I-375 TRAFFIC FORECASTING METHODOLOGY TECHNICAL MEMORANDUM

AUGUST 7, 2020

MDOT
Michigan Department of Transportation

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1 Background

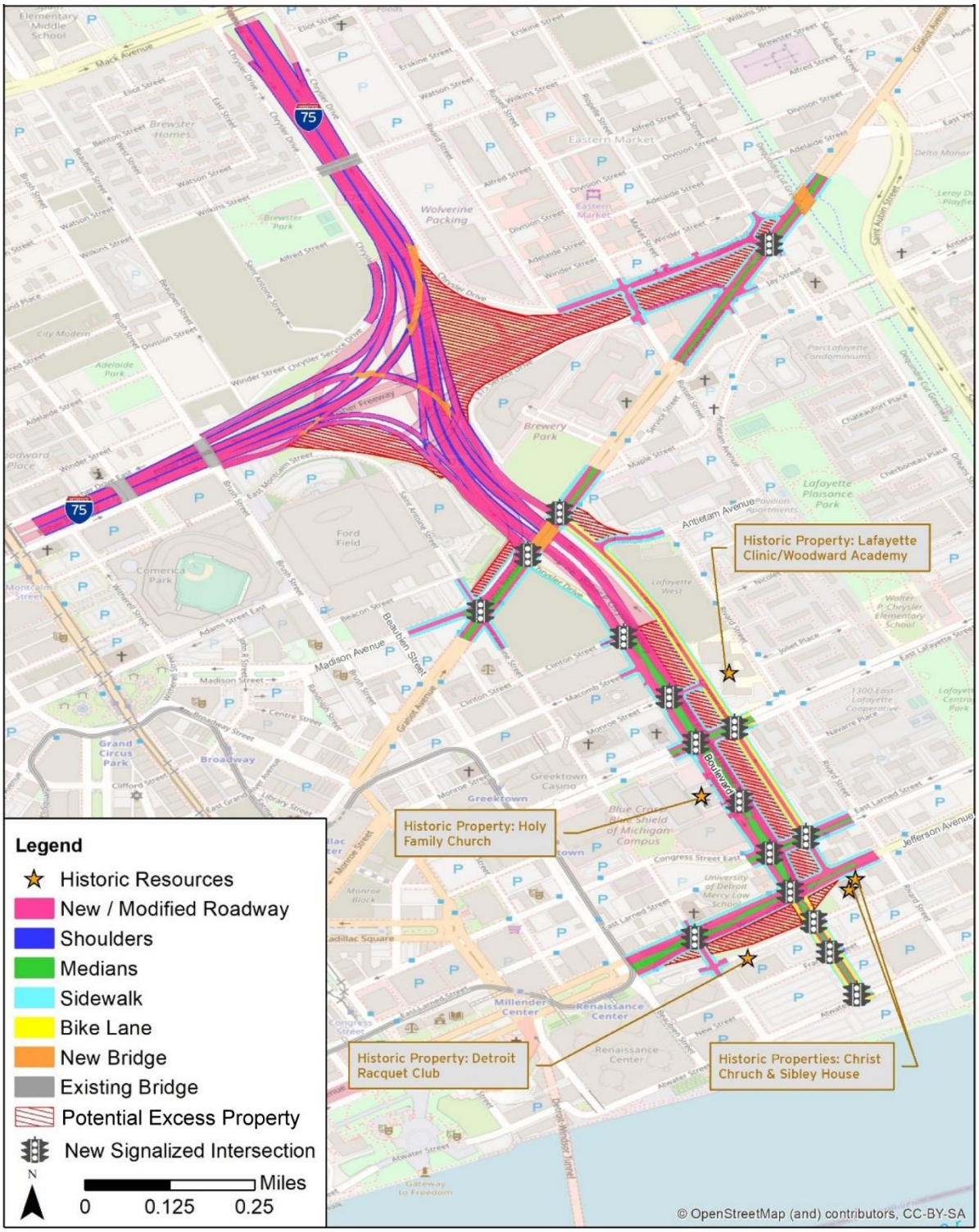
The Michigan Department of Transportation (MDOT) requested that HNTB perform a traffic analysis for the I-375 corridor for existing, Future 2040 No-Build, and Future 2040 Build conditions for the Preferred Alternative. The Future 2040 Build analysis was originally conducted based on Practical Alternative 5, which is documented in Section 7. After stakeholder feedback and alternative refinement, the analysis was refined for the Preferred Alternative, which is documented in Section 8.

The Future Build alternative assumes that the I-375 interstate mainline and one-way frontage roads will be changed to a boulevard south of the I-75/I-375 interchange, with an additional bi-directional service drive equipped with a center turn lane. Practical Alternative 5 had four lanes in each direction on the I-375 Boulevard with a local service road between Antietam Avenue and Jefferson Avenue. The Preferred Alternative has three lanes in each direction on I-375 Boulevard, with one four-lane section southbound north of Lafayette Avenue. The Preferred Alternative also has a local service road between Antietam Avenue and Monroe Street.

2 Introduction

This technical memorandum presents an overview of the traffic forecasting methodology for the I-375 project. It provides recommended growth rates to develop a future No-Build 2040 scenario based on growth from the Southeast Michigan Council of Governments' (SEMCOG) travel demand model (TDM). Additionally, this memorandum includes recommended factors to develop Future Build 2040 traffic volumes to account for changes in proposed access in the build alternative. Figure 1 illustrates the I-375 study corridor and the Practical Alternative 5.

Figure 1: Project Location Map and Practical Alternative 5



2.1 Existing Traffic Volumes

Turning movement counts with vehicle classifications were collected at modeled intersections in the project area between 7-9 AM and 2-6 PM. Mainline and ramp counts with vehicle classifications were collected for 24 hours. These counts were collected in April and May 2017, except for intersections south of Jefferson Avenue, which were taken in September 2017. The count locations are listed below.

Intersections

- Jefferson Ave. & Randolph St.
- Jefferson Ave. & SB Chrysler Service Dr.
- Jefferson Ave. & NB Chrysler Service Dr.
- Larned St. & SB Chrysler Service Dr.
- Larned St. & NB Chrysler Service Dr.
- Lafayette Ave. & SB Chrysler Service Dr.
- Lafayette Ave. & NB Chrysler Service Dr.
- Monroe & SB Chrysler Service Dr.
- Monroe & NB Chrysler Service Dr.
- Gratiot Ave. & SB Chrysler Service Dr.
- Gratiot Ave. & Antietam Ave.
- Antietam Ave. & NB Chrysler Service Dr.
- St. Antoine St. & Madison Ave.
- St. Antoine St. & Gratiot Ave.
- Russell St. & EB Fisher Service Dr.
- Russell St. & WB Fisher Service Dr.
- Gratiot Ave. & EB Fisher Service Dr.
- Mack Ave. & SB Chrysler Service Dr.
- Mack Ave. & NB Chrysler Service Dr.
- Brush St. & EB Fisher Service Dr.
- Brush St. & WB Fisher Service Dr.
- Clifford St. & EB Fisher Service Dr.
- Clifford St. & WB Fisher Service Dr.
- 2nd Ave. & EB Fisher Service Dr.
- 2nd Ave. & WB Fisher Service Dr.
- St. Antoine St. & Congress St.
- St. Antoine St. & Larned Ave.
- St. Antoine St. & Monroe St.
- St. Antoine St. & Lafayette Ave.
- Rivard St. & Lafayette Ave.
- Rivard St. & Larned St.
- Rivard St. Gratiot Ave.
- Russell St. & Gratiot Ave.
- Beaubien St. & Madison Ave.

