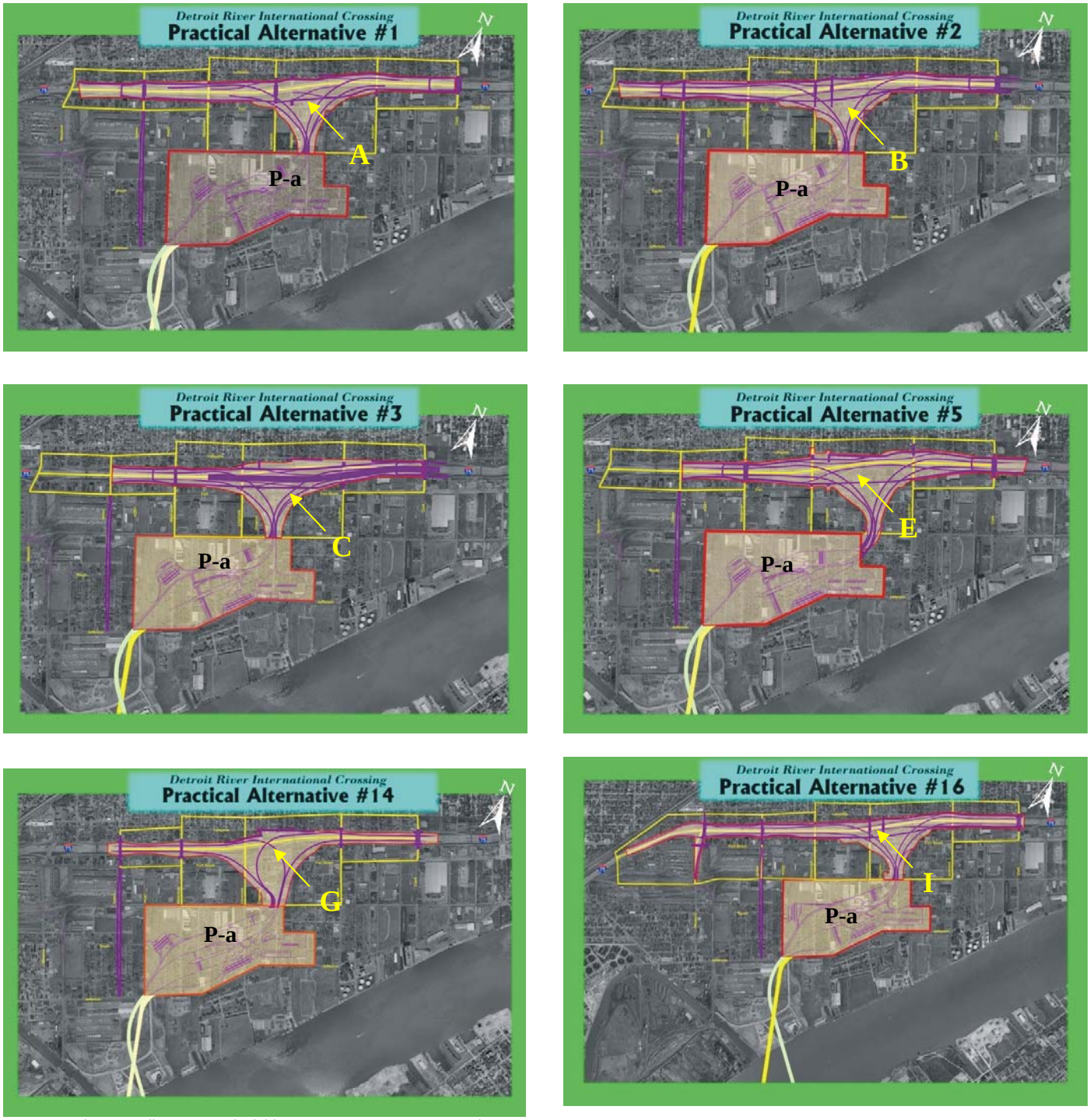
Table 4-2
Detroit River International Crossing Study
Crossing Systems Included in DRIC DEIS

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

Source: The Corradino Group of Michigan, Inc.

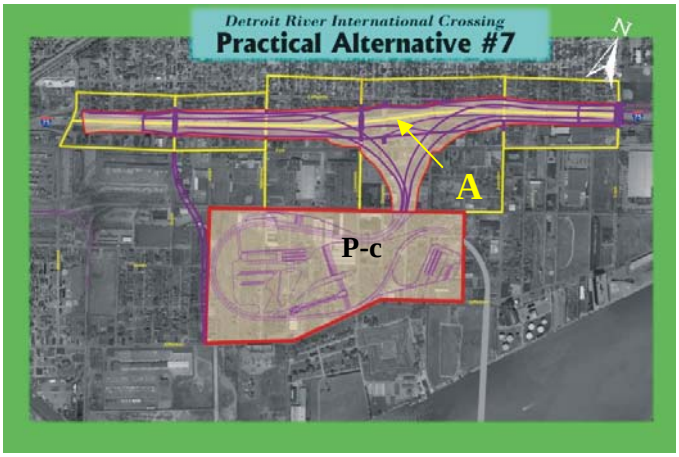
Figures 4-3 through 4-5 are representations of: how the DRIC crossings tie into the plazas, the plaza roadways, and how the connections are made between the plaza and I-75. The future Ambassador Bridge plaza is depicted on Figure 4-6. By comparison, the X-11/C-4 Illustrative Alternative that most closely resembles the Practical Alternatives is shown in Figure 4-7.

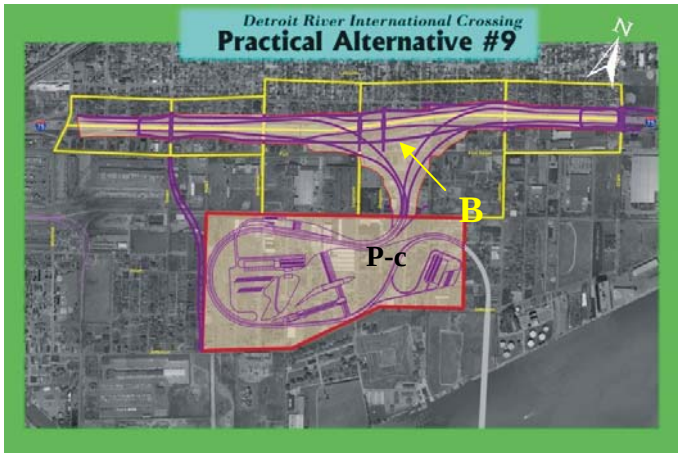
Figure 4-1
Detroit River International Crossing Study
Schematic Representation
of
X-10 Crossing Alternatives #1, #2, #3, #5, #14 and #16

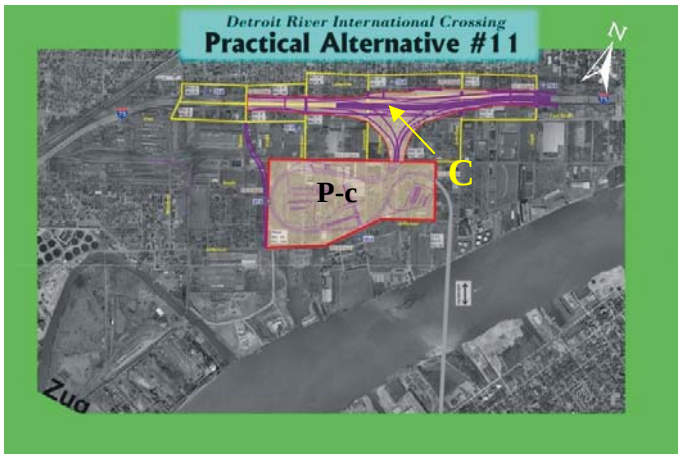


Source: The Corradino Group of Michigan, Inc. Parsons Transportation Group

Figure 4-2
Detroit River International Crossing Study
Schematic Representation
of
X-11 Crossing Alternatives #7, #9, #11

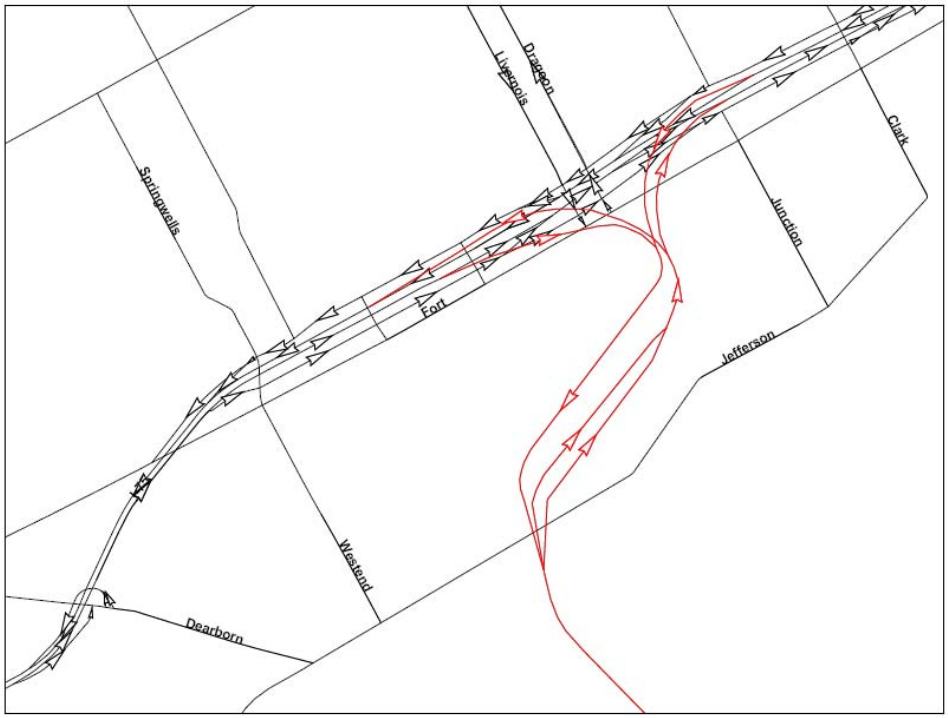






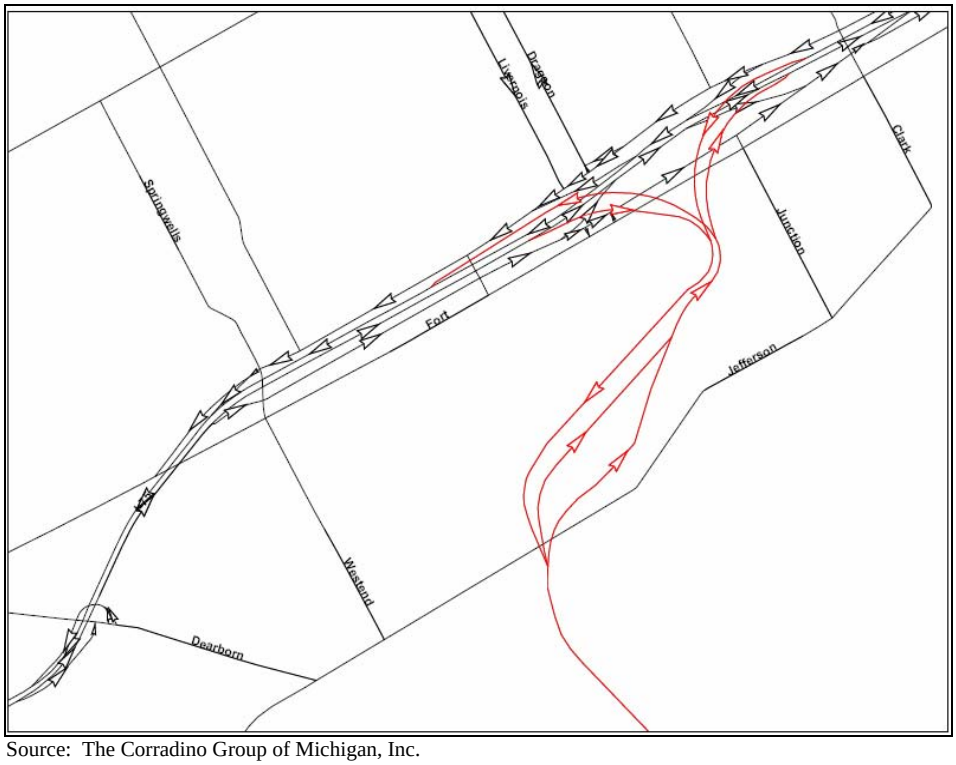
Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 4-3
Detroit River International Crossing Study
Model Network Coding for Alternatives #1, #2, #3, #14 and #16



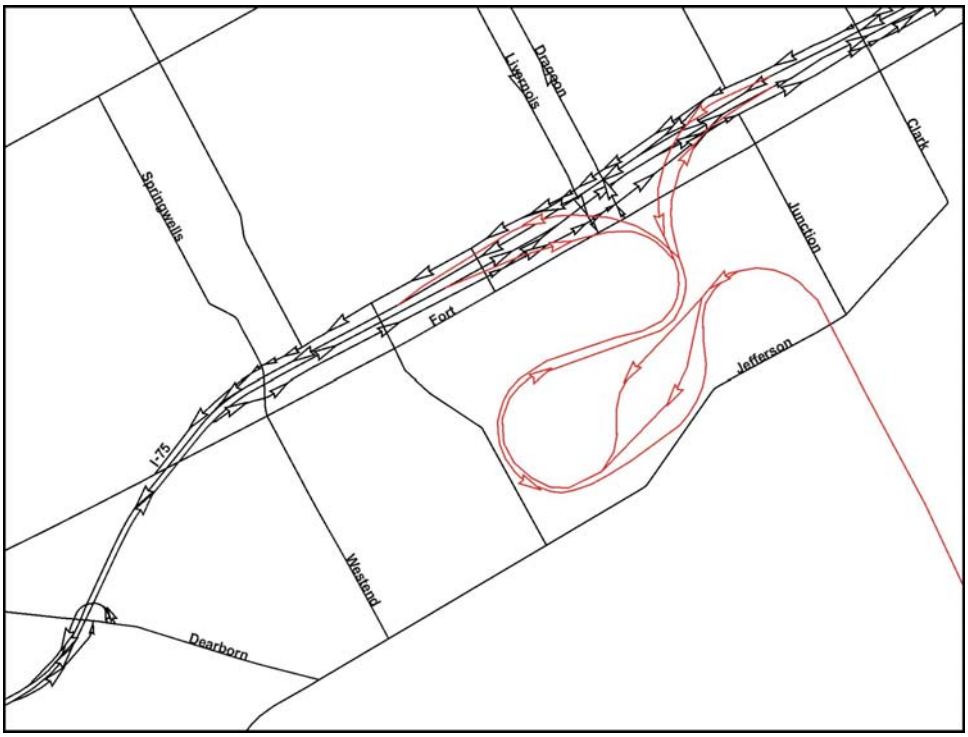
Source: The Corradino Group of Michigan, Inc.

Figure 4-4
Detroit River International Crossing Study
Model Network Coding for Alternative #5



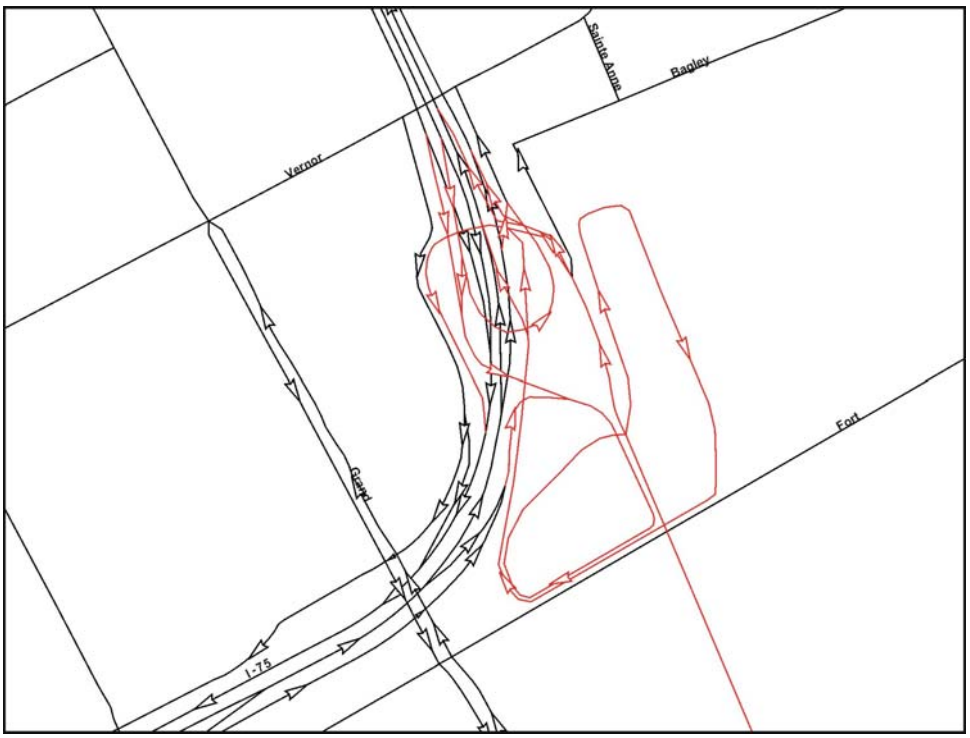
Source: The Corradino Group of Michigan, Inc.

Figure 4-5
Detroit River International Crossing Study
Model Network Coding for Alternatives #7, #9, and #11



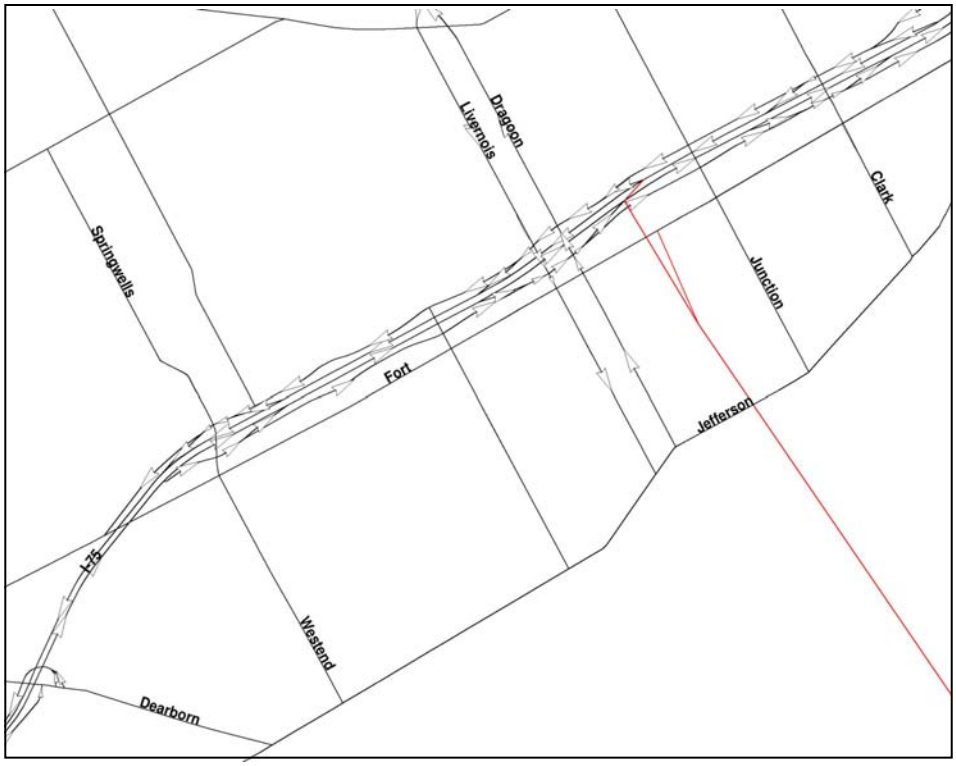
Source: The Corradino Group of Michigan, Inc.

Figure 4-6
Detroit River International Crossing Study
Model Network Coding for Ambassador Bridge/I-75 Gateway Configuration



Source: The Corradino Group of Michigan, Inc.

Figure 4-7
Detroit River International Crossing Study
Model Network Coding for the X-11 Illustrative Alternative



5. FORECASTS

The traffic forecasts using the single-logit model are presented in this section. A comparison of these results with those of the nested-logit model is included in Appendix A. It is reiterated that both models use three trip tables: 1) U.S. domestic traffic, 2) Canadian domestic traffic, and 3) international traffic crossing in the Southeast Michigan – Southwest Ontario border frontier. International traffic includes all car and truck trips crossing among the following four crossings: the Blue Water Bridge, the Detroit-Windsor Tunnel, the Ambassador Bridge, and the proposed DRIC crossing. With the trip tables established and domestic traffic operating in the background, the purpose of the DRIC modeling is to assign the international traffic to the network by way of one of the four crossings. This section focuses on reporting and analyzing crossing volumes among the four options, with emphasis on the Detroit River area, and with particular emphasis on the crossing volumes on the Ambassador Bridge and the proposed new crossing. The statistics reported are the crossing volumes for: cars, trucks, total vehicles, and passenger car equivalents (PCEs) along with: Vehicle Miles Traveled, Vehicle Hours Traveled, and volume-to-capacity (V/C) ratios.

5.1 Comparison with Illustrative Alternatives Forecast

Table 5-1 and Figure 5-1 compare the distribution of traffic between the X-11/C-4 Illustrative Alternative and the Practical Alternatives. While total traffic in the SEMCOG region is relatively stable across all alternatives, the introduction of the detailed plaza and interchange into the Practical Alternative networks, with the corresponding additional length and time, affects the shares of cars and trucks at the proposed DRIC crossing and Ambassador Bridge. The less detailed network for the X-11/C-4 Illustrative Alternative results in international traffic heavily favoring the proposed DRIC crossing over the Ambassador Bridge. The inclusion of the detailed networks in the Practical Alternatives results in a more balanced distribution between the two crossings.

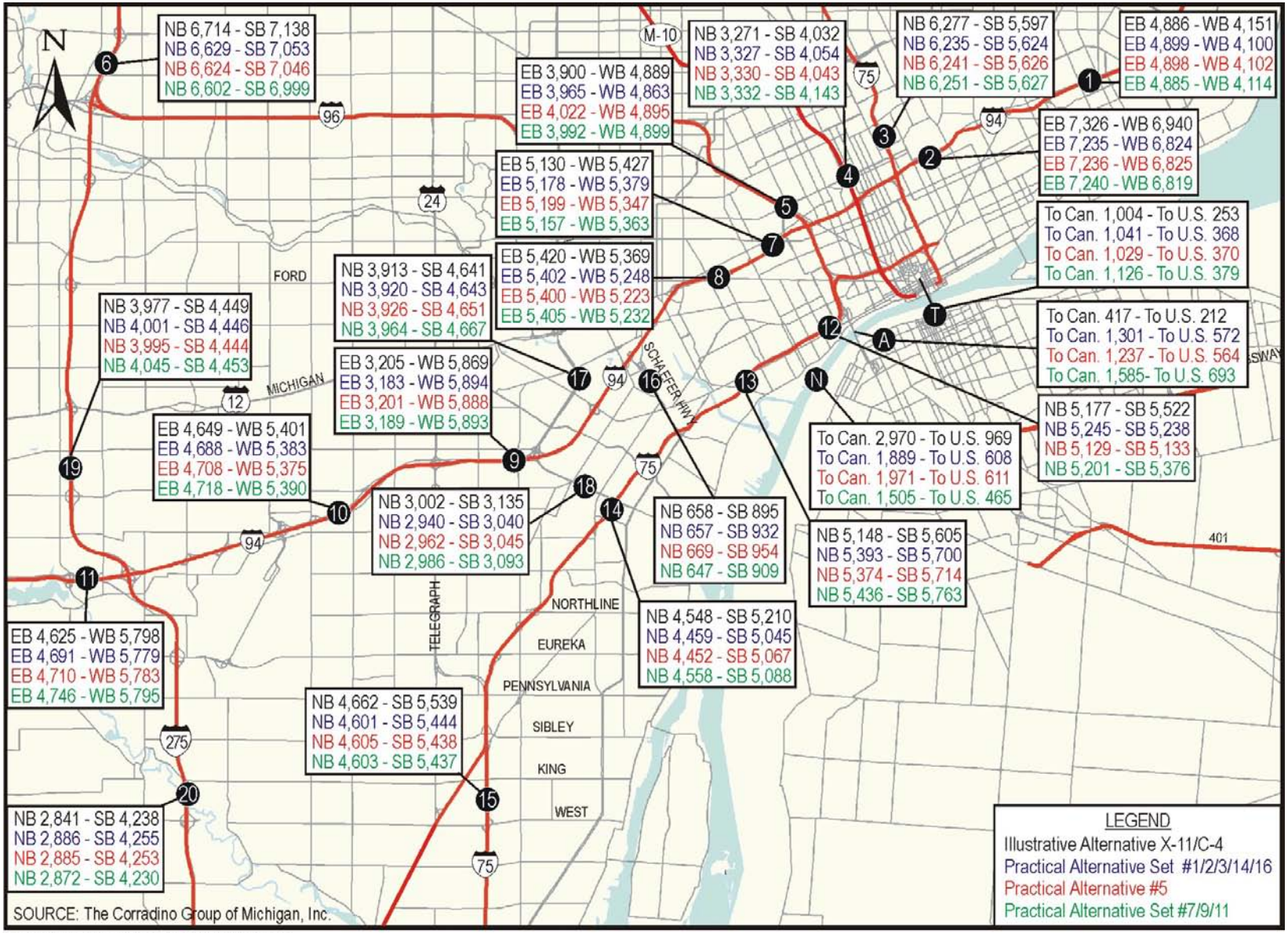
During the Illustrative Alternatives phase, approximately 200 cars were incorrectly allocated to the U.S.-to-Canada direction. This has been corrected for the Practical Alternatives and accounts for the difference in total car volumes shown for Illustrative Alternative X-11/C-4 as compared to all Practical Alternatives in Table 5-1.

Table 5-1
Detroit River International Crossing Study
2035 PM Peak Hour Total Traffic Volumes
Illustrative Alternative X-11/C-4 and All Practical Alternatives

	Network	U.S.-to-Canada					Canada-to-U.S.				
		BWB	DWT	AMB	NEW	Total	BWB	DWT	AMB	NEW	Total
Cars	Illustrative Alt. X-11/C-4	450	973	383	2,038	3,844	407	252	178	565	1,402
	#1, #2, #3, #14, #16	414	997	1,072	1,155	3,638	466	367	502	250	1,585
	#5	413	982	1,028	1,215	3,638	466	369	501	247	1,583
	#7, #9, #11	417	1,080	1,221	920	3,638	471	378	532	204	1,585
Trucks	Illustrative Alt. X-11/C-4	378	31	34	932	1,375	347	1	34	404	786
	#1, #2, #3, #14, #16	368	44	229	734	1,375	357	1	70	358	786
	#5	364	47	209	756	1,376	358	1	63	364	786
	#7, #9, #11	379	46	364	585	1,374	364	1	161	261	787
Total	Illustrative Alt. X-11/C-4	828	1,004	417	2,970	5,219	754	253	212	969	2,188
	#1, #2, #3, #14, #16	782	1,041	1,301	1,889	5,013	823	368	572	608	2,371
	#5	777	1,029	1,237	1,971	5,014	824	370	564	611	2,369
	#7, #9, #11	796	1,126	1,585	1,505	5,012	835	379	693	465	2,372

Source: The Corradino Group of Michigan, Inc.

Figure 5-1
Detroit River International Crossing Study
2035 PM Peak Hour Total Traffic Volumes
Illustrative Alternative X-11/C-4 and All Practical Alternatives



5.2 Crossing Distance and Travel Times

With each of the Practical Alternatives serving the same general location, the analysis focuses on the relatively small time differences associated with the physical layout of each alternative and their effects on international traffic volumes using the Blue Water Bridge, the Detroit-Windsor Tunnel, the Ambassador Bridge and the proposed DRIC crossing.

Aside from the incorporation of: the new crossings, the associated U.S. plazas, and the I-75 interchange connectors, all other aspects of the U.S. and Canadian networks remain the same for all alternatives. While multiple plaza and connector alternatives are under consideration in Canada, the Canadian DRIC team determined that these various plaza alternatives and plaza configurations do not constitute significant functional differences in the model network. Therefore, the Canadian team established one model network configuration for Canada, which the U.S. team has incorporated.

Within the Detroit area, the Ambassador Bridge and proposed DRIC crossing serve the same local and long-distance international traffic such that a direct comparison of the crossing times and distances from typical trip start and end points is possible. Table 5-2 presents the distances and times for four example trips in the 2035 PM peak hour with practical alternatives #1/2/3/14/16. The distances and times represent each unique segment of four example trips:

1) Highway 401 and Provincial Road in Canada to the I-75/I-96 interchange in the U.S.
2) Highway 401 and Provincial Road in Canada to the Rouge River Bridge on I-75 in the U.S.
3) The I-75/I-96 interchange in the U.S. to Highway 401 and Provincial Road in Canada.
4) The Rouge River Bridge on I-75 in the U.S. to Highway 401 and Provincial Road in Canada.

The length of the plaza-to-plaza segments includes the directional routes within the plazas. Specifically, the Ambassador Bridge's plaza-to-plaza route is different for outbound (to Canada) traffic and inbound (to the U.S.), and therefore has different lengths. Also, the Ambassador Bridge's Gateway plaza configuration serving inbound traffic (to the U.S.) is distinctly different for cars and trucks. Therefore Table 5-2 includes the distances and times for both vehicle classes for the Canada-to-U.S. direction.

Table 5-2
Detroit River International Crossing
Example Trip: Distances and Times in 2035 PM Peak Hour
Practical Alternatives #1, 2, 3, 14, and 16

U.S. to Canada	Ambassador Bridge		Proposed DRIC Crossing	
	Miles	Minutes	Miles	Minutes
I-75/Rouge Bridge to U.S. Plaza[a]	3.4	3.8	2.1	3.8
I-75/I-96 to U.S. Plaza	0.8	2.0	2.1	3.7
U.S. Plaza to Canadian Plaza	2.4	3.9	2.8	4.7
Canadian Plaza to Hwy 401/Provincial Rd.	8.6	10.8	8.3	8.2
I-75/Rouge Bridge to Hwy 401/Provincial Rd.	14.4	18.5	13.2	16.7
I-75/I-96 to Hwy 401/Provincial Rd.	11.8	16.7	13.2	16.6
Canada to U.S.	**Ambassador Bridge**		**Proposed DRIC Crossing**	
	Miles	**Minutes**	**Miles**	**Minutes**
Hwy 401/Provincial Rd. to Canadian Plaza	8.5	10.1	8.2	7.9
Canadian Plaza to U.S. Plaza (cars)[b]	1.9	3.1	2.8	4.0
Canadian Plaza to U.S. Plaza (trucks)	3.0	4.8	2.8	4.0
U.S. Plaza to I-75/I-96 (cars) [b]	0.6	0.7	2.1	2.3
U.S. Plaza to I-75/I-96 (trucks) [b]	0.6	0.7	2.1	2.3
U.S. Plaza to I-75/Rouge Bridge (cars) [b]	3.7	4.0	2.1	2.7
U.S. Plaza to I-75/Rouge Bridge (trucks) [b]	3.7	4.1	2.1	2.7
Hwy 401 to I-75/I-96 (cars) [b]	11.0	13.9	13.1	14.2
Hwy 401 to I-75/I-96 (trucks) [b]	12.1	15.6	13.1	14.2
Hwy 401 to I-75/Rouge Bridge (cars) [b]	14.1	17.2	13.1	14.6
Hwy 401 to I-75/Rouge Bridge (trucks) [b]	15.2	19.0	13.1	14.6

[a] As stated in Section 2.1.1, the user equilibrium assignment routine uses capacity restraint to establish congested travel times. Due to high international truck volume in the PM peak hour, this path has an elevated travel time.
[b] Inbound to the U.S., the Ambassador Bridge has a distinctly different route through the plaza for cars and trucks
Source: The Corradino Group of Michigan, Inc.

The data in Table 5-2 show that, in general, the proposed DRIC crossings provide the shortest distance and time for trips arriving from or traveling to the south (Rouge River Bridge). The Ambassador Bridge offers the shortest-distance path for trips arriving from or traveling to the north (I-75/I-96 Interchange). However, for trips in the U.S.-to-Canada direction, the travel time is slightly faster on the proposed DRIC crossing under Practical Alternative Set #1/2/3/14/16 (16.5 minutes versus 16.7 minutes for the Ambassador Bridge).

Table 5-3 presents the distance and travel times, by direction, for each of the three groups of DRIC Practical Alternatives. The distances and travel times presented are derived from the model and represent the capacity-constrained congested speeds for each of the three peak hours for 2015 and 2035. Because each proposed DRIC alternative provides sufficient capacity to meet the travel demand in 2035, the congested speeds are very close to free-flow speeds, and congestion is not a significant factor on travel times.

Table 5-3
Detroit River International Crossing
Proposed Plaza-to-Plaza
Distance and Travel Times

2015	Distance (miles)	U.S.-to-Canada Time (minutes)			Canada-to-U.S. Time (minutes)		
		AM	MD	PM	AM	MD	PM
#1/#2/#3/#14/#16	2.8	4.0	4.1	4.2	4.0	3.9	3.9
#5	2.9	4.2	4.2	4.3	4.1	4.1	4.1
#7/#9/#11	4.4	5.7	5.7	5.8	5.6	5.6	5.6
2035	**Distance (miles)**	**U.S.-to-Canada Time (minutes)**			**Canada-to-U.S. Time (minutes)**		
		AM	**MD**	**PM**	**AM**	**MD**	**PM**
#1/#2/#3/#14/#16	2.8	4.1	4.2	4.7	4.0	4.0	4.0
#5	2.9	4.2	4.3	4.4	4.2	4.1	4.1
#7/#9/#11	4.4	6.1	5.8	6.1	5.7	5.6	5.6

Source: The Corradino Group of Michigan, Inc.

The allocation of traffic between the Ambassador Bridge and the proposed DRIC alternatives is mostly dependent on the travel times over the crossings and through the plazas along with the alternative's location. The border clearance and toll processing times for all alternatives and all crossings are considered equal.[6]

Alternative Set #1/2/3/14/16 and Alternative #5 are very similar, each using crossing X-10 and a "linear" plaza design, as depicted in Figures 4-3 and 4-4. They have distances and travel times within 0.1 miles and 0.3 minutes of each other. Alternative Set #7/9/11 uses the X-11 crossing, which increases the length of the connecting route between the Canadian plaza and the bridge. On the U.S. side, these alternatives use a longer "U"-shaped plaza. As a result, Alternative Set #7/9/11 is 1.5 miles longer than the other DRIC alternatives. This translates into an increase of travel time of between 1.5 and 1.9 minutes, compared to Alternative Set #1/2/3/14/16 and Alternative #5. It is this increased travel time that influences the assignments among DRIC alternatives and between them and the Ambassador Bridge.

[6] The single-logit model does not apply time penalties to the new crossing, Ambassador Bridge, and the Blue Water Bridge. Time penalties are applied to the Detroit-Windsor Tunnel in order to calibrate base year crossing shares between the Ambassador Bridge and the Tunnel with observed data. These penalties do not represent processing times.

5.3 Crossing Volume Forecasts

This section and Appendix B present the volumes for the three existing crossings and the proposed DRIC crossings. Peak hour (AM, Midday, and PM) crossing volumes are presented for the years 2004, 2015, and 2035. In viewing these data, it should be noted, while reasonably close, the crossing patterns between the AM and PM peak hours are not mirror images of each other for a number of reasons. For example, international trucks do not always return to the same location at the end of each day. Trucks may enter the U.S. in the Detroit area and re-enter Canada via New York. Some cars may return during the PM peak hour via a different route than used in the AM peak hour as a result of congestion often caused by trucks on the crossings. Lastly, the DRIC model is a peak hour model, not a peak period model.[7] The pattern and volume of traffic and the distribution of trip purposes differ significantly between the AM peak hour and the PM peak hour.

Table 5-4 presents the base year assignments for the No Build condition resulting from the use of the single-logit model along with an equilibrium assignment. The 2004 scenario uses the current Ambassador Bridge plaza and interchange layout without the Gateway Project improvements, as they will not be completed until 2009, and is intended to show the present balance of international crossing volumes as calibrated to observed data. In general, the data show that in the 2004 base year:

- The Blue Water Bridge carries between 12 and 26 percent of two-way car traffic (○ red circle), and 32 and 35 percent of truck traffic (○ blue circle), depending on the peak-hour. The Blue Water Bridge, serving more long distance and fewer commuter trips, carries the least number of cars, especially in the AM peak hour, as compared to the Ambassador Bridge and the Detroit-Windsor Tunnel.

- The Detroit-Windsor Tunnel primarily serves as a direct connection between downtown Detroit and downtown Windsor. With its lack of direct access to the freeway network and certain restrictions regarding truck size and type, the Tunnel carries few trucks (□ blue squares).

- The Ambassador Bridge acts as the main thoroughfare for both commuter and long-distance traffic, especially truck traffic. The Ambassador Bridge carries between one-third and one-half of all cars and almost two-thirds of all trucks. Converted to PCEs, the Ambassador Bridge carries slightly more than half of all international traffic in each peak hour (□ green squares), while the Blue Water Bridge and Detroit-Windsor Tunnel carry between 19 and 29 percent each (□ black squares), depending on the peak period being observed.

[7] The DRIC model and its associated international trip tables were originally developed as a peak hour model. Background U.S. domestic trip tables were provided to the DRIC Study Team by SEMCOG as peak periods volumes and were converted to peak hours using the conversion factors provided in Table 8-5 of the *SEMCOG Travel Model Documentation*. These factors (peak period to peak hour) are: AM: 0.549; Midday: 0.206; PM: 0.349.

Table 5-4
Detroit River International Crossing Study
2004 Peak Hour Volumes
Single-Logit Assignment

AM

	Network	U.S.-to-Canada				Canada-to-U.S. (Peak Direction)				Two-Way Traffic			
		BWB	DWT	AMB	Total	BWB	DWT	AMB	Total	BWB	DWT	AMB	Total
Cars	2004 No Action	126 24%	195 37%	203 39%	524 100%	203 9%	836 39%	1,128 52%	2,167 100%	329 12%	1,031 38%	1,331 49%	2,691 100%
Trucks	2004 No Action	52 18%	16 6%	217 76%	285 100%	167 41%	25 6%	218 53%	410 100%	219 32%	41 6%	435 63%	695 100%
Total	2004 No Action	178 22%	211 26%	420 52%	809 100%	370 14%	861 33%	1,346 52%	2,577 100%	548 16%	1,072 32%	1,766 52%	3,386 100%
PCEs	2004 No Action	256 21%	235 19%	746 60%	1,237 100%	621 19%	899 28%	1,673 52%	3,192 100%	877 20%	1,134 26%	2,419 55%	4,429 100%

Midday

	Network	U.S.-to-Canada				Canada-to-U.S.				Two-Way Traffic			
		BWB	DWT	AMB	Total	BWB	DWT	AMB	Total	BWB	DWT	AMB	Total
Cars	2004 No Action	285 26%	413 37%	411 37%	1,109 100%	232 26%	312 35%	347 39%	891 100%	517 26%	725 36%	758 38%	2,000 100%
Trucks	2004 No Action	183 30%	38 6%	388 64%	609 100%	134 34%	11 3%	250 63%	395 100%	317 32%	49 5%	638 64%	1,004 100%
Total	2004 No Action	468 27%	451 26%	799 47%	1,718 100%	366 28%	323 25%	597 46%	1,286 100%	834 28%	774 26%	1,396 46%	3,004 100%
PCEs	2004 No Action	743 28%	508 19%	1,381 52%	2,632 100%	567 30%	340 18%	972 52%	1,879 100%	1,310 29%	848 19%	2,353 52%	4,510 100%

PM

	Network	U.S.-to-Canada (Peak Direction)				Canada-to-U.S.				Two-Way Traffic			
		BWB	DWT	AMB	Total	BWB	DWT	AMB	Total	BWB	DWT	AMB	Total
Cars	2004 No Action	374 15%	919 38%	1,156 47%	2,449 100%	307 31%	302 31%	379 38%	988 100%	681 20%	1,221 36%	1,535 45%	3,437 100%
Trucks	2004 No Action	164 29%	16 3%	379 68%	559 100%	155 43%	3 1%	202 56%	360 100%	319 35%	19 2%	581 63%	919 100%
Total	2004 No Action	538 18%	935 31%	1,535 51%	3,008 100%	462 34%	305 23%	581 43%	1,348 100%	1,000 23%	1,240 28%	2,116 49%	4,356 100%
PCEs	2004 No Action	784 20%	959 25%	2,104 55%	3,847 100%	695 37%	310 16%	884 47%	1,888 100%	1,479 26%	1,269 22%	2,988 52%	5,735 100%

Source: The Corradino Group of Michigan, Inc.

