1. Introduction

An I-75 Corridor Feasibility Study[1] , completed in November 2000, articulated the need for additional freeway capacity in Oakland County to provide safe and efficient traffic movement. The I-75 Feasibility Study showed that in the horizon year of 2025, the present roadway will operate at a level-of-service (LOS) E or worse during the afternoon peak hour for almost the entire length of I-75 from M-102 (8 Mile Road) to M-24 and from Baldwin Road to Sashabaw Road (Figure 1-1). North of Sashabaw Road, the computer models indicated that I-75 will operate under capacity in the 2025 afternoon peak hour, but further analysis revealed that the traffic in the 30th highest hour will exceed capacity in 2025. This latter peaking is associated more with recreational than commuter travel. Given this traffic growth experience, it is expected that all of I-75 will be over capacity in 2025.

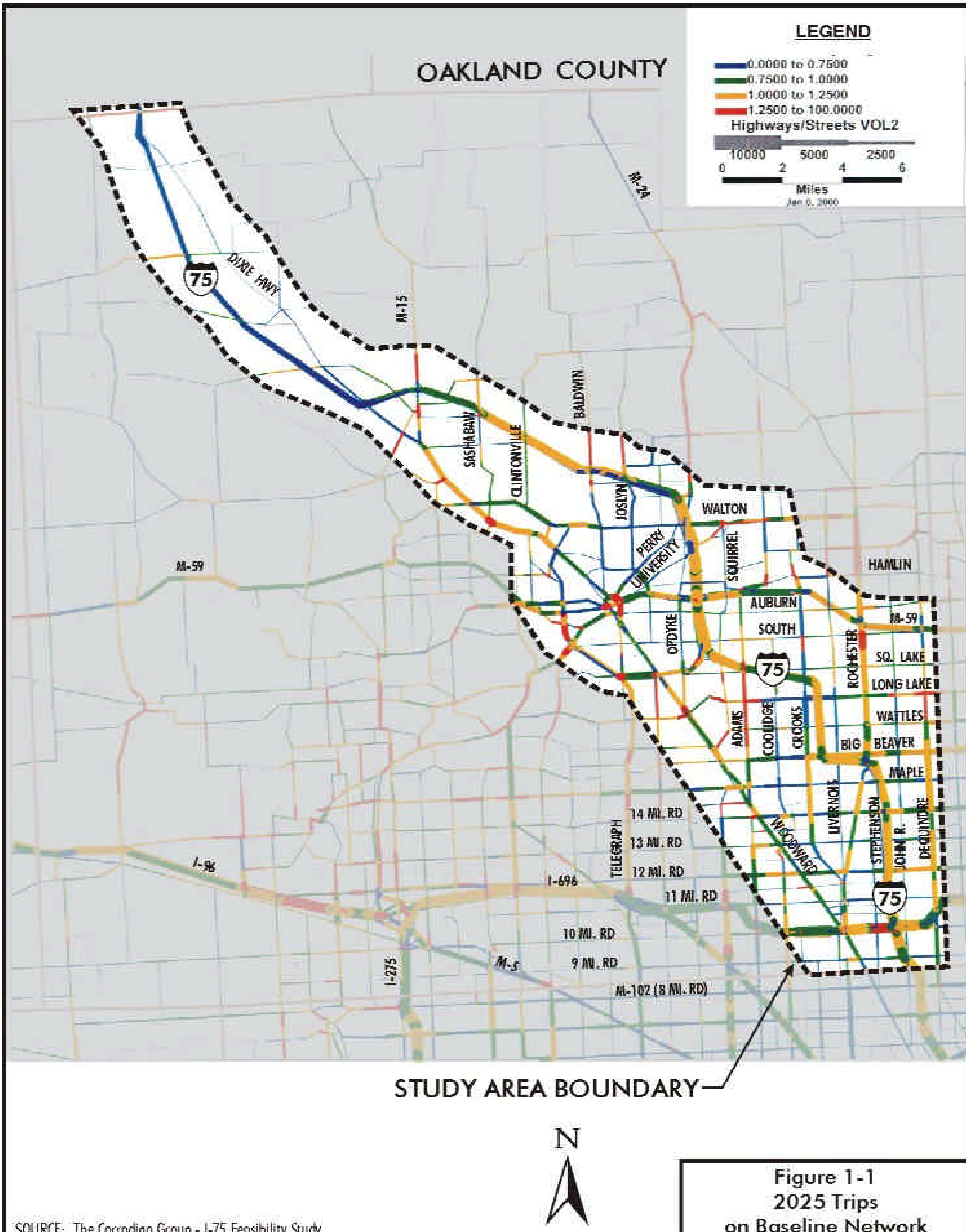
The I-75 Feasibility Study indicated that it is difficult for transit to obviate the need to expand I-75 by one lane in each direction in most sections because the travel demand in the corridor is so much greater than this solution can address. But, it was equally clear that the technical tools for evaluating transit and HOV proposals were limited in their sophistication. For example, SEMCOG's travel demand system lacked a technique such as a modal split model to forecast the use of high-type transit and high-occupancy vehicle (HOV) facilities.

