Induced Demand Analysis Technical Report

The Detroit River International Crossing Study

MDOT
Michigan Department of Transportation

January 2008

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SUMMARY

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

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

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

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

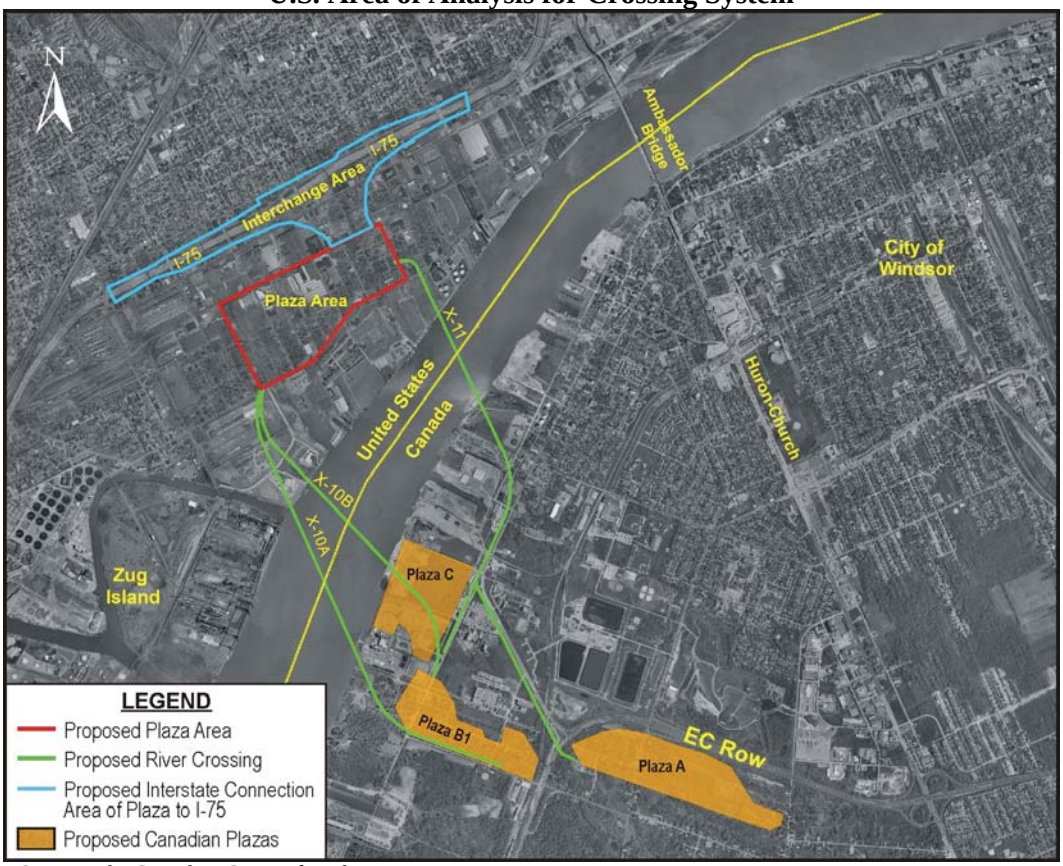
- Support the mobility needs of national and civil defense to protect the homeland.

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

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

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

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



Source: The Corradino Group of Michigan, Inc.

Purpose of the Report

The purpose of this report is to describe how the population and employment growth forecasts in the region could be affected by a new bridge connecting Detroit to Windsor. Prior to 1995, this

interrelationship between transportation facilities and socio-economic/land use forecasts was not typically integrated into the transportation planning process. A single set of socio-economic/land use forecasts was generated, regardless of the proposed transportation facilities. This was, in part, due to a concern that growth projections would be unduly used to justify major new projects. Advances in the state of the profession and Federal Court decisions influenced recognition in environmental impact analyses of the interrelation between transportation facilities and socio-economic/land use forecasts. The binational scope of the DRIC implies that this project has an effect on socio-economics that extends beyond the region.

Overview of the Methodology

The important interrelationships between transportation systems and urban development are incorporated in plans developed by the Southeast Michigan Council of Governments (SEMCOG), the Metropolitan Planning Organization for the region. Typically, those patterns of development reflect that, in selecting a location for an activity (e.g. industrial plant, office building, residence), a decision-maker considers, among other items, the accessibility of potential sites to concentrations of markets, suppliers, labor force, jobs, housing, schools, recreation, etc. It also is understood that improving access of developable/redevelopable land increases its potential to attract development that may have otherwise occurred elsewhere.

The SEMCOG 2030 Regional Development Forecast for Southeast Michigan, and its 2030 Regional Transportation Plan, form the basis of this work. These forecasts do not assume the construction of a new crossing. The DRIC consulting team extrapolated these forecasts to 2035 to be consistent with the horizon year of all other forecasts, then determined the impact of building a new river crossing.

The DRIC consultant secured existing and forecast data for the following areas outside the SEMCOG region:

- State of Michigan and its counties outside SEMCOG
- United States of America
- 48 individual U.S. States and several state sub-divisions
- Canada
- Province of Ontario and its counties, including Essex County (where Windsor is located)

Forecast data for states and counties in the U.S. were purchased from Woods & Poole Economics (W&P). The W&P forecasts were published in 2006 using a 2004/2005 base. The forecasts were made in annual increments through 2030. The DRIC consultant extrapolated these forecasts to 2035 on the basis of the 2025-through-2030 trends.

Canadian forecast data were available by province, and Ontario data were available by census division (i.e., county).

The DRIC consultant assembled the forecast data for the U.S. and Canadian area into Traffic Analysis Zones (TAZs). Travel times for the Build and the No-Build Alternatives for all DRIC TAZs (which cover all the U.S. and Canada) are available from the DRIC Travel Demand Model. Accessibility indices were developed from the travel time data. Based on changes in accessibility, shifts in population and employment were derived.

Population Shifts

Table S-1 shows the 2005 base year, the 2035 baseline population forecasts and the population impacts of a new border crossing on the U.S. side of the border. These data are presented for the City of Detroit, the rest of Wayne County, for all other SEMCOG counties, and the SEMCOG region as a whole.

Table S-1
Detroit River International Crossing Study
Impact of DRIC on Redistribution
of 2005-2035 Population Forecasts

	2005 Base Year Population	2035 Baseline Population Forecast	2005 - 2035 Population Change	Net Population Impact of New Border Crossing
U.S. Sub-Areas				
City of Detroit	928,587	853,004	-75,583	244
Balance of Wayne Co.	1,118,830	1,140,842	22,012	1,584
Livingston County	178,422	301,799	123,377	0
Macomb County	810,096	960,283	150,187	196
Monroe County	157,241	204,130	46,889	786
Oakland County	1,225,470	1,385,106	159,636	1,638
St. Clair County	170,702	211,976	41,274	9
Washtenaw County	349,459	469,640	120,181	106
Wayne County	2,047,417	1,993,846	-53,571	1,828
SEMCOG Region	4,938,807	5,526,780	587,973	4,563

Source: The al Chalabi Group

A new border crossing is forecast to cause population shifts resulting in a net increase of 4,600 people in the SEMCOG region, all coming from outside Michigan, because of changes in accessibility only. The net impact would be a change of less than a one percent in the distribution of the region's growth because of constructing a new border crossing.

Employment Shifts

The methodology for determining the impact of changes in accessibility indices on employment distribution is the same as that used for residential redistribution. Table S-2 presents the accessibility-induced employment impact of the border crossing expressed as the net employment change. Concentrations of net positive changes are located along I-275 and I-75 in Wayne County. This route is a major part of an Interstate Highway System "auto alley" that serves the North American auto industry from Canada, through the U.S. to its southern states like Kentucky, Tennessee and Georgia.

Changes in accessibility with the proposed new border crossing will shift about 1,800 jobs to Wayne County from outside the region. Shifts in employment would result in the SEMCOG region gaining 3,350 jobs; all from outside Michigan. Most of them would be to Wayne County, as noted above. Overall, this shift represents less than one percent of all the forecast employment growth from 2005 to 2035 in the region.

Table S-2
Detroit River International Crossing Study
Impact of DRIC on Redistribution
of 2005-2035 Employment Forecasts

County	2005 Base Year Employment	2035 Baseline Employment Forecast	2005 - 2035 Baseline Employment Change	Net Employment Impact of New Border Crossing
City of Detroit	330,282	305,203	-25,079	106
Balance of Wayne Co.	660,699	744,134	83,435	1,726
Livingston County	70,537	111,116	40,579	0
Macomb County	393,675	447,577	53,902	132
Monroe County	57,903	80,234	22,331	364
Oakland County	955,886	1,144,257	188,371	886
St. Clair County	66,995	85,504	18,509	60
Washtenaw County	244,185	302,707	58,522	78
Wayne County	990,981	1,049,337	58,356	1,832
SEMCOG Region	2,780,162	3,220,732	440,570	3,352

Source: The al Chalabi Group

Recent Changes in SEMCOG Forecasts

On March 29, 2007, SEMCOG released a study entitled, "A Region in Turbulence and Transition: The Economic and Demographic Outlook for Southeast Michigan Through 2035." The forecasts of growth are significantly lower than the previous SEMCOG forecasts (released in 2001) reported on later in this report. The new 2035 SEMCOG forecasts have not been disaggregated into Traffic Analysis Zones so detailed modeling with SEMCOG-produced data is not possible at this time. Nonetheless, a sensitivity test was conducted to judge the impact of these revised projections on the traffic forecasts of the DRIC crossing.

The results of the analysis indicate that international trips decrease slightly, but not significantly (Table S-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 652 truck trips could be affected by the downward revision of the trip tables. But, the reduction is just 51 truck trips (2,161 – 2,110 on Table S-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 in car trips in the 2035 peak hours on all crossings of the border in the SEMCOG region. Further, while reductions in domestic travel due to SEMCOG's revised forecasts demonstrate a small effect on international traffic, that effect does not materially change the overall border crossing assignment pattern between the previous SEMCOG forecast of demographics and the most recent projections.

Table S-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 S-4 demonstrates the latter point. It presents a comparison of crossing volumes using the original and revised trip tables. The network used for the comparison is connected to the X-10 crossing.

Table S-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.

Findings

The changes in accessibility in the SEMCOG region are limited because only one new/improved link – another border crossing – is introduced into the extensive roadway network. Nonetheless, the area along I-75, south of the proposed border crossing, in Wayne County is forecast to be the largest beneficiary.

Again, it is noted that this work only addresses shifts in growth already forecast, not net new growth. That issue was examined early in the DRIC Feasibility Study and led to the conclusion that without additional border crossing capacity, Michigan would lose, in the 30 years ending 2035, about 25,000 jobs and Ontario would lose approximately 16,500 jobs without an improvement in crossing capacity. For this crossing corridor, about two-thirds of the traffic is auto-industry-related. These job losses are not reflected in the original SEMCOG projections upon which the DRIC basic modeling was based.

In light of all of this, it is important to note the U.S. demand in 2035 for new automotive vehicles is forecast at 26 million,[1] a 53 percent increase from the 17 million current annual U.S. consumption of autos/trucks. A sketch planning analysis that is the basis of this forecast is included in Appendix A. This growth is similar to that which occurred over the last 20 years, when 15 new (not replacement) auto plants were built in the U.S., eight of which were built in "northern" locations (e.g., Ohio, Indiana, and Ontario, Canada). The implication is another dozen or more auto manufacturing plants will be built in the U.S. in the next 20 to 30 years to meet this increased demand. Michigan/Ontario will be in a position to gain 25,000 to 35,000 new jobs.

One final note is that in reaction to the continuing economic downturn in Michigan, SEMCOG reduced in March 2007 its 2001 growth forecasts. A sensitivity test of travel using those data indicates a very small reduction in international truck trips, and between one and seven percent drop in international car trips in 2035 peak hours on all crossings of the border in the SEMCOG region. These changes result in virtually no change in forecasts on the proposed DRIC crossing.

[1]Center for Automotive Research, *Economic Contribution of the Automotive Industry to the U.S. Economy: An Update* and *The Contribution of the International Auto Sector to the U.S. Economy: An Update*, 2003.

1. INTRODUCTION

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

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

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

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

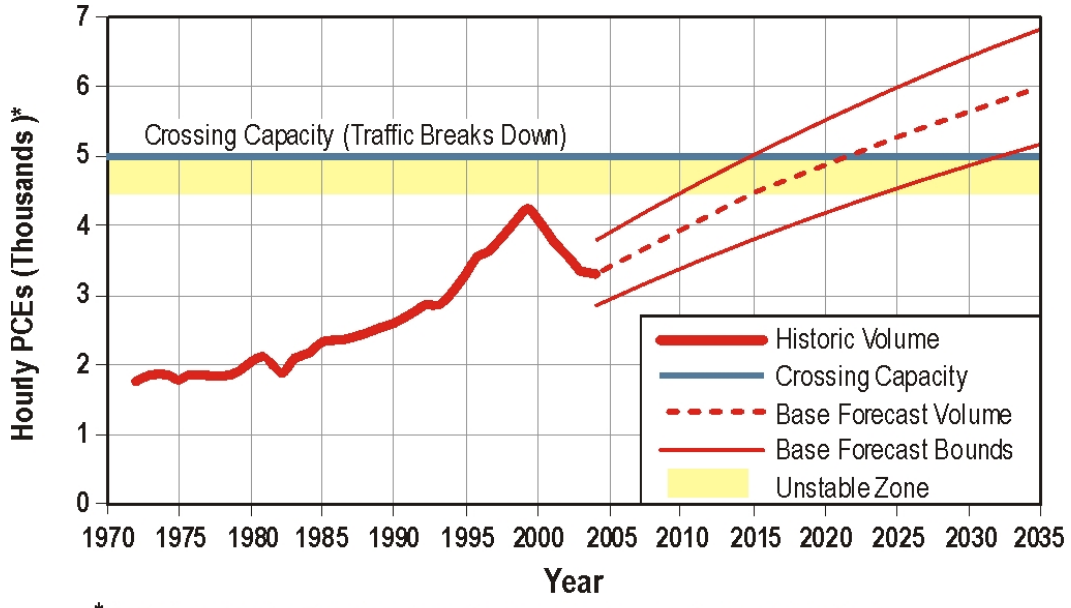
- Support the mobility needs of national and civil defense to protect the homeland.

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

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

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

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



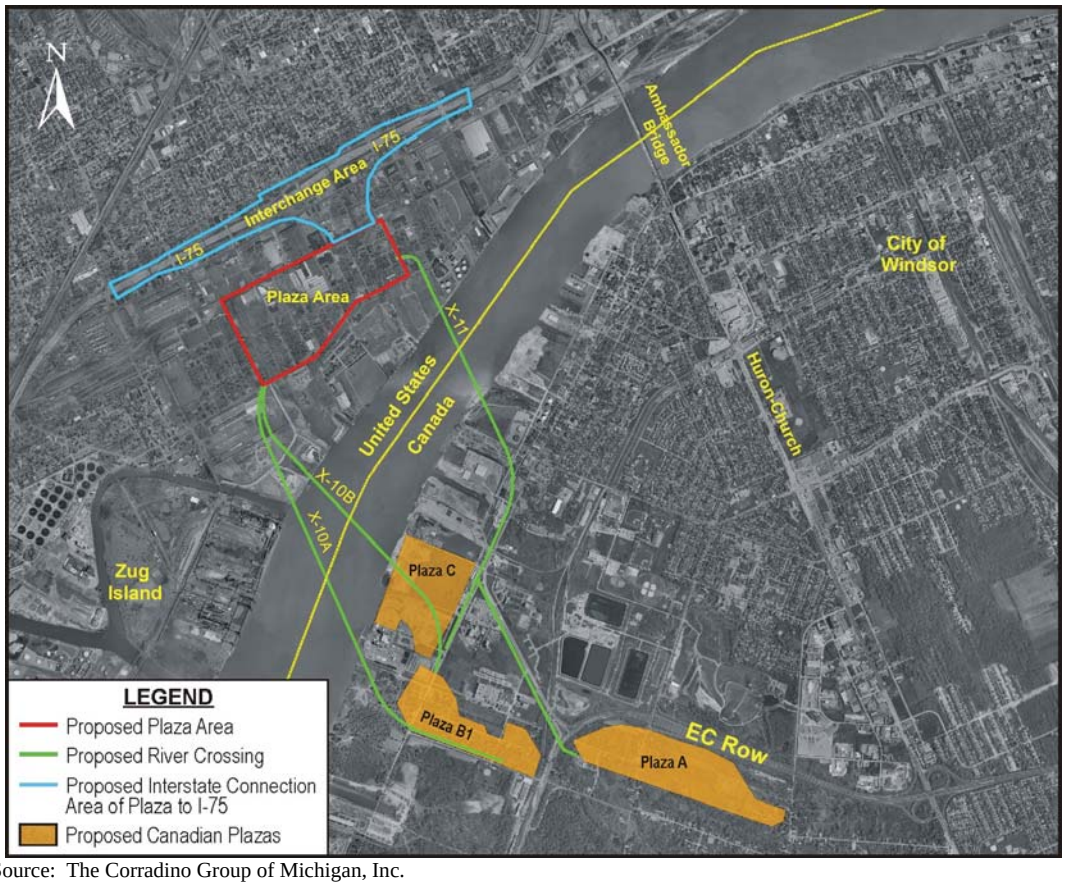
* PCE = Passenger Car Equivalents (i.e. trucks are converted to an equivalent number of cars)
Source: IBI Group
Preliminary - for Discussion Purposes Only

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

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

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

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



Source: The Corradino Group of Michigan, Inc.

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

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

Source: The Corradino Group of Michigan, Inc.

1.1 Purpose of the Report

The purpose of this report is to describe how the population and employment growth forecasts in the region could be affected by a new bridge connecting Detroit to Windsor. Prior to 1995, this interrelationship between transportation facilities and socio-economic/land use forecasts was not typically integrated into the transportation planning process. A single set of socio-economic/land use forecasts was generated, regardless of the proposed transportation facilities. This was, in part, due to a concern that growth projections would be unduly used to justify major new projects. Advances in the state of the profession and Federal Court decisions influenced recognition in environmental impact analyses of the interrelation between transportation facilities and socio-economic/land use forecasts. The binational scope of the DRIC implies that this project has an effect on socio-economics that extends beyond the region.

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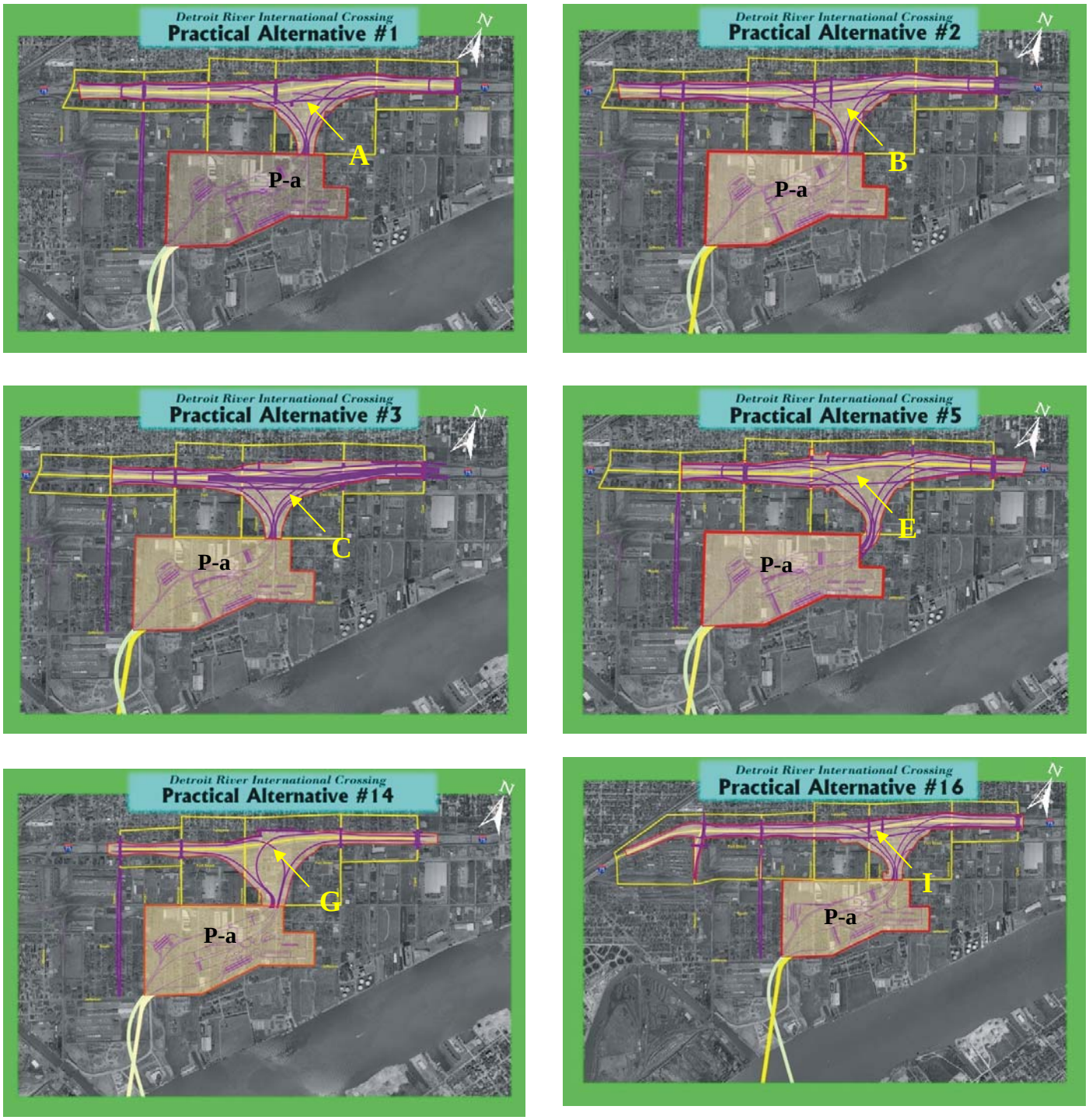
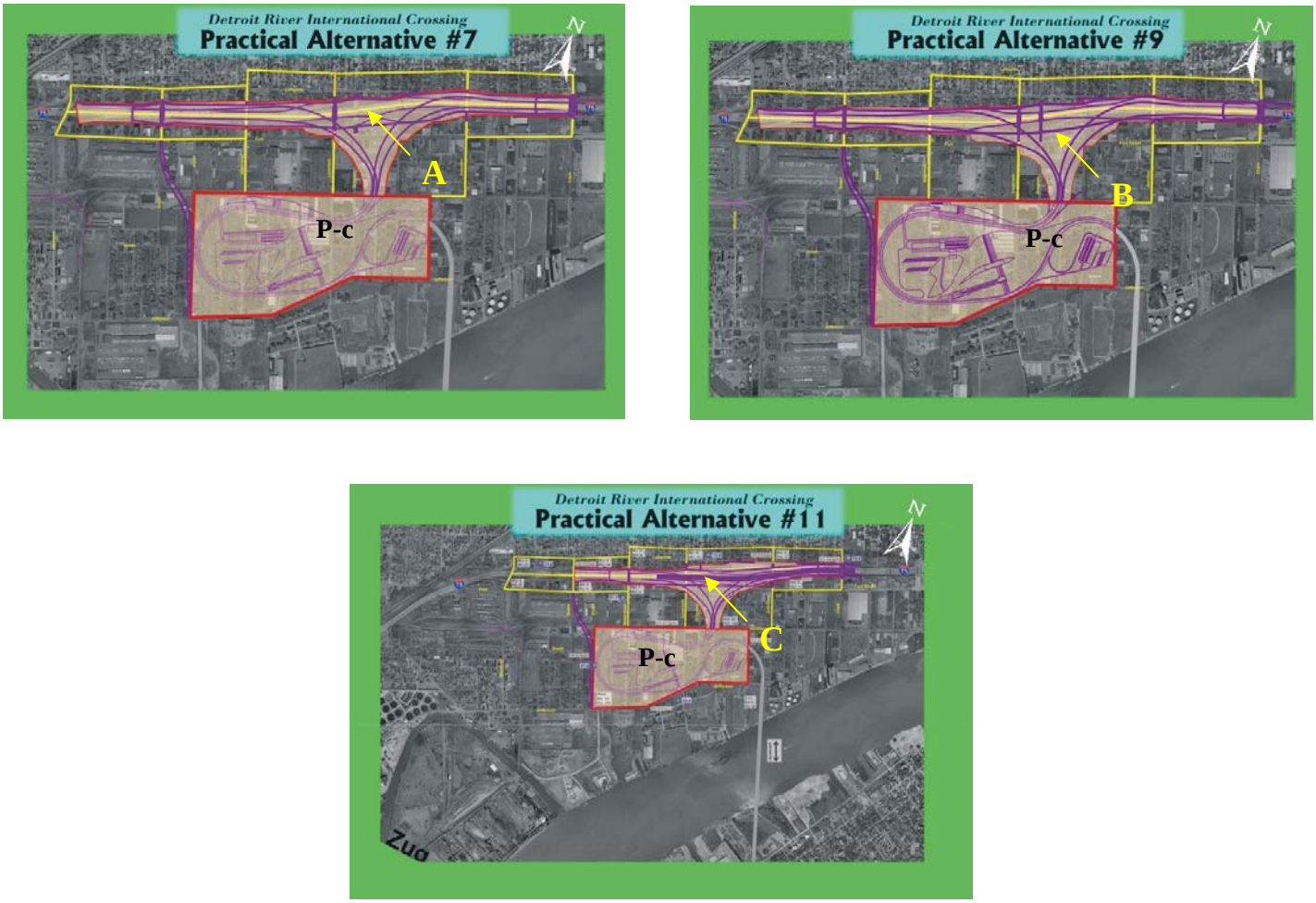
Figure 1-4
Detroit River International Crossing Study
Schematic Representation
of
X-10 Crossing Alternatives #1 through #3, #5, #14 and #16