Tables 5-5A through 5-7B present 2035 crossing volumes resulting from the use of the single-logit model along with the user-equilibrium assignment for each alternative and peak hour period. Peak period data for 2015 conditions are presented in Appendix B.

2035 AM Peak Hour

Table 5-5A illustrates for the 2035 AM peak hour the following:

- A five percent decline (○ red oval) in overall auto traffic on the Blue Water Bridge and a ten to 14 percent decline in overall truck traffic (○ blue oval) with the introduction of a proposed DRIC crossing. The decline is expected to be moderate for traffic traveling in both directions.

- The Detroit-Windsor Tunnel would register a 20 to 27 percent decline in total traffic (○ green oval), with the most significant reduction expected to occur in auto traffic in the Canada-to-U.S. peak direction.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge would realize a 38 percent reduction in car traffic (□ red squares). Also, with Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge is expected to realize a reduction of 86 percent of its truck traffic (□ green squares) with only two trucks in the Canada-to-U.S. direction (□ orange square).

- Under Alternative Set #7/9/11, the Ambassador Bridge is expected to realize a reduction of only 19 percent of its total car traffic (□ blue square) and a reduction of 64 percent of its truck traffic (□ black square). The increased time of Alternative Set #7/9/11 compared to the DRIC alternatives causes this retention of car and truck traffic at the Ambassador Bridge.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the proposed DRIC crossing is forecast to carry approximately 48 percent of all international PCEs in the U.S.-to-Canada direction (△ red pyramid). In the Canada-to-U.S. direction, these proposed DRIC crossings would carry approximately 43 to 48 percent of all PCEs (△ green pyramid). Overall, Alternative Set #1/2/3/14/16 and Alternative #5 would carry about 45 percent of all PCEs (▽ green wedge).

- The extra travel time associated with Alternative Set #7/9/11 would lower its share to 27 percent of all PCEs in the U.S.-to-Canada direction (△ blue pyramid). With this alternative set, the proposed DRIC crossing would carry 33 percent of all PCEs in the Canada-to-U.S. direction (△ black pyramid) and 31 percent of total PCEs (▽ black wedge).

Table 5-5B shows the 2035 AM peak hour directional volumes for just the Ambassador Bridge and the proposed DRIC crossing. Figure 5-2 depicts those movements.

- For the U.S.-to-Canada Direction

  – From I-75 Northbound: All DRIC alternatives would serve the majority of the car, truck and, therefore, total traffic (○ red oval).

Table 5-5A
Detroit River International Crossing Study
AM 2035 Peak Hour Volumes
Single-Logit Assignment

	Network	U.S.-to-Canada					Canada-to-U.S.					Two-Way Traffic				
		BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	No Build	182 24%	305 40%	273 36%	n/a	760 100%	186 6%	1,150 38%	1,709 56%	n/a	3,045 100%	368 10%	1,455 38%	1,982 52%	n/a	3,805 100%
	#1, #2, #3, #14, #16	177 23%	257 34%	130 17%	196 26%	760 100%	171 6%	866 28%	1,099 36%	908 30%	3,044 100%	348 9%	1,123 30%	1,229 32%	1,104 29%	3,804 100%
	#5	177 23%	256 34%	141 19%	185 24%	759 100%	172 6%	867 28%	1,101 36%	905 30%	3,045 100%	349 9%	1,123 30%	1,242 33%	1,090 29%	3,804 100%
	#7, #9, #11	178 23%	274 36%	242 32%	67 9%	761 100%	173 6%	957 31%	1,371 45%	544 18%	3,045 100%	351 9%	1,231 32%	1,613 42%	611 16%	3,806 100%
Trucks	No Build	191 26%	78 11%	454 63%	n/a	723 100%	361 41%	63 7%	465 52%	n/a	889 100%	552 34%	141 9%	919 57%	n/a	1,612 100%
	#1, #2, #3, #14, #16	158 22%	26 4%	126 17%	413 57%	723 100%	319 36%	16 2%	2 0%	551 62%	888 100%	477 30%	42 3%	128 8%	964 60%	1,611 100%
	#5	160 22%	26 4%	139 19%	398 55%	723 100%	321 36%	16 2%	2 0%	550 62%	889 100%	481 30%	42 3%	141 9%	948 59%	1,612 100%
	#7, #9, #11	168 23%	32 4%	277 38%	246 34%	723 100%	326 37%	19 2%	62 7%	483 54%	890 100%	494 31%	51 3%	339 21%	729 45%	1,613 100%
Total	No Build	373 25%	383 26%	727 49%	n/a	1,483 100%	547 14%	1,213 31%	2,174 55%	n/a	3,934 100%	920 17%	1,596 29%	2,901 54%	n/a	5,417 100%
	#1, #2, #3, #14, #16	335 23%	283 19%	256 17%	609 41%	1,483 100%	490 12%	882 22%	1,101 28%	1,459 37%	3,932 100%	825 15%	1,165 22%	1,357 25%	2,068 38%	5,415 100%
	#5	337 23%	282 19%	280 19%	583 39%	1,482 100%	493 13%	883 22%	1,103 28%	1,455 37%	3,934 100%	830 15%	1,165 22%	1,383 26%	2,038 38%	5,416 100%
	#7, #9, #11	346 23%	306 21%	519 35%	313 21%	1,484 100%	499 13%	976 25%	1,433 36%	1,027 26%	3,935 100%	845 16%	1,282 24%	1,952 36%	1,340 25%	5,419 100%
PCEs[a]	No Build	660 26%	500 19%	1,408 55%	n/a	2,568 100%	1,089 21%	1,308 25%	2,872 55%	n/a	5,268 100%	1,748 22%	1,808 23%	4,280 55%	n/a	7,835 100%
	#1, #2, #3, #14, #16	572 22%	322 13%	445 17%	1,229 48%	2,568 100%	969 18%	906 17%	1,104 21%	2,286 43%	5,264 100%	1,541 20%	1,228 16%	1,549 20%	3,514 45%	7,832 100%
	#5	577 22%	321 13%	489 19%	1,180 46%	2,567 100%	975 19%	907 17%	1,106 21%	2,280 43%	5,268 100%	1,552 20%	1,228 16%	1,595 20%	3,460 44%	7,834 100%
	#7, #9, #11	598 23%	354 14%	935 36%	682 27%	2,569 100%	988 19%	1,005 19%	1,526 29%	1,752 33%	5,270 100%	1,586 20%	1,359 17%	2,461 31%	2,434 31%	7,839 100%

[a] Passenger car equivalent is one truck equals 2.5 cars.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

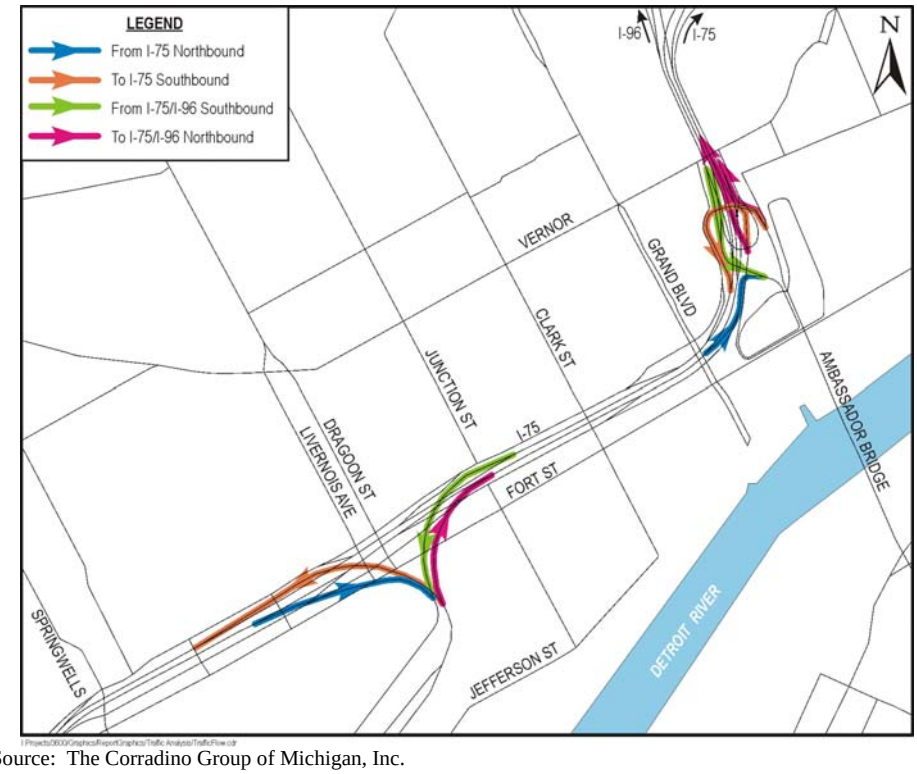
Source: The Corradino Group of Michigan, Inc.

Table 5-5B
Detroit River International Crossing Study
2035 AM Peak Hour Single-Logit Assignment
Directional Comparison

	Network	U.S.-to-Canada						Canada-to-U.S.						Total	
		from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
		AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	#1, #2, #3, #14, #16	53 42%	72 58%	77 38%	124 62%	130 40%	196 60%	120 22%	419 78%	979 67%	489 33%	1,099 55%	908 45%	1,229 53%	1,104 47%
	#5	54 45%	67 55%	87 42%	118 58%	141 43%	185 57%	111 22%	405 78%	990 66%	500 34%	1,101 55%	905 45%	1,242 53%	1,090 47%
	#7, #9, #11	62 51%	59 49%	180 96%	8 4%	242 78%	67 22%	133 25%	392 75%	1,238 89%	152 11%	1,371 72%	544 28%	1,613 73%	611 27%
Trucks	#1, #2, #3, #14, #16	42 12%	309 88%	84 45%	104 55%	126 23%	413 77%	0 0%	327 100%	2 1%	224 99%	2 0%	551 100%	128 12%	964 88%
	#5	42 12%	301 88%	97 50%	97 50%	139 26%	398 74%	0 0%	325 100%	2 1%	225 99%	2 0%	550 100%	141 13%	948 87%
	#7, #9, #11	53 18%	246 82%	224 100%	0 0%	277 53%	246 47%	1 0%	319 100%	61 27%	164 73%	62 11%	483 89%	339 32%	729 68%
Total	#1, #2, #3, #14, #16	95 20%	381 80%	161 41%	228 59%	256 30%	609 70%	120 14%	746 86%	981 58%	713 42%	1,101 43%	1,459 57%	1,357 40%	2,068 60%
	#5	96 21%	368 79%	184 46%	215 54%	280 32%	583 68%	111 13%	730 87%	992 58%	725 42%	1,103 43%	1,455 57%	1,383 40%	2,038 60%
	#7, #9, #11	115 27%	305 73%	404 98%	8 2%	519 62%	313 38%	134 16%	711 84%	1,299 80%	316 20%	1,433 58%	1,027 42%	1,952 59%	1,340 41%
PCEs[a]	#1, #2, #3, #14, #16	158 16%	845 84%	287 43%	384 57%	445 27%	1,229 73%	120 9%	1,237 91%	984 48%	1,049 52%	1,104 33%	2,286 67%	1,549 31%	3,514 69%
	#5	159 16%	820 84%	330 48%	361 52%	489 29%	1,180 71%	111 8%	1,218 92%	995 48%	1,063 52%	1,106 33%	2,280 67%	1,595 32%	3,460 68%
	#7, #9, #11	195 22%	674 78%	740 99%	8 1%	935 58%	682 42%	136 10%	1,190 90%	1,391 71%	562 29%	1,526 47%	1,752 53%	2,461 50%	2,434 50%

[a] Passenger car equivalent is one truck equals 2.5 cars.
Source: The Corradino Group of Michigan, Inc.

Figure 5-2
Detroit River International Crossing Study
Direction of Traffic Flows to/from I-75



Source: The Corradino Group of Michigan, Inc.

– From the I-75/I-96 Split:

✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve the predominant amount of car traffic and about half the truck traffic (○ blue circles).

✓ Alternative Set #7/9/11 would serve only four percent of the cars and no trucks (○ green ovals).

- <u>For the Canada-to-U.S. Direction</u>

– To I-75 Southbound: All DRIC alternatives would serve the predominant amount of the traffic (□ red box).

– To I-75/I-96 Split: All DRIC alternatives would serve 34 percent or less of the car traffic. These trips (□ blue square) have destinations upstream of both the new crossing and the Ambassador Bridge.

Alternative Set #1/2/3/14/16 and Alternative #5 would serve virtually all of the truck trips as the combination of a faster freeway connector and shorter plaza results in a shorter overall travel time as compared to the Ambassador Bridge (△ green pyramid). Alternative Set #7/9/11, with its more time-consuming plaza configuration, would 73 percent of these trucks (▽ black wedge).

2035 Midday Peak Hour

Table 5-6A illustrates for the 2035 Midday peak hour the following:

- A five percent decline (○ red oval) in overall auto traffic on the Blue Water Bridge and a nine to 12 percent decline (○ blue oval) in overall truck traffic with the introduction of a proposed DRIC. The decline is expected to moderate for traffic traveling in both directions.

- The Detroit-Windsor Tunnel would register a 13 to 21 percent decline in total traffic (○ green oval), with the most significant reduction expected to occur for total traffic in the U.S.-to-Canada peak direction due to a large drop in truck traffic.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge would realize a 37 percent reduction in car traffic (□ red squares). Also, with Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge is expected to realize a reduction of 67 percent of its truck traffic (□ green squares).

- Under Alternative Set #7/9/11, the Ambassador Bridge is expected to realize a reduction of only 27 percent of its total car traffic (□ blue square) and a reduction of 36 percent of its truck traffic (□ black square). The increased time of Alternative Set #7/9/11 compared to the DRIC alternatives causes this retention of car and truck traffic at the Ambassador Bridge.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the proposed DRIC crossing is forecast to carry approximately 39 percent of all international PCEs in the U.S.-to-Canada direction (△ red pyramid). In the Canada-to-U.S. direction, these proposed DRIC crossings would carry 36 percent of all PCEs (△ green pyramid). Overall, Alternative Set #1/2/3/14/16 and Alternative #5 would carry about 38 percent of all PCEs (▽ green wedge).

- The extra travel time associated with Alternative Set #7/9/11 would lower its share to 25 percent of all PCEs in the U.S.-to-Canada direction (△ blue pyramid). With this alternative set, the proposed DRIC crossing would carry 21 percent of all PCEs in the Canada-to-U.S. direction (△ black pyramid) and 23 percent of total PCEs (▽ black wedge).

Table 5-6A
Detroit River International Crossing Study
Midday 2035 Peak Hour Volumes
Single-Logit Assignment

	Network	U.S.-to-Canada					Canada-to-U.S.					Two-Way Traffic				
		BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	No Build	435 25%	555 32%	730 42%	n/a	1,720 100%	332 24%	419 30%	656 47%	n/a	1,407 100%	767 25%	974 31%	1,386 44%	n/a	3,127 100%
	#1, #2, #3, #14, #16	412 24%	566 33%	346 20%	396 23%	1,720 100%	321 23%	355 25%	529 38%	200 14%	1,405 100%	733 23%	921 29%	875 28%	596 19%	3,125 100%
	#5	413 24%	560 33%	339 20%	407 24%	1,719 100%	321 23%	354 25%	531 38%	198 14%	1,404 100%	734 24%	914 29%	870 28%	605 19%	3,123 100%
	#7, #9, #11	415 24%	621 36%	453 26%	230 13%	1,719 100%	323 23%	371 26%	563 40%	146 10%	1,403 100%	738 24%	992 32%	1,016 33%	376 12%	3,122 100%
Trucks	No Build	505 33%	297 20%	708 47%	n/a	1,510 100%	297 34%	31 4%	534 62%	n/a	862 100%	802 34%	328 14%	1,242 52%	n/a	2,372 100%
	#1, #2, #3, #14, #16	431 29%	96 6%	276 18%	706 47%	1,509 100%	278 32%	18 2%	133 15%	432 50%	861 100%	709 30%	114 5%	409 17%	1,138 48%	2,370 100%
	#5	434 29%	91 6%	264 17%	721 48%	1,510 100%	279 32%	18 2%	133 15%	432 50%	862 100%	713 30%	109 5%	397 17%	1,153 49%	2,372 100%
	#7, #9, #11	447 30%	115 8%	482 32%	465 31%	1,509 100%	283 33%	28 3%	317 37%	234 27%	862 100%	730 31%	143 6%	799 34%	699 29%	2,371 100%
Total	No Build	940 29%	852 26%	1,438 45%	n/a	3,230 100%	629 28%	450 20%	1,190 52%	n/a	2,269 100%	1,569 29%	1,302 24%	2,628 48%	n/a	5,499 100%
	#1, #2, #3, #14, #16	843 26%	662 21%	622 19%	1,102 34%	3,229 100%	599 26%	373 16%	662 29%	632 28%	2,266 100%	1,442 26%	1,035 19%	1,284 23%	1,734 32%	5,495 100%
	#5	847 26%	651 20%	603 19%	1,128 35%	3,229 100%	600 26%	372 16%	664 29%	630 28%	2,266 100%	1,447 26%	1,023 19%	1,267 23%	1,758 32%	5,495 100%
	#7, #9, #11	862 27%	736 23%	935 29%	695 22%	3,228 100%	606 27%	399 18%	880 39%	380 17%	2,265 100%	1,468 27%	1,135 21%	1,815 33%	1,075 20%	5,493 100%
PCEs[a]	No Build	1,698 31%	1,298 24%	2,500 45%	n/a	5,495 100%	1,075 30%	497 14%	1,991 56%	n/a	3,562 100%	2,772 31%	1,794 20%	4,491 50%	n/a	9,057 100%
	#1, #2, #3, #14, #16	1,490 27%	806 15%	1,036 19%	2,161 39%	5,493 100%	1,016 29%	400 11%	862 24%	1,280 36%	3,558 100%	2,506 28%	1,206 13%	1,898 21%	3,441 38%	9,050 100%
	#5	1,498 27%	788 14%	999 18%	2,210 40%	5,494 100%	1,019 29%	399 11%	864 24%	1,278 36%	3,559 100%	2,517 28%	1,187 13%	1,863 21%	3,488 39%	9,053 100%
	#7, #9, #11	1,533 28%	909 17%	1,658 30%	1,393 25%	5,492 100%	1,031 29%	441 12%	1,356 38%	731 21%	3,558 100%	2,563 28%	1,350 15%	3,014 33%	2,124 23%	9,050 100%

[a] Passenger car equivalent is one truck equals 2.5 cars.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table 5-6B shows the 2035 midday peak hour directional volumes for just the Ambassador Bridge and the proposed DRIC crossing.

- For the U.S.-to-Canada Direction

  – From I-75 Northbound: All DRIC alternatives would serve the majority of the car, truck and, therefore, total traffic (○ red oval).

  – From the I-75/I-96 Split:

    ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve about 43 to 48 percent of car traffic and about two-thirds of the truck traffic (○ blue circles).

    ✓ Alternative Set #7/9/11 would serve only about 12 percent of the cars and 13 percent of the trucks (○ green ovals).

- For the Canada-to-U.S. Direction

  – To I-75 Southbound: All DRIC alternatives would serve the predominant amount of the traffic (□ red box).

  – To I-75/I-96 Split: All DRIC alternatives would serve seven percent or less of the car traffic. These trips (□ blue box) have destinations upstream of both the new crossing and the Ambassador Bridge.

    ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve 52 to 56 percent of the truck trips (△ green pyramid). But Alternative Set #7/9/11, with its more time-consuming plaza configuration, would handle only eight percent of these trucks (▽ black wedge).

2035 PM Peak Hour

Table 5-7A illustrates for the 2035 PM peak hour the following:

- A seven percent decline (○ red oval) in overall auto traffic on the Blue Water Bridge and a 16 to 18 percent decline (○ blue oval) in overall truck traffic with the introduction of a proposed DRIC crossing. The decline in total traffic is expected to be greater in the U.S.-to-Canada direction due to the significant drop in truck traffic than the Canada-to-U.S. direction.

- The Detroit-Windsor Tunnel would register a 20 to 26 percent decline in total traffic (○ green oval), with the most significant reduction expected to occur in auto traffic in the U.S.-to-Canada direction.

Table 5-6B
Detroit River International Crossing Study
2035 Midday Peak Hour Single-Logit Assignment
Directional Comparison

	Network	U.S.-to-Canada						Canada-to-U.S.						Total	
		from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
		AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	#1, #2, #3, #14, #16	107 33%	216 67%	239 57%	180 43%	346 47%	396 53%	64 28%	168 72%	465 94%	32 6%	529 73%	200 27%	875 59%	596 41%
	#5	111 36%	200 64%	228 52%	207 48%	339 45%	407 55%	62 27%	164 73%	469 93%	34 7%	531 73%	198 27%	870 59%	605 41%
	#7, #9, #11	118 40%	180 60%	334 87%	50 13%	452 66%	230 34%	75 34%	146 66%	488 100%	1 0%	563 79%	147 21%	1,015 73%	377 27%
Trucks	#1, #2, #3, #14, #16	142 23%	488 77%	134 38%	218 62%	276 28%	706 72%	0 0%	289 100%	133 48%	143 52%	133 24%	432 76%	409 26%	1,138 74%
	#5	142 23%	475 77%	122 33%	246 67%	264 27%	721 73%	0 0%	266 100%	133 44%	166 56%	133 24%	432 76%	397 26%	1,153 74%
	#7, #9, #11	111 21%	411 79%	371 87%	54 13%	482 51%	465 49%	46 18%	209 82%	272 92%	25 8%	318 58%	234 42%	800 53%	699 47%
Total	#1, #2, #3, #14, #16	249 26%	704 74%	373 48%	398 52%	622 36%	1,102 64%	64 12%	457 88%	598 77%	175 23%	662 51%	632 49%	1,284 43%	1,734 57%
	#5	253 27%	675 73%	350 44%	453 56%	603 35%	1,128 65%	62 13%	430 87%	602 75%	200 25%	664 51%	630 49%	1,267 42%	1,758 58%
	#7, #9, #11	229 28%	591 72%	705 87%	104 13%	934 57%	695 43%	121 25%	355 75%	760 97%	26 3%	881 70%	381 30%	1,815 63%	1,076 37%
PCEs[a]	#1, #2, #3, #14, #16	462 24%	1,436 76%	574 44%	725 56%	1,036 32%	2,161 68%	64 7%	891 93%	798 67%	390 33%	862 40%	1,280 60%	1,898 36%	3,441 64%
	#5	466 25%	1,388 75%	533 39%	822 61%	999 31%	2,210 69%	62 7%	829 93%	802 64%	449 36%	864 40%	1,278 60%	1,863 35%	3,488 65%
	#7, #9, #11	396 25%	1,208 75%	1,262 87%	185 13%	1,657 54%	1,393 46%	190 22%	669 78%	1,168 95%	64 5%	1,358 65%	732 35%	3,015 59%	2,125 41%

[a] Passenger car equivalent is one truck equals 2.5 cars.
Source: The Corradino Group of Michigan, Inc.

Table 5-7A
Detroit River International Crossing Study
PM 2035 Peak Hour Volumes
Single-Logit Assignment

	Network	U.S.-to-Canada (Peak Direction)					Canada-to-U.S.					Two-Way Traffic				
		BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	No Build	458 13%	1,328 37%	1,852 51%	n/a	3,638 100%	490 31%	429 27%	664 42%	n/a	1,583 100%	948 18%	1,757 34%	2,516 48%	n/a	5,221 100%
	#1, #2, #3, #14, #16	414 11%	997 27%	1,072 29%	1,155 32%	3,638 100%	466 29%	367 23%	502 32%	250 16%	1,585 100%	880 17%	1,364 26%	1,574 30%	1,405 27%	5,223 100%
	#5	413 11%	982 27%	1,028 28%	1,215 33%	3,638 100%	466 29%	369 23%	501 32%	247 16%	1,583 100%	879 17%	1,351 26%	1,529 29%	1,462 28%	5,221 100%
	#7, #9, #11	417 11%	1,080 30%	1,221 34%	920 25%	3,638 100%	471 30%	378 24%	532 34%	204 13%	1,585 100%	888 17%	1,458 28%	1,753 34%	1,124 22%	5,223 100%
Trucks	No Build	493 36%	120 9%	761 55%	n/a	1,374 100%	390 50%	6 1%	391 50%	n/a	787 100%	883 41%	126 6%	1,152 53%	n/a	2,161 100%
	#1, #2, #3, #14, #16	368 27%	44 3%	229 17%	734 53%	1,375 100%	357 45%	1 0%	70 9%	358 46%	786 100%	725 34%	45 2%	299 14%	1,092 51%	2,161 100%
	#5	364 26%	47 3%	209 15%	756 55%	1,376 100%	358 46%	1 0%	63 8%	364 46%	786 100%	722 33%	48 2%	272 13%	1,120 52%	2,162 100%
	#7, #9, #11	379 28%	46 3%	364 26%	585 43%	1,374 100%	364 46%	1 0%	161 20%	261 33%	787 100%	743 34%	47 2%	525 24%	846 39%	2,161 100%
Total	No Build	951 19%	1,448 29%	2,613 52%	n/a	5,012 100%	880 37%	435 18%	1,055 45%	n/a	2,370 100%	1,831 25%	1,883 26%	3,668 50%	n/a	7,382 100%
	#1, #2, #3, #14, #16	782 16%	1,041 21%	1,301 26%	1,889 38%	5,013 100%	823 35%	368 16%	572 24%	608 26%	2,371 100%	1,605 22%	1,409 19%	1,873 25%	2,497 34%	7,384 100%
	#5	777 15%	1,029 21%	1,237 25%	1,971 39%	5,014 100%	824 35%	370 16%	564 24%	611 26%	2,369 100%	1,601 22%	1,399 19%	1,801 24%	2,582 35%	7,383 100%
	#7, #9, #11	796 16%	1,126 22%	1,585 32%	1,505 30%	5,012 100%	835 35%	379 16%	693 29%	465 20%	2,372 100%	1,631 22%	1,505 20%	2,278 31%	1,970 27%	7,384 100%
PCEs[a]	No Build	1,691 24%	1,628 23%	3,755 53%	n/a	7,073 100%	1,465 41%	444 13%	1,642 46%	n/a	3,551 100%	3,156 30%	2,072 20%	5,396 51%	n/a	10,624 100%
	#1, #2, #3, #14, #16	1,334 19%	1,107 16%	1,645 23%	2,990 42%	7,076 100%	1,359 38%	370 10%	677 19%	1,145 32%	3,550 100%	2,693 25%	1,477 14%	2,322 22%	4,135 39%	10,626 100%
	#5	1,323 19%	1,100 16%	1,551 22%	3,105 44%	7,078 100%	1,361 38%	372 10%	659 19%	1,157 33%	3,548 100%	2,684 25%	1,471 14%	2,209 21%	4,262 40%	10,626 100%
	#7, #9, #11	1,365 19%	1,195 17%	2,131 30%	2,383 34%	7,073 100%	1,381 39%	381 11%	935 26%	857 24%	3,553 100%	2,746 26%	1,576 15%	3,066 29%	3,239 30%	10,626 100%

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.
Source: The Corradino Group of Michigan, Inc.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge would realize a 37 to 39 percent reduction in car traffic (□ red squares). Also, with Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge is expected to realize a reduction of 75 percent of its truck traffic (□ green square).

- Under Alternative Set #7/9/11, the Ambassador Bridge is expected to realize a reduction of 30 percent of its total car traffic (□ blue square) and a reduction of 54 percent of its truck traffic (□ black square). The increased time of Alternative Set #7/9/11 compared to the DRIC alternatives causes this retention of car and truck traffic at the Ambassador Bridge.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the proposed DRIC crossing is forecast to carry approximately 43 percent of all international PCEs in the U.S.-to-Canada direction (△ red pyramid). In the Canada-to-U.S. direction, the proposed DRIC crossings would carry 33 percent of all PCEs (△ green pyramid). Overall, Alternative Set #1/2/3/14/16 and Alternative #5 would carry 40 percent of all PCEs (▽ green wedge).

- The extra travel time associated with Alternative Set #7/9/11 would lower its share to 34 percent of all PCEs in the U.S.-to-Canada direction (△ blue pyramid). With this alternative set, the proposed DRIC crossing would carry 24 percent of all PCEs in the Canada-to-U.S. direction (△ black pyramid) and 30 percent of total PCEs (▽ black wedge).

Table 5-7B shows the 2035 PM peak hour directional volumes for just the Ambassador Bridge and the proposed DRIC crossing.

- For the U.S.-to-Canada Direction

  – From I-75 Northbound: All DRIC alternatives would serve the majority of the car, truck and, therefore, total traffic (○ red oval).

  – From the I-75/I-96 Split:

    ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve about half of the car and truck traffic (○ blue circles).

    ✓ Alternative Set #7/9/11 would serve only 38 percent of the cars and just 16 percent of the trucks (○ green ovals).

- For the Canada-to-U.S. Direction

  – To I-75 Southbound: All DRIC alternatives would serve the predominant amount of the traffic (□ red box).

Table 5-7B
Detroit River International Crossing Study
2035 PM Peak Hour Single-Logit Assignment
Directional Comparison

	Network	U.S.-to-Canada (Peak Direction)						Canada-to-U.S.						Total	
		from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
		AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	#1, #2, #3, #14, #16	305 45%	379 55%	767 50%	776 50%	1,072 48%	1,155 52%	101 31%	224 69%	401 94%	26 6%	502 67%	250 33%	1,574 53%	1,405 47%
	#5	279 42%	379 58%	749 47%	836 53%	1,028 46%	1,215 54%	100 31%	220 69%	401 94%	27 6%	501 67%	247 33%	1,529 51%	1,462 49%
	#7, #9, #11	302 46%	360 54%	919 62%	560 38%	1,221 57%	920 43%	111 35%	204 65%	421 100%	0 0%	532 72%	204 28%	1,753 61%	1,124 39%
Trucks	#1, #2, #3, #14, #16	61 10%	577 90%	168 52%	157 48%	229 24%	734 76%	41 15%	239 85%	29 20%	119 80%	70 16%	358 84%	299 21%	1,092 79%
	#5	59 9%	569 91%	150 45%	187 55%	209 22%	756 78%	43 16%	233 84%	20 13%	131 87%	63 15%	364 85%	272 20%	1,120 80%
	#7, #9, #11	77 13%	532 87%	287 84%	53 16%	364 38%	585 62%	46 19%	200 81%	115 65%	61 35%	161 38%	261 62%	525 38%	846 62%
Total	#1, #2, #3, #14, #16	366 28%	956 72%	935 50%	933 50%	1,301 41%	1,889 59%	142 23%	463 77%	430 75%	145 25%	572 48%	608 52%	1,873 43%	2,497 57%
	#5	338 26%	948 74%	899 47%	1,023 53%	1,237 39%	1,971 61%	143 24%	453 76%	421 73%	158 27%	564 48%	611 52%	1,801 41%	2,582 59%
	#7, #9, #11	379 30%	892 70%	1,206 66%	613 34%	1,585 51%	1,505 49%	157 28%	404 72%	536 90%	61 10%	693 60%	465 40%	2,278 54%	1,970 46%
PCEs[a]	#1, #2, #3, #14, #16	458 20%	1,822 80%	1,187 50%	1,169 50%	1,645 35%	2,990 65%	204 20%	822 80%	474 59%	324 41%	677 37%	1,145 63%	2,322 36%	4,135 64%
	#5	427 19%	1,802 81%	1,124 46%	1,304 54%	1,551 33%	3,105 67%	208 21%	803 79%	451 56%	355 44%	659 36%	1,157 64%	2,209 34%	4,262 66%
	#7, #9, #11	495 23%	1,690 77%	1,637 70%	693 30%	2,131 47%	2,383 53%	226 24%	704 76%	709 82%	153 18%	935 52%	857 48%	3,066 49%	3,239 51%

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
Source: The Corradino Group of Michigan, Inc.

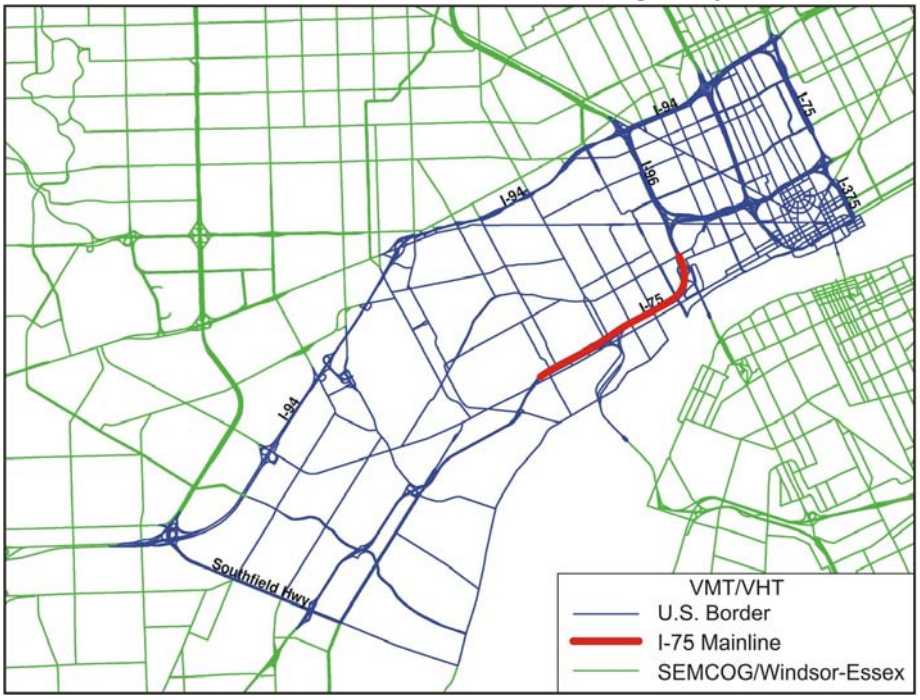
– To I-75/I-96 Split: All DRIC alternatives would serve six percent or less of the car traffic. These trips (□ blue square) have destinations upstream of both the new crossing and the Ambassador Bridge.

  ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve about 83 percent of the international truck trips as the combination of a faster freeway connector and shorter plaza results in a shorter overall travel time as compared to the Ambassador Bridge (△ green pyramid). Alternative Set #7/9/11, with its more time-consuming plaza configuration, would handle only 35 percent of these trucks (▽ black wedge).

5.4 Vehicle Miles Traveled and Vehicle Hours Traveled

Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) define the relative efficiency of one pathway versus another by illustrating whether an alternative actually decreases the amount of miles and hours needed to make the same number of trips. For this specific analysis, the model network was categorized into three zones (Figure 5-3):

Figure 5-3
VMT/VHT Analysis Area
Detroit River International Crossing Study



Note: The SEMCOG-Windsor/Essex County Region extends beyond this graphic to the official borders of the seven Michigan counties comprising SEMCOG and Essex County, Ontario.

Source: The Corradino Group of Michigan, Inc.

1) The I-75 mainline from the I-75/I-96 split to the Dearborn interchange. The intention of this zone is to determine the actual effect of the new crossing on VMT/VHT within the core section of I-75 that bears the greatest traffic burden from the international connections.
2) The general Detroit border area, incorporating the core zone that all international traffic crossing at Detroit must pass through. This zone extends from the Detroit River to I-375 on the northeast side of the central business district, to I-94 on the west, and to the Southfield Highway on the south.
3) The SEMCOG- Windsor/Essex County region, which encompasses the seven counties in SEMCOG and Essex County in Ontario.

Tables 5-8 and 5-9 present a comparison of the VMT and VHT for each set of alternatives for each zone against the No Build condition for 2035 PM peak hour and 2035 AM peak hour traffic. (Comparable tables of data for 2015 peak hour periods are provided in Appendix C.) The VMT and VHT within each zone are cumulative, i.e., they include the VMT and VHT for the zones within them. Only VMT and VHT of international traffic are analyzed.

Comparing the total VMT produced by international traffic for the No Build condition to VMT created by each alternative, Table 5-8 indicates that within the I-75 mainline zone, total international VMT and VHT would drop with the introduction of the proposed DRIC crossing due to truck traffic from the south diverting to the proposed DRIC crossing. Car VMT and VHT, however, would rise slightly as some auto trips would divert to Detroit that would otherwise cross the Blue Water Bridge under a No Build condition. Within the border area, VMT and VHT would rise also due to traffic diverting from the Blue Water Bridge.

Overall, within the SEMCOG region, the proposed Build Alternatives would be associated, in the 2035 PM peak hour, with an increase in VMT of two percent for cars and three percent for trucks (Table 5-8). The increase is about two percent as more traffic is attracted to the region. On the other hand, total regional VHT would decrease by 6-7%. The combination of increased traffic within the region and reduced total vehicle travel times illustrates the increased efficiency of the Detroit River Crossings after the addition of a new crossing. Additionally, under No Build conditions the average speed of international traffic on the regional network in the 2035 PM peak hour would be 34.5 mph, while for every Build Alternative the average speed would be closer to 38 mph.

Table 5-9 and 5-10 show similar overall regional impacts on international VMT and VHT during the 2035 AM and midday peak hour periods with the midday showing the least change.

Table 5-8
Detroit River International Crossing Study
2035 PM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,953	n/a	22,583	n/a	177,536	n/a	37	n/a	648	n/a	6,339	n/a
Alt #1/2/3/14/16	2,026	4%	24,785	10%	180,332	2%	41	11%	646	0%	5,900	-7%
Alt #5	2,095	7%	24,963	11%	180,611	2%	41	12%	640	-1%	5,894	-7%
Alt #7/9/11	1,996	2%	25,584	13%	181,392	2%	38	3%	660	2%	5,945	-6%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,115	n/a	13,721	n/a	149,008	n/a	40	n/a	323	n/a	3,117	n/a
Alt #1/2/3/14/16	1,650	-22%	14,363	5%	152,988	3%	31	-23%	356	10%	2,942	-6%
Alt #5	1,782	-16%	14,535	6%	153,348	3%	33	-19%	354	9%	2,942	-6%
Alt #7/9/11	1,487	-30%	14,947	9%	153,302	3%	27	-32%	356	10%	2,951	-5%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	4,069	n/a	36,304	n/a	326,544	n/a	77	n/a	971	n/a	9,456	n/a
Alt #1/2/3/14/16	3,676	-10%	39,148	8%	333,320	2%	71	-7%	1,002	3%	8,842	-6%
Alt #5	3,876	-5%	39,498	9%	333,959	2%	74	-4%	994	2%	8,836	-7%
Alt #7/9/11	3,482	-14%	40,531	12%	334,694	2%	65	-15%	1,016	5%	8,896	-6%

Source: The Corradino Group of Michigan, Inc.

