APPENDIX J. INTERSTATE ACCESS CHANGE REQUEST

U.S. Department of Transportation
Federal Highway Administration

Michigan Division

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May 29, 2019

In Reply Refer To:
HDA-MI

Mr. Paul Ajegba, P.E.
Director
Michigan Department of Transportation
425 W Ottawa St
Lansing, MI 48933

I-94 Modernization Interstate Access Change Request Acceptance

Dear Director Ajegba:

The Federal Highway Administration (FHWA) reviewed the Interstate Access Change Request (IACR) submitted on February 12, 2019 and the revised IACR submitted on May 9, 2019 for the proposed modifications to access on I-94 from east of I-96 to east of Conner Avenue in the City of Detroit. The proposed modifications were determined to be acceptable based on established safety, operations and engineering standards.

FHWA and MDOT are preparing an Environmental Impact Statement (EIS) for the modernization of I-94 which will consider the social, economic and environmental impacts of the proposed modifications. Following the Record of Decision (ROD), final approval of the proposed modifications to access may be given provided that the scope and design of the proposed project is consistent with the revised IACR submitted on May 9, 2019 and the ROD.

If you have any questions, please contact Chris Youngs at Chris.Youngs@dot.gov or (517)702-1839.

Sincerely,

THEODORE G BURCH

Digitally signed by THEODORE G BURCH
Date: 2019.05.29 08:53:52 -04'00'

Theodore G. Burch, P.E.
Assistant Division Administrator

For: Russell L. Jorgenson, P.E.
Division Administrator

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File Name:
I-94_Modernization_Interstate_Access_Change_Request_Acceptance_CY_MAY292019

I-94 Interstate Access Change Request

MDOT Technical Memorandum No. – TM 47

Date: May 9, 2019

Project Title: I-94 Modernization Project
MDOT JN: 122114
Control Section: 82024

Author: Corey Fischer, AICP
Reviewer: Joe Blasi, PE, PTOE

This document addresses the following interchanges:

- I-94 / Linwood Avenue and M-5 (Grand River) *
- I-94 / 14th Street
- I-94 / Trumbull Avenue *
- I-94 / M-10
- I-94 / John R Street, Brush Street, Beaubien Street, and Hastings Street
- I-94 / I-75 *
- I-94 / Russell Street
- I-94 / Chene Street *
- I-94 / Mount Elliott Street
- I-94 / Van Dyke Avenue *
- I-94 / Gratiot Avenue
- I-94 / French Road
- I-94 / Conner Avenue
- M-10 / Forest Avenue and Four Tops / Calumet
- M-10 / Grand Boulevard and Milwaukee Avenue

* Indicates no change in access

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Exhibits and Figures

*Figures are embedded in text, exhibits are on individual sheets

Tables

1.0 Introduction

The following Interstate Access Change Request (IACR) technical report demonstrates that multiple changes in access to the I-94 corridor in Detroit, Michigan, do not have significant negative impacts on safety and operations of the Interstate system. The information contained within this report provides substantiated reasoning to justify this conclusion and render a decision by the Federal Highway Administration (FHWA).

The contents in this report are broken down into five chapters. The first chapter describes the project, what exists today and what changes are being proposed. Chapter 2 outlines the operational and safety performance of the corridor as it exists today and what it is forecasted to be by 2040. Chapter 3 analyzes the operational and safety performance that come with the Build Alternative in the year 2040. Chapter 4 outlines design standards that will be followed for the proposed changes. Finally, Chapter 5 briefly summarizes the contents of the report and delivers a conclusion/recommendation for the FHWA.

On May 22, 2017, the FHWA updated the “Policy on Access to the Interstate System,” as published under Title 23, United States Code (U.S.C.), Section 111. This update is intended to streamline and eliminate duplication with the National Environmental Policy Act (NEPA) process. Six of the eight policy points previously documented in the last FHWA policy (Volume 74, Number 165) will now be addressed solely within the NEPA document. The remaining two policy points are addressed in an IACR technical report that focuses on the safety, operational and engineering aspects of the proposed change in access. The two policy points described below are addressed in detail within this document:

1. *An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).*

2. *The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.*

1.1 Project Description

Nearly 30 years ago, the Michigan Department of Transportation (MDOT) recognized the need to reconstruct I-94 in Detroit and in the 1990s sought community consensus on making repairs. In December 2004, a Final Environmental Impact Statement (FEIS) for the rehabilitation of I-94 was approved by FHWA. The rehabilitation included one additional through-lane in each direction, continuous service drives, replacement of more than sixty bridges, and modernization of the interchanges at I-75 (the Fisher Freeway) and M-10 (Lodge Freeway). A Record of Decision (ROD) was filed in 2005 that allowed MDOT to move forward with final design and construction activities.

In the summer of 2015, MDOT hosted open houses in Detroit where feedback gathered from the public focused primarily on local neighborhood connectivity within the corridor. The DOT requested assistance from members of the Detroit Planning Department to develop connectivity improvements over the freeway. The assistance included hosting neighborhood mobility and visioning workshops. The results of the workshops led the project team to make modifications to the Approved Selected Alternative (ASA) from the 2004 FEIS. These modifications were presented to the public in the fall of 2016 at a second round of MDOT-hosted open houses in Detroit.

The focus of the design modifications were to:

- Better use existing city streets as local connections instead of building new, continuous service drives adjacent to the freeway as proposed in the original plan
- Modify local access ramps to and from I-94, M-10 and I-75 to improve operations and safety
- Use the “complete streets” approach in the design of bridges and service drives to make them user-friendly for cars, bikes and pedestrians
- Reduce the overall project footprint to avoid and minimize impacts

On July 7, 2017, MDOT and FHWA published a Notice of Intent (NOI) in the Federal Register announcing their plans to prepare a Supplemental Environmental Impact Statement (SEIS) for proposed design modifications. Considered part of the SEIS, this IACR evaluates the operational and safety performance within the study area corridor. The IACR is not fully approved until a ROD is issued on the SEIS.

The proposed changes to I-94 and the surrounding network are known as the “Build Alternative” within the context of this document.

1.2 Project Location and Limits

The I-94 Modernization Project limits include the area where infrastructure modifications are proposed. Those limits are I-94 from I-96 to Conner Avenue. In order to satisfy the requirements for making changes to the interstate, a slightly wider limit must be used for the traffic and safety analysis. The requirements are that the analysis should include at least the first adjacent interchange on either side of the proposed change in access. In addition, the crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in the analysis. These analysis area limits, or microsimulation model limits are depicted in **Figure 1**. The analysis area on the I-94 corridor extends from the western limits of the I-96 interchange to Dickerson Avenue (east of Conner Avenue). The M-10 limits run from the northern ramps of Grand Boulevard down to Forest Avenue. Interstate 75 limits extend from Clay Street down to Warren Avenue. The local street network includes all service drives adjacent to I-94, I-96, I-75 and M-10, plus other side streets that span over the mainline. Exhibits One through Six in **Sections 2.0 and 3.0** identify all the intersections included in the analysis.

Figure 1: Analysis Area Limits

Source: HNTB

1.3 Purpose and Need

The purpose of the I-94 rehabilitation is to improve the capacity, safety and condition of the I-94 corridor to support the mobility needs of local and interstate commerce. The need for improvements stems from the freeway being built in the late 1940s and early 1950s and being at the end of its service life. Furthermore, traffic operations and safety continue to deteriorate in the corridor. Improvements to the service drives need to be updated to a “complete streets” design to support commercial activities and accommodate those living within the project area.

1.4 Summary of Build Alternative

The following section summarizes the Build Alternative for the I-94 study area corridor. The I-94 Rehabilitation Project involves the reconstruction and rehabilitation of the corridor, including the freeway-to-freeway system interchanges with M-10 and I-75, which are nearing the end of their useful life. All bridges within the project area are proposed to be reconstructed and modernized. The proposed action also adds or modifies specific auxiliary, acceleration, and deceleration lanes. The Build Alternative includes an additional lane in each direction along I-94 from I-96 to Conner Avenue. Full shoulders along the inside and outside lanes of the I-94 corridor are included in the design. These improvements bring the I-94 freeway up to current geometric standards where practical and feasible. Additional improvements to the local road system and service drives are also included in the Build Alternative. These local improvements will enhance connectivity for vehicles, bicyclists and pedestrians.

The following subsections describe specific areas that will be modified as part of the Build Alternative design. Details on levels of service (a measure of operational performance) are provided in **Sections 2.3, 2.4 and 3.2**. A detailed preliminary design plan can be found in **Appendix D**.

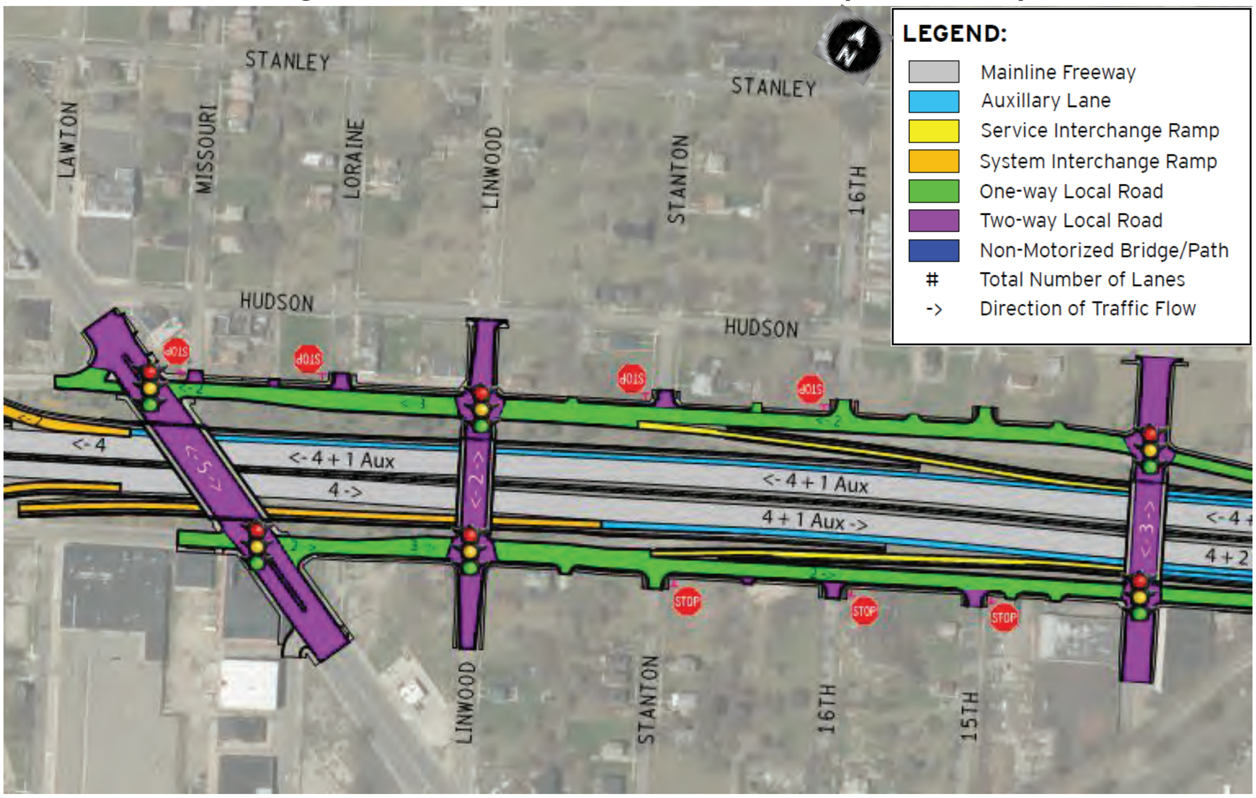
Interchanges

Reconstruction of all project area interchanges is proposed under the Build Alternative in order to improve the physical condition of the facilities and to meet current design standards. Some access points are proposed to be rebuilt in their same configuration while some I-94 ramps will be removed and not replaced.

Interchanges to be reconstructed include:

- **I-94 / Linwood Avenue and M-5 (Grand River)** – Currently, the full-access interchange has ramps accessing Edsel Ford Service Drive on both sides of I-94. The interchange is proposed to maintain the same configuration and access. The existing westbound entrance and eastbound exit ramps will remain and are not included as part of this project. The westbound exit and eastbound entrance ramps will be reconstructed and lengthened.

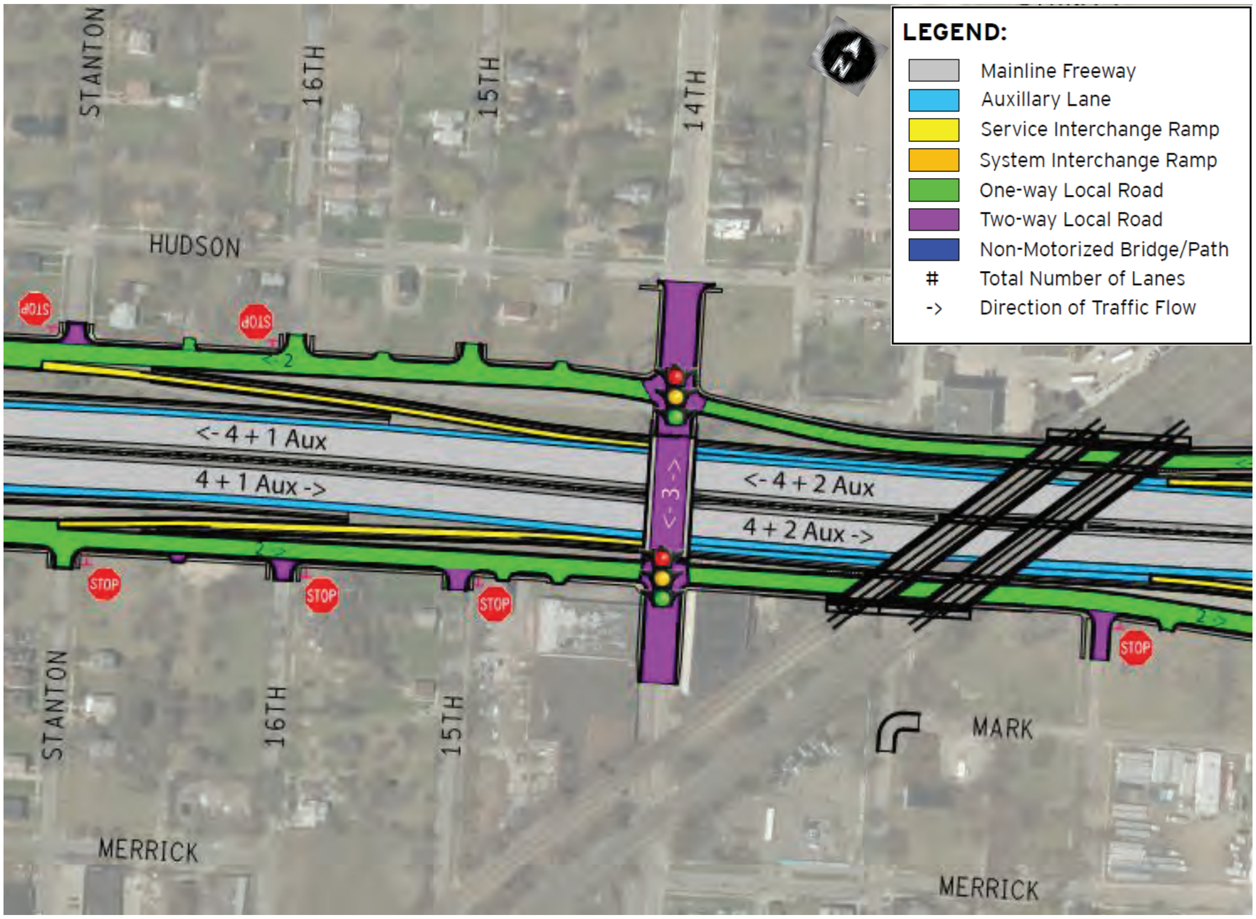
Figure 2: I-94 / Linwood Avenue and M-5 (Grand River)



Source: HNTB

- **I-94 / 14th Street** – The existing condition at this location has only an eastbound slip entrance ramp east of 14th Street. The ramp will be removed to eliminate the partial access as well as the deficient spacing between it and the Trumbull Avenue exit ramp. Eastbound I-94 can be accessed from Linwood Avenue, only four blocks to the west.