Today, SEMCOG is in the midst of developing an entirely new travel demand-forecasting model, using a software package called TransCAD. SEMCOG's new system will include a mode-choice model and should provide the tools needed for a comprehensive and detailed analysis of transit and HOV facilities in the region. But, because of the time needed to develop and validate such models, they are not available. So, MDOT's consultant, The Corradino Group (Corradino) implemented transit/HOV models to supplement SEMCOG's most up-to-date data and networks. It is important to note that this approach is used in a number of major urban areas without in-place models.

Using the new models, Technical Memorandum No. 1 documented that rapid transit in the Woodward Avenue Corridor is viable. But, it does not eliminate the need for an additional lane on I-75. The analysis also indicated HOV facilities in the peak periods, at least between I-696 and M-59, appeared viable and needed further testing.

This report begins with the results of Technical Memorandum No. 1 and continues the evaluation of transit or the use of high-occupancy-vehicle facilities/services to obviate the need to widen I-75. It is prepared in response to comments on Technical Memorandum No. 1 and to the scoping information received from the public, the I-75 Council, and by various governmental/resource agencies responsible for guidance/review of the Environmental Impact Statement. It includes a number of changes to SEMCOG's highway network to further align it with conditions on the ground and in the planning stage.

[1] *I-75 Corridor Study in Oakland County*; prepared for the Michigan Department of Transportation, SEMCOG, the Road Commission for Oakland County and The Traffic Improvement Association of Oakland County; by The Corradino Group; November 2000.


OAKLAND COUNTY
LEGEND
0.0000 to 0.7500
0.7500 to 1.0000
1.0000 to 1.2500
1.2500 to 100.0000
Highways/Streets VOL2
10000
5000
2500
0
2
4
6
Miles
75
DIXIE HWY
M-15
M-24
BALDWIN
SASHABAW
CLINTONVILLE
JOSLYN
WALTON
PERRY
UNIVERSITY
SQUIRREL
HAMLIN
M-59
AUBURN
SOUTH
OPDYKE
ROCHESTER
SQ. LAKE
LONG LAKE
WATTLES
ADAMS
COOLIDGE
CROOKS
BIG
BEAVER
MAPLE
LIVERNOIS
STEPHENSON
JOHN R.
DEQUINDRE
WOODWARD
14 MI. RD
13 MI. RD
12 MI. RD
11 MI. RD
10 MI. RD
9 MI. RD
M-102 (8 MI. RD)
TELEGRAPH
I-96
I-696
I-275
M-5
STUDY AREA BOUNDARY
N

SOURCE: The Corradino Group - I-75 Feasibility Study

Figure 1-1
2025 Trips
on Baseline Network

2. Transit Analysis

The transit concept evaluated in Technical Memorandum No. 1 is a high-performance system running on Woodward Avenue from Pontiac in Oakland County to Jefferson Avenue in downtown Detroit (Figure 2-1). It would include 28 stations and be characterized by:

- High speed (60 mph where distances and conditions permit);
- High quality vehicles with a quiet, smooth ride;
- Separation from other traffic to avoid congestion;
- Short headways, 3 minutes;
- Short dwell times, 15 seconds or less;
- Timed transfers with intersecting routes to avoid missed transfers;
- Communication between buses also to avoid missed transfers;
- Park-and-ride lots at stops north of, and including, the Michigan State Fairgrounds;
- Fare integration with intersecting transit service to permit a single fare for all segments of a trip; and,
- Pre-paid fares at platforms to reduce boarding times.