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



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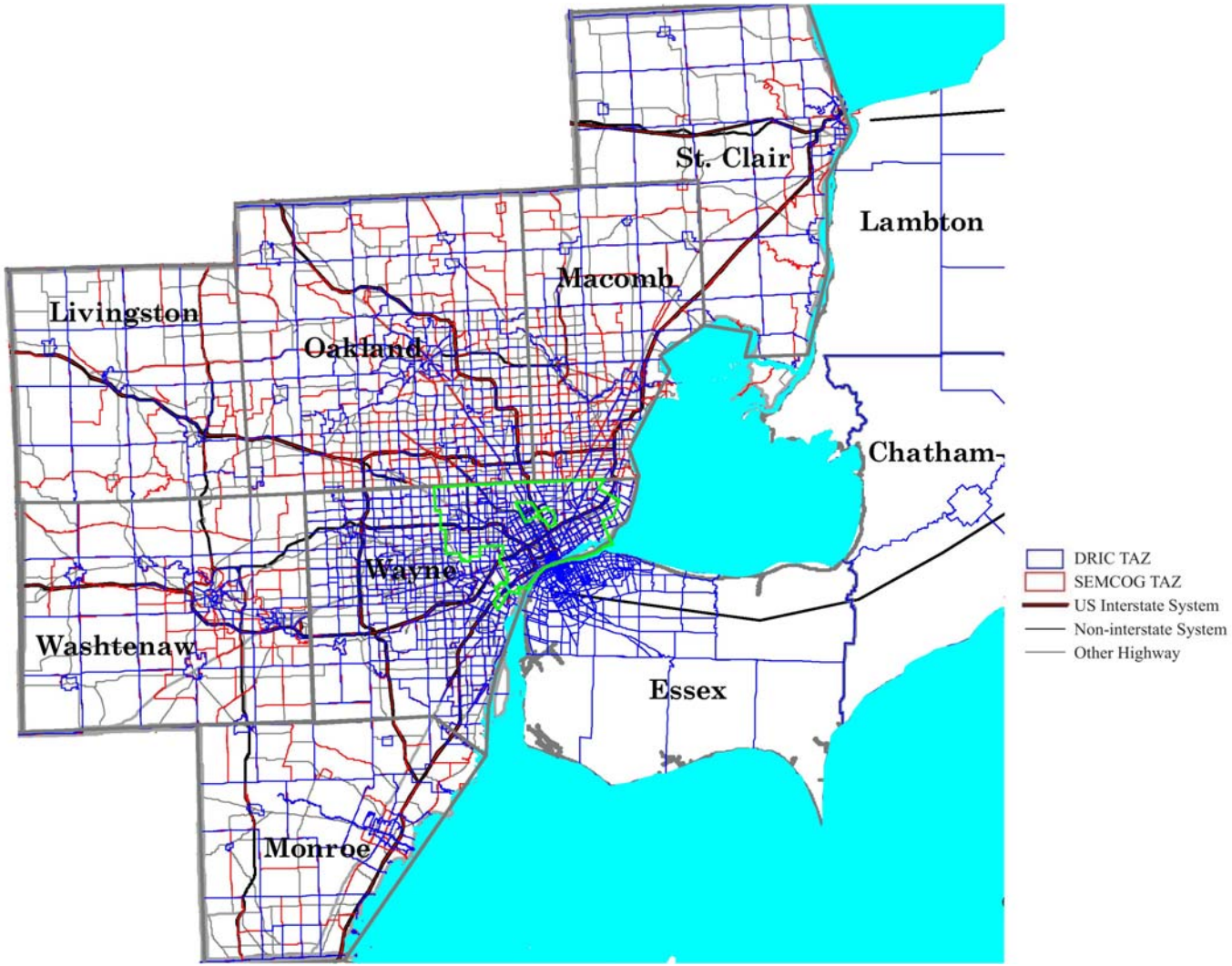
Canadian forecast data were available by province, and Ontario data were available by census division (i.e., county).

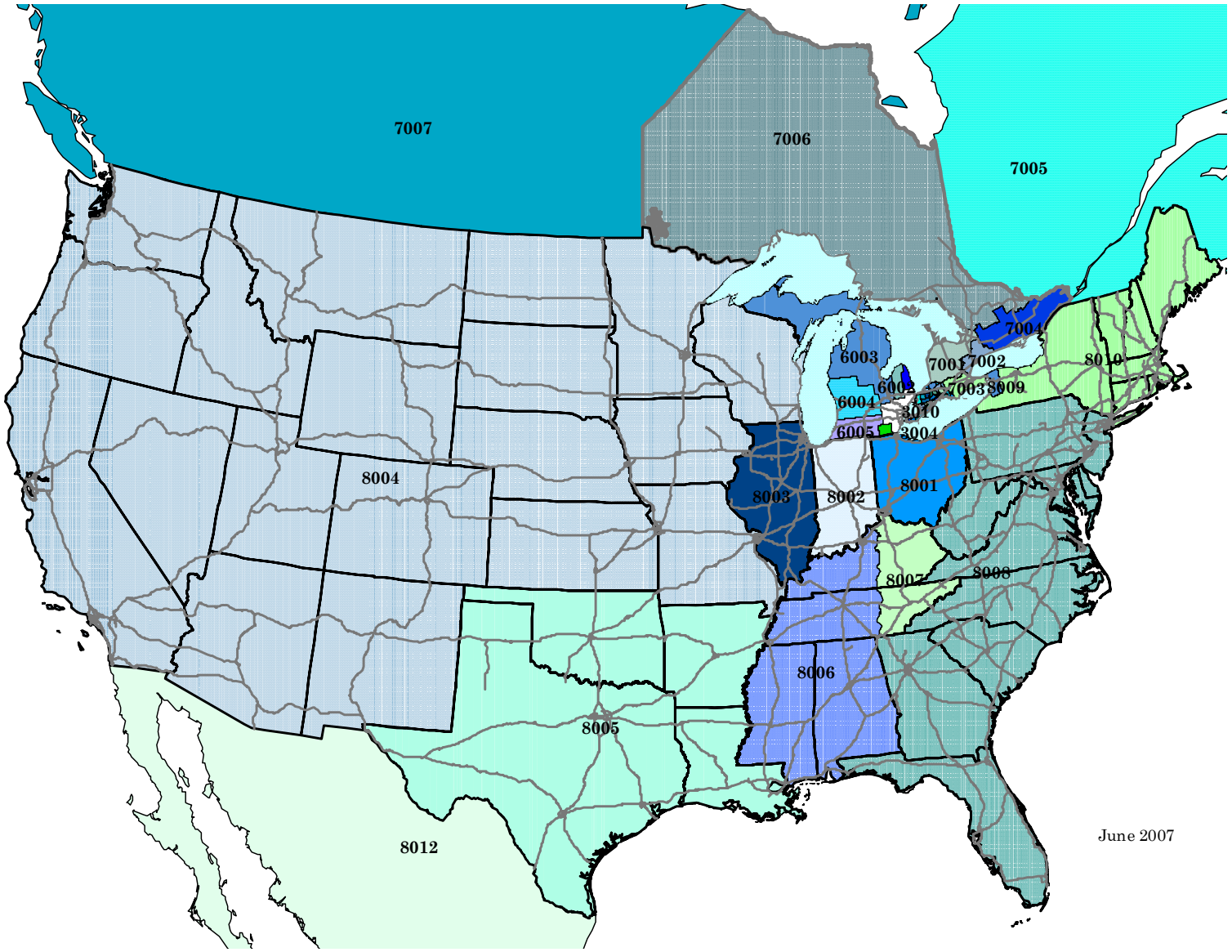
The DRIC consultant assembled the forecast data for the U.S. and Canadian area into Traffic Analysis Zones (TAZs) (Figures 1-6 and 1-7). Travel times for the Build and the No-Build Alternatives for all DRIC TAZs (which cover all the U.S. and Canada) are available from the DRIC Travel Demand Model. Accessibility indices were developed from the travel time data. Based on changes in accessibility, shifts in population and employment were derived. That methodology is described in Section 3 of this report.

Figure 1-6
Detroit River International Crossing Study
SEMCOG Region – SEMCOG TAZs Aggregated into DRIC TAZs



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 1-7
Detroit River International Crossing Study
TAZs External to SEMCOG Region[a]



[a] Colors and numbers depict the Traffic Analysis Zones outside the SEMCOG region as coded in the model travel demand model.
Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

2. DEMOGRAPHIC FORECASTS

2.1 The SEMCOG Forecasts

SEMCOG's rates of growth in both population and employment have been approximately half that of the United States during the period 1970 to 2000. Over the next 30-35 years, SEMCOG forecasts continued slow growth. The pattern of population change is generally one of growth outside Detroit and its mature suburbs. The City of Detroit's historic high rates of population and household loss are expected to moderate (Table 2-1). The first two columns of Table 2-1 show actual population for 1990 and 2000. The third column shows estimated population for 2005 by SEMCOG. The next three columns present the SEMCOG forecasts for 2015, 2025 and 2030 as available to the consultant when the analysis for this report was conducted. The last column shows the 2035 forecast as extrapolated by the DRIC consultant from the trends derived from the 2005-2030 SEMCOG forecasts.

Table 2-2 presents the employment trends and forecasts for the SEMCOG counties and the City of Detroit. The 2035 DRIC consultant extrapolations to 2035 reflect information derived from the W&P forecasts.

On March 29, 2007, SEMCOG released a new study entitled, "A Region in Turbulence and Transition: The Economic and Demographic Outlook for Southeast Michigan Through 2035." The new forecasts are significantly lower than the previous SEMCOG forecasts reported in Tables 2-1 and 2-2. The new 2035 SEMCOG forecasts have not been disaggregated into Traffic Analysis Zones. Nonetheless, the DRIC consultant has applied sensitivity tests to judge the impacts of these revised projections on the shifts in population and employment growth discussed in the next sections of this report. This sensitivity testing is reported later in this document.

2.2 Forecast Assumptions for the Canadian TAZs

The induced demand analysis examines the shifts in growth associated with building a new river crossing between Detroit and Windsor. The proposed crossing would link two metropolitan areas, one on each side of the border. In similar bridge studies, albeit with both ends of the improvement in the U.S., the build scenario resulted in shifts of activities from some parts of the region to others. Similar shifts may occur in the case of DRIC. Accordingly, it was decided to simulate the accessibility impacts of a new crossing on both metro areas through the application of a single model. Because it is not the purview of the consultant team on either side of the border to develop data for its counterpart, shifts in population and employment in Canada are not portrayed in this document.

Table 2-1
Detroit River International Crossing Study
Population Trends and Forecasts - SEMCOG Region

Area	Census Data and Census Estimates			SEMCOG Forecasts			ACG Extrapolation
	1990	2000	2005	2015	2025	2030	2035
Livingston County	115,645	156,951	181,404	216,808	260,026	282,557	301,799
Macomb County	717,400	788,149	828,950	858,335	907,554	930,420	960,283
Monroe County	133,600	145,959	153,772	176,449	190,716	195,397	204,130
Oakland County	1,083,592	1,194,157	1,213,669	1,281,557	1,318,551	1,333,497	1,385,106
St. Clair County	145,607	164,235	171,079	184,427	197,433	203,255	211,976
Washtenaw County	282,934	322,897	342,124	391,894	430,122	448,047	469,640
Wayne County	2,111,687	2,061,163	1,990,932	2,024,274	2,009,924	2,013,975	1,993,846
SEMCOG Region	**4,590,465**	**4,833,511**	**4,881,930**	**5,133,744**	**5,314,326**	**5,407,148**	**5,526,780**

Source: U.S. Census, Southeast Michigan Council of Governments and al Chalabi Group

Table 2-2
Detroit River International Crossing Study
Employment Forecasts - SEMCOG Region

	Estimate	SEMCOG Forecasts			ACG Extrapolation
Area	**2000**	**2005**	**2025**	**2030**	**2035**
Livingston County	59,159	70,537	97,652	103,869	111,116
Macomb County	381,341	393,675	426,969	432,546	447,577
Monroe County	52,761	56,867	72,243	75,819	80,234
Oakland County	910,002	954,609	1,073,463	1,086,843	1,144,257
St. Clair County	64,516	66,295	78,649	81,278	85,504
Washtenaw County	232,145	244,185	284,404	289,936	302,707
Wayne County	970,057	990,981	1,029,164	1,035,410	1,049,337
SEMCOG Region	**2,669,981**	**2,777,149**	**3,062,544**	**3,105,701**	**3,220,732**

Source: SEMCOG Web Site, "Regional Development Forecasts," downloaded May 24, 2007 and al Chalabi Group

The decision to apply a single induced demand model to both sides of the Detroit River required obtaining socio-economic data and forecasts for the Canadian side in a format and detail equivalent to that available for the SEMCOG region. Unfortunately, no such dataset was available at the time of the decision to proceed with a single induced demand model. Accordingly, the DRIC consultant generated base year 2005 and 2035 socio-economic forecasts first, by Ontario counties and, second, by DRIC TAZs for the Canadian portion of the study area.

Population and occupied dwelling units (households) for 1996 and 2001 were obtained from Statistics Canada, by dissemination area (equivalent to U.S. Census block group), for Essex and surrounding counties. In addition, 2005 population and employment, by dissemination area, were obtained from MapInfo Canada, through the PCensus Database. From these sources, 2005 base year data were generated by TAZ. Within the City of Windsor, there were several TAZs that were smaller than the dissemination areas; for those TAZs, the data were subdivided in proportion to those areas' geographic size.

Population and employment forecasts, by five-year increments, by county for the Province of Ontario outside Essex County, were acquired from the Center for Spatial Economics, Toronto. The methodology used for generating these forecasts is compatible with that used by W&P for the forecasts by U.S. county. It is noteworthy that the population component of these forecasts was not significantly different from those generated by the Ministry of Finance, Province of Ontario, and published in its report, "Ontario Population Projections Update 2005-2031, Ontario and its 49 Census Divisions, Based on the 2001 Census," April 2006. However, it was important to use compatible sets of population and employment forecasts such as that developed by the Center for Spatial Economics. The Ontario County forecasts were allocated to TAZs on the basis of the 1996-2005 trends, taking into consideration land availability for development and published local plans, where available. The result was a Canadian TAZ set that was similar to the set used on the U.S. side of the study area.

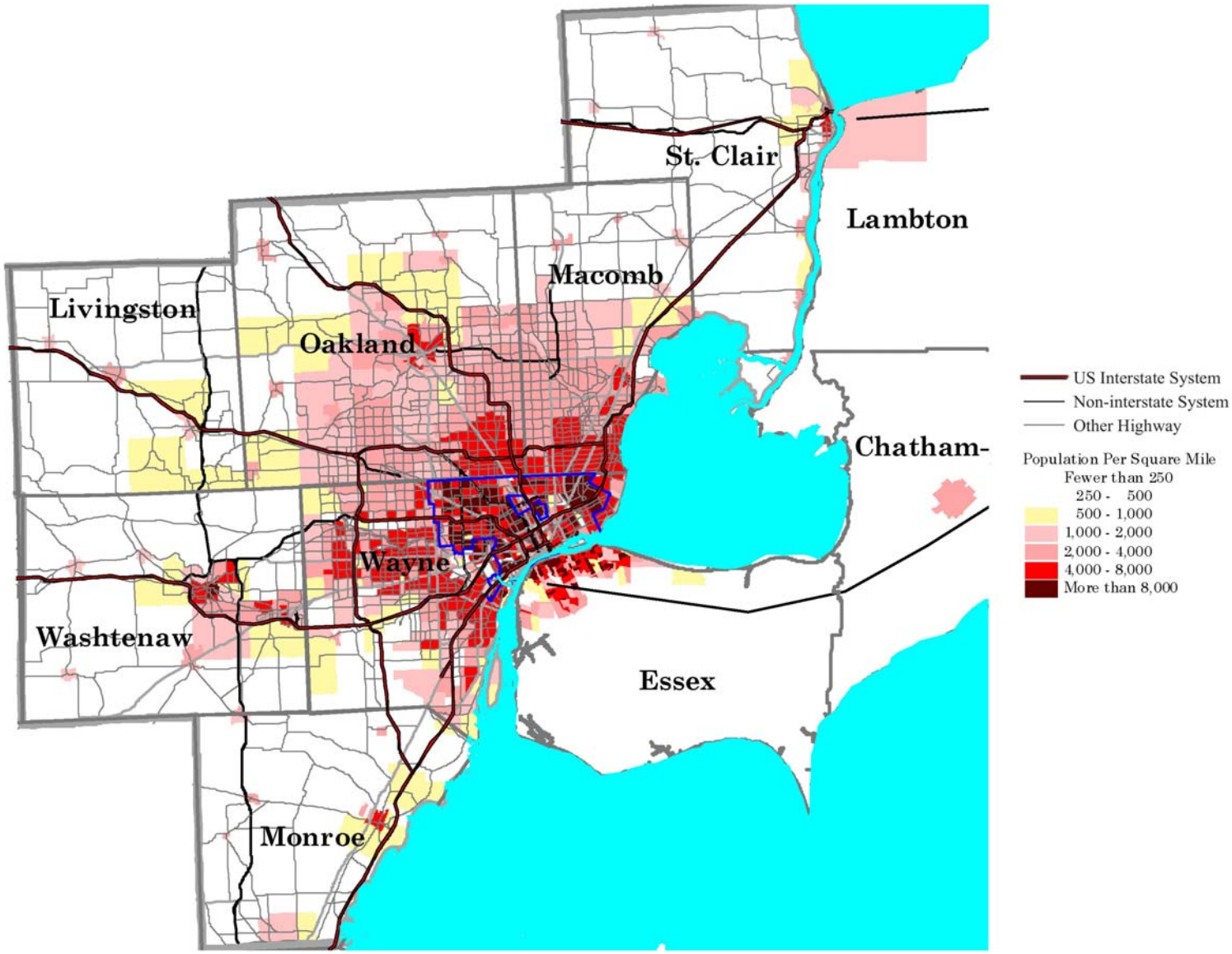
2.3 Socio-Economic Forecasts by DRIC Transportation Analysis Zones

The following set of three figures provides a view of the anticipated population changes implied in the baseline forecast. Figure 2-1 shows that 2005 population concentrations radiate from the regional core, the City of Detroit. Figure 2-2 shows that the current centers of high population concentration are the ones that are forecast to lose population. Some of this loss is due to continued reduction in household size. However, there are large areas, especially within the City of Detroit, where population losses will be due to relocations to other areas or an absolute reduction due to the birth/death cycle. There are pockets within these concentrations which are forecast to increase in population. In some of these areas, development/redevelopment is already underway and is expected to continue and expand. Figure 2-3[2] displays that the highest rates of population growth are occurring in the outer rings of the SEMCOG region and beyond. However, some of the TAZs with a high percentage growth have a small population base; thus, it is important to view all these graphics together.

Figures 2-4, 2-5 and 2-6[2] present the 2005 employment per square mile in the SEMCOG region. They illustrate that employment is less concentrated than population in the regional core in 2005 than elsewhere in the region. There are high concentrations of employment in Southeast Oakland, South Macomb, and Western Wayne Counties, as well as in Ann Arbor, Dearborn and Pontiac. The forecasted 2005-2035 changes would cause further outward dispersion of employment. Specifically, within the SEMCOG region, almost all the 2005-2035 employment growth is forecast to occur outside the I-696/I-275 ring (Figure 2-5). The area within this ring is forecast to grow by only 11,000 net new jobs. The percentage growth in employment between 2005 and 2035 shows the greatest growth in the outermost ring (Figure 2-6) (i.e., the tier of townships along the SEMCOG border), which is forecast to grow by more than 84,000 jobs, or approximately 19 percent of the total net employment growth forecast for the region.

