I-375 TRAFFIC TECHNICAL MEMO

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MDOT
Michigan Department of Transportation

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1 Introduction

The I-375 operational modeling process began with traffic volume data collection, development of the existing traffic model, and calibration of the existing traffic model. Origin/destination (OD) matrices were developed using the Southeast Michigan Council of Governments (SEMCOG) 2015 macroscopic travel demand model (TDM), as documented in *I-375 Traffic Forecasting Methodology Technical Memorandum*. SEMCOG's travel demand model and mesoscopic dynamic traffic assignment (DTA) model was also used to forecast vehicular growth for use in the 2040 Future No-Build (FNB) and 2040 Future Build Alternative VISSIM models. All scenarios were run for an AM peak period and PM peak period.

The content herein focuses on the VISSIM modeling efforts only. Traffic forecasting and DTA analyses are documented in the *I-375 Traffic Forecasting Methodology Technical Memorandum* and the *I-375 Dynamic Traffic Assignment Model Methodology and Assumptions*, respectively.

1.1 Operational Analysis Limits

The limits of the operational analysis include freeway segments, arterial segments, ramps, and intersections as listed in this section.

Freeway segments:

- I-75 from the Mack Avenue Interchange to the first merge/diverge point of M-10
- I-375 from I-75 to Jefferson Avenue

Arterial segments:

- Gratiot Avenue Connector from I-75 to Gratiot Avenue
- Gratiot Avenue from Orleans Street to St. Antoine Street
- Jefferson Avenue from I-375 to Woodward Avenue

Ramps:

- Northbound I-75 Exit Ramp to southbound I-375
- Northbound I-75 Ramp to northbound I-75 (at I-375 Interchange)
- Westbound Gratiot Avenue Connector Exit Ramp to southbound I-375
- Westbound Gratiot Avenue Connector Exit Ramp to northbound I-75
- Northbound I-375 Exit Ramp to eastbound Gratiot Avenue Connector
- Northbound I-375 Exit Ramp to southbound I-75
- Southbound I-75 Exit Ramp to eastbound Gratiot Avenue Connector
- Southbound I-75 Exit Ramp to southbound I-75
- Southbound I-75 Exit Ramp to northbound-southbound M-10
- Northbound-southbound M-10 Exit Ramp to northbound I-75
- Southbound I-75 Exit Ramp to 2nd Avenue
- Northbound I-75 Entrance Ramp from Brush Street
- Northbound I-75 Entrance Ramp from Clifford Street
- Northbound I-75 Exit Ramp to Mack Avenue
- Southbound I-75 Entrance Ramp from Mack Avenue
- Northbound I-75 Entrance Ramp from Mack Avenue
- Southbound I-75 Exit Ramp to Mack Avenue
- Northbound I-375 Entrance Ramp from Monroe Avenue
- Southbound I-375 Exit Ramp to Monroe Avenue
- Northbound I-375 Entrance Ramp from Larned Street
- Southbound I-375 Exit Ramp to Larned Street

Intersections:

- Jefferson Avenue and Randolph Street
- Jefferson Avenue and southbound Chrysler Service Drive
- Jefferson Avenue and northbound Chrysler Service Drive
- Larned Street and southbound Chrysler Service Drive
- Larned Street and northbound Chrysler Service Drive
- Lafayette Avenue and southbound Chrysler Service Drive
- Lafayette Avenue and northbound Chrysler Service Drive
- Monroe Avenue and southbound Chrysler Service Drive
- Monroe Avenue and northbound Chrysler Service Drive
- Gratiot Avenue and southbound Chrysler Service Drive.
- Gratiot Avenue and Antietam Avenue
- Antietam Avenue and northbound Chrysler Service Drive
- St. Antoine Street and Madison Avenue
- St. Antoine Street and Gratiot Avenue
- Russell Street and eastbound Fisher Service Drive
- Russell Street and westbound Fisher Service Drive
- Gratiot Avenue and eastbound Fisher Service Drive
- Mack Avenue and southbound Chrysler Service Drive.
- Mack Avenue and northbound Chrysler Service Drive
- Brush Street and eastbound Fisher Service Drive
- Brush Street and westbound Fisher Service Drive.
- Clifford Street and eastbound Fisher Service Drive.
- Clifford Street and westbound Fisher Service Drive.
- 2nd Avenue and eastbound Fisher Service Drive.
- 2nd Avenue and westbound Fisher Service Drive.
- St. Antoine Street and Congress Street
- St. Antoine Street and Larned Street
- St. Antoine Street and Monroe Street
- St. Antoine Street and Lafayette Avenue
- Rivard Street and Lafayette Avenue
- Rivard Street and Larned Street
- Rivard Street Gratiot Avenue
- Russell Street and Gratiot Avenue
- Beaubien Street and Madison Avenue
- Rivard Street and Jefferson Avenue
- Woodward Avenue and Jefferson Avenue
- Beaubien Street and Jefferson Avenue
- Schweizer Place and Franklin Street
- Schweizer Place and Atwater Street

2 Data Collection and Volumes

2.1 Traffic Volume

Traffic counts were collected in the project area in April and May 2017. Hourly volumes in the VISSIM model were created for 7-8 AM, 8-9 AM, 2-3 PM, 3-4 PM, 4-5 PM, and 5-6 PM to populate the two-hour (7-9 AM) AM peak model and four-hour (2-6 PM) PM peak model. OD matrices were then estimated for each simulation hour using a pattern OD from the SEMCOG TDM and hourly balanced traffic counts. Hourly truck and auto matrices were developed based on classification traffic counts, which were synthesized into 15-minute auto and truck matrices using the hourly matrices and 15-minute volume profile data from the traffic counts. The OD matrix estimation algorithm assumed all-or-nothing traffic assignment. This assumption was implemented using network cuts and assumed logical routing between OD pairs. The all-or-nothing assumption was maintained in VISSIM using select-link costs to control the assignment results. The 15-minute OD matrices were then assigned in VISSIM using the DTA module. More detail on traffic volumes and forecasts are provided in the *I-375 Traffic Forecasting Methodology Technical Memorandum*.

2.2 Data Collection

In addition to traffic counts, the following data was collected to support the development and calibration of the VISSIM model.

- Speed data was obtained from the National Performance Management Research Data Set (NPMRDS) for April and May 2017 for I-75, I-375, Gratiot Avenue, and Jefferson Avenue within the study corridor. Speed profiles were created to compare against VISSIM model data.
- Traffic signal timing data was obtained from MDOT and the City of Detroit for their respective signals within the project area.
- Speed limit and advisory speed data was obtained from SEMCOG's volume map and field observations.
- Vehicle travel times were collected during a field visit performed on Wednesday, July 12, 2017. This data was used as a calibration point in the VISSIM model. However, more emphasis was placed on matching speed profiles throughout the corridor, which were collected for similar segments as the travel time runs.

Raw data is available upon request.

3 VISSIM Model Attributes

Table 1 provides the simulation timings, broken down into seeding period and peak period components. The seeding period is a duration of time that the simulation runs to populate the model with traffic before results are measured.

Table 1: Simulation Timings

	Seeding Period (Both Models)	AM Peak Period	PM Peak Period
Duration	30 minutes	2 hours	4 hours
Simulation Seconds	0-1800 sec	1800-9000 sec	1800-16200 sec
Time of Day	30 minutes prior to peak periods	7:00-9:00 AM	2:00-6:00 PM

Each round of simulations consisted of 15 runs with a random seed of 42 and a random seed increment of one.

4 VISSIM Model Development

4.1 Model Geometry

The following section describes the methods used to develop the basic components of the VISSIM model. Section headings refer to the specific terminology used by VISSIM.

4.1.1 Links/Connectors/Lanes

The mainline roads were modeled to reflect the project area as described in Section 1.1. For decision points on the mainline, 1,500 feet was used as a default lane change distance. This default lane change distance was increased to 2,500 feet where the model calibration process indicated a longer lane change distance was needed. Ramp terminal intersections and connecting arterial streets were coded at the intersections described in Section 1.1. Practical modeling limits based on the proposed project limits were established in conjunction with MDOT and extend approximately one mile beyond project limits for mainline segments, and a ½ mile beyond the project limits for side streets when necessary. The extension is intended to capture queue spillback if present during congestion.

I-75 within the project area is signed to prohibit trucks from using the leftmost lane in each direction. Therefore, the corresponding lanes of the model were coded to only allow cars.

4.1.2 Desired Speed Decisions

Desired speed decisions were placed at every network input and location with a speed limit change.

4.1.3 Reduced Speed Areas

Reduced speed areas are typically used to provide a temporary slow-down to a section of roadway without changing the speed assigned to the vehicles. Reduced speed areas are commonly used on curves, at intersections, and at locations with advisory speed signs.

For the I-375 VISSIM model, reduced speed areas were placed at every intersection turning movement. Heavy vehicles were assigned a lower speed than cars. Left turns and

channelized right turns were assigned slightly higher speeds than traditional right turns. Turning speeds were assigned consistently throughout the network. Reduced speed areas were also used at locations with an advisory speed sign. These locations were predominantly at freeway entrance and exit ramps.

4.2 Intersections

Arterial intersections require a significant amount of VISSIM coding, including conflict areas, priority rules, stop signs, signals, and detectors. The process for defining the intersections is described in the following sections.

4.2.1 Conflict Areas

Conflict areas are used in VISSIM to define how vehicles should behave when their paths cross. For instance, if a vehicle is turning right onto a roadway, it should yield to any through traffic before turning. This is controlled through a conflict area that tells the right-turning car to stop and wait for any through traffic.

Conflict areas were used at every intersection and potential conflict points. At signalized intersections, traffic signal timings restrict conflicting movements; therefore, conflict areas were not placed for turning movements controlled by the signal (northbound left and westbound through, for instance).

4.2.2 Priority Rules

Priority rules provide another method of controlling how vehicles behave when their paths cross. In of the most recent version of VISSIM, conflict areas have replaced priority rules in most situations. Priority rules were only used in locations where conflict areas could not effectively simulate a yield condition.

4.2.3 Stop Signs/Signals/Detectors

Stop signs, signals and detectors were placed in the model based on collected field data. A right turn on red was simulated using stop signs that are only active during the red phase for the approach.

4.3 Driver Behavior

The Wiedemann 99 Car Following Model was used for freeway links and the Wiedemann 74 car following model was used for connecting arterial streets. Parameters were modified during the calibration process to match driving behaviors in the project area. Calibration details for the model are provided in Section 5. Table 2 and Table 3 show the VISSIM 9 default parameters compared to those used in the I-375 VISSIM model. Guidance for changing driver behaviors came from section 4.11.1.1 of Washington State Department of Transportation *Protocol for VISSIM Simulation* published in 2014.

For freeway and ramp movements, the “Freeway (free lane selection)” driving behavior was used as the baseline behavior. The “Freeway (merge)” driving behavior was used for merge, diverge, and weave segments. Engineering judgment and calibration results were then used to determine whether additional modifications were needed to the freeway and ramp network.

For arterial streets, the “Urban (motorized)” driving behavior was used as the baseline behavior. The “Urban (merge)” driving behavior was used in locations where numerous weaving movements required a more aggressive driving pattern to match the existing conditions, based on engineering judgment.

Modifications to driver behaviors were evaluated and modified based on vehicle travel times, traffic volumes, and visual audits during the calibration process. Calibration results are provided in Section 5.

Table 2: Wiedemann 99 Driver Behavior Parameter Adjustments

Following	VISSIM 9 Default	Freeway (free lane selection)	Freeway (merge)
Observed Vehicles	2	2	2
CC0 (Standstill Distance) (ft)	4.92	5.5	4.92
CC1 (Headway Time) (s)	0.9	1.05	.9
CC2 ('Following' Variation) (ft)	13.12	18	13.12
CC3 (Threshold for Entering 'Following')	-8	-8	-8
CC4 (Negative 'Following' Threshold)	-0.35	-0.35	-0.35
CC5 (Positive 'Following' Threshold)	0.35	0.35	0.35
CC6 (Speed Dependency of Oscillation)	11.44	11.44	11.44
CC7 (Oscillation Acceleration) (ft/s^2)	0.82	0.82	0.82
CC8 (Standstill Acceleration) (ft/s^2)	11.48	11.48	11.48
CC9 (Acceleration with 50 mph) (ft/s^2)	4.92	4.92	4.92
Lane Change	**VISSIM 9 Default**	**Freeway (free lane selection)**	**Freeway (merge)**
Necessary Lane Change - Own	-	-	-
Maximum Deceleration (ft/s^2)	-13.12	-13.12	-13.12
-1 ft/s2 per Distance (ft)	200	50	200
Accepted Deceleration (ft/s^2)	-1.64	-3.28	-1.64
Necessary Lane Change - Trailing Vehicle	-	-	-
Maximum Deceleration (ft/s^2)	-9.84	-9.84	-9.84
-1 ft/s^2 per Distance (ft)	200	50	200
Accepted Deceleration (ft/s^2)	-1.64	-1.64	-1.64
Waiting Time Before Diffusion (sec)	60	120	120
Min. Headway (front/rear) (ft)	1.64	1.64	1.64
Safety Distance Reduction Factor	0.6	0.6	0.3
Max. Deceleration for Cooperative Braking (ft/s^2)	-9.84	-9.84	-9.80
Overtake Reduced Speed Areas	Off	On	On
Advanced Merging	On	On	On
Consider Subsequent Static Routing Decisions	On	Off	On
Cooperative Lane Change	Off	Off	On
Maximum Speed Difference (mph)	6.71	6.71	6.71
Maximum Collision Time (s)	10	10	10

Table 3: Wiedemann 74 Driver Behavior Parameter Adjustments

Following	VISSIM 9 Default	Urban (motorized)	Urban (merge)
Observed Vehicles	4	4	4
Average Standstill Distance (ft)	6.56	6.56	6.56
Additive Part of Safety Distance	2.00	2.00	1.75
Multiplicative Part of Safety Distance	3.00	3.00	2.75
Lane Change	**VISSIM 9 Default**	**Urban (motorized)**	**Urban (merge)**
Necessary Lane Change - Own	-	-	-
Maximum Deceleration (ft/s^2)	-13.12	-13.12	-13.12
-1 ft/s2 per Distance (ft)	100	100	100
Accepted Deceleration (ft/s^2)	-3.28	-3.28	-3.28
Necessary Lane Change - Trailing Vehicle	-	-	-
Maximum Deceleration (ft/s^2)	-9.84	-9.84	-9.84
-1 ft/s2 per Distance (ft)	100	100	100
Accepted Deceleration (ft/s^2)	-3.28	-3.28	-3.28
Waiting Time Before Diffusion (sec)	120	120	120
Min. Headway (front/rear) (ft)	1.64	1.64	1.64
Safety Distance Reduction Factor	0.6	0.6	0.1
Max. Deceleration for Cooperative Braking (ft/s^2)	-9.84	-9.84	-9.84
Overtake Reduced Speed Areas	Off	Off	On
Advanced Merging	On	On	On
Consider Subsequent Static Routing Decisions	On	On	On
Cooperative Lane Change	Off	On	On
Maximum Speed Difference (mph)	6.71	6.71	6.71
Maximum Collision Time (s)	10	10	10

5 Calibration

The calibration status has been documented in the following excel spreadsheets titled: “AMVissimCalibration” and “PMVissimCalibration”, which can be provided upon request.

5.1 Calibration Requirements

Calibration of the I-375 VISSIM model was conducted using the *FHWA Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software* (FHWA Toolbox)**.** Figure 1 includes the Wisconsin DOT Freeway Model Calibration Criteria, as copied from page 64 of FHWA’s Toolbox.

Figure 1: Wisconsin DOT Freeway Model Calibration Criteria

Table 4. Wisconsin DOT freeway model calibration criteria.

Criteria and Measures	Calibration Acceptance Targets
Hourly Flows, Model Versus Observed	
Individual Link Flows	
Within 15%, for 700 veh/h < Flow < 2700 veh/h	> 85% of cases
Within 100 veh/h, for Flow < 700 veh/h	> 85% of cases
Within 400 veh/h, for Flow > 2700 veh/h	> 85% of cases
Sum of All Link Flows	Within 5% of sum of all link counts
GEH Statistic < 5 for Individual Link Flows*	> 85% of cases
GEH Statistic for Sum of All Link Flows	GEH < 4 for sum of all link counts
Travel Times, Model Versus Observed	
Journey Times, Network	
Within 15% (or 1 min, if higher)	> 85% of cases
Visual Audits	
Individual Link Speeds	
Visually Acceptable Speed-Flow Relationship	To analyst's satisfaction
Bottlenecks	
Visually Acceptable Queuing	To analyst's satisfaction

*The GEH statistic is computed as follows:

$$GEH = \sqrt{\frac{(E-V)^2}{(E+V)/2}} \quad (4)$$

where:

E = model estimated volume
V = field count

Source: "Freeway System Operational Assessment," *Paramics Calibration and Validation Guidelines* (Draft), Technical Report I-33, Wisconsin DOT, District 2, June 2002.

5.2 Calibration Summary

The AM and PM Existing VISSIM models were calibrated based on hourly model volumes, Geoffrey E. Havers (GEH) values, travel times, and visual audits.

5.2.1 Traffic Volumes

Traffic volumes were measured for calibration for each intersection turning movement, on mainline I-375 and I-75 between each interchange, and on each ramp in each direction in each hour of the model. For each turning movement or mainline volume, the following criteria must be met in more than 85% of cases:

- If flow <700 vehicles per hour (vph), then within 100 vehicles
- If 700 vph < flow < 2700 vph, then within 15%
- If flow > 2700 vph, then within 400 vehicles

Additionally, for each turning movement or mainline volume, the GEH statistic must be <5 for >85% of cases. The sum of all link flows must be within 5%, with a GEH statistic of <4. The GEH statistic is calculated as follows:

$$GEH = \sqrt{\frac{(E-V)^2}{\frac{(E+V)}{2}}}$$

Where:
E=model estimated volume
V=field count
Source: *FHWA Toolbox, July 2004*

Table 4 and Table 5 provides the calibration results for the mainline and intersection turning movements, respectively. The number of locations includes all movements for all time periods. For instance, there are 42 mainline locations where volumes are being checked. The AM model is two hours long, and each hour includes the 42 volume checks. Therefore, there are 84 total mainline volume checks in the AM. The PM model is four hours long, and therefore there are twice as many volume checks. Individual volume checks are included in the calibration spreadsheets.

Table 4: Mainline Volume Calibration Results

	Volume		GEH Statistic	
	AM	PM	AM	PM
Total Mainline Locations	84	168	84	168
Locations Meeting Criteria	84	155	84	151
Locations NOT Meeting Criteria	0	13	0	17
% Compliance	100%	92%	100%	90%
Calibrated?	Yes	Yes	Yes	Yes

The sum of all freeway volume locations was within 1% of field measured volumes for the AM model and 4% for the PM model.

The GEH statistic for the sum of all freeway volume locations was 1.1 for the AM model and 18.1 for the PM model. While the GEH statistic for the PM model is higher than 4, this represents a 4% difference in volume between measured and modeled volumes. As the volume gets higher in a modeled corridor, the GEH statistic becomes more sensitive. The total of the measured volumes is more than 280,000 vehicles. Since the volumes are within 4% for the model, this is considered to represent a calibrated model.

Table 5: Turning Movement Calibration Results

	Volume		GEH Statistic	
	AM	PM	AM	PM
Total Turning Movements	568	1152	549	1152
Turning Movements Meeting Criteria	568	1135	549	1109
Turning Movements NOT Meeting Criteria	0	17	19	43
% Compliance	100%	99%	97%	96%
Calibrated?	Yes	Yes	Yes	Yes

The sum of all turning movements was within 1% of field measured volumes for the AM model and 5% for the PM model.

The GEH statistic for the sum of all turning movements was 2.3 for the AM model and 12.8 for the PM model. While the GEH statistic is higher than 4 in the PM model, this represents a 5% difference in volume between measured and modeled volumes. Similar to the mainline, the GEH statistic becomes more sensitive as the volume gets higher in a modeled corridor, and the total of the measured volumes is more than 240,000 vehicles. Since the volume percentage requirement is 5% and the model is at 5%, the results are considered by the analyst to represent a calibrated model.