Table 5-9
Detroit River International Crossing Study
2035 AM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,387	n/a	15,846	n/a	124,197	n/a	24	n/a	420	n/a	3,410	n/a
Alt #1/2/3/14/16	1,433	3%	17,887	13%	126,079	2%	25	5%	428	2%	3,190	-6%
Alt #5	1,407	1%	17,909	13%	126,153	2%	24	2%	428	2%	3,196	-6%
Alt #7/9/11	977	-30%	17,415	10%	125,719	1%	17	-29%	430	3%	3,234	-5%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,241	n/a	9,117	n/a	103,773	n/a	21	n/a	197	n/a	1,993	n/a
Alt #1/2/3/14/16	1,085	-13%	10,440	15%	105,919	2%	19	-12%	228	16%	1,924	-3%
Alt #5	1,148	-8%	10,506	15%	105,956	2%	20	-7%	229	16%	1,926	-3%
Alt #7/9/11	869	-30%	10,610	16%	106,256	2%	15	-30%	230	16%	1,936	-3%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,627	n/a	24,963	n/a	227,970	n/a	45	n/a	617	n/a	5,402	n/a
Alt #1/2/3/14/16	2,518	-4%	28,328	13%	231,998	2%	44	-3%	656	6%	5,114	-5%
Alt #5	2,554	-3%	28,415	14%	232,108	2%	44	-2%	657	6%	5,121	-5%
Alt #7/9/11	1,846	-30%	28,025	12%	231,975	2%	32	-30%	660	7%	5,170	-4%

Source: The Corradino Group of Michigan, Inc.

Table 5-10
Detroit River International Crossing Study
2035 Midday Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,235	n/a	12,722	n/a	122,301	n/a	21	n/a	288	n/a	2,449	n/a
Alt #1/2/3/14/16	931	-25%	13,450	6%	123,185	1%	16	-24%	303	5%	2,376	-3%
Alt #5	1,007	-19%	13,506	6%	123,297	1%	17	-18%	303	5%	2,375	-3%
Alt #7/9/11	1,014	-18%	13,543	6%	123,245	1%	17	-17%	305	6%	2,391	-2%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,062	n/a	13,426	n/a	151,671	n/a	35	n/a	300	n/a	2,714	n/a
Alt #1/2/3/14/16	1,684	-18%	15,376	15%	154,091	2%	28	-18%	324	8%	2,605	-4%
Alt #5	1,829	-11%	15,371	14%	154,308	2%	31	-11%	320	7%	2,604	-4%
Alt #7/9/11	1,385	-33%	14,887	11%	154,325	2%	23	-33%	313	5%	2,624	-3%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	3,297	n/a	26,147	n/a	273,971	n/a	55	n/a	587	n/a	5,163	n/a
Alt #1/2/3/14/16	2,615	-21%	28,826	10%	277,275	1%	44	-20%	627	7%	4,981	-4%
Alt #5	2,835	-14%	28,877	10%	277,605	1%	48	-14%	623	6%	4,980	-4%
Alt #7/9/11	2,399	-27%	28,430	9%	277,570	1%	41	-27%	619	5%	5,016	-3%

Source: The Corradino Group of Michigan, Inc.

5.5 Volume-to-Capacity Ratio: Key Regional Links

Tables 5-11 through 5-13 present the international volume, total volume, and volume-to-capacity ratios of select links within Wayne County to demonstrate the impact that the proposed DRIC crossings may have on the U.S. highway network. Figures 5-4 through 5-6 show the locations of each of these select links and the corresponding volume-to-capacity ratios. Appendix D provides tables and figures for the 2015 peak hour periods.

For the 2035 PM peak hour conditions, the data demonstrate that international traffic represents a small portion of total traffic on most roadways. In addition to this fact, the locations of the proposed DRIC crossings are very close to the Ambassador Bridge, which further reduces their effect on the SEMCOG region's traffic and congestion. The exceptions are the ramps and crossing links of the Ambassador Bridge and Detroit-Windsor Tunnel, where volumes would exceed capacity before 2035 without a new crossing. However, when the DRIC crossing is introduced, that congestion is forecast to decrease substantially as traffic shifts to the proposed DRIC crossing from the bridge and tunnel.

The roadway segment that has a notable increase in V/C ratio is I-75 northbound, directly downstream from the location of proposed DRIC crossing (Segment 13). On that segment, international traffic for both directions would increase from 930 vehicles under the No Build condition in the 2035 PM peak hour to roughly 1,300 vehicles with the introduction of the proposed DRIC crossing. These additional vehicles raise the V/C ratio at this roadway segment from 0.80 to 0.88 (○ red circles on Table 5-13). Conversely, the introduction of the proposed DRIC crossing would cause a significant decrease in international vehicles on I-75 northbound just downstream of the Ambassador Bridge (Segment 12). The decrease from 1,158 vehicles in the 2035 PM Peak hour under the No Build Alternative to less than 600 vehicles with the introduction of the proposed DRIC crossing, would reduce the V/C ratio this roadway segment from 0.90 to as low as 0.76 (○ blue circles on Table 5-13).

Figure 5-4
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 AM Peak Hour Travel
(Numbers and letters correspond to Table 5-11)

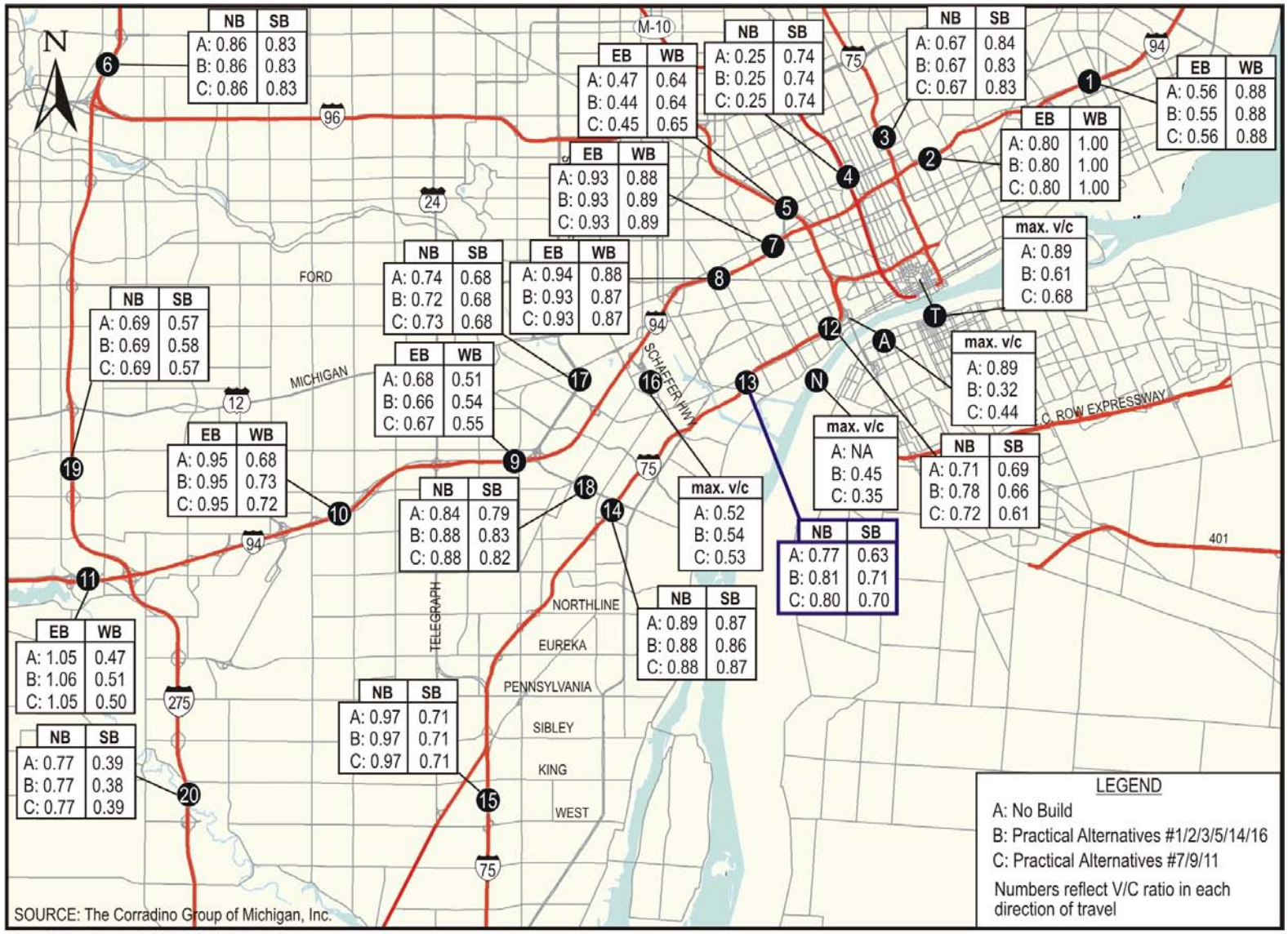


Table 5-11
Detroit River International Crossing Study
2035 AM Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,595	1,165	1,164	1,282	1,595	1,165	1,164	1,282	0.89	0.61	0.61	0.68	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	2,909	1,366	1,392	1,959	2,909	1,366	1,392	1,959	0.89	0.32	0.32	0.44	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	335	96	96	115	335	96	96	115	0.22	0.05	0.05	0.06	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	392	161	185	404	392	161	185	404	0.25	0.10	0.11	0.25	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	655	120	111	133	655	120	111	133	0.31	0.04	0.04	0.04	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	1,238	979	990	1,238	1,238	979	990	1,238	0.39	0.31	0.31	0.41	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	281	2	2	61	281	2	2	61	0.45	0.00	0.00	0.10	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	2,068	2,039	1,340	n/a	2,068	2,039	1,340	n/a	0.45	0.45	0.35	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	380	370	306	n/a	380	370	306	n/a	0.54	0.55	0.45	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	228	215	8	n/a	228	215	8	n/a	0.24	0.24	0.01	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	746	730	711	n/a	746	730	711	n/a	0.79	0.81	0.79	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	713	725	315	n/a	713	725	315	n/a	0.67	0.71	0.37	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	310	296	297	301	2,919	2,895	2,893	2,905	0.56	0.55	0.55	0.56	1	EB I-94 east of Conner
1	WB I-94 east of Conner	128	120	120	122	4,773	4,815	4,812	4,825	0.88	0.88	0.88	0.88	1	WB I-94 east of Conner
2	EB I-94 east of I-75	361	370	369	369	5,659	5,649	5,648	5,655	0.80	0.80	0.80	0.80	2	EB I-94 east of I-75
2	WB I-94 east of I-75	139	127	127	129	7,263	7,263	7,272	7,269	1.00	1.00	1.00	1.00	2	WB I-94 east of I-75
3	NB I-75 north of I-94	608	596	598	601	4,717	4,695	4,705	4,707	0.67	0.67	0.67	0.67	3	NB I-75 north of I-94
3	SB I-75 north of I-94	212	210	210	211	5,987	5,967	5,962	5,968	0.84	0.83	0.83	0.83	3	SB I-75 north of I-94
4	NB M-10 north of I-94	210	171	171	195	1,837	1,801	1,805	1,819	0.25	0.25	0.25	0.25	4	NB M-10 north of I-94
4	SB M-10 north of I-94	74	64	57	59	4,094	4,094	4,088	4,090	0.74	0.74	0.74	0.74	4	SB M-10 north of I-94
5	EB I-96 west of I-94	865	802	801	792	3,197	3,149	3,153	3,142	0.47	0.44	0.44	0.45	5	EB I-96 west of I-94
5	WB I-96 west of I-94	221	198	212	229	4,617	4,649	4,678	4,666	0.64	0.64	0.65	0.65	5	WB I-96 west of I-94
6	WB I-96 west of I-275	10	13	13	10	6,542	6,561	6,569	6,532	0.86	0.86	0.86	0.86	6	WB I-96 west of I-275
6	EB I-96 west of I-275	5	7	7	5	5,897	5,958	5,987	5,907	0.83	0.83	0.84	0.83	6	EB I-96 west of I-275
7	EB I-94 west of I-96	68	15	16	30	4,999	5,072	5,043	5,050	0.93	0.93	0.93	0.93	7	EB I-94 west of I-96
7	WB I-94 west of I-96	51	36	39	41	4,791	4,816	4,806	4,850	0.88	0.89	0.88	0.89	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	82	15	16	33	5,028	5,049	5,057	5,045	0.94	0.93	0.93	0.93	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	90	59	62	49	4,684	4,676	4,680	4,689	0.88	0.87	0.87	0.87	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	92	30	29	45	3,630	3,604	3,611	3,618	0.68	0.66	0.66	0.67	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	169	307	306	271	3,569	3,672	3,670	3,643	0.51	0.54	0.54	0.53	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	107	160	153	128	5,061	5,021	5,038	5,032	0.95	0.95	0.95	0.95	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	127	267	266	247	3,632	3,732	3,733	3,723	0.68	0.73	0.73	0.72	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	83	149	141	102	6,030	5,998	6,008	6,002	1.05	1.06	1.06	1.05	11	EB I-94 west of I-275
11	WB I-94 west of I-275	93	230	228	208	2,568	2,666	2,665	2,654	0.47	0.51	0.51	0.50	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	365	824	816	448	4,750	5,243	5,073	4,870	0.71	0.78	0.76	0.72	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	724	405	385	204	4,591	4,435	4,000	4,216	0.69	0.66	0.59	0.61	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	333	480	471	416	5,253	5,385	5,366	5,387	0.77	0.81	0.81	0.80	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	682	902	891	882	4,111	4,442	4,503	4,431	0.63	0.70	0.71	0.70	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	240	242	241	241	4,539	4,456	4,460	4,493	0.89	0.88	0.88	0.88	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	442	447	447	444	4,299	4,249	4,254	4,261	0.87	0.86	0.86	0.87	14	SB I-75 south of Southfield
15	NB I-75 south of King	219	222	221	221	5,249	5,243	5,238	5,246	0.97	0.97	0.97	0.97	15	NB I-75 south of King
15	SB I-75 south of King	343	346	346	345	3,603	3,601	3,603	3,604	0.71	0.71	0.71	0.71	15	SB I-75 south of King
16	Scheafer east of I-75	0	1	0	0	1,302	1,334	1,334	1,313	0.52	0.53	0.54	0.53	16	Scheafer east of I-75
17	NB Southfield north of I-94	0	0	0	0	4,059	3,946	3,946	3,986	0.74	0.72	0.72	0.73	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	0	0	0	3,704	3,699	3,696	3,710	0.68	0.68	0.68	0.68	17	SB Southfield north of I-94
18	NB Southfield south of I-94	68	200	199	194	2,875	2,820	2,824	2,829	0.84	0.88	0.88	0.88	18	NB Southfield south of I-94
18	SB Southfield south of I-94	27	142	135	95	2,725	2,676	2,683	2,725	0.79	0.83	0.83	0.82	18	SB Southfield south of I-94
19	NB I-275 north of I-94	9	12	12	11	3,889	3,915	3,915	3,890	0.69	0.69	0.69	0.69	19	NB I-275 north of I-94
19	SB I-275 north of I-94	1	1	1	1	3,253	3,288	3,299	3,254	0.57	0.58	0.58	0.57	19	SB I-275 north of I-94
20	NB I-275 south of King	2	2	2	2	4,199	4,205	4,207	4,198	0.77	0.77	0.77	0.77	20	NB I-275 south of King
20	SB I-275 south of King	8	8	7	7	2,025	2,015	2,023	2,027	0.39	0.38	0.39	0.39	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

Figure 5-5
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 Midday Peak Hour Travel
(Numbers and letters correspond to Table 5-12)

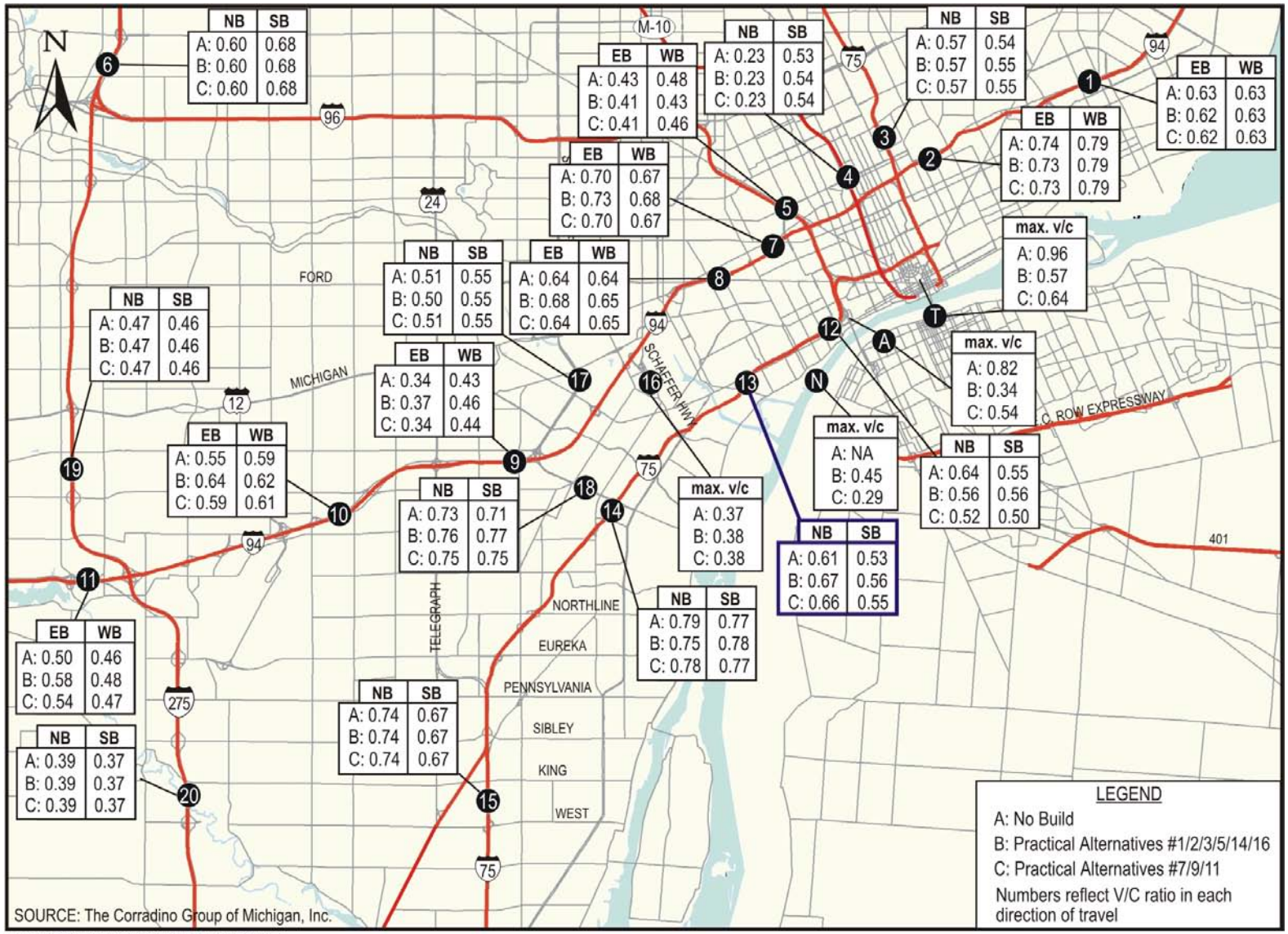


Table 5-12
Detroit River International Crossing Study
2035 Midday Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,302	1,035	1,025	1,135	1,302	1,035	1,025	1,135	0.96	0.57	0.56	0.64	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	2,627	1,286	1,269	1,819	2,627	1,286	1,269	1,819	0.82	0.34	0.32	0.54	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	602	249	253	229	602	249	253	229	0.36	0.15	0.15	0.13	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	835	372	350	706	835	372	350	706	0.47	0.19	0.18	0.42	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	424	64	62	121	424	64	62	121	0.25	0.02	0.02	0.06	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	437	465	469	488	437	465	469	488	0.14	0.15	0.15	0.16	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	326	133	133	272	326	133	133	272	0.52	0.21	0.21	0.43	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	1,734	1,758	1,076	n/a	1,734	1,758	1,076	n/a	0.44	0.45	0.29	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	704	675	591	n/a	704	675	591	n/a	0.91	0.92	0.80	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	397	453	105	n/a	397	453	105	n/a	0.46	0.55	0.12	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	457	430	355	n/a	457	430	355	n/a	0.57	0.55	0.45	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	176	200	25	n/a	176	200	25	n/a	0.25	0.30	0.04	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	315	275	276	283	3,090	3,054	3,055	3,060	0.63	0.62	0.62	0.62	1	EB I-94 east of Conner
1	WB I-94 east of Conner	275	263	264	266	3,221	3,211	3,211	3,213	0.63	0.63	0.63	0.63	1	WB I-94 east of Conner
2	EB I-94 east of I-75	329	290	289	298	4,947	4,922	4,919	4,922	0.74	0.73	0.73	0.73	2	EB I-94 east of I-75
2	WB I-94 east of I-75	327	314	314	318	5,449	5,456	5,459	5,447	0.79	0.79	0.79	0.79	2	WB I-94 east of I-75
3	NB I-75 north of I-94	253	250	251	253	3,929	3,927	3,929	3,938	0.57	0.57	0.57	0.57	3	NB I-75 north of I-94
3	SB I-75 north of I-94	333	342	340	342	3,715	3,714	3,706	3,717	0.54	0.55	0.54	0.55	3	SB I-75 north of I-94
4	NB M-10 north of I-94	134	132	132	134	1,522	1,521	1,520	1,522	0.23	0.23	0.23	0.23	4	NB M-10 north of I-94
4	SB M-10 north of I-94	247	268	267	258	2,669	2,710	2,710	2,680	0.53	0.54	0.54	0.54	4	SB M-10 north of I-94
5	EB I-96 west of I-94	468	416	438	436	2,826	2,728	2,750	2,758	0.43	0.40	0.41	0.41	5	EB I-96 west of I-94
5	WB I-96 west of I-94	629	414	436	541	2,958	2,765	2,800	2,903	0.48	0.42	0.43	0.46	5	WB I-96 west of I-94
6	WB I-96 west of I-275	3	3	3	3	4,362	4,359	4,359	4,356	0.60	0.60	0.60	0.60	6	WB I-96 west of I-275
6	EB I-96 west of I-275	5	5	5	5	4,645	4,642	4,642	4,643	0.68	0.68	0.68	0.68	6	EB I-96 west of I-275
7	EB I-94 west of I-96	97	115	117	88	3,639	3,778	3,794	3,679	0.70	0.73	0.73	0.70	7	EB I-94 west of I-96
7	WB I-94 west of I-96	61	49	51	56	3,496	3,530	3,532	3,522	0.67	0.68	0.68	0.67	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	97	113	115	87	3,327	3,446	3,459	3,341	0.64	0.67	0.68	0.64	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	75	62	64	74	3,325	3,344	3,350	3,365	0.64	0.65	0.65	0.65	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	88	104	95	95	1,740	1,887	1,878	1,763	0.34	0.37	0.36	0.34	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	94	168	146	140	2,942	3,035	3,016	2,976	0.43	0.46	0.45	0.44	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	114	345	323	220	2,844	3,041	3,021	2,936	0.55	0.64	0.63	0.59	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	84	157	135	129	3,040	3,101	3,082	3,077	0.59	0.62	0.61	0.61	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	61	291	270	166	2,749	2,957	2,937	2,848	0.50	0.58	0.58	0.54	11	EB I-94 west of I-275
11	WB I-94 west of I-275	49	121	98	92	2,481	2,550	2,529	2,523	0.46	0.48	0.48	0.47	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	829	522	548	385	3,745	3,383	3,324	3,270	0.64	0.56	0.56	0.52	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	511	542	596	308	3,410	3,485	3,277	3,234	0.55	0.56	0.54	0.50	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	803	1,040	1,017	941	3,526	3,758	3,742	3,742	0.61	0.67	0.67	0.66	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	498	594	570	551	3,291	3,398	3,437	3,366	0.53	0.56	0.56	0.55	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	633	615	614	637	3,444	3,283	3,281	3,417	0.79	0.75	0.75	0.78	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	387	390	390	389	3,648	3,687	3,685	3,657	0.77	0.78	0.78	0.77	14	SB I-75 south of Southfield
15	NB I-75 south of King	532	538	537	536	3,444	3,446	3,445	3,447	0.74	0.74	0.74	0.74	15	NB I-75 south of King
15	SB I-75 south of King	330	332	332	332	3,254	3,247	3,247	3,256	0.67	0.67	0.67	0.67	15	SB I-75 south of King
16	Scheafer east of I-75	0	0	0	0	957	1,006	1,013	1,002	0.37	0.38	0.38	0.38	16	Scheafer east of I-75
17	NB Southfield north of I-94	0	1	0	1	2,695	2,647	2,650	2,676	0.51	0.50	0.50	0.51	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	1	0	2	2,905	2,897	2,898	2,895	0.55	0.55	0.55	0.55	17	SB Southfield north of I-94
18	NB Southfield south of I-94	66	142	124	108	2,393	2,398	2,389	2,406	0.73	0.76	0.75	0.75	18	NB Southfield south of I-94
18	SB Southfield south of I-94	62	278	266	163	2,335	2,266	2,263	2,342	0.71	0.77	0.76	0.75	18	SB Southfield south of I-94
19	NB I-275 north of I-94	3	4	4	4	2,563	2,567	2,567	2,565	0.47	0.47	0.47	0.47	19	NB I-275 north of I-94
19	SB I-275 north of I-94	5	8	7	7	2,518	2,516	2,516	2,518	0.46	0.46	0.46	0.46	19	SB I-275 north of I-94
20	NB I-275 south of King	4	4	4	4	2,031	2,031	2,031	2,032	0.39	0.39	0.39	0.39	20	NB I-275 south of King
20	SB I-275 south of King	4	4	4	4	1,910	1,910	1,910	1,911	0.37	0.37	0.37	0.37	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

Figure 5-6
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 PM Peak Hour Travel
(Numbers and letters correspond with Table 5-13)

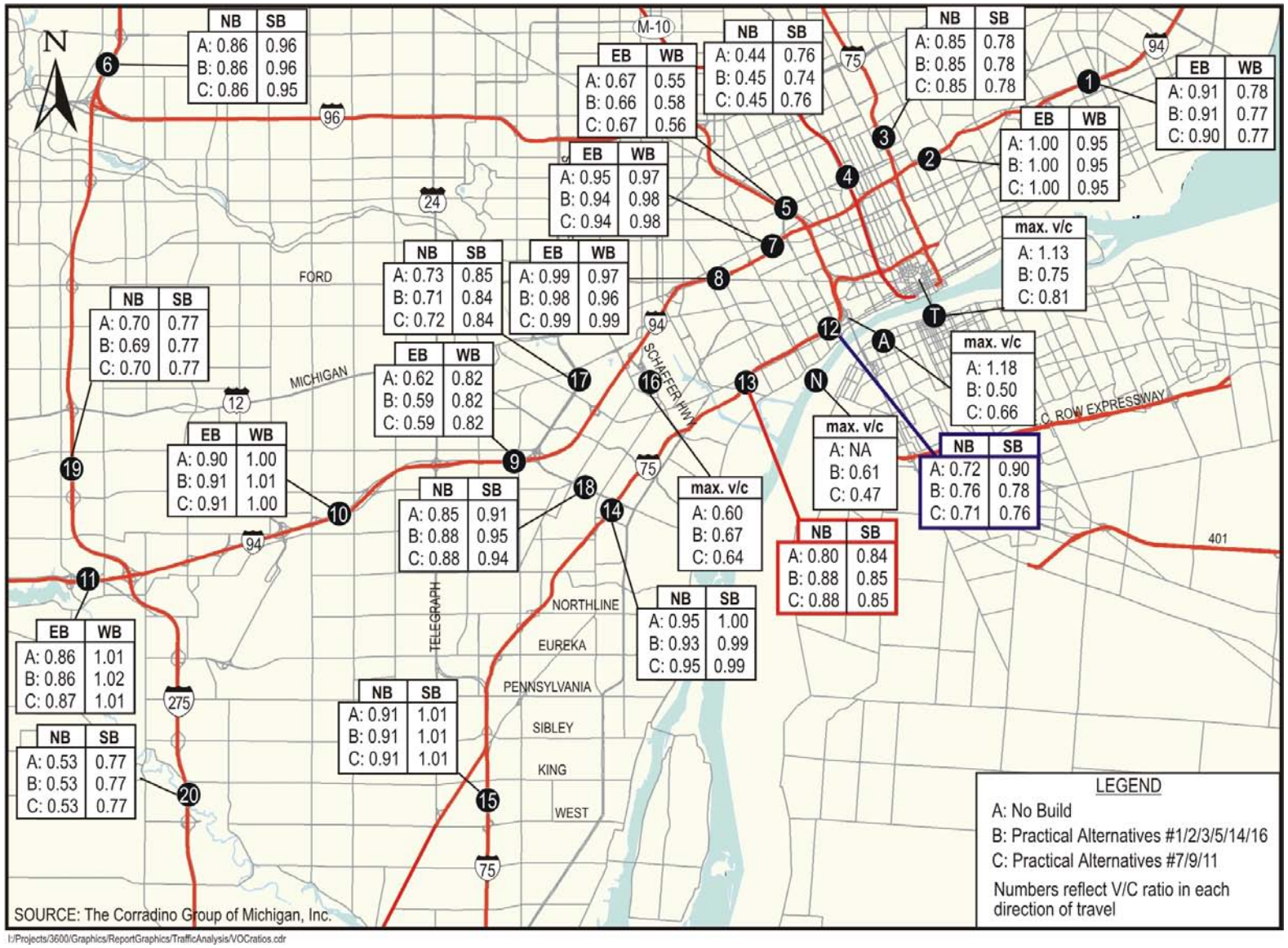


Table 5-13
Detroit River International Crossing Study
2035 PM Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,883	1,409	1,399	1,505	1,883	1,409	1,399	1,505	1.13	0.75	0.75	0.81	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	3,671	1,875	1,803	2,278	3,671	1,875	1,803	2,278	1.18	0.50	0.47	0.66	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	1,084	366	338	379	1,084	366	338	379	0.56	0.15	0.14	0.17	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	1,529	935	899	1,206	1,529	935	899	1,206	0.69	0.40	0.37	0.55	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	462	142	143	157	462	142	143	157	0.24	0.07	0.07	0.08	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	378	401	401	420	378	401	401	420	0.12	0.13	0.13	0.14	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	216	29	20	116	216	29	20	116	0.34	0.05	0.03	0.18	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	2,497	2,582	1,970	n/a	2,497	2,582	1,970	n/a	0.59	0.61	0.47	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	956	948	892	n/a	956	948	892	n/a	1.16	1.20	1.13	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	933	1,023	613	n/a	933	1,023	613	n/a	0.74	0.87	0.46	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	463	453	404	n/a	463	453	404	n/a	0.52	0.53	0.47	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	144	159	61	n/a	144	159	61	n/a	0.20	0.24	0.10	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	256	207	205	212	4,839	4,899	4,898	4,885	0.91	0.91	0.90	0.90	1	EB I-94 east of Conner
1	WB I-94 east of Conner	385	365	366	369	4,127	4,100	4,102	4,114	0.78	0.77	0.77	0.77	1	WB I-94 east of Conner
2	EB I-94 east of I-75	242	208	203	205	7,193	7,235	7,236	7,240	1.00	1.00	1.00	1.00	2	EB I-94 east of I-75
2	WB I-94 east of I-75	448	425	427	430	6,821	6,824	6,825	6,819	0.95	0.95	0.95	0.95	2	WB I-94 east of I-75
3	NB I-75 north of I-94	219	216	215	215	6,261	6,235	6,241	6,251	0.85	0.85	0.85	0.85	3	NB I-75 north of I-94
3	SB I-75 north of I-94	714	701	695	700	5,638	5,624	5,626	5,627	0.78	0.78	0.78	0.78	3	SB I-75 north of I-94
4	NB M-10 north of I-94	84	86	85	86	3,301	3,327	3,330	3,332	0.44	0.45	0.45	0.45	4	NB M-10 north of I-94
4	SB M-10 north of I-94	371	308	290	369	4,139	4,054	4,043	4,143	0.76	0.74	0.74	0.76	4	SB M-10 north of I-94
5	EB I-96 west of I-94	287	270	271	293	4,916	4,863	4,895	4,899	0.67	0.66	0.66	0.67	5	EB I-96 west of I-94
5	WB I-96 west of I-94	718	782	819	751	3,796	3,965	4,022	3,902	0.55	0.56	0.58	0.56	5	WB I-96 west of I-94
6	WB I-96 west of I-275	10	10	10	9	6,604	6,629	6,624	6,602	0.86	0.86	0.86	0.86	6	WB I-96 west of I-275
6	EB I-96 west of I-275	12	13	14	16	7,005	7,053	7,046	6,999	0.96	0.96	0.96	0.95	6	EB I-96 west of I-275
7	EB I-94 west of I-96	145	57	61	54	5,122	5,178	5,199	5,157	0.95	0.94	0.94	0.94	7	EB I-94 west of I-96
7	WB I-94 west of I-96	34	28	38	29	5,347	5,379	5,347	5,363	0.97	0.98	0.98	0.98	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	199	57	72	69	5,285	5,402	5,400	5,405	0.99	0.98	0.98	0.99	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	110	48	61	58	5,194	5,248	5,223	5,232	0.97	0.96	0.96	0.96	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	261	167	165	194	3,226	3,183	3,201	3,189	0.62	0.58	0.59	0.59	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	183	225	224	198	5,876	5,894	5,888	5,893	0.82	0.82	0.82	0.82	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	277	376	366	339	4,750	4,688	4,708	4,718	0.90	0.91	0.91	0.91	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	165	210	208	180	5,394	5,383	5,375	5,390	1.00	1.01	1.01	1.00	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	226	322	313	286	4,754	4,691	4,710	4,746	0.86	0.86	0.86	0.87	11	EB I-94 west of I-275
11	WB I-94 west of I-275	131	175	173	146	5,797	5,779	5,783	5,795	1.01	1.01	1.02	1.01	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	1,158	600	579	551	5,772	5,245	5,129	5,201	0.90	0.78	0.76	0.76	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	837	884	894	796	4,875	5,239	5,133	4,941	0.73	0.78	0.80	0.71	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	930	1,314	1,315	1,277	5,075	5,393	5,374	5,436	0.80	0.88	0.88	0.88	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	579	716	700	673	5,777	5,700	5,714	5,763	0.84	0.85	0.85	0.85	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	669	678	679	678	4,554	4,459	4,452	4,559	0.95	0.93	0.93	0.95	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	411	414	404	414	5,151	5,045	5,067	5,088	1.00	0.99	0.99	0.99	14	SB I-75 south of Southfield
15	NB I-75 south of King	581	590	591	589	4,603	4,601	4,605	4,603	0.91	0.91	0.91	0.91	15	NB I-75 south of King
15	SB I-75 south of King	369	371	372	371	5,443	5,444	5,438	5,437	1.01	1.01	1.01	1.01	15	SB I-75 south of King
16	Scheafer east of I-75	0	1	11	0	1,497	1,589	1,623	1,556	0.60	0.65	0.67	0.64	16	Scheafer east of I-75
17	NB Southfield north of I-94	1	2	1	1	4,015	3,920	3,926	3,964	0.73	0.71	0.71	0.72	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	0	0	0	4,691	4,643	4,651	4,667	0.85	0.84	0.84	0.84	17	SB Southfield north of I-94
18	NB Southfield south of I-94	35	131	128	96	2,966	2,940	2,962	2,986	0.85	0.88	0.88	0.88	18	NB Southfield south of I-94
18	SB Southfield south of I-94	84	274	267	213	3,134	3,040	3,045	3,093	0.91	0.95	0.95	0.94	18	SB Southfield south of I-94
19	NB I-275 north of I-94	3	3	3	3	4,047	4,001	3,995	4,045	0.70	0.69	0.69	0.70	19	NB I-275 north of I-94
19	SB I-275 north of I-94	12	14	14	14	4,453	4,446	4,444	4,453	0.77	0.77	0.77	0.77	19	SB I-275 north of I-94
20	NB I-275 south of King	10	10	10	10	2,876	2,886	2,885	2,872	0.53	0.53	0.53	0.53	20	NB I-275 south of King
20	SB I-275 south of King	3	3	3	3	4,235	4,255	4,253	4,230	0.77	0.77	0.77	0.77	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

During the Practical Alternative analysis, it was observed that international trucks eastbound on I-94 did not stay on I-94 all the way to I-96 in order to then go south on I-96/I-75 to the Ambassador Bridge. The trucks instead saved travel time by diverting over the local road system, starting at Oakwood in order to get onto easbound I-75 heading to the bridge. Because of this all model networks were modified to keep trucks off the local road system, only allowing them to use Southfield Rd to get between I-94 and I-75 in the area close to the Ambassador Bridge. In this area I-75 and I-94 parallel each other and are separated by two to three miles. The model's assignment pattern is evident in the No Build condition, as well as when the DRIC alternatives are introduced with an I-75 interchange. While this tendency to assign international trucks to I-75 is seen as an avoidance of I-94 congestion, all DRIC networks introduced restrictions on international trucks from using surface streets to cross between I-94 and I-75 other than at Southfield Road to discourage this tendency.

V/C ratio data for all peak hours in 2015 and 2035 are presented in Appendix D.