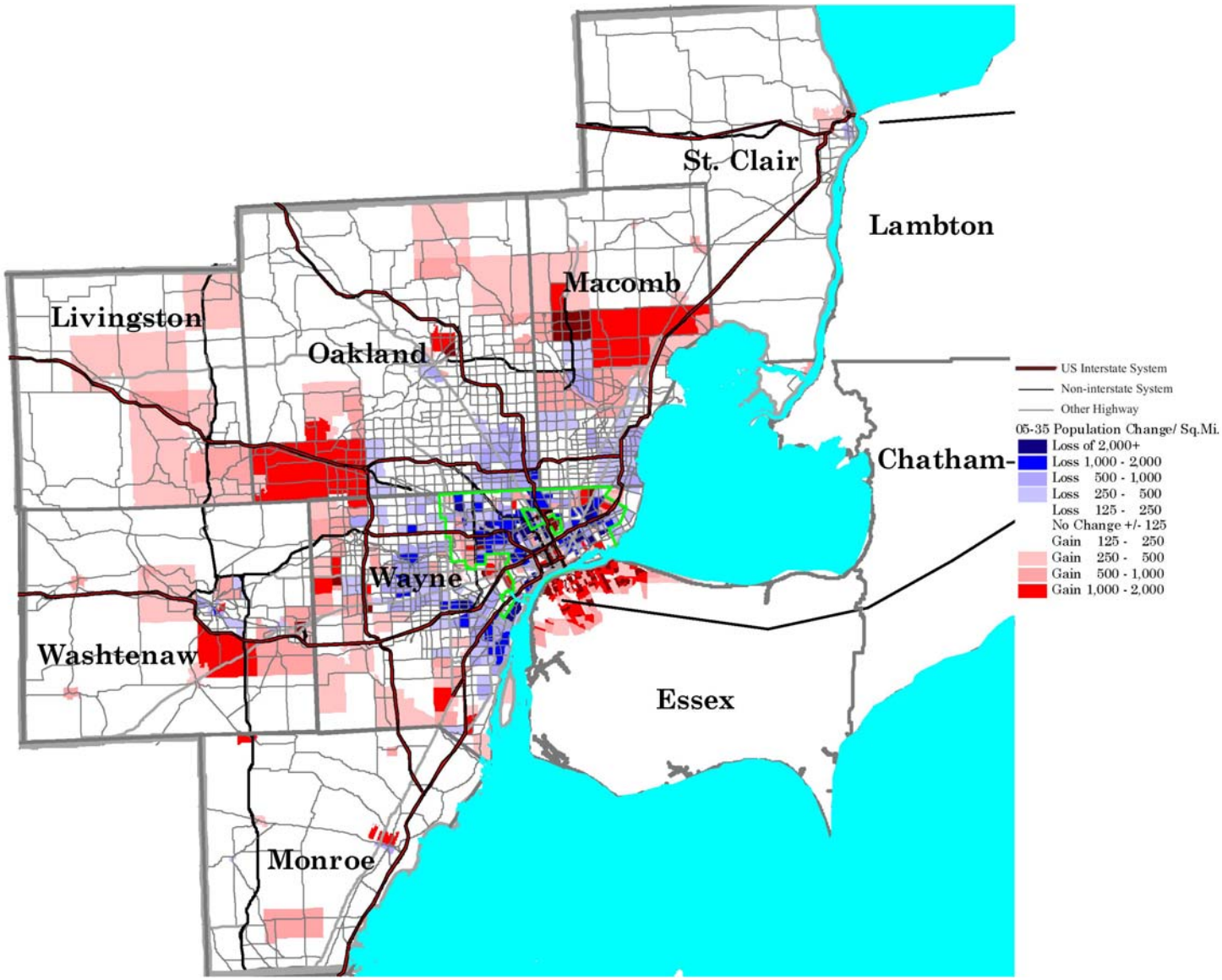
[2] It is noted the Canadian change depicted in Figures 2-3 and 2-6 is the result of applying the population or employment change per square mile for all TAZs covered by County Census Subdivisions.

Figure 2-1
Detroit River International Crossing Study
2005 Population per Square Mile



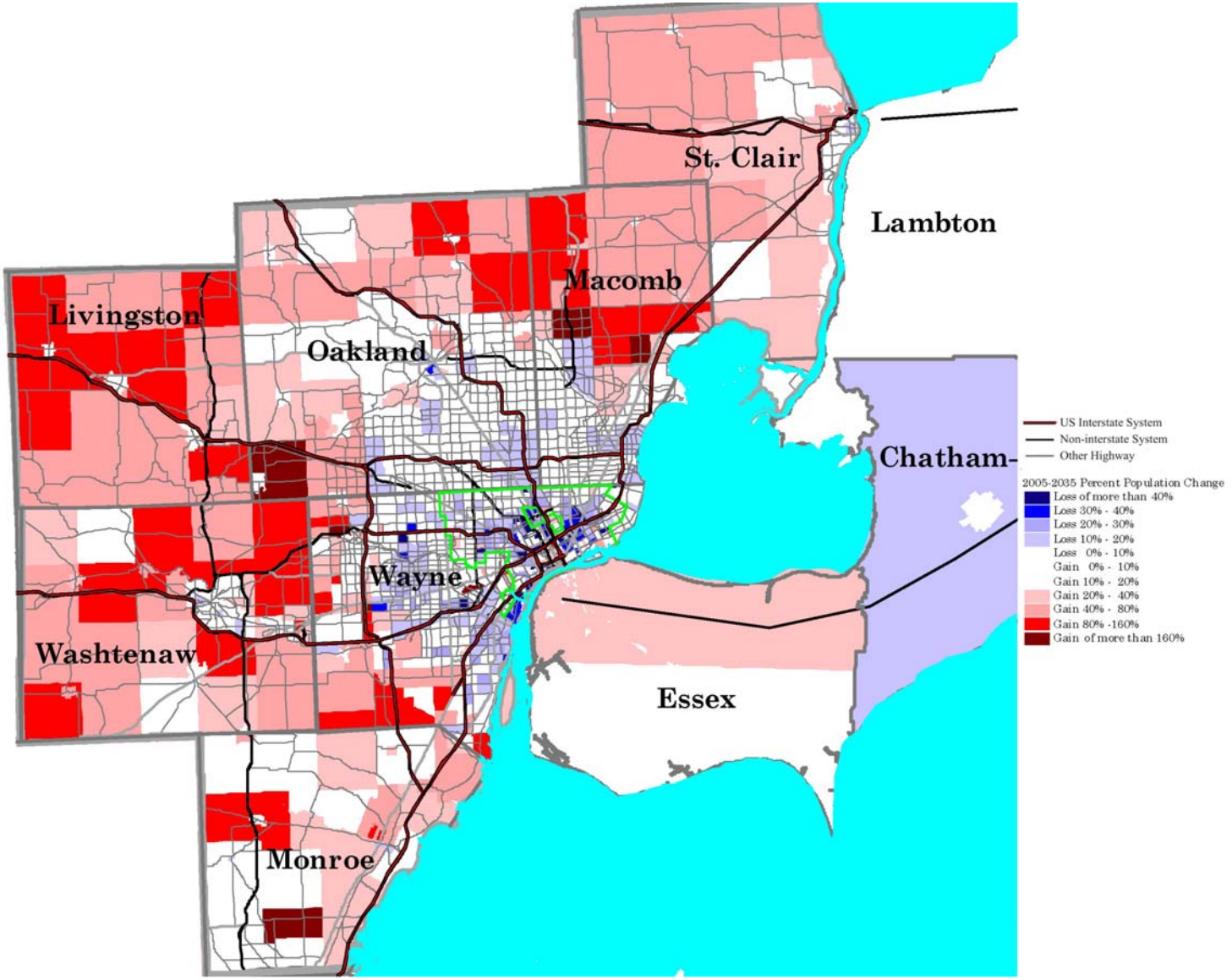
Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 2-2
Detroit River International Crossing Study
2005-2035 Population Change per Square Mile



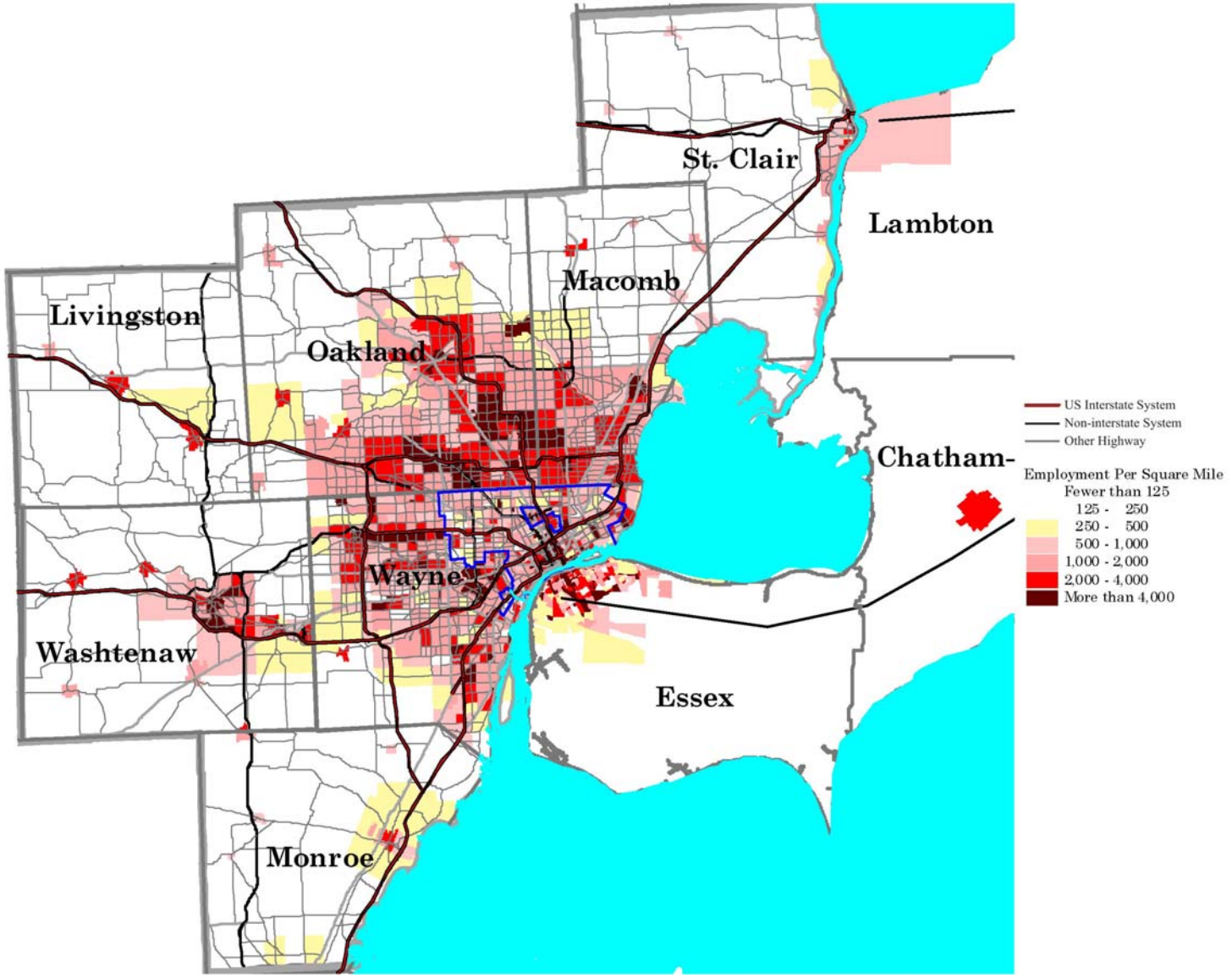
Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 2-3
Detroit River International Crossing Study
2005-2035 Percent Population Change



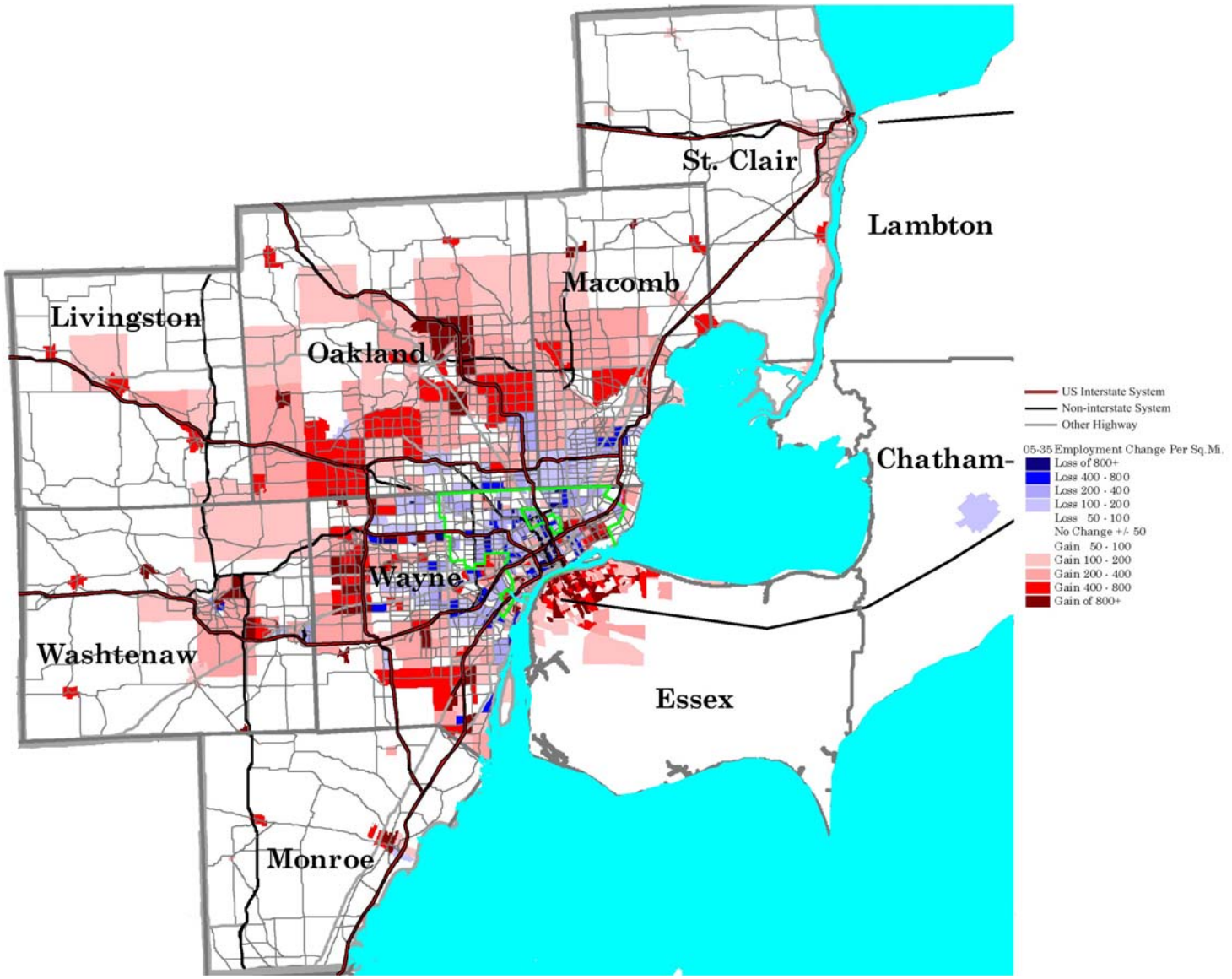
Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 2-4
Detroit River International Crossing Study
2005 Employment per Square Mile



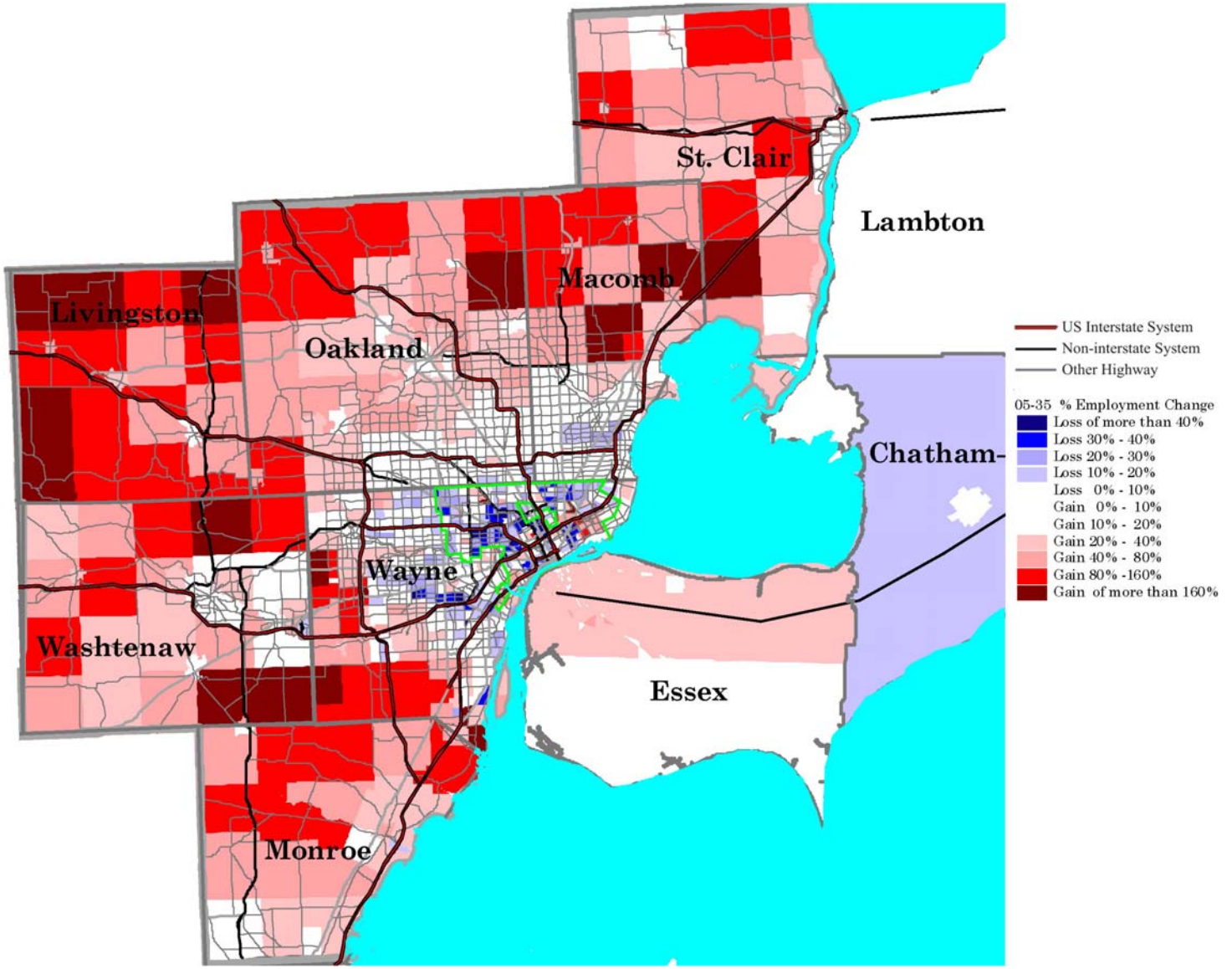
Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 2-5
Detroit River International Crossing Study
2005-2035 Employment Change per Square Mile



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 2-6
Detroit River International Crossing Study
2005-2035 Percent Employment Change



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

3. MEASURING THE INDUCED DEMAND OF A NEW BORDER CROSSING

3.1 Accessibility

Many factors influence the distribution of population and employment within a metropolitan region. Among these are:

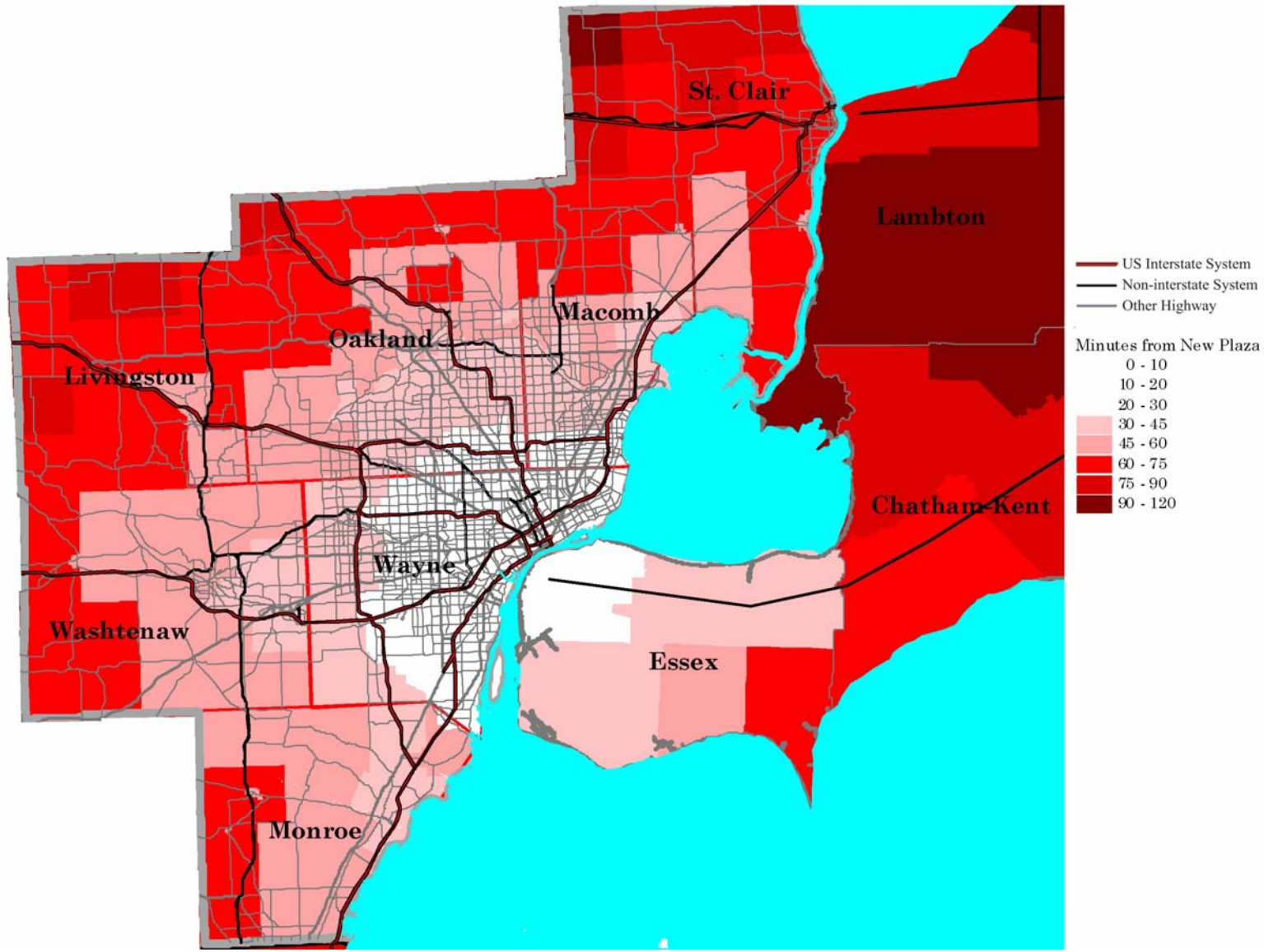
- Availability and cost of developable land.
- Availability and quality of urban services, e.g.: water, sewers, public safety and open space.
- Accessibility considerations, especially to jobs and labor.

The introduction of new transportation facilities changes the accessibility of an area and impacts population and employment growth. As noted earlier, prior to 1995, this interrelationship between transportation facilities and socio-economic/land use forecasts was not integrated into the transportation planning process. A single set of socio-economic/land use forecasts was generated, regardless of the proposed transportation facilities. This was in part due to a concern that growth projections would be unduly used to justify major new projects. Advances in the state of the profession and Federal Court decisions influenced recognition in environmental impact analyses of the interrelation between transportation facilities and socio-economic/land use forecasts.

One of the most common outputs of transportation planning models is a matrix measuring travel times between any pair of TAZs. Figure 3-1 shows the travel times from the location of the proposed bridge plaza to all other TAZs, assuming no new bridge (the No-Build Scenario). Building a new bridge would change some of these travel times, as illustrated in Figure 3-2. The biggest change would be travel time reduction of from one to eight minutes from the bridge plaza to the Essex and Chatham-Kent TAZs. As the graphic indicates, some areas (e.g., around Ann Arbor in Washtenaw County) will experience an increase in travel time from the TAZ of the new plaza as other proposed transportation improvements programmed for implementation will not keep pace with increased travel demand.