- Rivard St. & Jefferson Ave.
- Woodward Ave. & Jefferson Ave.
- Beaubien St. & Jefferson Ave.
- St. Antoine St. & Atwater St. (Collected September 2017)
- St. Antoine St. & Franklin St. (Collected September 2017)
- Schweizer Pl. & Franklin St. (Collected September 2017)
- Schweizer Pl. & Atwater St. (Collected September 2017)
- Rivard St. & Franklin St. (Collected September 2017)
- Rivard St. & Atwater St. (Collected September 2017)

Mainline

- I-75 at Russell St.
- I-75 at Cass Ave.
- I-75 at Wilkins St.
- I-375 at Larned St.

Ramps

- NB I-75 Exit to SB I-375
- NB I-75 Ramp to NB I-75 (at I-375 Interchange)
- Gratiot Connector WB Exit Ramp to SB I-375
- Gratiot Connector WB Exit Ramp to NB I-75
- NB I-375 Exit Ramp to EB Gratiot Connector
- NB I-375 Exit Ramp to SB I-75
- SB I-75 Exit Ramp to EB Gratiot Connector
- SB I-75 Exit Ramp to SB I-75
- SB I-75 to NB-SB M-10
- NB-SB M-10 Exit Ramp to NB I-75
- SB I-75 Exit Ramp to 2nd Ave.
- NB I-75 Entrance Ramp from Brush St.
- NB I-75 Entrance Ramp from Clifford St.
- NB I-75 Exit Ramp to Mack Ave.
- SB I-75 Entrance Ramp from Mack Ave.
- NB I-375 Entrance Ramp from Monroe Ave.
- SB I-375 Exit Ramp to Monroe Ave.
- NB I-375 Entrance Ramp from Larned St.
- SB I-375 Exit Ramp to Larned St.

The VISSIM model for the project uses the data from 7:00-9:00 AM, and 2:00-6:00 PM. The defined AM peak hour is 7:30 – 8:30 AM and the PM peak hour is 4:30-5:30 PM. The peak period analysis hours do not match the SEMCOG model period hours. This does not impact the growth rate evaluation as only the daily volume trends are reviewed. Peak hour traffic counts were not adjusted for day of week or month variations.

Existing (2017) balanced traffic volumes were developed for the following time periods using the collected traffic counts:

- 7:00 - 8:00 AM
- 8:00 – 9:00 AM
- 2:00 – 3:00 PM
- 3:00 – 4:00 PM
- 4:00 – 5:00 PM
- 5:00 – 6:00 PM
- 7:30 – 8:30 AM (AM Peak)
- 4:30 – 5:30 PM (PM Peak)

3 Existing Origin/Destination Matrices

The existing project origin/destination (OD) matrices were estimated for each of the balanced volume sets listed previously. The OD matrix zone structure and network coincide with the project VISSIM model. AM and PM subarea matrices from the 2015 SEMCOG TDM were used as the pattern matrix for the OD estimation procedure. Separate auto and truck matrices were estimated for each period to closely match observed truck counts.

For VISSIM modeling, the one-hour matrices between 7:00-9:00 AM and 2:00-6:00 PM were divided into 15-minute OD matrices using the 15-minute count data.

4 SEMCOG Regional Travel Demand Model (TDM)

HNTB utilized SEMCOG's 2015 and 2040 TDM. The 2015 and 2040 demographic data for the traffic analysis zones (TAZs) surrounding the project corridor were updated using preliminary data from SEMCOG's upcoming model release. The 2015 Existing, 2040 No-Build, and 2040 Build (Practical Alternative 5) models were run. The SEMCOG model growth rates were evaluated using the following comparisons:

- Zone-based growth from sociodemographic data
- Traffic Assignments
    - No-Build – Average Traffic Assignment Growth for Major Facilities
    - No-Build – Link-by-Link Comparison
    - Build – Screenline comparison to No-Build Assignments.

4.1 Zone-Based Growth

The sociodemographic data was analyzed to understand growth trends in employment and population in the project corridor. Figure 2 shows changes in employment from 2015 to 2040 using percent change, and Figure 3 shows population changes reported by absolute change.

The analysis shows the highest growth occurring in the downtown core west of I-375, north of Macomb Street, east of Cass Avenue, and extending north to Mack Avenue. The summaries shown in Figure 2 and Figure 3 use SEMCOG's preliminary data.