Calibration spreadsheets can be provided upon request and provide the individual mainline and turning movement calibration results for each hour of the peak periods.

5.2.2 Vehicle Travel Times

Per the *FHWA Toolbox*, it is necessary for greater than 85% of the model travel times to be within 15% or 1 minute of the measured travel times. Table 6 shows the vehicle travel time calibration results. The calibration spreadsheets provide the results of each travel time segment for each hour of the peak period.

Table 6: Vehicle Travel Time Calibration

	AM	PM
Travel Time Segments Meeting Criteria	22	21
Travel Time Segments Not Meeting Criteria	2	4
Total % of Travel Times Meeting Criteria	92%	84%
Calibrated?	Yes	No

The PM travel times for the corridor meet criteria 84% of the time, which is just under the recommended 85% threshold. While the travel times are a useful component of calibration, the field-collected data represents a relatively small sample size. The analyst recommends focusing on visual audits and speed profiles to determine calibration for the freeway.

There are two arterial locations where travel times were collected using the NPMRDS dataset to assist with calibration of the Wiedemann 74 driver behavior. These locations are on Jefferson Avenue and Gratiot within the project area. All four of the arterial travel time segments are within calibration parameters in both the AM and PM models.

5.2.3 Visual Audits

Per the *FHWA Toolbox* guidelines, link speeds should match "to the analyst's satisfaction". Therefore, link speeds are a qualitative comparison between field and model data instead of quantitative. While it is desirable for the speed profiles to match closely (or at least to match the general shape), profiles that match too closely could indicate over-calibration of the model. An over-calibrated model may not respond (i.e. show logical, different results) to proposed changes to the network in later Build Alternatives.

Methods for completing the visual audit included comparing HERE data at each time interval with the VISSIM model, comparing the congestion and queuing to Google Traffic, and field visits to verify traffic behavior. Speed data is provided in the calibration spreadsheets.

5.3 Calibration Spreadsheet Tabs

The calibration spreadsheets are available upon request, and each contain the following tabs:

- Intersection Volumes
- Mainline Volumes
- Mainline Speeds
- Travel Times
- Mainline Level of Service
- Intersection Level of Service

Further detail for each tab is provided in the following subsections.

5.3.1 Intersection Volumes

This tab contains the validation of all intersection turning movements present in the model. Validation of intersection movements is summarized in cells A2-B9 of the tab.

- Total Movements – The total number of intersection movements being validated in the model at a given time.
- All Time Periods – The total number of intersection movements multiplied by the number of hours in the peak period, since the validation occurred on a per-hour basis.
- # Within Diff – The number of movements for all time periods that were within the FHWA calibration criteria for volume.
- % Within Difference – The percent of movements for all time periods that were within the FHWA calibration criteria for volume.
- Sum All Movements – The percent difference between the sum of all target volumes and the sum of all modeled volumes.
- # within GEH – The number of movements for all time periods that were within the FHWA calibration requirements for GEH statistic.
- % Within GEH - The percent of movements for all time periods that were within the FHWA calibration criteria for GEH statistic.
- GEH All Movements – the GEH statistic for the difference between the sum of all target volumes and the sum of all modeled volumes.

Additional summary tables are provided in the calibration spreadsheet to compare each hour's validation status.

Individual movement data is provided in columns D-Y.

- The Intersection ID in column D corresponds with the node number in VISSIM.
- Columns E-K provide information about the turning movement.
- Columns L-O provide the target and VISSIM measured volumes for each hour of the simulation.
- Columns P-Y calculate whether the movement meets calibration requirements.
- In columns T-U and X-Y, "OK" means the movement meets requirements, where a "!" or "!!" means the movement does not meet requirements.

Since the individual movements are within the calibration parameters over 85% of the time, and since the sum of all movements and GEH of all movements are within calibration parameters, the I-375 Existing VISSIM model is determined to be calibrated.

5.3.2 Mainline Volumes

This tab contains the validation of the freeway volumes between each interchange in the model.

Validation of mainline volumes is summarized in cells A2-B9 of the tab. The heading descriptions can be found in the “Intersection Volumes” section of this writeup.

Since the individual movements are within the calibration parameters over 85% of the time, and since the sum of all movements and GEH of all movements are within calibration parameters, the I-375 Existing VISSIM model is determined to be calibrated.

5.3.3 Mainline Speeds

This tab contains the speed graphs obtained from NPMRDS data as well as the data output from the VISSIM model. This is where a majority of the time was spent during the calibration process. Speed was measured at 27 locations in each peak period. The color-coded table at the top of the tab shows the speed progression at each location in the model over the course of the peak period for the VISSIM data and the NPMRDS data, with the VISSIM data shown on the top.

Below the tables are speed graphs for each location in the corridor. In these graphs, the blue line represents the VISSIM data and the red line represents the NPMRDS data, or field data.

One key difference between the NPMRDS speed data and the VISSIM data is that the NPMRDS data is an average of two months of speed data, whereas the VISSIM speed data is the product of one volume set and is therefore representing one day of data. If the traffic counts were higher or lower on the day collected than an “average” day, the speed profiles will reflect a difference. In locations where the speed does not vary over the course of the peak, matching speeds can be relatively simple. In locations where the speed does vary over the course of the peak, there is a potential for variability between when the dip happens and how severe it is. This makes it more difficult to match speeds, since the NPMRDS data is a two-month average and the VISSIM data represents a single day.

5.3.4 Travel Times

This tab shows the travel time calibration results. Field data was collected on July 12, 2017. The ID and Segment information in columns A and B correspond with the travel time ID and name in VISSIM. The data validation summary is shown in columns I1-J4.

Since the travel times are within the calibration parameters over 85% of the time, the I-375 Existing VISSIM model is determined to be calibrated.

5.3.5 Mainline Level of Service

This tab provides the level of service (LOS) for each mainline segment along the corridor, which is calculated based on the highest 15-minute average density for the model. This table also provides the speed broken into 15-minute bins.

LOS was calculated by determining the vehicular density in vehicles per mile per lane (veh/mi/ln). A factor was then applied based on the peak period truck percent to convert

the value to passenger car equivalents per mile per lane (PCE/mi/ln). In this corridor, one truck is equal to 1.5 passenger cars. The I-75 mainline corridor was assumed to consist of 10% trucks, while the I-375 corridor is much lower at 1% trucks.

Note that the LOS is dependent on density, not speed. Therefore, a low speed does not necessarily mean a low level of service.

5.3.6 Intersection Level of Service

This tab provides a calculation of delay and LOS by movement, approach, and intersection for each intersection evaluated in the model. Columns A and B show the intersection Node Number and Node Name, respectively.

6 Future No-Build Scenario

The 2040 Future No-Build scenario was developed from the calibrated existing VISSIM models. The Future No-Build models is used to compare operations against the project's Build alternatives. Any committed changes (i.e. approved but unbuilt) between existing and Future No-Build, such as the closure of Woodward Avenue between Jefferson Avenue and Larned Street, were made to the Future No-Build model. Additionally, signal timings were optimized based on forecasted traffic demand. Traffic was forecasted using the methodology presented in the *I-375 Traffic Forecasting Methodology Technical Memorandum.* Signal timings were optimized using Synchro by incorporating the Future No-Build volumes into a Synchro model with existing signal timings programmed as a baseline.

Travel time segment limits can be found in Table 7, and the travel time results of the Future No-Build (FNB) VISSIM modeling effort are shown in Table 8 and Table 9 for the average of the entire peak-period as well as the average of the peak-hour. Appendix A shows the limits of each travel time segment on a map. As a result of public outreach, different travel time segments were analyzed for the Future No-Build (FNB) and Build models than were considered for the existing models.

Figure 2 and Figure 3 show the AM and PM peak intersection and freeway LOS, respectively, calculated per *Highway Capacity Manual (HCM) 2010.* The LOS for the AM and PM peaks are calculated by examining analysis results of the worst 15-minute time interval.

Table 7: Travel Time Segment Limits

Segment Name	From	To
Inbound SB I-75 to SB I-375	Mack Avenue	Jefferson Avenue at Woodward Avenue
Outbound NB I-375 to NB I-75	Jefferson Avenue at Woodward Avenue	Mack Avenue
Inbound WB Gratiot	Gratiot Avenue Connector	St. Antoine Street
Outbound EB Gratiot	St. Antoine Street	Gratiot Avenue Connector
Inbound SB I-375 to Greektown	Mack Avenue	Greektown Parking Garage
Outbound Greektown to NB I-375	Greektown Parking Garage	Mack Avenue
I-75 NB	3rd Avenue	Mack Avenue
I-75 SB	Mack Avenue	3rd Avenue

Table 8: Future 2040 No-Build AM Peak Travel Times

		AM Travel Time (min)				
Segment Name	Dist. (mi)	Ex*	FNB*	Diff.	Peak Hr. Avg	Worst 15 Min
Inbound SB I-75 to SB I-375	1.9	4.2	4.2	0.0	4.5	5.6
Outbound NB I-375 to NB I-75	2.0	3.2	3.5	0.3	3.4	3.8
Inbound WB Gratiot	0.7	2.9	3.5	0.6	3.3	4.6
Outbound EB Gratiot	0.7	2.0	2.4	0.4	2.4	2.6
Inbound SB I-375 to Greektown	1.1	1.5	1.8	0.3	2.0	2.4
Outbound Greektown to NB I-375	1.2	1.3	1.8	0.5	1.8	2.1
I-75 NB	1.7	2.1	7.4	5.3	8.0	12.7
I-75 SB	1.5	1.7	1.7	0.0	1.8	2.1

FNB: Future No-Build
Ex: Existing
*Average Travel Time for Peak Period

Table 9: Future 2040 No-Build PM Peak Travel Times

Segment Name	Dist. (mi)	PM Travel Time (min) Ex*	FNB*	Diff.	Peak Hr. Avg	Worst 15 Min
Inbound SB I-75 to SB I-375	1.9	3.7	4.4	0.7	12.0	14.5
Outbound NB I-375 to NB I-75	2.0	3.7	3.9	0.2	7.4	10.6
Inbound WB Gratiot	0.7	2.6	3.1	0.5	3.2	3.4
Outbound EB Gratiot	0.7	2.5	2.7	0.2	3.2	3.4
Inbound SB I-375 to Greektown	1.1	1.5	1.7	0.2	3.2	5.8
Outbound Greektown to NB I-375	1.2	2.2	1.9	-0.3	1.9	2.2
I-75 NB	1.7	3.6	3.7	0.1	7.3	10.5
I-75 SB	1.5	2.4	1.7	-0.7	2.1	2.7

FNB: Future No-Build
Ex: Existing
*Average Travel Time for Peak Period

One potentially counter-intuitive result from the FNB travel times is for the inbound vs. outbound Greektown travel time. Logically, travel time to the parking garage would be shorter than travel time out of the parking garage due to the required vehicle routing. In the AM, the difference between the two is very small and likely due to southbound vehicle queuing. In the PM, there's some gridlock originating around Jefferson Avenue and Beaubien Street which is resolved in the Build model. Over the whole peak period, the inbound traffic shows better travel times. However, the worst hour and worst 15 minutes show an elevated inbound travel time due to the signal failure at Beaubien Street which wasn't resolved with optimized signal timing.

Figure 2: Future 2040 No-Build AM Levels of Service

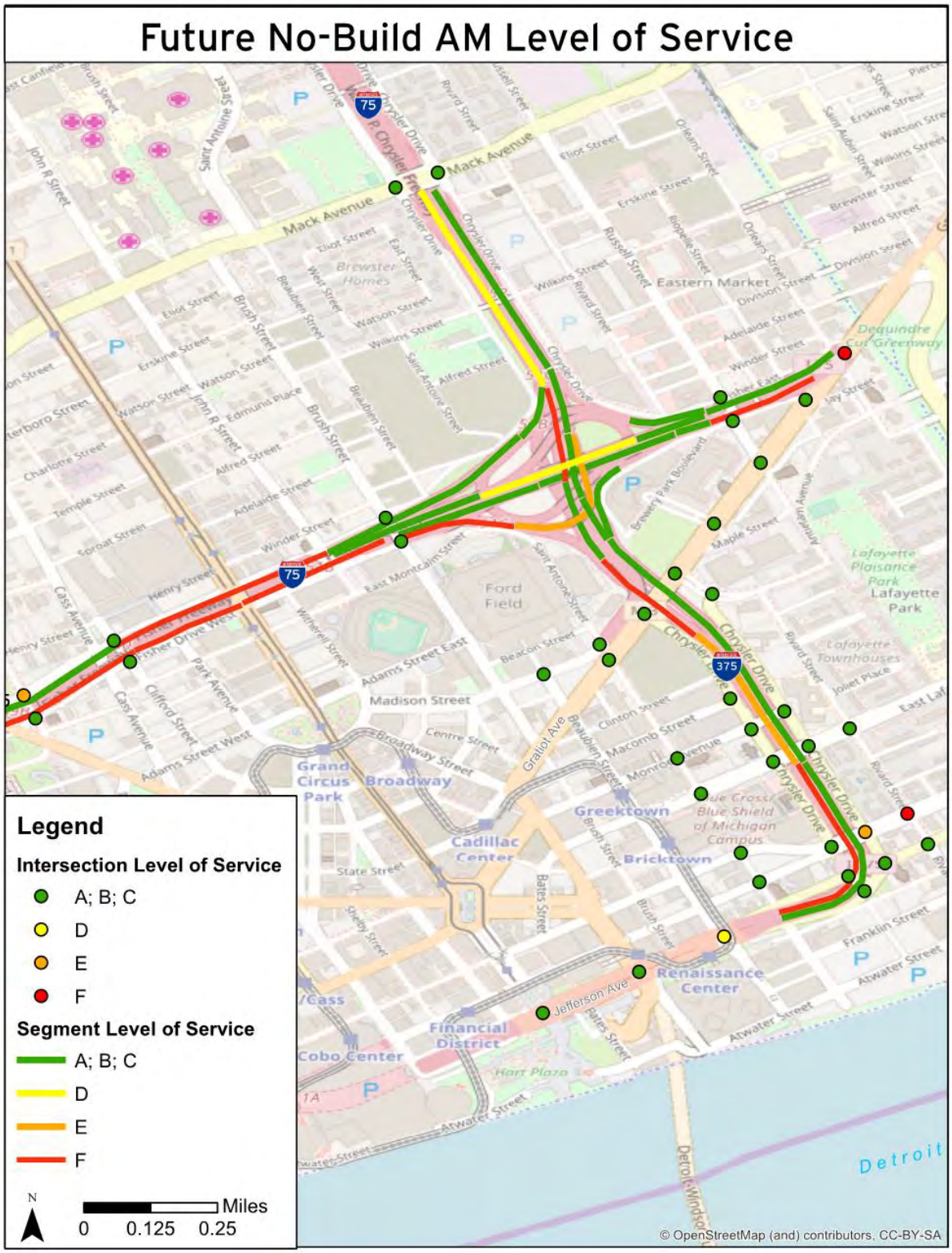
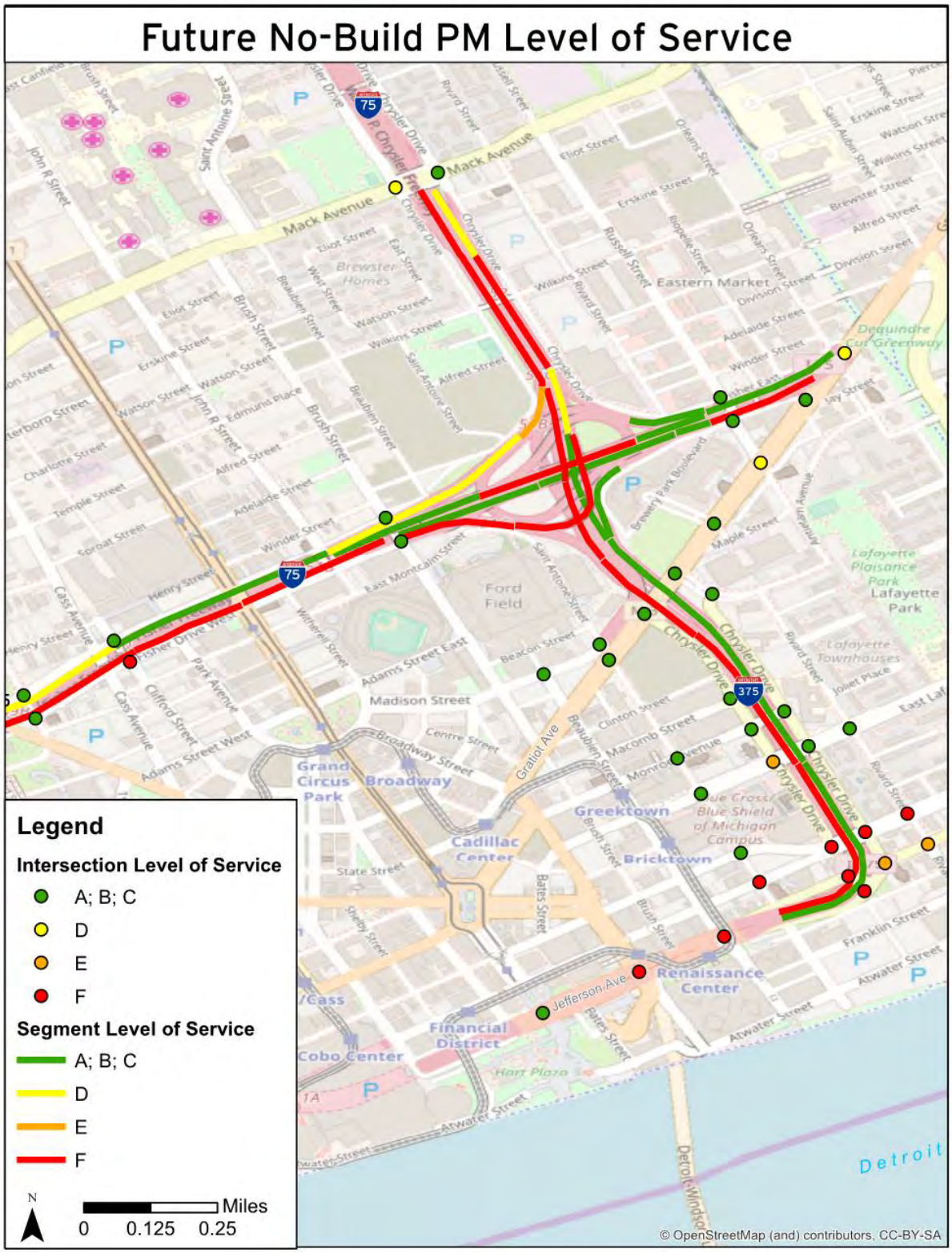


Figure 3: Future 2040 No-Build PM Levels of Service



Congestion in the AM Future No-Build scenario occurs on southbound I-375 south of the I-75 interchange due to the Jefferson Avenue and Beaubien Street intersection being over-capacity (first intersection from limited access portion of I-375) and due to the weaving movement between the I-75 on-ramp and the ramps at Lafayette Avenue.

Congestion in the PM Future No-Build scenario propagates to southbound I-75 north of I-375 as a result of congestion on southbound I-75 outside the model. Additional PM congestion occurs on southbound I-375 as a result of the Jefferson Avenue and Beaubien Street intersection being over-capacity.

7 Preferred Alternative Methodology

The AM and PM 2040 Build models were developed based on stakeholder feedback. Existing calibration parameters such as look-ahead distances and link behaviors were preserved in the new alternative segments, where applicable. Existing signals were optimized, and new signals were created using Synchro 9. Signal timings were then imported into VISSIM and small modifications were made based on performance of the VISSIM model.

Future traffic demand was calculated for the Build Alternative configuration as discussed in the *I-375 Traffic Forecasting Methodology Technical Memorandum***.** All-or-Nothing Dynamic Assignment was used to distribute traffic in the network. This was the same methodology used in the existing and Future No-Build models. Surcharges were assigned to links to encourage correct routing through the network where more than one routing option was available.