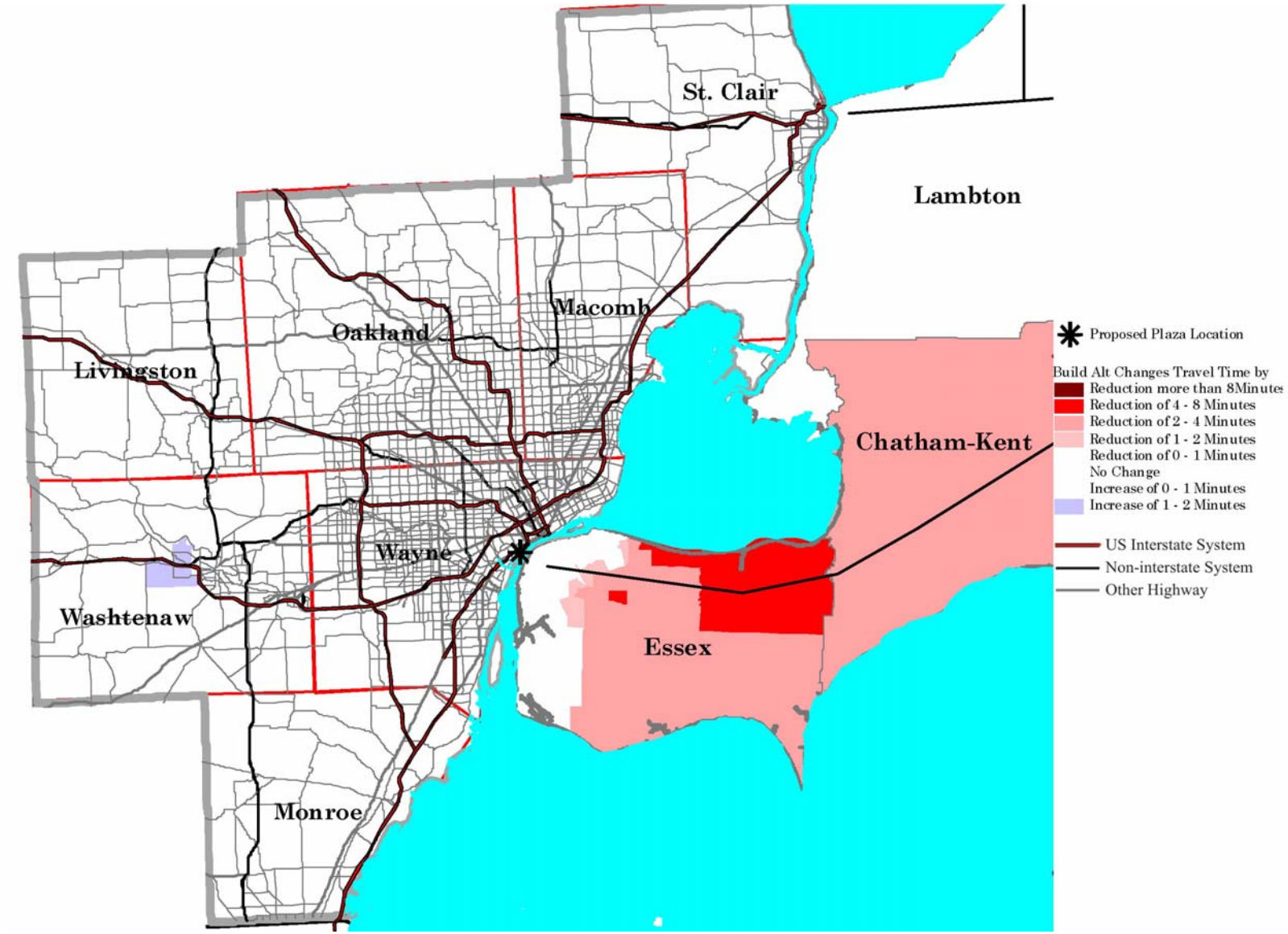
A number of the DRIC TAZs would experience a change in travel time to each of the other TAZs if a new Detroit-Windsor crossing were built. The TAZs which improve their accessibility to jobs or labor force become more attractive for development. The reverse also is true.

Figure 3-1
Detroit River International Crossing Study
2035 Travel Times from the Proposed DRIC Plaza Area
No-Build Scenario



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

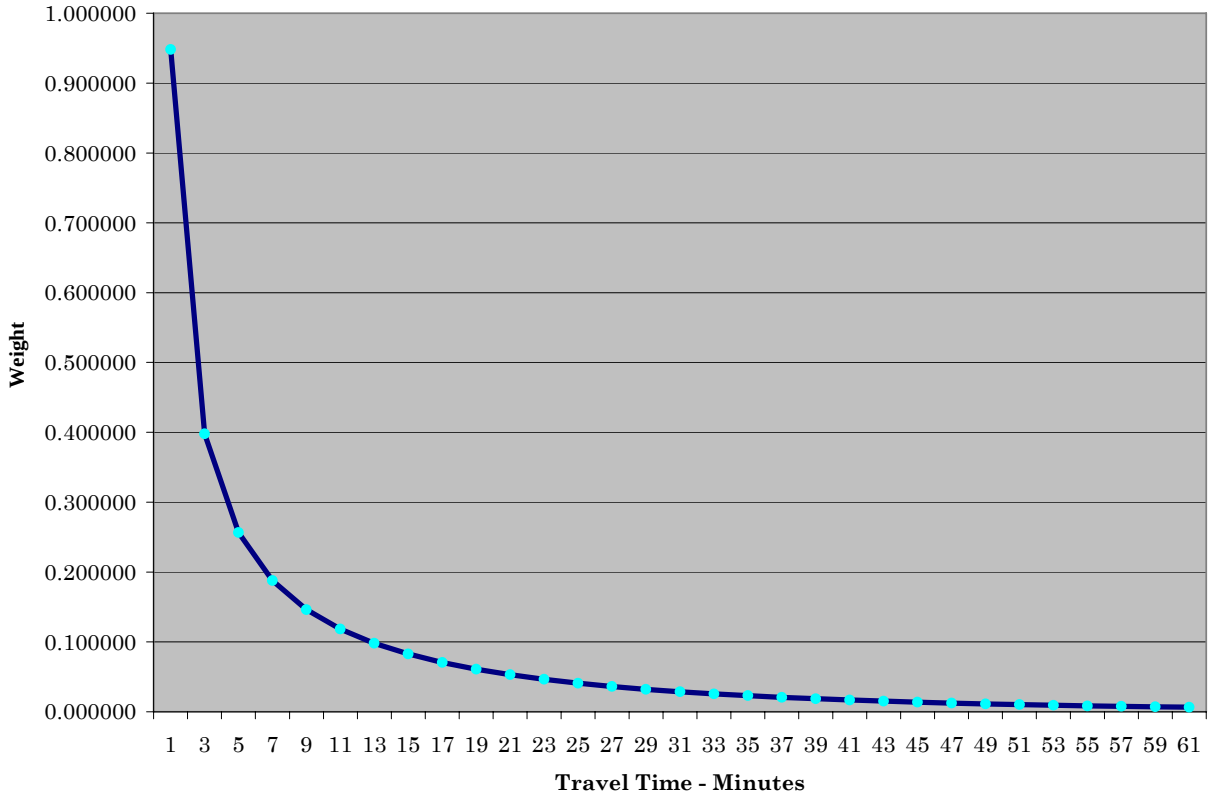
Figure 3-2
Detroit River International Crossing Study
Changes in 2035 Travel Times from the Proposed DRIC Plaza Area
Build vs. No-Build



Source: The al Chalabi Group in Association with The Corradino Group of Michigan, Inc.

In selecting jobs, workers put more emphasis (weight) on jobs that are closer to their residences than jobs far away. Applying these weights to the travel times from a TAZ of origin to each of the other destination TAZs yields an "accessibility index" for the TAZ of origin. The index is a function of the inter-zonal impedances in the gravity-type trip distribution model that is part of the standard modeling system used in major metropolitan areas. Figure 3-3 shows these weights as functions of travel time. These are derived from Census journey-to-work data for large metropolitan areas in the Midwest. This is appropriate in that the model is addressing accessibility beyond the Detroit-centered SEMCOG region. When summed, the products of these weights and the travel times from a TAZ of origin to all destinations generates the accessibility index for the TAZ of origin. Changes in the accessibility index for a zone, given two alternative transportation networks (Build and No-Build Scenarios), provide the basis for calculating the population and employment growth forecast differential of these two alternative scenarios.

Figure 3-3
Detroit River International Crossing Study
Accessibility Weights – Functions of Travel Time



Source: The al Chalabi Group using the DRIC Travel Demand Model.

3.2 Measuring Changes in Accessibility

The accessibility indices for three scenarios include: base year 2005; the 2035 No-Build Scenario; and, the Build Scenario for 2035. Comparing each of the 2035 scenarios to the 2005 base year

condition demonstrates the changes in accessibility indices that are forecast to occur without or with a new Detroit-Windsor crossing.

Figure 3-4 illustrates the accessibility indices changes between 2005 and 2035 for the No-Build condition; travel times will increase and accessibility will deteriorate. It should be noted that the No-Build scenario includes additions to the transportation network but not a new border crossing. The reason for the widespread deterioration in accessibility is that additional transportation improvements now proposed to occur between 2005 and 2035 are not adequate to keep pace with the forecasted population and employment growth, particularly in the outer ring of the region. This forecasted deterioration in accessibility is a common phenomenon affecting most older U.S. metropolitan regions. Proposed transportation improvements simply are not keeping pace with the increase in demand due to forecasted increases in population, households, and employment, as well as the forecasted increases in rates of travel per person due to projected increases in income, auto ownership, and related factors.

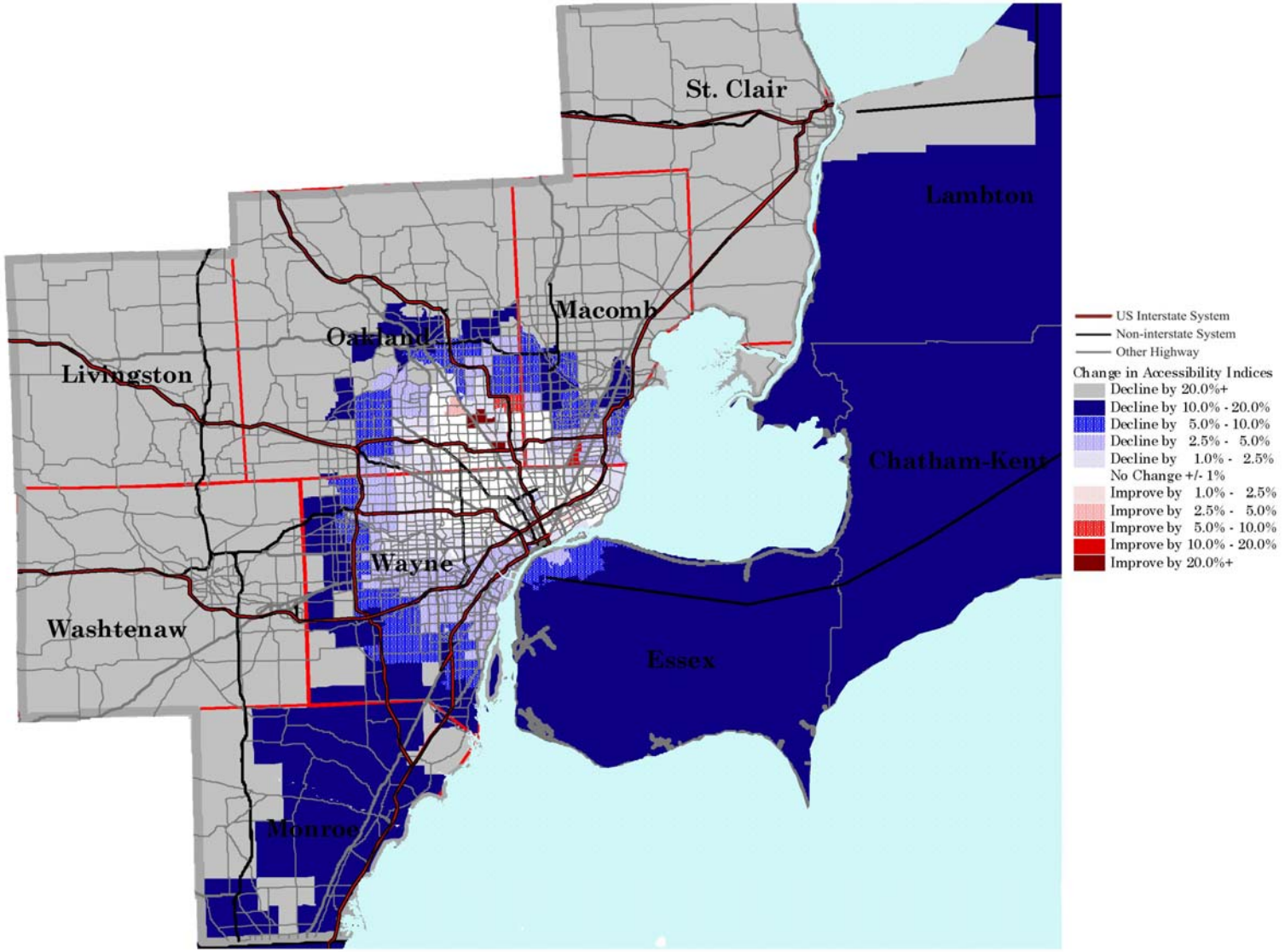
The accessibility indices in the core of the region do not deteriorate as significantly as those in the outer portion of the region (Figure 3-4). And, there are some pockets of improvement due to the combination of the proposed transportation improvements, coupled with the forecasted decrease in population and employment in a number of the core area TAZs.

Figure 3-5 presents the changes in accessibility indices between 2005 and 2035 assuming a new border crossing. The deterioration in accessibility is less than under the No-Build Scenario. And, for the Windsor Area (i.e. Essex and Chatham - Kent Counties), the accessibility indices show improvement due to extending the limited-access facility (Hwy 401) to the new bridge; currently, access to the Ambassador Bridge is via the major arterial, Huron Church Road.

Figure 3-6 illustrates the differences in accessibility indices between the DRIC Build and No-Build Scenarios. Areas shown in red-like colors are the TAZs forecast to experience improved accessibility with the Build Scenario. TAZs in southeast and south Wayne County, as well as Monroe and Lenawee counties, Michigan, experience improvement in accessibility with a new border crossing. Most of this improvement is due to reductions in travel time to and within Canada. St. Clair County, especially its eastern two thirds, would experience improvements as some traffic that would otherwise use the Blue Water Bridge shifts to the crossing (about 2,800 vehicles per day (vpd) in 2035 or 9% of the traffic). This shift means less traffic and reduced congestion for the Blue Water route that serves eastern St. Clair County. The changes on the Canadian side are more pronounced due to the improved access to Highway 401.

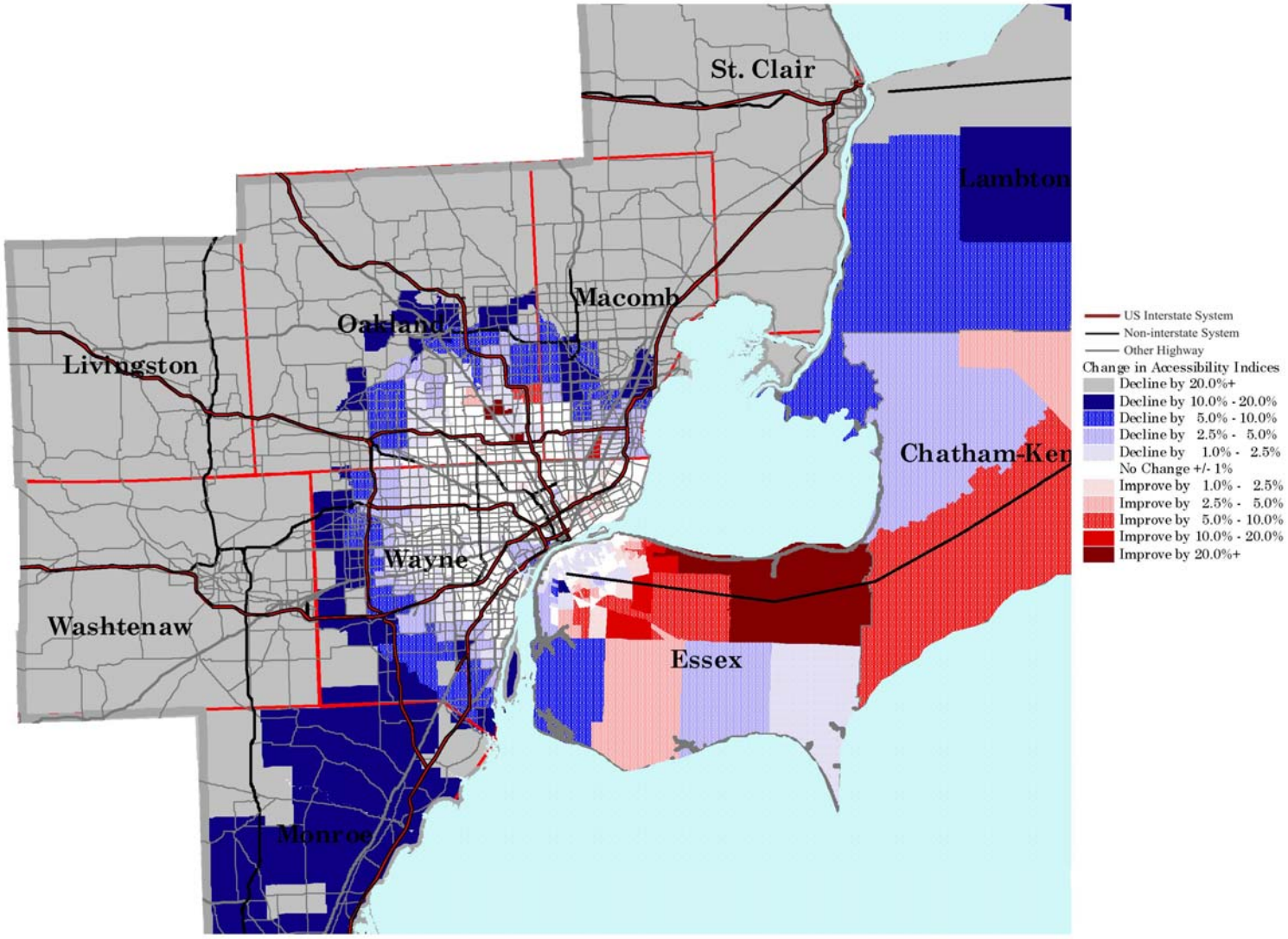
Areas shown in blue shades represent TAZs where accessibility is forecast to decline. Most of these TAZs are located in Livingston County or Oakland County. As the presence of a new crossing in Detroit shifts traffic from I-69 and the Blue Water Bridge (about 2,800 two-way vehicles per day), traffic levels and travel times on I-96 and I-75 rise slightly and, hence, accessibility to surrounding TAZs declines marginally. As these TAZs are located toward the periphery of the study area, their accessibility indices are relatively smaller than more central TAZs. One Oakland County area that is different is the community of Novi, which is served by I-96/I-696 and I-275. The way the Novi TAZ is connected in this highly-attractive interchange area creates the potential for a five percent improvement in accessibility with a new crossing.

Figure 3-4
Detroit River International Crossing Study
Changes in Accessibility Indices
2005-2035 No-Build Scenario



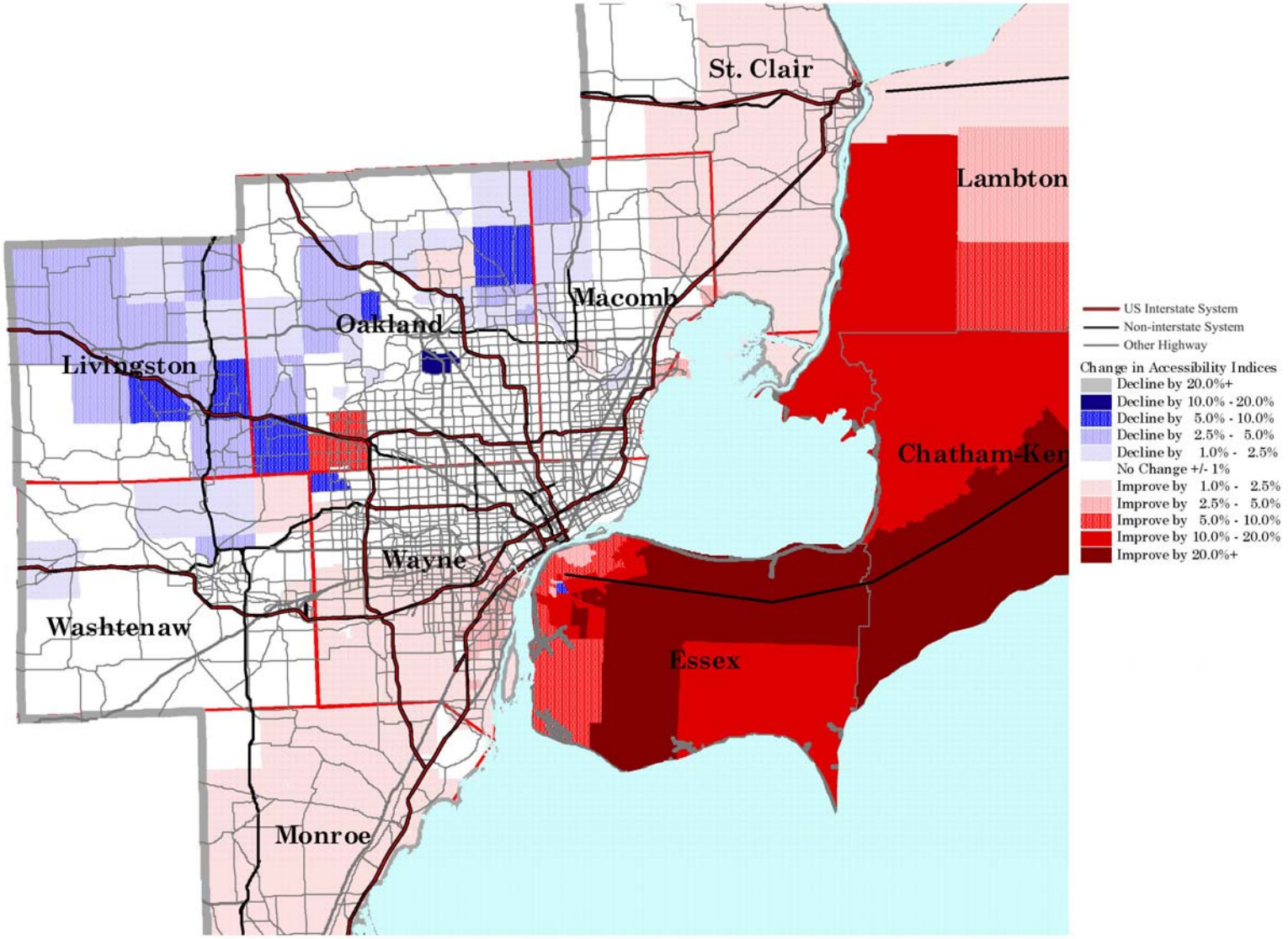
Source: The al Chalabi Group and The Corradino Group of Michigan, Inc.

Figure 3-5
Detroit River International Crossing Study
Changes in Accessibility Indices
2005-2035 Build Scenario



Source: The al Chalabi Group and The Corradino Group of Michigan, Inc.