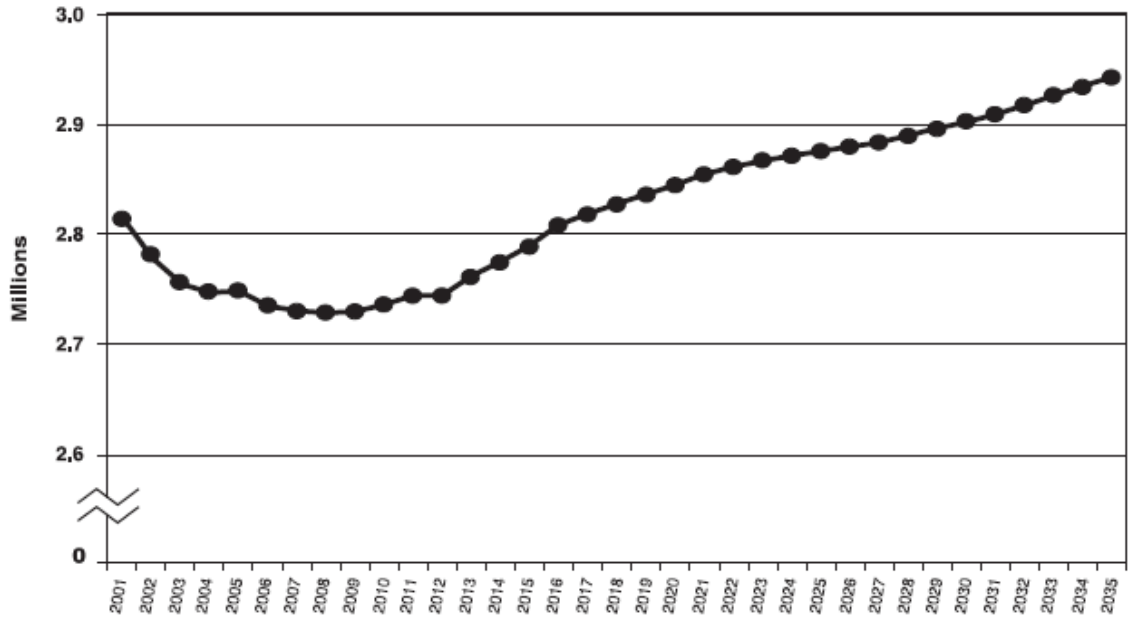
6. CHANGES IN DEMOGRAPHICS

6.1 Background

In a report issued in April 2007 titled *A Region in Turbulence and Transition*, SEMCOG indicates the following:

> *Southeast Michigan's economy is in the midst of a fundamental restructuring that has serious consequences for the region's long-term future. This turbulence and transition is due to the shrinkage of the domestic auto industry, where the Big Three have seen their share of U.S. light-vehicle sales (cars, SUVs, vans, pickup trucks) decline from 73 percent in 1995 to 53 percent in 2006.*
>
> *The consequences of the changes in the auto industry are profound. Losses of jobs in the region's core industry are rippling through the economy and will be felt across many sectors, from retail to construction. Southeast Michigan has lost 128,000 jobs since 2000 and will not begin to gain total jobs until 2010. By 2035, the region's employment will have grown seven percent over 2005 levels (Figure 6-1).*

Figure 6-1
Detroit River International Crossing Study
Total Employment
Southeast Michigan, 2001-2035

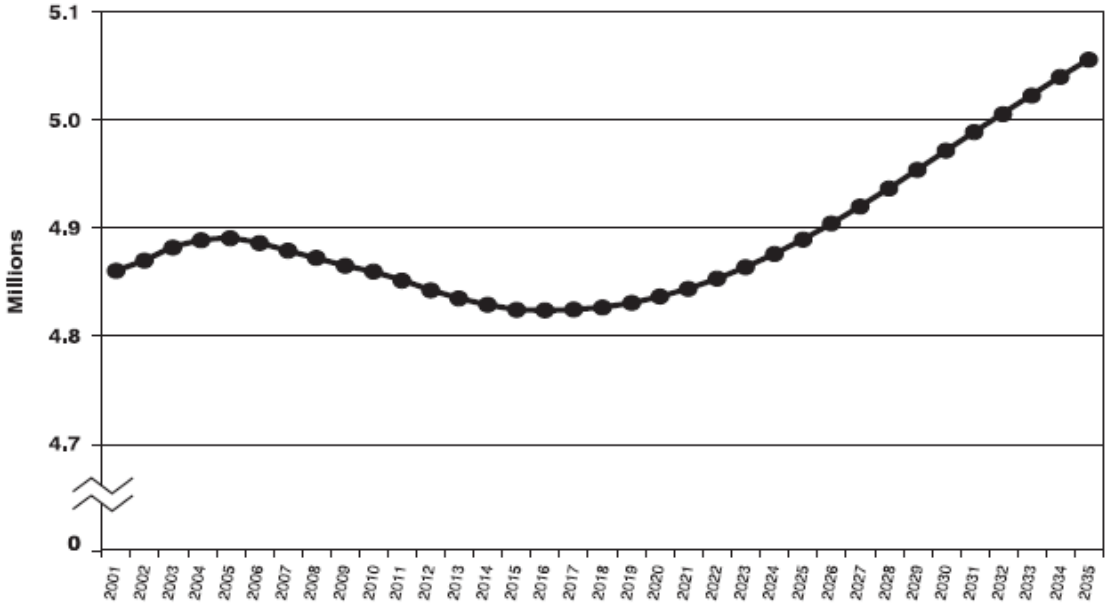


Source: SEMCOG

The other major factor that will affect the region in the long-term is the aging of the population. By 2035 Southeast Michigan will have 651,000 more people 65 or older and 296,000 fewer people of prime working age 25-64. This is a trend that will also be felt in the U.S. as a whole where, as in Southeast Michigan, the percentage of population 65 or older will increase dramatically. For the region, the percentage 65 or older will increase from 12 to 24 percent by 2035, and for the U.S. it will go from 12 to 20 percent.

Combined with more deaths in an aging population, increased out-migration is now causing Southeast Michigan's population to decline. The region will only recover enough, beginning after 2015, to add about three percent to the population over 30 years (Figure 6-2). Southeast Michigan's population will be 5.1 million in 2035.

Figure 6-2
Detroit River International Crossing Study
Total Population
Southeast Michigan, 2001-2035



Source: SEMCOG

With these observations as background, SEMCOG reduced its forecasts of growth between 2005 and 2030 for population by 75 percent (Table 6-1) and for employment by 50 percent (Table 6-2). Those region-wide changes have been disaggregated to the county level, but not to a smaller geographical unit. Nonetheless, the county-level changes in growth provide a glimpse of the dynamics of the region. From a population perspective (Table 6-1), Macomb County is expected to continue to grow at almost the same pace in the new forecast as in the previous forecast. The outer-ring counties – Livingston, Monroe and Washtenaw – are projected to experience a greater slowdown in growth. Wayne County is expected to experience the greatest loss by 2030 compared to the earlier SEMCOG forecast, and is the only county in the region projected to lose population, which continues a downward trend. While city-by-city forecasts are not available from SEMCOG, it is likely the loss will be especially felt in Detroit based on past trends.

Table 6-1
Detroit River International Crossing Study
Changes in Population Forecasts by SEMCOG

County	Population			
	Year 2000	Previous Forecast 2030	Current Forecast 2030	Change in Growth
Livingston	156,951	282,405	210,359	-42.6%
Macomb	788,149	926,347	914,685	-8.4%
Monroe	145,945	191,500	159,797	-69.6%
Oakland	1,194,156	1,346,185	1,303,674	-28.0%
St. Clair	164,235	203,552	189,274	-36.3%
Washtenaw	322,895	433,205	369,474	-57.8%
Wayne	2,061,162	2,018,091	1,824,112	-118.2%
Total	**4,833,493**	**5,401,285**	**4,971,375**	**-75.7%**

Source: SEMCOG

From an employment perspective, the SEMCOG forecasts are not directly comparable because the current forecast uses data from the Bureau of Economic Analysis, which includes more categories of employment than the Bureau of Labor Statistics data, which was used for the previous forecast. Nonetheless, the new projections of employment growth by 2030 in the SEMCOG region are down by about 50 percent compared to the earlier forecast. The greatest impact will be felt in Wayne County and, Detroit in particular, as a loss in jobs is forecast. Washtenaw is the only county projected to have a greater growth in the new employment forecast than the previous forecast. All other counties are still forecast to experience employment growth by 2030, albeit lower than projected before (Table 6-2).

Table 6-2
Detroit River International Crossing Study
Changes in Employment Forecasts by SEMCOG

County	Employment			
	Year 2000	Previous[a] Forecast 2030	Current[b] Forecast 2030	Change in Growth
Livingston	59,186	102,378	95,274	-16.4%
Macomb	383,308	441,126	427,658	-23.3%
Monroe	54,375	74,268	63,278	-55.5%
Oakland	910,441	1,100,545	1,001,198	-52.3%
St. Clair	64,531	80,857	78,780	-12.7%
Washtenaw	230,212	285,543	289,059	+6.4%
Wayne	971,127	1,024,905	943,826	-150.8%
Total	**2,673,180**	**3,109,622**	**2,899,073**	**-48.2%**

[a]Based on Bureau of Labor Statistics definition.
[b]Based on Bureau of Economic Analysis definition.
Source: SEMCOG

6.2 Sensitivity Analysis

The DRIC model does not include trip generation or trip distribution and instead uses domestic trip tables provided by SEMCOG and DRIC-produced international trip tables. The development of the latter can be found on the project Web site (www.partnershipborderstudy.com; then click "Reports", then click "Canadian", then scroll down to "Detroit River International Crossing Study-Travel Demand Forecasts"). To account for the recent update in SEMCOG's demographic forecasts, a set of county-level adjustment factors were applied to the original SEMCOG domestic trip tables, as well as the international trip tables, previously developed. The factors are based on the ratio of revised-to-original SEMCOG population and employment forecasts, by year and county. These county-level correction factors were applied to the original SEMCOG trip tables via a method known as "Fratar Balancing" to produce new trip tables for 2035 that are consistent with SEMCOG's revised demographic forecasts. The international trip tables were not Fratar balanced because all such trips, by virtue of their international nature, have no more than one trip end in the SEMCOG region, eliminating the possibility of the same trip being factored more than once.

The following methods were used to modify both U.S. domestic and international trip tables according to vehicle type and peak hour period:

- **AM peak passenger cars**: factor the origins by the ratio of revised-to-original population, and factor the destinations by the ratio of revised-to-original employment, by county.
- **AM peak period trucks**: factor the origins and destinations by the ratio of revised-to-original employment, by county.
- **Midday passenger cars**: factor the origins and destinations by the ratio of revised-to-original activity, where activity is the sum of population plus employment by county.
- **Midday trucks**: factor the origins and destinations by the ratio of revised-to-original employment, by county.
- **PM peak passenger cars**: factor the origins by the ratio of revised-to-original employment, and factor the destinations by the ratio of revised to original population, by county.
- **PM peak trucks**: factor the origins and destinations by the ratio of revised-to-original employment, by county.

Because the trip tables are for peak hours, as opposed to a 24-hour period, trip origins and destinations are not balanced, reflecting the directional aspect of peak hour travel patterns.[8] Therefore standard convergence of row factors (origins) and column factors (destinations) at a conventional 0.01 was not possible. Therefore, at least ten iterations were applied in the Fratar balancing process, with the emphasis of maximum constraint (closest match) given to matching rows, which represented trip origins.

The ultimate result of the factored tables is a reduction in total trips. Table 6-3 presents the original total trips and revised total trips by peak hour period, year, and vehicle class.

[8] Typically, in a 24-hour period, it is expected that a TAZ will have a matching number of trip origins and destinations, as generally people return to their original location every day. In contrast, a TAZ does not necessarily have a matching number of origins and destinations in a peak hour period, as evidenced in the AM peak hour example of residential zones providing the majority of trip origins and non-residential zones receiving the majority of trip destinations.

The results of the analysis indicate that international trips decrease slightly, but not significantly (Table 6-3). For example, of the 2,161 international truck trips crossing the border in the 2035 PM peak hour, 1,609 trips had no trip end in the SEMCOG area, meaning 552 truck trips could be affected by the downward revision of the trip tables. The reduction is just 51 truck trips (2,161 – 2,010 from Table 6-3) in the PM peak hour or an eight percent change of trips with local trip ends (51 ÷ 652). Overall, the adjustment to account for reduced SEMCOG demographic growth projections causes 2035 peak period traffic to decline no more than three percent for international truck trips and two to seven percent for international car trips in the 2035 peak hours on all crossings of the border in the SEMCOG region.

Table 6-3
Detroit River International Crossing Study
Revised Total Trips by Vehicle Class

	2035 AM Peak Hour		
	Original	**Revised**	**% Change**
U.S. Domestic Passenger Cars	777,831	713,725	8.2
U.S. Domestic Light Trucks	32,822	29,967	8.7
U.S. Domestic Medium Trucks	10,781	9,849	8.6
U.S. Domestic Heavy Trucks	15,956	14,645	8.2
International Cars	3,804	3,751	1.4
International Trucks	1,611	1,562	3.0
	2035 Midday Peak Hour		
	Original	**Revised**	**% Change**
U.S. Domestic Passenger Cars	601,111	549,660	8.6
U.S. Domestic Light Trucks	54,427	49,691	8.7
U.S. Domestic Medium Trucks	14,264	13,031	8.6
U.S. Domestic Heavy Trucks	19,543	17,918	8.3
International Cars	3,125	2,950	5.6
International Trucks	2,370	2,300	3.0
	2035 PM Peak Hour		
	Original	**Revised**	**% Change**
U.S. Domestic Passenger Cars	1,047,692	985,814	5.9
U.S. Domestic Light Trucks	33,601	30,677	8.7
U.S. Domestic Medium Trucks	8,350	7,627	8.7
U.S. Domestic Heavy Trucks	12,380	11,355	8.3
International Cars	5,223	4,854	7.1
International Trucks	2,161	2,110	2.4

Source: The Corradino Group of Michigan, Inc.

Table 6-4 presents a comparison of crossing volumes using the original and revised trip tables. Reductions in travel due to SEMCOG's revised forecasts demonstrate a small effect on international traffic, and does not materially change the overall border crossing assignment pattern. The network used for the comparison includes the X-10 crossing.

Table 6-4
Detroit River International Crossing Study
Original and Revised Trip Tables

2035 AM Peak Hour: Alternatives #1, 2, 3, 14, 16						
	Trip Table	**Two-way Traffic**				
		BWB	**DWT**	**AMB**	**NEW**	**Total**
Cars	Original	348	1,123	1,229	1,104	3,804
	Revised	333	1,014	1,171	993	3,511
Trucks	Original	477	42	128	964	1,611
	Revised	441	41	131	949	1,562
Total	Original	825	1,365	1,357	2,068	5,415
	Revised	774	1,055	1,302	1,942	5,073
PCEs	Original	1,541	1,228	1,549	3,514	7,832
	Revised	1,436	1,117	1,499	3,366	7,416
2035 Midday Peak Hour: Alternatives #1, 2, 3, 14, 16						
	Trip Table	**Two-way Traffic**				
		BWB	**DWT**	**AMB**	**NEW**	**Total**
Cars	Original	733	921	875	596	3,125
	Revised	696	860	802	572	2,930
Trucks	Original	709	114	409	1,138	2,370
	Revised	692	103	393	1,112	2,300
Total	Original	1,442	1,035	1,284	1,734	5,495
	Revised	1,388	963	1,195	1,684	5,230
PCEs	Original	2,506	1,206	1,898	3,441	9,050
	Revised	2,426	1,118	1,785	3,352	8,680
2035 PM Peak Hour: Alternatives #1, 2, 3, 14, 16						
	Trip Table	**Two-way Traffic**				
		BWB	**DWT**	**AMB**	**NEW**	**Total**
Cars	Original	880	1,364	1,574	1,405	5,223
	Revised	837	1,275	1,372	1,370	4,854
Trucks	Original	725	45	299	1,092	2,161
	Revised	735	43	249	1,083	2,110
Total	Original	1,605	1,409	1,873	2,497	7,384
	Revised	1,572	1,318	1,621	2,453	6,964
PCEs	Original	2,693	1,477	2,322	4,135	10,626
	Revised	2,675	1,383	1,995	4,078	10,129

Source: The Corradino Group of Michigan, Inc.

7. CONCLUSION

Forecasts using a single-logit model indicate a significant sensitivity to travel time in assigning traffic to the various proposed DRIC alternatives. Alternative Set #1/2/3/14/16 and Alternative #5 are projected to carry the largest volumes. They also divert the most traffic from the Ambassador Bridge. These conditions are related to the plaza and interchange configurations. The single-logit model assigns what is considered the upper end of the traffic forecast range. The lower end of the range is established by an alternative assignment technique known as a nested-logit model. The results of that technique are included in Appendix A.

Appendix A

Detroit River International Crossing Study
Nested-Logit Modeling Analysis and Results

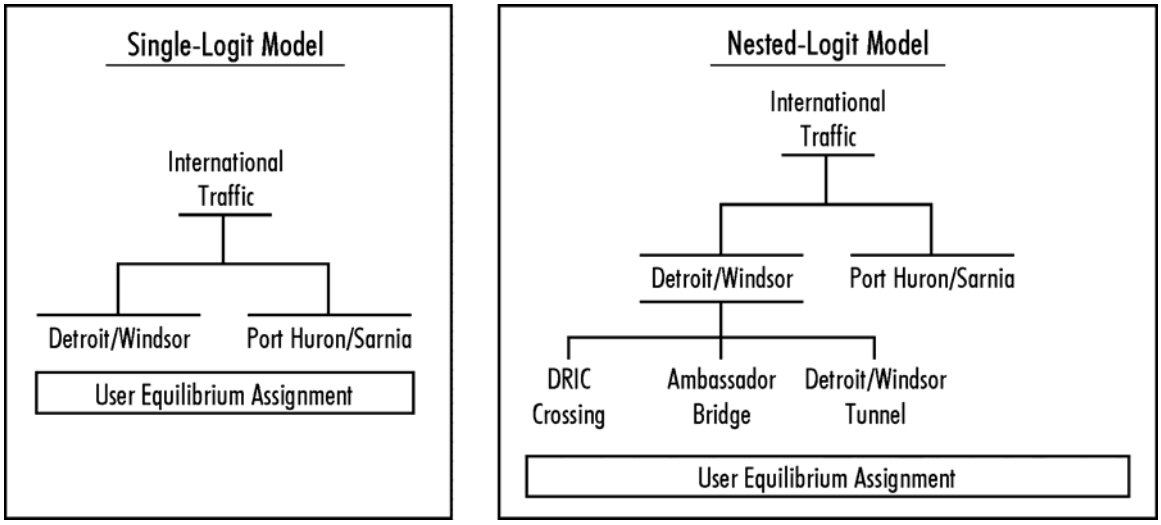
APPENDIX A
NESTED-LOGIT MODELING ANALYSIS AND RESULTS

Introduction

Appendix A presents the results of the nested-logit model's application. It was developed to address the single-logit model's sensitivity to travel time. Specifically, in response to the proximity of the Ambassador Bridge and the proposed DRIC crossings, the single-logit model assigns substantial traffic volumes to one crossing or the other as a result of relatively moderate travel time advantages between the alternatives. For example, in the 2035 AM peak hour with Alternative Set #1/2/3/14/16 and Alternative #5, no trucks are assigned to the Ambassador Bridge in the peak Canada-to-U.S. direction.

In contrast to the single-logit model, which allocates international traffic to the three Detroit crossings with a user-equilibrium assignment, the nested-logit model allocates international traffic to each Detroit crossing separately before beginning the user-equilibrium assignment. As a result, the nested-logit model is less sensitive to the travel time differences between the crossings when assigning international traffic. Figure A-1 presents the structures of both the single-logit and the nested-logit models.

Figure A-1
Model Structures



It is noted, as earlier in this report, the single-logit forecasts were used in the DEIS consistent with MDOT's approach to the NEPA process, which is to examine maximum-impact scenarios during preliminary phases and then modify these analyses in the FEIS as specifics of the project become better defined.

Nested-Logit Assignment

In the nested-logit model, the logit function has been expanded to two levels. The original distribution of all international traffic between the Detroit area and the Port Huron/Sarnia area (Blue Water Bridge) crossings takes place in the upper level. All international traffic crossing the border in the Detroit area is then allocated to one of the local Detroit crossings (Ambassador Bridge, Detroit-Windsor Tunnel, or the proposed new crossing) in the lower level. Once distributed to a crossing, traffic is assigned to the network via the same user-equilibrium method as in the single-logit model. Additionally, the nested-logit model has separate tables for tolls for all crossings, enabling it to test for tolling differences among crossings, an option not available in the single-logit model.

An integral feature of a nested model is the concept of logsums. Within each level of the nested logit model, distinct logit equations allocate trips between a discrete set of choices. In the case of the DRIC nested logit model, the upper level choice is between two regional crossing areas, Port Huron/Sarnia and the Detroit area. The Port Huron choice has no lower level choice. The other lower level Detroit choice is between three local crossings. For the upper level, the utilities are the logsums of the utilities from the logit equations of the lower-level nests. As noted earlier, this means that changes in lower nests have limited impacts on the choices at the upper levels. The form of the logsum function for a simple binary choice appears here:

logsum = NC * ln[exp(u1) + exp(u2)]

Where

NC	=	Nest coefficient constant
ln()	=	natural logarithm function
exp()	=	exponential function “e”
u1	=	Utility for using crossing 1
u2	=	Utility for using crossing 2
logsum	=	logsum to be used the logit equation in the next higher nest

The logit functions for the binary model are as follows:

s1	=	exp(u1)/[exp(u1) + exp(u2)]
s2	=	exp(u2)/[exp(u1) + exp(u2)]

Where

exp()	=	exponential function “e”
s1	=	fraction of trips that will be allocated to crossing 1
s2	=	fraction of trips that will be allocated to crossing 2

The form of the utility function is:

ux	=	Kx + ct*DT + cc*DC

Where

ux	=	Utility for using crossing x
Kx	=	Bias constant for using crossing x
ct	=	Travel cost coefficient
DT	=	Time to use crossing x, minus time to use the alternative crossing
cc	=	Travel cost coefficient
DC	=	Cost to use crossing x, minus cost to use the alternative crossing

In the utility function, the "bias" constants are determined through calibration and cause the model to replicate the observed crossing volumes. The coefficients "ct" and "cc" are determined during model estimation, and represent the elasticity of the traveler in response to differences in travel time and travel cost. DT is the difference in travel time (and other times such as inspections processing time at a plaza) in the model network. DC is cost to use Crossing X minus the cost to use the alternative crossing and is the monetized crossing time plus tolls for each facility.

In late 2006, the DRIC consultants developed new nested-logit parameters for both passenger car and truck traffic based on the same survey data used to develop the single-logit equation. Then, the consultants incorporated into the network detailed plaza and interchange configurations for the proposed DRIC crossings and a new Gateway plaza configuration for the Ambassador Bridge. At that time, the consultant also used an essential scaling function that had previously not been activated in the nested-logit model script. As a result, and to re-calibrate assigned crossing volumes to observed crossing volumes for the base year, the upper-level constants of the nested-logit equation (those related to the choice between the Detroit River area and the Port Huron/Sarnia area) were re-estimated. The revised constants were incorporated during testing and approval of the nested-logit model (Table A-1).[1]

Table A-1
Detroit River International Crossing Study
2-Level Nested-Logit Parameters
Passenger Vehicles (Cars)

	Nesting Coefficient (Logsum)	Constant	Generalized Time Coeff. (includes cost)
Port Huron / Sarnia	0.546	0.000	
Blue Water Bridge		-1.376	-0.110
Detroit / Windsor	0.546	-1.750	
Detroit Windsor Tunnel		0.000	-0.110
Ambassador Bridge		-0.456	-0.110
DRIC		-0.456	-0.110

Commercial Vehicles (Trucks)

	Nesting Coefficient (Logsum)	Constant	Time Coeff.	Cost Coeff.
Port Huron / Sarnia	0.98	0.000		
Blue Water Bridge		2.411	-0.044	-0.034
Detroit / Windsor	0.98	0.150		
Detroit Windsor Tunnel		0.000	-0.044	-0.034
Ambassador Bridge		3.100	-0.044	-0.034
DRIC		3.100	-0.044	-0.034

Source: IBI Group and The Corradino Group of Michigan, Inc.

[1] The nested-logit model was developed after the completion of the evaluation of Illustrative Alternatives and wasn't used in that evaluation. The re-estimation of upper-level constants for the nested-logit model has no effect on the outcome of that previous evaluation.

The process of re-estimating the upper-level constants involved calibrating the model to the observed PM peak hour traffic shares. Table A-2 presents the results of the calibration between observed and predicted shares for the nested-logit model, as well as the shares for the single-logit model. For the Port Huron and Detroit shares in table A-2 the observed data was available for a PM Peak period from the year 2000. The single and nested logit models predict a PM Peak hour and attempt to replicate the peak period shares from the observed data.

As Table A-2 shows, the overall effect of the re-estimated upper-level constants for the nested-logit model results in a closer calibration between the observed and predicted shares for both the upper level (Blue Water Bridge and Detroit area) and lower level (Detroit-Windsor Tunnel and the Ambassador Bridge), as compared to the single-logit model. The practical effect is that within the nested-logit model, the share of cars using the Blue Water Bridge (23.0%) is approximately three percentage points higher than single-logit model (19.8%), while the share of trucks using the Blue Water Bridge (32.6%) is approximately two percent lower than the single-logit model (34.7%). The shares within the lower level, for the Ambassador Bridge and Detroit-Windsor Tunnel, do not change significantly. This slight difference in calibrated shares between the nested-logit model and single-logit model remains in effect for the future year forecasts.

Table A-2
Observed versus Predicted 2004 Crossing Shares

Port Huron & Detroit Shares	**BWB (2-way)**		**Detroit (2-way)**		**BWB (2-way)**		**Detroit (2-way)**	
	Cars	**% Share**	**Cars**	**% Share**	**Trucks**	**% Share**	**Trucks**	**% Share**
Observed **2000** PM Peak **Period**	4,290	**23.3%**	14,119	**76.7%**	1,201	**32.8%**	2,456	**67.2%**
Predicted 2004 Peak Hour Single-Logit	681	**19.8%**	2756	**80.2%**	319	**34.7%**	600	**65.3%**
Predicted 2004 Peak Hour Nested-Logit	792	**23.0%**	2645	**77.0%**	300	**32.6%**	620	**67.4%**
Detroit Area Shares	**DWT (2-way)**		**AMB (2-way)**		**DWT (2-way)**		**AMB (2-way)**	
	Cars	**% Share**	**Cars**	**% Share**	**Trucks**	**% Share**	**Trucks**	**% Share**
Observed **2004** PM Peak **Hour**	1,240	**44.0%**	1,577	**56.0%**	19	**2.9%**	627	**97.1%**
Predicted 2004 Peak Hour Single-Logit	1,221	**44.3%**	1,535	**55.7%**	19	**3.2%**	581	**96.8%**
Predicted 2004 Peak Hour Nested-Logit	1,163	**44.0%**	1,482	**56.0%**	16	**2.6%**	604	**97.4%**

Note: Observations for the Blue Water Bridge were not included in the 2004 data, therefore 2000 data were used to establish the crossing share between Port Huron and Detroit.

Source: The IBI Group and The Corradino Group

The survey data used to estimate both the single-logit and nested-logit equations analyzed the traveler's choice of routes between the Port Huron/Sarnia area (the Blue Water Bridge) and the

Detroit River area. By virtue of the large distance between these two areas, the choice between the crossing routes represents a significant time difference for all but the most long-distance trips. In other words, for most trips, one crossing area represents a significantly shorter path than the other crossing area, making obvious the choice of which crossing area to take. Therefore, the sensitivity of the time coefficients is low, as the time differences between crossing routes (Port Huron/Sarnia versus the Detroit area) are high.

Such relatively insensitive time coefficients for the single-logit model were appropriate because the single-logit equation only addresses the upper-level choice between the Port Huron/Sarnia and the Detroit River areas. However, for the nested-logit model, the logit equation also incorporates the lower level choice among each individual Detroit River area crossing. In this situation, the locations of the Detroit area crossings are very close, and, therefore, the time differences between crossing routes are much smaller.

This proximity between local crossings requires significant time and cost coefficients to differentiate between the local crossing choices. However, the survey data of the local Detroit crossing choice could not produce such coefficients. This is partially due to the sparse zone structure of the survey instrument. Also, other extraneous factors, particularly size restrictions on trucks in the Detroit-Windsor Tunnel and frequent user programs at individual crossings, also affect crossing choice. Further, the survey could not determine the independent preference for a new crossing that did not exist. Therefore the time and cost coefficients from the single-logit equation were used as surrogates in the nested-logit equations. However, as these coefficients reflect choice decisions between long-distance options, the nested-logit model does not share the sensitivity to time differences between these local routes that is evident in the single-logit model's assignment of local trips via the user equilibrium assignment procedure. As a result, the nested-logit model assigns local international crossing shares more evenly than the single-logit model.

Equation Parameters

The parameters for the single-logit equation are presented in Table A-3. The parameters for the nested-logit equation are presented in Table A-4. Both sets of parameters were estimated based on the same survey data previously discussed. However, they are used in fundamentally different equations. Unlike the single-logit equation, the nested-logit equation includes a logsum function as the Nesting Coefficient (Table A-4). This nesting coefficient acts as a "buffer" between changes in utilities within the lower level (the choice among the Detroit area crossings) and the upper level (the choice between the Port Huron/Sarnia and the Detroit areas). Additionally, the nested-logit equation incorporates upper-level and lower-level constants. In this regard, similar parameters between the two sets of equations (such as the generalized time coefficients for cars and time and cost coefficients for trucks) are not directly comparable, as the nesting coefficient and upper-level constants for the nested-logit equation fundamentally alter the dynamics of the equation.

For example, comparing the parameters of the single-logit model with the nested-logit model, the generalized time coefficient for cars changes significantly between the single-logit model and the nested-logit model. However, the time and cost coefficients for trucks do not change significantly between the two models. But, in contrast to the single-logit model, the time and cost coefficients are no longer directly applied to the upper-level choice (between Port Huron/Sarnia and the Detroit area), but to each individual crossing within the lower-level nest. In the nested-logit model, the nesting coefficients used to compute the logsums of the lower-level logit equations establish the allocation between upper-level choices.

Table A-3
Detroit River International Crossing Study
Single-Logit Parameters

Passenger Vehicles (Cars)			
	Constant	**Generalized Time Coeff. (includes cost)**	
Port Huron / Sarnia	0	-0.0625	
Detroit / Windsor	0.9234	-0.0625	
Commercial Vehicles (Trucks)			
	Constant	**Time Coeff.**	**Cost Coeff.**
Port Huron / Sarnia	0	-0.0486	-0.0323
Detroit / Windsor	0.704	-0.0486	-0.0323

Source: IBI Group

Table A-4
Detroit River International Crossing Study
2-Level Nested-Logit Parameters

Passenger Vehicles (Cars)				
	Nesting Coefficient (Logsum)	**Constant**	**Generalized Time Coeff. (includes cost)**	
Port Huron / Sarnia	0.546	0.000		
Blue Water Bridge		-1.376	-0.110	
Detroit / Windsor	0.546	-1.750		
Detroit Windsor Tunnel		0.000	-0.110	
Ambassador Bridge		-0.456	-0.110	
New Crossing		-0.456	-0.110	
Commercial Vehicles (Trucks)				
	Nesting Coefficient (Logsum)	**Constant**	**Time Coeff.**	**Cost Coeff.**
Port Huron / Sarnia	0.98	0.000		
Blue Water Bridge		2.411	-0.044	-0.034
Detroit / Windsor	0.98	0.150		
Detroit Windsor Tunnel		0.000	-0.044	-0.034
Ambassador Bridge		3.100	-0.044	-0.034
New Crossing		3.100	-0.044	-0.034

Source: IBI Group and The Corradino Group of Michigan, Inc.

Ultimately the parameters represent the best estimation of two fundamentally different equations, although the lack of data regarding the choice among Detroit-area crossings implies that that single-logit equation is at a significant advantage. However, the nested-logit structure allows for the shares of crossing traffic to be determined for each individual crossing before the user-equilibrium assignment procedure loads the rest of the network. Therefore, the nested-logit model provides a distinctly different forecast, with less sensitivity to relatively moderate differences in travel time, compared with the single-logit forecasts. In other words, if time is not as critical to the choice of the crossing, the nested-logit model addresses the range in traffic that could occur on each crossing.

Comparisons

Tables 1A/1B through 6A/6B in Attachment 1 to this appendix compare the results of the nested-logit assignment to the single-logit assignment for each peak hour for both 2015 and 2035. The general trends and differences between the two modeling approaches are provided in two examples.

First, using the 2015 AM peak hour (Table A-5), it can be seen within the upper-level choice (Blue Water Bridge and the Detroit area crossings), the nested-logit model places approximately 20 percent more cars on the Blue Water Bridge than the single-logit model (○ red ovals). The nested-logit model assigns virtually the same number of trucks as the single-logit model to the Blue Water Bridge in the No Build condition (○ blue ovals), but assigns approximately 20 to 30 percent fewer trucks with the introduction of the proposed DRIC crossing (○ green circles). These characteristics occur across all alternatives and time periods (Tables 1A/1B through 6A/6B in the attachment to this appendix).

These upper level shifts are, in part, due to the recalibration of the nested-logit model, which more precisely matches observed crossing shares, resulting in a base year shift of approximately three percent more cars and two percent fewer trucks to the Blue Water Bridge, as compared to the single-logit distribution (see Section 2.1.3). These small percentage shifts in predicted base-year shares are carried forward to the future-year forecasts.

Table A-5 shows that the nested-logit model allocates 15 to 25 percent fewer cars to the Detroit-Windsor Tunnel, as compared to the single-logit model (□ red squares). The nested-logit model also allocates fewer trucks to the Tunnel, although trucks represent a very small portion of tunnel traffic (□ blue squares). However, the primary reason for the decrease in the Detroit-Windsor Tunnel's share of trips does not involve the Blue Water Bridge. In comparison to the single-logit model, the nested-logit model generally calculates lower utilities for the Detroit-Windsor Tunnel for most trips, as compared to the proposed DRIC crossing and the Ambassador Bridge. Therefore, the nested-logit model allocates smaller shares of traffic to the Tunnel, compared to the Ambassador Bridge and proposed DRIC crossing.

In regard to the Ambassador Bridge and the proposed DRIC crossing, Table A-5 shows that the nested-logit model allocates more trips overall to both of these crossings than the single-logit model, with the Ambassador Bridge actually receiving the highest share of total traffic (□ green squares). This is primarily due to the nested-logit model's allocation of truck trips relatively evenly between both crossings, as compared to the single-logit model, which strongly favors the proposed DRIC crossing (○ purple circles). This somewhat even allocation of trucks illustrates the reduced sensitivity to time and cost of the nested-logit model, as compared to the single-logit model.

Table A-5
Detroit River International Crossing Study
2015 AM Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada					Canada-to-U.S. (Peak Direction)					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	134	227	221	n/a	582	189	977	1,461	n/a	2,627	323	1,204	1,682	n/a	3,209
	Single	#1, #2, #3, #14, #16	131	198	103	151	583	180	755	996	696	2,627	311	953	1,099	847	3,210
	Single	#5	131	201	94	156	582	181	754	999	693	2,627	312	955	1,093	849	3,209
	Single	#7, #9, #11	132	206	190	56	584	182	819	1,208	416	2,625	314	1,025	1,398	472	3,209
	Nested	No Build	165	188	230	n/a	583	245	836	1,546	n/a	2,627	410	1,024	1,776	n/a	3,210
	Nested	#1, #2, #3, #14, #16	156	146	170	111	583	224	551	1,046	806	2,627	380	697	1,216	917	3,210
	Nested	#5	157	152	162	112	583	224	551	1,049	800	2,624	381	703	1,211	912	3,207
	Nested	#7, #9, #11	158	157	188	80	583	227	607	1,168	624	2,626	385	764	1,356	704	3,209
Trucks	Single	No Build	87	37	296	n/a	420	235	31	309	n/a	575	322	68	605	n/a	995
	Single	#1, #2, #3, #14, #16	72	16	77	256	421	215	10	0	349	574	287	26	77	605	995
	Single	#5	73	18	73	257	421	216	10	0	348	574	289	28	73	605	995
	Single	#7, #9, #11	78	16	176	151	421	219	12	82	261	574	297	28	258	412	995
	Nested	No Build	110	9	301	n/a	420	217	8	350	n/a	575	327	17	651	n/a	995
	Nested	#1, #2, #3, #14, #16	75	5	165	175	420	149	4	202	220	575	224	9	367	395	995
	Nested	#5	76	5	165	174	420	149	4	202	219	574	225	9	367	393	994
	Nested	#7, #9, #11	77	5	172	166	420	152	4	208	210	574	229	9	380	376	994
Total	Single	No Build	221	264	517	n/a	1,002	424	1,008	1,770	n/a	3,202	645	1,272	2,287	n/a	4,204
	Single	#1, #2, #3, #14, #16	203	214	180	407	1,004	395	765	996	1,045	3,201	598	979	1,176	1,452	4,205
	Single	#5	204	219	167	413	1,003	397	764	999	1,041	3,201	601	983	1,166	1,454	4,204
	Single	#7, #9, #11	210	222	366	207	1,005	401	831	1,290	677	3,199	611	1,053	1,656	884	4,204
	Nested	No Build	275	197	531	n/a	1,003	462	844	1,896	n/a	3,202	737	1,041	2,427	n/a	4,205
	Nested	#1, #2, #3, #14, #16	231	151	335	286	1,003	373	555	1,248	1,026	3,202	604	706	1,583	1,312	4,205
	Nested	#5	233	157	327	286	1,003	373	555	1,251	1,019	3,198	606	712	1,578	1,305	4,201
	Nested	#7, #9, #11	235	162	360	246	1,003	379	611	1,376	834	3,200	614	773	1,736	1,080	4,203
PCEs[a]	Single	No Build	352	320	961	n/a	1,632	777	1,055	2,234	n/a	4,065	1,128	1,374	3,195	n/a	5,697
	Single	#1, #2, #3, #14, #16	311	238	296	791	1,636	718	780	996	1,569	4,062	1,029	1,018	1,292	2,360	5,698
	Single	#5	314	246	277	799	1,635	721	779	999	1,563	4,062	1,035	1,025	1,276	2,362	5,697
	Single	#7, #9, #11	327	246	630	434	1,637	730	849	1,413	1,069	4,060	1,057	1,095	2,043	1,502	5,697
	Nested	No Build	440	211	983	n/a	1,633	788	856	2,421	n/a	4,065	1,228	1,067	3,404	n/a	5,698
	Nested	#1, #2, #3, #14, #16	344	159	583	549	1,633	597	561	1,551	1,356	4,065	940	720	2,134	1,905	5,698
	Nested	#5	347	165	575	547	1,633	597	561	1,554	1,348	4,059	944	726	2,129	1,895	5,692
	Nested	#7, #9, #11	351	170	618	495	1,633	607	617	1,688	1,149	4,061	958	787	2,306	1,644	5,694

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.
Source: The Corradino Group of Michigan, Inc.

Time Sensitivity

Additional detail of the change in time sensitivity with the nested-logit model is provided by examining Table A-6. For the single-logit model, for the 2035 AM peak hour, the total two-way volume for the proposed DRIC crossing under Alternative #5 is 1,090 cars, while under Alternative Set #7/9/11, the total two-way car volume is 611 – a difference of 479 (○ red oval). Using the nested-logit model, the total two-way volume for the proposed DRIC crossing with Alternative #5 is 1,153 cars, while under Alternative Set #7/9/11, the total two-way car volume is 909 – a difference of only 244 (○ blue circle). For trucks, the distinction among DRIC alternatives with the nested-logit assignment is even smaller. The single-logit assignment for total two-way trucks in the 2035 AM peak hour for Alternative #5 is 948 trucks, while under Alternative Set #7/9/11, the total is 729 trucks – a difference of 219 (□ red square). The nested-logit assignment for total two-way trucks in the 2035 AM peak hour under Alternative #5 is 636 trucks, while under Alternative Set #7/9/11 the total is 610 trucks – a difference of only 26 (□ blue square). This tightening of volumes among alternatives again illustrates the reduced travel time sensitivity of the nested-logit model.

The lower sensitivity to time carries over to the directional behavior of traffic entering or exiting the U.S. plazas as well. This is illustrated by Table A-7 for the 2035 AM peak hour. The major difference between the single-logit and nested-logit models in this regard is that the allocation of traffic between crossings is more balanced. Under the nested-logit model, neither the proposed new crossing nor the Ambassador Bridge dominates a specific directional movement, as they do with the single-logit technique (○ red and ○ blue ovals for the U.S.-to-Canada direction and □ red and □ blue boxes for the Canada-to-U.S. direction.