A design speed of 35 mph is assumed on the new boulevard, and 25-mph on the new local road. New system-to-system ramps were designed with a 40-mph design speed.

Pedestrian crossing times were developed in accordance with the *Manual on Uniform Traffic Control Devices* (*MUTCD)* for the Build Alternative. Feedback from stakeholders was to provide single-stage crossings wherever possible. Single-stage crossings are not feasible along the boulevard. Single-stage timings were implemented in VISSIM and queueing was observed on the freeway segments as well as major intersection failures along the boulevard. The boulevard will require two-stage pedestrian crossings along the boulevard from Clinton Street to Jefferson Avenue. The City of Detroit was made aware of the two-cycle pedestrian crossings and were in agreement of crossing in two-stages.

8 Preferred Alternative

8.1 Alternative Description

The Preferred Alternative is a combination of the Practical Alternative 5B interchange with direct left-turns along the boulevard. Practical Alternative 5B extends the boulevard further north of Gratiot and has an at-grade intersection with movements coming to and from northbound and southbound I-75. Figure 4 illustrates the Practical Alternative 5B interchange. This layout is also presented in an 11x17 exhibit attached as Appendix C.

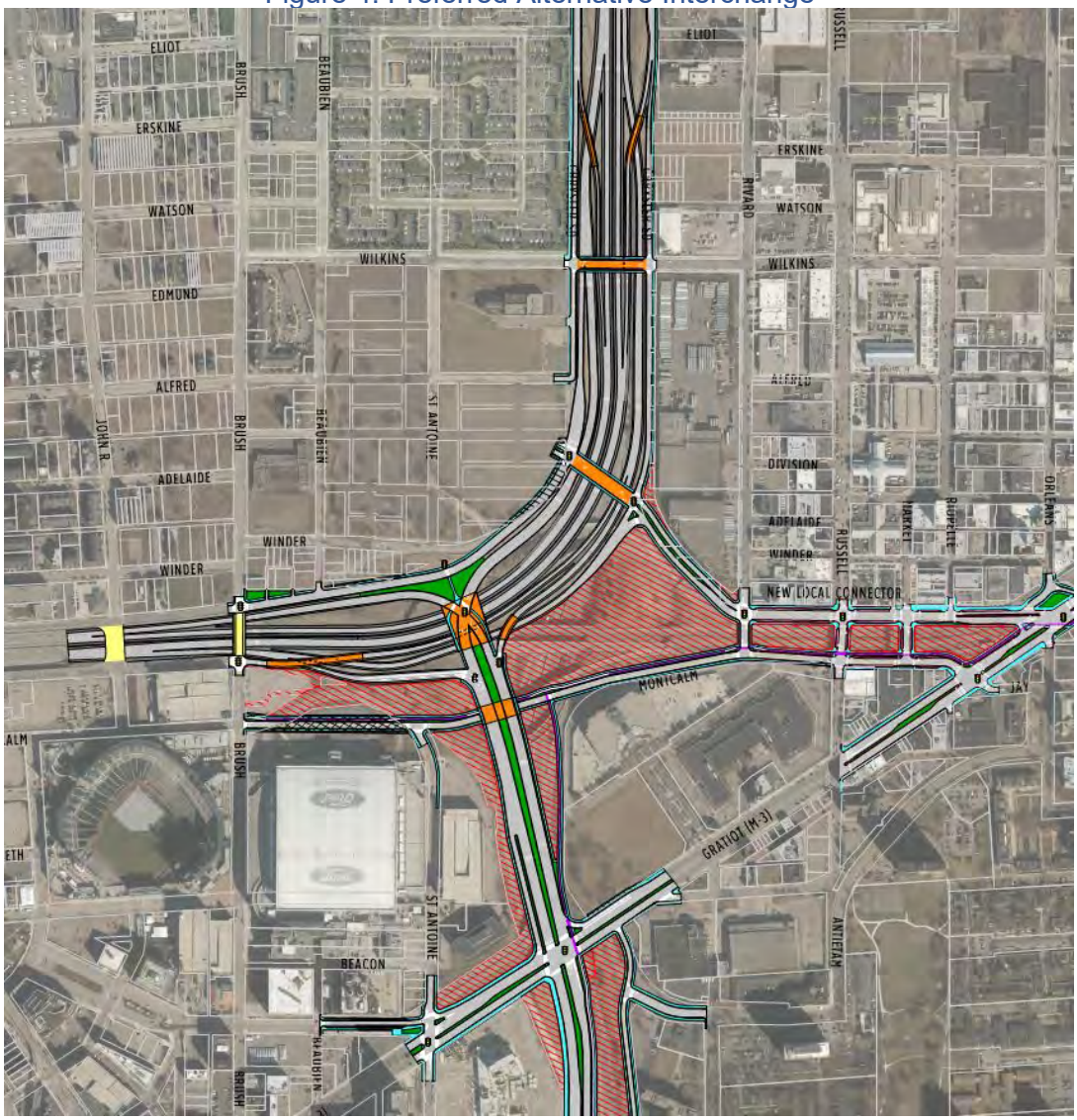
Coming from the north, vehicles wanting to exit southbound I-75 would exit to the right and have the option to either exit to the southbound Service Drive or to the boulevard. Vehicles wanting to stay on southbound I-75 would stay to the left, which is more traditional. Exiting to the southbound Service Drive has two options, one to stay right onto a connector roadway to Eastern Market or continue onto the Service Drive to Brush Street, John R Street, or Woodward Avenue. The second option is to stay to the left and go onto the boulevard. This interchange alternative has an at-grade intersection with Gratiot Avenue, however, left-turns are not allowed at the intersection. There are dual right-turn lanes for the southbound boulevard as well as westbound Gratiot Avenue.

Coming from the south on I-75, vehicles wanting to exit northbound I-75 would exit to the right have the option to either exit to the northbound Service Drive or to the boulevard. Vehicles wanting to stay on northbound I-75 would stay to the left, which is the same as Alternative 5A. Exiting to the northbound Service Drive has two options, one to stay right to turn into Eastern Market, or to continue north along the Service Drive. The second option is to stay right to access the boulevard.

Vehicles coming from the boulevard and wanting to go to I-75 have the option to turn right onto northbound I-75 or stay left for southbound I-75. A local connection is being created along Montcalm Street from Brush Street to Rivard Street, underneath the boulevard. No vehicular connection is being proposed from the boulevard to Montcalm Street. However, the two-way cycle track that runs along the boulevard will connection from just north of Gratiot Avenue to Montcalm Street. An outlet for special event use only is proposed from the Ford Field Parking Garage to the northbound boulevard. Police will control the flow of traffic for the intersection during special events.

The ramps to and from Mack Avenue on I-75 on the south side would be braided ramps. This means that those vehicles coming from northbound boulevard would not be able to exit to Mack Avenue. Similarly, those vehicles entering southbound I-75 from Mack Avenue would not be able to exit to the boulevard. Vehicles wishing to make this movement would have to use local roadways.

Figure 4. Preferred Alternative Interchange



On the south side of Eastern Market, there would be a new roadway configuration. Jay Street, on the east side of Gratiot Avenue, would connect to the Montcalm Street extension. The New Local Connector would connect Brush Park to Gratiot Avenue. There would be new signalized intersections along the New Local Connector. The New Local Connector would have two eastbound lanes and one westbound lane. There would be parking allowed on both sides of the roadway. Along the Montcalm Street extension, there would be one lane in each direction and parking allowed on both sides.

The following intersections would be newly signalized:

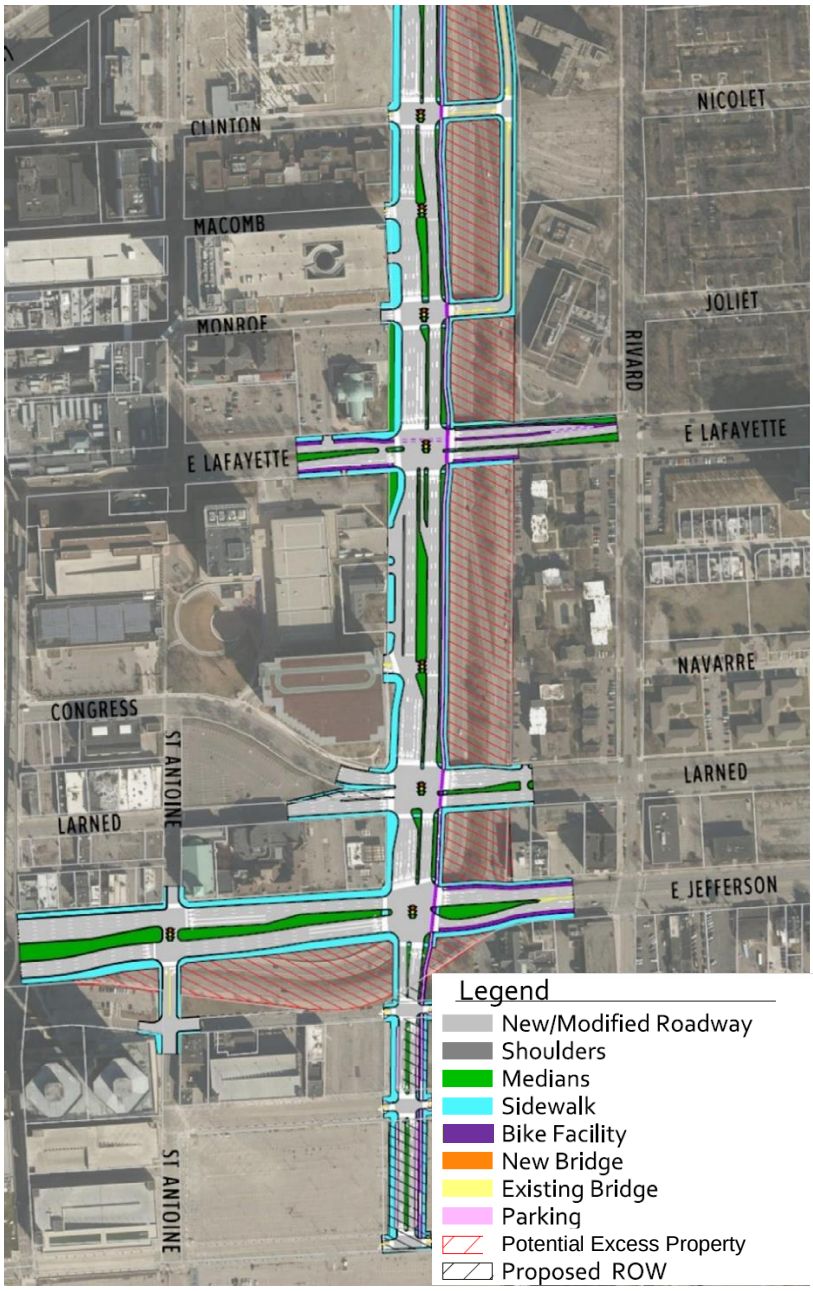
- Southbound I-75 Off-ramp and New Local Connector
- Northbound Service Drive and New Local Connector
- Rivard Street and New Local Connector
- Russell Street and New Local Connector

- Jay Street/Montcalm Street and Gratiot Avenue
- Southbound I-75 Off-ramp and Boulevard
- Northbound I-75 Off-ramp and Boulevard
- Northbound Boulevard and Northbound I-75 On-ramp (pedestrian only)
- Southbound Service Drive and Boulevard (pedestrian only)

With this option, the two-way cycle track along the boulevard would terminate at Montcalm Street in the north and Atwater Street in the south. There would also be a two-way cycle track along Montcalm Street that connects Brush Street easterly to Gratiot Avenue. The cycle track would cross Gratiot Avenue at the New Local Connector and continue north to connect to the Dequindre Cut Greenway.

South of Gratiot Avenue, the boulevard would have direct-left-turns to/from the side streets. All pedestrians would cross in two stages crossing the boulevard and there would be pedestrian signals. Right-turn on red would be prohibited for all westbound approaches with the cycle track. Figure 5 illustrates the boulevard south of the interchange.

Figure 5. Preferred Alternative Boulevard



8.2 Operational Results

The travel time results for the peak hour of the VISSIM modeling effort are shown in Table 10. Please refer to Table 7 for the limits of each travel time segment. Appendix A shows the limits of each travel time segment on a map.

Table 10: Preferred Alternative 2040 AM/PM Peak Hour Travel Time

Segment Name	Distance (miles)			AM Travel Time (minutes)			PM Travel Time (minutes)		
	FNB*	Build	Diff.	FNB	Build	Diff.	FNB	Build	Diff.
Inbound SB I-75 to SB I-375	1.9	2.0	0.1	4.5	6.5	2.0	12.0	6.0	-6.0
Outbound NB I-375 to NB I-75	2.0	2.0	0.0	3.4	10.7	7.3	7.4	9.1	1.7
Inbound WB Gratiot	0.7	0.7	0.0	3.3	3.4	0.1	3.2	3.3	0.1
Outbound EB Gratiot	0.7	0.7	0.0	2.4	2.2	-0.2	3.2	2.9	-0.3
Inbound SB I-375 to Greektown	1.1	1.1	0.0	2.0	3.3	1.3	3.2	2.9	-0.3
Outbound Greektown to NB I-375	1.2	1.2	0.0	1.8	2.9	1.1	1.9	3.2	1.3
I-75 NB	1.7	1.5	-0.2	8.0	1.6	-6.4	7.3	1.6	-5.7
I-75 SB	1.5	1.5	0.0	1.8	1.5	-0.3	2.1	1.6	-0.5

*FNB: Future No-Build

The conversion of I-375 from a limited-access freeway to an at-grade boulevard results in significantly different traffic operations, making it difficult to compare the two scenarios. For example, the corridor speed limit is reduced from 55 mph to 35 mph and vehicle conflict points are introduced at each cross-street. Overall, capacity in the corridor is reduced with the direct left conversion, resulting in traffic dispersing or rerouting to other viable corridors to reach their destinations. Details of the traffic diversion and reroute assumptions are provided in *I-375 Traffic Forecasting Methodology Technical Memorandum.*

As with the FNB scenario, one potentially counter-intuitive result from the build travel times is for the inbound vs. outbound Greektown travel time. Logically, travel time to the parking garage would be shorter than travel time out of the parking garage. In the AM, this difference is very small and likely due to vehicle queuing upstream. In the PM, the outbound segment was moved to the Lafayette Avenue garage exit. The signal progression favors outbound traffic flow, so once vehicles make the left turn onto Lafayette Avenue, they have a fairly smooth trip while southbound traffic may see more frequent interruptions due to the signal progression.

Figure 6 and Figure 7 provide the AM and PM peak intersection and freeway LOS, respectively, which is calculated per *HCM 2010* methodology. The LOS for the AM and PM peaks were calculated by examining analysis results for the worst 15-minute interval. Detailed LOS results are provided in Appendix C.

Figure 6: Preferred Alternative AM Levels of Service

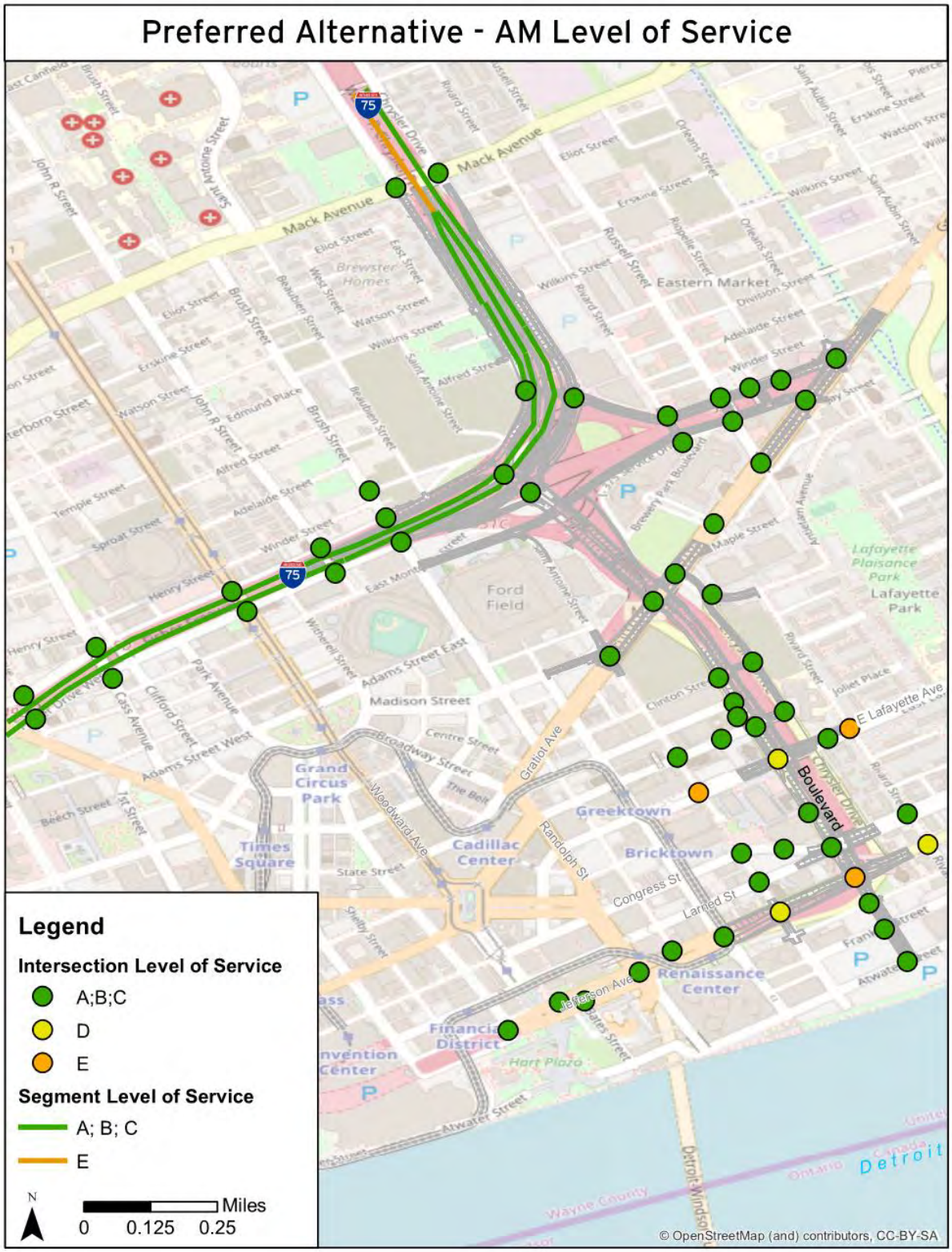
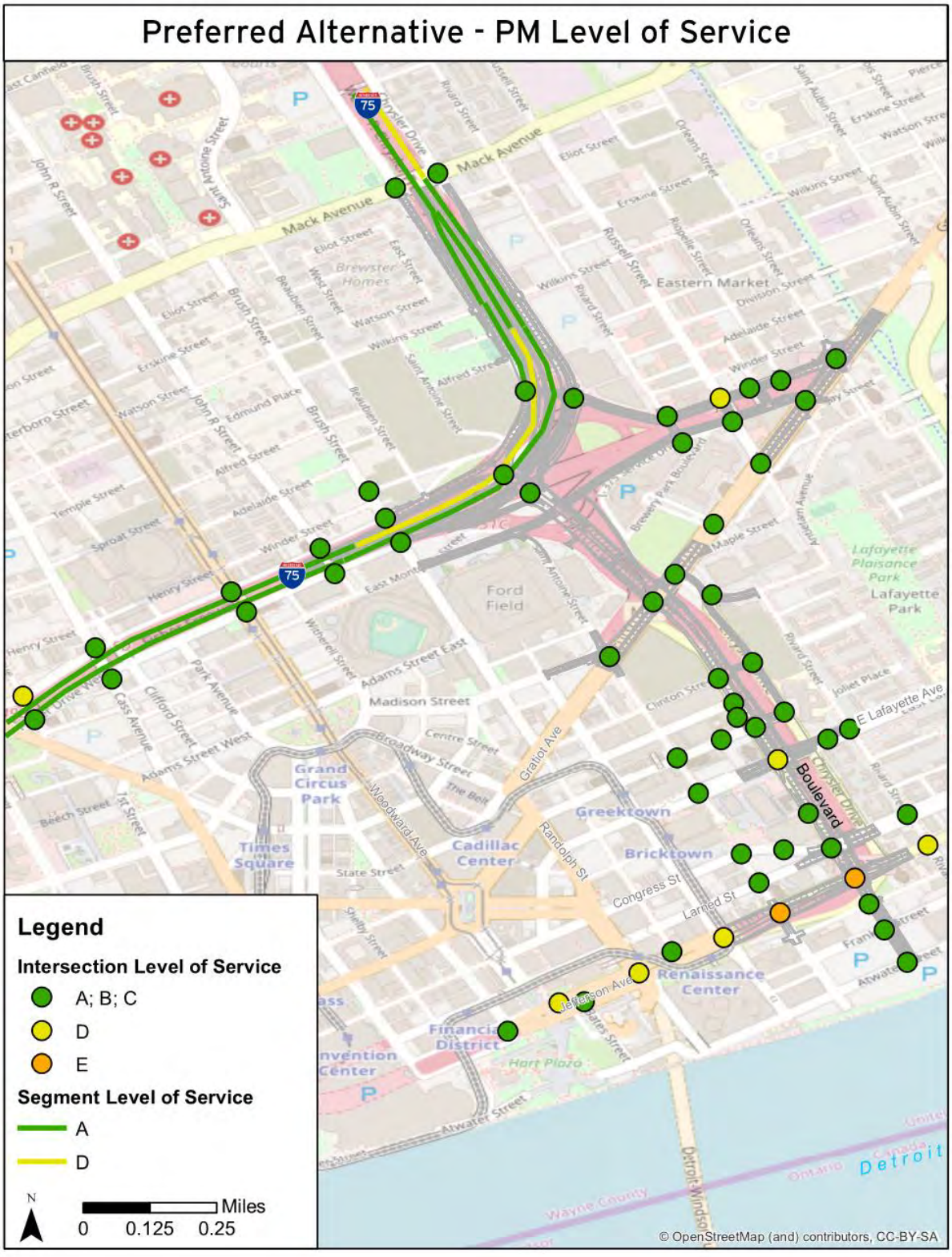


Figure 7: Preferred Alternative PM Levels of Service



8.2.1 Queuing Reports

The queue lengths for the AM and PM peaks are shown in Table 11 and Table 12.