Figure 3-6
Detroit River International Crossing Study
2035 Accessibility Indices
Build vs. No-Build



Source: The al Chalabi Group and The Corradino Group of Michigan, Inc.

3.3 Impact of Changes in Accessibility Indices on Redistribution of Population in the U.S.

Improving access to jobs makes a TAZ more attractive for residential development, assuming all other factors influencing development are held constant. Applying the changes in the accessibility indices, discussed in the preceding section, to the 2005-2035 forecasted growth in population, yields an initial redistribution of population representing the impact of building a new border crossing. The redistribution of population is directly proportional to the change in accessibility index, i.e., if an area's accessibility index improved by one percent, then the population gain is one percent. Again, gains balance losses as the growth is redistributed, not created. Following this initial redistribution, four levels of adjustments were made for the U.S. portion of the study area. It is not the purview of this analysis to forecast growth shifts in Canada.

- **Setting a Ceiling** – The holding capacity of households for each TAZ is calculated using such criteria as prevailing densities and available developable land. Households in excess of these capacities were redistributed to nearby zones experiencing increases in accessibility to jobs.

- **Setting a Floor** – TAZs with zero population growth but that would experience a significant increase in accessibility to jobs, are assigned a minimum number of additional households. The magnitude of the additional households is a function of the increase in the accessibility indices. Very few such zones were observed in the SEMCOG region.

- **Adjustments for Model "Noise"** – Several of the larger TAZs located on the periphery or outside the SEMCOG region had very small accessibility indices. Even small changes in these indices, attributed to the impact of a new border crossing, result in high percentages changes. To guard against distortion, TAZs with very low accessibility indices are held constant. Also, the indices of TAZs that appeared counter-intuitive were re-examined; the indices for those TAZs were adjusted to reflect averages of nearby TAZs of similar characteristics.

- **Balancing the Accessibility-Induced Adjustments** – For the SEMCOG region, the sum of the DRIC-induced growth in population, as adjusted by the preceding steps, was balanced by reduction in growth elsewhere so that the induced demand analysis is not forecasting a change in overall growth. As noted, the magnitude of the change in growth, by TAZ, is directly determined by the magnitude of the change in its accessibility index.

3.3.1 Population Shifts

Table 3-1 shows the 2005 base year, the 2035 baseline population forecasts and the population impacts of a new border crossing on the U.S. side of the border. These data are presented for the City of Detroit, the rest of Wayne County, for all other SEMCOG counties, and the SEMCOG region as a whole.

Table 3-1
Detroit River International Crossing Study
Impact of DRIC on Redistribution
of 2005-2035 Population Forecasts

	2005 Base Year Population	2035 Baseline Population Forecast	2005 - 2035 Population Change	Net Population Impact of New Border Crossing
City of Detroit	928,587	853,004	-75,583	244
Balance of Wayne Co.	1,118,830	1,140,842	22,012	1,584
Livingston County	178,422	301,799	123,377	0
Macomb County	810,096	960,283	150,187	196
Monroe County	157,241	204,130	46,889	786
Oakland County	1,225,470	1,385,106	159,636	1,638
St. Clair County	170,702	211,976	41,274	9
Washtenaw County	349,459	469,640	120,181	106
Wayne County	2,047,417	1,993,846	-53,571	1,828
SEMCOG Region	4,938,807	5,526,780	587,973	4,563

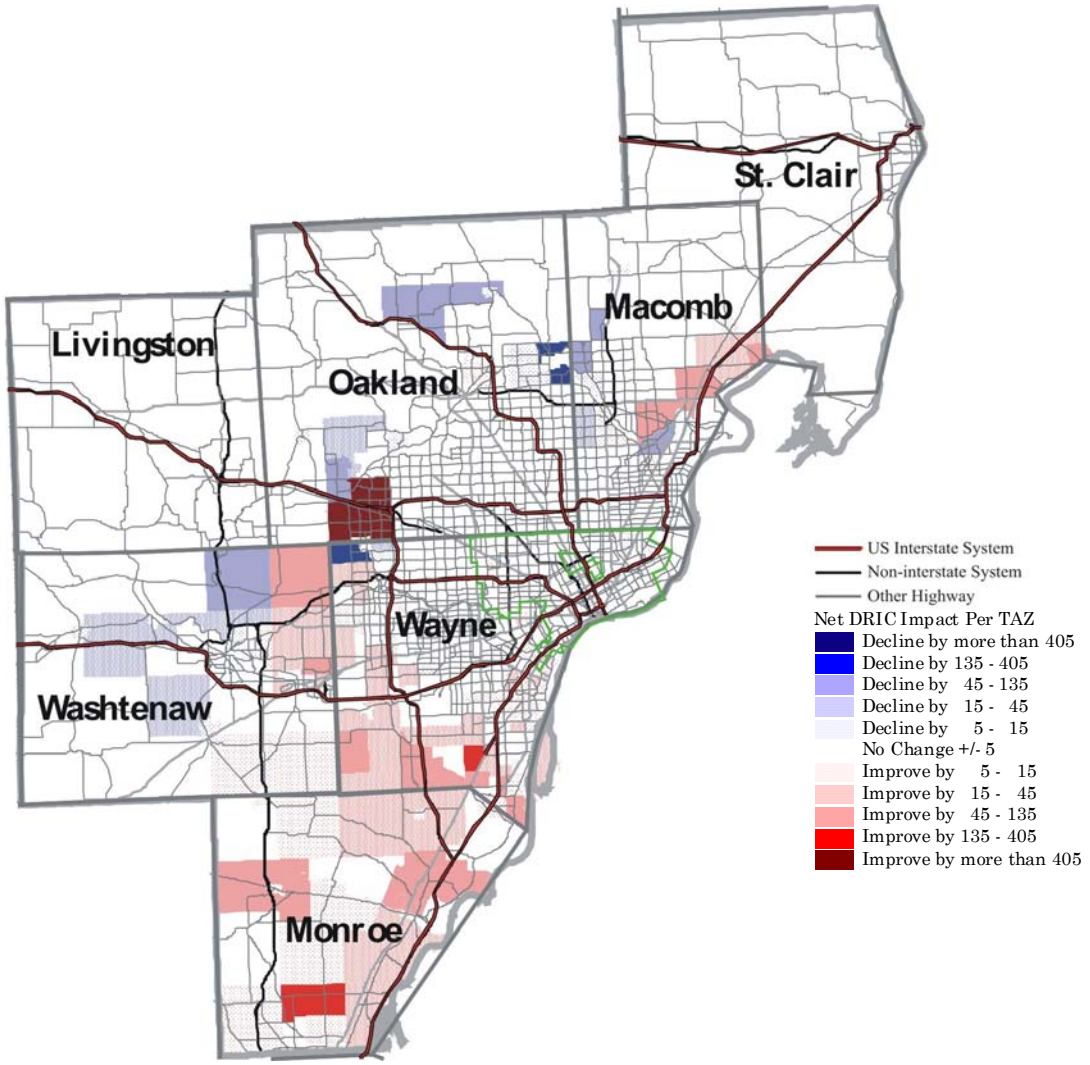
Source: The al Chalabi Group

A new border crossing is forecast to cause population shifts resulting in a net increase of 4,600 people in the SEMCOG region, all coming from outside Michigan, because of changes in accessibility only (Figures 3-7 and 3-8). This net impact would be a change of less than a one percent in the distribution of the region's growth because of constructing a new border crossing.

3.3.2 Employment Shifts

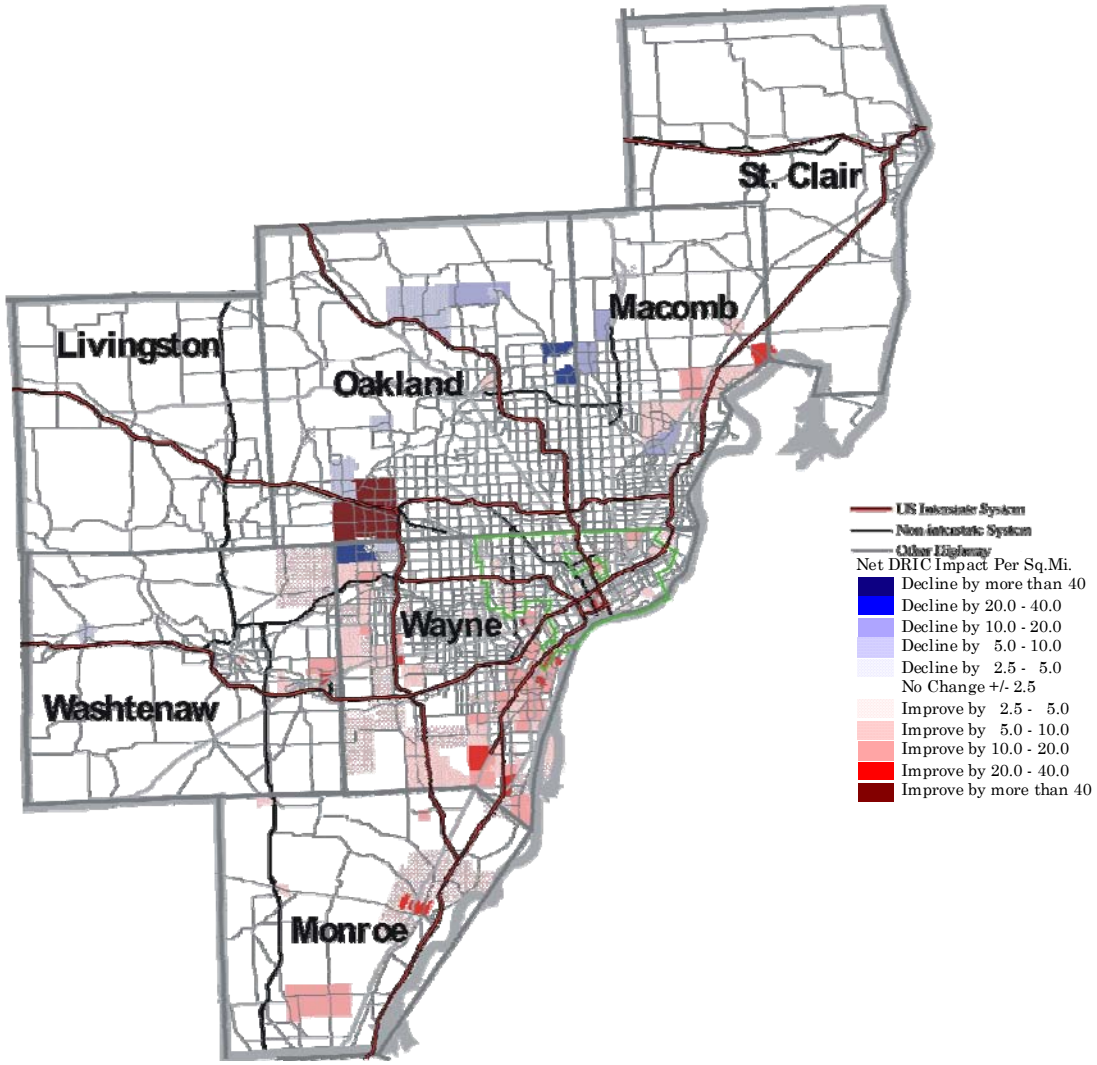
The methodology for determining the impact of changes in accessibility indices on employment distribution is the same as that used for residential redistribution. Table 3-2 and Figures 3-9 and 3-10 present the accessibility-induced employment impact of the border crossing expressed as the net employment change. Concentrations of net positive changes are located along I-75 in Wayne County. This route is a major part of an Interstate Highway System "auto alley" that serves the North American auto industry from Canada, through the U.S. to its southern states like Kentucky, Tennessee and Georgia.

Figure 3-7
Detroit River International Crossing Study
Population Redistribution
Net Impact per TAZ



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 3-8
Detroit River International Crossing Study
Population Redistribution (Access-Induced)
Net Impact per Square Mile



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

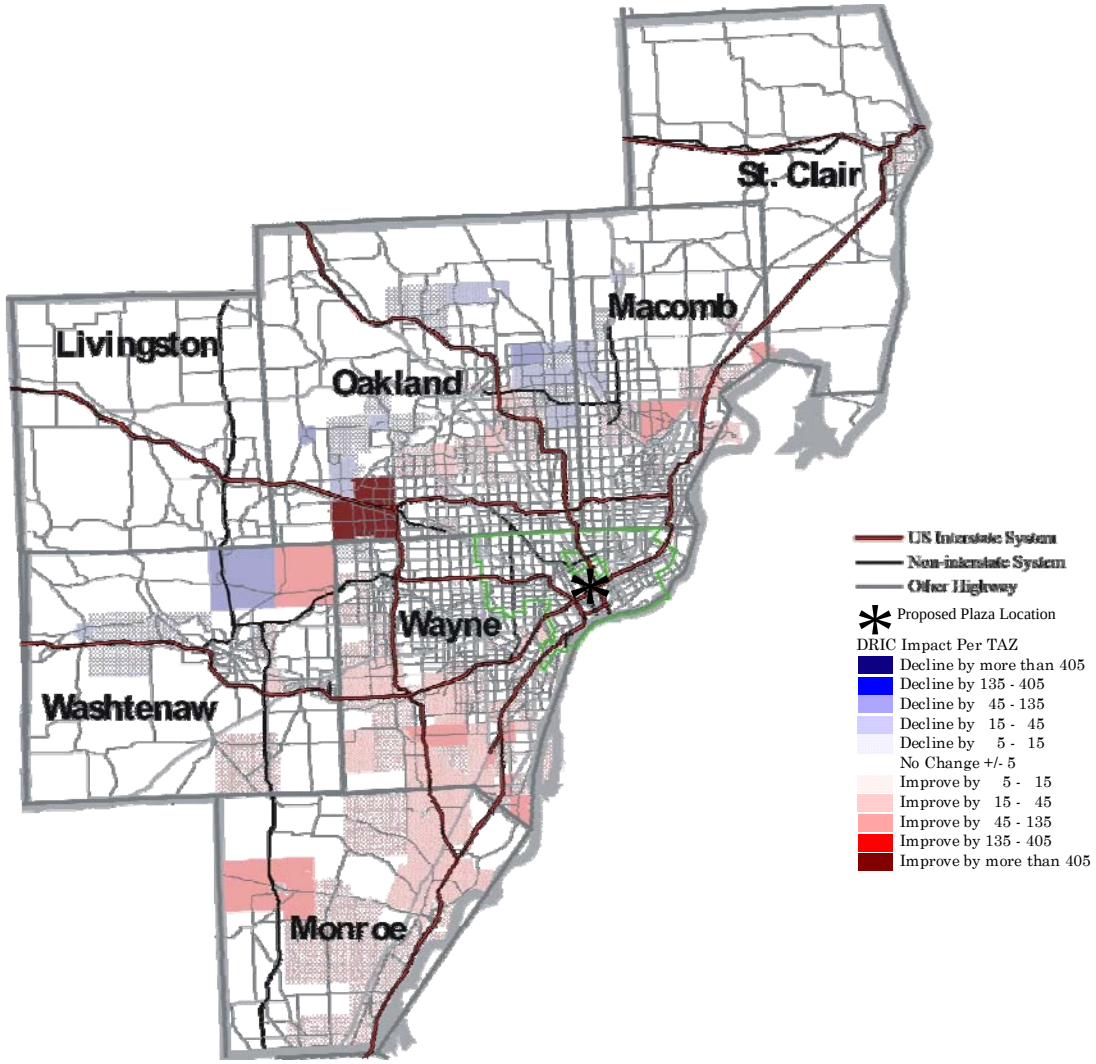
Table 3-2
Detroit River International Crossing Study
Impact of DRIC on Redistribution
of 2005-2035 Employment Forecasts

County	2005 Base Year Employment	2035 Baseline Employment Forecast	2005 - 2035 Baseline Employment Change	Net Employment Impact of New Border Crossing
City of Detroit	330,282	305,203	-25,079	106
Balance of Wayne Co.	660,699	744,134	83,435	1,726
Livingston County	70,537	111,116	40,579	0
Macomb County	393,675	447,577	53,902	132
Monroe County	57,903	80,234	22,331	364
Oakland County	955,886	1,144,257	188,371	886
St. Clair County	66,995	85,504	18,509	60
Washtenaw County	244,185	302,707	58,522	78
Wayne County	990,981	1,049,337	58,356	1,832
SEMCOG Region	2,780,162	3,220,732	440,570	3,352

Source: The al Chalabi Group

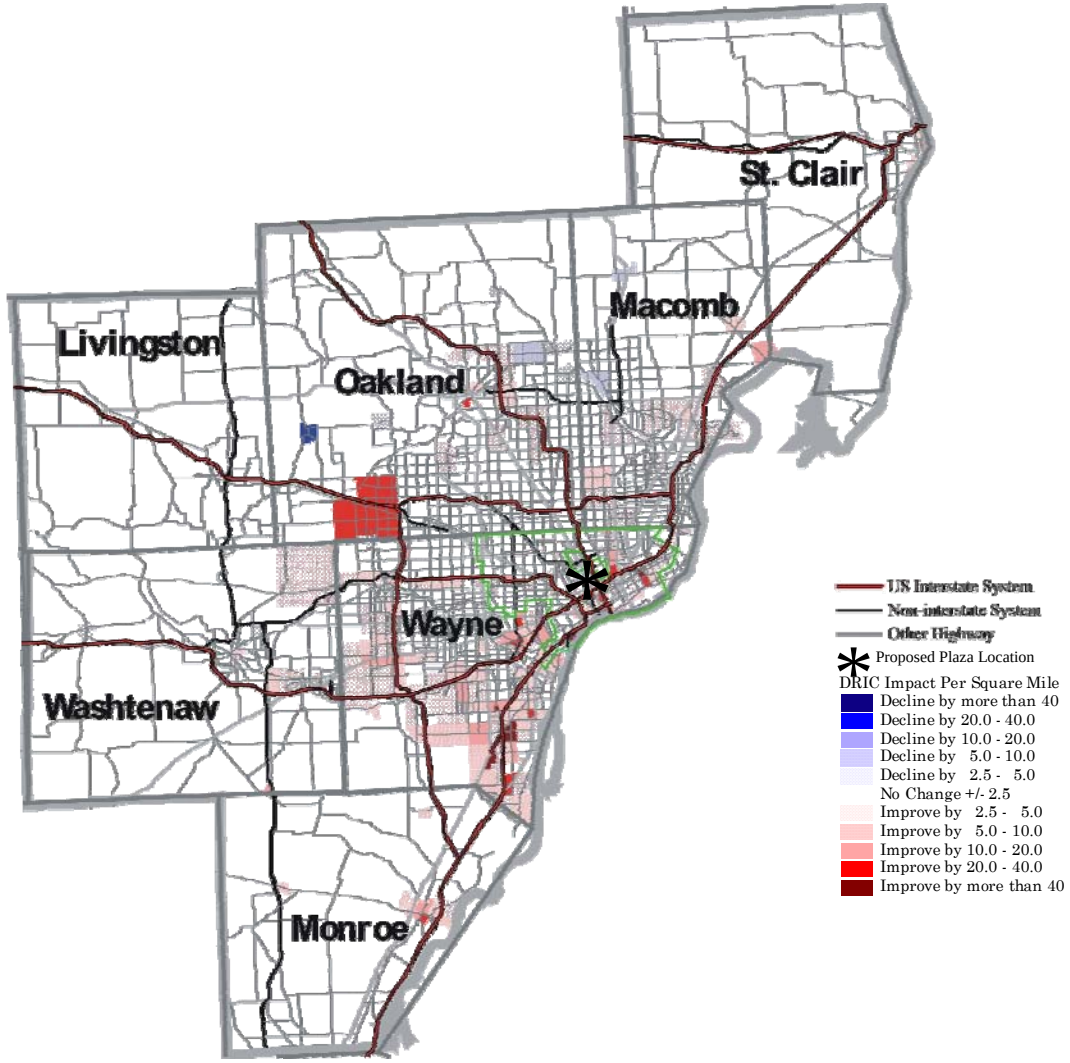
Changes in accessibility with the proposed new border crossing will shift about 1,800 jobs to Wayne County from outside the region. Shifts in employment would result in the SEMCOG region gaining 3,350 jobs, all from outside Michigan. Most of these would be to Wayne County, along the I-75 corridor that comes out of Ohio, Kentucky, and points south, as noted above. Overall, this shift represents less than one percent of all the forecast employment growth from 2005 to 2035 in the region.

Figure 3-9
Detroit River International Crossing Study
Employment Redistribution (Access-Induced)
Net Impact per TAZ



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure 3-10
Detroit River International Crossing Study
Employment Redistribution (Access-Induced)
Net Impact per Square Mile



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

4. FINDINGS

The changes in accessibility in the SEMCOG region are limited because only one new/improved link – another border crossing – is introduced into the extensive roadway network. Nonetheless, the area along I-75, south of the proposed border crossing, in Wayne County is forecast to be the largest beneficiary.

Again, it is noted that this work only addresses shifts in growth already forecast, not net new growth. That issue was examined early in the DRIC Feasibility Study and led to the conclusion that without additional border crossing capacity, Michigan would lose, in the 30 years ending 2035, about 25,000 jobs and Ontario would lose approximately 16,500 jobs without an improvement in crossing capacity. For this crossing corridor, about two-thirds of the traffic is auto-industry-related. These job losses are not reflected in the original SEMCOG projections (released in 2001) upon which the basic DRIC modeling was based.

In light of all of this, it is important to note the U.S. demand in 2035 for new automotive vehicles is forecast at 26 million,[3] a 53 percent increase from the 17 million current annual U.S. consumption of autos/trucks. A sketch planning analysis that is the basis of this forecast is included in Appendix A. This growth is similar to that which occurred over the last 20 years, when 15 new (not replacement) auto plants were built in the U.S., eight of which were built in "northern" locations (e.g., Ohio, Indiana, and Ontario, Canada). The implication is another dozen or more auto manufacturing plants will be built in the U.S. in the next 20 to 30 years to meet this increased demand. Michigan/Ontario will be in a position to gain 25,000 to 35,000 new jobs.

[3]Center for Automotive Research, *Economic Contribution of the Automotive Industry to the U.S. Economy: An Update* and *The Contribution of the International Auto Sector to the U.S. Economy: An Update*, 2003.