Figure 2: SEMCOG Employment Changes Between 2015 and 2040

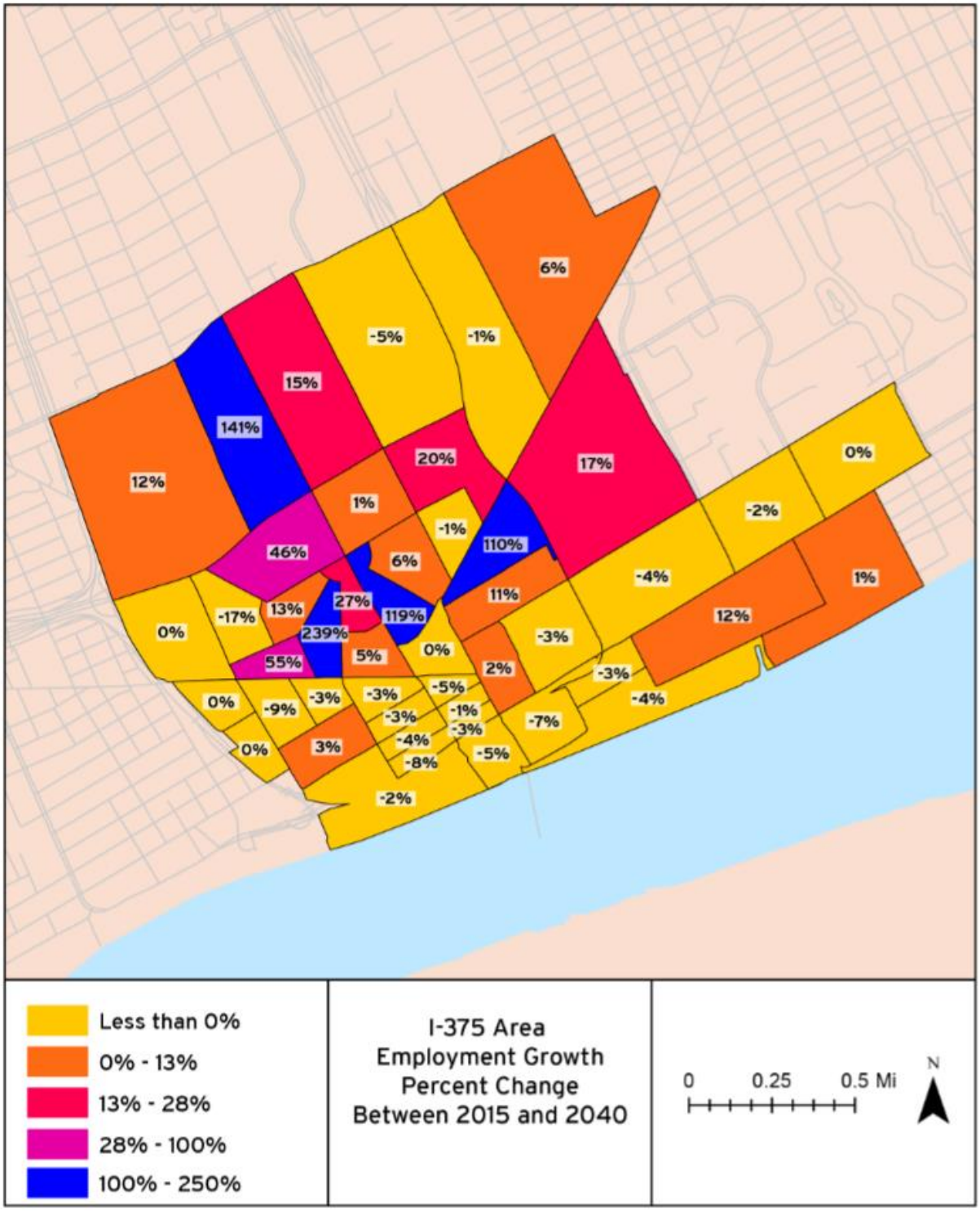
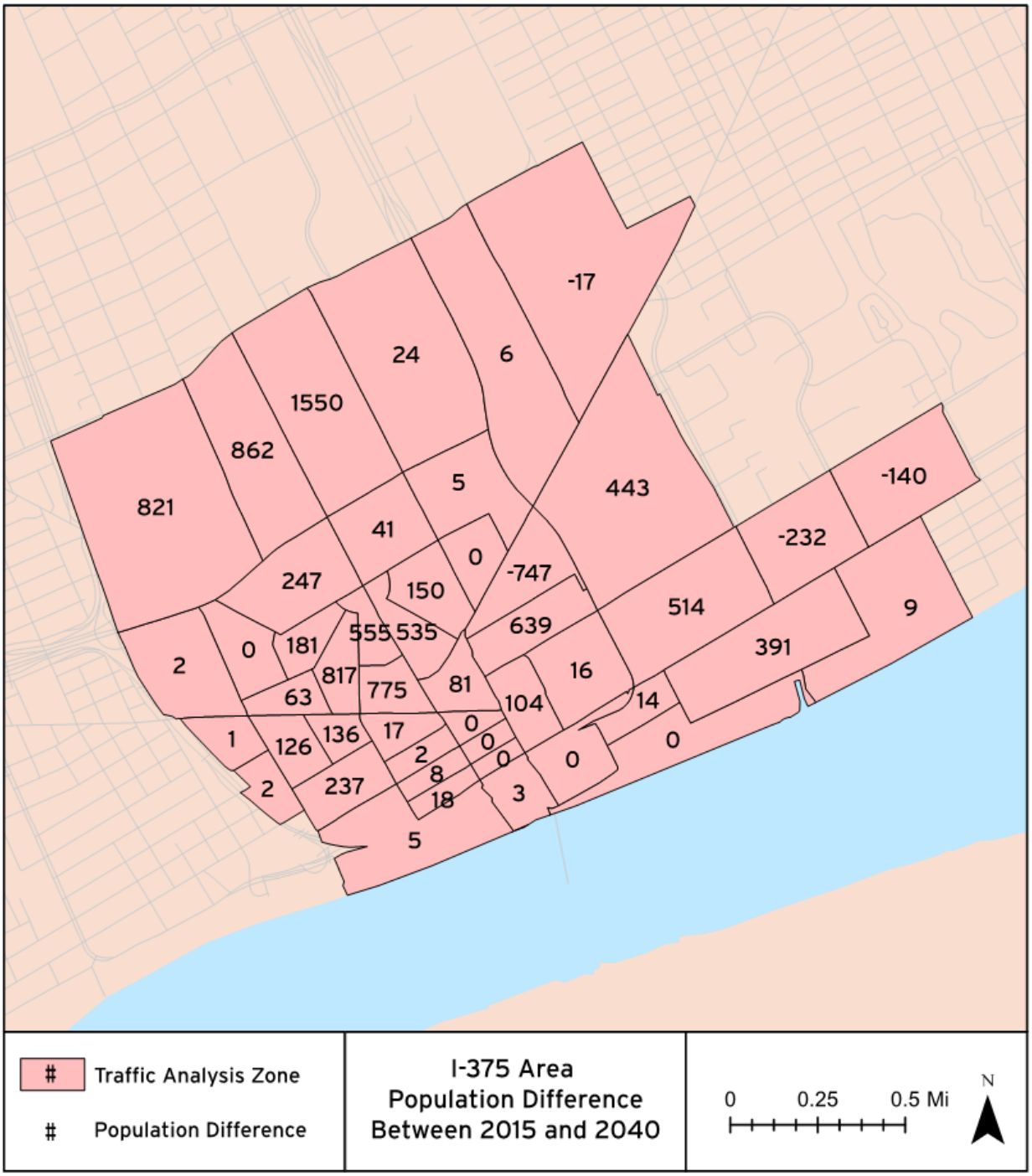