Figure 3: I-94 / 14th Street

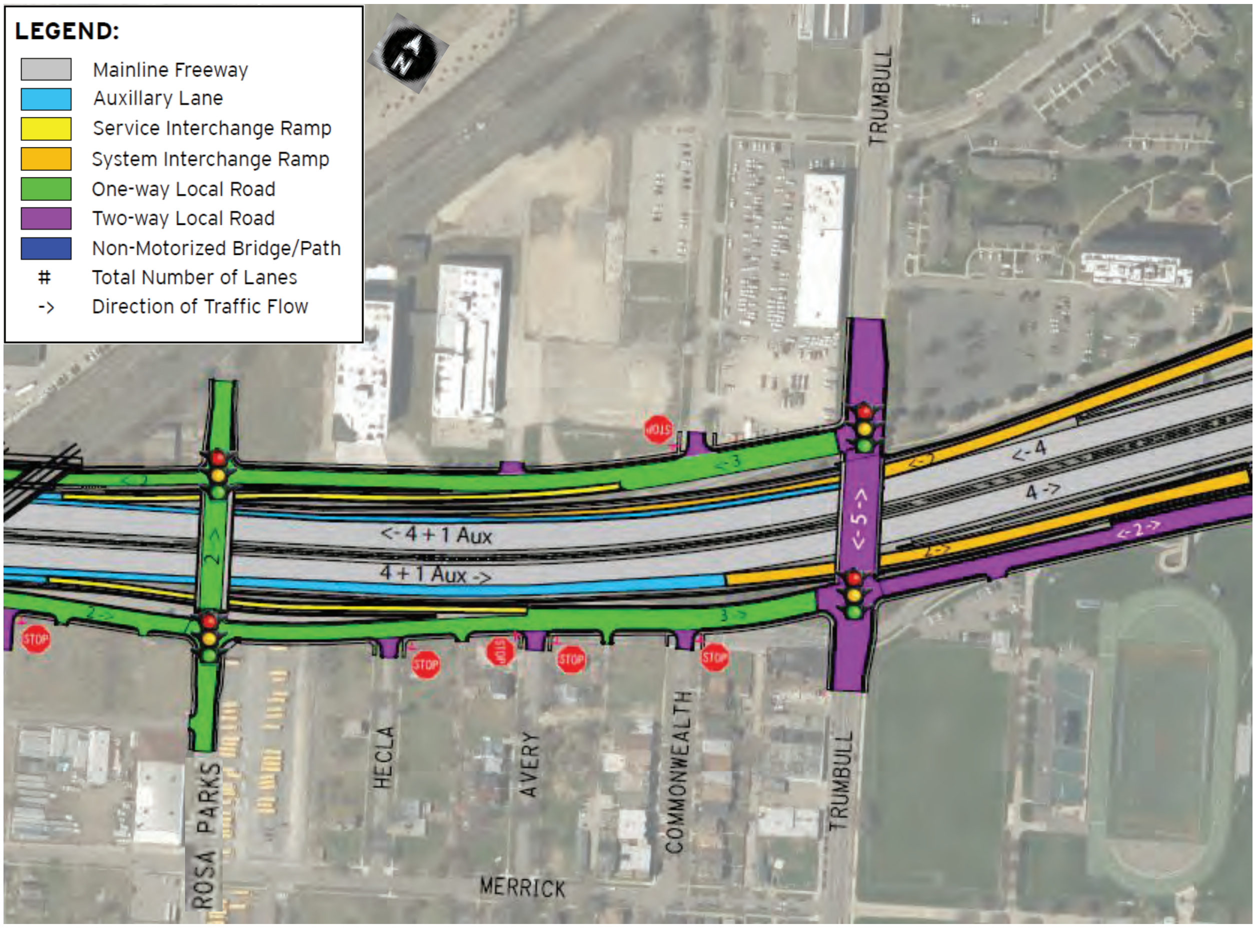


Source: HNTB

- **I-94 / Trumbull Avenue** – The existing condition includes partial access to and from the west represented by I-94 westbound entrance and eastbound exit ramps. The existing partial access will be maintained, but the ramps will be lengthened to the west of Rosa Parks Boulevard. Drivers that exit from I-94 to Trumbull and want to return to I-94 eastbound would have to follow the service drive, turn east on Warren Avenue and then turn north on Brush Street to reach the next I-94 eastbound entrance ramp. To help mitigate this situation, wayfinding signage will be added to the local road network directing vehicles along this route.

  This area has the potential for wrong way driving due to the transition from a two-way service drive to one-way. The southern intersection of Edsel Ford Service Drive and Trumbull Avenue already exists as a two-way to one-way configuration. Westbound traffic on the Edsel Ford Service Drive east of Trumbull Avenue is only permitted to turn right at the intersection. The roadway is aligned so that westbound vehicles are not lined up across from eastbound traffic. A channelizing island has also been placed at the intersection to discourage vehicles from going straight or left. The Build Alternative will construct the Edsel Ford Service Drive to match the existing configuration. To discourage northbound vehicles on Trumbull Avenue from turning left onto the eastbound Edsel Ford Service Drive, a raised median island and regulatory signs prohibiting left turns will be added. **Section 4.3** lists all the areas where special considerations will need to be taken to prevent the potential for wrong way driving.

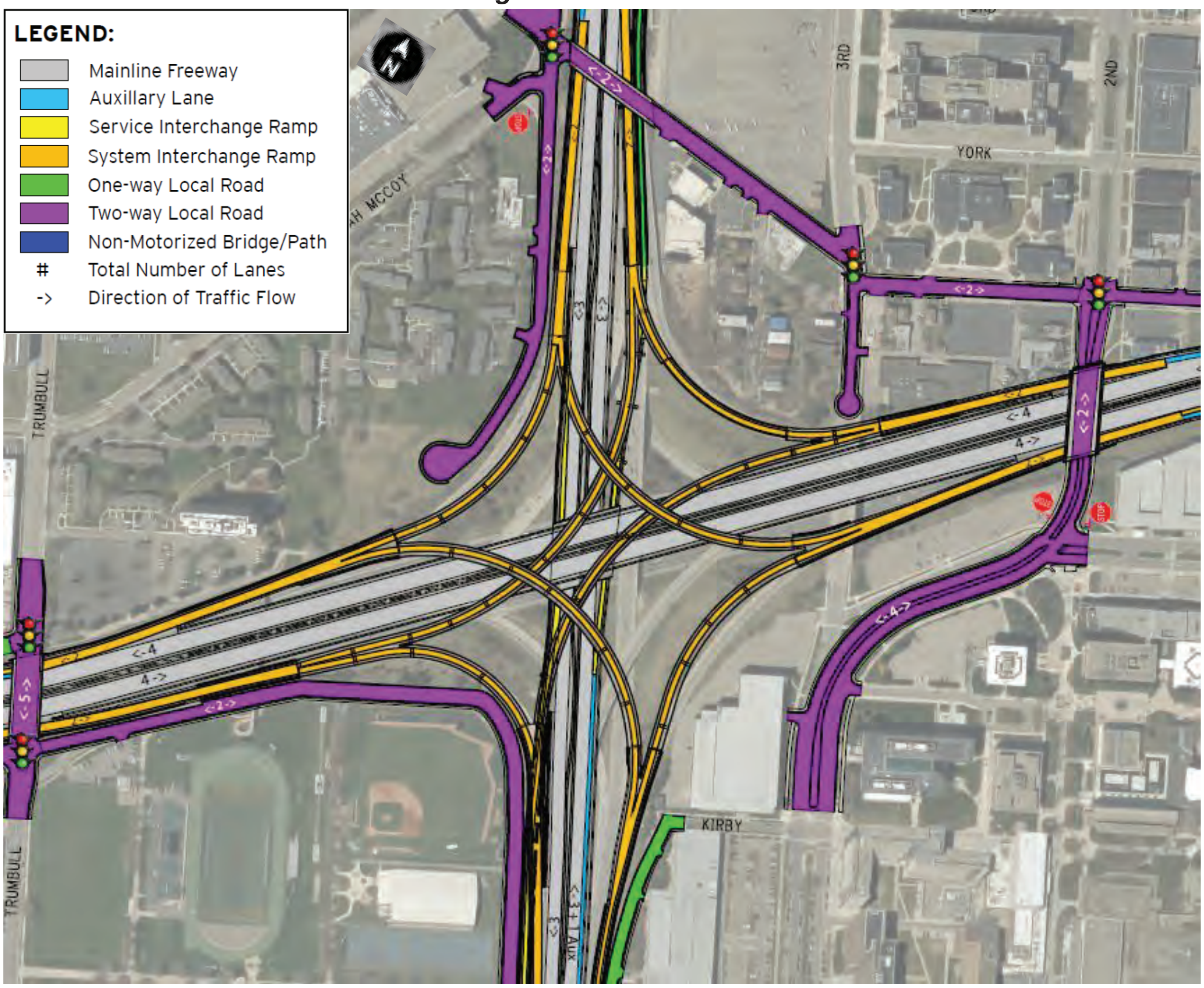
Figure 4: I-94 / Trumbull Avenue



Source: HNTB

- **I-94 / M-10** – This is an existing full access system interchange that includes left-sided and right-sided entrance and exit ramps. The Build Alternative eliminates the left-sided ramps and creates entrance and exit fly-over ramps that merge with the mainline from the right. In addition, the Build Alternative restacks the interchange to have M-10 pass under I-94. The northbound M-10 exit ramp to I-94 will be relocated to the south and braided with the northbound Forest Avenue entrance ramp. Similarly, the southbound M-10 entrance ramp from I-94 will braid with the southbound Forest Avenue / Four Tops / Calumet exit ramp.

Figure 5: I-94 / M-10



Source: HNTB

- **I-94 / John R Street, Brush Street, Beaubien Street, and Hastings Street** – This interchange currently functions as a full-access split diamond interchange with the eastbound exit and westbound entrance ramps accessing I-94 at John R Street and westbound exit and eastbound entrance ramps accessing I-94 at Beaubien Street. The Build Alternative design will relocate both west-facing ramps to Brush Street. East-facing ramps will be added to an extension of Hastings Street that will be constructed over I-94. The eastbound exit ramp will connect with a new one-way service drive at Brush Street. The service drive will extend to the eastbound I-94 entrance ramp at Hastings Street. The current service drive between John R and Brush will be eliminated. The new service drive connection will have signalized intersections at Brush, Beaubien and Hastings.

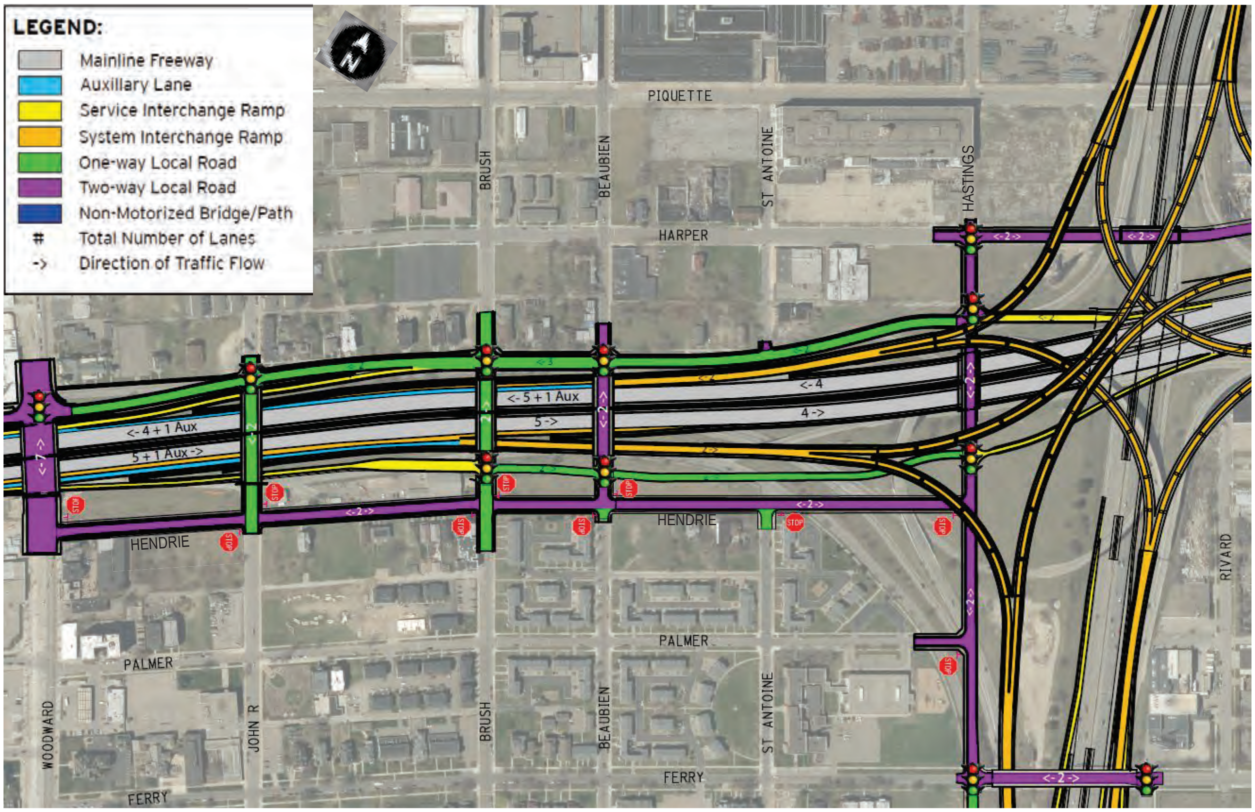
  The design creates close spacing between the newly created (eastbound) service drive and Hendrie Street. Hendrie Street currently services local traffic in eastbound and westbound directions. The operational analysis (see **Section 3.2**) shows minimal impact to traffic and safety given the new design spacing. Special consideration in this area is given to maintain the local street network due to Section 106 (historic preservation) concerns between John R and Brush, south of Hendrie. Furthermore, the City of Detroit wishes to maximize the use of the existing local grid network where possible.