For this Technical Memorandum No. 2, a significant increase in feeder service was added in Oakland County, particularly north of 13 Mile Road where the baseline network was relatively thin. Table 2-1 summarizes the regional results of this update, which indicate that the improved feeder bus connections to the Woodward Avenue rapid transit system would cause increases of about seven percent in daily transit trips and over 15 percent in rapid transit use in 2025.

Table 2-1
Rapid Transit and HOV Concepts
I-75 PM Peak Hour Characteristics (2025)

Measures	Simulations		
	No Action	Rapid Transit T.M. No. 1	Rapid Transit Updated
Regional Daily Transit Trips (Linked)[1]	117,682	154,667	164,945
Regional Transit Boardings (Unlinked)[2]	177,285	246,440	272,020
Woodward Rapid Transit Boardings	NA	43,035	49,782
DPM Boardings	10,967	9,930	9,608

Source: The Corradino Group of Michigan, Inc.
[1]Origin to destination.
[2]Stop to stop.

SOURCE: The Corradino Group of Michigan, Inc.

Figure 2-1
Proposed High Quality Transit Alternative
Attractions & Transit Connections/Stations

The change in feeder bus service affects rapid transit's station-by-station use as previously forecast in Technical Memorandum No. 1 (Table 2-2). From downtown Detroit to 7 Mile Road, rapid transit's two-way loading changes by up to 15 percent. North of 7 Mile Road, the percentage changes are larger, with two-way daily loadings holding at about 5,000 riders up to 14 Mile Road. From there, they decline to approximately 2,000 riders at the Pontiac terminus.

Figures 2-2 through 2-4 indicate that even with the additional and significant amount of feeder bus service serving optimum rapid transit operating in Woodward Avenue, the traffic on I-75 is not affected. And, using the traffic standard of Level of Service D (the design target for I-75), it can be seen that an additional lane is needed on I-75.

Table 2-2
Rapid Transit Station Activity

Node	Location	Access	Daily Ons + Offs	Daily 2-way Loaings T.M. No. 1	Daily 2-way Loadings Updated
15101	Pontiac Transp. Center	Auto Walk, Bus	2,204		
				1,046	2,204
15104	Square Lake Road	Auto, Walk, Bus	3,047		
				1,028	2,567
15105	Long Lake Road	Auto, Walk, Bus	244		
				1,036	2,645
15106	Big Beaver	Auto, Walk, Bus	674		
				1,020	2,747
15107	Maple Road	Auto, Walk, Bus	1,533		
				1,037	3,586
15108	14 Mile	Auto, Walk, Bus	2,339		
				1,140	4,675
15109	13 Mile	Auto, Walk, Bus	3,968		
				2,750	6,517
15110	12 Mile	Auto, Walk, Bus	3,511		
				3,401	7,254
15111	11 Mile	Auto, Walk, Bus	1,252		
				3,552	7,428
15139	10 Mile	Auto, Walk, Bus	1,312		
				4,048	7,902
15112	9 Mile	Auto, Walk, Bus	5,217		
				6,835	8,933
15113	M-102 (8 Mile)	Auto, Walk, Bus	4,395		
				10,248	12,016
15114	7 Mile	Walk, Bus	3,892		
				11,732	13,594
15115	McNichols	Walk, Bus	4,851		
				13,212	15,119
15117	Woodland Ave.	Walk, Bus	1,693		
				14,152	15,914
15116	Trowbridge	Walk, Bus	2,889		
				16,204	17,749
15118	Hazelwood	Walk, Bus	4,243		
				18,165	19,508
15119	Mount Vernon	Walk, Bus	4,661		
				19,998	21,169
15120	Grand Blvd.	Walk, Bus	3,039		
				19,793	20,868
15121	Antoinette	Walk, Bus	4,901		
				20,024	20,901
15122	Warren	Walk, Bus	6,306		
				21,608	22,295
15123	Alexandrine	Walk, Bus	3,841		
				21,731	22,258
15124	Mack	Walk, Bus	511		
				21,759	22,237
15125	Alfred	Walk, Bus	5,018		
				21,869	22,145
15126	I-75	Walk, Bus	1,639		
				20,954	21,206
15135	Grand Circus Park	DPM, Walk	4,884		
				16,130	16,376
15136	Campus Martius	Walk, Bus	12,321		
				5,059	5,179
15137	Jefferson Ave.	Walk, Bus	5,179		

Source: The Corradino Group of Michigan, Inc.