Figure 3: SEMCOG Population Changes Between 2015 and 2040

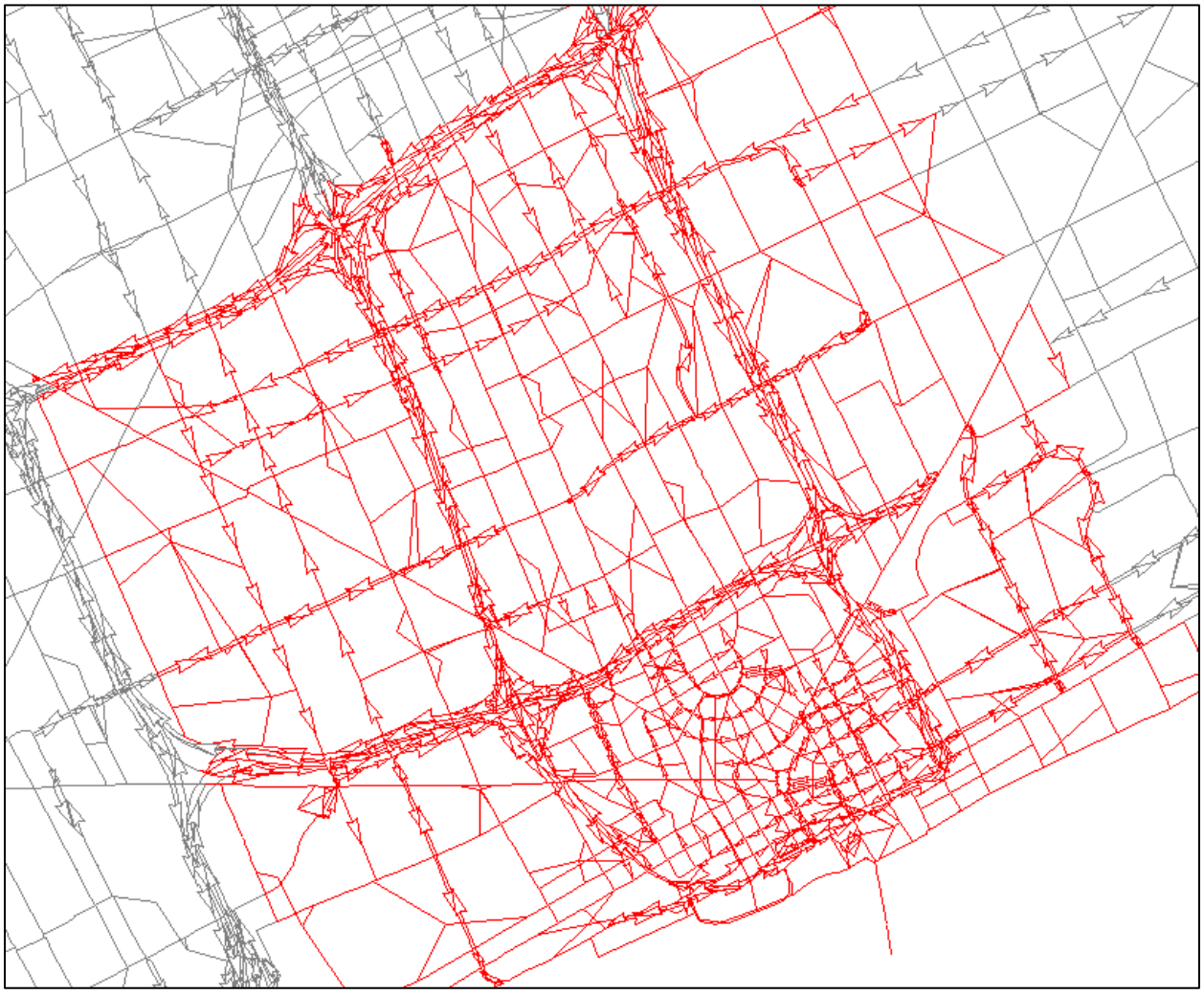


4.2 Traffic Assignment Comparison

4.2.1 No-Build – Average Growth for Major Facilities

The 2015 Existing and 2040 No-Build Traffic assignment growth rates were calculated for I-75, I-375, Gratiot Avenues, and M-10 in the highlighted areas shown in Figure 4. Vehicle Miles Traveled (VMT) is used to compare the growth of each major facility.

Figure 4: Downtown Detroit Model Links Analyzed for Growth Rates



The traffic assignment growth rate from 2015 to 2040 No-Build using Compounded Annual Growth Rate (CAGR) are listed in Table 1.

Table 1: Facility Growth Rates

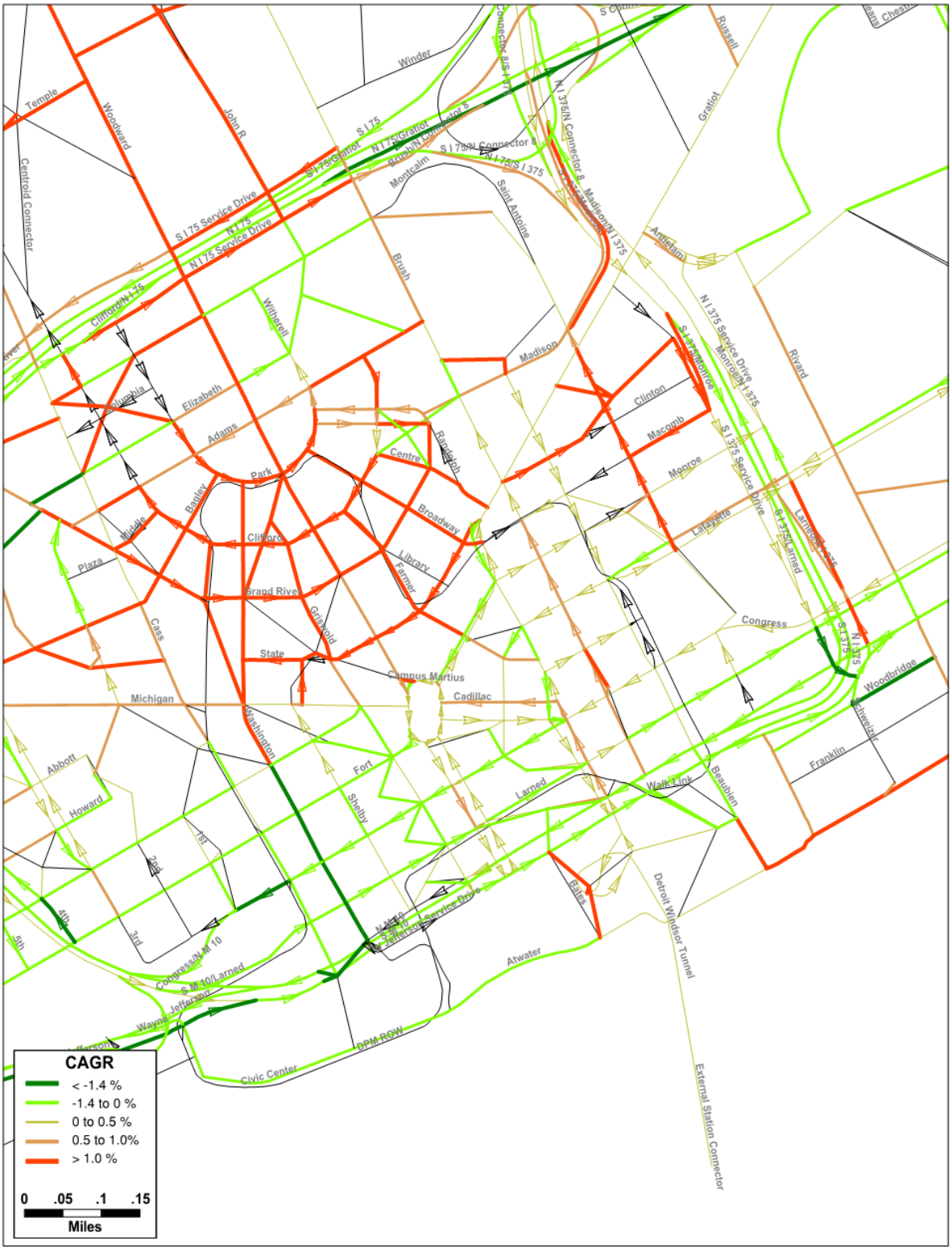
Facility	CAGR (2015 to 2040)
I-75	-0.02%
I-375	+0.2%
Gratiot Avenue	-0.4%
M-10	+0.4%

4.2.2 No-Build – Link by Link Comparison

The 2015 Existing and 2040 No-Build Traffic Assignment growth rates were calculated for each link in the study area. The results of this comparison are shown in Figure 5. The color scale in the figure shows the CAGR on a link-by-link basis. The green color shows areas where traffic decreased in the 2040 scenario. This includes Jefferson Avenue, I-375, I-75, and local streets just north of Jefferson Avenue. Areas in orange and red are locations where the growth rates were greater than 0.5% per year. The higher growth rate areas included: John R Street and Woodward Avenue north of I-75, I-375 ramps between Madison Avenue, and local roads in the downtown core between I-75 on the north, Cass Street on the west, I-375 on the east and Macomb Street on the south.