  The westbound Edsel Ford Service Drive will be maintained. The Woodward Avenue intersection has the potential for wrong way driving in the eastbound direction due to the transition from a two-way to one-way service drive. This is already an existing condition. The Hastings Avenue bridge over I-94, the I-94 eastbound entrance ramp, and the I-94 westbound exit ramp are new for the Build Alternative. To help discourage wrong-way entry to the interstate at the I-94 westbound exit ramp a raised median island on the north leg of the intersection and regulatory signs prohibiting left turns for southbound vehicles will be added. Regulatory signs prohibiting right turns will be added for northbound vehicles. **Section 4.3** lists all the areas where special considerations will need to be taken to prevent the potential for wrong way driving.

  John R Street and Brush Street, crossing over I-94, currently function as a one-way pair. This report assumes that they will both remain one-way in the final design. However, the City of Detroit has expressed interest in converting John R and Brush to two-way streets. The new interchange design does not preclude this conversion from one-way to two-way operations. An operational and safety analysis was completed for both one-way and two-way options and can be found in **Section 3.2**. If the City of Detroit wishes to move forward with a two-way conversion prior to final design, then the design will be added within the study area limits. The City of Detroit would be responsible for making the adjustment outside the study area.

  The Build Alternative will create a weaving segment on I-94 between M-10 and ramps to/from Brush. Although the weave is not ideal and removal of the ramps was considered, input from various stakeholders has identified the Brush Street ramps as being of critical importance. This service interchange provides for necessary local circulation between the two system interchanges, including access to a medical district (hospitals and medical facilities) as well as a museum and cultural district. A robust analysis using traffic simulation software involving vehicle trajectories and gap analysis revealed that the weave and surrounding area in question would operate at an acceptable LOS in the future. A technical memorandum can be found in **Appendix C** (page C-123) that provides greater analysis of the vehicle maneuvering between M-10 and Brush Street and the surrounding network**.**

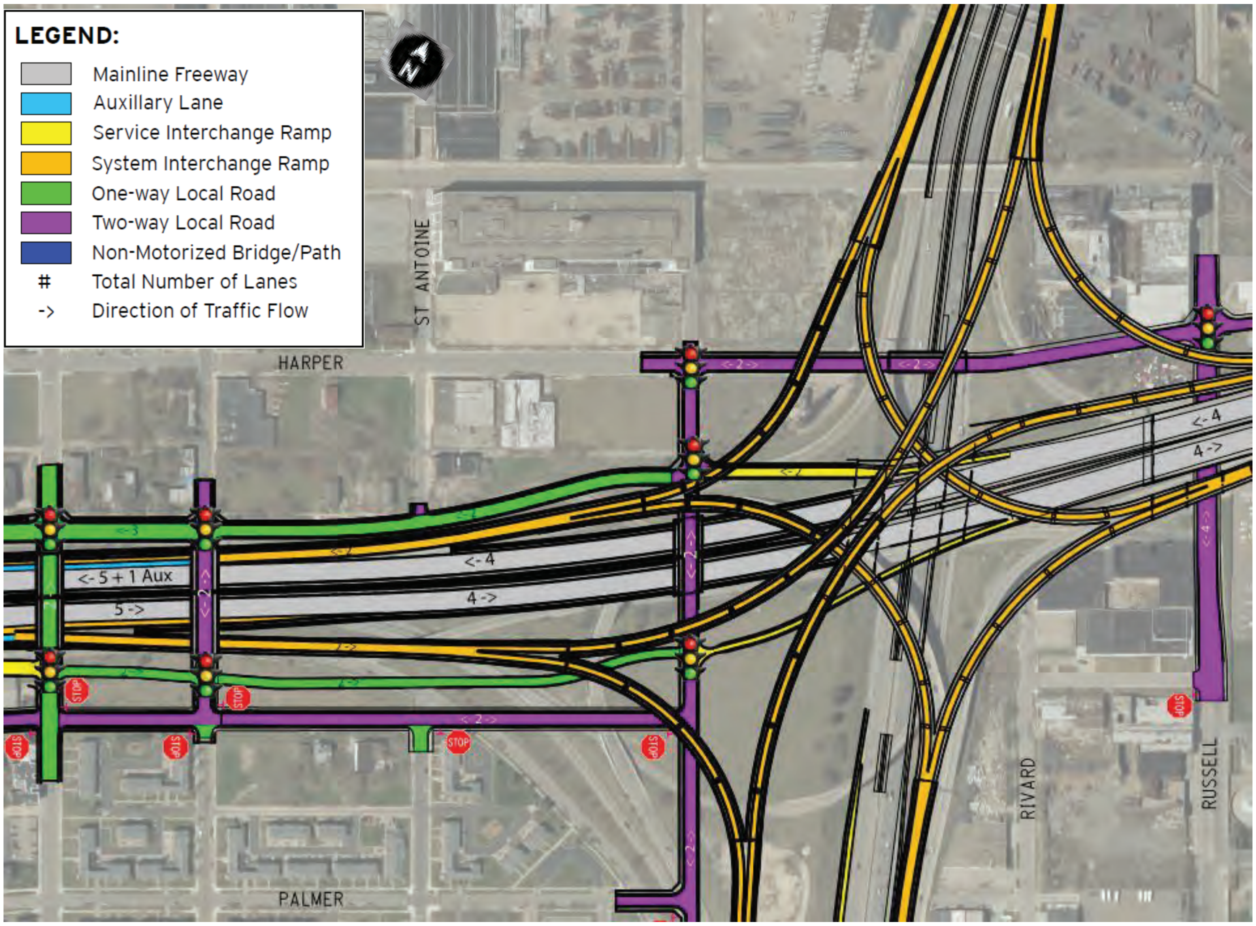
Figure 6: John R Street, Brush Street, Beaubien Street, and Hastings Street



Source: HNTB

- **I-94 / I-75** - The I-94/I-75 interchange is a full access system interchange connecting two interstate freeways. All of the ramps are flyover ramps and currently exit and enter from the right side of the mainline. The Build Alternative will reconstruct the existing interchange and modernize ramps to meet current design standards, which will flatten the flyover ramp curves compared to what exists today.

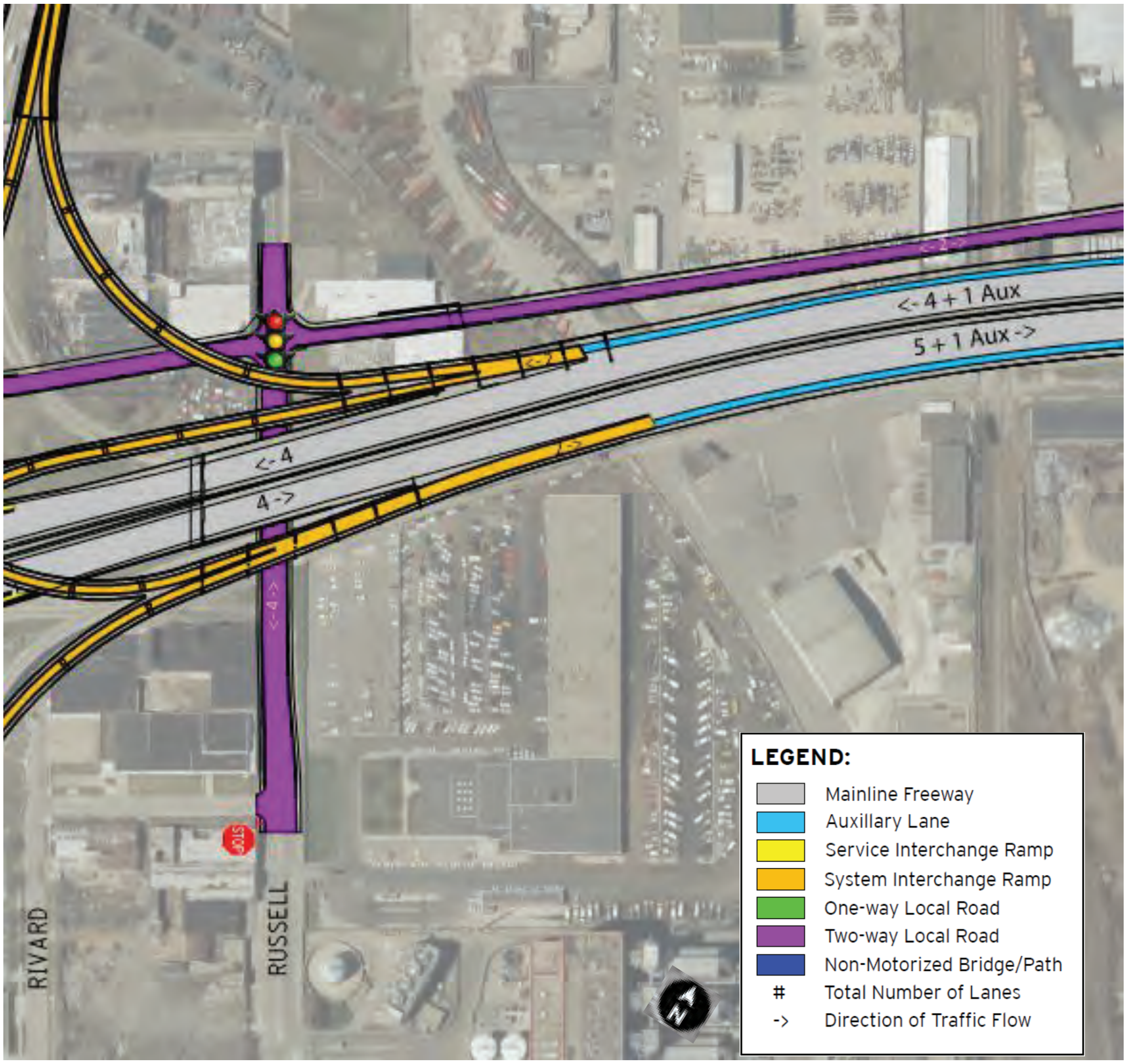
Figure 7: I-94 / I-75



Source: HNTB

- **I-94 / Russell Street** – This exists as a partial interchange that provides an eastbound exit movement from I-94 to Russell Street. The Build Alternative eliminates access from I-94 to Russell Street. Russell Street will be accessible from eastbound I-94 via Brush Street or Chene Street.

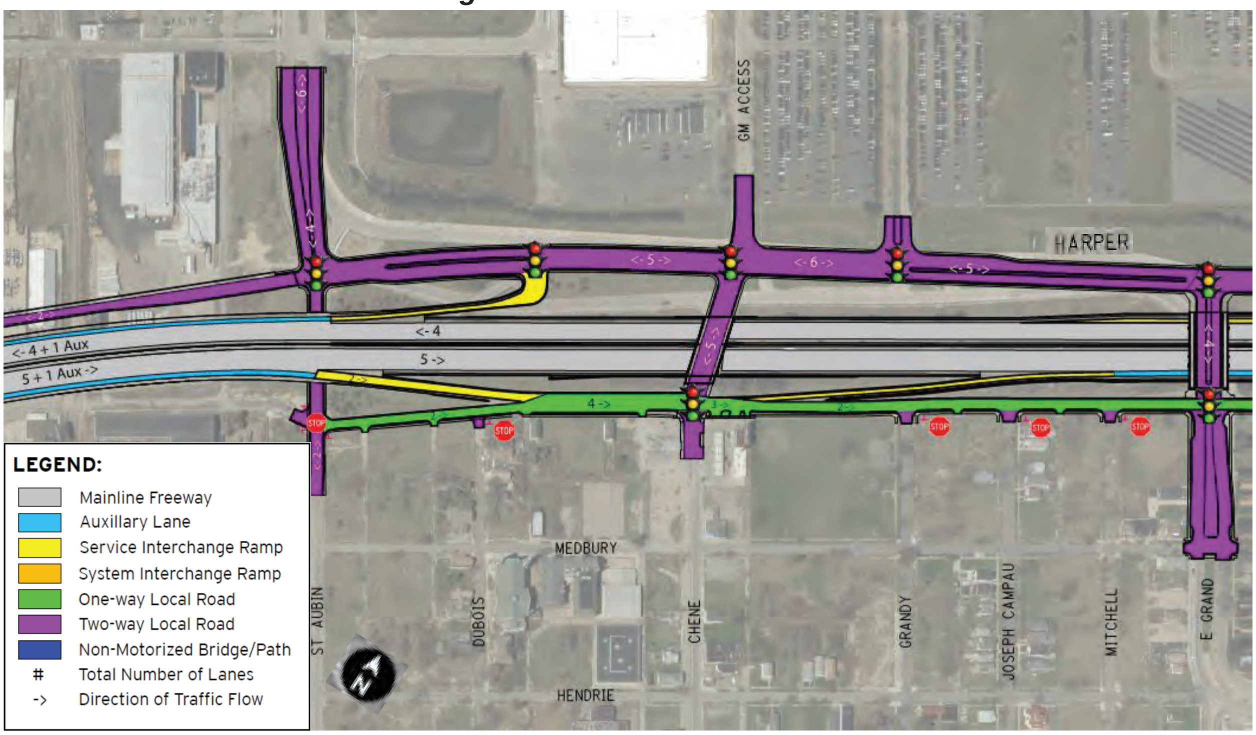
Figure 8: I-94 / Russell Street



Source: HNTB

- **I-94 / Chene Street** – Currently, the I-94 / Chene Street interchange is a three-quarters partial access interchange consisting of eastbound I-94 exit and entrance slip ramps and an entrance slip ramp to westbound I-94. The Build Alternative maintains the three ramps in the same locations, with the exception coming from the westbound entrance ramp, which is now configured as a button-hook ramp just to the west of Chene Street. This was done to accommodate a two-way Harper Avenue. **Section 4.1** explains the decision to not make the Chene Street interchange full service by adding a westbound exit ramp. The westbound movement can be accommodated through the nearby Mt. Elliott Street interchange.