Figures 2-2, 2-3 & 2-4
2025 NB I-75 Mainline, PM Peak Hour Volumes
(hundreds of vehicles)

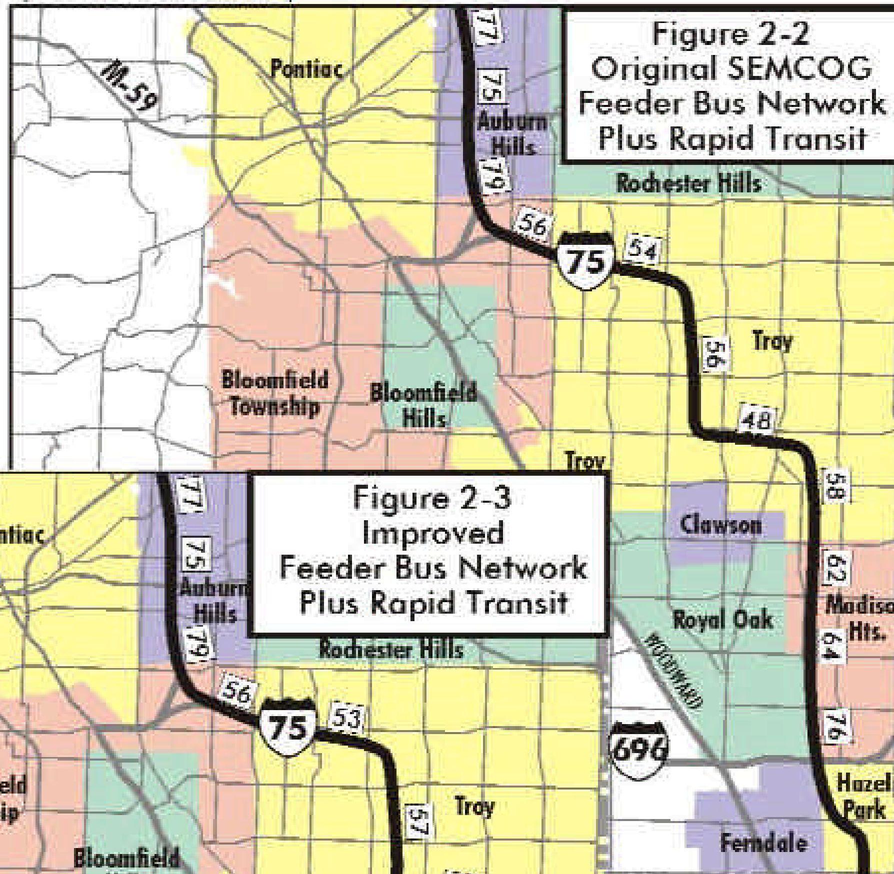
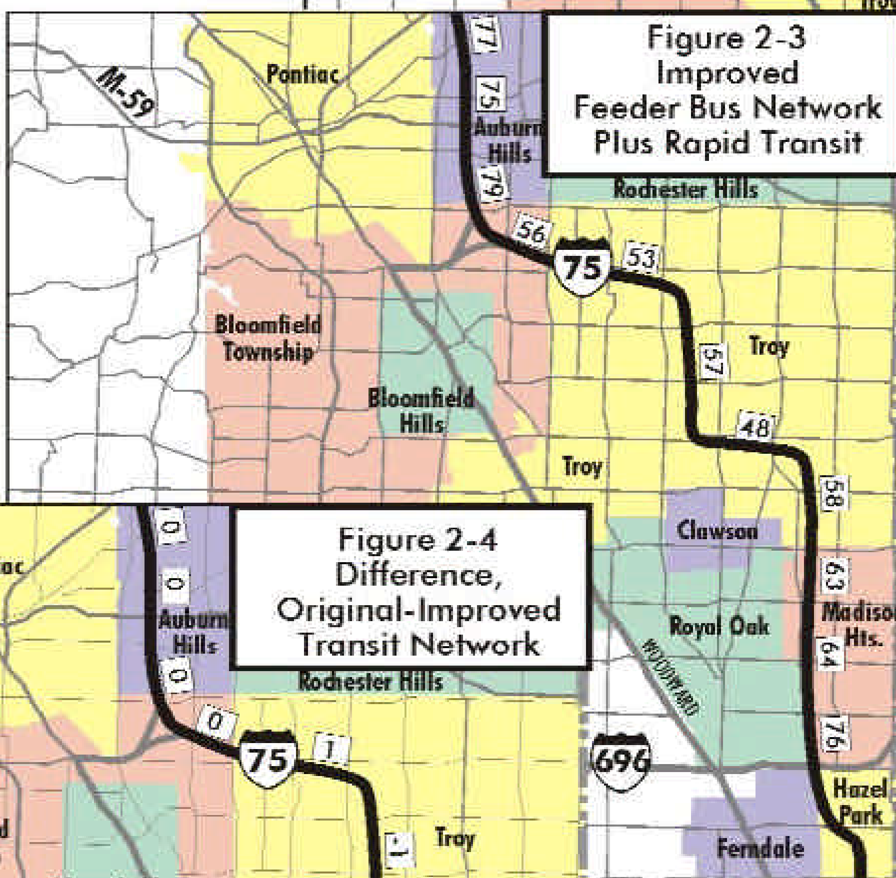
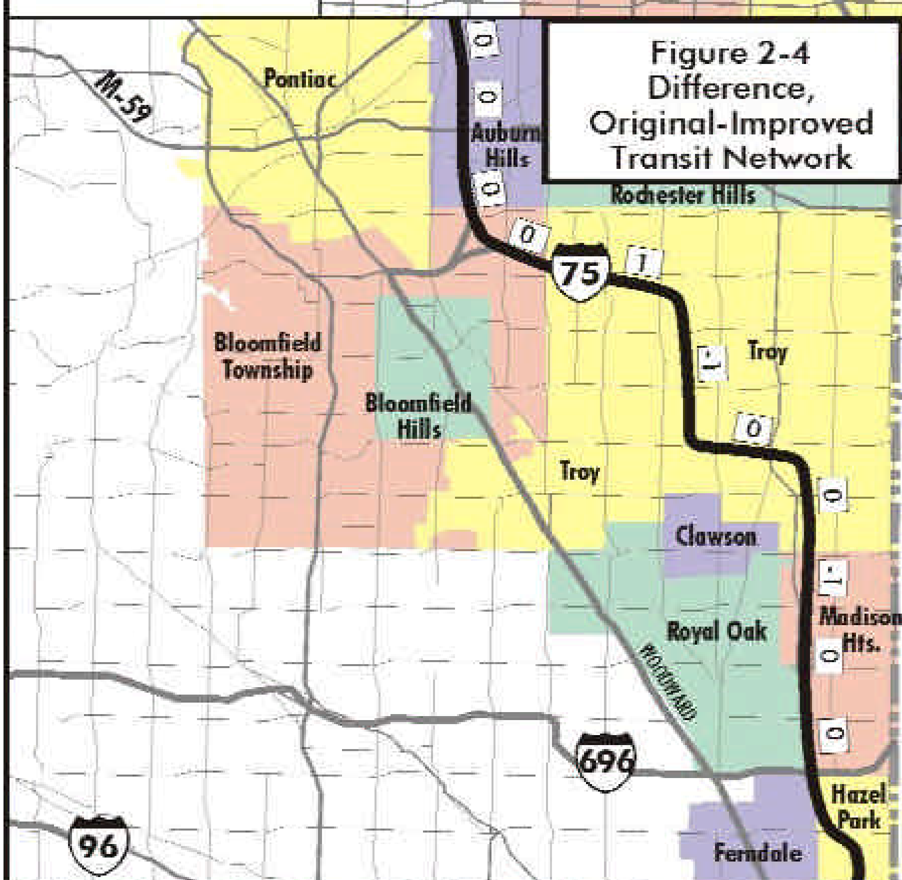