Table A-6
Detroit River International Crossing Study
2035 AM Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada					Canada-to-U.S. (Peak Direction)					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	182	305	273	n/a	760	186	1,150	1,709	n/a	3,045	368	1,455	1,982	n/a	3,805
	Single	#1, #2, #3, #14, #16	177	257	130	196	760	171	863	1,103	908	3,045	348	1,120	1,233	1,104	3,805
	Single	#5	177	256	141	185	759	172	867	1,101	905	3,045	349	1,123	1,242	1,090	3,804
	Single	#7, #9, #11	178	274	242	67	761	173	957	1,371	544	3,045	351	1,231	1,613	611	3,806
	Nested	No Build	219	248	294	n/a	761	239	1,066	1,738	n/a	3,043	458	1,314	2,032	n/a	3,804
	Nested	#1, #2, #3, #14, #16	206	189	218	147	760	214	650	1,166	1,015	3,045	420	839	1,384	1,162	3,805
	Nested	#5	207	189	220	146	762	215	651	1,171	1,007	3,044	422	840	1,391	1,153	3,806
	Nested	#7, #9, #11	208	203	241	107	759	217	725	1,301	802	3,045	425	928	1,542	909	3,804
Trucks	Single	No Build	191	78	454	n/a	723	361	63	465	n/a	889	552	141	919	n/a	1,612
	Single	#1, #2, #3, #14, #16	159	26	124	414	723	320	16	0	553	889	479	42	124	967	1,612
	Single	#5	160	26	139	398	723	321	16	2	550	889	481	42	141	948	1,612
	Single	#7, #9, #11	168	32	277	246	723	326	19	62	483	890	494	51	339	729	1,613
	Nested	No Build	221	15	488	n/a	724	333	13	543	n/a	889	554	28	1,031	n/a	1,613
	Nested	#1, #2, #3, #14, #16	154	8	270	291	723	219	6	313	350	888	373	14	583	641	1,611
	Nested	#5	155	8	273	288	724	220	6	314	348	888	375	14	587	636	1,612
	Nested	#7, #9, #11	157	8	283	275	723	224	7	323	335	889	381	15	606	610	1,612
Total	Single	No Build	373	383	727	n/a	1,483	547	1,213	2,174	n/a	3,934	920	1,596	2,901	n/a	5,417
	Single	#1, #2, #3, #14, #16	336	283	254	610	1,483	491	879	1,103	1,461	3,934	827	1,162	1,357	2,071	5,417
	Single	#5	337	282	280	583	1,482	493	883	1,103	1,455	3,934	830	1,165	1,383	2,038	5,416
	Single	#7, #9, #11	346	306	519	313	1,484	499	976	1,433	1,027	3,935	845	1,282	1,952	1,340	5,419
	Nested	No Build	440	263	782	n/a	1,485	572	1,079	2,281	n/a	3,932	1,012	1,342	3,063	n/a	5,417
	Nested	#1, #2, #3, #14, #16	360	197	488	438	1,483	433	656	1,479	1,365	3,933	793	853	1,967	1,803	5,416
	Nested	#5	362	197	493	434	1,486	435	657	1,485	1,355	3,932	797	854	1,978	1,789	5,418
	Nested	#7, #9, #11	365	211	524	382	1,482	441	732	1,624	1,137	3,934	806	943	2,148	1,519	5,416
PCEs[a]	Single	No Build	660	500	1,408	n/a	2,568	1,089	1,308	2,872	n/a	5,268	1,748	1,808	4,280	n/a	7,835
	Single	#1, #2, #3, #14, #16	575	322	440	1,231	2,568	971	903	1,103	2,291	5,268	1,546	1,225	1,543	3,522	7,835
	Single	#5	577	321	489	1,180	2,567	975	907	1,106	2,280	5,268	1,552	1,228	1,595	3,460	7,834
	Single	#7, #9, #11	598	354	935	682	2,569	988	1,005	1,526	1,752	5,270	1,586	1,359	2,461	2,434	7,839
	Nested	No Build	772	286	1,514	n/a	2,571	1,072	1,099	3,096	n/a	5,266	1,843	1,384	4,610	n/a	7,837
	Nested	#1, #2, #3, #14, #16	591	209	893	875	2,568	762	665	1,949	1,890	5,265	1,353	874	2,842	2,765	7,833
	Nested	#5	595	209	903	866	2,572	765	666	1,956	1,877	5,264	1,360	875	2,859	2,743	7,836
	Nested	#7, #9, #11	601	223	949	795	2,567	777	743	2,109	1,640	5,268	1,378	966	3,057	2,434	7,834

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.
Source: The Corradino Group of Michigan, Inc.

Table A-7
Detroit River International Crossing Study
Practical Alternatives Directional Comparison: 2035 AM Peak Hour Single Logit Assignment and Nested Logit Assignment

	Model Type	Network	U.S.-to-Canada						Canada-to-U.S. (Peak Direction)						Total	
			from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
			AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	Single	#1, #2, #3, #14, #16	53	71	77	125	130	196	122	409	981	499	1,103	908	1,233	1,104
	Single	#5	54	67	87	118	141	185	111	405	990	500	1,101	905	1,242	1,090
	Single	#7, #9, #11	62	59	180	8	242	67	133	392	1,238	152	1,371	544	1,613	611
	Nested	#1, #2, #3, #14, #16	48	50	170	97	218	147	174	309	992	706	1,166	1,015	1,384	1,162
	Nested	#5	50	48	170	98	220	146	173	295	998	712	1,171	1,007	1,391	1,153
	Nested	#7, #9, #11	56	39	185	68	241	107	206	264	1,095	538	1,301	802	1,542	909
Trucks	Single	#1, #2, #3, #14, #16	42	323	82	91	124	414	0	359	0	194	0	553	124	967
	Single	#5	42	301	97	97	139	398	0	325	2	225	2	550	141	948
	Single	#7, #9, #11	53	246	224	0	277	246	1	319	61	164	62	483	339	729
	Nested	#1, #2, #3, #14, #16	133	182	137	109	270	291	127	244	186	106	313	350	583	641
	Nested	#5	122	180	151	108	273	288	116	242	198	106	314	348	587	636
	Nested	#7, #9, #11	131	172	152	103	283	275	120	234	203	101	323	335	606	610
Total	Single	#1, #2, #3, #14, #16	95	394	159	216	254	610	122	768	981	693	1,103	1,461	1,357	2,071
	Single	#5	96	368	184	215	280	583	111	730	992	725	1,103	1,455	1,383	2,038
	Single	#7, #9, #11	115	305	404	8	519	313	134	711	1,299	316	1,433	1,027	1,952	1,340
	Nested	#1, #2, #3, #14, #16	181	232	307	206	488	438	301	553	1,178	812	1,479	1,365	1,967	1,803
	Nested	#5	172	228	321	206	493	434	289	537	1,196	818	1,485	1,355	1,978	1,789
	Nested	#7, #9, #11	187	211	337	171	524	382	326	498	1,298	639	1,624	1,137	2,148	1,519
PCEs[a]	Single	#1, #2, #3, #14, #16	158	879	282	353	440	1,231	122	1,307	981	984	1,103	2,291	1,543	3,522
	Single	#5	159	820	330	361	489	1,180	111	1,218	995	1,063	1,106	2,280	1,595	3,460
	Single	#7, #9, #11	195	674	740	8	935	682	136	1,190	1,391	562	1,526	1,752	2,461	2,434
	Nested	#1, #2, #3, #14, #16	381	505	513	370	893	875	492	919	1,457	971	1,949	1,890	2,842	2,765
	Nested	#5	355	498	548	368	903	866	463	900	1,493	977	1,956	1,877	2,859	2,743
	Nested	#7, #9, #11	384	469	565	326	949	795	506	849	1,603	791	2,109	1,640	3,057	2,434

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.

Source: The Corradino Group of Michigan, Inc.

Attachment 1

Table 1A
Detroit River International Crossing Study
2015 AM Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada					Canada-to-U.S. (PeakDirection)					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	134	227	221	n/a	582	189	977	1,461	n/a	2,627	323	1,204	1,682	n/a	3,209
	Single	#1, #2, #3, #14, #16	131	198	102	150	581	180	755	996	695	2,626	311	953	1,098	845	3,207
	Single	#5	131	201	95	156	583	180	755	999	692	2,626	311	956	1,094	848	3,209
	Single	#7, #9, #11	132	207	188	56	583	182	820	1,206	417	2,625	314	1,027	1,394	473	3,208
	Nested	No Build	165	188	230	n/a	583	245	836	1,546	n/a	2,627	410	1,024	1,776	n/a	3,210
	Nested	#1, #2, #3, #14, #16	156	146	170	110	582	224	551	1,046	806	2,627	380	697	1,216	916	3,209
	Nested	#5	157	152	163	113	585	224	552	1,049	800	2,625	381	704	1,212	913	3,210
	Nested	#7, #9, #11	158	157	188	80	583	227	608	1,168	625	2,628	385	765	1,356	705	3,211
Trucks	Single	No Build	87	37	296	n/a	420	235	31	309	n/a	575	322	68	605	n/a	995
	Single	#1, #2, #3, #14, #16	72	16	80	253	421	215	10	0	349	574	287	26	80	602	995
	Single	#5	73	20	71	256	420	216	10	0	348	574	289	30	71	604	994
	Single	#7, #9, #11	77	16	188	139	420	219	12	86	256	573	296	28	274	395	993
	Nested	No Build	110	9	301	n/a	420	217	8	350	n/a	575	327	17	651	n/a	995
	Nested	#1, #2, #3, #14, #16	75	5	165	175	420	149	4	202	220	575	224	9	367	395	995
	Nested	#5	76	5	166	174	421	149	4	202	219	574	225	9	368	393	995
	Nested	#7, #9, #11	77	5	173	166	421	152	4	209	210	575	229	9	382	376	996
Total	Single	No Build	221	264	517	n/a	1,002	424	1,008	1,770	n/a	3,202	645	1,272	2,287	n/a	4,204
	Single	#1, #2, #3, #14, #16	203	214	182	403	1,002	395	765	996	1,044	3,200	598	979	1,178	1,447	4,202
	Single	#5	204	221	166	412	1,003	396	765	999	1,040	3,200	600	986	1,165	1,452	4,203
	Single	#7, #9, #11	209	223	376	195	1,003	401	832	1,292	673	3,198	610	1,055	1,668	868	4,201
	Nested	No Build	275	197	531	n/a	1,003	462	844	1,896	n/a	3,202	737	1,041	2,427	n/a	4,205
	Nested	#1, #2, #3, #14, #16	231	151	335	285	1,002	373	555	1,248	1,026	3,202	604	706	1,583	1,311	4,204
	Nested	#5	233	157	329	287	1,006	373	556	1,251	1,019	3,199	606	713	1,580	1,306	4,205
	Nested	#7, #9, #11	235	162	361	246	1,004	379	612	1,377	835	3,203	614	774	1,738	1,081	4,207
PCEs[a]	Single	No Build	352	320	961	n/a	1,632	777	1,055	2,234	n/a	4,065	1,128	1,374	3,195	n/a	5,697
	Single	#1, #2, #3, #14, #16	311	238	302	783	1,634	718	780	996	1,568	4,061	1,029	1,018	1,298	2,350	5,695
	Single	#5	314	251	273	796	1,633	720	780	999	1,562	4,061	1,034	1,031	1,272	2,358	5,694
	Single	#7, #9, #11	325	247	658	404	1,633	730	850	1,421	1,057	4,058	1,054	1,097	2,079	1,461	5,691
	Nested	No Build	440	211	983	n/a	1,633	788	856	2,421	n/a	4,065	1,228	1,067	3,404	n/a	5,698
	Nested	#1, #2, #3, #14, #16	344	159	583	548	1,632	597	561	1,551	1,356	4,065	940	720	2,134	1,904	5,697
	Nested	#5	347	165	578	548	1,638	597	562	1,554	1,348	4,060	944	727	2,132	1,896	5,698
	Nested	#7, #9, #11	351	170	621	495	1,636	607	618	1,691	1,150	4,066	958	788	2,311	1,645	5,701

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table 1B
Detroit River International Crossing Study
Practical Alternatives Directional Comparison: 2015 AM Peak Hour Single Logit Assignment and Nested Logit Assignment

	Model Type	Network	U.S.-to-Canada						Canada-to-U.S. (Peak Direction)						Total	
			from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
			AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	Single	#1,#2,#3,#14,#16	42	58	60	92	102	150	115	344	881	351	996	695	1,098	845
	Single	#5	49	54	46	102	95	156	109	334	890	358	999	692	1,094	848
	Single	#7,#9,#11	50	47	138	9	188	56	132	307	1,074	110	1,206	417	1,394	473
	Nested	#1,#2,#3,#14,#16	40	40	130	70	170	110	159	248	887	558	1,046	806	1,216	916
	Nested	#5	52	37	111	75	163	112	158	238	891	562	1,049	800	1,212	912
	Nested	#7,#9,#11	47	31	141	49	188	80	188	208	980	417	1,168	625	1,356	705
Trucks	Single	#1,#2,#3,#14,#16	27	191	53	62	80	253	0	219	0	130	0	349	80	602
	Single	#5	27	190	44	66	71	256	0	210	0	138	0	348	71	604
	Single	#7,#9,#11	35	139	153	0	188	139	0	205	86	51	86	256	274	395
	Nested	#1,#2,#3,#14,#16	75	109	90	66	165	175	77	157	125	63	202	220	367	395
	Nested	#5	94	108	72	66	166	174	77	149	125	70	202	219	368	393
	Nested	#7,#9,#11	81	104	92	62	173	166	80	150	129	60	209	210	382	376
Total	Single	#1,#2,#3,#14,#16	69	249	113	154	182	403	115	563	881	481	996	1,044	1,178	1,447
	Single	#5	76	244	90	168	166	412	109	544	890	496	999	1,040	1,165	1,452
	Single	#7,#9,#11	85	186	291	9	376	195	132	512	1,160	161	1,292	673	1,668	868
	Nested	#1,#2,#3,#14,#16	115	149	220	136	335	285	236	405	1,012	621	1,248	1,026	1,583	1,311
	Nested	#5	146	145	183	141	329	286	235	387	1,016	632	1,251	1,019	1,580	1,305
	Nested	#7,#9,#11	128	135	233	111	361	246	268	358	1,109	477	1,377	835	1,738	1,081
PCEs[a]	Single	#1,#2,#3,#14,#16	110	536	193	247	302	783	115	892	881	676	996	1,568	1,298	2,350
	Single	#5	117	529	156	267	273	796	109	859	890	703	999	1,562	1,272	2,358
	Single	#7,#9,#11	138	395	521	9	658	404	132	820	1,289	238	1,421	1,057	2,079	1,461
	Nested	#1,#2,#3,#14,#16	228	313	355	235	583	548	352	641	1,200	716	1,551	1,356	2,134	1,904
	Nested	#5	287	307	291	240	578	547	351	611	1,204	737	1,554	1,348	2,132	1,895
	Nested	#7,#9,#11	250	291	371	204	621	495	388	583	1,303	567	1,691	1,150	2,311	1,645

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.

Source: The Corradino Group of Michigan, Inc.

Table 2A
Detroit River International Crossing Study
2015 Midday Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada					Canada-to-U.S.					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	368	595	560	n/a	1,523	293	354	558	n/a	1,205	661	949	1,118	n/a	2,728
	Single	#1, #2, #3, #14, #16	357	515	263	388	1,523	285	300	450	171	1,206	642	815	713	559	2,729
	Single	#5	357	510	234	421	1,522	285	301	451	169	1,206	642	811	685	590	2,728
	Single	#7, #9, #11	359	545	444	174	1,522	287	309	488	120	1,204	646	854	932	294	2,726
	Nested	No Build	447	557	519	n/a	1,523	372	374	460	n/a	1,206	819	931	979	n/a	2,729
	Nested	#1, #2, #3, #14, #16	420	424	388	291	1,523	353	292	332	229	1,206	773	716	720	520	2,729
	Nested	#5	422	434	372	294	1,522	353	292	334	225	1,204	775	726	706	519	2,726
	Nested	#7, #9, #11	425	454	426	217	1,522	356	312	365	173	1,206	781	766	791	390	2,728
Trucks	Single	No Build	278	105	506	n/a	889	189	12	356	n/a	557	467	117	862	n/a	1,446
	Single	#1, #2, #3, #14, #16	249	48	125	466	888	179	13	86	280	558	428	61	211	746	1,446
	Single	#5	251	81	119	439	890	179	13	86	279	557	430	94	205	718	1,447
	Single	#7, #9, #11	259	59	355	216	889	182	12	258	106	558	441	71	613	322	1,447
	Nested	No Build	263	20	607	n/a	890	163	11	384	n/a	558	426	31	991	n/a	1,448
	Nested	#1, #2, #3, #14, #16	176	11	344	359	890	114	6	222	217	559	290	17	566	576	1,449
	Nested	#5	178	11	340	360	889	114	6	223	216	559	292	17	563	576	1,448
	Nested	#7, #9, #11	181	11	357	341	890	116	6	230	206	558	297	17	587	547	1,448
Total	Single	No Build	646	700	1,066	n/a	2,412	482	366	914	n/a	1,762	1,128	1,066	1,980	n/a	4,174
	Single	#1, #2, #3, #14, #16	606	563	388	854	2,411	464	313	536	451	1,764	1,070	876	924	1,305	4,175
	Single	#5	608	591	353	860	2,412	464	314	537	448	1,763	1,072	905	890	1,308	4,175
	Single	#7, #9, #11	618	604	799	390	2,411	469	321	746	226	1,762	1,087	925	1,545	616	4,173
	Nested	No Build	710	577	1,126	n/a	2,413	535	385	844	n/a	1,764	1,245	962	1,970	n/a	4,177
	Nested	#1, #2, #3, #14, #16	596	435	732	650	2,413	467	298	554	446	1,765	1,063	733	1,286	1,096	4,178
	Nested	#5	600	445	712	654	2,411	467	298	557	441	1,763	1,067	743	1,269	1,095	4,174
	Nested	#7, #9, #11	606	465	783	558	2,412	472	318	595	379	1,764	1,078	783	1,378	937	4,176
PCEs[a]	Single	No Build	1,063	858	1,825	n/a	3,746	766	384	1,448	n/a	2,598	1,829	1,242	3,273	n/a	6,343
	Single	#1, #2, #3, #14, #16	980	635	576	1,553	3,743	733	333	665	871	2,601	1,712	968	1,241	2,424	6,344
	Single	#5	985	713	532	1,519	3,747	733	334	666	867	2,599	1,717	1,046	1,198	2,385	6,346
	Single	#7, #9, #11	1,007	693	1,332	714	3,745	742	339	1,133	385	2,599	1,749	1,032	2,465	1,099	6,344
	Nested	No Build	1,105	607	2,037	n/a	3,748	780	402	1,420	n/a	2,601	1,884	1,009	3,457	n/a	6,349
	Nested	#1, #2, #3, #14, #16	860	452	1,248	1,189	3,748	638	307	887	772	2,604	1,498	759	2,135	1,960	6,352
	Nested	#5	867	462	1,222	1,194	3,745	638	307	892	765	2,602	1,505	769	2,114	1,959	6,346
	Nested	#7, #9, #11	878	482	1,319	1,070	3,747	646	327	940	688	2,601	1,524	809	2,259	1,758	6,348

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table 2B
Detroit River International Crossing Study
Practical Alternatives Directional Comparison: 2015 Midday Peak Hour Single Logit Assignment and Nested Logit Assignment

	Model Type	Network	U.S.-to-Canada						Canada-to-U.S.						Total	
			from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
			AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	Single	#1,#2,#3,#14,#16	99	195	164	193	263	388	60	140	390	31	450	171	713	559
	Single	#5	116	186	118	235	234	421	59	136	392	33	451	169	685	590
	Single	#7,#9,#11	113	143	331	31	444	174	72	120	416	0	488	120	932	294
	Nested	#1,#2,#3,#14,#16	101	124	287	167	388	291	74	104	258	125	332	229	720	520
	Nested	#5	128	118	244	176	372	294	74	100	260	125	334	225	706	519
	Nested	#7,#9,#11	116	96	310	121	426	217	85	83	280	90	365	173	791	390
Trucks	Single	#1,#2,#3,#14,#16	68	313	57	153	125	466	0	185	86	95	86	280	211	746
	Single	#5	87	293	32	146	119	439	0	173	86	106	86	279	205	718
	Single	#7,#9,#11	87	210	268	6	355	216	38	99	220	7	258	106	613	322
	Nested	#1,#2,#3,#14,#16	148	244	196	115	344	359	80	144	142	73	222	217	566	576
	Nested	#5	152	244	188	116	340	360	81	143	142	73	223	216	563	576
	Nested	#7,#9,#11	154	234	203	107	357	341	83	137	147	69	230	206	587	547
Total	Single	#1,#2,#3,#14,#16	167	508	221	346	388	854	60	325	476	126	536	451	924	1,305
	Single	#5	203	479	150	381	353	860	59	309	478	139	537	448	890	1,308
	Single	#7,#9,#11	200	353	599	37	799	390	110	219	636	7	746	226	1,545	616
	Nested	#1,#2,#3,#14,#16	249	368	483	282	732	650	154	248	400	198	554	446	1,286	1,096
	Nested	#5	280	362	432	292	712	654	155	243	402	198	557	441	1,269	1,095
	Nested	#7,#9,#11	270	330	513	228	783	558	168	220	427	159	595	379	1,378	937
PCEs[a]	Single	#1,#2,#3,#14,#16	269	978	307	576	576	1,553	60	603	605	269	665	871	1,241	2,424
	Single	#5	334	919	198	600	532	1,519	59	569	607	298	666	867	1,198	2,385
	Single	#7,#9,#11	331	668	1,001	46	1,332	714	167	368	966	18	1,133	385	2,465	1,099
	Nested	#1,#2,#3,#14,#16	471	734	777	455	1,248	1,189	274	464	613	308	887	772	2,135	1,960
	Nested	#5	508	728	714	466	1,222	1,194	277	458	615	308	892	765	2,114	1,959
	Nested	#7,#9,#11	501	681	818	389	1,319	1,070	293	426	648	263	940	688	2,259	1,758

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.

Source: The Corradino Group of Michigan, Inc.

Table 3A
Detroit River International Crossing Study
2015 PM Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada (Peak Direction)					Canada-to-U.S.					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	445	1,233	1,621	n/a	3,299	361	325	544	n/a	1,230	806	1,558	2,165	n/a	4,529
	Single	#1, #2, #3, #14, #16	415	952	905	1,026	3,298	347	287	397	199	1,230	762	1,239	1,302	1,225	4,528
	Single	#5	415	954	863	1,066	3,298	347	285	401	196	1,229	762	1,239	1,264	1,262	4,527
	Single	#7, #9, #11	419	1,031	1,197	652	3,299	350	284	441	155	1,230	769	1,315	1,638	807	4,529
	Nested	No Build	516	1,325	1,458	n/a	3,299	446	262	524	n/a	1,232	962	1,587	1,982	n/a	4,531
	Nested	#1, #2, #3, #14, #16	473	973	986	867	3,299	418	202	367	243	1,230	891	1,175	1,353	1,110	4,529
	Nested	#5	474	983	956	885	3,298	419	201	370	240	1,230	893	1,184	1,326	1,125	4,528
	Nested	#7, #9, #11	478	1,041	1,096	683	3,298	423	216	404	187	1,230	901	1,257	1,500	870	4,528
Trucks	Single	No Build	270	41	503	n/a	814	228	1	279	n/a	508	498	42	782	n/a	1,322
	Single	#1, #2, #3, #14, #16	209	25	96	485	815	211	1	48	249	509	420	26	144	734	1,324
	Single	#5	210	26	95	484	815	212	1	38	256	507	422	27	133	740	1,322
	Single	#7, #9, #11	219	30	221	346	816	216	1	126	166	509	435	31	347	512	1,325
	Nested	No Build	284	16	515	n/a	815	184	7	317	n/a	508	468	23	832	n/a	1,323
	Nested	#1, #2, #3, #14, #16	181	8	290	336	815	128	3	183	195	509	309	11	473	531	1,324
	Nested	#5	181	8	292	333	814	128	4	183	193	508	309	12	475	526	1,322
	Nested	#7, #9, #11	185	8	301	320	814	131	4	189	184	508	316	12	490	504	1,322
Total	Single	No Build	715	1,274	2,124	n/a	4,113	589	326	823	n/a	1,738	1,304	1,600	2,947	n/a	5,851
	Single	#1, #2, #3, #14, #16	624	977	1,001	1,511	4,113	558	288	445	448	1,739	1,182	1,265	1,446	1,959	5,852
	Single	#5	625	980	958	1,550	4,113	559	286	439	452	1,736	1,184	1,266	1,397	2,002	5,849
	Single	#7, #9, #11	638	1,061	1,418	998	4,115	566	285	567	321	1,739	1,204	1,346	1,985	1,319	5,854
	Nested	No Build	800	1,341	1,973	n/a	4,114	630	269	841	n/a	1,740	1,430	1,610	2,814	n/a	5,854
	Nested	#1, #2, #3, #14, #16	654	981	1,276	1,203	4,114	546	205	550	438	1,739	1,200	1,186	1,826	1,641	5,853
	Nested	#5	655	991	1,248	1,218	4,112	547	205	553	433	1,738	1,202	1,196	1,801	1,651	5,850
	Nested	#7, #9, #11	663	1,049	1,397	1,003	4,112	554	220	593	371	1,738	1,217	1,269	1,990	1,374	5,850
PCEs[a]	Single	No Build	1,120	1,336	2,879	n/a	5,334	931	328	1,242	n/a	2,500	2,051	1,663	4,120	n/a	7,834
	Single	#1, #2, #3, #14, #16	938	1,015	1,145	2,239	5,336	875	290	517	822	2,503	1,812	1,304	1,662	3,060	7,838
	Single	#5	940	1,019	1,101	2,276	5,336	877	288	496	836	2,497	1,817	1,307	1,597	3,112	7,832
	Single	#7, #9, #11	967	1,106	1,750	1,517	5,339	890	287	756	570	2,503	1,857	1,393	2,506	2,087	7,842
	Nested	No Build	1,226	1,365	2,746	n/a	5,337	906	280	1,317	n/a	2,502	2,132	1,645	4,062	n/a	7,839
	Nested	#1, #2, #3, #14, #16	926	993	1,711	1,707	5,337	738	210	825	731	2,503	1,664	1,203	2,536	2,438	7,839
	Nested	#5	927	1,003	1,686	1,718	5,333	739	211	828	723	2,500	1,666	1,214	2,514	2,440	7,833
	Nested	#7, #9, #11	941	1,061	1,849	1,483	5,333	751	226	877	647	2,500	1,691	1,287	2,725	2,130	7,833

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table 3B
Detroit River International Crossing Study
Practical Alternatives Directional Comparison: 2015 PM Peak Hour Single Logit Assignment and Nested Logit Assignment

	Model Type	Network	U.S.-to-Canada (Peak Direction)						Canada-to-U.S.						Total	
			from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
			AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	Single	#1,#2,#3,#14,#16	269	360	636	666	905	1,026	83	174	314	25	397	199	1,302	1,225
	Single	#5	302	345	561	721	863	1,066	83	170	318	26	401	196	1,264	1,262
	Single	#7,#9,#11	297	328	900	324	1,197	652	94	155	347	0	441	155	1,638	807
	Nested	#1,#2,#3,#14,#16	280	281	706	586	986	867	94	115	273	128	367	243	1,353	1,110
	Nested	#5	314	263	642	622	956	885	94	111	276	129	370	240	1,326	1,125
	Nested	#7,#9,#11	323	232	773	451	1,096	683	107	93	297	94	404	187	1,500	870
Trucks	Single	#1,#2,#3,#14,#16	29	385	67	100	96	485	26	170	22	79	48	249	144	734
	Single	#5	34	354	61	129	95	483	27	161	11	95	38	256	133	739
	Single	#7,#9,#11	42	326	179	20	221	346	29	143	97	23	126	166	347	512
	Nested	#1,#2,#3,#14,#16	162	255	128	81	290	336	92	153	91	42	183	195	473	531
	Nested	#5	184	263	108	70	292	333	92	151	91	42	183	193	475	526
	Nested	#7,#9,#11	169	243	132	77	301	320	95	145	94	39	189	184	490	504
Total	Single	#1,#2,#3,#14,#16	298	745	703	766	1,001	1,511	109	344	336	104	445	448	1,446	1,959
	Single	#5	336	699	622	850	958	1,549	110	331	329	121	439	452	1,397	2,001
	Single	#7,#9,#11	339	654	1,079	344	1,418	998	123	298	444	23	567	321	1,985	1,319
	Nested	#1,#2,#3,#14,#16	442	536	834	667	1,276	1,203	186	268	364	170	550	438	1,826	1,641
	Nested	#5	498	526	750	692	1,248	1,218	186	262	367	171	553	433	1,801	1,651
	Nested	#7,#9,#11	492	475	905	528	1,397	1,003	202	238	391	133	593	371	1,990	1,374
PCEs[a]	Single	#1,#2,#3,#14,#16	342	1,323	804	916	1,145	2,239	148	599	369	223	517	822	1,662	3,060
	Single	#5	387	1,230	714	1,044	1,101	2,274	151	573	346	264	496	836	1,597	3,110
	Single	#7,#9,#11	402	1,143	1,348	374	1,750	1,517	167	513	590	58	756	570	2,506	2,087
	Nested	#1,#2,#3,#14,#16	685	919	1,026	789	1,711	1,707	324	498	501	233	825	731	2,536	2,438
	Nested	#5	774	921	912	797	1,686	1,718	324	489	504	234	828	723	2,514	2,440
	Nested	#7,#9,#11	746	840	1,103	644	1,849	1,483	345	456	532	192	877	647	2,725	2,130

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.

Source: The Corradino Group of Michigan, Inc.

Table 4A
Detroit River International Crossing Study
2035 AM Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada					Canada-to-U.S. (Peak Direction)					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	182	305	273	n/a	760	186	1,150	1,709	n/a	3,045	368	1,455	1,982	n/a	3,805
	Single	#1, #2, #3, #14, #16	177	257	130	196	760	171	866	1,099	908	3,044	348	1,123	1,229	1,104	3,804
	Single	#5	177	256	141	185	759	172	867	1,101	905	3,045	349	1,123	1,242	1,090	3,804
	Single	#7, #9, #11	178	274	242	67	761	173	957	1,371	544	3,045	351	1,231	1,613	611	3,806
	Nested	No Build	219	248	294	n/a	761	239	1,066	1,738	n/a	3,043	458	1,314	2,032	n/a	3,804
	Nested	#1, #2, #3, #14, #16	206	189	220	146	761	214	651	1,171	1,007	3,043	420	840	1,391	1,153	3,804
	Nested	#5	207	189	220	146	762	215	651	1,171	1,007	3,044	422	840	1,391	1,153	3,806
	Nested	#7, #9, #11	208	203	241	107	759	217	725	1,301	802	3,045	425	928	1,542	909	3,804
Trucks	Single	No Build	191	78	454	n/a	723	361	63	465	n/a	889	552	141	919	n/a	1,612
	Single	#1, #2, #3, #14, #16	158	26	126	413	723	319	16	2	551	888	477	42	128	964	1,611
	Single	#5	160	26	139	398	723	321	16	2	550	889	481	42	141	948	1,612
	Single	#7, #9, #11	168	32	277	246	723	326	19	62	483	890	494	51	339	729	1,613
	Nested	No Build	221	15	488	n/a	724	333	13	543	n/a	889	554	28	1,031	n/a	1,613
	Nested	#1, #2, #3, #14, #16	154	8	271	291	724	219	6	313	350	888	373	14	584	641	1,612
	Nested	#5	155	8	273	288	724	220	6	314	348	888	375	14	587	636	1,612
	Nested	#7, #9, #11	157	8	283	275	723	224	7	323	335	889	381	15	606	610	1,612
Total	Single	No Build	373	383	727	n/a	1,483	547	1,213	2,174	n/a	3,934	920	1,596	2,901	n/a	5,417
	Single	#1, #2, #3, #14, #16	335	283	256	609	1,483	490	882	1,101	1,459	3,932	825	1,165	1,357	2,068	5,415
	Single	#5	337	282	280	583	1,482	493	883	1,103	1,455	3,934	830	1,165	1,383	2,038	5,416
	Single	#7, #9, #11	346	306	519	313	1,484	499	976	1,433	1,027	3,935	845	1,282	1,952	1,340	5,419
	Nested	No Build	440	263	782	n/a	1,485	572	1,079	2,281	n/a	3,932	1,012	1,342	3,063	n/a	5,417
	Nested	#1, #2, #3, #14, #16	360	197	491	437	1,485	433	657	1,484	1,357	3,931	793	854	1,975	1,794	5,416
	Nested	#5	362	197	493	434	1,486	435	657	1,485	1,355	3,932	797	854	1,978	1,789	5,418
	Nested	#7, #9, #11	365	211	524	382	1,482	441	732	1,624	1,137	3,934	806	943	2,148	1,519	5,416
PCEs[a]	Single	No Build	660	500	1,408	n/a	2,568	1,089	1,308	2,872	n/a	5,268	1,748	1,808	4,280	n/a	7,835
	Single	#1, #2, #3, #14, #16	572	322	445	1,229	2,568	969	906	1,104	2,286	5,264	1,541	1,228	1,549	3,514	7,832
	Single	#5	577	321	489	1,180	2,567	975	907	1,106	2,280	5,268	1,552	1,228	1,595	3,460	7,834
	Single	#7, #9, #11	598	354	935	682	2,569	988	1,005	1,526	1,752	5,270	1,586	1,359	2,461	2,434	7,839
	Nested	No Build	772	286	1,514	n/a	2,571	1,072	1,099	3,096	n/a	5,266	1,843	1,384	4,610	n/a	7,837
	Nested	#1, #2, #3, #14, #16	591	209	898	874	2,571	762	666	1,954	1,882	5,263	1,353	875	2,851	2,756	7,834
	Nested	#5	595	209	903	866	2,572	765	666	1,956	1,877	5,264	1,360	875	2,859	2,743	7,836
	Nested	#7, #9, #11	601	223	949	795	2,567	777	743	2,109	1,640	5,268	1,378	966	3,057	2,434	7,834

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table 4B
Detroit River International Crossing Study
Practical Alternatives Directional Comparison: 2035 AM Peak Hour Single Logit Assignment and Nested Logit Assignment

	Model Type	Network	U.S.-to-Canada						Canada-to-U.S. (Peak Direction)						Total	
			from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
			AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	Single	#1,#2,#3,#14,#16	53	72	77	124	130	196	120	419	979	489	1,099	908	1,229	1,104
	Single	#5	54	67	87	118	141	185	111	405	990	500	1,101	905	1,242	1,090
	Single	#7,#9,#11	62	59	180	8	242	67	133	392	1,238	152	1,371	544	1,613	611
	Nested	#1,#2,#3,#14,#16	48	50	170	96	218	146	174	310	991	706	1,165	1,016	1,383	1,162
	Nested	#5	50	48	170	98	220	146	173	295	998	712	1,171	1,007	1,391	1,153
	Nested	#7,#9,#11	56	39	185	68	241	107	206	264	1,095	538	1,301	802	1,542	909
Trucks	Single	#1,#2,#3,#14,#16	42	309	84	104	126	413	0	327	2	224	2	551	128	964
	Single	#5	42	301	97	97	139	398	0	325	2	225	2	550	141	948
	Single	#7,#9,#11	53	246	224	0	277	246	1	319	61	164	62	483	339	729
	Nested	#1,#2,#3,#14,#16	121	182	150	109	271	291	115	244	198	106	313	350	584	641
	Nested	#5	122	180	151	108	273	288	116	242	198	106	314	348	587	636
	Nested	#7,#9,#11	131	172	152	103	283	275	120	234	203	101	323	335	606	610
Total	Single	#1,#2,#3,#14,#16	95	381	161	228	256	609	120	746	981	713	1,101	1,459	1,357	2,068
	Single	#5	96	368	184	215	280	583	111	730	992	725	1,103	1,455	1,383	2,038
	Single	#7,#9,#11	115	305	404	8	519	313	134	711	1,299	316	1,433	1,027	1,952	1,340
	Nested	#1,#2,#3,#14,#16	169	232	320	205	489	437	289	554	1,189	812	1,478	1,366	1,967	1,803
	Nested	#5	172	228	321	206	493	434	289	537	1,196	818	1,485	1,355	1,978	1,789
	Nested	#7,#9,#11	187	211	337	171	524	382	326	498	1,298	639	1,624	1,137	2,148	1,519
PCEs[a]	Single	#1,#2,#3,#14,#16	158	845	287	384	445	1,229	120	1,237	984	1,049	1,104	2,286	1,549	3,514
	Single	#5	159	820	330	361	489	1,180	111	1,218	995	1,063	1,106	2,280	1,595	3,460
	Single	#7,#9,#11	195	674	740	8	935	682	136	1,190	1,391	562	1,526	1,752	2,461	2,434
	Nested	#1,#2,#3,#14,#16	351	505	545	369	896	874	462	920	1,486	971	1,948	1,891	2,843	2,765
	Nested	#5	355	498	548	368	903	866	463	900	1,493	977	1,956	1,877	2,859	2,743
	Nested	#7,#9,#11	384	469	565	326	949	795	506	849	1,603	791	2,109	1,640	3,057	2,434

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.

Source: The Corradino Group of Michigan, Inc.