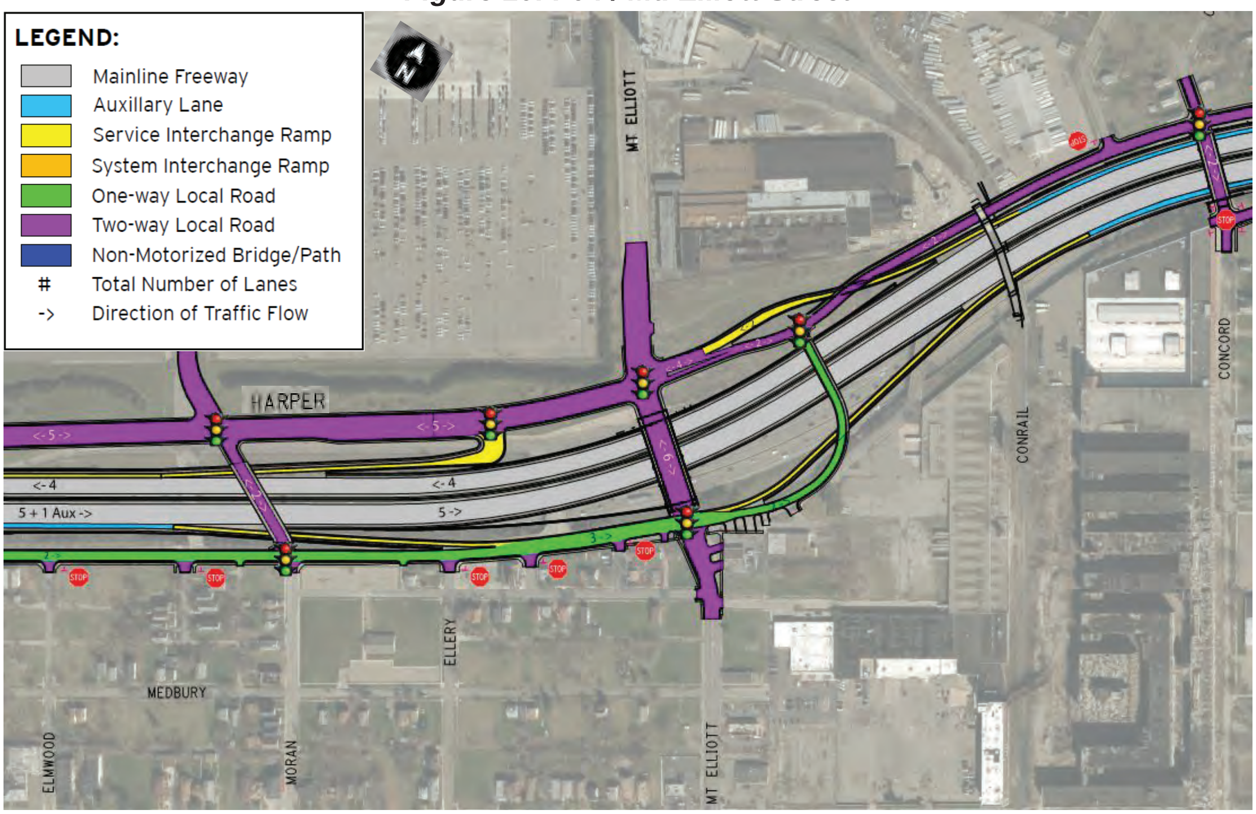
Figure 9: I-94 / Chene Street



Source: HNTB

- **I-94 / Mt. Elliott Street** - Currently, the I-94 / Mt. Elliott Street interchange is a full access interchange. All existing freeway access will be maintained within the proposed action. The existing westbound I-94 entrance ramp currently is located west of the interchange near Lucky Place. The Build Alternative will relocate and reconfigure the westbound I-94 entrance ramp as a button-hook ramp just west of Mt. Elliott. The reconfiguration accommodates a two-way Harper Avenue. The westbound exit ramp is braided with Harper and ties into the westbound side of Harper before Mt. Elliott. The eastbound Service Drive bridge over I-94 will be reconstructed to maintain access to the northern service drive. To mitigate potential wrong way driving a raised, channelized island between westbound and eastbound traffic on the east leg of the intersection and regulatory signing will be added. To aid southbound vehicles on Mt. Elliott in entering the correct lane, turning guide lines will be used in addition to regulatory signing. **Section 4.3** lists all the areas where special considerations will need to be taken to prevent the potential for wrong way driving.

Figure 10: I-94 / Mt. Elliott Street

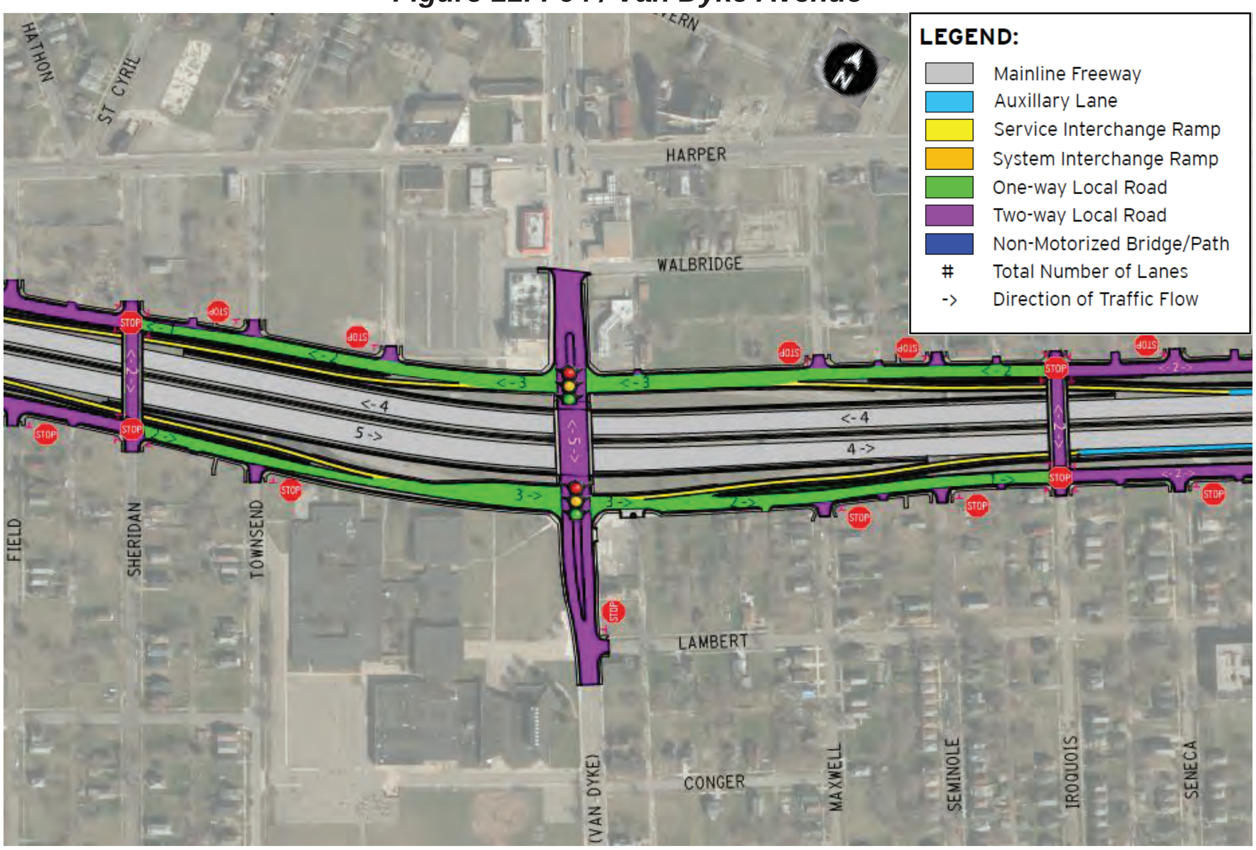


Source: HNTB

- **I-94 / Van Dyke Avenue** – Van Dyke (M-53) is currently a full access diamond interchange. This configuration will be maintained in the Build Alternative, but the entrance and exit ramps will be lengthened. This area has the potential for wrong way driving due to the transition from a two-way service drives to one-way. The southern intersection of Edsel Ford Service Drive and Iroquois Avenue is already an existing condition, except moved two blocks to the west from Burns Avenue. The two-way to one-way transition on the northern service drive at Sheridan Street is also an existing condition, except moved two blocks to the east from Frontenac Avenue.

  The diamond interchange in both the existing condition and the Build Alternative has the potential for wrong-way drivers on the I-94 westbound exit ramp and I-94 eastbound exit ramp. In the existing condition painted medians with cross hatching have been added to discourage left turns at the Edsel Ford Service Drive for both northbound and southbound vehicles. Ground mounted one-way signs and span mounted case signs also inform the driver of the direction of travel. In the build alternative the existing painted medians will be replaced with raised median islands to further discourage wrong way movements. Regulatory signing will be added to further direct drivers on the direction of travel. **Section 4.3** lists all the areas where special considerations will need to be taken to prevent the potential for wrong way driving.

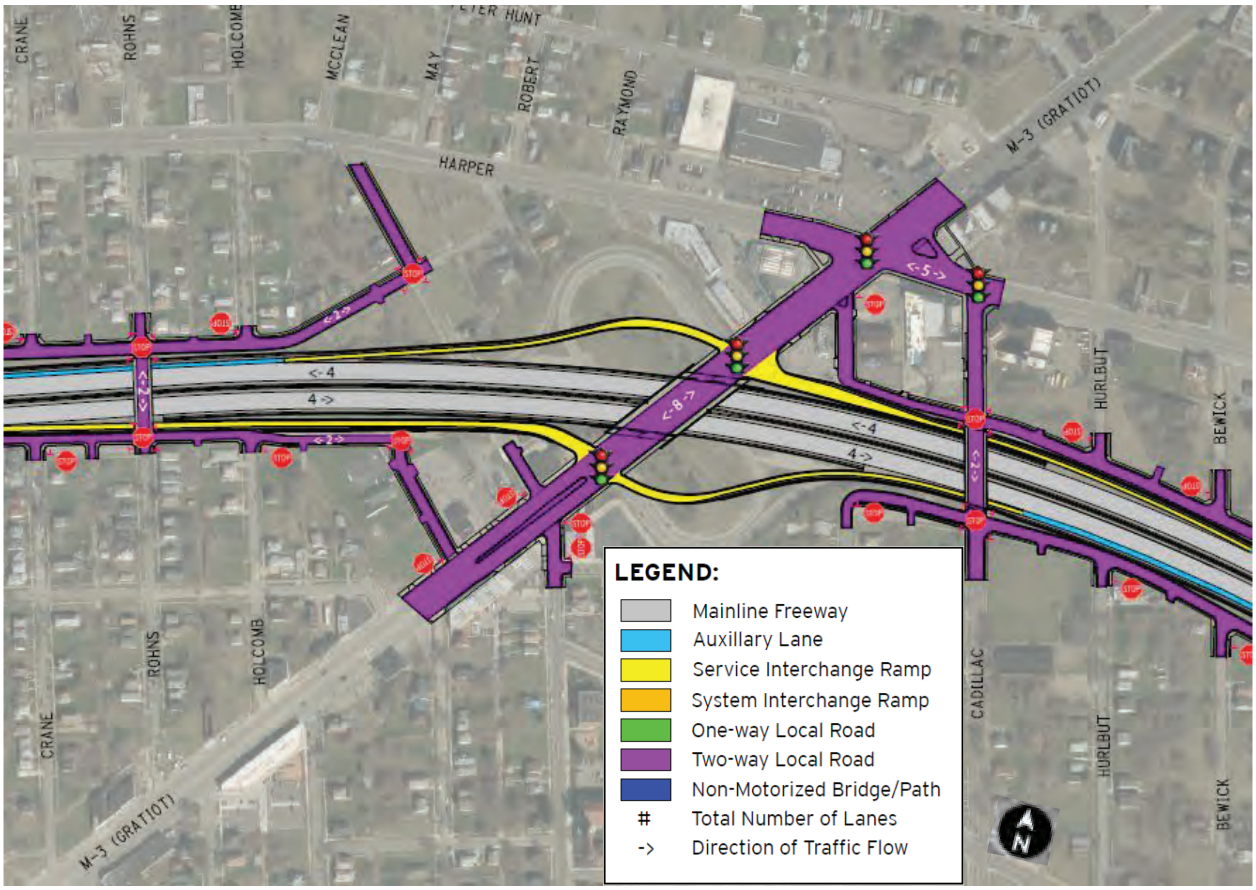
Figure 11: I-94 / Van Dyke Avenue



Source: HNTB

- **I-94 / Gratiot Avenue -** The existing I-94 / Gratiot Avenue full access interchange is a partial cloverleaf configuration with ramps in the northwest and southeast quadrants. The Build Alternative will reconfigure the existing partial cloverleaf interchange into a standard diamond interchange, maintaining full access. Service drive and side street connections will also be constructed to create better neighborhood continuity.

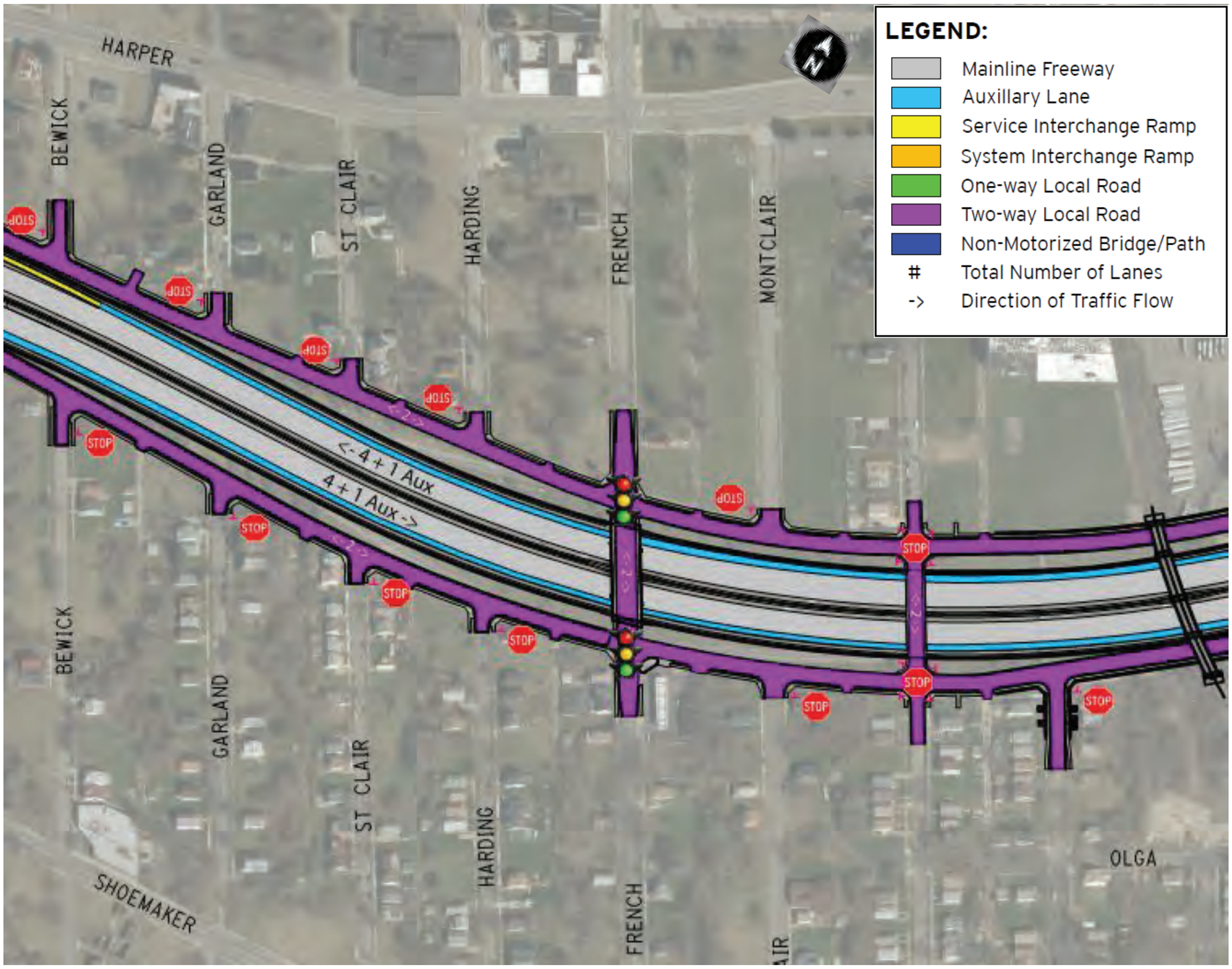
Figure 12: I-94 / Gratiot Avenue



Source: HNTB

- **I-94 / French Road** – The interchange is currently three-quarter partial access with eastbound I-94 exit and entrance ramps, as well as a westbound I-94 entrance ramp. Due to the low demand, proximity to other interchanges and geometric restrictions, the Build Alternative eliminates this partial access interchange. Access will be provided either by the adjacent Gratiot Avenue or Conner Avenue interchanges.