The average link growth rate in the downtown core between Cass Street, I-75, I-375, and Macomb Street has a compounded average annual growth rate (CAGR) of 1.12%. This increase in traffic correlates closely with the population and employment trends shown in Figure 2 and Figure 3.

Figure 5: Growth Factors for No-Build 2015 to 2040



4.2.3 Build – Screenline Comparison to No-Build Assignments

The Build scenario (Alternative 5) was analyzed with the SEMCOG model. To compare the No-Build and Build traffic assignments a series of screenline locations were constructed. Figure 6 shows the screenline locations that were used for the comparison. The results from the screenline analysis showed the impacts of access and capacity changes between the No-Build and Build scenarios. The results from this comparison were not used directly to forecast the Build scenario but were instead used to confirm and guide the recommended adjustment factors outlined in the last section of this memorandum. The percent difference between Build and No-Build for select screenline locations are shown in Table 2.

Figure 6: Screenline Locations

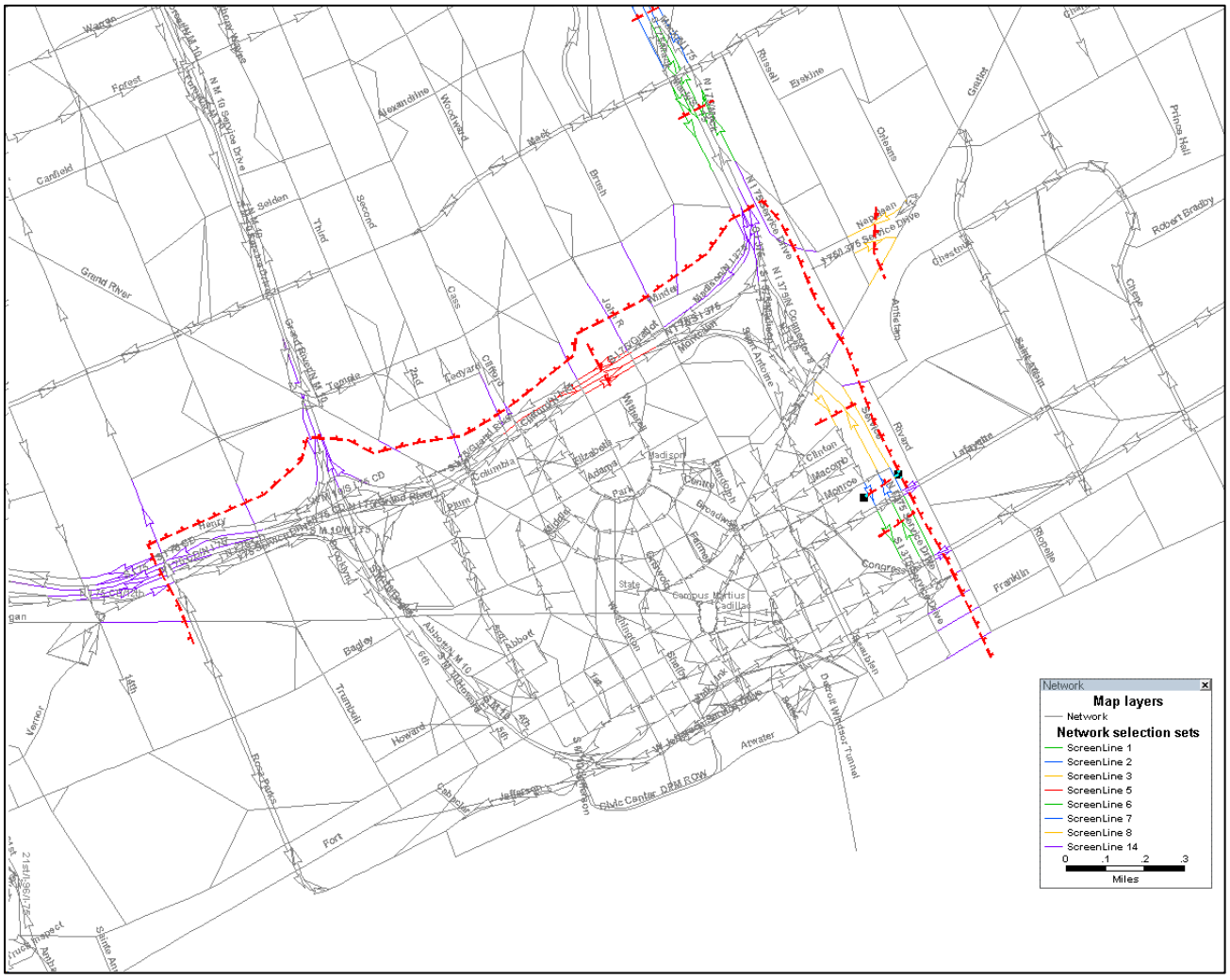


Table 2: Screenline Traffic Differences Between Build and No-Build Alternatives

Screenline #	Location	Build vs. No-Build
3	I-375 South of Gratiot Ave/Madison Ave	-28%
5	I-75 East of Woodward Ave	-40%
6	I-375 South of Mack Ave	-25%
7	I-375 north of Mack Ave	-20%
8	Gratiot Ave and Gratiot Connector	23%
14	Cut line for traffic entering downtown	-4%

Observations for the Build and No-Build comparison are included below, based on an analysis of the difference in traffic volumes in the region between the two scenarios and a review of the screenlines in Figure 5:

- For the I-375 corridor south of Gratiot Avenue and Madison Avenue, the SEMCOG model showed a reduction in traffic caused by the reduction in capacity in the corridor.
- For the I-75 corridor (west end of the VISSIM model), the SEMCOG model indicates a reduction in overall traffic because the Gratiot Connector (east leg of the interchange) was eliminated and because the capacity downstream on I-375 south of the interchange was reduced in the Build condition.
- For the I-375 segment near Mack Avenue (northern project limits), there is anticipated to be a 15-25 percent reduction in traffic.
- The Gratiot Avenue corridor east of I-375 experienced an increase in traffic in the Build compared to the No-Build between I-375 and St. Aubin Street; however, north and east of that section the traffic on Gratiot Avenue decreased significantly because traffic was diverting to other corridors outside of the I-375 corridor when the Gratiot Avenue connector was eliminated in the Build condition.

5 Traffic Forecasting Process

Traffic forecasts for the Build alternative were developed using a two-step process, where the underlying growth rate trends were first applied to the No-Build scenario and the Build scenario pivots from the No-Build forecasts using differences between the No-Build and Build scenarios.