Table 5A
Detroit River International Crossing Study
2035 Midday Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada					Canada-to-U.S.					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	435	555	730	n/a	1,720	332	419	656	n/a	1,407	767	974	1,386	n/a	3,127
	Single	#1, #2, #3, #14, #16	412	566	346	396	1,720	321	355	529	200	1,405	733	921	875	596	3,125
	Single	#5	413	560	339	407	1,719	321	354	531	198	1,404	734	914	870	605	3,123
	Single	#7, #9, #11	415	621	453	230	1,719	323	371	563	146	1,403	738	992	1,016	376	3,122
	Nested	No Build	529	649	541	n/a	1,719	426	439	539	n/a	1,404	955	1,088	1,080	n/a	3,123
	Nested	#1, #2, #3, #14, #16	492	482	412	333	1,719	401	340	384	280	1,405	893	822	796	613	3,124
	Nested	#5	493	482	416	329	1,720	402	341	386	275	1,404	895	823	802	604	3,124
	Nested	#7, #9, #11	498	516	456	250	1,720	406	364	423	211	1,404	904	880	879	461	3,124
Trucks	Single	No Build	505	297	708	n/a	1,510	297	31	534	n/a	862	802	328	1,242	n/a	2,372
	Single	#1, #2, #3, #14, #16	431	96	276	706	1,509	278	18	133	432	861	709	114	409	1,138	2,370
	Single	#5	434	91	264	721	1,510	279	18	133	432	862	713	109	397	1,153	2,372
	Single	#7, #9, #11	447	115	482	465	1,509	283	28	317	234	862	730	143	799	699	2,371
	Nested	No Build	476	34	1,000	n/a	1,510	255	16	592	n/a	863	731	50	1,592	n/a	2,373
	Nested	#1, #2, #3, #14, #16	311	18	572	609	1,510	177	9	341	335	862	488	27	913	944	2,372
	Nested	#5	311	18	575	605	1,509	178	9	343	333	863	489	27	918	938	2,372
	Nested	#7, #9, #11	318	19	595	577	1,509	181	9	354	318	862	499	28	949	895	2,371
Total	Single	No Build	940	852	1,438	n/a	3,230	629	450	1,190	n/a	2,269	1,569	1,302	2,628	n/a	5,499
	Single	#1, #2, #3, #14, #16	843	662	622	1,102	3,229	599	373	662	632	2,266	1,442	1,035	1,284	1,734	5,495
	Single	#5	847	651	603	1,128	3,229	600	372	664	630	2,266	1,447	1,023	1,267	1,758	5,495
	Single	#7, #9, #11	862	736	935	695	3,228	606	399	880	380	2,265	1,468	1,135	1,815	1,075	5,493
	Nested	No Build	1,005	683	1,541	n/a	3,229	681	455	1,131	n/a	2,267	1,686	1,138	2,672	n/a	5,496
	Nested	#1, #2, #3, #14, #16	803	500	984	942	3,229	578	349	725	615	2,267	1,381	849	1,709	1,557	5,496
	Nested	#5	804	500	991	934	3,229	580	350	729	608	2,267	1,384	850	1,720	1,542	5,496
	Nested	#7, #9, #11	816	535	1,051	827	3,229	587	373	777	529	2,266	1,403	908	1,828	1,356	5,495
PCEs[a]	Single	No Build	1,698	1,298	2,500	n/a	5,495	1,075	497	1,991	n/a	3,562	2,772	1,794	4,491	n/a	9,057
	Single	#1, #2, #3, #14, #16	1,490	806	1,036	2,161	5,493	1,016	400	862	1,280	3,558	2,506	1,206	1,898	3,441	9,050
	Single	#5	1,498	788	999	2,210	5,494	1,019	399	864	1,278	3,559	2,517	1,187	1,863	3,488	9,053
	Single	#7, #9, #11	1,533	909	1,658	1,393	5,492	1,031	441	1,356	731	3,558	2,563	1,350	3,014	2,124	9,050
	Nested	No Build	1,719	734	3,041	n/a	5,494	1,064	479	2,019	n/a	3,562	2,783	1,213	5,060	n/a	9,056
	Nested	#1, #2, #3, #14, #16	1,270	527	1,842	1,856	5,494	844	363	1,237	1,118	3,560	2,113	890	3,079	2,973	9,054
	Nested	#5	1,271	527	1,854	1,842	5,493	847	364	1,244	1,108	3,562	2,118	891	3,097	2,949	9,054
	Nested	#7, #9, #11	1,293	564	1,944	1,693	5,493	859	387	1,308	1,006	3,559	2,152	950	3,252	2,699	9,052

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table 5B
Detroit River International Crossing Study
Practical Alternatives Directional Comparison: 2035 Midday Peak Hour Single Logit Assignment and Nested Logit Assignment

	Model Type	Network	U.S.-to-Canada						Canada-to-U.S.						Total	
			from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
			AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	Single	#1,#2,#3,#14,#16	107	216	239	180	346	396	64	168	465	32	529	200	875	596
	Single	#5	111	200	228	207	339	407	62	164	469	34	531	198	870	605
	Single	#7,#9,#11	118	180	334	50	452	230	75	146	488	1	563	147	1,015	377
	Nested	#1,#2,#3,#14,#16	106	138	306	195	412	333	83	126	301	154	384	280	796	613
	Nested	#5	107	130	307	199	414	329	84	121	303	155	387	276	801	605
	Nested	#7,#9,#11	126	108	330	142	456	250	96	100	327	111	423	211	879	461
Trucks	Single	#1,#2,#3,#14,#16	142	488	134	218	276	706	0	289	133	143	133	432	409	1,138
	Single	#5	142	475	122	246	264	721	0	266	133	166	133	432	397	1,153
	Single	#7,#9,#11	111	411	371	54	482	465	46	209	272	25	318	234	800	699
	Nested	#1,#2,#3,#14,#16	244	459	328	150	572	609	127	223	214	112	341	335	913	944
	Nested	#5	246	455	329	150	575	605	128	221	215	112	343	333	918	938
	Nested	#7,#9,#11	255	435	340	142	595	577	132	212	222	106	354	318	949	895
Total	Single	#1,#2,#3,#14,#16	249	704	373	398	622	1,102	64	457	598	175	662	632	1,284	1,734
	Single	#5	253	675	350	453	603	1,128	62	430	602	200	664	630	1,267	1,758
	Single	#7,#9,#11	229	591	705	104	934	695	121	355	760	26	881	381	1,815	1,076
	Nested	#1,#2,#3,#14,#16	350	597	634	345	984	942	210	349	515	266	725	615	1,709	1,557
	Nested	#5	353	585	636	349	989	934	212	342	518	267	730	609	1,719	1,543
	Nested	#7,#9,#11	381	543	670	284	1,051	827	228	312	549	217	777	529	1,828	1,356
PCEs[a]	Single	#1,#2,#3,#14,#16	462	1,436	574	725	1,036	2,161	64	891	798	390	862	1,280	1,898	3,441
	Single	#5	466	1,388	533	822	999	2,210	62	829	802	449	864	1,278	1,863	3,488
	Single	#7,#9,#11	396	1,208	1,262	185	1,657	1,393	190	669	1,168	64	1,358	732	3,015	2,125
	Nested	#1,#2,#3,#14,#16	716	1,286	1,126	570	1,842	1,856	401	684	836	434	1,237	1,118	3,079	2,973
	Nested	#5	722	1,268	1,130	574	1,852	1,842	404	674	841	435	1,245	1,109	3,096	2,950
	Nested	#7,#9,#11	764	1,196	1,180	497	1,944	1,693	426	630	882	376	1,308	1,006	3,252	2,699

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.

Source: The Corradino Group of Michigan, Inc.

Table 6A
Detroit River International Crossing Study
2035 PM Peak Hour Volumes; Single Logit Assignment and Nested-Logit Assignment

	Model Type	Network	U.S.-to-Canada (Peak Direction)					Canada-to-U.S.					Two-Way Traffic				
			BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	Single	No Build	458	1,328	1,852	n/a	3,638	490	429	664	n/a	1,583	948	1,757	2,516	n/a	5,221
	Single	#1, #2, #3, #14, #16	414	997	1,072	1,155	3,638	466	367	502	250	1,585	880	1,364	1,574	1,405	5,223
	Single	#5	413	982	1,028	1,215	3,638	466	369	501	247	1,583	879	1,351	1,529	1,462	5,221
	Single	#7, #9, #11	417	1,080	1,221	920	3,638	471	378	532	204	1,585	888	1,458	1,753	1,124	5,223
	Nested	No Build	521	1,528	1,589	n/a	3,638	589	340	655	n/a	1,584	1,110	1,868	2,244	n/a	5,222
	Nested	#1, #2, #3, #14, #16	472	1,060	1,073	1,034	3,639	548	254	457	325	1,584	1,020	1,314	1,530	1,359	5,223
	Nested	#5	472	1,053	1,070	1,044	3,639	550	254	460	320	1,584	1,022	1,307	1,530	1,364	5,223
	Nested	#7, #9, #11	476	1,136	1,191	835	3,638	554	275	504	252	1,585	1,030	1,411	1,695	1,087	5,223
Trucks	Single	No Build	493	120	761	n/a	1,374	390	6	391	n/a	787	883	126	1,152	n/a	2,161
	Single	#1, #2, #3, #14, #16	368	44	229	734	1,375	357	1	70	358	786	725	45	299	1,092	2,161
	Single	#5	364	47	209	756	1,376	358	1	63	364	786	722	48	272	1,120	2,162
	Single	#7, #9, #11	379	46	364	585	1,374	364	1	161	261	787	743	47	525	846	2,161
	Nested	No Build	520	26	828	n/a	1,374	328	9	449	n/a	786	848	35	1,277	n/a	2,160
	Nested	#1, #2, #3, #14, #16	333	13	474	555	1,375	232	5	264	285	786	565	18	738	840	2,161
	Nested	#5	334	13	475	552	1,374	233	5	265	283	786	567	18	740	835	2,160
	Nested	#7, #9, #11	340	14	490	530	1,374	237	5	274	271	787	577	19	764	801	2,161
Total	Single	No Build	951	1,448	2,613	n/a	5,012	880	435	1,055	n/a	2,370	1,831	1,883	3,668	n/a	7,382
	Single	#1, #2, #3, #14, #16	782	1,041	1,301	1,889	5,013	823	368	572	608	2,371	1,605	1,409	1,873	2,497	7,384
	Single	#5	777	1,029	1,237	1,971	5,014	824	370	564	611	2,369	1,601	1,399	1,801	2,582	7,383
	Single	#7, #9, #11	796	1,126	1,585	1,505	5,012	835	379	693	465	2,372	1,631	1,505	2,278	1,970	7,384
	Nested	No Build	1,041	1,554	2,417	n/a	5,012	917	349	1,104	n/a	2,370	1,958	1,903	3,521	n/a	7,382
	Nested	#1, #2, #3, #14, #16	805	1,073	1,547	1,589	5,014	780	259	721	610	2,370	1,585	1,332	2,268	2,199	7,384
	Nested	#5	806	1,066	1,545	1,596	5,013	783	259	725	603	2,370	1,589	1,325	2,270	2,199	7,383
	Nested	#7, #9, #11	816	1,150	1,681	1,365	5,012	791	280	778	523	2,372	1,607	1,430	2,459	1,888	7,384
PCEs[a]	Single	No Build	1,691	1,628	3,755	n/a	7,073	1,465	444	1,642	n/a	3,551	3,156	2,072	5,396	n/a	10,624
	Single	#1, #2, #3, #14, #16	1,334	1,107	1,645	2,990	7,076	1,359	370	677	1,145	3,550	2,693	1,477	2,322	4,135	10,626
	Single	#5	1,323	1,100	1,551	3,105	7,078	1,361	372	659	1,157	3,548	2,684	1,471	2,209	4,262	10,626
	Single	#7, #9, #11	1,365	1,195	2,131	2,383	7,073	1,381	381	935	857	3,553	2,746	1,576	3,066	3,239	10,626
	Nested	No Build	1,821	1,593	3,659	n/a	7,073	1,409	363	1,778	n/a	3,549	3,230	1,956	5,437	n/a	10,622
	Nested	#1, #2, #3, #14, #16	1,305	1,093	2,258	2,422	7,077	1,128	267	1,117	1,038	3,549	2,433	1,359	3,375	3,459	10,626
	Nested	#5	1,307	1,086	2,258	2,424	7,074	1,133	267	1,123	1,028	3,549	2,440	1,352	3,380	3,452	10,623
	Nested	#7, #9, #11	1,326	1,171	2,416	2,160	7,073	1,147	288	1,189	930	3,553	2,473	1,459	3,605	3,090	10,626

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table 6B
Detroit River International Crossing Study
Practical Alternatives Directional Comparison: 2035 PM Peak Hour Single Logit Assignment and Nested Logit Assignment

	Model Type	Network	U.S.-to-Canada (Peak Direction)						Canada-to-U.S.						Total	
			from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
			AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	Single	#1,#2,#3,#14,#16	305	379	767	776	1,072	1,155	101	224	401	26	502	250	1,574	1,405
	Single	#5	279	379	749	836	1,028	1,215	100	220	401	27	501	247	1,529	1,462
	Single	#7,#9,#11	302	360	919	560	1,221	920	111	204	421	0	532	204	1,753	1,124
	Nested	#1,#2,#3,#14,#16	288	311	785	723	1,073	1,034	117	151	340	174	457	325	1,530	1,359
	Nested	#5	294	298	776	746	1,070	1,044	117	145	343	175	460	320	1,530	1,364
	Nested	#7,#9,#11	335	261	856	574	1,191	835	134	123	370	129	504	252	1,695	1,087
Trucks	Single	#1,#2,#3,#14,#16	61	577	168	157	229	734	41	239	29	119	70	358	299	1,092
	Single	#5	59	569	150	187	209	756	43	233	20	131	63	364	272	1,120
	Single	#7,#9,#11	77	532	287	53	364	585	46	200	115	61	161	261	525	846
	Nested	#1,#2,#3,#14,#16	272	424	202	131	474	555	138	221	126	64	264	285	738	840
	Nested	#5	268	421	207	131	475	552	138	218	127	65	265	283	740	835
	Nested	#7,#9,#11	280	405	210	125	490	530	143	210	131	61	274	271	764	801
Total	Single	#1,#2,#3,#14,#16	366	956	935	933	1,301	1,889	142	463	430	145	572	608	1,873	2,497
	Single	#5	338	948	899	1,023	1,237	1,971	143	453	421	158	564	611	1,801	2,582
	Single	#7,#9,#11	379	892	1,206	613	1,585	1,505	157	404	536	61	693	465	2,278	1,970
	Nested	#1,#2,#3,#14,#16	560	735	987	854	1,547	1,589	255	372	466	238	721	610	2,268	2,199
	Nested	#5	562	719	983	877	1,545	1,596	255	363	470	240	725	603	2,270	2,199
	Nested	#7,#9,#11	615	666	1,066	699	1,681	1,365	277	333	501	190	778	523	2,459	1,888
PCEs[a]	Single	#1,#2,#3,#14,#16	458	1,822	1,187	1,169	1,645	2,990	204	822	474	324	677	1,145	2,322	4,135
	Single	#5	427	1,802	1,124	1,304	1,551	3,105	208	803	451	355	659	1,157	2,209	4,262
	Single	#7,#9,#11	495	1,690	1,637	693	2,131	2,383	226	704	709	153	935	857	3,066	3,239
	Nested	#1,#2,#3,#14,#16	968	1,371	1,290	1,051	2,258	2,422	462	704	655	334	1,117	1,038	3,375	3,459
	Nested	#5	964	1,351	1,294	1,074	2,258	2,424	462	690	661	338	1,123	1,028	3,380	3,452
	Nested	#7,#9,#11	1,035	1,274	1,381	887	2,416	2,160	492	648	698	282	1,189	930	3,605	3,090

[a] Passenger car equivalent is one truck equals 2.5 cars, the rate used by SEMCOG.

Source: The Corradino Group of Michigan, Inc.

Appendix B

Detroit River International Crossing Study
Single-Logit Model Traffic Data

2015 AM Peak Hour

Table B-1A illustrates for the 2015 AM peak hour the following:

- A four percent decline in overall auto traffic (○ red oval) on the Blue Water Bridge and an eight to ten percent decline in overall truck traffic (○ blue oval) with the introduction of a proposed DRIC crossing. The decline is expected to be moderate for traffic traveling in both directions.

- The Detroit-Windsor Tunnel would register a 17 to 23 percent decline in total traffic (○ green oval), with the most significant reduction expected to occur in auto traffic in the U.S.-to-Canada direction.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge would realize a 34 percent reduction in car traffic (□ red squares). Also, with Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge is expected to realize a reduction of 87 percent of its truck traffic (□ green squares) cars and trucks.

- Under Alternative Set #7/9/11, the Ambassador Bridge is expected to realize a reduction of only 17 percent of its total car traffic (□ blue square) and a reduction of 55 percent of its truck traffic (□ black square). The increased time of Alternative Set #7/9/11 compared to other DRIC alternatives causes this retention of car and truck traffic at the Ambassador Bridge.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the proposed DRIC crossing is forecast to carry approximately 48 percent of all international PCEs in the U.S.-to-Canada direction (△ red pyramid). In the Canada-to-U.S. direction, these proposed DRIC crossings would carry 39 percent of all PCEs (△ green pyramid). Overall, Alternative Set #1/2/3/14/16 and Alternative #5 would carry 41 percent of all PCEs (▽ green wedge).

- The extra travel time associated with Alternative Set #7/9/11 would lower its share to 25 percent of all PCEs in the U.S.-to-Canada direction (△ blue pyramid). With this alternative set, the proposed DRIC crossing would carry 26 percent of all PCEs in the Canada-to-U.S. direction (△ black pyramid) and 26 percent of total PCEs (▽ black wedge).

Table B-1B shows the 2015 AM peak hour directional volumes for just the Ambassador Bridge and the proposed DRIC crossing.

- For the U.S.-to-Canada Direction

  - From I-75 Northbound: All DRIC alternatives would serve the majority of the car, truck and, therefore, total traffic (○ red oval).

  - From the I-75/I-96 Split:

    ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve the predominant amount of car traffic and more than half the truck traffic (○ blue circles).

- ✓ Alternative Set #7/9/11 would serve only six percent of the cars and none of the trucks (○ green ovals).

- For the Canada-to-U.S. Direction

  - To I-75 Southbound: All DRIC alternatives would serve the predominant amount of the traffic (□ red box).

  - To I-75/I-96 Split: All DRIC alternatives would serve about 29 percent or less of the car traffic. These trips (□ blue square) have destinations upstream of the new crossing and the Ambassador Bridge.

    - ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve all of the truck trips (△ green pyramid). Alternative Set #7/9/11, with its more time-consuming plaza configuration, would handle only 37 percent of these trucks (▽ black wedge).

Table B-1A
Detroit River International Crossing Study
AM 2015 Peak Hour Volumes
Single-Logit Assignment

	Network	U.S.-to-Canada					Canada-to-U.S.					Two-Way Traffic				
		BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	No Build	134 23%	227 39%	221 38%	n/a	582 100%	189 7%	977 37%	1,461 56%	n/a	2,627 100%	323 10%	1,204 38%	1,682 52%	n/a	3,209 100%
	#1, #2, #3, #14, #16	131 23%	198 34%	102 18%	150 26%	581 100%	180 7%	755 29%	996 38%	695 26%	2,626 100%	311 10%	953 30%	1,098 34%	845 26%	3,207 100%
	#5	131 22%	201 34%	95 16%	156 27%	583 100%	180 7%	755 29%	999 38%	692 26%	2,626 100%	311 10%	956 30%	1,094 34%	848 26%	3,209 100%
	#7, #9, #11	132 23%	207 36%	188 32%	56 10%	583 100%	182 7%	820 31%	1,206 46%	417 16%	2,625 100%	314 10%	1,027 32%	1,394 43%	473 15%	3,208 100%
Trucks	No Build	87 21%	37 9%	296 70%	n/a	420 100%	235 41%	31 5%	309 54%	n/a	575 100%	322 32%	68 7%	605 61%	n/a	995 100%
	#1, #2, #3, #14, #16	72 17%	16 4%	80 19%	253 60%	421 100%	215 37%	10 2%	0 0%	349 61%	574 100%	287 29%	26 3%	80 8%	602 61%	995 100%
	#5	73 17%	20 5%	71 17%	256 61%	420 100%	216 38%	10 2%	0 0%	348 61%	574 100%	289 29%	30 3%	71 7%	604 61%	994 100%
	#7, #9, #11	77 18%	16 4%	188 45%	139 33%	420 100%	219 38%	12 2%	86 15%	256 45%	573 100%	296 30%	28 3%	274 28%	395 40%	993 100%
Total	No Build	221 22%	264 26%	517 52%	n/a	1,002 100%	424 13%	1,008 31%	1,770 55%	n/a	3,202 100%	645 15%	1,272 30%	2,287 54%	n/a	4,204 100%
	#1, #2, #3, #14, #16	203 20%	214 21%	182 18%	403 40%	1,002 100%	395 12%	765 24%	996 31%	1,044 33%	3,200 100%	598 14%	979 23%	1,178 28%	1,447 34%	4,202 100%
	#5	204 20%	221 22%	166 17%	412 41%	1,003 100%	396 12%	765 24%	999 31%	1,040 33%	3,200 100%	600 14%	986 23%	1,165 28%	1,452 35%	4,203 100%
	#7, #9, #11	209 21%	223 22%	376 37%	195 19%	1,003 100%	401 13%	832 26%	1,292 40%	673 21%	3,198 100%	610 15%	1,055 25%	1,668 40%	868 21%	4,201 100%
PCEs[a]	No Build	352 22%	320 20%	961 59%	n/a	1,632 100%	777 19%	1,055 26%	2,234 55%	n/a	4,065 100%	1,128 20%	1,374 24%	3,195 56%	n/a	5,697 100%
	#1, #2, #3, #14, #16	311 19%	238 15%	302 18%	783 48%	1,634 100%	718 18%	780 19%	996 25%	1,568 39%	4,061 100%	1,029 18%	1,018 18%	1,298 23%	2,350 41%	5,695 100%
	#5	314 19%	251 15%	273 17%	796 49%	1,633 100%	720 18%	780 19%	999 25%	1,562 38%	4,061 100%	1,034 18%	1,031 18%	1,272 22%	2,358 41%	5,694 100%
	#7, #9, #11	325 20%	247 15%	658 40%	404 25%	1,633 100%	730 18%	850 21%	1,421 35%	1,057 26%	4,058 100%	1,054 19%	1,097 19%	2,079 37%	1,461 26%	5,691 100%

[a] The passenger car equivalent is one truck equals 2.5 cars.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table B-1B
Detroit River International Crossing Study
2015 AM Peak Hour Single-Logit Assignment
Directional Comparison

	Network	U.S.-to-Canada						Canada-to-U.S.						Total	
		from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
		AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	#1, #2, #3, #14, #16	42 42%	58 58%	60 39%	92 61%	102 40%	150 60%	115 25%	344 75%	881 72%	351 28%	996 59%	695 41%	1,098 57%	845 43%
	#5	49 48%	54 52%	46 31%	102 69%	95 38%	156 62%	109 25%	334 75%	890 71%	358 29%	999 59%	692 41%	1,094 56%	848 44%
	#7, #9, #11	50 52%	47 48%	138 94%	9 6%	188 77%	56 23%	132 30%	307 70%	1,074 91%	110 9%	1,206 74%	417 26%	1,394 75%	473 25%
Trucks	#1, #2, #3, #14, #16	27 12%	191 88%	53 46%	62 54%	80 24%	253 76%	0 0%	219 100%	0 0%	130 100%	0 0%	349 100%	80 12%	602 88%
	#5	27 12%	190 88%	44 40%	66 60%	71 22%	256 78%	0 0%	210 100%	0 0%	138 100%	0 0%	348 100%	71 11%	604 89%
	#7, #9, #11	35 20%	139 80%	153 100%	0 0%	188 57%	139 43%	0 0%	205 100%	86 63%	51 37%	86 25%	256 75%	274 41%	395 59%
Total	#1, #2, #3, #14, #16	69 22%	249 78%	113 42%	154 58%	182 31%	403 69%	115 17%	563 83%	881 65%	481 35%	996 49%	1,044 51%	1,178 45%	1,447 55%
	#5	76 24%	244 76%	90 35%	168 65%	166 29%	412 71%	109 17%	544 83%	890 64%	496 36%	999 49%	1,040 51%	1,165 45%	1,452 55%
	#7, #9, #11	85 31%	186 69%	291 97%	9 3%	376 66%	195 34%	132 20%	512 80%	1,160 88%	161 12%	1,292 66%	673 34%	1,668 66%	868 34%
PCEs[a]	#1, #2, #3, #14, #16	110 17%	536 83%	193 44%	247 56%	302 28%	783 72%	115 11%	892 89%	881 57%	676 43%	996 39%	1,568 61%	1,298 36%	2,350 64%
	#5	117 18%	529 82%	156 37%	267 63%	273 26%	796 74%	109 11%	859 89%	890 56%	703 44%	999 39%	1,562 61%	1,272 35%	2,358 65%
	#7, #9, #11	138 26%	395 74%	521 98%	9 2%	658 62%	404 38%	132 14%	820 86%	1,289 84%	238 16%	1,421 57%	1,057 43%	2,079 59%	1,461 41%

[a] The passenger car equivalent is one truck equals 2.5 cars.
Source: The Corradino Group of Michigan, Inc.

2015 Midday Peak Hour

Table B-2A illustrates for the 2015 midday peak hour the following:

- A three percent decline in overall auto traffic (○ red oval) on the Blue Water Bridge and an eight percent decline in overall truck traffic (○ blue oval) with the introduction of a proposed DRIC crossing. The decline is expected to be moderate for traffic traveling in both directions.

- The Detroit-Windsor Tunnel would register a 15 to 18 percent decline in total traffic (○ green oval), with the most significant reduction expected to occur in auto traffic in the U.S.-to-Canada peak direction.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge would realize a 37 percent reduction in car traffic (□ red squares). Also, with Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge is expected to realize a reduction of 76 percent of its truck traffic (□ green square).

- Under Alternative Set #7/9/11, the Ambassador Bridge is expected to realize a reduction of only 17 percent of its total car traffic (□ blue square) and a reduction of 29 percent of its truck traffic (□ black square). The increased time of Alternative Set #7/9/11 compared to the other DRIC alternatives causes this retention of car and truck traffic at the Ambassador Bridge.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the proposed DRIC crossing is forecast to carry approximately 42 percent of all international PCEs in the U.S.-to-Canada direction (△ red pyramid). In the Canada-to-U.S. direction, these proposed DRIC crossings would carry 33 percent of all PCEs (△ green pyramid). Overall, Alternative Set #1/2/3/14/16 and Alternative #5 would carry 38 percent of all PCEs (▽ green wedge).

- The extra travel time associated with Alternative Set #7/9/11 would lower its share to 19 percent of all PCEs in the U.S.-to-Canada direction (△ blue pyramid). With this alternative set, the proposed DRIC crossing would carry 15 percent of all PCEs in the Canada-to-U.S. direction (△ black pyramid) and 17 percent of total PCEs (▽ black wedge).

Table B-2B shows 2015 Midday peak hour the directional volumes for just the Ambassador Bridge and the proposed DRIC crossing.

- For the U.S.-to-Canada Direction

  - From I-75 Northbound: All DRIC alternatives would serve the majority of the car, truck and, therefore, total traffic (○ red oval).

  - From the I-75/I-96 Split:

    ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve the predominant amount of car and truck traffic (○ blue oval).

- ✓ Alternative Set #7/9/11 would serve only nine percent of the cars and just two percent of the trucks (○ green circles).

- <u>For the Canada-to-U.S. Direction</u>

  - To I-75 Southbound: All DRIC alternatives would serve the predominant amount of the traffic (□ red box).

  - To I-75/I-96 Split: All DRIC alternatives would serve eight percent or less of the car traffic. These trips (□ blue square) have destinations upstream of the new crossing and the Ambassador Bridge.

    - ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve about 55 percent of the truck trips (△ green pyramid). But Alternative Set #7/9/11, with its more time-consuming plaza configuration, would handle only three percent of these trucks (▽ black wedge).

Table B-2A
Detroit River International Crossing Study
Midday 2015 Peak Hour Volumes
Single-Logit Assignment

	Network	U.S.-to-Canada					Canada-to-U.S.					Two-Way Traffic				
		BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	No Build	368 24%	595 39%	560 37%	n/a	1,523 100%	293 24%	354 29%	558 46%	n/a	1,205 100%	661 24%	949 35%	1,118 41%	n/a	2,728 100%
	#1, #2, #3, #14, #16	357 23%	515 34%	263 17%	388 25%	1,523 100%	285 24%	300 25%	450 37%	171 14%	1,206 100%	642 24%	815 30%	713 26%	559 20%	2,729 100%
	#5	357 23%	510 34%	234 15%	421 28%	1,522 100%	285 24%	301 25%	451 37%	169 14%	1,206 100%	642 24%	811 30%	685 25%	590 22%	2,728 100%
	#7, #9, #11	359 24%	545 36%	444 29%	174 11%	1,522 100%	287 24%	309 26%	488 41%	120 10%	1,204 100%	646 24%	854 31%	932 34%	294 11%	2,726 100%
Trucks	No Build	278 31%	105 12%	506 57%	n/a	889 100%	189 34%	12 2%	356 64%	n/a	557 100%	467 32%	117 8%	862 60%	n/a	1,446 100%
	#1, #2, #3, #14, #16	249 28%	48 5%	125 14%	466 52%	888 100%	179 32%	13 2%	86 15%	280 50%	558 100%	428 30%	61 4%	211 15%	746 52%	1,446 100%
	#5	251 28%	81 9%	119 13%	439 49%	890 100%	179 32%	13 2%	86 15%	279 50%	557 100%	430 30%	94 6%	205 14%	718 50%	1,447 100%
	#7, #9, #11	259 29%	59 7%	355 40%	216 24%	889 100%	182 33%	12 2%	258 46%	106 19%	558 100%	441 30%	71 5%	613 42%	322 22%	1,447 100%
Total	No Build	646 27%	700 29%	1,066 44%	n/a	2,412 100%	482 27%	366 21%	914 52%	n/a	1,762 100%	1,128 27%	1,066 26%	1,980 47%	n/a	4,174 100%
	#1, #2, #3, #14, #16	606 25%	563 23%	388 16%	854 35%	2,411 100%	464 26%	313 18%	536 30%	451 26%	1,764 100%	1,070 26%	876 21%	924 22%	1,305 31%	4,175 100%
	#5	608 25%	591 25%	353 15%	860 36%	2,412 100%	464 26%	314 18%	537 30%	448 25%	1,763 100%	1,072 26%	905 22%	890 21%	1,308 31%	4,175 100%
	#7, #9, #11	618 26%	604 25%	799 33%	390 16%	2,411 100%	469 27%	321 18%	746 42%	226 13%	1,762 100%	1,087 26%	925 22%	1,545 37%	616 15%	4,173 100%
PCEs[a]	No Build	1,063 28%	858 23%	1,825 49%	n/a	3,746 100%	766 29%	384 15%	1,448 56%	n/a	2,598 100%	1,829 29%	1,242 20%	3,273 52%	n/a	6,343 100%
	#1, #2, #3, #14, #16	980 26%	635 17%	576 15%	1,553 41%	3,743 100%	733 28%	333 13%	665 26%	871 33%	2,601 100%	1,712 27%	968 15%	1,241 20%	2,424 38%	6,344 100%
	#5	985 26%	713 19%	532 14%	1,519 41%	3,747 100%	733 28%	334 13%	666 26%	867 33%	2,599 100%	1,717 27%	1,046 16%	1,198 19%	2,385 38%	6,346 100%
	#7, #9, #11	1,007 27%	693 18%	1,332 36%	714 19%	3,745 100%	742 29%	339 13%	1,133 44%	385 15%	2,599 100%	1,749 28%	1,032 16%	2,465 39%	1,099 17%	6,344 100%

[a] The passenger car equivalent is one truck equals 2.5 cars.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table B-2B
Detroit River International Crossing Study
2015 Midday Peak Hour Single-Logit Assignment
Directional Comparison

	Network	U.S.-to-Canada						Canada-to-U.S.						Total	
		from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
		AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	#1, #2, #3, #14, #16	99 34%	195 66%	164 46%	193 54%	263 40%	388 60%	60 30%	140 70%	390 93%	31 7%	450 72%	171 28%	713 56%	559 44%
	#5	116 38%	186 62%	118 33%	235 67%	234 36%	421 64%	59 30%	136 70%	392 92%	33 8%	451 73%	169 27%	685 54%	590 46%
	#7, #9, #11	113 44%	143 56%	331 91%	31 9%	444 72%	174 28%	72 38%	120 63%	416 100%	0 0%	488 80%	120 20%	932 76%	294 24%
Trucks	#1, #2, #3, #14, #16	68 18%	313 82%	57 27%	153 73%	125 21%	466 79%	0 0%	185 100%	86 48%	95 52%	86 23%	280 77%	211 22%	746 78%
	#5	87 23%	293 77%	32 18%	146 82%	119 21%	439 79%	0 0%	173 100%	86 45%	106 55%	86 24%	279 76%	205 22%	718 78%
	#7, #9, #11	87 29%	210 71%	268 98%	6 2%	355 62%	216 38%	38 28%	99 72%	220 97%	7 3%	258 71%	106 29%	613 66%	322 34%
Total	#1, #2, #3, #14, #16	167 25%	508 75%	221 39%	346 61%	388 31%	854 69%	60 16%	325 84%	476 79%	126 21%	536 54%	451 46%	924 41%	1,305 59%
	#5	203 30%	479 70%	150 28%	381 72%	353 29%	860 71%	59 16%	309 84%	478 77%	139 23%	537 55%	448 45%	890 40%	1,308 60%
	#7, #9, #11	200 36%	353 64%	599 94%	37 6%	799 67%	390 33%	110 33%	219 67%	636 99%	7 1%	746 77%	226 23%	1,545 71%	616 29%
PCEs[a]	#1, #2, #3, #14, #16	269 22%	978 78%	307 35%	576 65%	576 27%	1,553 73%	60 9%	603 91%	605 69%	269 31%	665 43%	871 57%	1,241 34%	2,424 66%
	#5	334 27%	919 73%	198 25%	600 75%	532 26%	1,519 74%	59 9%	569 91%	607 67%	298 33%	666 43%	867 57%	1,198 33%	2,385 67%
	#7, #9, #11	331 33%	668 67%	1,001 96%	46 4%	1,332 65%	714 35%	167 31%	368 69%	966 98%	18 2%	1,133 75%	385 25%	2,465 69%	1,099 31%

[a] The passenger car equivalent is one truck equals 2.5 cars.
Source: The Corradino Group of Michigan, Inc.

2015 PM Peak Hour

Table B-3A illustrates for the 2015 PM peak hour the following:

- A five percent decline (○ red oval) in overall auto traffic on the Blue Water Bridge and a 13 to 16 percent decline in overall truck traffic (○ blue oval) with the introduction of a proposed DRIC crossing. The decline is expected to be moderate for traffic traveling in both directions.

- The Detroit-Windsor Tunnel would register a 15 to 21 percent decline in total traffic (○ green oval), with the most significant reduction expected to occur in auto traffic in the U.S.-to-Canada direction.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge would realize a 40 percent reduction in car traffic (□ red square). Also, with Alternative Set #1/2/3/14/16 and Alternative #5, the Ambassador Bridge is expected to realize a reduction of 83 percent of its truck traffic (□ green square).

- Under Alternative Set #7/9/11, the Ambassador Bridge is expected to realize a reduction of only 24 percent of its total car traffic (□ blue square) and a reduction of 55 percent of its truck traffic (□ black square). The increased time of Alternative Set #7/9/11 compared to the other DRIC alternatives causes this retention of car and truck traffic at the Ambassador Bridge.

- With Alternative Set #1/2/3/14/16 and Alternative #5, the proposed DRIC crossing is forecast to carry approximately 42 percent of all international PCEs in the U.S.-to-Canada direction (△ red pyramid). In the Canada-to-U.S. direction, these proposed DRIC crossings would carry 33 percent of all PCEs (△ green pyramid). Overall, Alternative Set #1/2/3/14/16 and Alternative #5 would carry about 40 percent of all PCEs (▽ green wedge).

- The extra travel time associated with Alternative Set #7/9/11 would lower its share to 28 percent of all PCEs in the U.S.-to-Canada direction (△ blue pyramid). With this alternative set, the proposed DRIC crossing would carry 23 percent of all PCEs in the Canada-to-U.S. direction (△ black pyramid) and 27 percent of total PCEs (▽ black wedge).

Table B-3B shows the 2015 PM peak hour directional volumes for just the Ambassador Bridge and the proposed DRIC crossing.

- For the U.S.-to-Canada Direction

  - From I-75 Northbound: All DRIC alternatives would serve the majority of the car, truck and, therefore, total traffic (○ red oval).

  - From the I-75/I-96 Split:

    ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve the predominant amount of car traffic and about 60 to 68 percent of the truck traffic (○ blue circles).

- ✓ Alternative Set #7/9/11 would serve only 26 percent of the cars and just ten percent of the trucks (○ green ovals).

- <u>For the Canada-to-U.S. Direction</u>

  - To I-75 Southbound: All DRIC alternatives would serve the predominant amount of the traffic (□ red box).

  - To I-75/I-96 Split: All DRIC alternatives would serve less than eight percent of the car traffic. These trips (□ blue square) have destinations upstream of the new crossing and the Ambassador Bridge.

    - ✓ Alternative Set #1/2/3/14/16 and Alternative #5 would serve about 78 to 90 percent of the long distance truck trips (△ green pyramid). But Alternative Set #7/9/11, with its more time-consuming plaza configuration, would handle only 19 percent of these trucks (▽ black wedge).

Table B-3A
Detroit River International River Crossing Study
PM 2015 Peak Hour Volumes
Single-Logit Assignment

	Network	U.S.-to-Canada					Canada-to-U.S.					Two-Way Traffic				
		BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]	BWB	DWT	AMB	NEW	Total[b]
Cars	No Build	445 13%	1,233 37%	1,621 49%	n/a	3,299 100%	361 29%	325 26%	544 44%	n/a	1,230 100%	806 18%	1,558 34%	2,165 48%	n/a	4,529 100%
	#1, #2, #3, #14, #16	415 13%	952 29%	905 27%	1,026 31%	3,298 100%	347 28%	287 23%	397 32%	199 16%	1,230 100%	762 17%	1,239 27%	1,302 29%	1,225 27%	4,528 100%
	#5	415 13%	954 29%	863 26%	1,066 32%	3,298 100%	347 28%	285 23%	401 33%	196 16%	1,229 100%	762 17%	1,239 27%	1,264 28%	1,262 28%	4,527 100%
	#7, #9, #11	419 13%	1,031 31%	1,197 36%	652 20%	3,299 100%	350 28%	284 23%	441 36%	155 13%	1,230 100%	769 17%	1,315 29%	1,638 36%	807 18%	4,529 100%
Trucks	No Build	270 33%	41 5%	503 62%	n/a	814 100%	228 45%	1 0%	279 55%	n/a	508 100%	498 38%	42 3%	782 59%	n/a	1,322 100%
	#1, #2, #3, #14, #16	209 26%	25 3%	96 12%	485 60%	815 100%	211 41%	1 0%	48 9%	249 49%	509 100%	420 32%	26 2%	144 11%	734 55%	1,324 100%
	#5	210 26%	26 3%	95 12%	484 59%	815 100%	212 42%	1 0%	38 7%	256 50%	507 100%	422 32%	27 2%	133 10%	740 56%	1,322 100%
	#7, #9, #11	219 27%	30 4%	221 27%	346 42%	816 100%	216 42%	1 0%	126 25%	166 33%	509 100%	435 33%	31 2%	347 26%	512 39%	1,325 100%
Total	No Build	715 17%	1,274 31%	2,124 52%	n/a	4,113 100%	589 34%	326 19%	823 47%	n/a	1,738 100%	1,304 22%	1,600 27%	2,947 50%	n/a	5,851 100%
	#1, #2, #3, #14, #16	624 15%	977 24%	1,001 24%	1,511 37%	4,113 100%	558 32%	288 17%	445 26%	448 26%	1,739 100%	1,182 20%	1,265 22%	1,446 25%	1,959 33%	5,852 100%
	#5	625 15%	980 24%	958 23%	1,550 38%	4,113 100%	559 32%	286 16%	439 25%	452 26%	1,736 100%	1,184 20%	1,266 22%	1,397 24%	2,002 34%	5,849 100%
	#7, #9, #11	638 16%	1,061 26%	1,418 34%	998 24%	4,115 100%	566 33%	285 16%	567 33%	321 18%	1,739 100%	1,204 21%	1,346 23%	1,985 34%	1,319 23%	5,854 100%
PCEs[a]	No Build	1,120 21%	1,336 25%	2,879 54%	n/a	5,334 100%	931 37%	328 13%	1,242 50%	n/a	2,500 100%	2,051 26%	1,663 21%	4,120 53%	n/a	7,834 100%
	#1, #2, #3, #14, #16	938 18%	1,015 19%	1,145 21%	2,239 42%	5,336 100%	875 35%	290 12%	517 21%	822 33%	2,503 100%	1,812 23%	1,304 17%	1,662 21%	3,060 39%	7,838 100%
	#5	940 18%	1,019 19%	1,101 21%	2,276 43%	5,336 100%	877 35%	288 12%	496 20%	836 33%	2,497 100%	1,817 23%	1,307 17%	1,597 20%	3,112 40%	7,832 100%
	#7, #9, #11	967 18%	1,106 21%	1,750 33%	1,517 28%	5,339 100%	890 36%	287 11%	756 30%	570 23%	2,503 100%	1,857 24%	1,393 18%	2,506 32%	2,087 27%	7,842 100%

[a] The passenger car equivalent is one truck equals 2.5 cars.
[b] Slight difference in totals among alternatives is the result of rounding real numbers into integers.