Table 11: I-375 Preferred Alternative – AM Queue Counter Results

Intersection	Movement	Available Storage (feet)	Q Length (feet)	Q Max Length (feet)
Boulevard at the SPUI	NB Left	1,485	143	736
	SB Left	1,800	179	529
	EB Right	800	94	331
I-75 SB Service Road at Eastern Market	SB Approach	820	24	198
I-75 NB Service Road at Eastern Market	NB Left/Thru	1,800	0	6
	NB Right	1,800	22	163
I-75 NB off-ramp to Mack Avenue	NB off ramp	1,750	17	82
I-75 SB off-ramp to Mack Avenue	SB off ramp	1,000	68	275

Table 12: I-375 Preferred Alternative - PM Queue Counter Results

Intersection	Movement	Available Storage (feet)	Q Length (feet)	Q Max Length (feet)
Boulevard at the SPUI	NB Left	1,485	107	642
	SB Left	1,800	101	300
	EB Right	800	50	224
I-75 SB Service Road at Eastern Market	SB Approach	820	9	94
I-75 NB Service Road at Eastern Market	NB Left/Thru	1,800	1	24
	NB Right	1,800	22	208
I-75 NB off-ramp to Mack Avenue	NB off ramp	1,750	31	122
I-75 SB off-ramp to Mack Avenue	SB off ramp	1,000	66	247

In both peak periods, the maximum queue lengths are less than the available storage for all approaches at all intersections analyzed, indicating no backing up onto the freeway.

8.3 Observations

In both peak periods, the Preferred Alternative shows an operational improvement for I-75 compared to the Future No-Build condition. This is due in part to the rerouting of vehicles who may take different, more viable paths to reach their destination.

Operations on the boulevard differ between the AM and PM peak periods. Specific details for each peak is described herein.

8.3.1 AM Period

The AM peak period produces more vehicular traffic in the southbound direction along the boulevard. As the most critical operational need of the corridor is to prevent queue spillback onto I-75, signal timings were adjusted to prioritize throughput of southbound movements to prevent spillback in the VISSIM models. The signal adjustments resulted in the southbound boulevard operating without significant congestion throughout the AM model. Major southbound intersections such as Clinton Street and Lafayette Avenue do experience occasional queuing due to the heavy southbound volume, however these queues tend to dissipate once the green phase is activated for the southbound movement. In addition to these intersections, the southbound left movement at Jefferson Avenue experiences queuing that effects the intersection with Larned Street as well. This is likely caused by the lack of available storage between Jefferson Avenue and Larned Street.

The prioritization of the southbound movement along the boulevard does create some adverse effects on cross streets as these movements do not necessarily receive enough green time to accommodate all the volume. This congestion occurs later in the model at Lafayette and is most prevalent at eastbound and westbound Jefferson Avenue.

8.3.2 PM Period

The PM period has more balanced traffic volumes between southbound and northbound along the boulevard. The southbound boulevard demand feeds high demand southbound left movements at Lafayette Avenue, Larned Street, and Jefferson Avenue, which causes queuing at Jefferson Avenue and Larned Street. The northbound demand is served by high eastbound left traffic movements from Lafayette Avenue, Larned Street, and Jefferson Avenue. This heavier northbound volume results in increased queuing on the northbound boulevard between Jefferson Avenue and Gratiot Avenue as compared to the AM peak. The signal timing assumptions are set to provide the best overall operations of the system. This requires queue management of the boulevard both northbound and southbound and pedestrian accommodations, leaving very little flexibility in timing for the eastbound and westbound left-turn movements. In particular, Jefferson Avenue suffers from heavy congestion in both the east and westbound direction. The eastbound left turn and westbound movements have limited green time due to the other vehicular and pedestrian demands at the intersection. The northbound and southbound movements along the boulevard were given priority when developing signal timings for the corridor. Once vehicles access the boulevard, the major northbound and southbound movements benefit from the coordinated signal system. Congestion is still present but the signal

timings and progression along the boulevard provides steady flow on the mainline as well as managing the delay and queueing on the side streets.

References

FHWA. (2004). *FHWA Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software*

FHWA. (2009). *Manual on Uniform Traffic Control Devices*

MDOT. (2018). *I-375 Engineering & Traffic Evaluation Technical Memorandum*

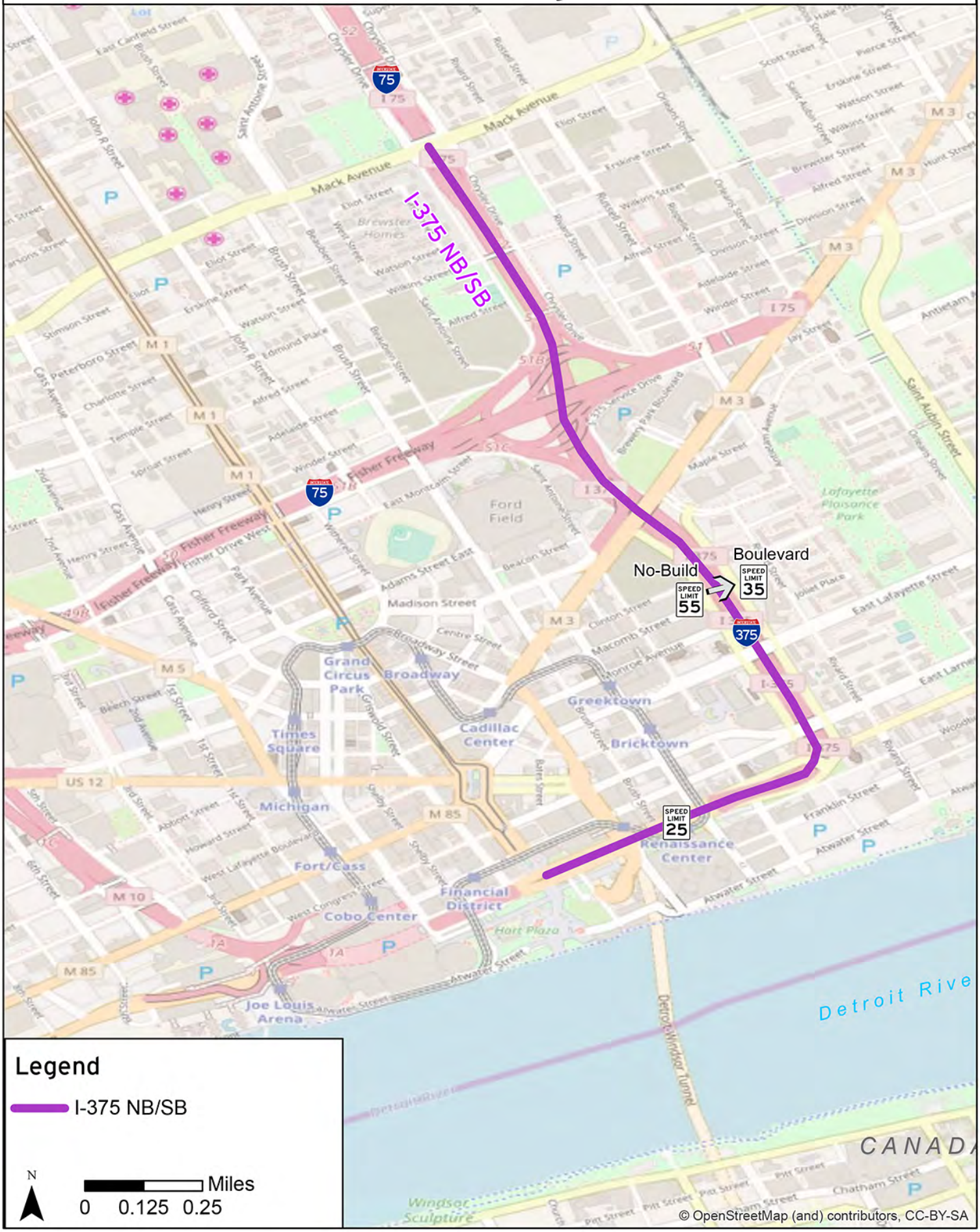
Transportation Research Board. (2010). *Highway Capacity Manual*

SEMCOG. (2018). *I-375 Dynamic Traffic Assignment Model Methodology and Assumptions*

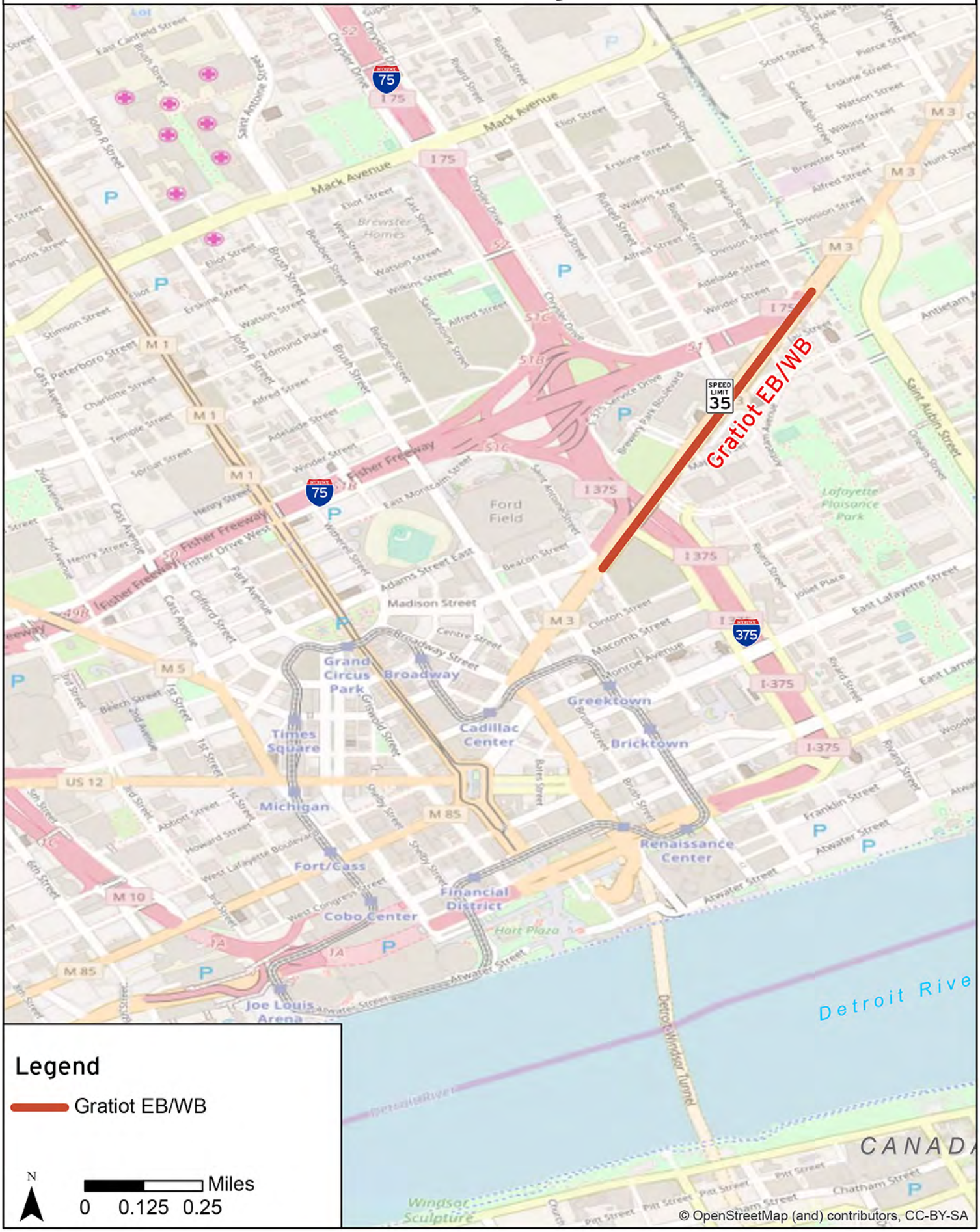
WSDOT. (2014). *Protocol for VISSIM Simulation*