Figure 2-2
Original SEMCOG
Feeder Bus Network
Plus Rapid Transit
M-59
Pontiac
Auburn Hills
Rochester Hills
Bloomfield Township
Bloomfield Hills
Troy
Clawson
Royal Oak
Madison Hts.
Hazel Park
Ferndale
WOODWARD
75
696
77
75
79
56
54
56
48
58
62
64
76





2025 PM Peak Hour Traffic Volumes and LOS for I-75 - No Build

Segment	Northbound Volumes	NB LOS*
M-102 to 9 Mile Road	7,773	E
9 Mile Road to I-696	7,827	E
I-696 to 11 Mile Road	7,590	E
11 Mile Road to 12 Mile Road	6,430	F
12 Mile Road to 14 Mile Road	6,250	F
14 Mile Road to Rochester Road	5,812	E
Rochester Road to Big Beaver Road	4,820	D
Big Beaver Road to Crooks Road	5,654	E
Crooks Road to Adams Road	5,346	D
Adams Road to Square Lake Road	5,586	F
Square Lake Road (I-75 BL) to M-59	7,803	E
North of M-59	7,460	E

Source: The Corradino Group of Michigan, Inc.
*Considering weaving and incidents LOS F would prevail over these segments.

L:Projects/3676/Corradino/DR2/Fig-2-2.cdr

3. Updated HOV Analysis

The previous analyses documented in Technical Memorandum No. 1 indicated that further study of HOV in the peak periods is necessary. The options given further consideration are:

HOV Option A – This option calls for the HOV lane to be added between M-102 (8 Mile Road) and M-15 with modifications at each interchange in this section, but not including M-102 (called Full-Access HOV). This section of I-75 was chosen because the analysis covered in Technical Memorandum No. 1 indicated HOV was at least marginally effective here.

HOV Option B – This option calls for the HOV lane to be added between I-696 and M-59, with interchange modifications at those and all interchanges in between. This section of I-75 demonstrated in the earlier analysis (Technical Memorandum No. 1) that it had the greatest potential for successful HOV treatment. At I-696 special ramps to the HOV lane would be provided to/from the north. At M-59 the special ramps would be from the south. These ramps would allow exclusive access to the HOV lane.

HOV Option C – This option calls for striping and signing the HOV lane (called Basic HOV) with no exclusive access facilities to/from any interchange along the length of I-75 from M-102 to M-15. Again, earlier analysis indicated this section of I-75 has some potential for successful HOV treatment.

The following sections of this report document the travel characteristics and potential impacts associated with these alternatives. Options A and B are discussed first as they present the greatest challenge.

HOV Options A and B

Travel Characteristics

To measure the effectiveness of these alternatives, a comparison is made with the option of adding a lane for the use of all vehicles, i.e., NOT just high-occupancy vehicles (car pools, van pools, and buses). The first issue to be examined is 2025 traffic flow. In this case, the afternoon peak hour "throughput" (northbound) of the HOV lane is examined for each option, in comparison with the performance of an additional lane serving all vehicles (i.e., a general-purpose lane).[2] One test is whether the HOV lane would carry more than 700 vehicles per hour (a generally accepted measure of the viability of HOV). Another test assesses whether the HOV lane would carry more people than the adjacent general-purpose lane. For Options A and B, traffic modeling shows that this standard is met (Tables 3-1A and 3-1B).

[2]The afternoon peak is the larger of the two peaks (AM and PM). But, because of relatively balanced flow, these PM/northbound results are expected to be mirrored in the AM/southbound peak period.

Table 3-1A
2025 PM Peak Hour Throughput NB (Vehicles and Persons)
HOV Lane (2-plus) vs. General Purpose Lane at Key Segments Along I-75
Option A: Full-Access HOV/M-102 to M-15

	Total HOV Lane Vehicles per Hour	Person Throughput per Lane		Passes Test
		HOV Lane	Adjacent General Purpose Lane (Avg.)[1]	
M-102 to I-696	1,590	4,020	2,040	Yes
I-696 to 12 Mile	2,270	5,700	2,320	Yes
12 Mile to 14 Mile	1,980	4,970	2,040	Yes
Square Lake to M-59	2,030	5,030	2,130	Yes
Sashabaw to M-15	910	2,280	1,570	Yes

Source: The Corradino Group of Michigan, Inc.
[1]Numbers differ from those in Technical Memorandum No. 1 because of highway network modifications such as: 1) making the section of I-75 between I-696 and 12 Mile the equivalent of four through lanes compared to three in the original SEMCOG network; and, 2) including the Crooks/Long Lake interchange as now being designed.

Table 3-1B
2025 PM Peak Hour Throughput NB (Vehicles and Persons)
HOV Lane (2-plus) vs. General Purpose Lane at Key Segments Along I-75
Option B: Full-Access HOV/I-696 to M-59

	Total HOV Lane Vehicles per Hour	Person Throughput per Lane		Passes Test
		HOV Lane	Adjacent General Purpose Lane (Avg.)[1]	
I-696 to 12 Mile	2,150	5,400	2,290	Yes
12 Mile to 14 Mile	1,970	4,950	2,040	Yes
Square Lake to M-59	1,820	4,510	2,080	Yes

Source: The Corradino Group of Michigan, Inc.
[1]Numbers differ from those in Technical Memorandum No. 1 because of highway network modifications such as: 1) making the section of I-75 between I-696 and 12 Mile the equivalent of four through lanes compared to three in the original SEMCOG network; and, 2) including the Crooks/Long Lake interchange as now being designed.