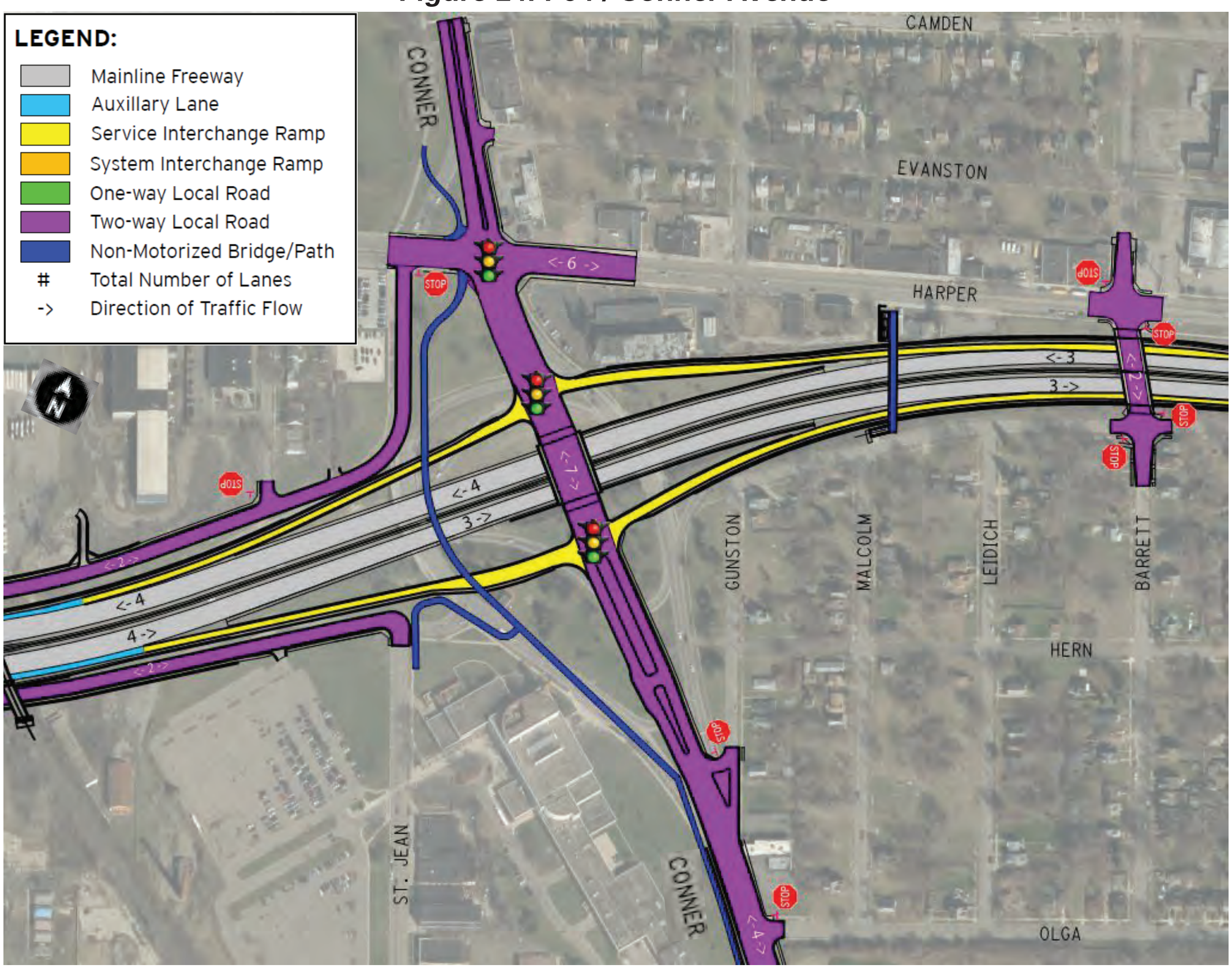
Figure 13: I-94 / French Road



Source: HNTB

- **I-94 / Conner Avenue** - The existing full access interchange is comprised of directional ramps and turnaround lanes in a unique configuration that can be confusing to motorists. Northbound and southbound Conner Avenue lanes currently diverge through the interchange to accommodate directional ramps and crossover movements. The existing eastbound I-94 exit ramp merges with southbound Conner Avenue. Vehicles can either continue southbound or use a turnaround to travel northbound. Similarly, the existing westbound I-94 exit ramp tees into northbound Conner Avenue. Vehicles can either turn right to continue along northbound Conner Avenue, or they can continue straight where they loop around and connect on the left side of southbound Conner Avenue. Northbound and southbound Conner Avenue have separate westbound I-94 entrance ramps. Southbound Conner Avenue must use a turnaround to merge with northbound Conner Avenue vehicles before entering eastbound I-94. The Build Alternative reconfigures the interchange into a standard diamond interchange, maintaining full access. The Build Alternative provides a new bicycle and pedestrian structure for the Iron-Belle Trail which follows the existing southbound Conner alignment.

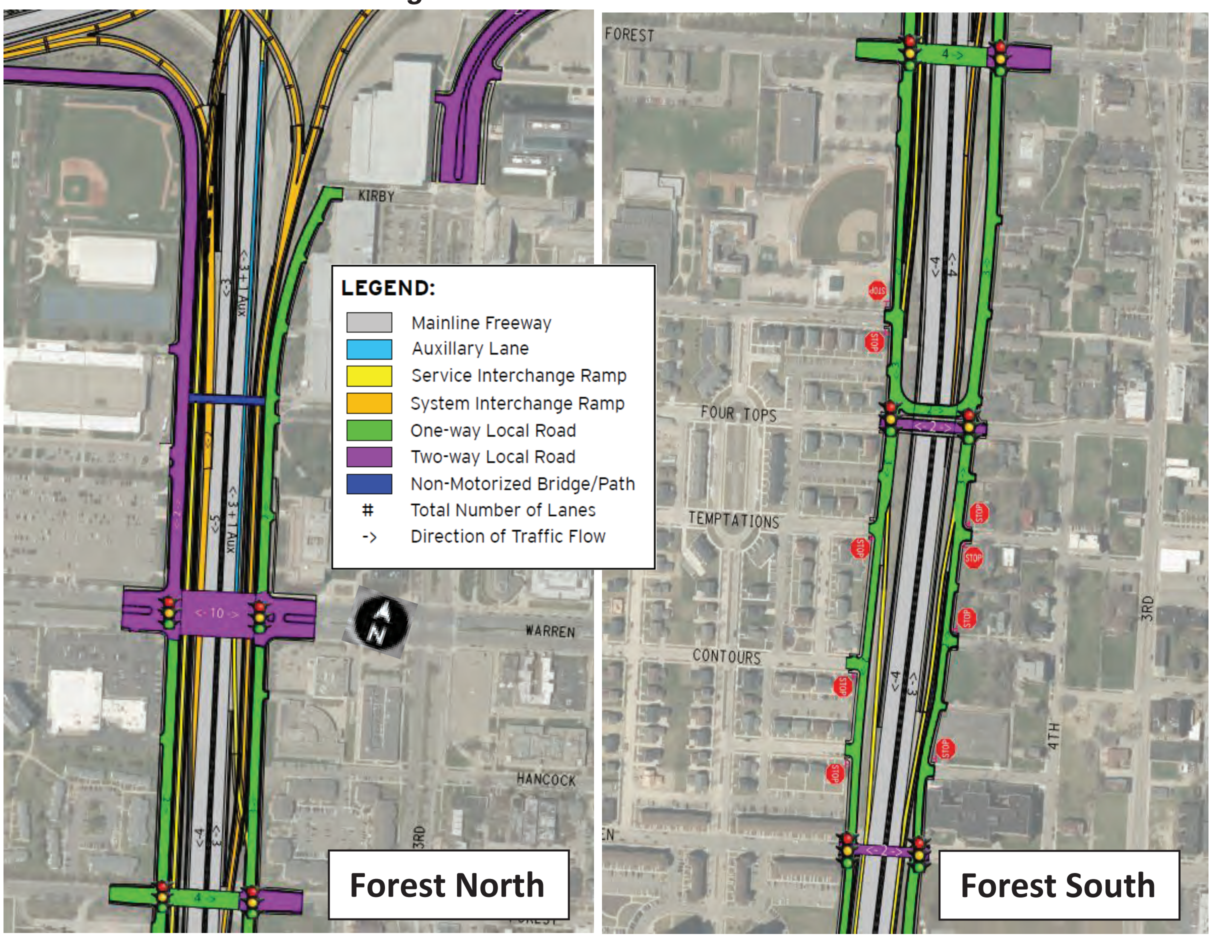
Figure 14: I-94 / Conner Avenue



Source: HNTB

- **M-10 / Forest Avenue and Four Tops / Calumet** – The existing M-10 / Forest Avenue full access interchange is a standard diamond configuration with service drives. The proximity of the northern Forest Avenue ramps to the M-10/I-94 interchange creates difficulties for drivers trying position for either a left or right-side exit onto I-94. In the Build Alternative design, the Forest Avenue northbound entrance ramp and southbound exit ramp will be modified and braided with the new M-10 / I-94 south-facing ramps. The southbound exit ramp and the two south-facing ramps (northbound exit ramp and southbound entrance ramp) at Forest Avenue will be moved a few blocks south to access Four Tops / Calumet. A complete street, U-turn, bridge will be constructed at Four Tops / Calumet. Full access will be maintained.

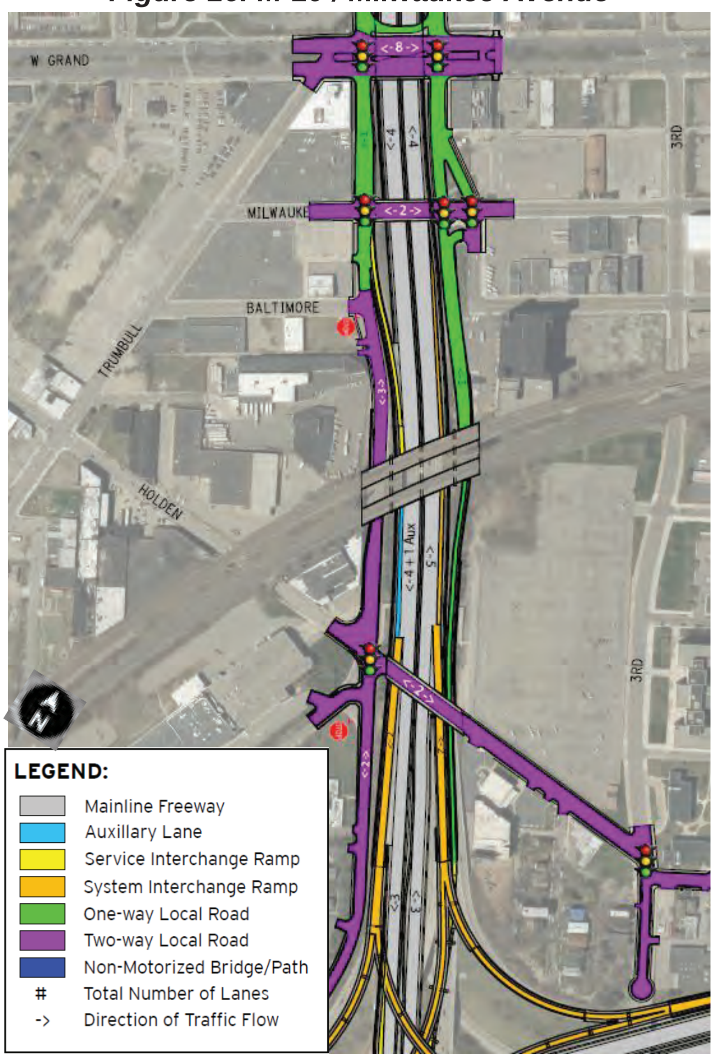
Figure 15: M-10 / Forest Avenue



Source: HNTB

- **M-10 / Grand Boulevard and Milwaukee Avenue** – Currently, the M-10 northbound exit and southbound entrance ramps directly connect with Milwaukee Avenue. The northbound entrance ramp and southbound exit ramp connect to M-10 via slip ramps north of Grand Boulevard. Service drive access is available on both sides of the interchange. In the Build Alternative design, the northbound M-10 exit ramp to Milwaukee Avenue will be relocated south of Holden Street to braid with the I-94 ramps. The southbound entrance-ramp from Milwaukee will also be reconstructed. This area has the potential for wrong way driving due to the transition from a two-way service drive to one-way at Baltimore Avenue on the southbound service drive. Signing and pavement markings will be added per MUTCD guidelines in areas where two-way segments transition to one-way segments. Raised pavement will also be added to channelize vehicles in the proper direction. **Section 4.3** lists all the areas where special considerations will need to be taken to prevent the potential for wrong way driving.

Figure 16: M-10 / Milwaukee Avenue



Source: HNTB

2.0 Existing and Future No-Build

Sections 2.1 and 2.2 describe the network configuration and the process for volume forecasting in the study area. Sections 2.3 and 2.4 highlight the Existing (2014) and No-Build (2040) operations for the I-94 corridor. Finally, Section 2.5 describes how crashes are impacting the corridor.

2.1 Network Configuration

The analysis area limits, or microsimulation model limits on the I-94 corridor extend from the western limits of the I-96 interchange to Dickerson Avenue (east of Conner Avenue) on I-94. The M-10 limits run from the northern ramps of Grand Boulevard down to Forest Avenue. Interstate 75 limits extend from Clay Street down to Warren Avenue. The local street network includes all service drives adjacent to I-94, I-96, I-75 and M-10, plus other side streets that are directly affected by the mainline. Exhibits One through Six in Sections 2.0 and 3.0 identify all the intersections included in the analysis.

Interstate 94 through the study area is currently a six-lane urban freeway that carries three lanes of traffic in the eastbound and westbound directions. There are over 50 ramp entrances or exits within the seven-mile project limits. Three major system interchanges influence the I-94 study area: I-96, M-10 and I-75. Interstate 96 is located on the western edge of the study area, and M-10 and I-75 pass through the corridor. Each of these interchanges contribute to the poor operations on the I-94 corridor. One-way service drives intermittently run parallel to the I-94 corridor and are utilized as access points to and from I-94.