Appendix A – Travel Time Segment Paths

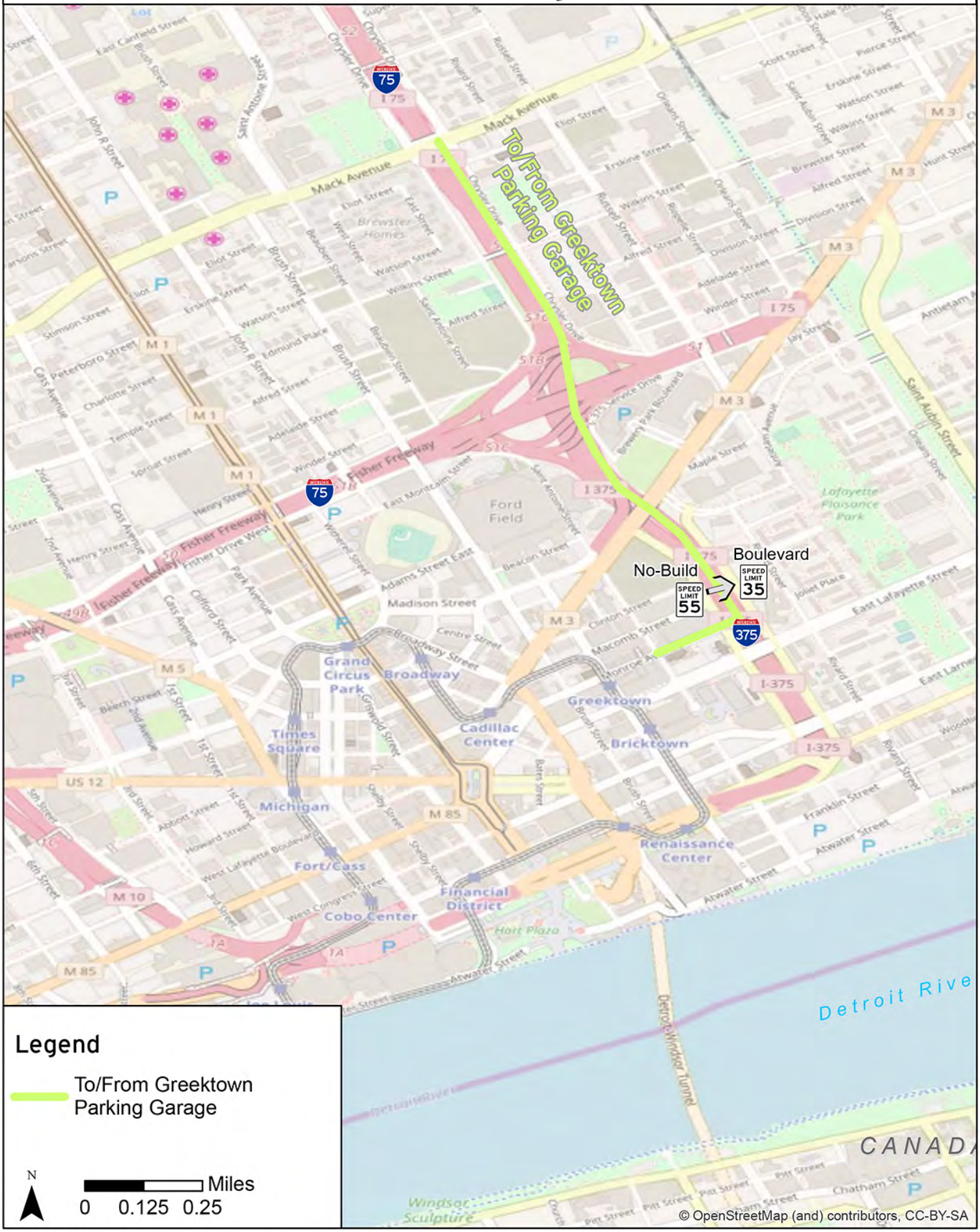
Travel Time Segments



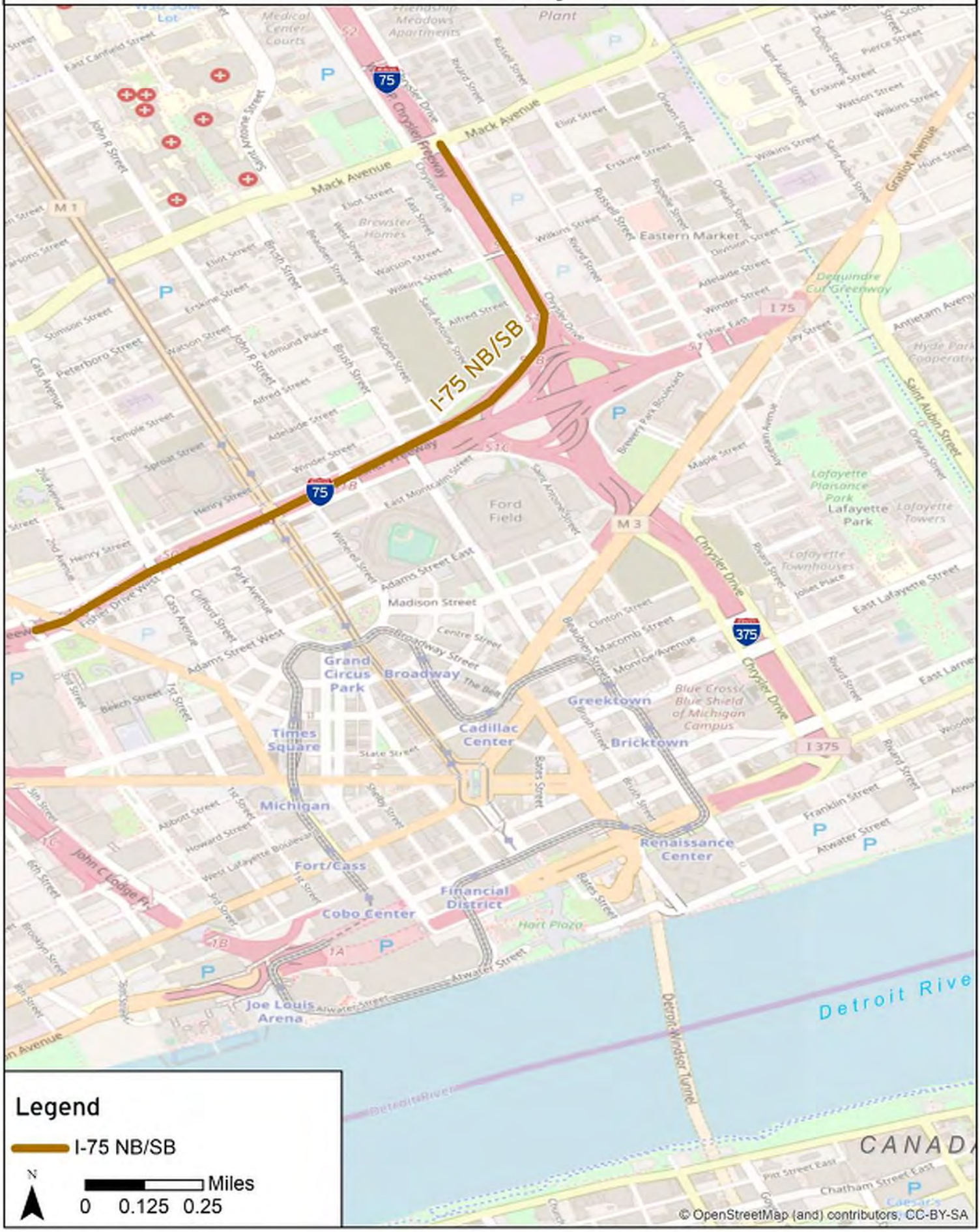
Travel Time Segments



Travel Time Segments

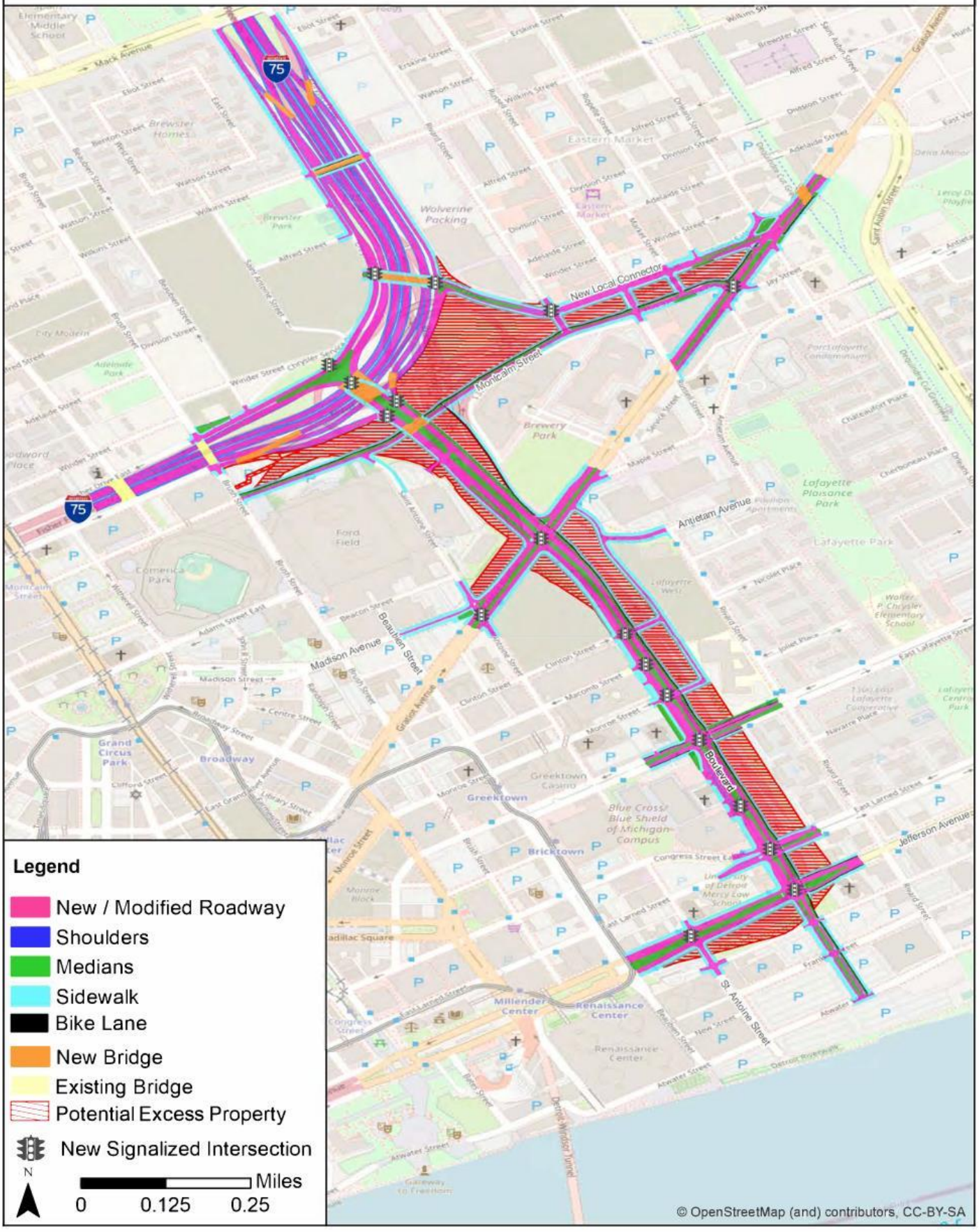


Travel Time Segments



Appendix B - Preferred Alternative Geometric Layout

Preferred Alternative



Appendix C – Operational Results

Future No-Build 2040 Freeway Level of Service								
Direction	Freeway	ID	Location	Operation Type	FNB AM		FNB PM	
					Density	LOS	Density	LOS
NB	I-375	1	Beaubien to Lafayette	Basic	8.03	A	11.10	B
NB	I-375	2	Lafayette to Nicolet	Basic	8.96	A	13.45	B
NB	I-375	3	Nicolet to Madison	Non-Basic	10.28	B	15.88	B
NB	I-375	4	Madison to I-75 Ramp	Basic	9.23	A	16.86	B
NB	I-375	5	Madison to south of Fisher Freeway	Basic	9.04	A	13.91	B
NB	I-375	6	South of Fisher Freeway to north of Fisher Freeway	Non-Basic	9.80	A	19.65	B
NB	I-375	7	North of Fisher Feeway to Alfred	Non-Basic	21.01	C	30.73	D
NB	I-75	8	Alfred to north of Wilkins	Non-Basic	17.97	B	47.33	F
NB	I-75	9	North of Wilkins to Mack	Basic	19.67	C	28.43	D
SB	I-75	10	Mack to north of Wilkins	Basic	34.23	D	220.88	F
SB	I-75	11	North of Wilkins to Alfred	Non-Basic	31.61	D	250.69	F
SB	I-375	12	Alfred to Fisher Freeway	Basic	25.82	C	203.96	F
SB	I-75	13	Alfred to St Antoine	Non-Basic	26.24	C	44.36	E
SB	I-75	14	St Antoine to John R	Basic	16.51	B	28.67	D
SB	I-375	15	Fisher Freeway to south of Fisher Freeway	Basic	25.21	C	262.02	F
SB	I-375	16	South of Fisher to Madison	Basic	21.49	C	194.59	F
SB	I-375	17	Madison to Nicolet	Non-Basic	75.78	F	202.55	F
SB	I-375	18	Nicolet to Lafayette	Basic	42.99	E	195.16	F
SB	I-375	19	Lafayette to Beaubien	Basic	89.09	F	195.91	F
WB	G Conn	20	Gratiot to Russell	Non-Basic	16.01	B	14.63	B
WB	G Conn	21	Russell to I-75	Basic	8.61	A	5.85	A
WB	G Conn	22	East of I-375	Basic	14.37	B	16.13	B
WB	G Conn		375	Basic	29.08	D	74.76	F
WB	G Conn	23	St Antoine to John R	Basic	21.24	C	23.04	C
SB	I-75	24	John R to Cass	Non-Basic	66.68	F	27.89	C
SB	I-75	25	Cass to Grand River	Non-Basic	13.69	B	30.72	D
NB	I-75	26	Grand River to Clifford	Non-Basic	168.85	F	237.36	F
NB	I-75	27	Clifford to Woodward	Basic	163.06	F	224.12	F
NB	I-75	28	Woodward to Brush	Non-Basic	144.88	F	223.74	F
NB	I-75	29	Brush to St Antoine	Non-Basic	165.05	F	225.86	F
EB	G Conn	30	Brush to I-375	Basic	14.74	B	25.97	C
NB	I-75	31	St Antoine to north of Fisher Freeway	Basic	38.91	E	76.71	F
EB	G Conn	32	I-375 to east of I-375	Non-Basic	14.73	B	27.66	C
EB	G Conn	33	East of I-375 to Rivard	Basic	12.15	B	19.17	C
EB	G Conn	34	Rivard to Gratiot	Non-Basic	65.21	F	50.76	F

Future No-Build 2040 Intersection Level of Service																								
Intersections			Sig?	AM								PM												
				Vissim		All		Approach		Intersection		Vissim				All		Approach		Intersection	
Int ID	Int Name	Mvmt		7AM3	8AM4	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	2PM	3PM	4PM	5PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1	Jefferson & Woodward	WBU	S	50	56	80.04	F	24.4	C	15.1	B	44	49	24	0	76.14	E	25.2	C	32.8	C
		WBU	S	279	306	111.04	F					238	342	232	0	99.31	F				
		WBT	S	926	886	8.34	A					1088	1959	1517	0	13.76	B				
		WBT	S	729	944	7.92	A					446	459	303	0	8.71	A				
		WBR	S	-	-	0.00	A					-	-	-	-	0.00	A				
		EBT	S	2162	2523	6.56	A	6.6	A			1052	1257	1064	0	45.87	D	45.9	D		
		EBU	S	-	-	0.00	A					-	-	-	-	0.00	A				
		EBL	S	-	-	0.00	A					-	-	-	-	0.00	A				
		SBL	S	-	-	0.00	A	0.0	A			-	-	-	-	0.00	A	0.0	A		
		SBR	S	-	-	0.00	A					-	-	-	-	0.00	A				
		SBU	S	-	-	0.00	A					-	-	-	-	0.00	A				
2	Jefferson & Randolph	NBRR	S	74	61	28.10	C	28.1	C	34.2	C	119	151	142	0	180.96	F	181.0	F	127.8	F
		EBR	S	177	186	3.51	A	39.2	D			291	493	399	0	3.73	A	146.9	F		
		EBT	S	1774	2044	42.75	D					900	1115	862	0	193.11	F				
		NBR	S	711	490	43.45	D	40.4	D			225	206	136	0	74.82	E	72.0	E		
		NBT	S	226	212	30.61	C					74	69	69	0	63.44	E				
		SBT	S	19	31	38.86	D	34.8	C			56	94	101	0	283.59	F	335.6	F		
		SBL	S	75	117	39.29	D					176	179	119	0	487.25	F				
		SBR	S	304	387	33.49	C					337	443	314	0	265.17	F				
		WBT	S	1617	1735	28.91	C	26.9	C			1409	2257	1698	0	57.09	E	49.5	D		
		WBR	S	455	507	19.67	B					258	286	186	0	7.81	A				
3	Jefferson & Beaubien	NBL	S	29	30	56.24	E	39.8	D	36.8	D	103	284	311	0	152.89	F	79.6	E	210.1	F
		NBR	S	20	23	12.62	B					134	312	469	0	24.53	C				
		NBT	S	4	7	60.34	E					8	22	30	0	62.05	E				
		EBU	S	522	582	78.00	E	34.1	C			347	332	194	0	902.70	F	260.8	F		
		EBT	S	1599	1574	19.60	B					940	1203	931	0	44.37	D				
		EBL	S	63	94	97.26	F					24	20	12	0	456.20	F				
		EBR	S	431	460	25.63	C					103	89	47	0	30.74	C				
		WBT	S	1828	1998	44.08	D	38.6	D			1205	1696	1226	0	221.83	F	208.5	F		
		WBU	S	552	541	6.42	A					60	55	33	0	17.40	B				
		WBR	S	46	87	25.04	C					34	39	32	0	58.42	E				
		WBL	S	208	221	78.81	E					33	28	29	0	223.05	F				
		SBR	S	60	80	29.73	C	50.6	D			138	240	59	10	15.76	B	23.6	C		
		SBL	S	37	46	66.74	E					46	87	21	0	39.64	D				
		SBT	S	59	68	61.69	E					18	17	15	1	42.85	D				
4	Jefferson Ave EB & Chrysler Service Dr SB	SBL	S	507	461	12.90	B	12.9	B	14.6	B	371	317	286	1	18.47	B	18.5	B	137.0	F
		EBU	S	57	81	8.44	A	15.7	B			57	103	109	0	454.57	F	200.7	F		
		EBT	S	762	908	16.22	B					633	854	743	0	178.09	F				
5	Jefferson Ave WB & Chrysler Service Dr SB	SBR	S	105	157	7.33	A	12.2	B	9.8	A	127	220	185	0	156.56	F	69.6	E	199.8	F
		SBT	S	507	461	13.18	B					369	316	284	1	39.64	D				
		NBL	S	57	80	11.13	B	11.1	B			57	102	102	0	591.66	F	591.7	F		
		WBT	S	740	902	7.71	A	7.7	A			634	919	692	0	266.76	F	266.8	F		
6	Jefferson & Chrysler Service Dr NB	NBR	S	1200	1280	4.24	A	5.3	A	11.4	B	944	1020	899	1	4.48	A	11.4	B	72.5	E
		NBT	S	66	92	24.23	C					60	145	137	0	119.45	F				
		WBT	S	745	899	14.79	B	17.7	B			639	916	729	0	169.52	F	125.9	F		
		WBR	S	489	472	22.16	C					510	615	501	0	71.29	E				
7	Chrysler Service Dr SB & Larned	WBL	S	45	48	3.78	A	5.2	A	26.2	C	23	25	9	10	78.13	E	23.5	C	115.3	F
		WBT	S	208	343	5.50	A					62	76	71	53	3.69	A				
		SBL	S	299	281	26.75	C	31.1	C			215	378	355	0	145.78	F	88.8	F		
		SBT	S	539	537	35.18	D					432	460	361	0	67.62	E				
		SBR	S	551	581	29.45	C					117	108	98	0	62.10	E				
		EBT	S	205	263	20.39	C	19.8	B			315	459	602	0	207.36	F	194.4	F		
		EBR	S	27	32	15.63	B					40	57	117	0	90.90	F				
8	Chrysler Service Dr NB & Larned	NBT	S	498	517	17.80	B	16.9	B	58.6	E	571	750	630	0	24.98	C	24.9	C	107.0	F
		NBR	S	5	2	5.47	A					0	2	9	0	4.69	A				
		NBL	S	53	41	10.03	B					8	3	7	0	16.65	B				
		WBR	S	237	338	233.12	F	158.7	F			213	277	285	284	388.04	F	364.0	F		
		WBU	S	0	0	0.00	A					0	0	0	0	0.00	A				
		WBT	S	201	350	70.83	E					77	98	74	68	297.49	F				
		EBL	S	113	140	21.75	C	16.8	B			224	420	400	0	87.18	F	55.3	E		
		EBT	S	384	414	15.40	B					297	412	570	0	31.32	C				
9	Chrysler Service Dr SB & E Lafayette	WBL	S	53	68	25.45	C	20.7	C	22.8	C	19	15	19	2	35.41	D	26.0	C	59.5	E
		WBT	S	240	445	19.70	B					169	177	229	194	24.93	C				
		SBL	S	323	339	18.12	B	22.9	C			371	435	382	5	9.66	A	9.9	A		
		SBT	S	216	346	17.59	B					39	226	163	9	5.56	A				
		SBR	S	571	561	27.52	C					267	228	233	8	10.88	B				
		EBT	S	55	98	26.51	C	29.0	C			215	265	505	170	245.56	F	239.5	F		
		EBR	S	28	51	33.96	C					7	22	24	1	38.62	D				
		EBU	S	0	0	0.00	A					0	0	0	0	0.00	A				
10	Chrysler Service Dr NB & E Lafayette	EBL	S	55	75	7.00	A	17.2	B	30.5	C	174	237	369	123	14.45	B	11.6	B	18.9	B
		EBT	S	317	368	18.97	B					412	460	519	55	10.46	B				
		NBL	S	26	41	33.71	C	29.9	C			16	18	13	2	60.46	E	44.2	D		
		NBT	S	70	36	30.43	C					18	16	116	10	36.61	D				
		NBR	S	6	9	6.09	A					8	16	9	0	27.47	C				
		WBT	S	270	471	33.89	C	38.0	D			171	175	234	217	19.44	B	26.1	C		
		WBR	S	389	506	40.92	D					279	427	327	383	30.11	C				
		WBU	S	0	0	0.00	A					0	0	0	0	0.00	A				
11	Chrysler Service Dr SB & Monroe	SBT	S	1039	1182	12.60	B	12.5	B	12.5	B	537	693	587	0	23.98	C	24.6	C	24.6	C
		SBL	S	60	58	11.29	B					34	30	28	0	34.55	C				
		EBR	S	-	-	0.00	A	0.0	A			-	-	-	-	0.00	A	0.0	A		
		EBT	S	-	-	0.00	A					-	-	-	-	0.00	A				
12	Chrysler Service Dr NB & Monroe	NBT	S	599	657	19.06	B	19.1	B	21.4	C	562	761	809	521	30.22	C	30.2	C	30.8	C
		EBL	S	163	236	29.83	C	29.8	C			559	607	601	241	31.47	C	31.5	C		