Source: The Corradino Group of Michigan, Inc.

Table B-3B
Detroit River International Crossing Study
2015 PM Peak Hour Single-Logit Assignment
Directional Comparison

	Network	U.S.-to-Canada						Canada-to-U.S.						Total	
		from I-75 Northbound		from I-75/I-96		Total		to I-75 Southbound		to I-75/I-96		Total		2-Way	
		AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW	AMB	NEW
Cars	#1, #2, #3, #14, #16	269 43%	360 57%	636 49%	666 51%	905 47%	1,026 53%	83 32%	174 68%	314 93%	25 7%	397 67%	199 33%	1,302 52%	1,225 48%
	#5	302 47%	345 53%	561 44%	721 56%	863 45%	1,066 55%	83 33%	170 67%	318 92%	26 8%	401 67%	196 33%	1,264 50%	1,262 50%
	#7, #9, #11	297 48%	328 52%	900 74%	324 26%	1,197 65%	652 35%	94 38%	155 62%	347 100%	0 0%	441 74%	155 26%	1,638 67%	807 33%
Trucks	#1, #2, #3, #14, #16	29 7%	385 93%	67 40%	100 60%	96 17%	485 83%	26 13%	170 87%	22 22%	79 78%	48 16%	249 84%	144 16%	734 84%
	#5	34 9%	354 91%	61 32%	129 68%	95 16%	483 84%	27 14%	161 86%	11 10%	95 90%	38 13%	256 87%	133 15%	739 85%
	#7, #9, #11	42 11%	326 89%	179 90%	20 10%	221 39%	346 61%	29 17%	143 83%	97 81%	23 19%	126 43%	166 57%	347 40%	512 60%
Total	#1, #2, #3, #14, #16	298 29%	745 71%	703 48%	766 52%	1,001 40%	1,511 60%	109 24%	344 76%	336 76%	104 24%	445 50%	448 50%	1,446 42%	1,959 58%
	#5	336 32%	699 68%	622 42%	850 58%	958 38%	1,549 62%	110 25%	331 75%	329 73%	121 27%	439 49%	452 51%	1,397 41%	2,001 59%
	#7, #9, #11	339 34%	654 66%	1,079 76%	344 24%	1,418 59%	998 41%	123 29%	298 71%	444 95%	23 5%	567 64%	321 36%	1,985 60%	1,319 40%
PCEs[a]	#1, #2, #3, #14, #16	342 21%	1,323 79%	804 47%	916 53%	1,145 34%	2,239 66%	148 20%	599 80%	369 62%	223 38%	517 39%	822 61%	1,662 35%	3,060 65%
	#5	387 24%	1,230 76%	714 41%	1,044 59%	1,101 33%	2,274 67%	151 21%	573 79%	346 57%	264 43%	496 37%	836 63%	1,597 34%	3,110 66%
	#7, #9, #11	402 26%	1,143 74%	1,348 78%	374 22%	1,750 54%	1,517 46%	167 25%	513 75%	590 91%	58 9%	756 57%	570 43%	2,506 55%	2,087 45%

[a] The passenger car equivalent is one truck equals 2.5 cars.
Source: The Corradino Group of Michigan, Inc.

Appendix C

Detroit River International Crossing Study
Vehicle Miles of Travel (VMT)
and
Vehicle Hours of Travel (VHT)

Table C-1
Detroit River International Crossing Study
2015 AM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,165	n/a	13,442	n/a	102,177	n/a	20	n/a	335	n/a	2,551	n/a
Alt #1/2/3/14/16	1,135	-3%	14,842	10%	103,339	1%	19	-2%	347	4%	2,438	-4%
Alt #5	1,147	-2%	14,910	11%	103,428	1%	19	-1%	348	4%	2,439	-4%
Alt #7/9/11	828	-29%	14,597	9%	103,235	1%	14	-29%	349	4%	2,468	-3%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	760	n/a	5,637	n/a	1,168	n/a	13	n/a	118	n/a	1,168	n/a
Alt #1/2/3/14/16	647	-15%	6,384	13%	1,136	-3%	11	-14%	136	15%	1,136	-3%
Alt #5	708	-7%	6,434	14%	1,136	-3%	12	-7%	136	15%	1,136	-3%
Alt #7/9/11	461	-39%	6,438	14%	1,145	-2%	8	-40%	136	15%	1,145	-2%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,925	n/a	19,079	n/a	103,345	n/a	33	n/a	454	n/a	3,719	n/a
Alt #1/2/3/14/16	1,782	-7%	21,226	11%	104,474	1%	30	-7%	483	6%	3,574	-4%
Alt #5	1,855	-4%	21,344	12%	104,564	1%	32	-3%	484	7%	3,575	-4%
Alt #7/9/11	1,290	-33%	21,035	10%	104,380	1%	22	-33%	485	7%	3,613	-3%

Source: The Corradino Group of Michigan, Inc.

Table C-2
Detroit River International Crossing Study
2015 Midday Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,068	n/a	10,982	n/a	103,833	n/a	18	n/a	246	n/a	2,022	n/a
Alt #1/2/3/14/16	897	-16%	11,825	8%	104,728	1%	15	-15%	262	6%	1,985	-2%
Alt #5	994	-7%	11,972	9%	104,869	1%	17	-5%	263	7%	1,986	-2%
Alt #7/9/11	900	-16%	11,733	7%	104,711	1%	15	-14%	261	6%	1,997	-1%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,246	n/a	8,115	n/a	92,594	n/a	21	n/a	168	n/a	1,605	n/a
Alt #1/2/3/14/16	1,072	-14%	9,384	16%	93,779	1%	18	-13%	191	14%	1,569	-2%
Alt #5	1,167	-6%	9,444	16%	93,768	1%	20	-6%	193	15%	1,569	-2%
Alt #7/9/11	833	-33%	8,694	7%	93,651	1%	14	-33%	177	6%	1,578	-2%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,314	n/a	19,097	n/a	196,427	n/a	39	n/a	414	n/a	3,627	n/a
Alt #1/2/3/14/16	1,968	-15%	21,209	11%	198,507	1%	33	-14%	453	9%	3,554	-2%
Alt #5	2,160	-7%	21,416	12%	198,637	1%	37	-6%	456	10%	3,555	-2%
Alt #7/9/11	1,733	-25%	20,427	7%	198,362	1%	29	-24%	438	6%	3,575	-1%

Source: The Corradino Group of Michigan, Inc.

Table C-3
Detroit River International Crossing Study
2015 PM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,742	n/a	19,564	n/a	149,561	n/a	31	n/a	528	n/a	4,566	n/a
Alt #1/2/3/14/16	1,795	3%	21,570	10%	152,102	2%	35	11%	538	2%	4,355	-5%
Alt #5	1,936	11%	21,854	12%	152,397	2%	37	17%	537	2%	4,349	-5%
Alt #7/9/11	1,643	-6%	21,752	11%	152,336	2%	29	-6%	544	3%	4,394	-4%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,342	n/a	8,217	n/a	92,079	n/a	24	n/a	180	n/a	1,738	n/a
Alt #1/2/3/14/16	1,023	-24%	9,145	11%	93,888	2%	18	-24%	209	16%	1,682	-3%
Alt #5	1,144	-15%	9,273	13%	94,013	2%	21	-15%	209	16%	1,681	-3%
Alt #7/9/11	847	-37%	9,154	11%	94,190	2%	15	-39%	205	14%	1,692	-3%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	3,085	n/a	27,781	n/a	241,639	n/a	56	n/a	708	n/a	6,303	n/a
Alt #1/2/3/14/16	2,818	-9%	30,714	11%	245,990	2%	53	-4%	747	6%	6,038	-4%
Alt #5	3,080	0%	31,127	12%	246,410	2%	57	3%	745	5%	6,029	-4%
Alt #7/9/11	2,490	-19%	30,907	11%	246,526	2%	44	-20%	749	6%	6,086	-3%

Source: The Corradino Group of Michigan, Inc.

Table C-4
Detroit River International Crossing Study
2035 AM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,387	n/a	15,846	n/a	124,197	n/a	24	n/a	420	n/a	3,410	n/a
Alt #1/2/3/14/16	1,433	3%	17,887	13%	126,079	2%	25	5%	428	2%	3,190	-6%
Alt #5	1,407	1%	17,909	13%	126,153	2%	24	2%	428	2%	3,196	-6%
Alt #7/9/11	977	-30%	17,415	10%	125,719	1%	17	-29%	430	3%	3,234	-5%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,241	n/a	9,117	n/a	103,773	n/a	21	n/a	197	n/a	1,993	n/a
Alt #1/2/3/14/16	1,085	-13%	10,440	15%	105,919	2%	19	-12%	228	16%	1,924	-3%
Alt #5	1,148	-8%	10,506	15%	105,956	2%	20	-7%	229	16%	1,926	-3%
Alt #7/9/11	869	-30%	10,610	16%	106,256	2%	15	-30%	230	16%	1,936	-3%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,627	n/a	24,963	n/a	227,970	n/a	45	n/a	617	n/a	5,402	n/a
Alt #1/2/3/14/16	2,518	-4%	28,328	13%	231,998	2%	44	-3%	656	6%	5,114	-5%
Alt #5	2,554	-3%	28,415	14%	232,108	2%	44	-2%	657	6%	5,121	-5%
Alt #7/9/11	1,846	-30%	28,025	12%	231,975	2%	32	-30%	660	7%	5,170	-4%

Source: The Corradino Group of Michigan, Inc.

Table C-5
Detroit River International Crossing Study
2035 Midday Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,235	n/a	12,722	n/a	122,301	n/a	21	n/a	288	n/a	2,449	n/a
Alt #1/2/3/14/16	931	-25%	13,450	6%	123,185	1%	16	-24%	303	5%	2,376	-3%
Alt #5	1,007	-19%	13,506	6%	123,297	1%	17	-18%	303	5%	2,375	-3%
Alt #7/9/11	1,014	-18%	13,543	6%	123,245	1%	17	-17%	305	6%	2,391	-2%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,062	n/a	13,426	n/a	151,671	n/a	35	n/a	300	n/a	2,714	n/a
Alt #1/2/3/14/16	1,684	-18%	15,376	15%	154,091	2%	28	-18%	324	8%	2,605	-4%
Alt #5	1,829	-11%	15,371	14%	154,308	2%	31	-11%	320	7%	2,604	-4%
Alt #7/9/11	1,385	-33%	14,887	11%	154,325	2%	23	-33%	313	5%	2,624	-3%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	3,297	n/a	26,147	n/a	273,971	n/a	55	n/a	587	n/a	5,163	n/a
Alt #1/2/3/14/16	2,615	-21%	28,826	10%	277,275	1%	44	-20%	627	7%	4,981	-4%
Alt #5	2,835	-14%	28,877	10%	277,605	1%	48	-14%	623	6%	4,980	-4%
Alt #7/9/11	2,399	-27%	28,430	9%	277,570	1%	41	-27%	619	5%	5,016	-3%

Source: The Corradino Group of Michigan, Inc.

Table C-6
Detroit River International Crossing Study
2035 PM Peak Hour Vehicle Miles Traveled and Vehicle Hours Traveled
International Traffic Only

	Cars											
	I-75		Border Area		SEMCOG/ Windsor-Essex Co. Region		I-75		Border Area		SEMCOG/ Windsor Essex Co. Region	
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	1,953	n/a	22,583	n/a	177,536	n/a	37	n/a	648	n/a	6,339	n/a
Alt #1/2/3/14/16	2,026	4%	24,785	10%	180,332	2%	41	11%	646	0%	5,900	-7%
Alt #5	2,095	7%	24,963	11%	180,611	2%	41	12%	640	-1%	5,894	-7%
Alt #7/9/11	1,996	2%	25,584	13%	181,392	2%	38	3%	660	2%	5,945	-6%
	Trucks											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	2,115	n/a	13,721	n/a	149,008	n/a	40	n/a	323	n/a	3,117	n/a
Alt #1/2/3/14/16	1,650	-22%	14,363	5%	152,988	3%	31	-23%	356	10%	2,942	-6%
Alt #5	1,782	-16%	14,535	6%	153,348	3%	33	-19%	354	9%	2,942	-6%
Alt #7/9/11	1,487	-30%	14,947	9%	153,302	3%	27	-32%	356	10%	2,951	-5%
	Total											
	VMT	% Diff	VMT	% Diff	VMT	% Diff	VHT	% Diff	VHT	% Diff	VHT	% Diff
No Build	4,069	n/a	36,304	n/a	326,544	n/a	77	n/a	971	n/a	9,456	n/a
Alt #1/2/3/14/16	3,676	-10%	39,148	8%	333,320	2%	71	-7%	1,002	3%	8,842	-6%
Alt #5	3,876	-5%	39,498	9%	333,959	2%	74	-4%	994	2%	8,836	-7%
Alt #7/9/11	3,482	-14%	40,531	12%	334,694	2%	65	-15%	1,016	5%	8,896	-6%

Source: The Corradino Group of Michigan, Inc.

Appendix D

Detroit River International Crossing Study
Volume-to-Capacity Ratios

Figure D-1
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2015 AM Peak Hour Travel
(Numbers and letters correspond to Table D-1)

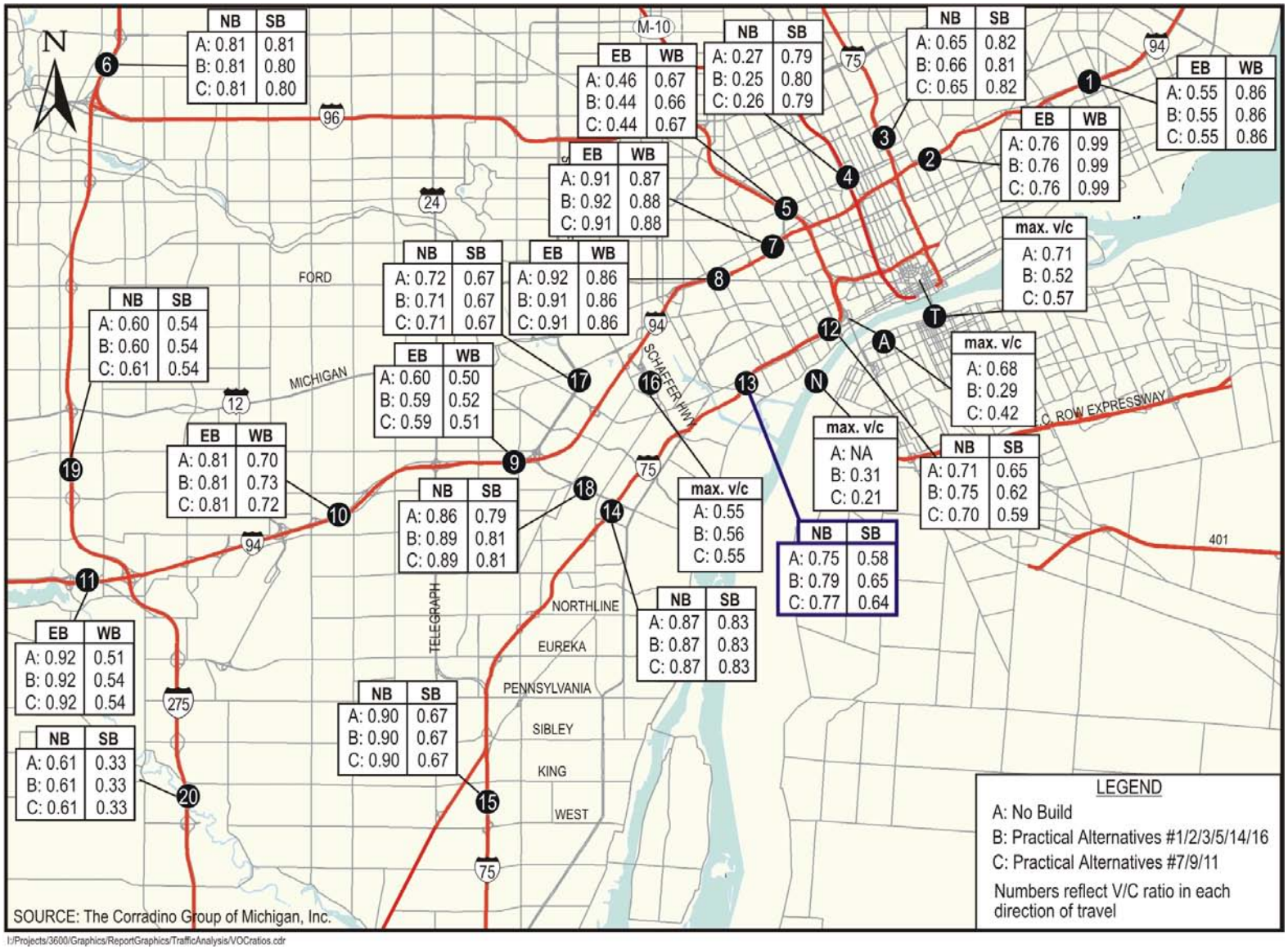


Table D-1
Detroit River International Crossing Study
2015 AM Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,272	980	987	1,055	1,272	980	1,164	1,055	0.71	0.52	0.52	0.57	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	2,295	1,187	1,173	1,681	2,295	1,187	1,392	1,681	0.68	0.28	0.29	0.42	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	228	69	75	85	228	69	96	85	0.14	0.04	0.04	0.05	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	289	113	90	291	289	113	185	291	0.18	0.06	0.05	0.17	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	521	115	109	133	521	115	111	133	0.24	0.04	0.04	0.04	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	1,059	881	890	1,074	1,059	881	990	1,074	0.34	0.28	0.28	0.36	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	186	0	0	87	186	0	2	87	0.30	0.00	0.00	0.14	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	1,448	1,452	867	n/a	1,448	2,039	867	n/a	0.31	0.30	0.21	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	250	244	185	n/a	250	370	185	n/a	0.34	0.35	0.26	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	154	168	9	n/a	154	215	9	n/a	0.16	0.18	0.01	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	563	545	512	n/a	563	730	512	n/a	0.57	0.57	0.55	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	481	496	161	n/a	481	725	161	n/a	0.43	0.47	0.16	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	225	218	218	221	2,917	2,912	2,893	2,914	0.55	0.55	0.55	0.55	1	EB I-94 east of Conner
1	WB I-94 east of Conner	98	90	90	91	4,728	4,736	4,812	4,734	0.86	0.86	0.86	0.86	1	WB I-94 east of Conner
2	EB I-94 east of I-75	282	286	281	291	5,437	5,446	5,648	5,463	0.76	0.76	0.76	0.76	2	EB I-94 east of I-75
2	WB I-94 east of I-75	104	93	93	95	7,251	7,274	7,272	7,264	0.99	0.99	0.99	0.99	2	WB I-94 east of I-75
3	NB I-75 north of I-94	502	492	494	495	4,660	4,664	4,705	4,656	0.65	0.66	0.66	0.65	3	NB I-75 north of I-94
3	SB I-75 north of I-94	152	150	151	151	5,904	5,880	5,962	5,886	0.82	0.81	0.81	0.82	3	SB I-75 north of I-94
4	NB M-10 north of I-94	176	150	149	162	1,946	1,851	1,805	1,865	0.27	0.25	0.25	0.26	4	NB M-10 north of I-94
4	SB M-10 north of I-94	45	50	52	45	4,384	4,393	4,088	4,390	0.79	0.80	0.80	0.79	4	SB M-10 north of I-94
5	EB I-96 west of I-94	715	669	677	669	3,184	3,130	3,153	3,120	0.46	0.44	0.44	0.44	5	EB I-96 west of I-94
5	WB I-96 west of I-94	178	136	133	167	4,855	4,839	4,678	4,857	0.67	0.66	0.66	0.67	5	WB I-96 west of I-94
6	WB I-96 west of I-275	10	12	12	11	6,154	6,167	6,569	6,149	0.81	0.81	0.81	0.81	6	WB I-96 west of I-275
6	EB I-96 west of I-275	3	3	3	3	5,756	5,716	5,987	5,731	0.81	0.80	0.80	0.80	6	EB I-96 west of I-275
7	EB I-94 west of I-96	38	13	13	19	4,954	5,000	5,043	4,975	0.91	0.92	0.92	0.91	7	EB I-94 west of I-96
7	WB I-94 west of I-96	54	35	33	42	4,723	4,764	4,806	4,772	0.87	0.88	0.87	0.88	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	50	15	16	31	4,935	4,925	5,057	4,933	0.92	0.91	0.91	0.91	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	83	43	42	52	4,651	4,640	4,680	4,648	0.86	0.86	0.86	0.86	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	54	23	23	36	3,217	3,200	3,611	3,212	0.60	0.59	0.59	0.59	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	129	208	199	189	3,530	3,600	3,670	3,585	0.50	0.52	0.51	0.51	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	56	103	102	74	4,353	4,312	5,038	4,358	0.81	0.81	0.81	0.81	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	93	186	177	168	3,741	3,807	3,733	3,797	0.70	0.73	0.72	0.72	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	50	97	96	68	5,249	5,221	6,008	5,261	0.92	0.92	0.92	0.92	11	EB I-94 west of I-275
11	WB I-94 west of I-275	70	160	152	143	2,867	2,937	2,665	2,928	0.51	0.54	0.54	0.54	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	233	550	552	247	4,937	5,225	5,073	4,900	0.71	0.75	0.74	0.70	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	570	311	320	189	4,417	4,258	4,000	4,122	0.65	0.62	0.56	0.59	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	214	310	308	255	5,290	5,383	5,366	5,386	0.75	0.78	0.79	0.77	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	533	700	688	668	3,910	4,216	4,503	4,188	0.58	0.64	0.65	0.64	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	164	166	166	165	4,500	4,503	4,460	4,512	0.87	0.87	0.87	0.87	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	330	335	335	333	4,175	4,178	4,254	4,171	0.83	0.83	0.83	0.83	14	SB I-75 south of Southfield
15	NB I-75 south of King	148	150	150	149	4,900	4,882	5,238	4,896	0.90	0.90	0.90	0.90	15	NB I-75 south of King
15	SB I-75 south of King	248	249	249	249	3,476	3,469	3,603	3,471	0.67	0.67	0.67	0.67	15	SB I-75 south of King
16	Scheafer east of I-75	0	1	0	0	1,343	1,372	1,334	1,368	0.55	0.55	0.56	0.55	16	Scheafer east of I-75
17	NB Southfield north of I-94	0	0	0	0	3,925	3,858	3,946	3,887	0.72	0.71	0.70	0.71	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	0	0	0	3,643	3,642	3,696	3,645	0.67	0.67	0.67	0.67	17	SB Southfield north of I-94
18	NB Southfield south of I-94	60	148	141	137	2,964	2,941	2,824	2,957	0.86	0.89	0.89	0.89	18	NB Southfield south of I-94
18	SB Southfield south of I-94	13	90	89	48	2,732	2,704	2,683	2,741	0.79	0.81	0.81	0.81	18	SB Southfield south of I-94
19	NB I-275 north of I-94	6	9	9	8	3,423	3,417	3,915	3,430	0.60	0.60	0.60	0.61	19	NB I-275 north of I-94
19	SB I-275 north of I-94	1	1	1	1	3,063	3,053	3,299	3,057	0.54	0.54	0.54	0.54	19	SB I-275 north of I-94
20	NB I-275 south of King	1	1	1	1	3,291	3,302	4,207	3,298	0.61	0.61	0.61	0.61	20	NB I-275 south of King
20	SB I-275 south of King	3	3	3	3	1,747	1,747	2,023	1,745	0.33	0.33	0.33	0.33	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

Figure D-2
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2015 Midday Peak Hour Travel
(Numbers and letters correspond to Table D-2)

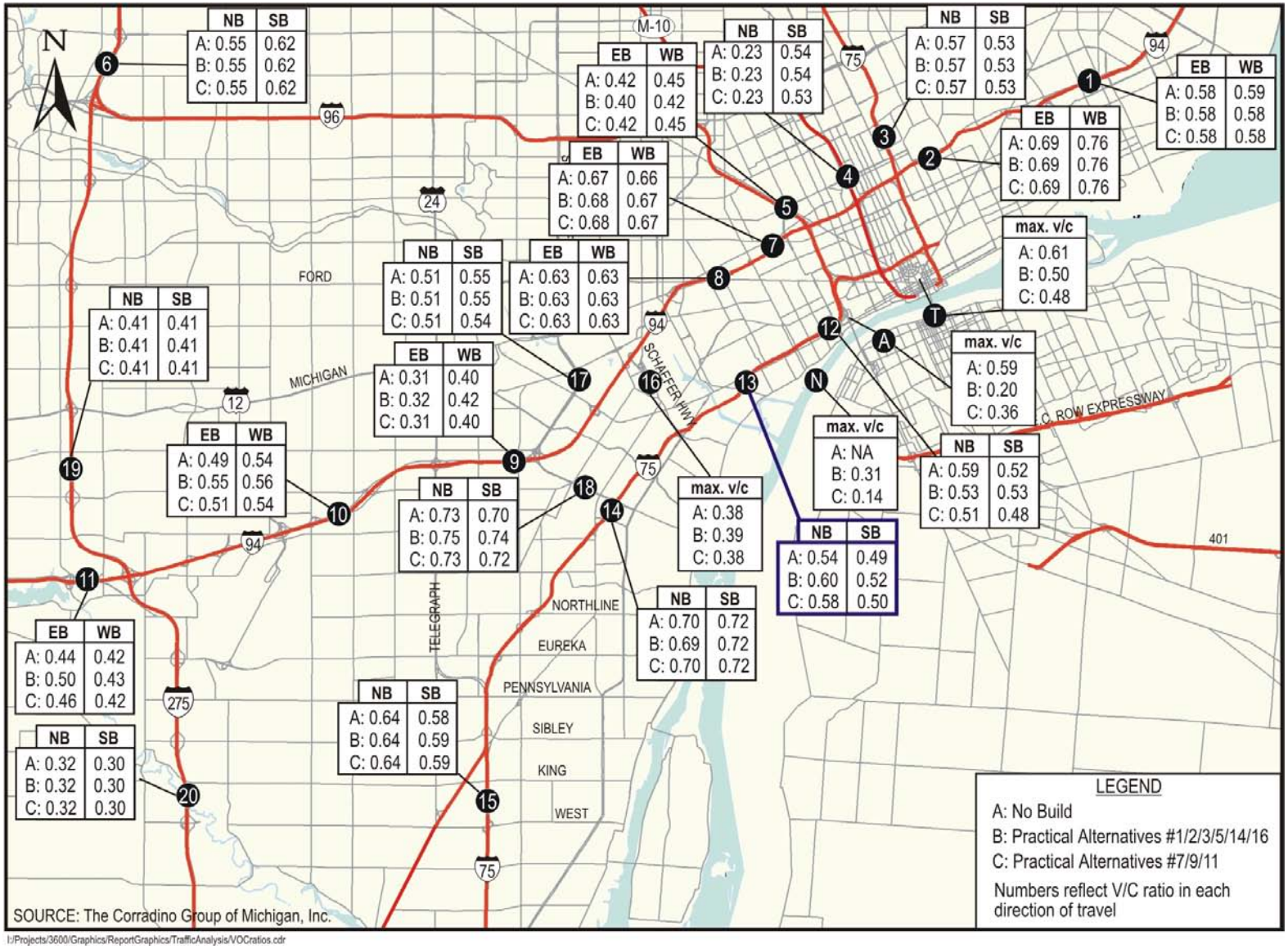


Table D-2
Detroit River International Crossing Study
2015 Midday Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,066	876	904	925	1,066	876	904	925	0.61	0.44	0.50	0.48	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	1,984	927	893	1,550	1,984	927	893	1,550	0.59	0.20	0.20	0.36	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	491	167	203	200	491	167	203	200	0.29	0.09	0.11	0.11	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	575	221	151	600	575	221	151	600	0.32	0.10	0.07	0.33	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	317	60	59	110	317	60	59	110	0.17	0.02	0.02	0.06	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	370	390	392	416	370	390	392	416	0.12	0.12	0.12	0.14	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	227	86	86	220	227	86	86	220	0.36	0.14	0.14	0.35	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	1,305	1,309	616	n/a	1,305	1,309	616	n/a	0.31	0.30	0.14	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	509	479	353	n/a	509	479	353	n/a	0.62	0.61	0.45	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	346	381	37	n/a	346	381	37	n/a	0.37	0.40	0.03	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	325	310	219	n/a	325	310	219	n/a	0.38	0.38	0.24	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	126	139	7	n/a	126	139	7	n/a	0.17	0.20	0.01	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	209	192	193	197	2,948	2,932	2,933	2,938	0.58	0.58	0.58	0.58	1	EB I-94 east of Conner
1	WB I-94 east of Conner	208	200	200	203	3,040	3,029	3,029	3,032	0.59	0.58	0.58	0.58	1	WB I-94 east of Conner
2	EB I-94 east of I-75	221	205	206	211	4,747	4,740	4,742	4,745	0.69	0.69	0.69	0.69	2	EB I-94 east of I-75
2	WB I-94 east of I-75	260	250	251	254	5,267	5,272	5,278	5,268	0.76	0.76	0.76	0.76	2	WB I-94 east of I-75
3	NB I-75 north of I-94	201	204	204	200	3,920	3,922	3,922	3,922	0.57	0.57	0.57	0.57	3	NB I-75 north of I-94
3	SB I-75 north of I-94	272	271	272	271	3,635	3,627	3,622	3,628	0.53	0.53	0.53	0.53	3	SB I-75 north of I-94
4	NB M-10 north of I-94	103	102	102	104	1,588	1,591	1,590	1,590	0.23	0.23	0.23	0.23	4	NB M-10 north of I-94
4	SB M-10 north of I-94	187	181	183	166	2,762	2,776	2,772	2,746	0.54	0.54	0.54	0.53	4	SB M-10 north of I-94
5	EB I-96 west of I-94	366	326	337	371	2,837	2,764	2,775	2,821	0.42	0.40	0.40	0.42	5	EB I-96 west of I-94
5	WB I-96 west of I-94	452	324	322	441	2,963	2,833	2,867	2,960	0.45	0.42	0.42	0.45	5	WB I-96 west of I-94
6	WB I-96 west of I-275	2	2	2	2	3,968	3,963	3,969	3,969	0.55	0.55	0.55	0.55	6	WB I-96 west of I-275
6	EB I-96 west of I-275	4	4	4	4	4,224	4,223	4,223	4,223	0.62	0.62	0.62	0.62	6	EB I-96 west of I-275
7	EB I-94 west of I-96	78	64	61	72	3,519	3,575	3,589	3,583	0.67	0.68	0.68	0.68	7	EB I-94 west of I-96
7	WB I-94 west of I-96	50	42	43	47	3,422	3,478	3,477	3,480	0.66	0.67	0.67	0.67	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	75	62	62	69	3,246	3,245	3,266	3,257	0.63	0.62	0.63	0.63	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	60	45	47	54	3,233	3,248	3,249	3,252	0.63	0.63	0.63	0.63	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	51	78	77	61	1,576	1,630	1,631	1,594	0.31	0.32	0.32	0.31	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	66	114	103	69	2,771	2,821	2,816	2,777	0.40	0.42	0.42	0.40	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	70	223	221	116	2,536	2,678	2,677	2,580	0.49	0.55	0.55	0.51	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	57	104	93	60	2,776	2,822	2,813	2,779	0.54	0.56	0.55	0.54	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	38	189	188	83	2,426	2,574	2,574	2,470	0.44	0.50	0.50	0.46	11	EB I-94 west of I-275
11	WB I-94 west of I-275	35	81	69	37	2,261	2,307	2,296	2,264	0.42	0.43	0.43	0.42	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	583	370	407	290	3,667	3,389	3,346	3,287	0.59	0.53	0.53	0.51	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	377	463	497	206	3,343	3,413	3,206	3,175	0.52	0.53	0.50	0.48	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	561	742	742	627	3,341	3,602	3,613	3,529	0.54	0.60	0.60	0.58	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	364	435	423	380	3,159	3,264	3,329	3,225	0.49	0.52	0.52	0.50	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	430	433	433	432	3,225	3,209	3,206	3,219	0.70	0.69	0.69	0.70	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	283	285	285	284	3,505	3,512	3,514	3,519	0.72	0.72	0.72	0.72	14	SB I-75 south of Southfield
15	NB I-75 south of King	357	359	359	358	3,094	3,098	3,098	3,098	0.64	0.64	0.64	0.64	15	NB I-75 south of King
15	SB I-75 south of King	236	237	237	237	2,915	2,920	2,920	2,915	0.58	0.59	0.59	0.59	15	SB I-75 south of King
16	Scheafer east of I-75	0	0	0	0	971	1,005	1,005	1,001	0.38	0.38	0.39	0.38	16	Scheafer east of I-75
17	NB Southfield north of I-94	0	0	0	0	2,706	2,672	2,676	2,705	0.51	0.51	0.51	0.51	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	1	0	0	2,876	2,883	2,882	2,867	0.55	0.55	0.55	0.54	17	SB Southfield north of I-94
18	NB Southfield south of I-94	53	95	83	58	2,427	2,425	2,417	2,429	0.73	0.75	0.74	0.73	18	NB Southfield south of I-94
18	SB Southfield south of I-94	52	179	179	89	2,339	2,326	2,325	2,347	0.70	0.74	0.74	0.72	18	SB Southfield south of I-94
19	NB I-275 north of I-94	1	3	3	2	2,212	2,216	2,215	2,212	0.41	0.41	0.41	0.41	19	NB I-275 north of I-94
19	SB I-275 north of I-94	3	6	5	4	2,190	2,190	2,189	2,190	0.41	0.41	0.41	0.41	19	SB I-275 north of I-94
20	NB I-275 south of King	2	2	2	2	1,636	1,638	1,637	1,637	0.32	0.32	0.32	0.32	20	NB I-275 south of King
20	SB I-275 south of King	2	2	2	2	1,540	1,540	1,540	1,540	0.30	0.30	0.30	0.30	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

Figure D-3
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2015 PM Peak Hour Travel
(Numbers and letters correspond to Table D-3)