2.2 Traffic Forecast

A detailed description of how traffic was forecasted for the study area can be found in "*TM 3 – I-94 Traffic Volume Forecasting"* technical memorandum in **Appendix B**. In summary, data taken from the Southeast Michigan Council of Governments' (SEMCOG) 2010 and 2040 travel demand model (TDM) was used to project yearly growth rates on the I-94 mainline, adjacent service roads and intersections. Existing traffic counts were grown to represent the year 2040 conditions. According to the SEMCOG TDM, the total traffic is expected to increase 29% by 2040. While effective at predicting mainline volumes, limitations of the TDM caused the project team to adjust the methodology for projecting volumes on service drives and ramps. The methodology agreed upon by MDOT and SEMCOG is as follows:

1. A total of 1,000 thru vehicles per hour (VPH) were applied to the I-94 service drives during each of the a.m. and p.m. peak hours. The 1,000 thru vehicles are based on existing peak hour traffic volumes counted at the Chene Street and Mt. Elliott Street intersections with the I-94 eastbound and westbound service drives. Chene Street and Mt. Elliott Street were used to develop the thru VPH based on the existing continuous service drives at these locations.
2. Projected directional distributions were developed based on an evaluation of existing traffic volumes and anticipated travel pattern impacts from the continuous service drives.

The directional distributions were applied to the 1,000 thru VPH to assign peak hour thru volumes on the eastbound and westbound I-94 service drives.

3. To develop peak hour turning movement volumes at the study area intersections, 10% of the service drive thru traffic volume was used. The peak hour turning movement percentage was developed based on review of existing turning movement counts at low volume intersections on the I-94 corridor and the Trumbull Ave Bridge evaluation. The Trumbull evaluation can be found in **Appendix C** (page C-149). Additionally, the I-96 reconstruction project (Newburg Rd to Melvin St) in Livonia was reviewed to confirm the proposed methodology for the I-94 corridor. A review of the I-96 project found that when distributing turning volumes to adjacent signals it was assumed that 10% turned left and 10% turned right which matches the proposed methodology for the I-94 corridor. This methodology was used if the existing turning movements were lower than 10% of the service drive thru volume, otherwise the existing volume was used.

Existing (2014) and Future (2040) peak hour volumes, plus the average daily traffic volumes can be found in **Appendix B**. Once existing and future volumes were forecasted for the corridor, traffic simulation modeling was used to evaluate existing and future traffic operations.

2.3 Existing (2014) Peak Period Traffic Operations

Microsimulation models play a vital role in predicting how roadways will operate in the future and assist DOTs in determining if a design will improve the overall performance of a corridor. To predict future operations on I-94, existing microsimulation models of the corridor were created and calibrated to match how traffic currently operates on the network in the a.m. and p.m. peak conditions. *Quadstone Paramics* was the software selected for the freeway analysis; *Synchro* was used to analyze the arterial intersections. The models were calibrated using 2014 as the base (existing) year, and then used as the foundation to predict 2040 roadway conditions in the No-Build and Build Alternative configurations. A detailed explanation of how the existing a.m. and p.m. Paramics models were calibrated can be found in "*TM 8 – Existing (2014) Paramics Assessment and Model Calibration for I-94"* technical memorandum in **Appendix C** (page C-201). An additional calibration memo was created to highlight the proposed design weave between M-10 and Brush Street. That memorandum can also be found in **Appendix C** (page C-123).

Once calibrated, the a.m. and p.m. peak period models were run and raw data output (i.e. average speed and delay) was generated. The raw data output was then processed to show Level of Service (LOS) for mainline segments and adjacent intersections. Level of Service is a simplified method of describing how a corridor or intersection is performing operationally. The LOS thresholds are displayed in **Table A**. A LOS A or B means traffic is free-flowing, whereas a LOS E or F indicates that the demand on a roadway segment equals or exceeds its capacity, resulting in congestion. According to the "I-94 Rehabilitation Engineering Report" (June 2010), LOS E is considered the minimum acceptable LOS on urban freeways, but only during the peak hours. The minimum acceptable Design Criteria defined by MDOT for all other facilities is a LOS D or better.

The results of the existing peak hour conditions are described in the subsections below. The future No-Build and Build Alternative results are described in **Sections 2.4 and 3.2**, respectively.

Table A: Level of Service Thresholds

LOS	Freeways Mainline max Density (pc/mi/ln)	Freeways Merge/Diverge max Density (pc/mi/ln)	Freeways Weaving Segment (pc/mi/ln)	Signalized Interchanges Avg. Delay (sec/veh)	Signalized Intersections Avg. Delay (sec/veh)	Unsignalized Intersections Avg. Delay (sec/veh)
A	<11	<10	<10	<15	<10	<10
B	>11-18	>10-20	>10-20	>15-30	>10-20	>10-15
C	>18-26	>20-28	>20-28	>30-55	>20-35	>15-25
D	>26-35	>28-35	>28-35	>55-85	>35-55	>25-35
E	>35-45	>35	>35	>85-120	>55-80	>35-50
F	>45 Demand Exceeds Capacity	Demand Exceeds Capacity	>43 Demand Exceeds Capacity	>120	>80	>50

Source: HCM 6
Note: pc – passenger cars, mi – mile, ln – lane, sec – second, veh - vehicle

2.3.1 A.M. Peak Period Operational Results

Exhibit 1 shows the a.m. existing operational performance of the I-94 corridor, plus surrounding intersections.

Mainline

Table B describes the portions of the I-94 corridor that operate at a LOS E or F. Eastbound I-94 performs at a LOS A, B or C throughout the majority of the corridor. However, LOS F occurs from the western edge of the study area to the 14th Street entrance-ramp. There is also a quarter-mile segment between M-10 and Woodward Avenue that is LOS E. These slowdowns are a result of high traffic volumes and substandard acceleration and weave distances.

Westbound, LOS E and F extends from the eastern edge of the study area to M-10. There is a one-quarter mile stretch between the I-75 ramps where the LOS is a D. The bottleneck is released at I-75 temporarily before drivers experience another bottleneck approaching M-10. West of M-10, LOS C and D extend to the study area's western boundary. Cumulatively, about 43 percent of the I-94 analysis area operates at a LOS E or F.

On I-75, LOS E extends from Clay Street to Ferry Street in the southbound direction. All other segments of I-75 and M-10 operate at acceptable LOS.

Table B: A.M. Existing Segments on I-94 with LOS E or F

Segment	Direction	Length (Mi)	Percent of I-94 Study Area Corridor
Study area western edge to 14th St entrance-ramp	EB	0.88	6.08%
M-10 entrance-ramp to Woodward Ave entrance-ramp	EB	0.21	1.45%
Connor St exit-ramp to I-75	WB	4.32	29.79%
I-75 entrance-ramp to M-10 flyover	WB	0.77	5.34%
Total of all segments	EB/WB	6.18	42.66%

Note: Analysis area is approximately 14.5 miles (7.25 miles one way). Lengths are an approximation.

Arterial Intersections

All intersections operate at a LOS C or better. Low traffic demand on the surrounding arterial streets is the contributing factor as to why no intersections operate at a LOS E or F.

2.3.2 P.M. Peak Period Operational Results

Exhibit 2 shows the existing p.m. operational performance of the I-94 corridor, plus surrounding intersections.

Mainline

Table C shows that half of the corridor operates at a LOS E or F during the p.m. peak. Eastbound I-94 operations have a mixture of LOS C through F. Level of service E and F occurs between I-96 and I-75, and between the Chene Street entrance-ramp to Van Dyke Avenue (M-53). East of Van Dyke Avenue, traffic clears up slightly even though LOS E appears between the access ramps at Gratiot Avenue (M-3), French Road and Conner Street.

Traffic operates at a LOS C and D moving westbound from Conner Street to I-75. After that, LOS E and F extends two-miles to the I-96 interchange. Past I-96, traffic improves to a LOS C. Poor LOS can be attributed to vehicles positioning to exit at the I-96 interchange.

On southbound I-75, LOS E extends from the Clay Street entrance-ramp to the I-94 exit-ramp. All other segments of I-75 and M-10 operate at acceptable LOS.

Table C: P.M. Existing Segments on I-94 with LOS E or F

Segment	**Direction**	**Length (Mi)**	**Percent of I-94 Study Area Corridor**
Edsel Ford exit-ramp (I-96) to I-75 entrance-ramp	EB	2.78	19.17%
Chene St entrance-ramp to M-53 entrance-ramp	EB	1.62	11.17%
Between M-3 Loop and entrance-ramp	EB	0.16	1.10%
Between French Rd ramps	EB	0.37	2.55%
Between Conner St ramps	EB	0.26	1.79%
I-75 entrance-ramp to I-96 exit-ramp	WB	2.00	13.79%
Total of all segments	EB/WB	7.19	49.57%

Note: Analysis area is approximately 14.5 miles (7.25 miles one way). Lengths are an approximation.

Arterial Intersections

There are no intersections that perform at LOS E or F during the p.m. peak period. Southbound I-75 Frontage Road at E Ferry Street is the only intersection that performs at a LOS D. Like the a.m., low volumes on the arterial streets contribute to the satisfactory operations.