Future No-Build 2040 Intersection Level of Service																							
Intersections			Sig?	AM								PM											
				Vissim		All		Approach		Intersection		Vissim				All		Approach		Intersection	
Int ID	Int Name	Mvmt		7AM3	8AM4	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	2PM	3PM	4PM	5PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
13	Chrysler Service Dr SB & Macomb	SWBR	U	272	347	1.38	A	1.1	A	1.1	A	227	119	128	0	1.66	A	1.9	A	1.9	A
		SWBT	U	1275	1373	1.01	A					853	1013	877	0	1.91	A				
		SBR	U	1	0	0.29	A	0.3	A			2	1	0	0	0.47	A	0.5	A		
14	Chrysler Service Dr SB & Gratiot	WBL	U	1	0	0.71	A	5.4	A	4.5	A	1	1	0	0	0.37	A	0.2	A	0.4	A
		WBT	U	1139	1484	5.45	A					559	429	560	386	0.17	A				
		EBR	U	0	0	0.00	A	0.1	A			1	0	0	0	0.22	A	0.8	A		
		EBT	U	232	309	0.10	A					423	699	1145	1221	0.76	A				
15	Antietam & Gratiot	EBT	S	203	259	16.54	B	5.5	A	17.6	B	380	628	1062	1089	23.43	C	0.2	A	24.5	C
		EBR	S	30	48	11.83	B					46	63	87	128	25.88	C				
		WBT	S	1073	1364	16.62	B	7.8	A			516	368	520	355	13.34	B	11.5	B		
		WBL	S	113	147	19.61	B					88	96	86	92	94.79	F				
		NBL	S	69	119	44.28	D	16.5	B			45	63	40	30	42.96	D	14.4	B		
		NBR	S	84	105	10.13	B					88	113	118	149	14.21	B				
16	Antietam & Chrysler Service Dr NB	SBT	U	142	195	0.10	A	0.1	A	2.8	A	134	159	172	220	0.11	A	0.1	A	2.6	A
		EBL	U	86	106	9.07	A	8.6	A			68	90	60	32	8.56	A	8.2	A		
		EBR	U	14	20	5.74	A					16	19	23	16	6.92	A				
		NBT	U	69	119	0.05	A	0.1	A			64	87	97	147	0.19	A	0.2	A		
17	St. Antoine & Madison	WBT	S	800	1050	10.89	B	10.7	B	17.1	B	242	275	286	83	12.59	B	11.9	B	21.0	C
		WBR	S	177	423	9.71	A					41	67	131	30	7.95	A				
		EBT	S	148	193	43.02	D	46.2	D			449	440	548	773	19.01	B	19.1	B		
		EBL	S	23	63	66.74	E					19	35	78	63	21.40	C				
		SBL	S	10	19	44.83	D	29.0	C			83	115	115	125	53.18	D	50.0	D		
		SBR	S	13	34	16.36	B					32	81	117	104	41.73	D				
		NBR	S	56	30	21.27	C	25.2	C			67	60	51	46	20.63	C	21.8	C		
		NBL	S	6	5	50.64	D					10	5	10	5	25.59	C				
		NBT	S	58	132	26.30	C					21	57	32	37	23.77	C				
18	St. Antoine & Gratiot	EBT	S	187	269	10.53	B	10.5	B	28.7	C	361	607	1032	1133	13.69	B	13.7	B	32.4	C
		EBL	S	0	0	0.00	A					0	0	0	0	0.00	A				
		WBT	S	1128	1495	23.89	C	23.9	C			563	429	561	386	35.70	D	35.7	D		
		NBL	S	13	22	51.70	D	78.3	E			28	25	6	5	83.37	F	58.6	E		
		NBR	S	45	42	38.32	D					62	93	112	91	31.02	C				
		NBT	S	121	167	95.85	F					98	121	92	88	68.97	E				
19	Fisher Service Dr EB & Russell St	NBL	U	35	98	3.23	A	1.0	A	1.1	A	3	7	3	1	3.42	A	1.7	A	6.7	A
		NBR	U	18	43	0.34	A					54	57	38	43	0.23	A				
		NBT	U	118	192	0.39	A					279	220	245	238	1.97	A				
		EBR	U	3	4	7.47	A	9.4	A			12	9	36	48	57.44	F	54.5	F		
		EBT	U	0	0	0.00	A					0	0	0	0	0.00	A				
		EBL	U	6	14	10.18	B					69	70	125	217	54.02	F				
		SBT	U	73	134	0.38	A	0.6	A			319	210	191	187	0.61	A	1.1	A		
		SBR	U	39	131	0.64	A					13	10	6	4	0.64	A				
		SBL	U	15	26	1.61	A					53	52	41	35	4.13	A				
20	Fisher Service Dr WB & Russell St	NBT	S	94	170	17.13	B	17.5	B	15.2	B	274	242	280	313	19.27	B	20.2	C	16.9	B
		NBL	S	28	37	18.91	B					72	52	90	144	23.53	C				
		SBR	S	13	26	12.96	B	16.2	B			56	36	31	22	18.16	B	17.2	B		
		SBT	S	93	169	16.63	B					275	225	169	163	17.06	B				
		EBL	S	0	0	0.00	A	4.0	A			0	0	0	0	0.00	A	5.9	A		
		EBR	S	31	107	4.05	A					44	24	46	33	5.87	A				
		WBR	S	8	13	6.02	A	13.6	B			42	22	22	23	5.94	A	11.1	B		
		WBT	S	13	13	17.94	B					31	12	10	13	17.00	B				
		WBL	S	3	17	15.64	B					64	25	20	30	11.55	B				
21	Fisher Service Dr. EB & Gratiot	WBR	S	5	7	10.41	B	24.5	C	22.2	C	11	13	13	9	16.66	B	22.6	C	31.6	C
		WBL	S	14	27	29.19	C					17	9	16	19	26.51	C				
		NBT	S	25	55	15.37	B	37.4	D			60	66	59	46	48.55	D	51.8	D		
		NBR	S	211	274	40.00	D					447	688	1143	1282	52.23	D				
		EBL	S	6	30	26.09	C	28.2	C			34	42	33	50	25.35	C	14.1	B		
		EBR	S	12	29	29.12	C					69	57	44	26	8.52	A				
		SBT	S	1301	1652	19.35	B	19.3	B			525	508	583	357	16.02	B	16.0	B		
22	I-75/Gratiot Connector & Gratiot	EBL	U	928	856	46.55	E	54.7	F	58.7	F	907	1854	2020	208	25.37	D	25.2	D	16.6	D
		EBR	U	202	340	92.29	F					25	29	157	12	20.50	C				
		NBT	U	221	311	13.12	B	13.1	B			494	739	1190	1342	12.57	B	12.6	B		
		SBR	U	1434	1522	5.97	A	64.4	F			1010	1227	1232	971	1.09	A	12.7	B		
		SBT	U	1104	1315	141.75	F					503	479	429	339	36.69	E				
		SBRS	U	28	31	9.11	A					25	18	15	20	1.80	A				
23	Chrysler Service Dr SB & Mack Ave	SBL	S	383	276	34.14	C	22.5	C	17.3	B	250	291	220	66	106.33	F	52.1	D	38.9	D
		SBT	S	167	252	36.00	D					221	302	310	66	60.63	E				
		SBR	S	722	625	13.26	B					513	430	426	87	22.01	C				
		WBL	S	109	86	38.50	D	13.3	B			99	103	106	18	306.72	F	55.1	E		
		WBT	S	728	786	9.56	A					646	641	697	282	16.73	B				
		EBT	S	649	647	14.16	B	13.6	B			949	1237	1127	369	19.05	B	19.6	B		
		EBR	S	236	229	12.13	B					351	488	479	96	21.25	C				
		EBU	S	0	0	0.00	A					0	0	0	0	0.00	A				
24	Chrysler Service Dr NB & Mack Ave	EBL	S	332	294	26.84	C	20.0	B	27.4	C	536	635	442	159	26.80	C	18.2	B	33.2	C
		EBT	S	706	631	16.77	B					667	895	898	292	11.21	B				
		NBT	S	204	223	38.75	D	38.3	D			237	247	439	211	59.52	E	53.5	D		
		NBL	S	291	314	44.09	D					288	228	273	70	58.56	E				
		NBR	S	103	124	20.81	C					129	128	273	64	31.19	C				
		WBR	S	199	245	27.25	C	29.0	C			297	296	215	127	31.51	C	39.7	D		
		WBT	S	543	555	29.62	C					450	517	530	245	45.16	D				
		WBU	S	0	0	0.00	A					0	0	0	0	0.00	A				

Future No-Build 2040 Intersection Level of Service																							
Intersections			Sig?	AM								PM											
				Vissim		All		Approach		Intersection		Vissim				All		Approach		Intersection	
Int ID	Int Name	Mvmt		7AM3	8AM4	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	2PM	3PM	4PM	5PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
25	Fisher Service Rd EB & Brush St	SBT	S	53	95	5.16	A	5.2	A	7.6	A	51	58	70	51	10.33	B	12.1	B	17.5	B
		SBL	S	0	7	5.68	A					5	12	6	9	30.65	C				
		NBT	S	43	60	10.13	B	9.8	A			95	145	265	298	23.74	C	24.2	C		
		NBR	S	5	13	7.05	A					18	19	35	39	26.63	C				
		EBL	S	12	5	13.03	B	7.8	A			29	57	76	79	17.70	B	14.1	B		
		EBR	S	103	203	5.67	A					56	159	184	142	5.79	A				
		EBT	S	16	43	17.29	B					51	113	74	102	21.12	C				
26	Fisher Service Dr WB & Brush St	NBL	S	26	24	8.96	A	8.9	A	9.0	A	63	110	186	233	16.66	B	17.1	B	16.8	B
		NBT	S	31	41	8.81	A					61	92	153	145	17.53	B				
		WBL	S	0	2	10.32	B	13.1	B			0	2	9	5	31.63	C	29.5	C		
		WBT	S	7	4	13.07	B					3	8	9	14	29.52	C				
		WBR	S	-	-	0.00	A					-	-	-	-	0.00	A				
		SBT	S	53	101	10.97	B	8.7	A			57	67	68	55	23.10	C	16.1	B		
		SBR	S	26	57	4.17	A					38	41	49	29	5.73	A				
27	Fisher Service Dr EB & Clifford St	NBR	S	79	71	10.43	B	13.0	B	12.9	B	123	174	202	51	1167.12	F	1135.9	F	285.3	F
		NBT	S	28	30	20.31	C					67	87	134	27	1078.67	F				
		EBT	S	716	1010	12.90	B	12.9	B			701	1046	1090	56	55.10	E	55.1	E		
		EBL	S	2	2	8.26	A					1	7	16	0	24.51	C				
28	Fisher Service Dr WB & Clifford St	NBL	S	27	30	33.71	C	32.7	C	11.9	B	54	76	116	22	25.85	C	24.6	C	13.6	B
		NBT	S	4	1	24.87	C					15	17	34	6	20.33	C				
		WBT	S	170	195	8.22	A	8.5	A			244	317	387	422	10.88	B	10.7	B		
		WBR	S	18	9	10.84	B					19	13	17	16	8.00	A				
29	Fisher Service Dr EB & 2nd Ave	EBT	S	427	719	6.57	A	9.6	A	19.1	B	413	589	695	855	8.80	A	9.3	A	10.1	B
		EBL	S	343	237	13.34	B					63	143	144	73	12.87	B				
		NBR	S	33	24	6.52	A	19.1	B			69	152	178	186	7.46	A	12.4	B		
		NBT	S	15	16	47.92	D					8	22	41	45	57.56	E				
		SBL	S	310	440	42.61	D	42.6	D			131	145	209	68	11.40	B	11.4	B		
30	Fisher Service Dr WB & 2nd Ave	WBRaT	S	310	366	73.34	E	92.5	F	70.6	E	258	297	414	127	29.06	C	21.1	C	33.4	C
		WBRaR	S	229	152	72.27	E					56	147	119	30	34.11	C				
		WBRaL	S	316	437	126.06	F					131	145	209	68	0.00	A				
		NBL	S	1	2	37.61	D	49.8	D			1	10	19	20	44.84	D	48.4	D		
		NBT	S	355	249	49.87	D					69	155	165	98	48.46	D				
		WBT	S	228	288	45.80	D	40.7	D			392	512	573	644	43.17	D	43.1	D		
		WBR	S	152	183	33.15	C					64	103	93	86	42.36	D				
31	St. Antoine & Congress	WBT	U	574	808	0.01	A	0.0	A	0.2	A	281	374	466	274	0.07	A	0.1	A	0.4	A
		NBL	U	18	36	6.93	A	6.9	A			16	19	30	3	7.21	A	7.2	A		
32	St. Antoine & Larned	EBT	S	230	242	9.86	A	10.1	B	10.3	B	334	480	770	0	123.50	F	124.0	F	119.8	F
		EBL	S	10	12	16.22	B					6	7	11	0	152.10	F				
		NBR	S	9	50	4.84	A	13.2	B			18	42	19	0	86.88	F	67.5	E		
		NBT	S	8	24	21.83	C					10	13	19	3	30.71	C				
33	Monroe & St. Antoine	EBL	S	39	69	6.93	A	8.5	A	8.5	A	87	101	101	42	14.62	B	13.0	B	11.7	B
		EBT	S	132	183	8.91	A					255	326	349	153	12.45	B				
		NBT	S	104	182	9.15	A	8.6	A			236	210	236	158	10.84	B	10.2	B		
		NBR	S	38	66	7.03	A					67	61	100	73	7.98	A				

Future No-Build 2040 Intersection Level of Service

Intersections			Sig?	AM								PM									
				Vissim		All		Approach		Intersection		Vissim				All		Approach		Intersection	
Int ID	Int Name	Mvmt		7AM3	8AM4	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	2PM	3PM	4PM	5PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
34	Lafayette & St. Antoine	WBT	S	400	631	18.35	B	17.0	B	23.4	C	212	203	305	103	11.60	B	9.1	A	34.0	C
		WBR	S	73	131	9.78	A					142	95	132	65	5.31	A				
		WBL	S	165	165	43.00	D	43.0	D			7	11	9	4	15.65	B	15.7	B		
		NBR	S	0	0	0.00	A	0.0	A			0	0	0	0	0.00	A	0.0	A		
		NBL	S	0	0	0.00	A					0	0	0	0	0.00	A				
		NBT	S	0	0	0.00	A					0	0	0	0	0.00	A				
		EBT	S	76	137	18.02	B	22.1	C			204	234	405	182	75.66	E	58.6	E		
		EBR	S	49	54	6.36	A					5	6	9	2	607.76	F				
		EBL	S	60	92	40.01	D					155	174	167	98	18.42	B				
35	Lafayette & Rivard	WBU	S	0	0	0.00	A	22.2	C	23.2	C	0	0	0	0	0.00	A	19.0	B	25.5	C
		WBT	S	507	772	22.42	C					363	470	418	443	18.31	B				
		WBL	S	11	40	24.71	C					27	20	16	32	29.25	C				
		WBR	S	58	50	19.63	B					19	33	33	37	17.90	B				
		EBT	S	248	289	33.98	C	31.4	C			325	364	422	49	39.94	D	37.0	D		
		EBR	S	42	47	13.48	B					70	58	68	6	21.52	C				
		EBL	S	38	40	34.26	C					30	44	51	4	40.52	D				
		NBR	S	7	23	5.73	A	13.1	B			32	36	40	51	11.10	B	16.0	B		
		NBL	S	31	32	16.15	B					23	31	61	57	18.58	B				
		NBT	S	34	49	11.79	B					41	56	91	73	18.23	B				
		SBL	S	23	32	19.29	B	17.6	B			27	53	52	59	19.84	B	17.2	B		
		SBR	S	138	164	17.53	B					70	96	78	101	15.65	B				
		SBT	S	98	114	17.41	B					56	66	68	65	17.83	B				
36	Rivard & Larned	WBU	S	0	0	0.00	A	293.6	F	220.4	F	0	0	0	0	0.00	A	721.6	F	517.6	F
		WBT	S	415	568	295.41	F					243	341	279	233	728.10	F				
		WBL	S	22	24	130.46	F					10	13	7	3	438.59	F				
		WBR	S	17	14	464.93	F					12	17	10	16	818.05	F				
		EBT	S	318	328	32.05	C	28.7	C			247	350	527	0	27.82	C	28.3	C		
		EBR	S	63	70	11.59	B					40	27	20	0	23.02	C				
		EBL	S	11	15	30.52	C					13	36	28	0	54.45	D				
		NBR	S	11	8	14.21	B	22.4	C			13	24	20	13	19.46	B	88.6	F		
		NBL	S	25	64	31.55	C					40	44	78	92	189.26	F				
		NBT	S	41	69	19.04	B					55	74	83	110	31.52	C				
		SBL	S	10	15	497.54	F	773.8	F			11	26	19	34	2078.15	F	2238.1	F		
		SBR	S	31	50	941.17	F					16	14	11	21	2584.33	F				
		SBT	S	62	135	734.45	F					55	67	33	89	2170.44	F				
37	Rivard & Gratiot	EBL	U	20	31	17.96	C	18.0	C	2.8	C	18	14	15	0	5.68	A	5.7	A	1.9	A
		SBT	U	0	0	0.00	A	16.2	C			0	0	0	0	0.00	A	10.3	B		
		SBR	U	2	9	21.79	C					21	20	15	66	8.62	A				
		SBL	U	2	2	8.33	A					20	25	30	51	12.11	B				
		NBT	U	0	0	0.00	A	5.3	A			0	0	0	0	0.00	A	17.8	C		
		NBL	U	0	6	28.71	D					4	0	6	3	29.81	D				
		NBR	U	1	2	5.26	A					18	12	25	14	15.12	C				
		WBR	U	59	90	2.35	A	3.0	A			19	25	17	6	1.00	A	0.5	A		
		WBL	U	5	3	1.90	A					1	2	1	1	1.14	A				
		WBT	U	1204	1491	3.06	A					575	446	583	371	0.48	A				
		EBR	U	0	0	0.00	A	2.3	A			0	1	0	0	0.20	A	1.0	A		
		EBT	U	266	332	0.14	A					450	724	1173	1237	2.00	A				
38	Russell & Gratiot	EBL	S	52	61	17.66	B	17.7	B	20.0	B	122	108	141	163	6.61	A	6.6	A	42.1	D
		WBL	S	2	13	28.36	C	21.0	C			29	30	19	13	89.01	F	46.1	D		
		WBR	S	103	197	19.52	B					194	165	120	81	43.29	D				
		WBT	S	1218	1497	21.10	C					387	380	499	309	44.32	D				
		NBT	S	1	6	35.89	D	28.3	C			24	17	14	24	33.18	C	34.4	C		
		NBR	S	1	0	14.69	B					15	11	23	6	35.96	D				
		NBL	S	0	6	38.12	D					4	5	7	6	35.98	D				
		SBT	S	0	0	0.00	A	0.0	A			0	0	0	0	0.00	A	0.0	A		
		SBL	S	0	0	0.00	A					0	0	0	0	0.00	A				
		SBR	S	0	0	0.00	A					0	0	0	0	0.00	A				
		EBR	S	3	7	11.40	B	14.4	B			5	8	2	2	42.03	D	48.2	D		
		EBT	S	212	271	14.45	B					362	644	1073	1145	48.28	D				
39	Madison & Beaubien	WBL	S	431	443	46.48	D	31.9	C	26.5	C	92	122	147	53	96.66	F	40.7	D	21.6	C
		WBT	S	378	635	15.22	B					192	235	269	138	13.85	B				
		EBR	S	77	179	7.82	A	9.8	A			160	170	204	183	8.60	A	12.8	B		
		EBT	S	167	256	10.65	B					461	467	605	831	14.20	B				
		SBT	S	20	55	17.45	B	17.7	B			23	43	72	50	23.63	C	24.3	C		
		SBR	S	3	9	16.53	B					5	17	25	10	18.44	B				
		SBL	S	2	2	21.32	C					7	8	27	11	31.02	C				
40	Rivard & Jefferson	WBT	S	-	-	0.00	A	0.0	A	23.0	C	-	-	-	-	0.00	A	0.0	A	56.8	E
		WBL	S	-	-	0.00	A					-	-	-	-	0.00	A				
		WBR	S	-	-	0.00	A					-	-	-	-	0.00	A				
		EBT	S	909	969	22.58	C	23.3	C			879	932	877	1	59.77	E	57.9	E		
		EBR	S	282	301	23.86	C					43	50	28	0	24.44	C				
		EBL	S	13	17	65.92	E					19	23	25	0	47.48	D				
		NBR	S	0	0	0.00	A	0.0	A			0	0	0	0	0.00	A	0.0	A		
		NBL	S	0	0	0.00	A					0	0	0	0	0.00	A				
		NBT	S	0	0	0.00	A					0	0	0	0	0.00	A				
		SBL	S	26	41	27.12	C	20.6	C			45	55	55	4	44.84	D	46.4	D		
		SBR	S	24	37	11.21	B					30	27	20	0	47.00	D				
		SBT	S	124	152	20.96	C					23	24	34	4	48.58	D				

Future No-Build 2040 Intersection Level of Service																					
Intersections			Sig?	AM								PM									
				Vissim		All		Approach		Intersection		Vissim				All		Approach		Intersection	
Int ID	Int Name	Mvmt		7AM3	8AM4	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	2PM	3PM	4PM	5PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
197	Jefferson & Griswold	WBT	S	534	663	23.42	C	23.0	C	22.5	C	89	116	86	0	1.94	A	1.6	A	6.5	A
		WBT	S	927	886	25.81	C					357	343	219	0	5.86	A				
		WBR	S	192	278	8.49	A					1092	1954	1508	0	0.23	A				
		SBR	S	0	0	0.00	A	26.7	C			0	0	0	0	0.00	A	0.0	A		
		SBR	S	32	46	29.53	C					0	0	0	0	0.00	A				
		SBL	S	64	74	25.30	C					0	0	0	0	0.00	A				
		EBT	S	1984	2341	22.14	C	21.9	C			845	1023	917	0	15.00	B	14.9	B		
		EBT	S	98	103	17.88	B					48	58	45	0	13.04	B				