Step 1: Traffic Forecasts for the No-Build: The future No-Build traffic was forecasted by applying growth factors to traffic counts. The anticipated growth from 2017 to 2040 was determined from the following sources:

a. Traffic Assignments – 2015 Existing and 2040 No-Build
b. Zonal based sociodemographic data for zones within and surrounding the project area.

Step 2: Traffic Forecasts for Build: The Build scenario was forecasted by applying impacts from the differences between Build and No-Build 2040 to the forecasts from Step 1.

5.1 Growth Rate Recommendations

The growth rate recommendations for the I-375 project are listed in Table 3. The higher growth rate of 1.0% per year in the downtown core is based on SEMCOG model assignment results. The 0.5% for the rest of the corridor is a minimum growth rate chosen for this project. The purpose of the minimum growth rate is to account for unknown traffic impacts such as developments not in the SEMCOG model, planned road projects that do not materialize, or new road projects currently out of the SEMCOG plan.

Table 3: I-375 Recommend Growth Rates

Locations	Annual Growth Rate (2017 – 2040)
John R St., Woodward Ave., Madison Ave., Brush St., Macomb St., and other local roads in the higher growth area (Figure 3)	1.0%/year
I-75, Jefferson Ave., I-375, Gratiot Ave., Lafayette Ave., Mack Ave., and local roads outside the higher growth area (Figure 3)	0.5%/year

6 2040 No-Build Forecasts

The recommended growth rates were applied to the Existing Year OD matrices through Fratar Factoring, which applied the growth rate at the zone level. Growth rates at individual locations along the project corridor were a result of the factored OD matrices. The Existing Year OD matrices match the balanced hourly volumes for the project corridor.

The truck percentages and 15-minute profiles for the VISSIM analysis were maintained with the 2040 No-Build forecasts.

6.1 Adjustments for Woodward Closure

Woodward Avenue between Jefferson Avenue and Larned Street was converted to a pedestrian corridor after the traffic counts were taken. The 2040 No-Build OD matrices were adjusted based on the following assumed diversion routes for Woodward Avenue traffic.

- 50% of northbound Woodward Avenue (at Jefferson Avenue) was moved to Randolph Street.
- 50% of northbound Woodward Avenue (at Jefferson Avenue) was moved to location west of Woodward (outside corridor).
- 50% of southbound Woodward Avenue (at Jefferson Avenue) was moved to Randolph Street.
- 50% of southbound Woodward Avenue (at Jefferson Avenue) was moved to locations west of Woodward Avenue (outside corridor).

The 2040 No-Build forecasts were developed by assigning the 2040 No-Build OD matrices to the 2040 No-Build network through an all-or-nothing traffic assignment.

7 2040 Build Forecasts – Practical Alternative 5

The 2040 Build Forecasts pivot from the 2040 No-Build forecasts based on access and capacity changes between the two scenarios. The 2040 Build OD matrices were adjusted based on the recommended diversion routes and related traffic redistributions listed in this section. The SEMCOG TDM traffic assignment results (future 2040 Build compared to 2040 No-Build) were used to guide the OD adjustment factors. The recommended factors are summarized in the following sections.

7.1 Capacity Adjustments

As shown in the travel demand model results section, the reduction in capacity in the Build corridor compared to the No-Build results in the SEMCOG model showing reduced traffic volumes for several sections of I-375 and I-75. Macroscopic scale models, such as the SEMCOG model, are best used for evaluating regional trends. They are inadequate for capturing intersection level operations. To better forecast the capacity constraints in the Build Alternative the VISSIM model is used in a feedback loop to guide diversion

assumptions for the corridor capacity constraints. The two movements of interest include: eastbound Jefferson Avenue to northbound I-375 and southbound I-375 to westbound Jefferson Avenue. In the Existing Year conditions, these movements are free-flow as part of the I-375 freeway spur. In the proposed 2040 Build scenario, these movements become right- and left-turn movements at a signalized intersection. The draft capacity constraint assumptions for these movements are listed below. These capacity constraint assumptions were used for the traffic analysis shown with the final operational results.

- 20% traffic reduction from eastbound Jefferson Avenue to northbound I-375
- 20% traffic reduction from southbound I-375 to westbound Jefferson Avenue

These reductions result from local downtown rerouting as well as traffic bypassing the I-375 corridor for alternative routes.

7.2 Access Adjustments

The Build alternative modifies access along the project corridor. These access changes will result in modified trip routes. To account for these access changes the following adjustment factors are recommended.

Northbound I-75 to eastbound Gratiot Avenue

- 10% will use Mack Avenue instead of the eastbound I-75 to eastbound Gratiot Connector
- 50% will divert out of the project corridor to parallel routes
- 40% will use the provided connection (I-75 ramp to Gratiot Avenue, southbound left onto Gratiot Avenue)

Westbound Gratiot Avenue to southbound I-75

- 10% will use Mack Avenue
- 50% will divert out of project corridor to parallel routes
- 40% will use the provided connection (westbound right onto I-75 ramp from Gratiot Avenue)

New connection between Madison Avenue and Gratiot Avenue

The proposed Madison Avenue/Gratiot Avenue crossover provides new access between the two roads. To account for this new access, the OD matrices were modified to account for rerouting between the two locations.

- 70% of westbound Madison Avenue traffic turning left at Beaubien Street was moved to Gratiot Avenue at the crossover
- 20% of westbound Gratiot Avenue traffic was moved to Madison Avenue
- 10% of eastbound Gratiot Avenue traffic was moved to Madison Avenue
- 30% of eastbound Madison Avenue (eastbound through at Beaubien Street) was moved to Gratiot Avenue

Brush Street Entrance/Exit to I-75

- 30% of westbound Madison Avenue off-ramp (westbound through at Beaubien Street) from southbound I-75 will go to the Brush Street off-ramp
- 30% of eastbound Madison Avenue on-ramp (eastbound through at Beaubien Street) to northbound I-75 will go to the Brush Street on-ramp

Southbound I-75 to eastbound Gratiot Avenue

- 90% of southbound I-75 to eastbound Gratiot Avenue was moved to Mack Avenue

Westbound Gratiot Avenue to northbound I-75

- 90% of westbound Gratiot Avenue to northbound I-75 was moved to Mack Avenue

I-75 to Larned Street

Access to Larned Street from I-75 was limited for Build Alternative 5. The following modifications were used to reroute I-75 traffic destined for Larned Street:

- 40% will go to eastbound Jefferson Avenue
- 40% will go to eastbound Lafayette Avenue
- 20% will go to Larned Street through Gratiot Avenue and the Frontage Road

New connection between I-375 and Schweizer Place

New access will be created between I-375 and Schweizer Place at the Jefferson Avenue intersection. This new connection will provide improved access to areas south of Jefferson Avenue and better roadway connectivity to the east-west roads of Woodbridge, Franklin, and Atwater streets. To account for the access modifications and improved roadway connectivity the following adjustments were made:

- The eastbound right and northbound right at the St. Antoine Street and Jefferson Avenue were moved to Schweizer Place south of Jefferson Avenue.
- 20% of westbound left traffic at Beaubien Street at Jefferson Avenue from southbound I-375 were moved to Schweizer Place.
- 20% of northbound right traffic at Beaubien Street at Jefferson Avenue destined for northbound I-375 were moved to Schweizer Place.
- 50% of all northbound left traffic at Rivard Street at Jefferson Avenue destined for northbound I-375 was moved to Schweizer Place.
- 90% of southbound I-375 to eastbound right at Rivard Street at Jefferson Avenue was moved to Schweizer Place.