Exhibit 1
I-94 IACR Study Area
2014 Existing AM Modeled Level of Service

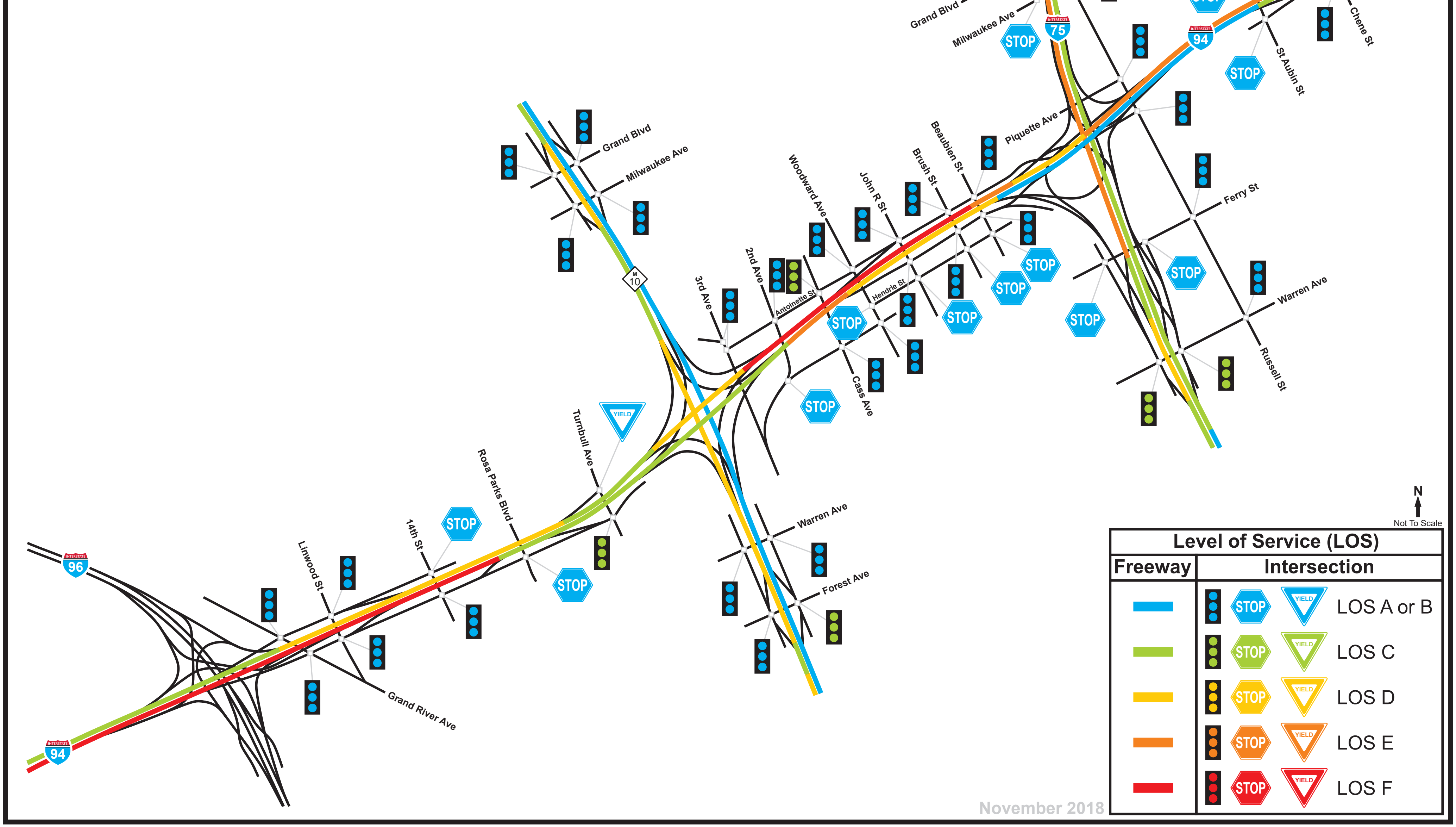


Exhibit 1
I-94 IACR Study Area
2014 Existing AM Modeled Level of Service

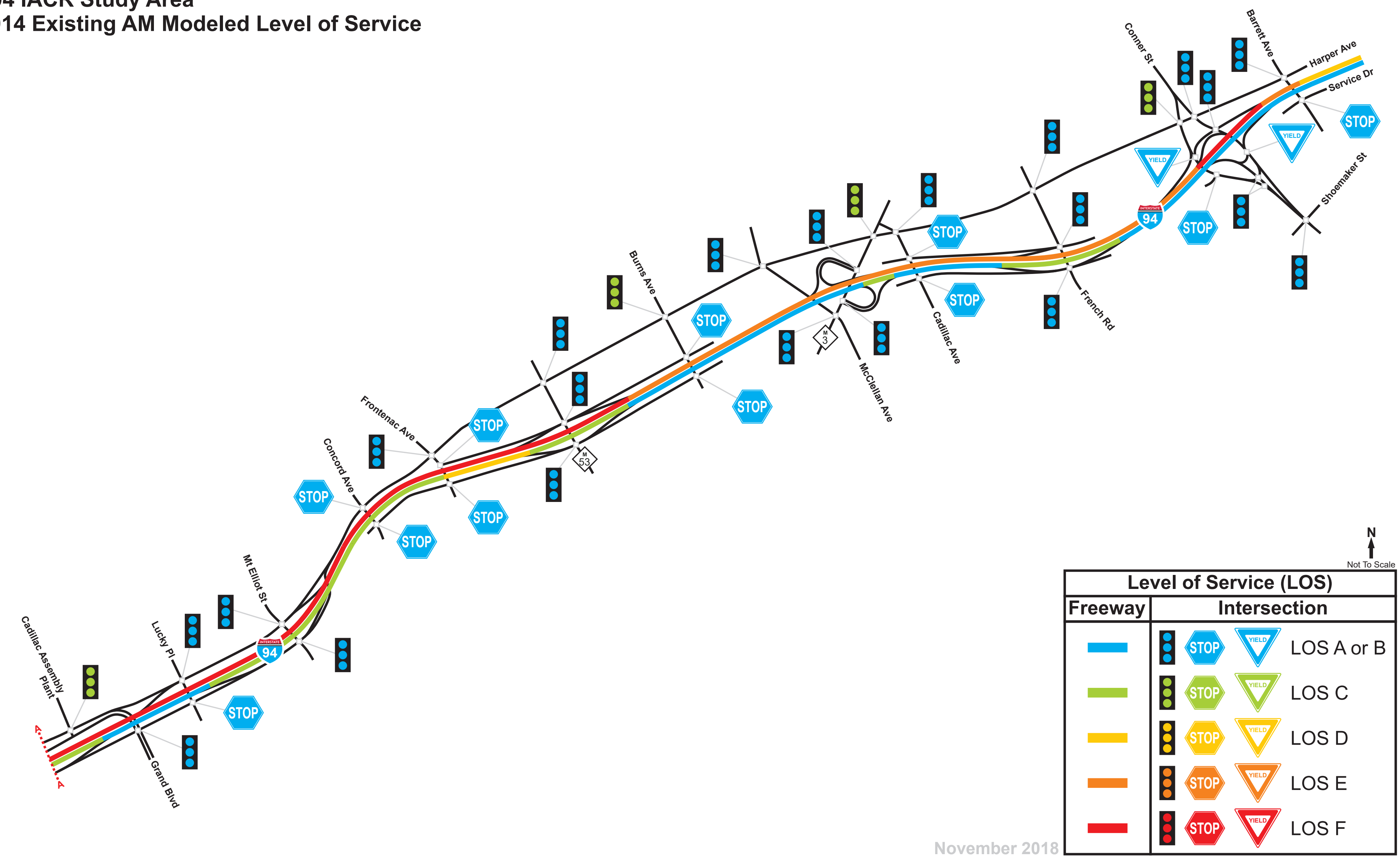


Exhibit 2
I-94 IACR Study Area
2014 Existing PM Modeled Level of Service

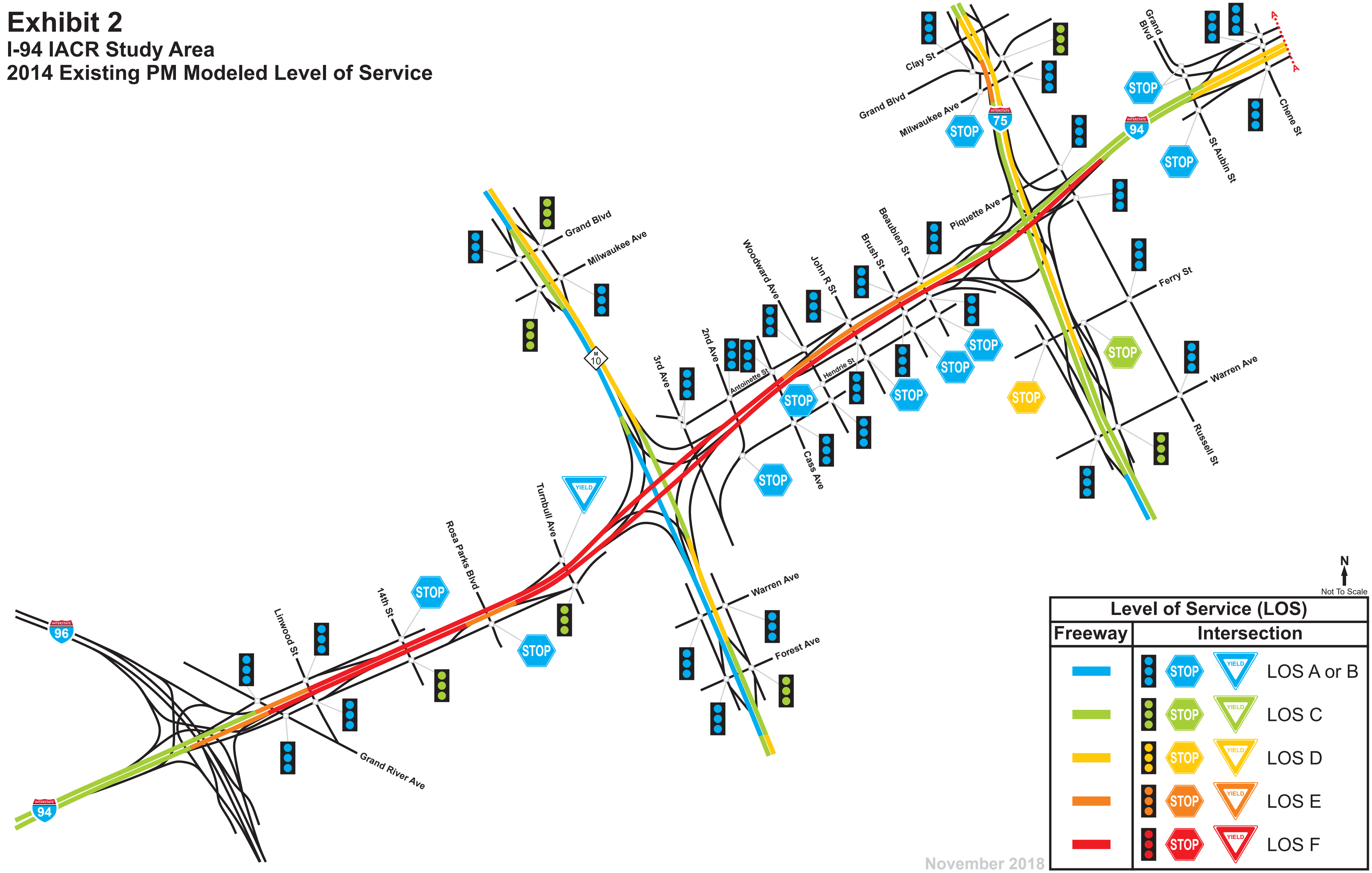


Exhibit 2
I-94 IACR Study Area
2014 Existing PM Modeled Level of Service

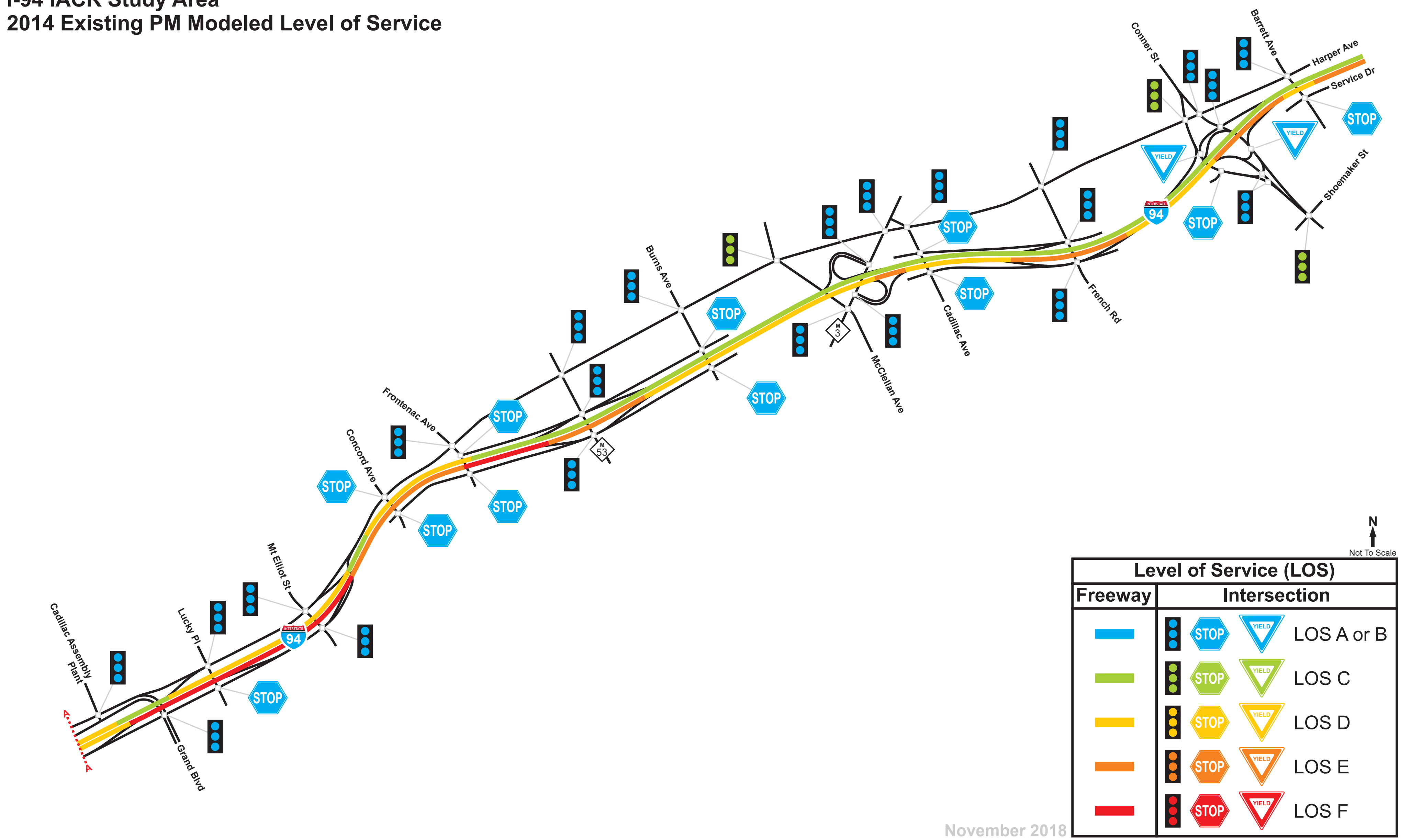


Table D: Existing LOS in Analysis Area

Segment	Segment Type	Existing AM Peak		Existing PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Eastbound I-94					
Grand Blvd Entr Ramp to I-96 Exit Ramp	Weave	45.3	F	27.5	C
Grand River Ave Exit Ramp	Ramp	53.4	F	26.8	C
Grand River Ave Exit Ramp to I-96 S-E Entr Ramp	Basic	84.3	F	38.5	E
I-96 S-E Entr Ramp	Ramp	95.7	F	55.0	F
I-94 N-E Entr Ramp	Ramp	59.2	F	52.0	F
Linwood St Entr Ramp	Ramp	47.7	F	53.8	F
14th St Entr Ramp to Trumbull Ave Exit Ramp	Weave	25.5	C	41.4	E
M-10 Exit Ramps	Ramp	26.5	C	55.6	F
M-10 Exit Ramps to M-10 Entr Ramps	Basic	20.1	C	46.6	F
M-10 Entr Ramps to John R St Exit Ramp	Ramp*	37.5	E	56.9	F
John R St Exit Ramp to I-75 Exit Ramp	Basic	29.6	D	62.6	F
I-75 Exit Ramp	Ramp	28.4	D	95.3	F
I-75 Exit Ramp to Beaubien St Entr Ramp	Basic	14.7	B	102.2	F
Beaubien St Entr Ramp to Russell St Exit Ramp	Weave	13.0	B	92.5	F
Russell St Exit Ramp to I-75 Entr Ramp	Basic	15.2	B	74.9	F
I-75 Entr Ramp to Chene St Exit Ramp	Weave	15.9	B	27.1	C
Chene St Exit Ramp to Chene St Entr Ramp	Basic	21.3	C	32.0	D
Chene St Entr Ramp to Mt Elliott St Exit Ramp	Weave	16.8	B	45.2	F
Mt Elliott St Exit Ramp to Mt Elliott St Entr Ramp	Basic	22.9	C	45.3	F
Mt Elliott St Entr Ramp	Ramp	21.4	C	38.6	E
Mt Elliott St Entr Ramp to M-53 Exit Ramp	Basic	22.9	C	43.8	E
M-53 Exit Ramp	Ramp	28.4	D	58.4	F
M-53 Exit Ramp to M-53 Entr Ramp	Basic	24.9	C	38.9	E
M-53 Entr Ramp to Gratiot Ave Exit Ramp	Ramp*	19.6	B	29.7	D
Gratiot Ave Exit Ramp To Gratiot Ave Entr Ramp	Basic	20.3	C	39.1	E
Gratiot Ave Entr Ramp to French Rd Exit Ramp	Ramp*	17.6	B	32.3	D
French Rd Exit Ramp to French Rd Entr Ramp	Basic	20.2	C	39.6	E
French Rd Entr Ramp to Conner St Exit Ramp	Ramp*	18.7	B	31.6	D
Conner St Exit Ramp to Conner St Entr Ramp	Basic	17.2	B	41.3	E
Conner St Entr Ramp	Ramp	17.1	B	32.7	D
East of Conner St Entr Ramp	Basic	17.6	B	35.3	E
Westbound I-94					
East of Conner St Exit Ramp	Basic	33.9	D	21.2	C
Conner St Exit Ramp	Ramp	36.1	E	21.0	C
Conner St Exit Ramp to Conner St Entr Ramp	Basic	46.5	F	19.2	C
NB & SB Conner St Entr Ramps	Ramp	41.8	E	20.4	C
SB Conner St Entr Ramp to French Rd Entr Ramp	Basic	37.1	E	21.7	C
French Rd Entr Ramp to Gratiot Ave Exit Ramp	Ramp*	42.3	E	24.8	C
Gratiot Ave Exit Ramp to Gratiot Ave Entr Ramp	Basic	42.1	E	25.0	C
Gratiot Ave Entr Ramp to M-53 Exit Ramp	Ramp*	41.9	E	25.3	C
M-53 Exit Ramp to M-53 Entr Ramp	Basic	47.5	F	26.0	C
M-53 Entr Ramp	Ramp	47.4	F	26.7	C
M-53 Entr Ramp to Mt Elliott St Exit Ramp	Basic	47.2	F	27.3	D
Mt Elliott St Exit Ramp	Ramp	46.1	F	26.2	C
Mt Elliott St Exit Ramp to Harper Ave Entr Ramp	Basic	50.4	F	26.4	D
Harper Ave Entr Ramp	Ramp	52.2	F	26.8	C
Harper Ave Entr Ramp to Chene St Entr Ramp	Basic	54.0	F	27.2	D
Chene St Entr Ramp to I-75 Exit Ramp	Weave	40.0	E	24.1	C
I-75 Exit Ramp to Beaubien St Exit Ramp	Basic	41.1	E	21.5	C
Beaubien St Exit Ramp	Ramp	32.7	D	21.3	C
Beaubien St Exit Ramp to I-75 Entr Ramp	Basic	29.5	D	20.5	C
I-75 Entr Ramp	Ramp	41.1	E	31.6	D
I-75 Entr Ramp to John R St Entr Ramp	Basic	46.5	F	41.7	E
John R St Entr Ramp to M-10 Exit Ramps	Ramp*	43.5	F	46.0	F
M-10 Exit Ramps to M-10 Entr Ramps	Basic	26.2	D	59.8	F
M-10 Entr Ramps	Ramp	24.5	C	68.1	F
Trumbull Ave Entr Ramp to Linwood St Exit Ramp	Ramp*	31.1	D	46.7	F
Linwood St Exit Ramp to I-96 Exit Ramp	Basic	34.9	D	50.6	F
I-96 Exit Ramp	Ramp	33.9	D	40.1	E
I-96 Exit Ramp to Grand River Ave Entr Ramp	Basic	21.1	C	21.6	C
Grand River Ave Entr Ramp	Ramp	21.6	C	22.5	C
I-96 Entr Ramp to Grand Blvd Exit Ramp	Weave	20.2	C	23.1	C
Northbound M10					
South of Forest Ave Exit Ramp	Basic	16.8	B	26.1	D
Forest Ave Exit Ramp	Ramp	17.3	B	26.8	C
Forest Ave Exit Ramp to Forest Ave Entr Ramp	Basic	13.6	B	23.5	C
Forest Ave Entr Ramp to I-94 S-E Exit Ramp	Weave	14.3	B	29.9	D
I-94 S-W Exit Ramp	Ramp	15.0	B	30.7	D
I-94 S-W Exit Ramp to I-94 E-N Entr Ramp	Basic	12.9	B	25.2	C
I-94 E-N Entr Ramp to I-94 W-N Entr Ramp	Basic	16.2	B	33.0	D
I-94 W-N Entr Ramp to Milwaukee Ave Exit Ramp	Weave	18.2	B	32.8	D
Milwaukee Ave Exit Ramp to Grand Blvd Entr Ramp	Basic	15.4	B	28.3	D
North of Grand Blvd Entr Ramp	Basic	13.5	B	27.4	D
Southbound M10					
North of Grand Blvd Exit Ramp	Basic	25.1	C	17.0	B
Grand Blvd Exit Ramp to Milwaukee Ave Entr Ramp	Basic	32.1	D	20.2	C
Milwaukee Ave Entr Ramp to I-94 N-W Exit Ramp	Weave	25.2	C	19.7	B
I-94 N-E Exit Ramp	Ramp	30.1	D	20.4	C
I-94 N-E Exit Ramp to I-94 Entr Ramps	Basic	27.1	D	16.6	B
I-94 Entr Ramps to Forest Ave Exit Ramp	Weave	30.7	D	17.6	B
Forest Ave Exit Ramp to Forest Ave Entr Ramp	Basic	26.5	D	16.7	B
Forest Ave Entr Ramp	Ramp	27.8	C	18.6	B
South of Forest Ave Entr Ramp	Basic	27.9	D	18.7	C
Northbound I-75					
South of Warren Ave Exit Ramp	Basic	15.1	B	18.2	C
Warren Ave Exit Ramp to I-94 Exit Ramps	Basic	20.7	C	23.9	C
I-94 Exit Ramps to Warren Ave Entr Ramp	Basic	20.9	C	25.6	C
Warren Ave Entr Ramp	Ramp	22.4	C	27.5	C
Warren Ave Entr Ramp to I-94 E-N Entr Ramp	Basic	22.2	C	29.3	D
I-94 E-N Entr Ramp to I-94 W-N Entr Ramp	Basic	24.0	C	29.4	D
I-94 W-N Entr Ramp to Clay St Exit Ramp	Ramp*	26.5	C	32.7	D
Clay St Exit Ramp to Clay St Entr Ramp	Basic	18.8	C	28.3	D
North of Clay St Entr Ramp	Basic	15.8	B	25.0	C
Southbound I-75					
North of Clay St Exit Ramp	Basic	30.3	D	20.7	C
Clay St Exit Ramp to Clay St Entr Ramp	Basic	36.6	E	27.3	D
Clay St Entr Ramp to I-94 Exit Ramps	Weave	41.0	E	38.1	E
I-94 Exit Ramps to Warren Ave Exit Ramp	Basic	39.0	E	24.2	C
Warren Ave Exit Ramp	Ramp	35.3	E	24.0	C
Warren Ave Exit Ramp to I-94 Entr Ramps	Basic	25.9	C	20.0	C
I-94 Entr Ramps to Warren Ave Entr Ramp	Basic	27.7	D	19.6	C
South of Warren Ave Entr Ramp	Basic	22.6	C	16.9	B