Preferred Alternative - Mainline LOS								
Direction	Freeway	ID	Location	Operation Type	AM		PM	
					Density	LOS	Density	LOS
NB	I-75	8	Mack exit to I-75 near Wilkins	Basic	21.89	C	22.33	C
NB	I-75	9	Boulevard entrance to Mack entrance	Basic	19.38	C	26.34	D
SB	I-75	10	Mack exit to Boulevard exit	Non-Basic	35.85	E	22.04	C
SB	I-75	13	Boulevard exit to Mack entrance	Basic	15.49	B	22.79	C
SB	I-75	14	I-75 near Boulevard to Boulevard entrance	Basic	21.08	C	32.73	D
SB	I-75	24	Boulevard entrance to 2nd Ave exit	Non-Basic	16.35	B	20.53	C
SB	I-75	25	2nd Ave exit to M-10 exit	Basic	13.17	B	21.86	C
NB	I-75	26	M-10 entrance to I-75 near Clifford	Non-Basic	20.78	C	19.64	B
NB	I-75	27	I-75 near Clifford to Clifford entrance	Basic	19.03	C	17.94	B
NB	I-75	28	Clifford entrance to Boulevard exit	Non-Basic	20.09	C	20.56	C
NB	I-75	29	Boulevard exit to I-75 near Boulevard	Basic	17.12	B	17.23	B
NB	I-75	30	I-75 near Boulevard to Mack exit	Basic	17.29	B	17.39	B
SB	I-75	38	Mack entrance to I-75 near Boulevard	Non-Basic	18.82	B	29.34	D
NB	I-75	40	I-75 near Wilkins to Boulevard entrance	Basic	24.52	C	25.01	C

Preferred Alternative - Intersection Level of Service																			
Intersections			Sig?	AM							PM								
				Vissim	All		Approach		Intersection		Vissim	All		Approach		Intersection			
Int ID	Int Name	Mvmt		7:30AM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	4:30PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS		
1	Jefferson & Woodward	WBU	U	49	1.86	A	9.6	A	5.5	A	29	17.01	C	44.4	E	28.4	D		
		WBU	U	233	11.28	B					391	46.35	E						
		EBT	U	2383	5.01	A	5.01	A			1306	23.30	C	23.30	C				
2	Jefferson & Randolph	WBR	S	420	20.56	C	22.1	C	25.4	C	305	18.73	B	20.7	C	35.9	D		
		WBT	S	1156	22.70	C					2418	20.97	C						
		SBL	S	112	32.93	C	32.7	C			200	64.84	E	76.0	E				
		SBT	S	27	31.25	C					202	49.96	D						
		SBR	S	330	32.74	C					644	87.70	F						
		NBR	S	582	26.73	C	26.9	C			166	27.37	C	27.1	C				
		NBT	S	238	27.22	C					91	26.64	C						
		NBR	S	63	23.18	C	23.18	C			265	59.55	E	59.55	E				
		EBT	S	1934	27.63	C	25.6	C			1302	45.75	D	33.4	C				
		EBR	S	176	3.68	A					676	9.71	A						
3	Jefferson & Beaubien	WBU	S	0	0.00	A	18.6	B	30.0	C	0	0.00	A	23.4	C	44.9	D		
		WBR	S	44	5.34	A					37	2.65	A						
		WBL	S	107	70.20	E					28	68.56	E						
		WBT	S	1205	14.50	B					1569	23.09	C						
		SBL	S	42	87.55	F	51.6	D			11	123.49	F	35.9	D				
		SBT	S	68	52.25	D					4	43.28	D						
		SBR	S	72	29.84	C					38	9.73	A						
		NBR	S	20	9.32	A	29.8	C			227	12.07	B	68.2	E				
		NBT	S	8	38.84	D					36	55.00	D						
		NBL	S	28	41.43	D					479	95.83	F						
		EBT	S	1638	33.71	C	34.3	C			1323	70.31	E	54.8	D				
		EBL	S	86	74.21	E					20	152.01	F						
		EBR	S	469	34.17	C					92	14.45	B						
		EBU	S	522	29.82	C					428	11.06	B						
5	Jefferson & Boulevard	WBR	S	523	23.67	C	82.8	F	72.6	E	219	21.11	C	108.2	F	73.4	E		
		WBT	S	925	116.12	F					802	132.03	F						
		SBL	S	450	76.54	E	30.6	C			414	105.30	F	38.7	D				
		SBT	S	610	13.53	B					52	19.80	B						
		SBR	S	421	6.24	A					897	9.07	A						
		NBR	S	16	13.32	B	58.8	E			148	41.53	D	50.3	D				
		NBT	S	8	37.36	D					373	53.31	D						
		NBL	S	40	81.51	F					77	52.21	D						
		EBT	S	824	32.84	C	103.9	F			942	27.37	C	88.8	F				
		EBL	S	581	223.54	F					709	171.34	F						
		EBR	S	147	29.34	C					10	25.69	C						
7	Boulevard & Larned	WBR	S	540	30.43	C	37.4	D	26.2	C	428	28.20	C	32.9	C	34.1	C		
		WBL	S	45	57.82	E					18	98.41	F						
		WBT	S	318	46.43	D					76	44.18	D						
		SBL	S	313	36.45	D	21.9	C			360	46.60	D	28.8	C				
		SBT	S	1421	22.89	C					1185	26.53	C						
		SBR	S	400	7.10	A					145	2.84	A						
		NBR	S	3	10.84	B	19.5	B			7	21.04	C	36.5	D				
		NBT	S	1109	19.56	B					1290	36.56	D						
		EBT	S	131	41.37	D	47.7	D			532	36.31	D	40.9	D				
		EBL	S	154	56.15	E					255	55.13	E						
		EBR	S	20	23.92	C					171	33.74	C						
9	Boulevard & E Lafayette	WBR	S	507	27.32	C	63.4	E	46.4	D	420	24.00	C	35.5	D	44.2	D		
		WBL	S	58	86.64	F					23	51.57	D						
		WBT	S	307	118.63	F					197	58.17	E						
		SBL	S	356	97.53	F	32.7	C			372	66.73	E	28.2	C				
		SBT	S	2253	23.84	C					1542	21.67	C						
		SBR	S	469	26.08	C					215	7.99	A						
		NBR	S	0	0.00	A	30.7	C			7	40.92	D	64.9	E				
		NBT	S	1713	20.37	C					2038	64.97	E						
		NBL	S	75	268.62	F					12	61.06	E						
		EBT	S	9	54.29	D	339.3	F			178	33.13	C	36.9	D				
		EBL	S	112	542.86	F					196	44.48	D						
		EBR	S	69	43.82	D					39	15.68	B						
		EBU	S	0	21.82	C					0	0.00	A						
10	E Lafayette & Rivard - Turn Around	WBU	U	0	0.00	A	0.00	A	0.3	A	0	0.00	A	0.00	A	0.1	A		
		EBT	U	363	0.27	A	0.27	A			557	0.13	A	0.13	A				
11	Boulevard & Monroe	WBR	S	25	59.01	E	60.3	E	8.7	A	125	92.58	F	90.8	F	16.7	B		
		WBL	S	3	71.15	E					5	45.07	D						
		SBL	S	0	0.00	A	10.6	B			23	67.59	E	6.5	A				
		SBT	S	3053	10.63	B					1987	5.75	A						
		NBR	S	0	0.00	A	3.1	A			0	0.00	A	16.2	B				
		NBT	S	2334	3.07	A					2647	16.19	B						
		EBT	S	0	0.00	A	46.4	D			0	0.00	A	48.9	D				
		EBL	S	110	58.70	E					200	78.88	E						
		EBR	S	35	7.89	A					143	6.94	A						
13	Boulevard & Macomb	SBT	S	3193	11.27	B	10.9	B	7.3	A	2259	1.09	A	1.1	A	11.3	B		
		SBR	S	156	3.27	A					99	1.13	A						
		NBT	S	2470	1.09	A	1.09	A			2965	13.75	B	13.75	B				
		EBL	S	56	58.90	E	52.7	D			243	80.83	F	80.8	F				
		EBR	S	12	24.77	C					0	0.00	A						
15	Gratiot & Antietam	NBR	U	99	0.96	A	1.2	A	1.2	A	129	1.13	A	2.8	A	2.8	A		
		EBT	U	432	0.60	A					1346	2.03	A						
		EBR	U	139	3.29	A					302	6.86	A						
16	Antietam & Chrysler Dr	WBR	U	99	6.21	A	6.2	A	2.7	A	120	6.64	A	6.6	A	2.3	A		
		WBL	U	0	0.00	A					0	0.00	A						
		SBL	U	39	0.37	A	0.2	A			226	0.80	A	0.7	A				
		SBT	U	99	0.07	A					77	0.41	A						
		NBR	U	0	0.12	A	0.1	A			2	0.32	A	0.2	A				
		NBT	U	0	0.03	A					9	0.14	A						
18	St. Antoine & Gratiot	WBR	S	341	9.33	A	11.3	B	15.2	B	136	13.39	B	25.8	C	30.9	C		
		WBL	S	149	9.34	A					98	8.69	A						
		WBT	S	213	33.55	C					123	72.41	E						
		SBL	S	1555	8.85	A					503	21.04	C						
		SBT	S	32	48.38	D	49.0	D			16	96.11	F	83.6	F				
		SBT	S	18	50.24	D					101	72.61	E						
		NBR	S	0	0.00	A					111	91.74	F						
		NBT	S	86	48.45	D	35.8	D			31	44.20	D	18.6	B				
		NBL	S	55	16.11	B					118	11.83	B						
		EBT	S	50	29.43	C	26.7	C			50	30.39	C	0.0	A				
		EBL	S	323	26.24	C					1275	26.43	C						
19	Fisher Service Dr EB & Russell St	WBR	U	0	0.13	A	0.6	A	13.1	B	0	4.95	A	1.8	A	10.3	B		
		WBL	U	5	3.37	A					208	2.71	A						
		WBT	U	47	0.34	A					126	0.18	A						
		SBL	U	85	12.98	B	11.6	B			0	0.00	A	0.0	A				
		SBT	U	88	11.06	B					0	0.00	A						
		SBR	U	69	10.75	B					0	0.00	A						
		NBR	U	20	15.39	C	19.3	C			50	16.17	C	20.9	C				
		NBT	U	165	20.73	C					229	22.55	C						
		NBL	U	31	14.45	B					62	18.58	C						
		EBT	U	20	0.03	A	2.4	A			67	0.03	A	0.9	A				
		EBL	U	9	8.48	A					5	10.20	B						
		EBR	U	5	1.22	A					5	3.03	A						

Preferred Alternative - Intersection Level of Service																			
Intersections			Sig?	AM							PM								
				Vissim	All		Approach		Intersection		Vissim	All		Approach		Intersection			
Int ID	Int Name	Mvmt		7:30AM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	4:30PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS		
20	Fisher Service Dr WB & Russell St	WBR	S	14	6.13	A	12.5	B	9.3	A	30	5.52	A	8.1	A	50.6	D		
		WBL	S	5	22.89	C					0	0.00	A						
		WBT	S	71	13.17	B					81	9.00	A						
		SBL	S	5	45.06	D	29.5	C			213	291.29	F	279.2	F				
		SBT	S	92	32.48	C					0	0.00	A						
		SBR	S	28	16.85	B					39	213.32	F						
		NBR	S	5	8.03	A	31.7	C			0	0.00	A	28.9	C				
		NBT	S	142	30.30	C					200	28.89	C						
		NBL	S	24	45.01	D					34	29.28	C						
		EBT	S	1090	4.00	A	3.9	A			1311	14.39	B	14.3	B				
		EBL	S	10	6.40	A					9	4.72	A						
		EBR	S	146	3.35	A					0	0.00	A						
21	Fisher Service Dr. EB & Gratiot	SBR	S	92.2	44.18	D	42.2	D	25.5	C	19.5	8.81	A	29.1	C	14.5	B		
		SBL	S	13.4	28.52	C					60.4	35.70	D						
		SBT	S	0	0.00	A					0	0.00	A						
		NBT	S	0	0.00	A	30.1	C			0	0.00	A	31.9	C				
		NBL	S	0	0.00	A					0	0.00	A						
		NBR	S	6.8	30.11	C					3.9	31.85	C						
		EBL	S	135.7	203.39	F	72.5	E			90	27.43	C	14.2	B				
		EBT	S	287.4	17.79	B					1421.2	13.28	B						
		EBR	S	35.7	15.47	B					47.9	15.68	B						
		WBR	S	20.5	18.32	B	15.4	B			316.1	21.00	C	14.0	B				
		WBT	S	2280.2	15.33	B					911.1	11.59	B						
		WBL	S	0	0.00	A					0	0.00	A						
22	Gratiot & Fisher Service Dr. WB	WBT	S	2238	34.36	C	34.2	C	32.5	C	867	17.98	B	17.4	B	23.8	C		
		WBR	S	51	25.82	C					37	4.63	A						
		SBL	S	1117	33.27	C	33.8	C			1242	35.72	D	34.0	C				
		SBR	S	58	44.93	D					358	28.00	C						
		EBT	S	307	14.49	B	14.49	B			1477	16.68	B	16.68	B				
23	Chrysler Service Dr SB & Mack Ave	WBL	S	554	22.06	C	17.9	B	26.6	C	449	21.59	C	18.5	B	25.8	C		
		WBT	S	612	14.16	B					433	15.24	B						
		SBL	S	494	26.51	C	26.6	C			340	31.41	C	30.3	C				
		SBT	S	11	32.55	C					111	30.67	C						
		SBR	S	578	26.56	C					310	28.97	C						
		EBT	S	811	39.05	D	38.5	D			1145	28.97	C	28.0	C				
		EBR	S	49	28.72	C					252	23.80	C						
		EBU	S	0	0.00	A					0	0.00	A						
24	Chrysler Service Dr NB & Mack Ave	WBU	S	0	0.00	A	30.6	C	18.3	B	0	0.00	A	26.2	C	14.0	B		
		WBR	S	262	20.70	C					210	18.44	B						
		WBT	S	1090	32.93	C					836	28.14	C						
		NBR	S	29	30.60	C	28.7	C			36	31.24	C	30.7	C				
		NBT	S	46	27.31	C					45	29.33	C						
		NBL	S	80	28.89	C					42	31.62	C						
		EBT	S	919	2.38	A	4.3	A			1030	1.81	A	4.1	A				
		EBL	S	388	8.95	A					456	9.13	A						
25	Fisher Service Rd EB & Brush St	SBL	S	15	11.22	B	6.3	A	9.4	A	64	10.40	B	5.8	A	18.2	B		
		SBT	S	744	6.25	A					337	4.95	A						
		NBR	S	111	2.74	A	3.7	A			465	16.10	B	17.5	B				
		NBT	S	54	5.55	A					328	19.50	B						
		EBT	S	52	29.15	C	25.8	C			262	33.62	C	29.9	C				
		EBL	S	12	23.39	C					53	28.67	C						
		EBR	S	139	24.70	C					158	24.28	C						
26	Fisher Service Dr WB & Brush St	WBR	S	102	14.85	B	31.9	C	31.3	C	36	5.68	A	10.1	B	18.6	B		
		WBL	S	682	35.73	D					353	11.77	B						
		WBT	S	955	31.05	C					480	9.29	A						
		SBT	S	77	37.05	D	25.1	C			46	30.66	C	19.9	B				
		SBR	S	43	4.00	A					32	4.23	A						
		NBT	S	40	23.73	C	26.4	C			163	31.75	C	37.8	D				
		NBL	S	27	30.45	C					217	42.34	D						
27	Fisher Service Dr EB & Clifford St	SBL	S	108	27.79	C	27.8	C	13.6	B	340	45.35	D	45.4	D	23.5	C		
		SBT	S	0	0.00	A					0	0.00	A						
		NBR	S	86	6.47	A	8.8	A			262	20.19	C	22.1	C				
		NBT	S	31	15.16	B					167	24.99	C						
		EBT	S	914	12.62	B	12.6	B			1023	16.95	B	17.0	B				
		EBL	S	2	7.04	A					25	19.06	B						
		EBR	S	0	0.00	A					0	0.00	A						
28	Fisher Service Dr WB & Clifford St	WBR	S	14	5.38	A	7.9	A	10.1	B	6	10.00	A	33.0	C	33.8	C		
		WBL	S	108	8.40	A					345	61.99	E						
		WBT	S	206	7.76	A					422	9.70	A						
		NBT	S	3	12.60	B	32.7	C			41	29.57	C	36.7	D				
		NBL	S	30	34.65	C					151	38.63	D						
29	Fisher Service Dr EB & 2nd Ave	WBU	S	460	2.05	A	2.05	A	7.6	A	195	1.59	A	1.59	A	7.2	A		
		NBR	S	29	5.52	A	21.1	C			202	7.85	A	13.6	B				
		NBT	S	26	38.40	D					48	37.73	D						
		EBT	S	587	6.16	A	9.5	A			773	6.51	A	6.7	A				
		EBL	S	376	14.64	B					94	8.04	A						
30	Fisher Service Dr WB & 2nd Ave	WBR	S	244	22.33	C	12.3	B	27.3	C	86	20.52	C	13.9	B	53.8	D		
		WBU	S	461	0.72	A					195	0.42	A						
		WBT	S	276	22.61	C					383	19.34	B						
		WBR	S	246	31.18	C	38.6	D			76	86.77	F	92.1	F				
		WBT	S	322	44.30	D					669	92.68	F						
		NBT	S	400	48.36	D	48.3	D			123	40.17	D	40.1	D				
		NBL	S	1	19.23	B					21	39.97	D						
31	St. Antoine & Congress	WBT	U	638	0.04	A	0.04	A	0.3	A	509	0.05	A	0.05	A	0.4	A		
		NBL	U	30	6.06	A	6.06	A			28	5.95	A	5.95	A				
32	St. Antoine & Larned	NBR	S	43	4.47	A	8.2	A	9.3	A	20	4.55	A	12.5	B	13.0	B		
		NBT	S	18	17.08	B					18	21.39	C						
		EBT	S	265	9.47	A	9.6	A			945	13.00	B	13.0	B				
		EBL	S	13	11.95	B					11	15.82	B						
33	Monroe & St. Antoine	SBL	U	0	0.00	A	0.0	A	10.7	B	0	0.00	A	0.0	A	17.1	C		
		SBT	U	0	0.00	A					0	0.00	A						
		NBR	U	40	9.59	A	11.7	B			138	19.80	C	21.5	C				
		NBT	U	146	12.27	B					254	22.41	C						
		EBT	U	46	8.41	A	8.8	A			160	10.38	B	10.1	B				
		EBL	U	55	9.09	A					83	9.66	A						
		EBR	U	0	0.00	A					0	0.00	A						
34	Lafayette & St. Antoine	WBR	S	61	10.13	B	28.8	C	60.2	E	126	5.89	A	12.8	B	17.3	B		
		WBL	S	153	68.58	E					8	20.27	C						
		WBT	S	438	17.52	B					244	16.14	B						
		SBR	S	50	1.07	A	109.9	F			50	0.77	A	4.5	A				
		SBL	S	60	277.90	F					61	5.93	A						
		SBT	S	50	15.70	B					50	6.44	A						
		NBR	S	0	0.00	A	0.0	A			0	0.00	A	0.0	A				
		NBT	S	0	0.00	A					0	0.00	A						
		NBL	S	0	0.00	A					0	0.00	A						
		EBT	S	61	299.67	F	128.6	F			230	19.76	B	26.1	C				
		EBL	S	73	66.71	E					189	34.73	C						
		EBR	S	49	7.32	A					8	3.87	A						