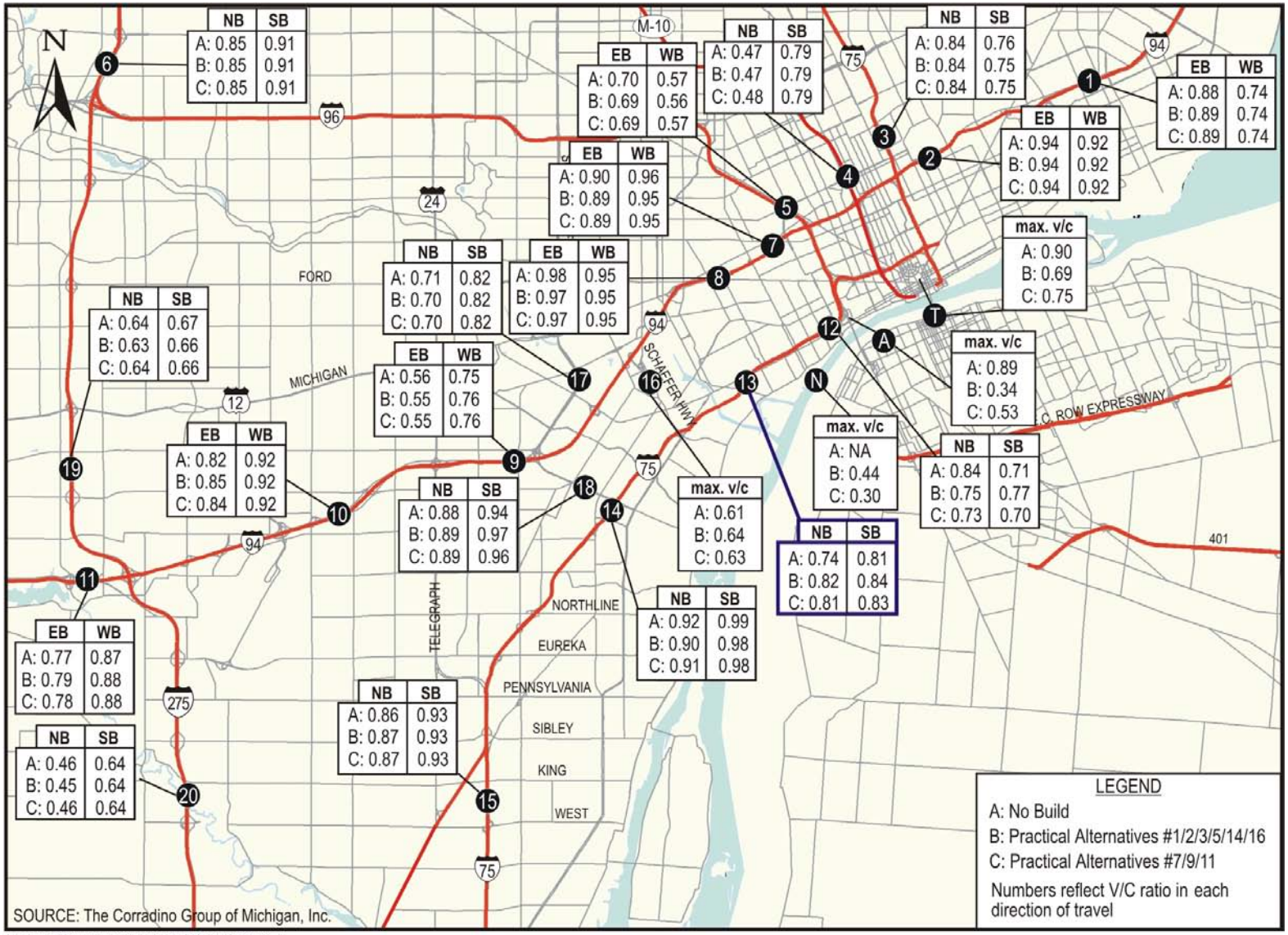


Table D-3
Detroit River International Crossing Study
2015 PM Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,600	1,265	1,266	1,345	1,600	1,265	1,266	1,345	0.90	0.68	0.69	0.75	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	2,949	1,449	1,401	1,986	2,949	1,449	1,401	1,986	0.89	0.34	0.33	0.53	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	883	298	336	339	883	298	336	339	0.43	0.11	0.13	0.13	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	1,242	703	622	1,079	1,242	703	622	1,079	0.53	0.27	0.24	0.45	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	352	109	110	123	352	109	110	123	0.18	0.05	0.05	0.06	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	318	314	318	347	318	314	318	347	0.10	0.10	0.10	0.12	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	152	22	11	98	152	22	11	98	0.24	0.03	0.02	0.15	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	1,958	2,002	1,319	n/a	1,958	2,002	1,319	n/a	0.44	0.44	0.30	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	745	700	654	n/a	745	700	654	n/a	0.84	0.82	0.76	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	766	850	344	n/a	766	850	344	n/a	0.58	0.70	0.25	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	344	332	298	n/a	344	332	298	n/a	0.38	0.38	0.34	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	103	121	23	n/a	103	121	23	n/a	0.14	0.18	0.04	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	177	150	150	154	4,810	4,874	4,875	4,871	0.88	0.89	0.89	0.89	1	EB I-94 east of Conner
1	WB I-94 east of Conner	291	284	285	287	4,000	3,994	3,996	3,998	0.74	0.74	0.74	0.74	1	WB I-94 east of Conner
2	EB I-94 east of I-75	155	136	135	147	6,885	6,851	6,875	6,884	0.94	0.93	0.94	0.94	2	EB I-94 east of I-75
2	WB I-94 east of I-75	367	359	361	361	6,654	6,682	6,689	6,684	0.92	0.92	0.92	0.92	2	WB I-94 east of I-75
3	NB I-75 north of I-94	166	164	164	164	6,207	6,196	6,187	6,196	0.84	0.84	0.84	0.84	3	NB I-75 north of I-94
3	SB I-75 north of I-94	608	587	576	589	5,490	5,470	5,437	5,473	0.76	0.75	0.75	0.75	3	SB I-75 north of I-94
4	NB M-10 north of I-94	72	72	72	73	3,521	3,527	3,529	3,541	0.47	0.47	0.47	0.48	4	NB M-10 north of I-94
4	SB M-10 north of I-94	285	258	304	280	4,379	4,333	4,364	4,366	0.79	0.78	0.79	0.79	4	SB M-10 north of I-94
5	EB I-96 west of I-94	245	211	218	230	5,107	5,079	5,102	5,078	0.70	0.69	0.69	0.69	5	EB I-96 west of I-94
5	WB I-96 west of I-94	649	626	591	649	4,011	4,077	4,031	4,096	0.57	0.56	0.56	0.57	5	WB I-96 west of I-94
6	WB I-96 west of I-275	14	14	14	14	6,533	6,504	6,496	6,507	0.85	0.85	0.85	0.85	6	WB I-96 west of I-275
6	EB I-96 west of I-275	12	13	11	15	6,651	6,659	6,655	6,660	0.91	0.91	0.91	0.91	6	EB I-96 west of I-275
7	EB I-94 west of I-96	88	51	47	56	4,941	4,936	4,937	4,930	0.90	0.89	0.89	0.89	7	EB I-94 west of I-96
7	WB I-94 west of I-96	23	19	21	21	5,259	5,240	5,247	5,245	0.96	0.95	0.95	0.95	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	104	52	74	65	5,376	5,344	5,312	5,348	0.98	0.97	0.97	0.97	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	61	35	37	41	5,176	5,209	5,205	5,205	0.95	0.95	0.95	0.95	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	172	158	158	150	2,990	2,996	2,980	2,970	0.56	0.55	0.55	0.55	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	117	166	159	142	5,476	5,498	5,508	5,502	0.75	0.76	0.76	0.76	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	176	286	287	234	4,432	4,430	4,423	4,435	0.82	0.85	0.84	0.84	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	103	153	147	129	4,985	4,959	4,964	4,985	0.92	0.92	0.92	0.92	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	142	248	249	197	4,385	4,380	4,375	4,388	0.77	0.79	0.79	0.78	11	EB I-94 west of I-275
11	WB I-94 west of I-275	80	130	123	106	5,032	5,024	5,027	5,036	0.87	0.88	0.88	0.88	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	921	445	475	401	5,652	5,210	5,177	5,125	0.84	0.75	0.74	0.73	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	420	800	992	417	4,922	5,288	5,359	5,000	0.71	0.75	0.77	0.70	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	737	1,024	990	960	4,976	5,328	5,305	5,317	0.74	0.82	0.81	0.81	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	418	518	510	485	5,706	5,729	5,801	5,788	0.81	0.83	0.84	0.83	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	523	530	530	529	4,591	4,503	4,506	4,518	0.92	0.90	0.90	0.91	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	282	285	285	285	5,180	5,133	5,126	5,145	0.99	0.98	0.98	0.98	14	SB I-75 south of Southfield
15	NB I-75 south of King	446	452	452	451	4,531	4,537	4,538	4,535	0.86	0.87	0.87	0.87	15	NB I-75 south of King
15	SB I-75 south of King	250	253	253	252	5,126	5,127	5,126	5,126	0.93	0.93	0.93	0.93	15	SB I-75 south of King
16	Scheafer east of I-75	0	2	2	2	1,533	1,591	1,581	1,572	0.61	0.64	0.63	0.63	16	Scheafer east of I-75
17	NB Southfield north of I-94	1	1	1	1	3,927	3,864	3,871	3,899	0.71	0.70	0.70	0.70	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	1	0	0	4,563	4,519	4,518	4,544	0.82	0.82	0.82	0.82	17	SB Southfield north of I-94
18	NB Southfield south of I-94	30	95	88	70	3,065	3,034	3,043	3,059	0.88	0.89	0.89	0.89	18	NB Southfield south of I-94
18	SB Southfield south of I-94	69	192	193	152	3,264	3,211	3,209	3,255	0.94	0.97	0.97	0.96	18	SB Southfield south of I-94
19	NB I-275 north of I-94	3	3	3	3	3,659	3,619	3,618	3,657	0.64	0.63	0.63	0.64	19	NB I-275 north of I-94
19	SB I-275 north of I-94	9	13	13	13	3,843	3,831	3,831	3,836	0.67	0.66	0.66	0.66	19	SB I-275 north of I-94
20	NB I-275 south of King	5	5	5	5	2,494	2,459	2,459	2,493	0.46	0.45	0.45	0.46	20	NB I-275 south of King
20	SB I-275 south of King	2	2	2	2	3,522	3,518	3,522	3,523	0.64	0.64	0.64	0.64	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

Figure D-4
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 AM Peak Hour Travel
(Numbers and letters correspond to Table D-4)

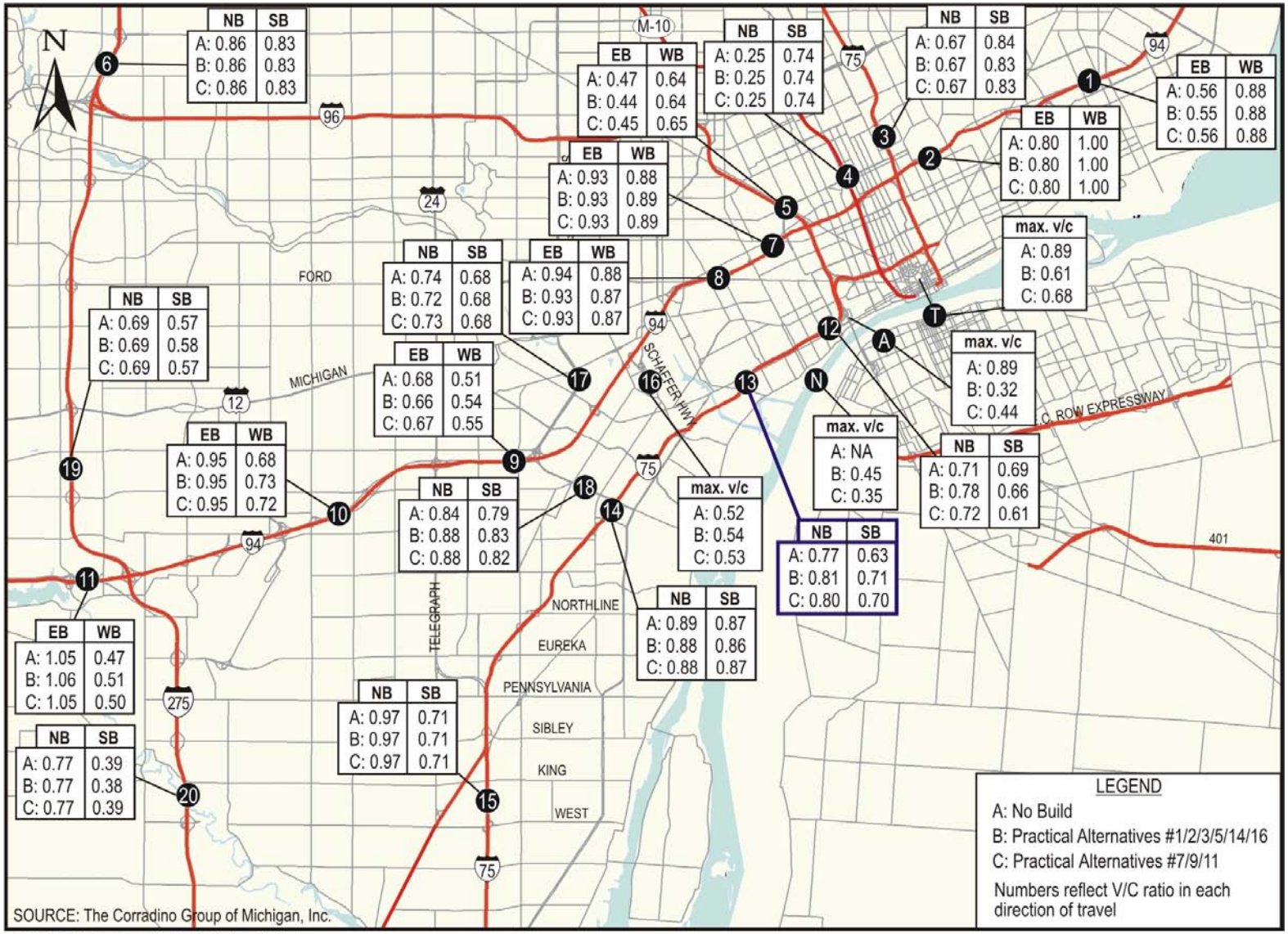


Table D-4
Detroit River International Crossing Study
2035 AM Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,595	1,165	1,164	1,282	1,595	1,165	1,164	1,282	0.89	0.61	0.61	0.68	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	2,909	1,366	1,392	1,959	2,909	1,366	1,392	1,959	0.89	0.32	0.32	0.44	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	335	96	96	115	335	96	96	115	0.22	0.05	0.05	0.06	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	392	161	185	404	392	161	185	404	0.25	0.10	0.11	0.25	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	655	120	111	133	655	120	111	133	0.31	0.04	0.04	0.04	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	1,238	979	990	1,238	1,238	979	990	1,238	0.39	0.31	0.31	0.41	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	281	2	2	61	281	2	2	61	0.45	0.00	0.00	0.10	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	2,068	2,039	1,340	n/a	2,068	2,039	1,340	n/a	0.45	0.45	0.35	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	380	370	306	n/a	380	370	306	n/a	0.54	0.55	0.45	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	228	215	8	n/a	228	215	8	n/a	0.24	0.24	0.01	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	746	730	711	n/a	746	730	711	n/a	0.79	0.81	0.79	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	713	725	315	n/a	713	725	315	n/a	0.67	0.71	0.37	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	310	296	297	301	2,919	2,895	2,893	2,905	0.56	0.55	0.55	0.56	1	EB I-94 east of Conner
1	WB I-94 east of Conner	128	120	120	122	4,773	4,815	4,812	4,825	0.88	0.88	0.88	0.88	1	WB I-94 east of Conner
2	EB I-94 east of I-75	361	370	369	369	5,659	5,649	5,648	5,655	0.80	0.80	0.80	0.80	2	EB I-94 east of I-75
2	WB I-94 east of I-75	139	127	127	129	7,263	7,263	7,272	7,269	1.00	1.00	1.00	1.00	2	WB I-94 east of I-75
3	NB I-75 north of I-94	608	596	598	601	4,717	4,695	4,705	4,707	0.67	0.67	0.67	0.67	3	NB I-75 north of I-94
3	SB I-75 north of I-94	212	210	210	211	5,987	5,967	5,962	5,968	0.84	0.83	0.83	0.83	3	SB I-75 north of I-94
4	NB M-10 north of I-94	210	171	171	195	1,837	1,801	1,805	1,819	0.25	0.25	0.25	0.25	4	NB M-10 north of I-94
4	SB M-10 north of I-94	74	64	57	59	4,094	4,094	4,088	4,090	0.74	0.74	0.74	0.74	4	SB M-10 north of I-94
5	EB I-96 west of I-94	865	802	801	792	3,197	3,149	3,153	3,142	0.47	0.44	0.44	0.45	5	EB I-96 west of I-94
5	WB I-96 west of I-94	221	198	212	229	4,617	4,649	4,678	4,666	0.64	0.64	0.65	0.65	5	WB I-96 west of I-94
6	WB I-96 west of I-275	10	13	13	10	6,542	6,561	6,569	6,532	0.86	0.86	0.86	0.86	6	WB I-96 west of I-275
6	EB I-96 west of I-275	5	7	7	5	5,897	5,958	5,987	5,907	0.83	0.83	0.84	0.83	6	EB I-96 west of I-275
7	EB I-94 west of I-96	68	15	16	30	4,999	5,072	5,043	5,050	0.93	0.93	0.93	0.93	7	EB I-94 west of I-96
7	WB I-94 west of I-96	51	36	39	41	4,791	4,816	4,806	4,850	0.88	0.89	0.88	0.89	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	82	15	16	33	5,028	5,049	5,057	5,045	0.94	0.93	0.93	0.93	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	90	59	62	49	4,684	4,676	4,680	4,689	0.88	0.87	0.87	0.87	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	92	30	29	45	3,630	3,604	3,611	3,618	0.68	0.66	0.66	0.67	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	169	307	306	271	3,569	3,672	3,670	3,643	0.51	0.54	0.54	0.53	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	107	160	153	128	5,061	5,021	5,038	5,032	0.95	0.95	0.95	0.95	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	127	267	266	247	3,632	3,732	3,733	3,723	0.68	0.73	0.73	0.72	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	83	149	141	102	6,030	5,998	6,008	6,002	1.05	1.06	1.06	1.05	11	EB I-94 west of I-275
11	WB I-94 west of I-275	93	230	228	208	2,568	2,666	2,665	2,654	0.47	0.51	0.51	0.50	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	365	824	816	448	4,750	5,243	5,073	4,870	0.71	0.78	0.76	0.72	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	724	405	385	204	4,591	4,435	4,000	4,216	0.69	0.66	0.59	0.61	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	333	480	471	416	5,253	5,385	5,366	5,387	0.77	0.81	0.81	0.80	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	682	902	891	882	4,111	4,442	4,503	4,431	0.63	0.70	0.71	0.70	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	240	242	241	241	4,539	4,456	4,460	4,493	0.89	0.88	0.88	0.88	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	442	447	447	444	4,299	4,249	4,254	4,261	0.87	0.86	0.86	0.87	14	SB I-75 south of Southfield
15	NB I-75 south of King	219	222	221	221	5,249	5,243	5,238	5,246	0.97	0.97	0.97	0.97	15	NB I-75 south of King
15	SB I-75 south of King	343	346	346	345	3,603	3,601	3,603	3,604	0.71	0.71	0.71	0.71	15	SB I-75 south of King
16	Scheafer east of I-75	0	1	0	0	1,302	1,334	1,334	1,313	0.52	0.53	0.54	0.53	16	Scheafer east of I-75
17	NB Southfield north of I-94	0	0	0	0	4,059	3,946	3,946	3,986	0.74	0.72	0.72	0.73	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	0	0	0	3,704	3,699	3,696	3,710	0.68	0.68	0.68	0.68	17	SB Southfield north of I-94
18	NB Southfield south of I-94	68	200	199	194	2,875	2,820	2,824	2,829	0.84	0.88	0.88	0.88	18	NB Southfield south of I-94
18	SB Southfield south of I-94	27	142	135	95	2,725	2,676	2,683	2,725	0.79	0.83	0.83	0.82	18	SB Southfield south of I-94
19	NB I-275 north of I-94	9	12	12	11	3,889	3,915	3,915	3,890	0.69	0.69	0.69	0.69	19	NB I-275 north of I-94
19	SB I-275 north of I-94	1	1	1	1	3,253	3,288	3,299	3,254	0.57	0.58	0.58	0.57	19	SB I-275 north of I-94
20	NB I-275 south of King	2	2	2	2	4,199	4,205	4,207	4,198	0.77	0.77	0.77	0.77	20	NB I-275 south of King
20	SB I-275 south of King	8	8	7	7	2,025	2,015	2,023	2,027	0.39	0.38	0.39	0.39	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

Figure D-5
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 Midday Peak Hour Travel
(Numbers and letters correspond to Table D-5)

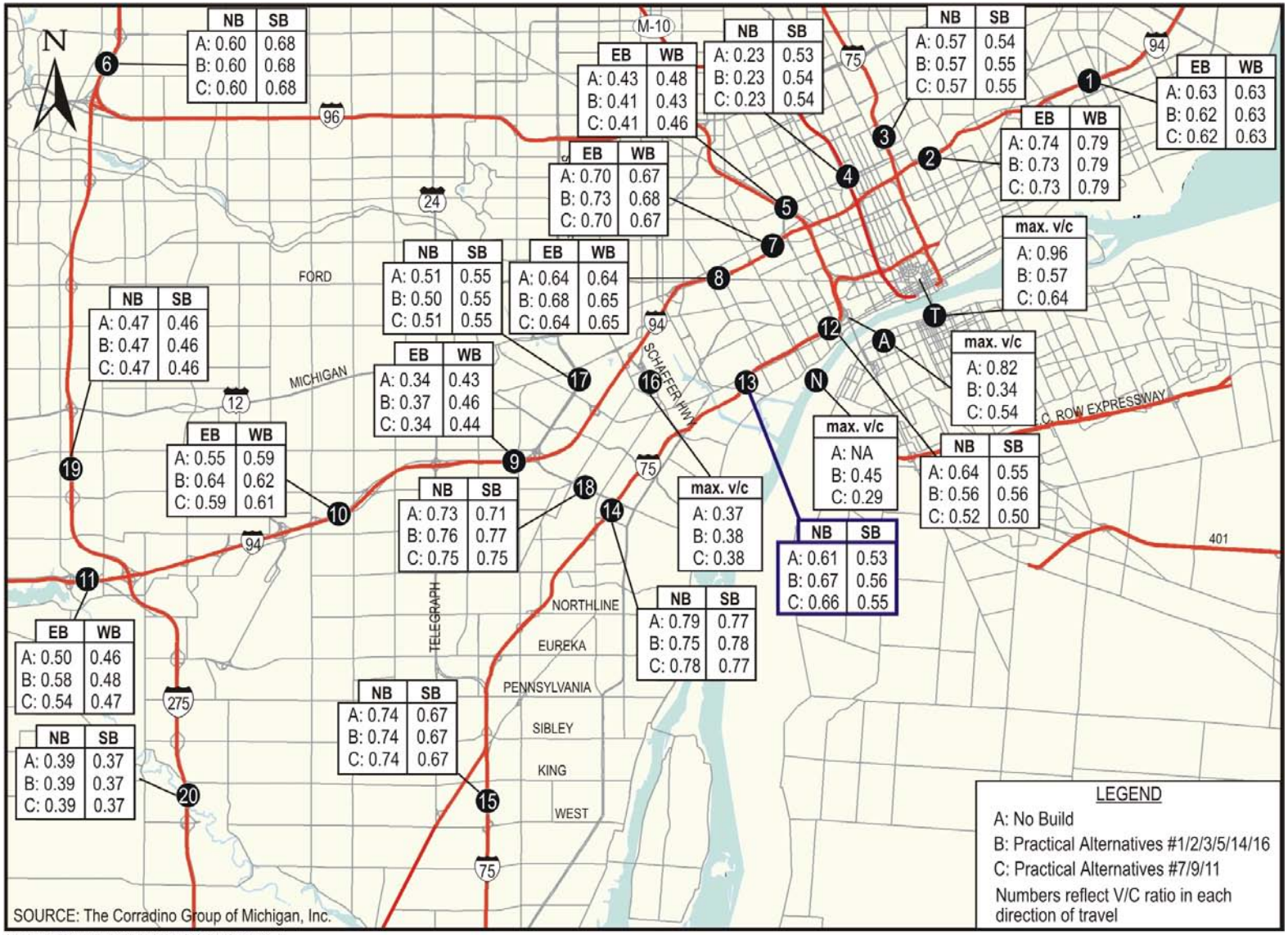


Table D-5
Detroit River International Crossing Study
2035 Midday Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,302	1,035	1,025	1,135	1,302	1,035	1,025	1,135	0.96	0.57	0.56	0.64	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	2,627	1,286	1,269	1,819	2,627	1,286	1,269	1,819	0.82	0.34	0.32	0.54	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	602	249	253	229	602	249	253	229	0.36	0.15	0.15	0.13	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	835	372	350	706	835	372	350	706	0.47	0.19	0.18	0.42	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	424	64	62	121	424	64	62	121	0.25	0.02	0.02	0.06	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	437	465	469	488	437	465	469	488	0.14	0.15	0.15	0.16	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	326	133	133	272	326	133	133	272	0.52	0.21	0.21	0.43	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	1,734	1,758	1,076	n/a	1,734	1,758	1,076	n/a	0.44	0.45	0.29	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	704	675	591	n/a	704	675	591	n/a	0.91	0.92	0.80	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	397	453	105	n/a	397	453	105	n/a	0.46	0.55	0.12	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	457	430	355	n/a	457	430	355	n/a	0.57	0.55	0.45	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	176	200	25	n/a	176	200	25	n/a	0.25	0.30	0.04	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	315	275	276	283	3,090	3,054	3,055	3,060	0.63	0.62	0.62	0.62	1	EB I-94 east of Conner
1	WB I-94 east of Conner	275	263	264	266	3,221	3,211	3,211	3,213	0.63	0.63	0.63	0.63	1	WB I-94 east of Conner
2	EB I-94 east of I-75	329	290	289	298	4,947	4,922	4,919	4,922	0.74	0.73	0.73	0.73	2	EB I-94 east of I-75
2	WB I-94 east of I-75	327	314	314	318	5,449	5,456	5,459	5,447	0.79	0.79	0.79	0.79	2	WB I-94 east of I-75
3	NB I-75 north of I-94	253	250	251	253	3,929	3,927	3,929	3,938	0.57	0.57	0.57	0.57	3	NB I-75 north of I-94
3	SB I-75 north of I-94	333	342	340	342	3,715	3,714	3,706	3,717	0.54	0.55	0.54	0.55	3	SB I-75 north of I-94
4	NB M-10 north of I-94	134	132	132	134	1,522	1,521	1,520	1,522	0.23	0.23	0.23	0.23	4	NB M-10 north of I-94
4	SB M-10 north of I-94	247	268	267	258	2,669	2,710	2,710	2,680	0.53	0.54	0.54	0.54	4	SB M-10 north of I-94
5	EB I-96 west of I-94	468	416	438	436	2,826	2,728	2,750	2,758	0.43	0.40	0.41	0.41	5	EB I-96 west of I-94
5	WB I-96 west of I-94	629	414	436	541	2,958	2,765	2,800	2,903	0.48	0.42	0.43	0.46	5	WB I-96 west of I-94
6	WB I-96 west of I-275	3	3	3	3	4,362	4,359	4,359	4,356	0.60	0.60	0.60	0.60	6	WB I-96 west of I-275
6	EB I-96 west of I-275	5	5	5	5	4,645	4,642	4,642	4,643	0.68	0.68	0.68	0.68	6	EB I-96 west of I-275
7	EB I-94 west of I-96	97	115	117	88	3,639	3,778	3,794	3,679	0.70	0.73	0.73	0.70	7	EB I-94 west of I-96
7	WB I-94 west of I-96	61	49	51	56	3,496	3,530	3,532	3,522	0.67	0.68	0.68	0.67	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	97	113	115	87	3,327	3,446	3,459	3,341	0.64	0.67	0.68	0.64	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	75	62	64	74	3,325	3,344	3,350	3,365	0.64	0.65	0.65	0.65	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	88	104	95	95	1,740	1,887	1,878	1,763	0.34	0.37	0.36	0.34	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	94	168	146	140	2,942	3,035	3,016	2,976	0.43	0.46	0.45	0.44	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	114	345	323	220	2,844	3,041	3,021	2,936	0.55	0.64	0.63	0.59	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	84	157	135	129	3,040	3,101	3,082	3,077	0.59	0.62	0.61	0.61	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	61	291	270	166	2,749	2,957	2,937	2,848	0.50	0.58	0.58	0.54	11	EB I-94 west of I-275
11	WB I-94 west of I-275	49	121	98	92	2,481	2,550	2,529	2,523	0.46	0.48	0.48	0.47	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	829	522	548	385	3,745	3,383	3,324	3,270	0.64	0.56	0.56	0.52	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	511	542	596	308	3,410	3,485	3,277	3,234	0.55	0.56	0.54	0.50	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	803	1,040	1,017	941	3,526	3,758	3,742	3,742	0.61	0.67	0.67	0.66	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	498	594	570	551	3,291	3,398	3,437	3,366	0.53	0.56	0.56	0.55	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	633	615	614	637	3,444	3,283	3,281	3,417	0.79	0.75	0.75	0.78	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	387	390	390	389	3,648	3,687	3,685	3,657	0.77	0.78	0.78	0.77	14	SB I-75 south of Southfield
15	NB I-75 south of King	532	538	537	536	3,444	3,446	3,445	3,447	0.74	0.74	0.74	0.74	15	NB I-75 south of King
15	SB I-75 south of King	330	332	332	332	3,254	3,247	3,247	3,256	0.67	0.67	0.67	0.67	15	SB I-75 south of King
16	Scheafer east of I-75	0	0	0	0	957	1,006	1,013	1,002	0.37	0.38	0.38	0.38	16	Scheafer east of I-75
17	NB Southfield north of I-94	0	1	0	1	2,695	2,647	2,650	2,676	0.51	0.50	0.50	0.51	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	1	0	2	2,905	2,897	2,898	2,895	0.55	0.55	0.55	0.55	17	SB Southfield north of I-94
18	NB Southfield south of I-94	66	142	124	108	2,393	2,398	2,389	2,406	0.73	0.76	0.75	0.75	18	NB Southfield south of I-94
18	SB Southfield south of I-94	62	278	266	163	2,335	2,266	2,263	2,342	0.71	0.77	0.76	0.75	18	SB Southfield south of I-94
19	NB I-275 north of I-94	3	4	4	4	2,563	2,567	2,567	2,565	0.47	0.47	0.47	0.47	19	NB I-275 north of I-94
19	SB I-275 north of I-94	5	8	7	7	2,518	2,516	2,516	2,518	0.46	0.46	0.46	0.46	19	SB I-275 north of I-94
20	NB I-275 south of King	4	4	4	4	2,031	2,031	2,031	2,032	0.39	0.39	0.39	0.39	20	NB I-275 south of King
20	SB I-275 south of King	4	4	4	4	1,910	1,910	1,910	1,911	0.37	0.37	0.37	0.37	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.

Figure D-6
Detroit River International Crossing Study
Volume-to-Capacity Ratios
2035 PM Peak Hour Travel
(Numbers and letters correspond with Table D-6)

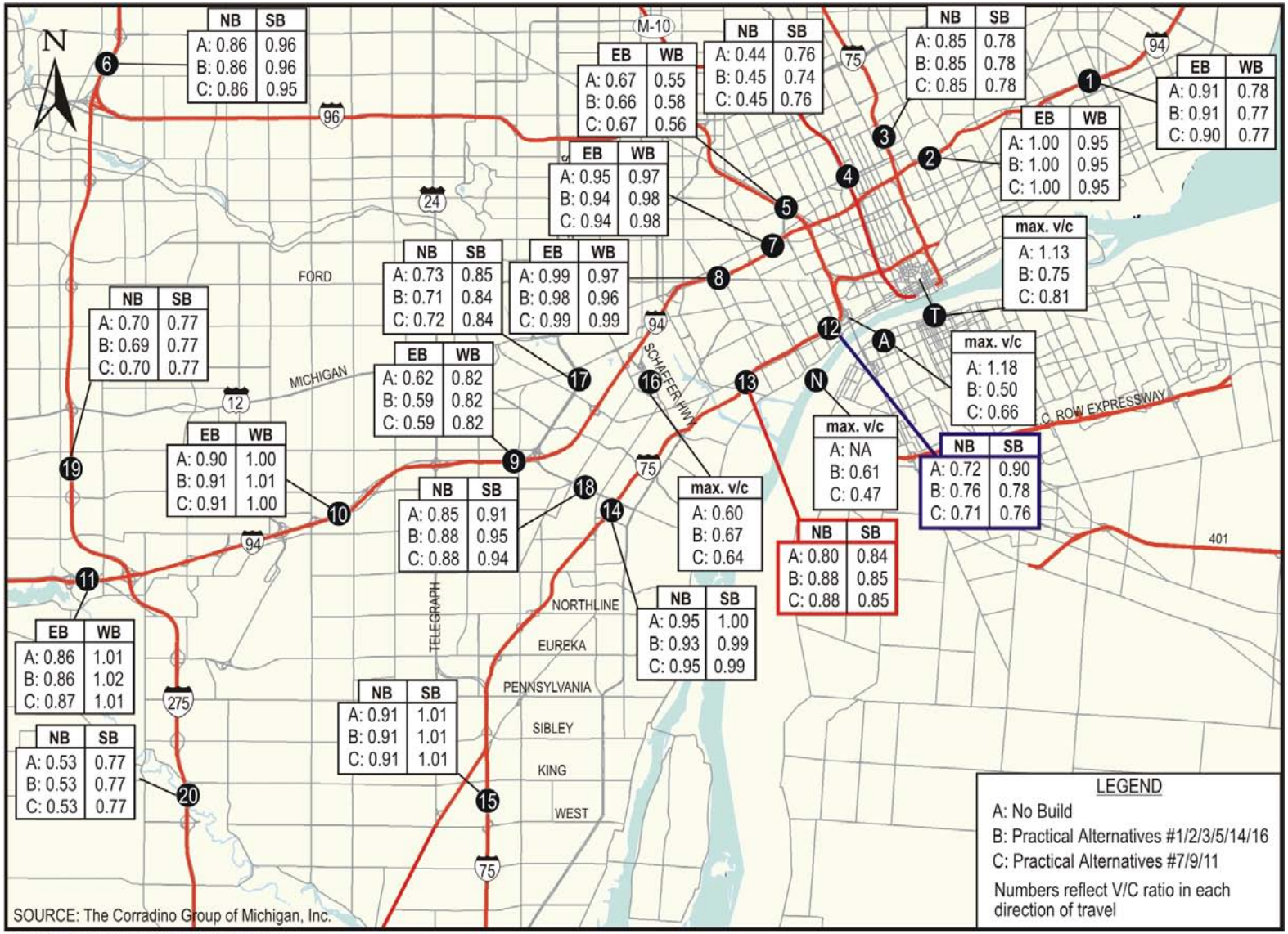


Table D-6
Detroit River International Crossing Study
2035 PM Peak Hour Volume-to-Capacity Ratio at Key Regional Links

		International Volume				Total Volume				Volume/Capacity Ratio					
		No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11	No Build	Alts #1/2/3/14/16	Alt #5	Alts #7/9/11		
T	Detroit-Windsor Tunnel	1,883	1,409	1,399	1,505	1,883	1,409	1,399	1,505	1.13	0.75	0.75	0.81	T	Detroit-Windsor Tunnel
A	Ambassador Bridge	3,671	1,875	1,803	2,278	3,671	1,875	1,803	2,278	1.18	0.50	0.47	0.66	A	Ambassador Bridge
A	Ramp: NB I-75 to AMB	1,084	366	338	379	1,084	366	338	379	0.56	0.15	0.14	0.17	A	Ramp: NB I-75 to AMB
A	Ramp: SB I-75/I-96 to AMB	1,529	935	899	1,206	1,529	935	899	1,206	0.69	0.40	0.37	0.55	A	Ramp: SB I-75/I-96 to AMB
A	Ramp: AMB to SB I-75	462	142	143	157	462	142	143	157	0.24	0.07	0.07	0.08	A	Ramp: AMB to SB I-75
A	Ramp: AMB to NB I-75/I-96 Cars	378	401	401	420	378	401	401	420	0.12	0.13	0.13	0.14	A	Ramp: AMB to NB I-75/I-96 Cars
A	Ramp: AMB to NB I-75/I-96 Trucks	216	29	20	116	216	29	20	116	0.34	0.05	0.03	0.18	A	Ramp: AMB to NB I-75/I-96 Trucks
N	New Crossing	n/a	2,497	2,582	1,970	n/a	2,497	2,582	1,970	n/a	0.59	0.61	0.47	N	New Crossing
N	Ramp: NB I-75 to NEW	n/a	956	948	892	n/a	956	948	892	n/a	1.16	1.20	1.13	N	Ramp: NB I-75 to NEW
N	Ramp: SB I-75 to NEW	n/a	933	1,023	613	n/a	933	1,023	613	n/a	0.74	0.87	0.46	N	Ramp: SB I-75 to NEW
N	Ramp: NEW to SB I-75	n/a	463	453	404	n/a	463	453	404	n/a	0.52	0.53	0.47	N	Ramp: NEW to SB I-75
N	Ramp: NEW to NB I-75	n/a	144	159	61	n/a	144	159	61	n/a	0.20	0.24	0.10	N	Ramp: NEW to NB I-75
1	EB I-94 east of Conner	256	207	205	212	4,839	4,899	4,898	4,885	0.91	0.91	0.90	0.90	1	EB I-94 east of Conner
1	WB I-94 east of Conner	385	365	366	369	4,127	4,100	4,102	4,114	0.78	0.77	0.77	0.77	1	WB I-94 east of Conner
2	EB I-94 east of I-75	242	208	203	205	7,193	7,235	7,236	7,240	1.00	1.00	1.00	1.00	2	EB I-94 east of I-75
2	WB I-94 east of I-75	448	425	427	430	6,821	6,824	6,825	6,819	0.95	0.95	0.95	0.95	2	WB I-94 east of I-75
3	NB I-75 north of I-94	219	216	215	215	6,261	6,235	6,241	6,251	0.85	0.85	0.85	0.85	3	NB I-75 north of I-94
3	SB I-75 north of I-94	714	701	695	700	5,638	5,624	5,626	5,627	0.78	0.78	0.78	0.78	3	SB I-75 north of I-94
4	NB M-10 north of I-94	84	86	85	86	3,301	3,327	3,330	3,332	0.44	0.45	0.45	0.45	4	NB M-10 north of I-94
4	SB M-10 north of I-94	371	308	290	369	4,139	4,054	4,043	4,143	0.76	0.74	0.74	0.76	4	SB M-10 north of I-94
5	EB I-96 west of I-94	287	270	271	293	4,916	4,863	4,895	4,899	0.67	0.66	0.66	0.67	5	EB I-96 west of I-94
5	WB I-96 west of I-94	718	782	819	751	3,796	3,965	4,022	3,902	0.55	0.56	0.58	0.56	5	WB I-96 west of I-94
6	WB I-96 west of I-275	10	10	10	9	6,604	6,629	6,624	6,602	0.86	0.86	0.86	0.86	6	WB I-96 west of I-275
6	EB I-96 west of I-275	12	13	14	16	7,005	7,053	7,046	6,999	0.96	0.96	0.96	0.95	6	EB I-96 west of I-275
7	EB I-94 west of I-96	145	57	61	54	5,122	5,178	5,199	5,157	0.95	0.94	0.94	0.94	7	EB I-94 west of I-96
7	WB I-94 west of I-96	34	28	38	29	5,347	5,379	5,347	5,363	0.97	0.98	0.98	0.98	7	WB I-94 west of I-96
8	EB I-94 west of Livernois	199	57	72	69	5,285	5,402	5,400	5,405	0.99	0.98	0.98	0.99	8	EB I-94 west of Livernois
8	WB I-94 west of Livernois	110	48	61	58	5,194	5,248	5,223	5,232	0.97	0.96	0.96	0.96	8	WB I-94 west of Livernois
9	EB I-94 west of Telegraph	261	167	165	194	3,226	3,183	3,201	3,189	0.62	0.58	0.59	0.59	9	EB I-94 west of Telegraph
9	WB I-94 west of Telegraph	183	225	224	198	5,876	5,894	5,888	5,893	0.82	0.82	0.82	0.82	9	WB I-94 west of Telegraph
10	EB I-94 east of Middlebelt	277	376	366	339	4,750	4,688	4,708	4,718	0.90	0.91	0.91	0.91	10	EB I-94 east of Middlebelt
10	WB I-94 east of Middlebelt	165	210	208	180	5,394	5,383	5,375	5,390	1.00	1.01	1.01	1.00	10	WB I-94 east of Middlebelt
11	EB I-94 west of I-275	226	322	313	286	4,754	4,691	4,710	4,746	0.86	0.86	0.86	0.87	11	EB I-94 west of I-275
11	WB I-94 west of I-275	131	175	173	146	5,797	5,779	5,783	5,795	1.01	1.01	1.02	1.01	11	WB I-94 west of I-275
12	NB I-75 south of Ambassador	1,158	600	579	551	5,772	5,245	5,129	5,201	0.90	0.78	0.76	0.76	12	NB I-75 south of Ambassador
12	SB I-75 south of Ambassador	582	964	1,043	707	4,875	5,239	5,133	4,941	0.72	0.76	0.75	0.71	12	SB I-75 south of Ambassador
13	NB I-75 south of Springwells	930	1,314	1,315	1,277	5,075	5,393	5,374	5,436	0.80	0.88	0.88	0.88	13	NB I-75 south of Springwells
13	SB I-75 south of Springwells	579	716	700	673	5,777	5,700	5,714	5,763	0.84	0.85	0.85	0.85	13	SB I-75 south of Springwells
14	NB I-75 south of Southfield	669	678	679	678	4,554	4,459	4,452	4,559	0.95	0.93	0.93	0.95	14	NB I-75 south of Southfield
14	SB I-75 south of Southfield	411	414	404	414	5,151	5,045	5,067	5,088	1.00	0.99	0.99	0.99	14	SB I-75 south of Southfield
15	NB I-75 south of King	581	590	591	589	4,603	4,601	4,605	4,603	0.91	0.91	0.91	0.91	15	NB I-75 south of King
15	SB I-75 south of King	369	371	372	371	5,443	5,444	5,438	5,437	1.01	1.01	1.01	1.01	15	SB I-75 south of King
16	Scheafer east of I-75	0	1	11	0	1,497	1,589	1,623	1,556	0.60	0.65	0.67	0.64	16	Scheafer east of I-75
17	NB Southfield north of I-94	1	2	1	1	4,015	3,920	3,926	3,964	0.73	0.71	0.71	0.72	17	NB Southfield north of I-94
17	SB Southfield north of I-94	0	0	0	0	4,691	4,643	4,651	4,667	0.85	0.84	0.84	0.84	17	SB Southfield north of I-94
18	NB Southfield south of I-94	35	131	128	96	2,966	2,940	2,962	2,986	0.85	0.88	0.88	0.88	18	NB Southfield south of I-94
18	SB Southfield south of I-94	84	274	267	213	3,134	3,040	3,045	3,093	0.91	0.95	0.95	0.94	18	SB Southfield south of I-94
19	NB I-275 north of I-94	3	3	3	3	4,047	4,001	3,995	4,045	0.70	0.69	0.69	0.70	19	NB I-275 north of I-94
19	SB I-275 north of I-94	12	14	14	14	4,453	4,446	4,444	4,453	0.77	0.77	0.77	0.77	19	SB I-275 north of I-94
20	NB I-275 south of King	10	10	10	10	2,876	2,886	2,885	2,872	0.53	0.53	0.53	0.53	20	NB I-275 south of King
20	SB I-275 south of King	3	3	3	3	4,235	4,255	4,253	4,230	0.77	0.77	0.77	0.77	20	SB I-275 south of King

Source: The Corradino Group of Michigan, Inc.