A third comparison is the throughput of all northbound lanes on I-75 in the afternoon peak hour with the addition of an HOV lane versus the addition of a general-purpose lane. The results again demonstrate that HOV is viable for both Options A and B (Tables 3-2A and 3-2B).

Table 3-2A
2025 PM Peak Hour Total Freeway Person Throughput NB
HOV Lane (2-plus) vs. General Purpose Lane at Key Segments Along I-75
Option A: Full-Access HOV/M-102 to M-15

	Add GP Lane Alternate	Add HOV Lane Alternate	HOV Increase	Passes Test
	Peak Hour Person Throughput	Peak Hour Person Throughput	Peak Hour Person Throughput	
M-102 to I-696	11,270	12,180	+910	Yes
I-696 to 12 Mile	11,340	12,650	+1,310	Yes
12 Mile to 14 Mile	10,320	11,080	+760	Yes
Square Lake to M-59	10,570	11,420	+850	Yes
Sashabaw to M-15	6,730	6,980	+250	Yes

Source: The Corradino Group of Michigan, Inc.

Table 3-2B
2025 PM Peak Hour Total Freeway Person Throughput NB
HOV Lane (2-plus) vs. General Purpose Lane at Key Segments Along I-75
Option B: Full-Access HOV/I-696 to M-59

	Add GP Lane Alternate	Add HOV Lane Alternate	HOV Increase	Passes Test
	Peak Hour Person Throughput	Peak Hour Person Throughput	Peak Hour Person Throughput	
I-696 to 12 Mile	11,340	12,250	+910	Yes
12 Mile to 14 Mile	10,320	11,080	+760	Yes
Square Lake to M-59	10,570	10,750	+180	Yes

Source: The Corradino Group of Michigan, Inc.

One final test drawn from standards established by the Texas Transportation Institute (TTI) indicates that travel time savings for HOV lanes should exceed one minute per mile. This does not occur for either Options A or B as the HOV travel time savings for the sections between either M-102 and M-15 or I-696 and M-59 are only about 0.1 minute per mile.

It is important to note these tests of Full-Access HOV concepts give an advantage to the HOV vehicles using the special ramps. But, they constrain the speed of the HOV lane, just like the general purpose lane, as a function of congestion. This represents reality. The results are different from those produced by others in earlier analyses[3] of I-75 which showed the HOV lane could carry between 2,300 and 2,900 vehicles (6,900 to 9,000 people) in the PM peak hour in 2020 and

[3] *Southeast Michigan High-Occupancy Vehicle (HOV) Feasibility Study Final Report*, Parsons Brinckerhoff Michigan, Inc., May 1999.

create travel time savings of one minute per mile or more. These latter data exceed the capacity of a single lane at LOS F and reflect an average vehicle occupancy of almost three. These results are just not achievable in a practical sense. Nevertheless, they do reinforce the conclusion cited above, i.e., that HOV works along I-75, at least between I-696 and M-59. The question then becomes: what are the impacts?

Other Impacts

With the traffic flow feasibility of a Full-Access HOV demonstrated for both Options A and B, additional impacts of these concepts were compared with those of installing one additional lane on I-75 (to bring the entire section between M-102 and M-59 to four through lanes) without special ramp improvements. The latter option will fit within the available right-of-way, for all practical purposes.

To facilitate Options A and B, special flyover ramps would be constructed to "land" in the middle of the freeway and provide direct access to the HOV lane (Figure 3-1). Such flyovers/landing areas would add 30 feet to the roadway width for some distance in each direction of I-75 at the interchanges. The additional roadway width cannot be accommodated within the right-of-way in some cases and impacts would result. The impacts covered in this analysis include the number of business structures (not businesses), single-family dwelling units, multi-family dwelling units, churches, and other institutions that could potentially be acquired. The number of additional acres of wetlands is also measured. Finally, the cost of constructing the improvements, exclusive of right-of-way, is presented. To set the stage for this analysis, the physical characteristics of the proposed improvements at several key locations are described, proceeding from south to north. Where expected conditions are particularly illustrative of the impacts to be encountered, graphics are provided.

Figure 3-1
Example HOV Access