The Build forecasts were developed by assigning the Build OD matrices to the Build network through an all-or-nothing traffic assignment. The Build OD matrices were equal to the No-Build OD matrices with the inclusion of the capacity and access adjustment factors.

7.3 Comparison of No-Build and Practical Alternative 5 Forecasts

The underlying growth rates for the No-Build and Build scenarios were equal. However, the adjustment factors for access changes and capacity constraints for the Build condition resulted in differences in screenline volumes for the two scenarios. Table 4 shows the percent difference from No-Build to Build forecasts at various locations in the corridor. The percentage differences were calculated from the total forecasted volume (7-9 AM, 2-6 PM).

Table 4: Comparison of No-Build and Practical Alternative 5 Forecasts

Screenline Location	Build % Difference	Reason for difference
Jefferson Ave west of Woodward Ave	-4 %	I-375/Jefferson Capacity Constraint
Jefferson Ave west of Beaubien St	-6%	I-375/Jefferson Capacity Constraint
Jefferson Ave east of Rivard St	-2%	SB I-375 to EB Larned St is using Jefferson Ave
I-75 at 2nd St	-13%	Removal of Gratiot Connector
I-75 south of Mack Ave	-5%	I-375/Jefferson Capacity Constraint
I-375 north of Lafayette Ave	-5%	I-375/Jefferson Capacity Constraint
I-375 north of Jefferson Ave	-5%	I-375/Jefferson Capacity Constraint
Gratiot Avenue west of Rivard St	+70%	Removal of Gratiot Connector
Gratiot Avenue east of St. Aubin St	-41%	Removal of Gratiot Connector

The I-375/Jefferson Avenue capacity constraint assumption resulted in reduced screenline volume on Jefferson Avenue west of I-375 and on I-375 north of Jefferson Avenue. The Gratiot Connector removal resulted in lower volume on I-75 west of I-375. It also created a large volume increase on Gratiot Avenue just east of I-375, however, the volume using Gratiot Avenue east of St. Aubin Street decreased by over 40%.

Through coordination with stakeholders, the Practical Alternative 5 was further refined in late 2018. Practical Alternative 5 refinements reduced capacity on I-375 by changing the 8-lane boulevard to 6 lanes. Additional modification included access changes along I-375 and shortening the local road to be between Antietam Avenue and Monroe Street. To account for these changes, a series of additional traffic analyses were completed using Synchro, VISSIM, and SEMCOG's dynamic traffic assignment (DTA) model. The additional analyses were used to understand the capacity of the Practical Alternative 5 and the surrounding roadways.

The DTA model covers a No-Build 2045 and Build 2045 condition. The DTA model identified diversion routes for the I-375 corridor. The access and capacity factors presented for Practical Alternative 5 were further altered to incorporate the detailed corridor capacity and diversion route analysis.

7.4 Diversion Routes for I-375

The DTA model suggested more than 20% of peak period demand on I-375 would be diverted to other corridors. This diversion was spread amongst many corridors. The corridors that had the highest diversion traffic were Gratiot Avenue west of I-375, Rivard Street and Antietam Avenue for traffic east of I-375, and the Brush Street ramp connection for I-75. All three of these locations would be new access points to I-75 that do not exist in the current roadway configuration. The access points would allow for trips to take alternative routes from I-75 into downtown (west of I-375) or the neighborhoods (east of I-375). The volume changes in percent difference from 2045 No-Build to Build DTA for the I-375 project area and diversion routes are shown in Table 5.

Table 5: DTA Volume Changes for I-375 and Diversion Routes

		% Change		Average Hourly Volume Difference	
Location		AM	PM	AM	PM
I-375	SB I-375 north of Clinton St	-26%	-41%	-952	-1072
	NB I-375 north of Clinton St	-17%	-21%	-422	-847
	I-375 screenline north of Jefferson Ave	-36%	-40%	-1002	-1076
Diversion Routes	Gratiot Ave east of Brush St	46%	10%	351	60
	Brush St south of I-75	58%	93%	198	338
	Antietam Ave south of Gratiot Ave	81%	35%	341	307

7.5 I-375 Local Road Access

Practical Alternative 5 includes one-way to two-way conversion for the local access streets of Clinton Street and Macomb Street. Clinton Street access is not available in the Existing Year condition or Practical Alternative 5. These changes, in conjunction with the reduced capacity of I-375, would create a change in local road access on I-375. A higher portion of trips start and end toward the northern portions of the I-375 corridor, with fewer trips toward the south at Jefferson Avenue. This trend is shown in Table 5, where the difference between No-Build and Build increase on I-375 from Clinton Street to Jefferson Avenue.

The forecast differences between the No-Build and Build scenarios are compared in Table 6.