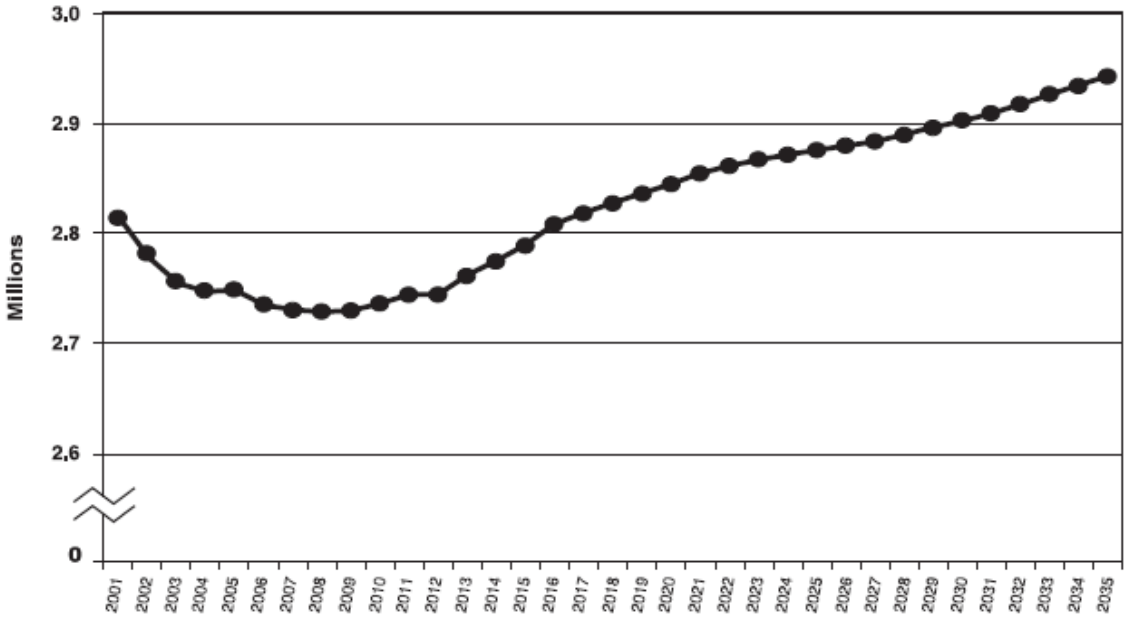
5. CHANGES IN REGIONAL GROWTH FORECASTS

5.1 Background

On March 29, 2007, SEMCOG released a report entitled *A Region in Turbulence and Transition*, which 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 5-1).*

Figure 5-1
Detroit River International Crossing Study
Total Employment
Southeast Michigan, 2001-2035



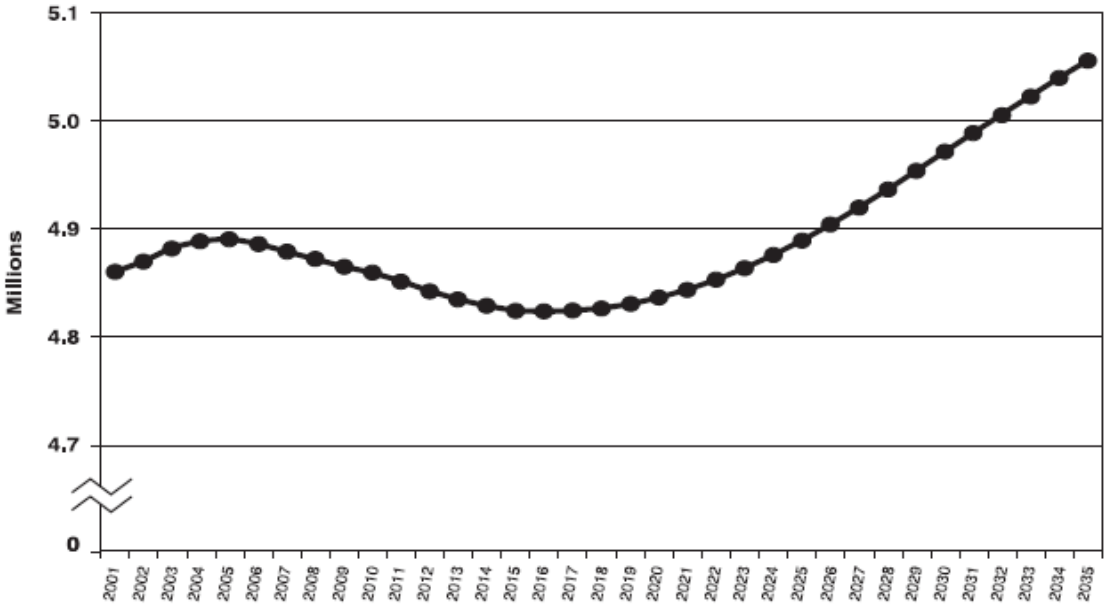
Source: SEMCOG

> *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 5-2). Southeast Michigan's population will be 5.1 million in 2035.

Figure 5-2
Detroit River International Crossing Study
Total Population
Southeast Michigan, 2001-2035



Source: SEMCOG

With these observations as background, SEMCOG reduced its forecasts of future growth in population (Table 5-1) and employment between 2005 and 2030 by 75 percent and about 50 percent, respectively. Those 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 5-1), 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. But, the bigger issue is that it is the only county in the region projected to lose population, which continues a downward trend. And, 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 5-1
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 new forecast uses the employment definition of the Bureau of Economic Analysis and the previous forecast used Bureau of Labor Statistics data as a base. 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, by implication, Detroit, as a loss in jobs is forecast. All other counties, but Washtenaw, are still forecast to experience employment growth by 2030, albeit lower than projected before (Table 5-2).

Table 5-2
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

5.2 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, only 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 period trucks**: factor the origins and destinations by the ratio of revised-to-original employment, by county.

Because the trip tables are for peak periods, as opposed to a 24-hour period, trip origins and destinations are not balanced, reflecting the directional aspect of peak hour travel patterns.[4] 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 5-3 presents the original total trips and revised total trips by peak hour period, year, and vehicle class.

[4] 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 5-3). 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 652 truck trips could be affected by the downward revision of the trip tables. But, the reduction is just 51 truck trips (2,161 – 2,110 on Table 5-3) 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 in car trips in the 2035 peak hours on all crossings of the border in the SEMCOG region. Further, while reductions in domestic travel due to SEMCOG's revised forecasts demonstrate a small effect on international traffic, that effect does not materially change the overall border crossing assignment pattern between the previous SEMCOG forecast of demographics and the most recent projections.

Table 5-3
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 5-4 demonstrates the latter point. It presents a comparison of crossing volumes using the original and revised trip tables. The network used for the comparison is connected to the X-10 crossing.

Table 5-4
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.

Appendix A

Sketch Planning Analysis of Automotive Future in Michigan

1. SKETCH PLANNING ANALYSIS OF THE AUTOMOTIVE INDUSTRY'S FUTURE IN MICHIGAN

This appendix provides a sketch planning analysis of the potential effects of additional border crossing capacity on Michigan's automotive industry.

2. STRUCTURE OF THE STATE ECONOMY

The Detroit/Windsor border crossing is the busiest trade gateway in North America. The North American Free Trade Agreement (NAFTA) of 1994 and the earlier (1989) Canada/USA Free Trade Agreement have greatly increased trade between Canada and the United States and have spurred major cross-border investments. Canada is the largest and most important trading partner of the U.S., constituting almost 20 percent of U.S. trade (imports and exports). Figure A-1 illustrates the U.S. trade with Canada by all surface modes for 2006. Tables A-1 through A-3 show the top ten states trading with Canada for 2006.

Figures A-2 and A-3 show the "top-ten" states for exports and imports to Canada for all surface modes by value of the shipments. As can be seen, Michigan is in a class by itself.

2.1 The Role of the Automotive Industry in U.S./Canada Trade

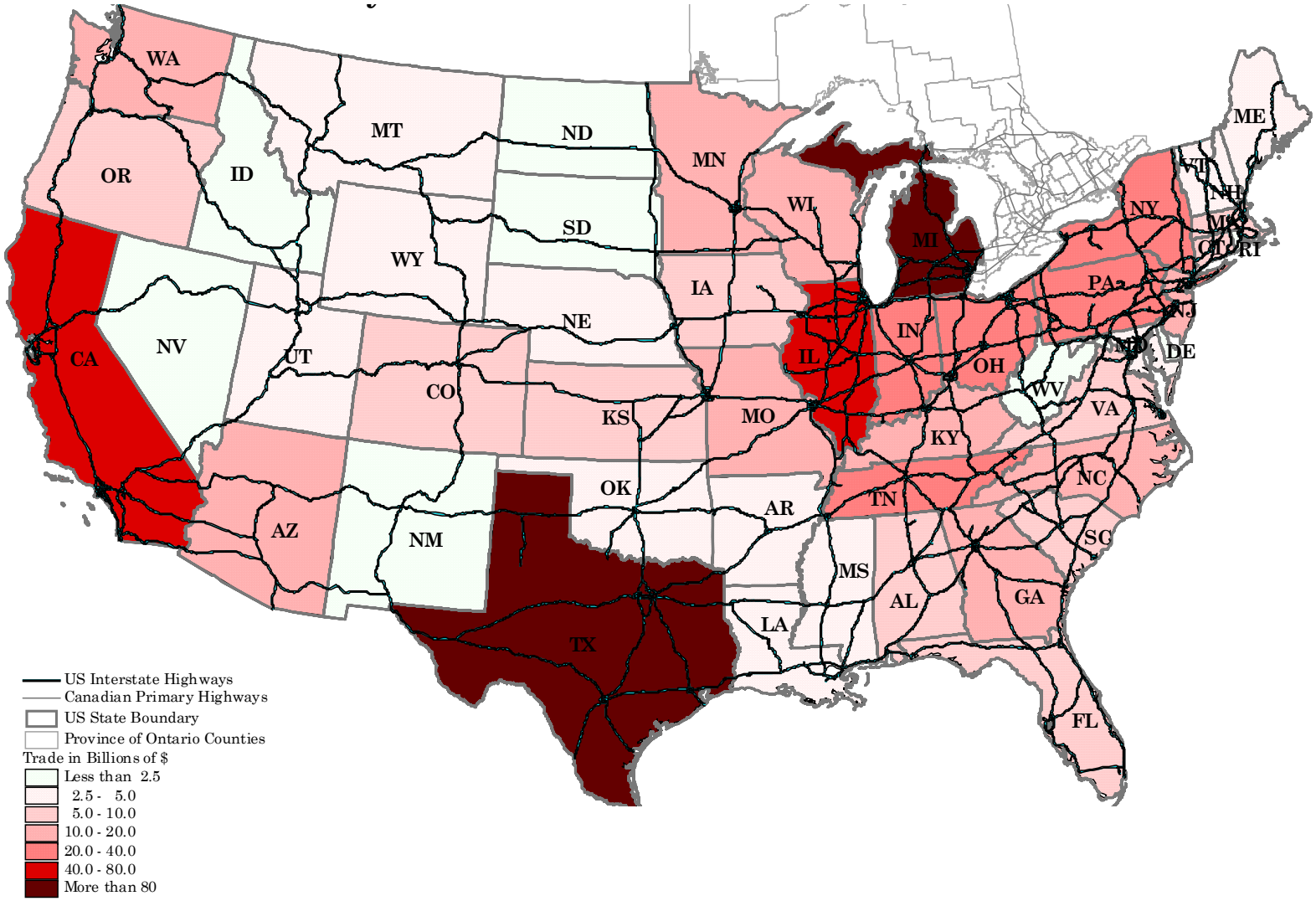
While population and manufacturing volumes are key ingredients to trade, Michigan's location also explains its first place ranking in trade with Canada. The primary reason for the State of Michigan's share of surface trade with Canada is the significant role of automotive manufacturing in both Michigan and Ontario. Motor vehicles and parts constitute 24 percent of U.S.-Canada trade.[1]

Figures A-4 and A-5 show the value of auto-related exports and imports to/from Canada by state. Table A-4 shows the shares of automotive parts as a percentage of total trade with Canada.

In spite of recent trends by foreign-domiciled auto firms to locate assembly plants in the southern states of the U.S., these states (Arkansas, Kentucky and Mississippi) exhibit relatively little trade with Canada, or Mexico for that matter, which is a source of a growing auto parts business. Part of the reason, is that foreign plants (most-specifically, Honda) are very integrated or have supplier plants located in close proximity, all within a day's drive. The Midwest, primarily the states bordering the Great Lakes, also has a large reservoir of parts plants, supplying not only the American auto companies, but also foreign companies. This fact, according to Bill Testa of the Federal Reserve Bank of Chicago, permits "the Midwest's continued high concentration of automotive parts and related industries (and) keeps it a contender for future siting of North American automotive production facilities".[2]

[1] MDOT, *Senate Transportation Hearing Briefing*, 8/25/05.
[2] Midwestchicagofedblogs.org/archives/2006/06, *Score one (Honda auto plant) for the Midwest*, 06/2006.

Figure A-1
Detroit River International Crossing Study
2006 Value of Total Trade with Canada and Mexico
By U.S. State in Billions of U.S. Dollars



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Table A-1
Detroit River International Crossing Study
Top 10 States Exporting to Canada
by Surface Modes of Transportation
Ranked by 2006 Surface Trade Value

Rank	State	Value (millions)
1	Michigan	$23,212
2	Ohio	$17,392
3	Texas	$13,201
4	Illinois	$11,606
5	New York	$10,730
6	California	$10,642
7	Indiana	$9,514
8	Pennsylvania	$8,015
9	Tennessee	$6,614
10	Kentucky	$5,535

Source: BTS Transborder Freight Data, http://www.bts.gov/transborder/

Table A-2
Detroit River International Crossing Study
Top 10 States Importing from Canada
by Surface Modes of Transportation
Ranked by 2006 Surface Trade Value

Rank	State	Value (millions)
1	Michigan	$48,368
2	Illinois	$25,352
3	New York	$22,891
4	California	$19,671
5	Ohio	$15,041
6	Washington	$12,823
7	Pennsylvania	$11,562
8	Minnesota	$9,875
9	Texas	$9,675
10	Tennessee	$8,760

Source: BTS Transborder Freight Data, http://www.bts.gov/transborder/

Table A-3
Detroit River International Crossing Study
Top 10 States Trading with Canada
by Surface Modes of Transportation
Ranked by 2006 Surface Trade Value

Rank	State	Value (millions)
1	Michigan	$71,580
2	Illinois	$36,958
3	New York	$33,621
4	Ohio	$32,433
5	California	$30,312
6	Texas	$22,876
7	Pennsylvania	$19,577
8	Washington	$18,134
9	Indiana	$16,277
10	Tennessee	$15,375

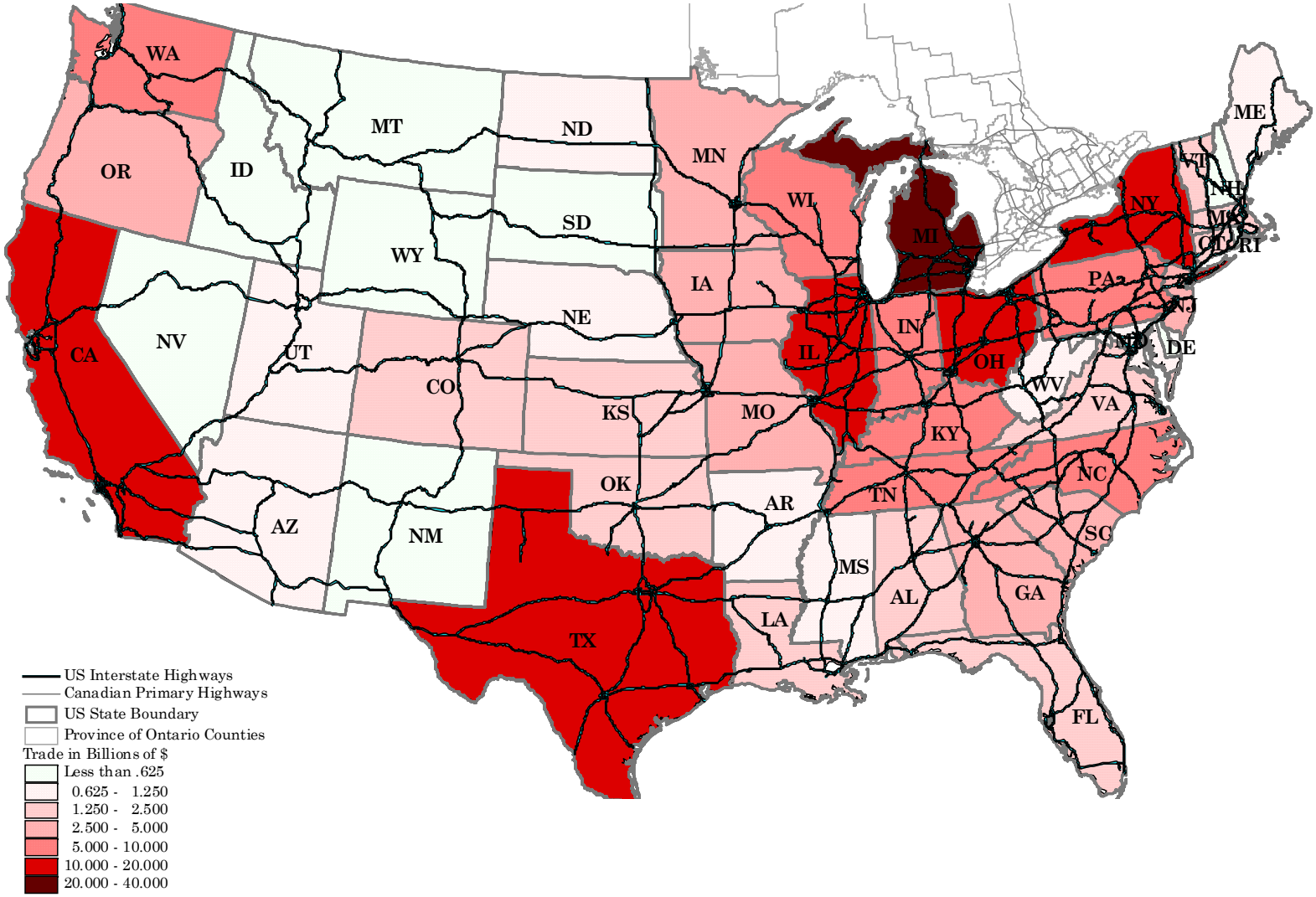
Source: BTS Transborder Freight Data, http://www.bts.gov/transborder/

Table A-4
Detroit River International Crossing Study
Automotive Parts Manufacturing
As a Share of Total Trade with Canada
Ranked by 2006 Surface Trade Value

Rank	State	Value (millions)
1	Michigan	$46,483
2	California	$12,436
3	Ohio	$7,708
4	Indiana	$5,526
5	Illinois	$4,373
6	Kentucky	$3,252
7	Missouri	$3,147
8	Tennessee	$2,305
9	Texas	$1,865
10	New York	$1,831

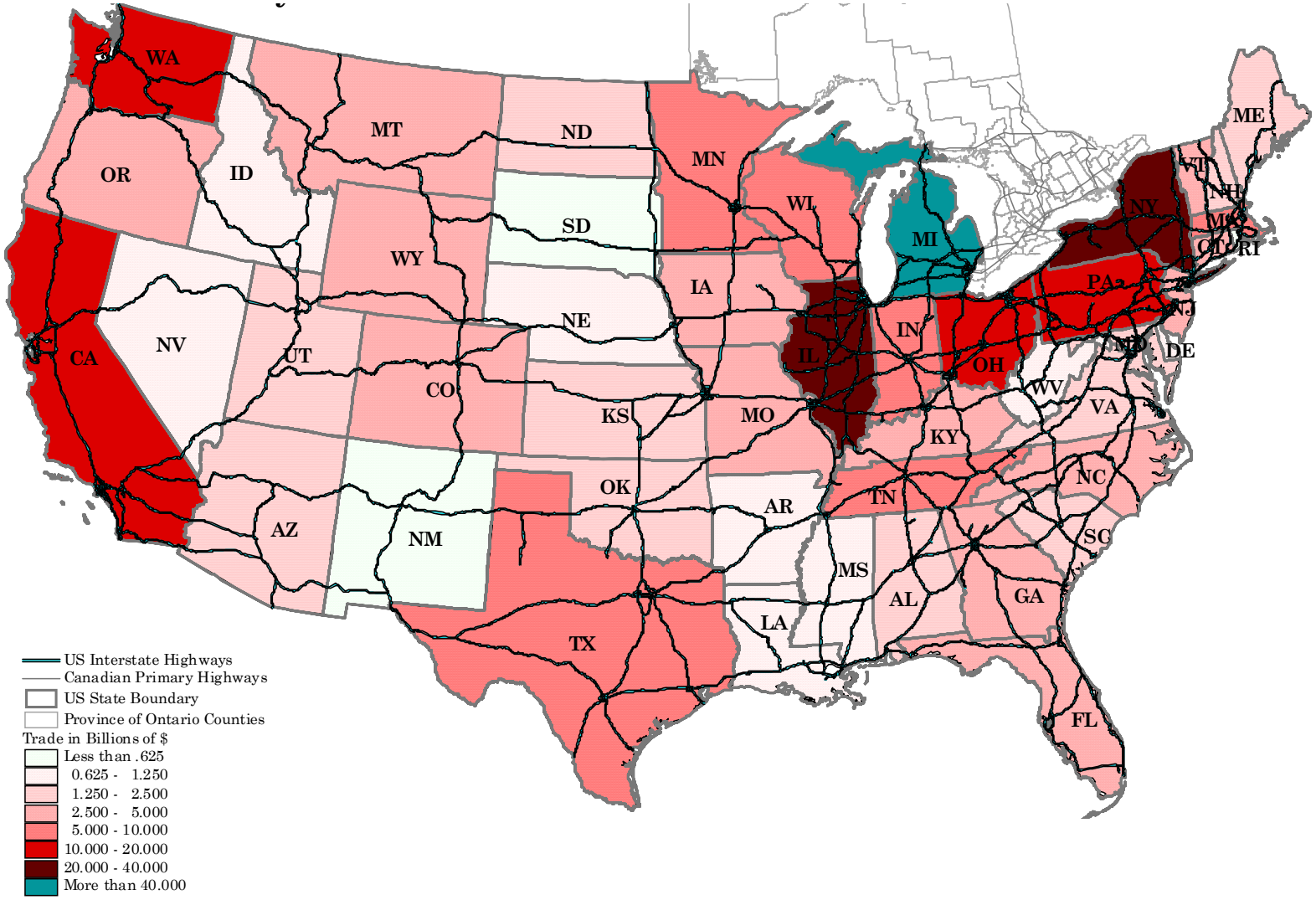
Source: BTS Transborder Freight Data, http://www.bts.gov/transborder/

Figure A-2
Detroit River International Crossing Study
2006 Value of Total Exports to Canada
By State of Origin in Billions of U.S. Dollars