Preferred Alternative - Intersection Level of Service																		
Intersections			Sig?	AM							PM							
				Vissim	All		Approach		Intersection		Vissim	All		Approach		Intersection		
Int ID	Int Name	Mvmt		7:30AM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	4:30PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	
35	Lafayette & Rivard	WBU	S	0	0.00	A	117.3	F	66.2	E	0	0.00	A	29.7	C	18.6	B	
		WBR	S	135	125.36	F					136	30.08	C					
		WBL	S	22	78.60	E					23	25.72	C					
		WBT	S	613	116.90	F					500	29.83	C					
		SBL	S	27	38.73	D	45.1	D			50	18.41	B	12.8	B			
		SBT	S	115	32.52	C					73	11.82	B					
		SBR	S	243	51.73	D					84	10.42	B					
		NBT	S	111	9.93	A	10.4	B			157	12.14	B	11.5	B			
		NBL	S	37	12.71	B					57	13.18	B					
		NBR	S	15	7.86	A					56	8.06	A					
		EBT	S	274	2.57	A	5.4	A			445	11.26	B	11.1	B			
		EBL	S	45	27.10	C					35	25.23	C					
		EBR	S	46	0.98	A					77	3.56	A					
36	Rivard & Larned	WBU	S	0	0.00	A	14.9	B	14.4	B	0	0.00	A	13.6	B	13.8	B	
		WBR	S	49	11.72	B					52	9.44	A					
		WBL	S	24	16.07	B					7	21.60	C					
		WBT	S	820	15.07	B					449	13.97	B					
		SBL	S	13	20.97	C	14.8	B			23	21.83	C	18.2	B			
		SBT	S	134	15.54	B					64	18.37	B					
		SBR	S	45	11.05	B					12	9.84	A					
		NBR	S	9	6.16	A	14.5	B			12	7.01	A	12.6	B			
		NBT	S	82	13.14	B					126	12.90	B					
		NBL	S	48	18.44	B					67	13.05	B					
		EBT	S	387	13.36	B	13.2	B			826	13.50	B	13.7	B			
		EBL	S	12	26.87	C					44	20.20	C					
		EBR	S	48	8.35	A					27	10.84	B					
37	Rivard & Gratiot	WBR	U	95	4.10	A	3.3	A	3.0	A	16	1.52	A	1.9	A	1.7	A	
		WBL	U	152	7.58	A					54	14.87	B					
		WBT	U	1975	2.91	A					805	1.09	A					
		SBL	U	1	7.69	A	15.0	C			51	16.69	C	13.5	B			
		SBT	U	0	0.00	A					0	0.00	A					
		SBR	U	5	17.22	C					47	10.02	B					
		NBR	U	1	2.27	A	9.3	A			25	8.69	A	9.5	A			
		NBT	U	0	0.00	A					0	0.00	A					
		NBL	U	2	13.44	B					4	14.26	B					
		EBT	U	493	0.15	A	1.6	A			1466	0.55	A	0.6	A			
		EBL	U	33	22.78	C					9	6.99	A					
		EBR	U	0	0.00	A					0	0.00	A					
38	Russell & Gratiot	WBR	S	184	31.07	C	30.6	C	29.0	C	125	26.25	C	32.1	C	29.0	C	
		WBL	S	5	20.24	C					16	34.88	C					
		WBT	S	2165	30.63	C					785	32.99	C					
		SBL	S	0	0.00	A	0.0	A			0	0.00	A	0.0	A			
		SBT	S	0	0.00	A					0	0.00	A					
		SBR	S	0	0.00	A					0	0.00	A					
		NBR	S	1	1.02	A	25.9	C			18	13.14	B	18.9	B			
		NBT	S	4	29.49	C					24	23.32	C					
		NBL	S	2	25.37	C					6	18.93	B					
		EBT	S	427	19.43	B	21.1	C			1366	26.71	C	27.3	C			
		EBL	S	64	32.57	C					154	33.27	C					
		EBR	S	2	5.80	A					2	12.04	B					
40	Rivard & Jefferson	WBR	S	66	43.10	D	58.3	E	36.1	D	106	66.24	E	102.1	F	45.8	D	
		WBL	S	95	41.18	D					18	55.19	E					
		WBT	S	1402	60.15	E					903	107.26	F					
		SBL	S	34	33.43	C	33.7	C			64	36.09	D	42.5	D			
		SBT	S	152	30.10	C					32	39.21	D					
		SBR	S	28	53.53	D					15	77.41	E					
		NBR	S	0	0.00	A	0.0	A			0	0.00	A	0.0	A			
		NBT	S	0	0.00	A					0	0.00	A					
		NBL	S	0	0.00	A					0	0.00	A					
		EBT	S	1004	8.82	A	9.6	A			1426	7.38	A	7.8	A			
		EBL	S	9	39.80	D					32	25.78	C					
		EBR	S	276	11.19	B					52	8.94	A					
41	Jefferson & Bates	WBT	U	1484	0.20	A	0.20	A	8.2	A	3058	3.00	A	3.00	A	16.3	C	
		NBR	U	6	22.96	C	22.96	C			320	136.92	F	136.92	F			
		EBT	U	2084	15.15	C	12.7	B			1672	17.75	C	17.6	C			
		EBR	U	524	3.16	A					13	5.15	A					
		EBU	U	0	0.00	A					0	0.00	A					
42	Jefferson & Brush	WBR	S	285	11.62	B	11.3	B	16.2	B	24	13.00	B	21.6	C	32.3	C	
		WBT	S	1537	11.22	B					2458	21.68	C					
		SBR	S	8	7.25	A	7.25	A			235	83.78	F	83.78	F			
		EBT	S	2684	19.55	B	19.55	B			1893	39.84	D	39.84	D			
43	Jefferson & St Antoine	WBU	S	7	65.90	E	0.7	A	40.0	D	117	270.62	F	22.0	C	56.0	E	
		WBR	S	12	5.92	A					18	5.83	A					
		WBL	S	8	39.56	D					0	40.79	D					
		WBT	S	1354	0.10	A					1635	4.32	A					
		NBR	S	0	0.00	A	0.00	A			0	0.00	A	0.00	A			
		EBT	S	1533	77.80	E	72.5	E			1538	95.43	F	94.9	F			
		EBR	S	135	12.56	B					10	17.23	B					
44	Congress & Congress Pkg	WBR	U	88	1.95	A	0.4	A	0.5	A	1	0.35	A	0.1	A	7.3	A	
		WBT	U	630	0.16	A					221	0.05	A					
		SBR	U	8	7.81	A	7.81	A			287	12.90	B	12.90	B			
45	Boulevard & Congress Pkg	SBT	S	2111	2.49	A	2.4	A	1.7	A	1580	13.98	B	14.0	B	24.5	C	
		SBR	S	274	1.66	A					3	1.08	A					
		NBT	S	1803	0.77	A	0.77	A			1962	29.52	C	29.52	C			
		EBL	S	1	21.20	C	12.6	B			128	86.71	F	51.7	D			
		EBR	S	14	11.78	B					127	16.60	B					
46	Boulevard & Greektown Pkg	SBL	U	0	0.00	A	5.2	A	5.2	A	23	0.78	A	1.6	A	1.6	A	
		SBT	U	3061	5.40	A					1992	1.75	A					
		SBR	U	139	0.20	A					242	0.23	A					
47	Chrysler Dr & Woodward Academy	WBR	U	24	5.97	A	6.1	A	2.7	A	175	14.60	B	16.0	C	14.0	B	
		WBL	U	25	6.17	A					126	17.91	C					
		SBL	U	70	0.50	A	0.5	A			19	0.63	A	0.6	A			
		SBT	U	3	0.30	A					5	0.41	A					
		NBR	U	0	0.00	A	0.0	A			23	1.28	A	1.3	A			
		NBT	U	0	0.00	A					0	0.00	A					
48	Monroe & Source-Sink	NBR	U	0	0.00	A	0.00	A	0.2	A	0	0.00	A	0.00	A	1.6	A	
		EBT	U	137	0.21	A	0.2	A			326	1.66	A	1.6	A			
		EBR	U	15	0.46	A					31	0.59	A					
51	Brush & Winder	WBR	U	0	0.00	A	0.0	A	0.1	A	0	0.00	A	0.0	A	0.0	A	
		WBL	U	0	0.00	A					0	0.00	A					
		SBT	U	121	0.08	A	0.08	A			79	0.04	A	0.04	A			
		NBT	U	142	0.06	A	0.06	A			199	0.03	A	0.03	A			
52	Fisher Service Dr WB & Riopelle St	WBR	U	0	0.00	A	0.0	A	1.3	A	0	0.00	A	0.0	A	5.6	A	
		WBT	U	51	0.02	A					37	0.01	A					
		SBL	U	0	0.00	A	0.0	A			0	0.00	A	0.0	A			
		SBR	U	0	0.00	A					0	0.00	A					
		EBT	U	1171	1.35	A	1.3	A			1602	5.74	A	5.7	A			
		EBL	U	0	0.00	A					0	0.00	A					

Preferred Alternative - Intersection Level of Service																			
Intersections			Sig?	AM								PM							
				Vissim	All		Approach		Intersection			Vissim	All		Approach		Intersection	
Int ID	Int Name	Mvmt		7:30AM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS		4:30PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
53	Fisher Service Dr WB & Market St	WBR	U	32	0.56	A	0.4	A	1.4	A		17	0.56	A	0.6	A	4.3	A
		WBL	U	0	0.00	A						0	0.00	A				
		WBT	U	19	0.25	A						20	0.58	A				
		SBL	U	1	3.55	A	6.7	A				34	14.78	B	11.3	B		
		SBT	U	1	3.22	A						0	0.00	A				
		SBR	U	27	6.84	A						35	7.97	A				
		NBR	U	74	11.75	B	11.0	B				48	23.36	C	20.3	C		
		NBT	U	0	0.00	A						0	0.00	A				
		NBL	U	44	9.85	A						55	17.52	C				
		EBT	U	1098	0.29	A	0.3	A				1518	3.01	A	3.0	A		
		EBL	U	0	0.00	A						0	0.00	A				
		EBR	U	0	0.00	A						0	0.00	A				
57	Schweizer & Atwater	WBR	U	65	8.82	A	11.1	B	9.8	A		167	10.40	B	11.9	B	13.2	B
		WBT	U	178	11.93	B						158	13.45	B				
		SBL	U	153	9.33	A	8.9	A				26	9.27	A	7.6	A		
		SBR	U	150	8.45	A						27	6.02	A				
		EBT	U	79	9.27	A	9.2	A				155	15.92	C	15.4	C		
		EBL	U	38	9.08	A						169	14.96	B				
61	Schweizer & Franklin	WBR	U	29	15.31	C	26.8	D	13.3	B		131	20.86	C	22.9	C	14.7	B
		WBL	U	15	24.34	C						8	14.96	B				
		WBT	U	153	29.26	D						76	27.20	D				
		SBL	U	132	1.25	A	1.6	A				18	1.20	A	0.5	A		
		SBT	U	264	1.21	A						36	0.15	A				
		SBR	U	264	2.09	A						19	0.63	A				
		NBR	U	18	1.52	A	1.9	A				23	6.76	A	8.4	A		
		NBT	U	65	0.13	A						289	8.73	A				
		NBL	U	21	7.66	A						24	6.10	A				
		EBT	U	234	35.51	E	34.8	D				95	20.87	C	20.8	C		
		EBL	U	36	34.05	D						129	20.63	C				
		EBR	U	23	28.35	D						9	21.97	C				
62	Schweizer & Woodbridge	WBR	U	8	7.85	A	14.5	B	3.1	A		60	42.96	E	36.0	E	21.4	C
		WBL	U	14	10.86	B						12	37.85	E				
		WBT	U	66	15.97	C						47	26.62	D				
		SBL	U	61	1.32	A	0.6	A				6	5.07	A	0.6	A		
		SBT	U	633	0.48	A						49	0.04	A				
		SBR	U	63	0.83	A						7	0.58	A				
		NBR	U	37	0.58	A	3.9	A				32	14.30	B	21.8	C		
		NBT	U	51	2.16	A						481	22.97	C				
		NBL	U	41	9.21	A						32	11.99	B				
		EBT	U	63	13.81	B	12.8	B				50	11.64	B	15.9	C		
		EBL	U	7	11.30	B						61	21.21	C				
		EBR	U	14	9.11	A						12	6.41	A				
322	Boulevard & Clinton	WBR	S	39	52.29	D	58.0	E	19.2	B		209	45.35	D	45.2	D	15.7	B
		WBL	S	10	79.05	E						4	38.35	D				
		WBT	S	0	0.00	A						0	0.00	A				
		SBL	S	0	0.00	A	29.9	C				0	0.00	A	10.0	B		
		SBT	S	3330	30.69	C						2347	10.03	B				
		SBR	S	289	20.77	C						30	10.70	B				
		NBR	S	0	0.00	A	3.0	A				0	0.00	A	15.6	B		
		NBT	S	2500	2.53	A						3184	15.56	B				
		NBL	S	28	43.62	D						0	0.00	A				
		EBT	S	0	0.00	A	49.2	D				0	0.00	A	45.8	D		
		EBL	S	7	54.89	D						237	46.10	D				
		EBR	S	15	46.53	D						15	40.76	D				
328	Clinton & Chrysler Dr	SBT	U	73	0.00	A	0.2	A	0.4	A		24	0.62	A	14.2	B	17.1	C
		SBR	U	26	0.58	A						51	20.69	C				
		NBT	U	1	0.01	A	1.4	A				11	5.28	A	18.4	C		
		NBL	U	23	1.43	A						163	19.21	C				
		EBL	U	0	0.00	A	0.0	A				0	0.00	A	0.0	A		
		EBR	U	0	0.00	A						0	0.00	A				
331	Jefferson & Griswold	WBR	S	98	3.99	A	17.4	B	20.3	C		60	3.83	A	11.8	B	18.5	B
		WBT	S	489	18.73	B						455	20.46	C				
		SBR	S	667	18.41	B						2289	10.31	B				
		WBT	S	22	24.61	C	24.9	C				150	27.50	C	31.8	C		
		SBL	S	77	25.01	C						153	36.15	D				
		SBR	S	0	0.00	A						1	24.77	C				
		EBT	S	2234	21.93	C	21.93	C				1094	31.74	C	31.74	C		
		EBT	S	96	15.49	B	15.49	B				66	20.13	C	20.13	C		
336	Chrysler Service Dr SB & Fisher Service Dr WB	WBL	S	28	54.95	D	55.8	E	8.6	A		72	58.42	E	62.4	E	14.8	B
		WBT	S	68	56.09	E						53	67.77	E				
		NBL	S	266	6.08	A	6.3	A				115	5.02	A	5.4	A		
		NBT	S	1644	6.32	A						513	5.59	A				
		NBR	S	15	1.53	A						9	1.66	A				
		EBT	S	0	0.00	A	0.0	A				0	0.00	A	0.0	A		
		EBR	S	0	0.00	A						0	0.00	A				
338	Fisher Service Dr WB & John R St	WBR	S	50	3.29	A	3.7	A	6.8	A		23	16.78	B	12.6	B	18.2	B
		WBL	S	183	3.95	A						45	17.17	B				
		WBT	S	791	3.69	A						661	12.14	B				
		SBT	S	25	26.33	C	16.4	B				104	30.45	C	26.2	C		
		SBR	S	27	7.13	A						41	15.48	B				
		NBT	S	70	35.52	D	33.9	C				174	30.12	C	30.1	C		
		NBL	S	26	29.36	C						74	29.97	C				
339	Fisher Service Dr WB & Woodward Ave	WBR	S	45	4.33	A	18.9	B	20.2	C		77	6.50	A	8.2	A	17.5	B
		WBL	S	649	21.65	C						181	8.70	A				
		WBT	S	145	10.84	B						518	8.24	A				
		SBT	S	822	19.55	B	19.2	B				556	18.40	B	18.3	B		
		SBR	S	81	16.04	B						51	17.27	B				
		NBT	S	423	19.68	B	23.9	C				1177	21.06	C	22.3	C		
		NBL	S	104	41.32	D						219	29.11	C				
340	Fisher Service Rd EB & John R St	SBL	S	18	0.55	A	0.4	A	10.0	A		15	1.04	A	0.3	A	15.0	B
		SBT	S	191	0.37	A						134	0.19	A				
		NBR	S	46	5.14	A	9.3	A				69	13.06	B	18.4	B		
		NBT	S	33	15.09	B						162	20.71	C				
		EBT	S	140	19.88	B	16.3	B				392	18.09	B	17.7	B		
		EBL	S	64	16.70	B						84	18.50	B				
		EBR	S	125	11.96	B						35	11.31	B				
341	Fisher Service Rd EB & Woodward Ave	SBL	S	57	17.32	B	5.9	A	12.8	B		28	31.04	C	7.5	A	21.1	C
		SBT	S	1413	5.47	A						709	6.53	A				
		NBR	S	52	5.22	A	8.5	A				250	15.50	B	24.8	C		
		NBT	S	381	8.96	A						1129	26.85	C				
		EBT	S	223	29.01	C	33.9	C				237	26.14	C	29.3	C		
		EBL	S	148	31.73	C						267	32.17	C				
		EBR	S	192	41.31	D						88	29.05	C				
342	Chrysler Service Dr NB & Fisher Service Dr WB	WBR	S	91	8.16	A	32.7	C	15.2	B		141	4.77	A	25.1	C	11.0	B
		WBT	S	96	51.21	D						101	43.17	D				
		WBL	S	99	37.23	D						60	42.46	D				
		NBT	S	1	3.33	A	7.3	A				0	0.00	A	6.2	A		
		NBR	S	1054	7.30	A						1214	6.22	A				
		NBL	S	0	0.00	A						27	7.03	A				
		SBT	S	177	33.91	C	33.91	C				70	34.64	C	34.64	C		

Preferred Alternative - Intersection Level of Service																	
Intersections			Sig?	AM						PM							
				Vissim	All		Approach		Intersection		Vissim	All		Approach		Intersection	
Int ID	Int Name	Mvmt		7:30AM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	4:30PM	Mvt Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
343	I-75 and Boulevard	EBR	S	1349	28.93	C	28.93	C	8.9	A	1166	16.93	B	16.93	B	7.2	A
		SBT	S	3260	0.57	A	0.57	A			1609	0.14	A	0.14	A		
		NBR	U	1652	5.26	A	5.9	A	5.9	A	2360	3.84	A	3.5	A	3.5	A
		NBT	U	1347	6.58	A					1397	2.83	A				
344	Modified SPUI	SBT	S	3260	25.18	C	25.18	C	24.6	C	1609	29.25	C	29.25	C	22.8	C
		NBT	S	1341	23.21	C	23.21	C			1396	15.41	B	15.41	B		
345	Fisher Service Dr EB & Rivard	WBR	U	54	1.33	A	0.6	A	1.7	A	75	3.53	A	1.6	A	1.9	A
		WBT	U	93	0.12	A					112	0.38	A				
		SBL	U	0	0.00	A	6.7	A			0	0.00	A	0.0	A		
		SBR	U	28	6.66	A					0	0.00	A				
		EBT	U	35	0.01	A	2.1	A			77	0.00	A	2.3	A		
		EBL	U	30	4.49	A					30	8.29	A				
346	Fisher Service Dr WB & Rivard	WBR	S	6	2.26	A	6.5	A	7.9	A	7	7.21	A	7.2	A	9.1	A
		WBL	S	3	41.05	D					0	0.00	A				
		WBT	S	114	5.75	A					147	7.20	A				
		SBL	S	10	35.01	D	30.1	C			36	36.65	D	30.5	C		
		SBT	S	24	35.77	D					0	0.00	A				
		SBR	S	10	10.69	B					10	8.95	A				
		NBR	S	5	26.77	C	35.4	D			5	32.84	C	43.5	D		
		NBT	S	16	36.81	D					13	40.72	D				
		NBL	S	62	35.72	D					86	44.51	D				
		EBT	S	1232	5.39	A	5.4	A			1279	5.81	A	5.8	A		
		EBL	S	2	8.78	A					3	1.28	A				
		EBR	S	0	0.00	A					0	0.00	A				
350	Boulevard & Gratiot	WBR	S	659	59.15	E	53.9	D	27.7	C	408	42.52	D	38.3	D	22.6	C
		WBT	S	1306	51.27	D					460	34.46	C				
		SBR	S	963	18.81	B	29.6	C			397	6.86	A	13.6	B		
		SBT	S	3624	32.47	C					2378	14.70	B				
		NBR	S	195	5.84	A	6.1	A			262	26.30	C	15.8	B		
		NBT	S	2347	6.08	A					3355	15.02	B				
		EBT	S	377	15.01	B	15.0	B			1383	48.43	D	48.4	D		
		EBR	S	0	0.03	A					0	5.44	A				