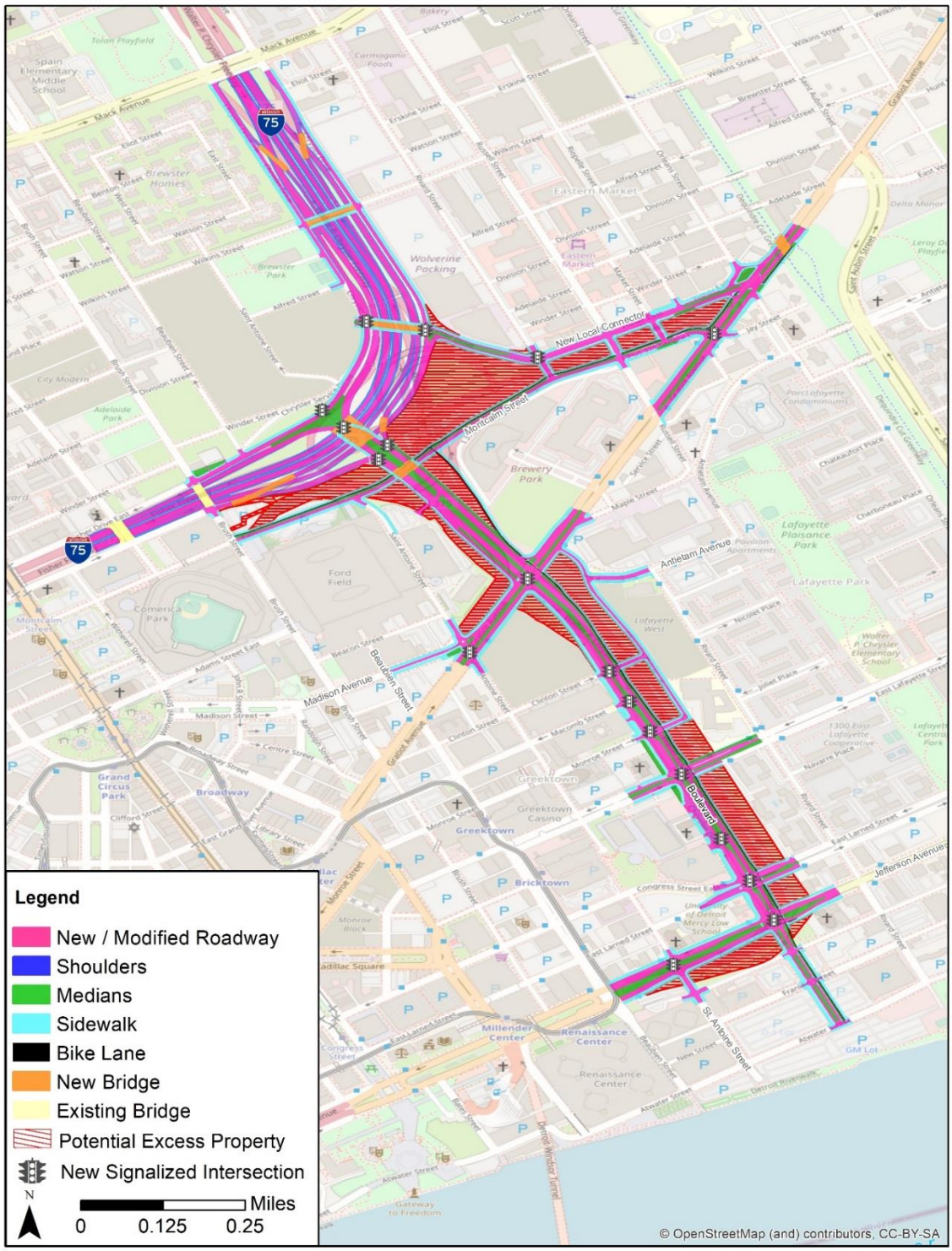
Table 6: Comparison of No-Build and Preferred Build Forecast

Location	Build % Difference	Average Hourly Volume Difference	Reason for Difference
Local Roads west of I-375 (Clinton St to Jefferson Ave)	-23%	-1590	I-375 Traffic Diverting to other routes (primary routes are Gratiot Ave and Brush St)
Macomb St of I-375	30%	70	
Monroe St west of I-375	-29%	-158	
I-375	-13%	-119	
Larned St west of I-375	-20%	-205	
Jefferson Ave west of I-375	-29%	-1178	
Local Roads east of I-375 (Lafayette Ave to Jefferson Ave)	-11%	-575	I-375 Traffic Diverting to other routes (primary route is Rivard St/Antietam Ave)
Lafayette Ave east of I-375	-7%	-85	
Larned St east of I-375	-6%	-68	
Jefferson Ave east of I-375	-14%	-422	
I-375 north of Clinton St	-21%	-1370	I-375 Traffic Diverting to other routes
Gratiot Ave east of Brush St	43%	628	I-375 Diversion Routes
Brush St south of I-75	94%	356	
Service Drive/Antietam Ave south of Gratiot Ave	144%	479	
I-75 north of Mack Ave	1%	146	Minimal Difference
I-75 at 2nd St	-9%	-663	I-375 Diversion entering downtown from the west and diversion from Gratiot connector removal

8 2040 Build Forecasts - Preferred Alternative

The Preferred Alternative was developed and refined in 2019 and early 2020. The forecast for the Preferred Alternative was developed from the Practical Alternative 5 forecast (Section 7) with logical local traffic redistribution to accommodate the specifics of each design adjustment. The main difference between Practical Alternative 5 and the Preferred Alternative is the design of the I-375/I-75 Interchange and I-375 access at Gratiot Avenue. The Preferred Alternative design reconfigures the I-375/I-75 interchange from fly-over ramps to a modified single point intersection design with an extended boulevard intersecting Gratiot Avenue. Figure 7 shows the Preferred alternative.

Figure 7: Preferred Alternative



The major design refinements and traffic redistribution assumptions are listed below.

I-375/I-75 Interchange

Design Changes:

- System flyover ramps between I-375 and I-75 changed to a service interchange with a signalized intersection between ramp movements. This change reduces the capacity of traffic entering the boulevard compared to Practical Alternative 5. Understanding the full extent of the capacity changes is complex due to the role that each movement plays in the signal timing. However, forecasting between Practical Alternative 5 and the Preferred Alternative indicated a 36% reduction in SB traffic in the AM and a 28% reduction in the PM. This traffic has been rerouted to other corridors as discussed in the *I-375 Expanded Study Area Analysis (June, 2020)*

Traffic Redistribution:

- Some traffic was rerouted to the southbound I-75 Service Drive to access the central business district (west of I-375) via north-south routes such as Brush Street and Woodward Avenue. Most of the rerouted traffic would use Gratiot Avenue to access I-75 in Practical Alternative 5.

I-75 to Eastern Market (Gratiot Connector)

Design Change:

- I-75 access to Eastern Market and Gratiot Avenue would be reinstated with the Preferred Alternative. The design resembles the existing Gratiot Connector with the addition of city street connectivity.

Traffic Redistribution:

- Traffic was redistributed to follow existing travel routes on the Gratiot Connector. In the Preferred Alternative, traffic was shifted to the I-375 & Gratiot Avenue intersection.

Gratiot Avenue and I-375 Boulevard Intersection

Design Change:

- The boulevard would extended north from Clinton Street to the I-75 interchange. This extension would include an intersection at Gratiot Avenue. The Gratiot Avenue and boulevard intersection would restrict all left-turn movements.

Traffic Redistribution:

- The eastbound left turn at Gratiot Avenue destined for I-75 was rerouted to the I-75 Service Drive via Woodward Avenue and Brush Street. Local traffic was rerouted through the intersection east on Gratiot Avenue.

9 Expanded Study Area Analysis

Traffic impacts are anticipated outside the original study area due to capacity constraints and access adjustments with the Preferred Alternative. Additional locations for analysis were identified from SEMCOG's DTA model and analyzed using Synchro and HCS

software. The forecasts for these locations were developed from base year traffic counts, a background growth rate of 0.5% per year, and 2045 DTA model differences between the Build and No-Build models. Expanded study area methodology is documented in *I-375 Expanded Study Area Analysis*, and the DTA model methodology and results are documented in the *I-375 Dynamic Traffic Assignment Model Methodology and Assumptions* document.

10 Conclusion

The I-375 traffic forecasting methodology used project traffic counts, growth rate trends from the SEMCOG model, and other consideration to grow existing 2017 traffic volumes to 2040 No-Build forecasts. The Build forecasts used underlying growth rates from the No-Build while accounting for access changes and capacity constraints introduced with the Build scenario. The traffic forecasts were used for the VISSIM operational analysis and were used as inputs for the Air and Noise analyses.

References

MDOT. (2020). *I-375 Expanded Study Area Analysis*
MDOT. (2020). *I-375 Dynamic Traffic Assignment Model Methodology and Assumptions*