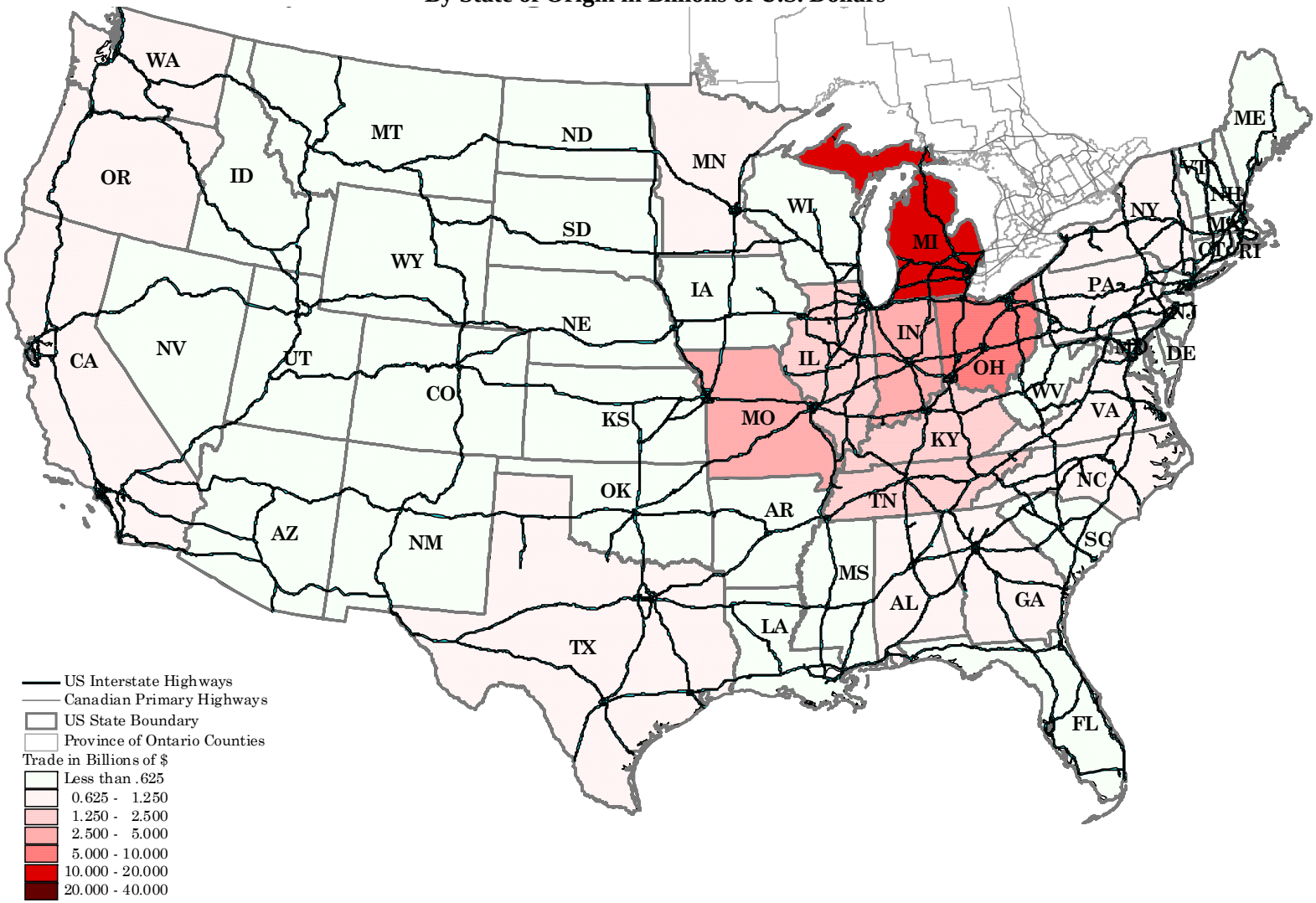
Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure A-3
Detroit River International Crossing Study
2006 Value of Total Imports from Canada
By State of Destination in Billions of U.S. Dollars



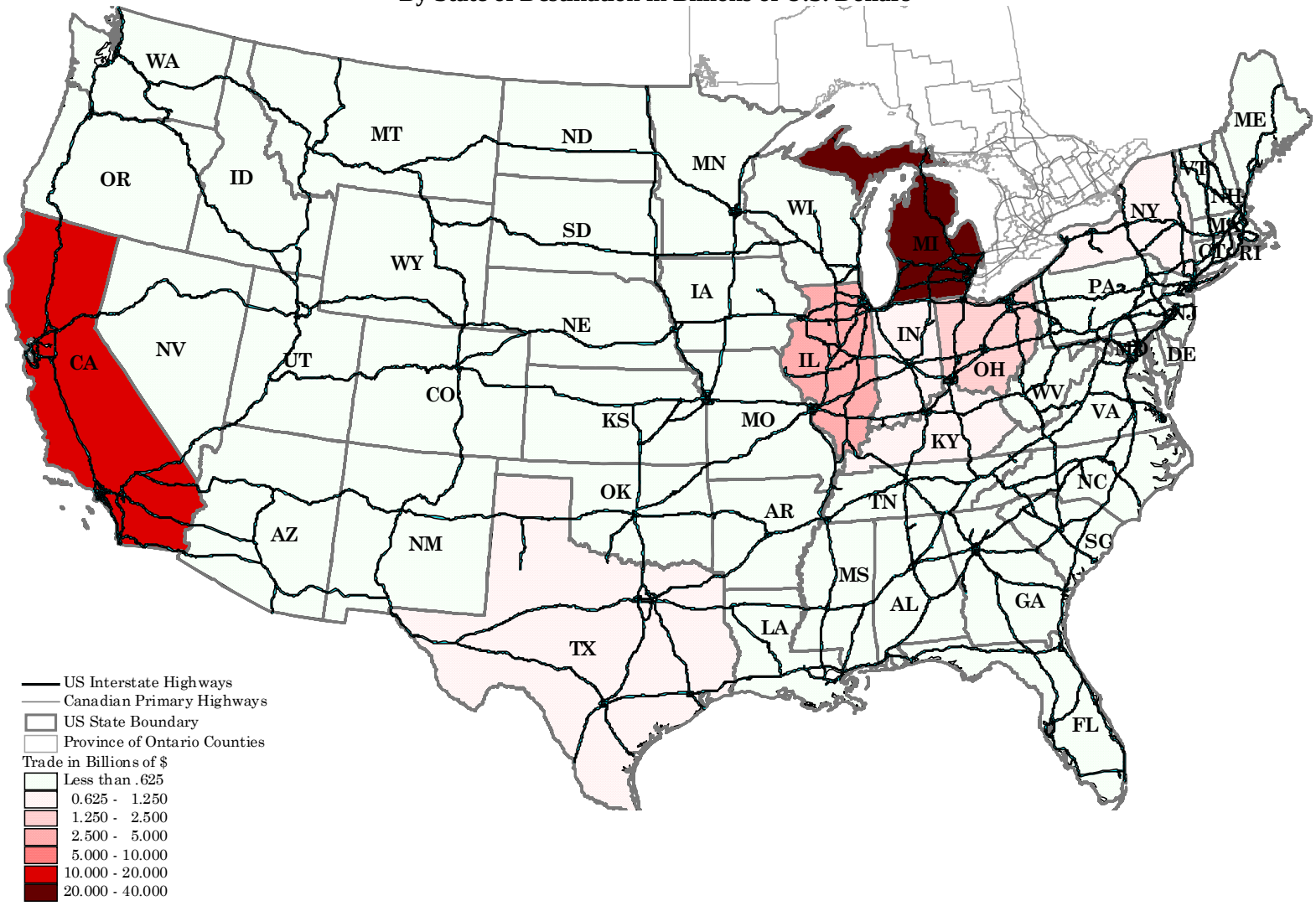
Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure A-4
Detroit River International Crossing Study
2006 Value of Auto and Auto Parts Exports to Canada
By State of Origin in Billions of U.S. Dollars



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure A-5
Detroit River International Crossing Study
2006 Value of Auto and Auto Parts Imports from Canada
By State of Destination in Billions of U.S. Dollars



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

2.2 Automotive Manufacture and its Trade Movement Routes: Potential Impacts on the U.S. and Michigan

For the State of Michigan, automotive parts manufacture constitutes 49.5 percent of its total surface trade exports and 72.4 percent of its total surface trade imports from Canada (by value). The Detroit-Windsor crossings carry approximately 65 percent of this automotive parts surface traffic. Surface trade between the U.S. and its NAFTA partners has grown more than 200 percent (by value) between 1990 and 2004. Surface trade values for 2005 were 10.2 percent higher than those of 2004. Based on the latest available data (December 2006), 2006 values are 6.5 percent higher than 2005. Surface trade between the U.S. and its NAFTA partners is expected to continue at substantial annual increases.

The 2004 report, Transportation: Invest in America: The Bottom Line, by the American Association of State Highway and Transportation Officials (AASHTO), estimates international trade will increase by more than 3 percent per year and will double by 2020. It states that most of this trade will be transported by truck. The top 10 border crossings – led by Detroit and Laredo – would continue to account for approximately three-quarters of all NAFTA trade.

It is essential, therefore, to determine where the above-cited automotive trade originates and where it is destined; to forecast its growth and possible locational changes in the future; and, to identify how those changes would be influenced by a build/no-build decision regarding additional border crossing capacity. Estimates of a "no-build" scenario, prepared for the DRIC, have identified total job losses for the U.S. and Canada at 97,600 by 2035, with 70,900 losses in the U.S. and 26,700 in Canada.[3] Of these losses, about 25,000 would be Michigan jobs, and 16,500 jobs in Ontario without an improvement in crossing capacity.

Over one million persons in the United States are employed, directly, by the automotive industry (vehicle manufacturing plus auto parts manufacturers)[4]. Another 131,500 persons in Canada are employed, directly, by the auto industry[5]. Approximately three-quarters of this number (736,500) resides and works in an area called the "auto corridor north", which consists of the states of Michigan, Illinois, Indiana, Ohio, Wisconsin and the Province of Ontario[6].

Prior studies, conducted by a member of the DRIC consulting team (The al Chalabi Group, Inc.) in 1995 and 2005, indicated that each direct automotive job in the 9-County Chicago area created an additional 5.7 indirect and induced jobs[7], for a total impact of 6.7 jobs related to automotive industry activity. Other studies by the Center for Automotive Research[8] (CAR) estimated the indirect and induced impacts at 7.5 for all U.S. auto manufacturing plants; including "downstream" motor vehicle use, added to a total of 10.3 jobs. CAR stated that this latter total job impact represented 9.8 percent of the total 2001 employment in the United States. A later CAR study (March 2005) calculated a similar induced impact of 10.4 for international auto manufacturers located in North America. Consequently, approximately 10 to 11.5 million jobs

[3] HLB/HDR, *Detroit River International Crossing Study: Regional and Economic Impact of Increasing Delay and Delay-Related Costs at the Detroit River Crossing*, 08/09/2005, as revised 02/17/2006.
[4] U.S. Department of Labor Statistics: 2004.
[5] Klier, Thomas, *Determinants of supplier plant location: evidence from the auto industry, Economic Perspectives* 9/22/05 from *Automotive News*.
[6] IBID.
[7] ACG: The al Chalabi Group, Ltd., *South Suburban Airport: Economic Impact Assessment*, using Ford Auto Plant prototype.
[8] CAR: Center for Automotive Research, *Economic Contribution of the Automotive Industry to the U.S. Economy: An Update* and *The Contribution of the International Auto Sector to the U.S. Economy: An Update*, Fall 2003.

are dependent on the auto industry in the United States. If a similar ratio were applied to Canada, its auto-related impacts would be 1.3 to 1.4 million jobs.

These job impacts are both significant and highly concentrated in one of the nation's "auto-corridors," in the Great Lakes manufacturing belt and in the State of Michigan. Furthermore, the industry depends on an intricate linkage of supplier plants to auto parts manufacturers and auto assembly plants which creates the indirect portion of the multiplier impact of the auto industry. Much of that linked-industry is located along the nation's interstate highway system within an "auto corridor" dependent upon just-in-time delivery, and a very substantial portion constitutes the international trade carried by the Detroit-Windsor crossings.

Because of the substantial linkage of the manufacturing process, a plant in Michigan affects jobs there, but also in Canada, (its major trading partner), as well as in Indiana, Ohio and Illinois, and as far away as Mexico. On the other hand, an assembly plant located in Ohio contributes to jobs in the supplier parts and research and development (R&D) facilities of Michigan.

3. SKETCH PLANNING ANALYSIS

Given the significant impacts that have been documented and their apparent increase over time, it was decided to conduct a sketch planning analysis of the impact of new border crossing capacity on automotive industry jobs in Wayne County, the SEMCOG region, the State of Michigan, and the United States. The IMPLAN (Impact Analysis for Planning) Input/Output (I/O) model was used to corroborate the CAR impact estimates and those of the earlier studies by a member of the DRIC consulting team (The al Chalabi Group).

This sketch planning analysis describes the direct, indirect, induced and total jobs created by the auto industry as a whole and, more-specifically, by a 4,000-job auto assembly plant. Indirect employment includes supplier jobs, parts manufacturer jobs, and employment in providing services to an auto assembly plant. Induced jobs include the local goods and services purchased by the salaries and wages of the employees with the direct and indirect jobs. Total job impacts are considerable.

The larger the impact area (county, state, nation) the larger the job impact. But the impact on the smaller area (county) depends on the concentration within it of associated industries and workers which reflects an ability to capture the induced jobs. Also, auto production or assembly creates a much-larger induced impact than other auto-related industries. The IMPLAN-based sketch planning analysis estimates that auto assembly plants create a multiplier of 23 jobs per one direct job, compared with the 11.1 multiplier for the auto industry, in general, and a 2.2 job impact multiplier for an auto parts plant.

Due to the above-cited job concentration and impact, Michigan and Ontario are most seriously affected by any severe transport congestion.

Studies by Klier[9] indicate a "state of the art supply chain management requires most supplier plants be located within a day's drive from the assembly plant customer." That distance is generally estimated to be 450 miles. Klier, and others, describe an auto industry that "…no longer reach(es) eastward from Detroit to Pennsylvania and New York, it is now defined in a

[9] Klier – OpCit.

marked north-south direction, extending from Detroit to Kentucky and Tennessee and beyond, with fingers reaching north into Canada and south into Mexico".[10] Because of the just-in-time nature of auto manufacturing, the location of auto plants is highly correlated with the access to the interstate highway network. As can be seen in Figure A-6, a large portion of the nation's 1,000+ employee auto plants are located within the designated corridor; in fact, this corridor contains 71 percent[11] of employees in plants of 1,000 or more. Klier states that 78 percent of all auto plants are located in counties reached by an interstate highway[12]. Furthermore, approximately 86 of the 182 plants in the U.S. with more than 1,000 employees and approximately 186,239 of their 417,656 employees (or 44.6 percent) would benefit from an improvement in capacity in either the Detroit-Windsor or Port Huron-Sarnia corridors, or be hampered by constraints in them.[13] This estimate is based on the calculation of plants located in an area that would experience decreased accessibility or increased travel time due to capacity constraints as discussed in the main body of this report.

3.1 Forecasts of Demand and the Impacts of Automotive Plant Locations

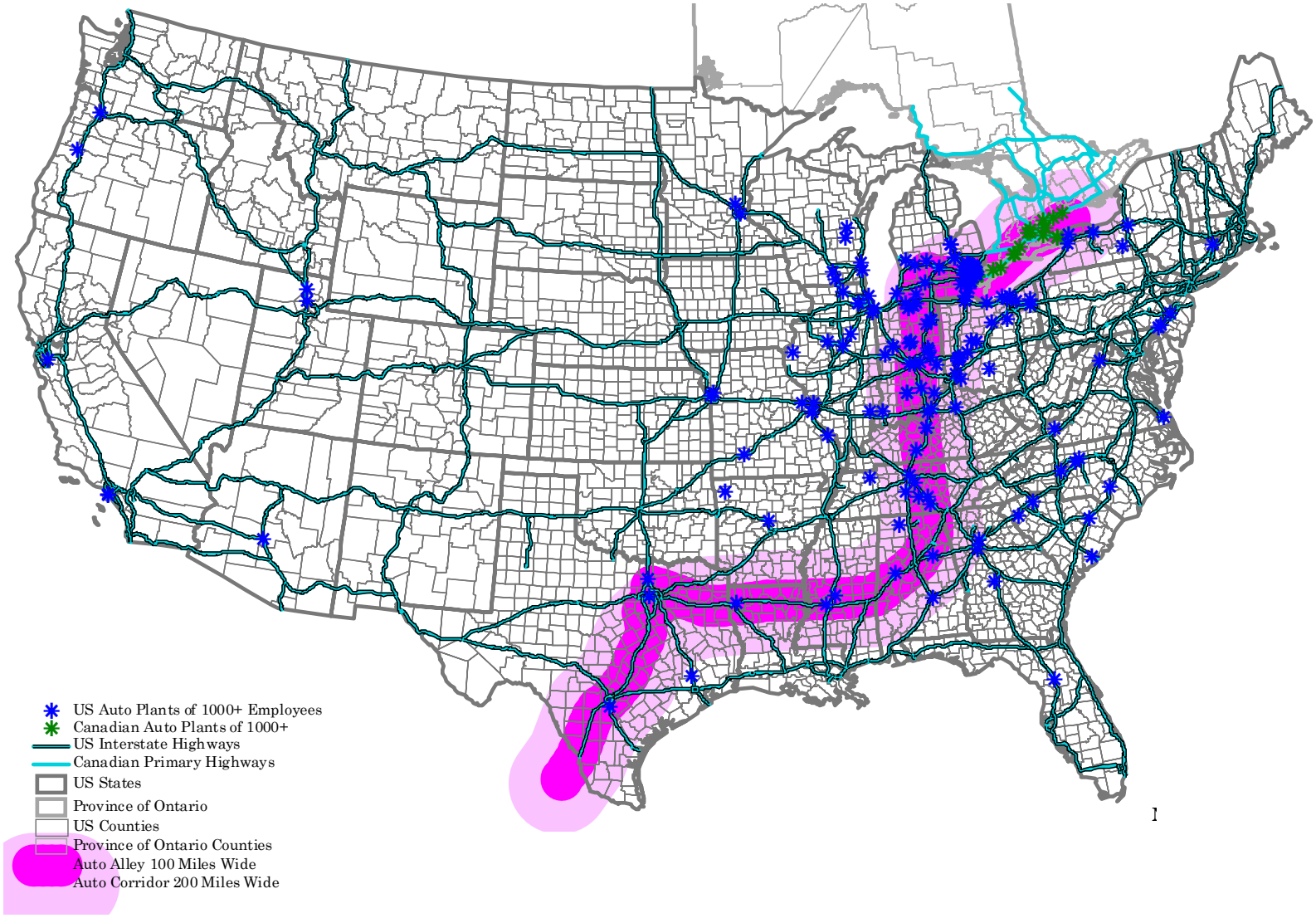
3.1.1 Forecasts of Demand

The IMPLAN Input/Output Model describes the economic impact of a single plant or an industry, in general. It does this by calculating the number of indirect and induced jobs created by the development of one direct job – in any industry. It also has the ability to calculate the economic output and the revenues to government that are produced. In this instance, it is the U.S. auto industry, which is the source of the direct jobs to be analyzed.

The number of direct U.S. auto industry jobs has remained fairly consistent in the 800,000 to one million range since 1978 due, in large part, to increased productivity, rather than increased employment (Figure A-7). The auto industry, "produces a higher level of output in the United States than any other single industry, and this output has been growing."[14] And, "No other single industry is linked to as much of U.S. manufacturing or generates as much retail business and employment."[15] The salaries and wages produced by the auto jobs also are higher than most hourly and salaried jobs and contribute to the general economy in terms of household expenditures, property and sales taxes and government revenues.

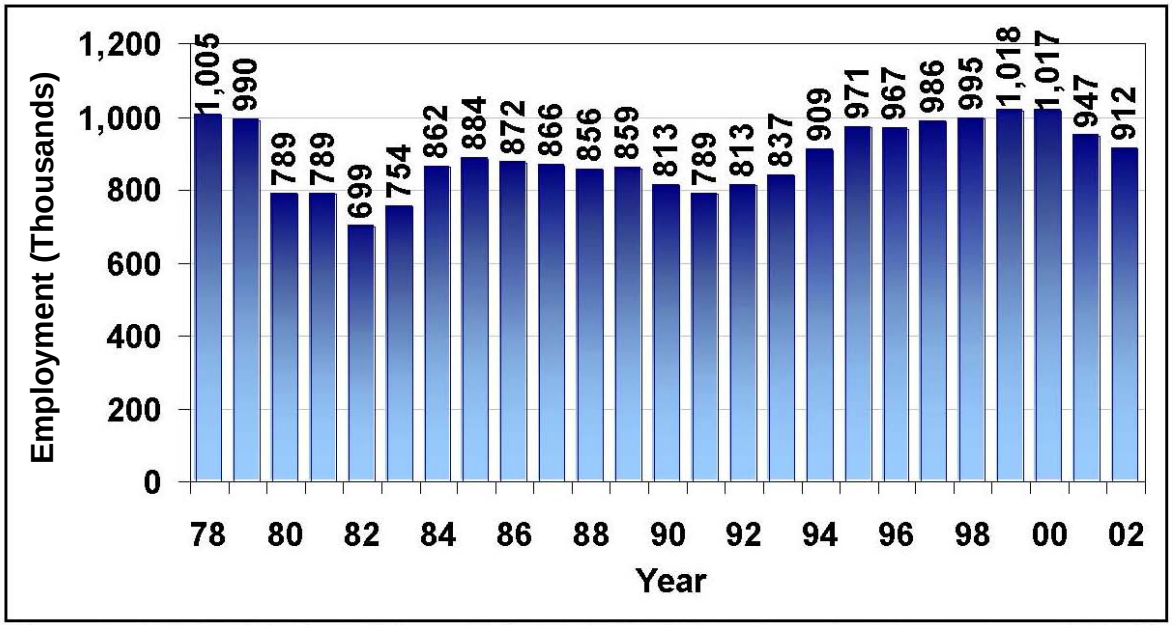
[10] IBID.
[11] Calculated by the DRIC consultant.
[12] Klier, OpCit.
[13] Calculated by the DRIC consultant.
[14] IBID.
[15] CAR - OpCit.

Figure A-6
Detroit River International Crossing Study
Major Auto Plants (1,000+ Employees)
Within the Contiguous United States and the Province of Ontario



Source: The al Chalabi Group in association with The Corradino Group of Michigan, Inc.

Figure A-7
Detroit River International Crossing Study
Total U.S. Employment: Motor Vehicles and Equipment 1978-2002



Source: CAR: Center for Automotive Research, Economic Contribution of the Automotive Industry to the U.S. Economy – An Update, 2003. (Data presented from: Ward's Motor Vehicle Facts & Figures 1999, p. 77; USDOL, BLS, Employment and Earnings, January 2000-2003, p. 229,231; http://www.bls.gov/January 21, 2003.

Indirect and induced, or multiplier, impacts attributed to the U.S. automotive industry have ranged from the 6.7 estimated in 1995 by a member of the DRIC consulting team (The al Chalabi Group) to the range of 7.6[16] to 10.4[17] estimated by CAR in 1998 and 2003, respectively. Due to the multiplier effect of the automotive industry, it has been estimated that auto-related jobs contribute 9 to 10 percent[18] of all jobs in the United States. Furthermore, the automotive industry has continued to increase its output (51 percent between 1987 and 2002 in 1996 dollars); and, in spite of recent downturns, remains crucial to the American economy.

There are two major trends in the location of new or expanded automotive plants and suppliers in the U.S. and North America:

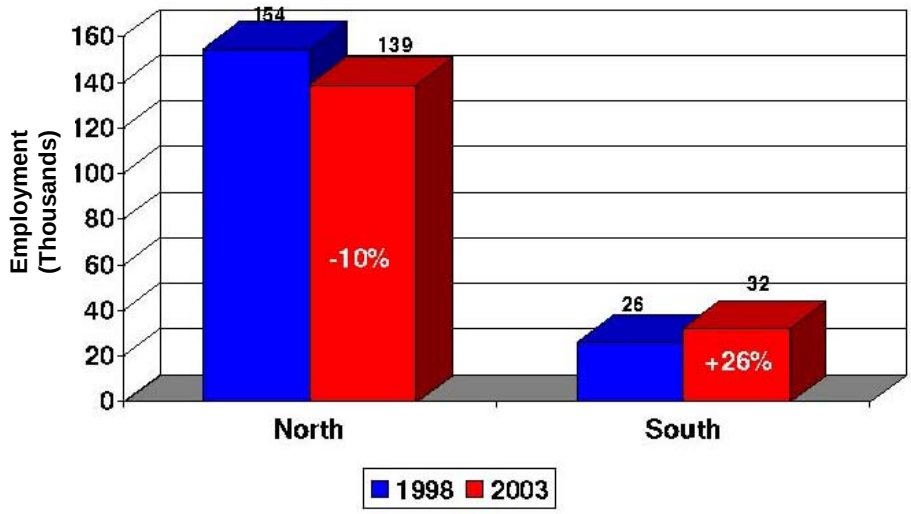
- American (traditional domestic) auto manufacturers are investing in new facilities and modernizing their existing plants primarily in the north (Great Lakes and Ontario). However, while they rely on a range of suppliers from Mexico to Canada and points beyond, the existing pool of these facilities is concentrated in the Great Lakes region, in particular, around Detroit/Michigan.

[16] Center of Automotive Research (CAR) based on direct, indirect and expenditure-induced automotive employment.
[17] Center of Automotive Research (CAR) based on direct, indirect and "downstream/socio-economic" employment.
[18] By Center of Automotive Research and others.

- International auto manufacturers, or U.S. international automotive suppliers (USIAS), which produce and sell vehicles in the United States, tend to locate in the southern portion of the United States, although they also have located in Ohio, Indiana, Illinois and Michigan. Their suppliers tend to locate within a day's travel time (roughly 450 miles).[19]

Automotive manufacturers prefer to build vehicles close to their primary markets to reduce the cost of shipping finished vehicles to their customers. And, while the Great Lakes' share of vehicle registrations has dropped, the share in the South Atlantic has increased. This decrease is reflected in the downsizing of the traditional domestic automakers group market share as the USIAS group has increased.[20] However, the north retains a commanding lead in motor vehicle manufacturing employment, 139,000 to 32,000, as shown in Figure A-8.

Figure A-8
Detroit River International Crossing Study
Motor Vehicle Manufacturing Employment



Sources: "The Auto Industry Moving South: An Examination of Trends" K. Hill, E. Brahmst, 12/03
Bureau of Labor Statistics

It is estimated that, from 1984 to 2005, 16 international automotive plants and 64,260 new jobs have been created in the U.S.[21] While plant development has been nearly equally divided, north and south, a slightly larger share (9 plants, 31,626 jobs) went to the north. However, the seven southern plants were larger and more self-contained, with 32,634 or 50.8 percent of the jobs and 46.8 percent of the total vehicle capacity (Table A-5).

Between 2006 and 2008, an additional annual capacity of 750,000 vehicles is proposed to be built with approximately 7,500 new jobs, 60 percent of which are to be in the south (Table A-6).

[19] Klier, OpCit.
[20] Hill, Kim; Brahmst, Emilio, Center for Automotive Research, *The Auto Industry Moving South: An Examination of Trends*, 12/15/03.
[21] Hill, Kim, Manufacturing Summit, Nashville, *The U.S. Automobile Industry: What Lies Ahead*, 12-05/2006.

Table A-5
Detroit River International Crossing Study
International Auto Assembly Facilities in U.S. and Canada

Company	Location	Employment	Investment (Thru June 2006 Millions $)	Annual Capacity
BMW	Spartanburg, SC	4,600	2,200	200,000
Honda	Lincoln, AL	4,300	1,200	300,000
Hyundai	Hope Hull, AL	2,000	1,100	300,000
Mercedes-Benz	Vance, AL	4,000	2,200	160,000
Nissan	Canton, MS	4,100	1,430	400,000
Nissan	Smyrna, TN	6,700	1,600	550,000
Toyota	Georgetown, KY	6,934	5,850	500,000
Honda	Alliston, ON	4,375	1,500	390,000
Honda	East Liberty, OH	2,230	920	240,000
Honda	Marysville, OH	4,315	3,200	440,000
Mitsubishi	Normal, IL	1,900	850	240,000
Subaru	Lafayette, IN	1,315	1,350	262,000
Toyota	Cambridge, ON	4,342	2,400	250,000
Toyota	Princeton, IN	4,659	2,600	300,000
NUMMI	Fremont, CA	5,715	1,300	370,000
CAMI	Ingersoll, ON	2,775	1,300	250,000
TOTAL		**64,260**	**$31,000**	**5,152,000**

Red = South
Blue = North
Sources: Hill, Kim, Manufacturing Summit, Nashville, *The U.S. Automobile Industry: What Lies Ahead*, 12-05-2006.

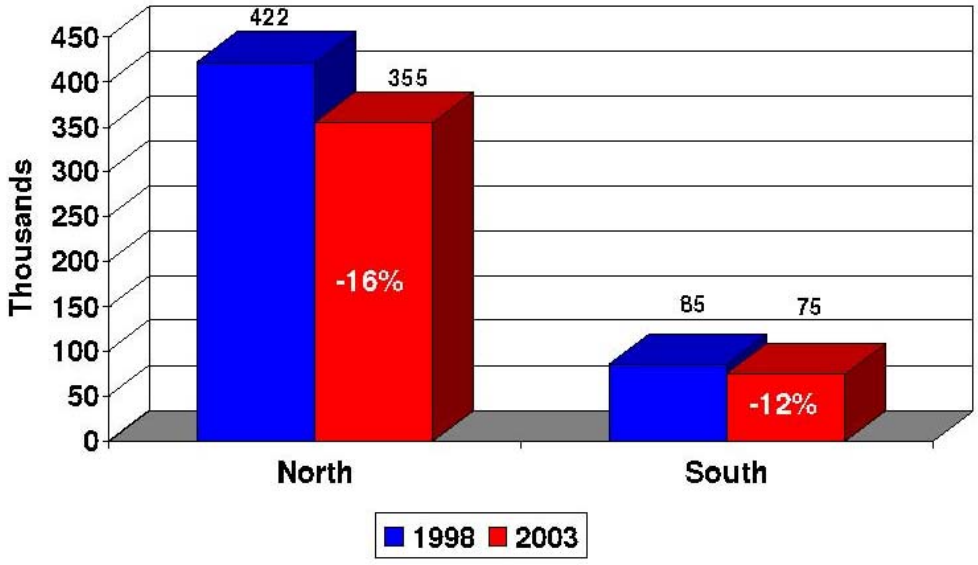
Table A-6
Detroit River International Crossing Study
New International Auto Assembly Facilities: 2006-2008

Company	Location	Employment	Investment ($ Million)	New Annual Capacity
Toyota-Texas	San Antonio, Texas	2,000	800	150,000
Toyota-Texas (Addition)	San Antonio, Texas	---	50	50,000
Toyota-Canada	Woodstock, Ont.	1,300	650	100,000
Toyota-Canada (Addition)	Woodstock, Ont.	700	300	50,000
Toyota-Subaru	Lafayette, Ind.	1,000	230	100,000
Kia	Troup County, Ga.	2,500	1,200	300,000
New Vehicle Total		7,500		750,000

Sources: Hill, Kim, Automotive News, Harbour Report, CAR research, *Changing Dynamics of the North American Automobile Industry: Crisis or Opportunity for Michigan?*

Auto suppliers (motor vehicle parts manufacturing) employment has declined in both the north and the south, between 1998 and 2003, as production has been attracted to low-cost locations – Mexico, China, etc. In that period, the north lost 16 percent and the south lost 12 percent of their employment (Figure A-9).

Figure A-9
Detroit River International Crossing Study
Motor Vehicles Parts Manufacturing Employment



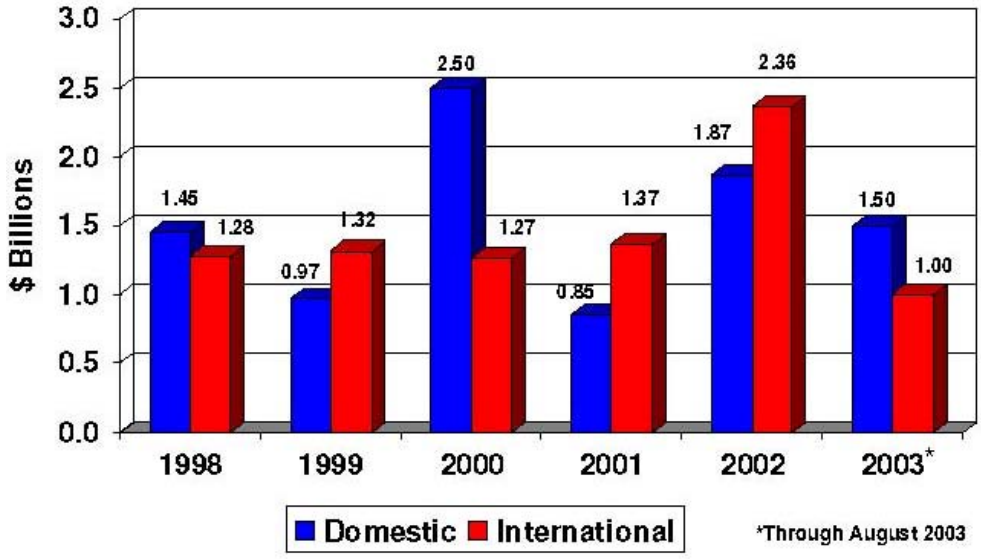
Sources: BLS and *The Auto Industry Moving South*

However, in 2003, the north had nearly five times (4.67) as many employees in the supplier industry as the south and more than four times (4.34) as many employees in auto manufacturing.[22] In general, auto manufacturing in Michigan produces a greater number of induced jobs because of the high concentration of existing related firms in the State.

While nine of 16 auto manufacturing plants and 49.2 percent of the jobs developed between 1984 and 2005 were by foreign auto manufacturers in the northern U.S., U.S. domestic auto manufacturing firms also built new and expanded existing facilities. Investment by domestic companies between 1998 and 2003, versus that of international companies, indicates a growth trend in international investment; however, over the same period, the average domestic investment is about equal ($1.52 billion vs. $1.43 billion) (Figures A-10 and A-11). A growing amount of all development continues going south.

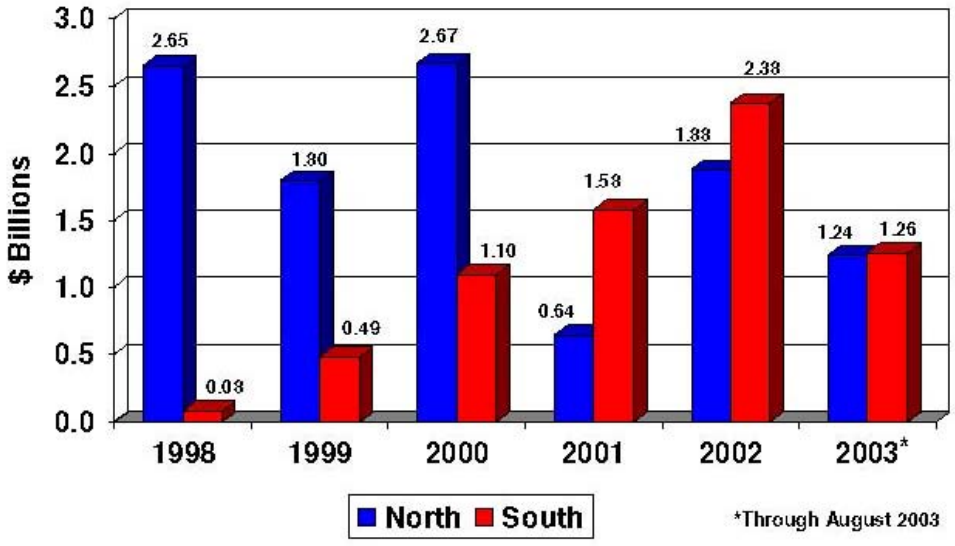
[22] Center for Automotive Research (CAR), Survey of Companies.

Figure A-10
Detroit River International Crossing Study
Original Equipment Manufacturer (OEM) Investment: Domestic/International



Sources: CAR research: Book of Deals, *The Auto Industry Moving South*

Figure A-11
Detroit River International Crossing Study
Original Equipment Manufacturer Investment: North/South



Sources: CAR research: Book of Deals, The Auto Industry Moving South

The data shown above are from studies conducted by the Center for Automotive Research (CAR) based on study of 55 manufacturing facilities, new and expanded, during the period 1998-2003. It shows an investment of $21 billion and 63,300 total jobs created or retained. Southern states tended to give a larger incentive per plant ($410 vs. $365 million), but garnered fewer jobs (25,000 vs. 38,260). Incentives per job were $50,180 in the north versus $87,700 in the south. Northern incentives tended to go, primarily, into tax abatements (83%), while southern incentives went to infrastructure (44%), then tax abatements (38%).

In general, the information on migration and/or expansion/modernization of domestic plants; the growth and location of international plants in the U.S.; and, the growth and location of supplier plants to both, indicate that while the southern U.S. offers the growing population and market; the northern U.S. offers the concentration of existing facilities and R&D talents. Incentives tend to come into play once a general location (several states) has been decided.

The growth of auto assembly/manufacturer plants and auto parts suppliers in the U.S. depends on the growth of demand, primarily in the United States, itself. The U.S. consumes approximately the number of cars produced annually in North America. Specifically, the number of cars (domestic/international) produced annually in North America (U.S.-12.1 million, Canada-2.6 million; Mexico-1.3 million) is approximately the same number sold in the U.S.; this has averaged 17.0 million per year over the period 2000-2007. But, the number of cars sold in North America exceeds the number produced by approximately four million (Table A-7). This requires the import of approximately four million vehicles annually.

Table A-7
Detroit River International Crossing Study
Production and Sale (Consumption)
of Automotive Vehicles in North America

Country	Annual Automotive Production (millions)	Annual Automotive Sales (millions)
United States	12.1	17.0
Canada	2.6	1.7
Mexico	1.3	1.0
Total	**16.0**	**19.7**

Source: Center for Automotive Research

Assuming the same number of automotive vehicles per household, and the same auto retirement rate of cars as in 2003, it is forecast that U.S. consumers will purchase 26 million automotive vehicles in the year 2035 (Tables A-8 and A-9). In addition, demand in both Canada and Mexico should increase. To meet the 2035 U.S. demand, only, the industry will have to increase production with new and/or expanded plants. The 16 plants built between 1984 and 2005 (Table A-5) produced 64,260 jobs and produced 5.125 million vehicles. Where these plants locate; the incentives normally offered; and, the impact that a new or expanded plant will have in terms of direct, indirect and induced jobs are discussed, as follows.

Table A-8
Detroit River International Crossing Study
Forecast of Annual New Sales
and Lease of Autos and Light Trucks

Year	U.S. Households	Vehicle Inventory	Annual Sales and Leases
2003	110,008,830	222,701,430	16,643,000
2004	111,450,340	225,619,617	16,865,000
2009	119,026,649	240,957,066	20,563,793
2014	126,179,867	255,438,011	21,698,892
2019	132,860,214	268,961,679	22,759,850
2024	139,033,613	281,459,082	23,782,296
2029	144,774,350	293,080,609	24,730,629
2034	150,431,283	304,532,481	25,782,531
2035	151,562,670	306,822,855	25,990,395
Change 2004-2035	**40,112,330**	**81,203,238**	**9,125,395**

Source: Hill K., Changing Dynamics of the North American Automobile Industry: Crisis or Opportunity for Michigan, CAR 2006.

Table A-9
Detroit River International Crossing Study
Calculation of Additional
Production Capacity Needed

2035 Demand for New Vehicles	26,000,000
2004 U.S. Production Capacity	13,500,000 [a]
2004 Import Sales	3,500,000 [b]
Additional Capacity Required	9,000,000

[a] U.S. domestic/USIAS production
[b] Contribution of the International Auto Sector to the U.S. Economy.
Source: Hill K., Changing Dynamics of the North American Automobile Industry: Crisis or Opportunity for Michigan, CAR 2006.

3.1.2 The Prospects for an Added Auto Assembly Plant and the Impact of Border Crossing Capacity on its Location

If the United-States-located international auto suppliers (USIAS) choose to manufacture larger shares of their U.S. vehicles in the U.S., the additional capacity required could increase by as much as half the current 3.5 million imported vehicle demand. Consequently, the 2035 added capacity could range from 9 to 10.5 million vehicles. The 16 new assembly plants built in the U.S. between 1984 and 2005 created a production capacity of 5.125 million vehicles, or an average of 320,000 vehicles per plant. At this capacity, it would require an additional 28 to 32 auto plants in the U.S. Adjusting for the impact of a 1 to 2 percent annual increase in productivity would reduce this demand to approximately 16 to 18 plants.

Given the current distribution of new plants previously analyzed (nine in the northern states; seven in the south) and with modernization and/or expansion of domestic plant production that

retains an approximate 50-50 share (domestic/USIAS) of vehicle production, it is reasonable to assume that improved border crossing capacity in the Detroit-Windsor corridor would make the State of Michigan a candidate for the siting of one or more of these plants; e.g. one of eight. It also is reasonable to assume that at least half of the total 16 to 18 plants would be located in the northern U.S. states (Ohio, Indiana, Illinois) and in Ontario, as happened in the last 20 years.

The siting of a plant in Michigan is probable, in particular, if an aggressive marketing strategy were to incorporate the fact that additional border crossing capacity will be available between 2010 and 2015, and its many advantages, including improved accessibility and travel times between Detroit and Windsor, as well as improved travel times to the major north/south and east/west interstates. Moreover, due to its substantial in-place powertrain and auto parts manufacturing plants, tool-and-die facilities, and research-and-development centers, the State of Michigan is likely to benefit, in terms of indirect and induced jobs, from any plant located within a one-day travel time, including Ontario.

3.1.2.1 Impact to New Auto Plan Locations

The desirability of attracting a new auto plant, with its average 4,000- employees, is considerable, specifically because of the high wages and salaries, the ample output and the large jobs multiplier.

Because of the substantial in-place auto-related facilities located in Michigan, it was assumed that Michigan would also benefit, to a varying degrees, if the 4,000-job plant were located in another state. Both a proximate northern state and a more-remote southern state were selected: Indiana and Alabama. Both have been major recipients of new automotive assembly plants. This section describes the economic impacts in the recipient state and in the State of Michigan if a 4,000-employee plant is located in:

- Michigan
- Indiana
- Alabama

Impact models were developed and run for each of the three states, individually, and for combined Indiana/Michigan and Alabama/Michigan impacts. For the combined runs, a subsequent subtraction process estimated the impacts on the State of Michigan. Consequently, it is possible to estimate the impacts on Michigan of auto assembly plant developments in, near or far from it.

In the modeling, the State of Michigan experienced a net loss of 35,664 jobs, with an even greater absolute number of jobs lost in the auto industry between 2003 and 2004. These losses had a significant impact on the model's employment multiplier of the auto industry; it was reduced from 8.88 in 2003 (Table A-10) to 7.55 in 2004 (Table A-11). Direct employee compensation was reduced by 21 percent and total compensation by 28 percent. However, direct output increased by 30 percent and total output by 6.8 percent. Increased output and reduced compensation can be considered as improving Michigan's competitiveness. Using the data from 2004, a 4,000-employee plant in Michigan would support 30,195 direct, indirect and induced jobs.

Table A-10
Detroit River International Crossing Study
Impacts of a 4,000-Employee Auto Assembly Plant
on the State of Michigan (2003)

	Direct	Indirect	Induced	Total
Employment	4,000	13,598	17,917	35,515
Output[a]	4,080	2,767	1,640	8,487
Employee Compensation[a]	594	932	586	2,111
Proprietor Income[a]	<1	47	57	104
Indirect Business Taxes[a]	21	68	91	180
Employment Multiplier	-	-	-	**8.88**

[a]In millions of 2003 dollars
Source: The al Chalabi Group

Table A-11
Detroit River International Crossing Study
Impacts of a 4,000-Employee Auto Assembly Plant
on the State of Michigan (2004)

	Direct	Indirect	Induced	Total
Employment	4,000	12,712	13,483	30,195
Output[a]	5,326	2,422	1,315	9,062
Employee Compensation[a]	491	705	454	1,650
Proprietor Income[a]	<1	57	46	104
Indirect Business Taxes[a]	23	77	69	169
Employment Multiplier	-	-	-	**7.55**

[a]In millions of 2004 dollars
Source: The al Chalabi Group

The IMPLAN model forecast of a 4,000-employee assembly plant in Indiana has a total job multiplier of 8.43 (total employment/base 4,000 employment) (Table A-12), based on 2004 data.

Table A-12
Detroit River International Crossing Study
Impacts of a 4,000-Employee Auto Assembly Plant
on the State of Indiana (2004)

	Direct	Indirect	Induced	Total
Employment	4,000	15,415	14,318	33,733
Output[a]	5,248	2,598	1,329	9,175
Employee Compensation[a]	435	676	436	1,547
Proprietor Income[a]	14	63	42	120
Indirect Business Taxes[a]	21	86	68	175
Employment Multiplier	-	-	-	**8.43**

[a]In millions of 2004 dollars
Source: The al Chalabi Group

To test the impact on Michigan of a 4,000-employee plant located in Indiana, a model was run for the combined two-state region (Table A-13). The total jobs that would be created in the State of Michigan, by an Indiana plant, is estimated at 1,618.

Table A-13
Detroit River International Crossing Study
Impacts of a 4000-Employee Auto Assembly Plant in Indiana
on the Michigan Economy

	New Basic	Indirect	Induced	Total
Employment	791	283	544	1,618
Output[a]	100	33	54	187
Employee Compensation[a]	34	10	18	53
Proprietor Income[a]	6	2	2	10
Indirect Business Taxes[a]	2	1	3	6

[a]In millions of 2004 dollars
Source: The al Chalabi Group

The IMPLAN model indicates the 2004 employment multiplier of a plant in Alabama is 7.15 (Table A-14), which is only five percent lower than the current multiplier in the State of Michigan. This is due, primarily, to the highly-integrated USIAS facilities in Alabama and to the high employee compensation relative to that of the entire state.

Table A-14
Detroit River International Crossing Study
Impacts of a 4,000-Employee Auto Assembly Plant
on the State of Alabama (2004)

	Direct	Indirect	Induced	Total
Employment	4,000	12,590	11,991	28,580
Output[a]	5,192	1,853	1,040	8,086
Employee Compensation[a]	417	488	373	1,278
Proprietor Income[a]	<1	49	34	84
Indirect Business Taxes[a]	19	72	52	143
Employment Multiplier	-	-	-	**7.15**

[a]In millions of 2004 dollars
Source: The al Chalabi Group

To test the impacts, on Michigan, of 4,000-employee plant in Alabama, a model was run for the combined two-state region. Table A-14 shows the results of that model run. Michigan would gain 1,150 jobs if a new auto plant were located in Alabama (Table A-15).

Table A-15
Detroit River International Crossing Study
Impacts of a 4,000-Employee Auto Assembly Plant
in Alabama on Michigan's Economy

	New Basic	Indirect	Induced	Total
Employment	532	198	420	1,150
Output[a]	91	28	4	123
Employee Compensation[a]	27	9	14	50
Proprietor Income[a]	2	1	2	5
Indirect Business Taxes[a]	2	1	2	5

[a]In millions of 2004 dollars
Source: The al Chalabi Group

In summary, whether a new 4,000-employee auto assembly plant is located in Michigan, Indiana or Alabama, there would be jobs created in the State of Michigan because of the close interrelationships of producers and suppliers and services along "auto-alley" (Table A-16). However, the difference between siting such a plant within Michigan is dramatic – an increase of about 29,000 jobs [(30,195 – 1,168 = 28,577) or (30,195 – 1,150 = 29,045)]. The ability of Michigan to gain any of these jobs is a matter of conjecture. Clearly, Michigan's rebound from its current economic situation suggest that such an accomplishment will be difficult or distant, or both. Building on Michigan's assets is essential to this rebound, including its trade relationship and its strengths in the automotive industry which will require improved cross-border capacity.

Table A-16
Detroit River International Crossing Study
Job Impacts in Michigan
of Various 4,000-employee Automotive Plant Locations

Michigan	30,195
Indiana	1,618
Alabama	1,150

Source: The al Chalabi Group