*Overlapping ramp segment
Source: Paramics

2.4 Future (2040) No-Build Peak Period Traffic Operations

Traffic volumes were forecasted for the year 2040 using travel demand model data. A detailed overview of how the volumes were grown to the build year 2040 can be found in "*TM 3 – I-94 Traffic Volume Forecasting"* technical memorandum in **Appendix B**. To analyze a No-Build condition, the forecasted volumes were applied to the calibrated base year simulation models for the a.m. and p.m. peak periods. The models were then run, and output was collected assuming no changes to the study area. **Sections 2.4.1** and **2.4.2** describe the traffic operations.

2.4.1 A.M. Peak Period Operational Results

Exhibit 3 shows the a.m. future No-Build operational performance of the I-94 corridor, plus surrounding intersections.

Mainline

The corridor is expected to degrade compared to the existing conditions if no action is taken. As shown in **Table E**, over 50 percent of the I-94 corridor is forecasted to operate at a LOS E or F during the a.m. peak period. The eastbound direction of I-94 operates at a LOS F from the western edge of the study area to Rosa Parks Boulevard and from the M-10 entrance-ramp to Woodward Avenue. A small section between Frontenac Avenue and M-53 operates at a LOS E. The rest of the study area eastbound corridor operates at a LOS D or better.

In the westbound direction, vehicles positioning for the I-75 interchange cause backups on the I-94 mainline. Level of service F extends from the eastern edge of the study area to I-75. In the existing conditions described in **Section 2.3,** the delay extending back from the I-75 interchange was not as severe as it is forecasted by 2040. Two westbound sections of I-94 operate at a LOS E. The first is between the I-75 entrance-ramp and M-10, and the other is from the Linwood Street exit-ramp to the I-96 interchange.

Level of service E and F extend through the analysis area in the southbound (peak) direction of M-10. In the existing condition, the levels of service were C and D. Network deterioration also occurs in the southbound direction of I-75. The northbound directions of I-75 and M-10 operate at acceptable levels of service but have worsened compared to the existing conditions.

Table E: A.M. Future No-Build Segments on I-94 with LOS E or F

Segment	Direction	Length (Mi)	Percent of I-94 Study Area Corridor
Analysis area western edge to Rosa Parks Blvd	EB	1.17	8.07%
M-10 entrance-ramp to Woodward Ave	EB	0.27	1.86%
Frontenac Ave to M-53 exit-ramp	EB	0.16	1.12%
Analysis area eastern edge to I-75	WB	4.41	30.41%
I-75 entrance-ramp to M-10 entrance-ramp	WB	1.07	7.38%
Linwood St exit-ramp to I-96 exit-ramp	WB	0.33	2.28%
Total of all segments	EB/WB	7.41	51.12%

Note: Analysis area is approximately 14.5 miles (7.25 miles one way). Lengths are an approximation.

Arterial Intersections

There are no intersections that perform at LOS E or F. The only intersection that performs at a LOS D is Harper Avenue at Burns Avenue. The rest operate at LOS C or better.

2.4.2 P.M. Peak Period Operational Results

Exhibit 4 shows the p.m. future No-Build operational performance of the I-94 corridor, plus surrounding intersections.

Mainline

Roughly 95 percent of the I-94 corridor is expected to operate at a LOS E or F during the p.m. peak period by 2040 (see **Table F**). Level of service E and F also exist in the northbound directions of I-75 and M-10. The westbound vehicles positioning to exit at I-75 and M-10 cause backup on the I-94 mainline. This is a change from the existing p.m. conditions. Improvements clearly must be made to the corridor prior to 2040 to mitigate these conditions.

Table F: P.M. Future No-Build Segments on I-94 with LOS E or F

Segment	Direction	Length (Mi)	Percent of I-94 Study Area Corridor
Analysis area western edge to Conner St entrance-ramp	EB	7.16	49.38%
Analysis area eastern edge to I-96 exit-ramp	WB	6.67	46.00%
Total of all segments	EB/WB	13.83	95.38%

Note: Analysis area is approximately 14.5 miles (7.25 miles one way). Lengths are an approximation.

Arterial Intersections

There are no intersections that perform at LOS E or F. Ferry Street at I-75 southbound Frontage Road is the one intersection that performs at a LOS D.

Exhibit 3
I-94 IACR Study Area
2040 No Build AM Modeled Level of Service

Exhibit 3
I-94 IACR Study Area
2040 No Build AM Modeled Level of Service

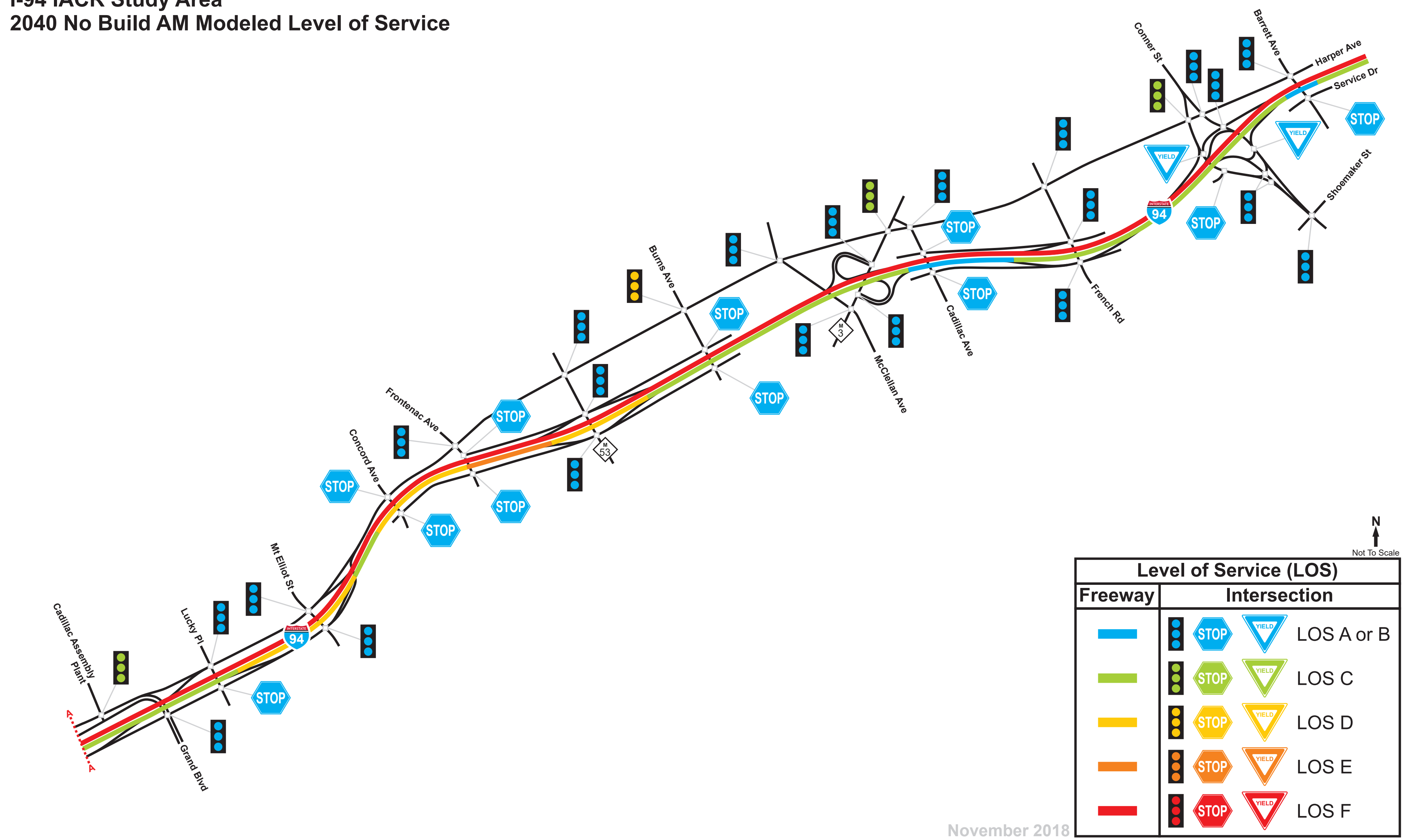


Exhibit 4
I-94 IACR Study Area
2040 No Build PM Modeled Level of Service

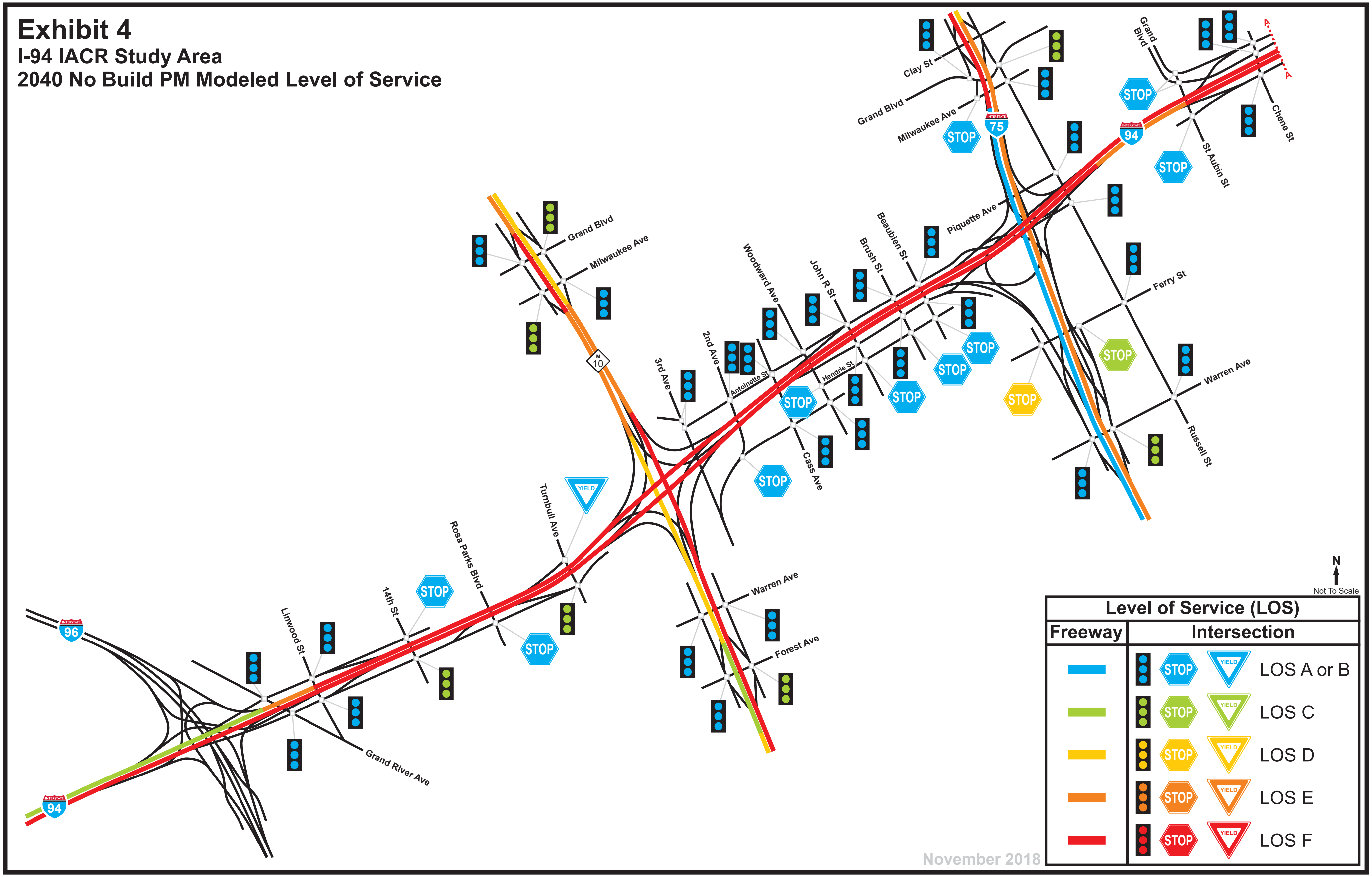


Exhibit 4
I-94 IACR Study Area
2040 No Build PM Modeled Level of Service

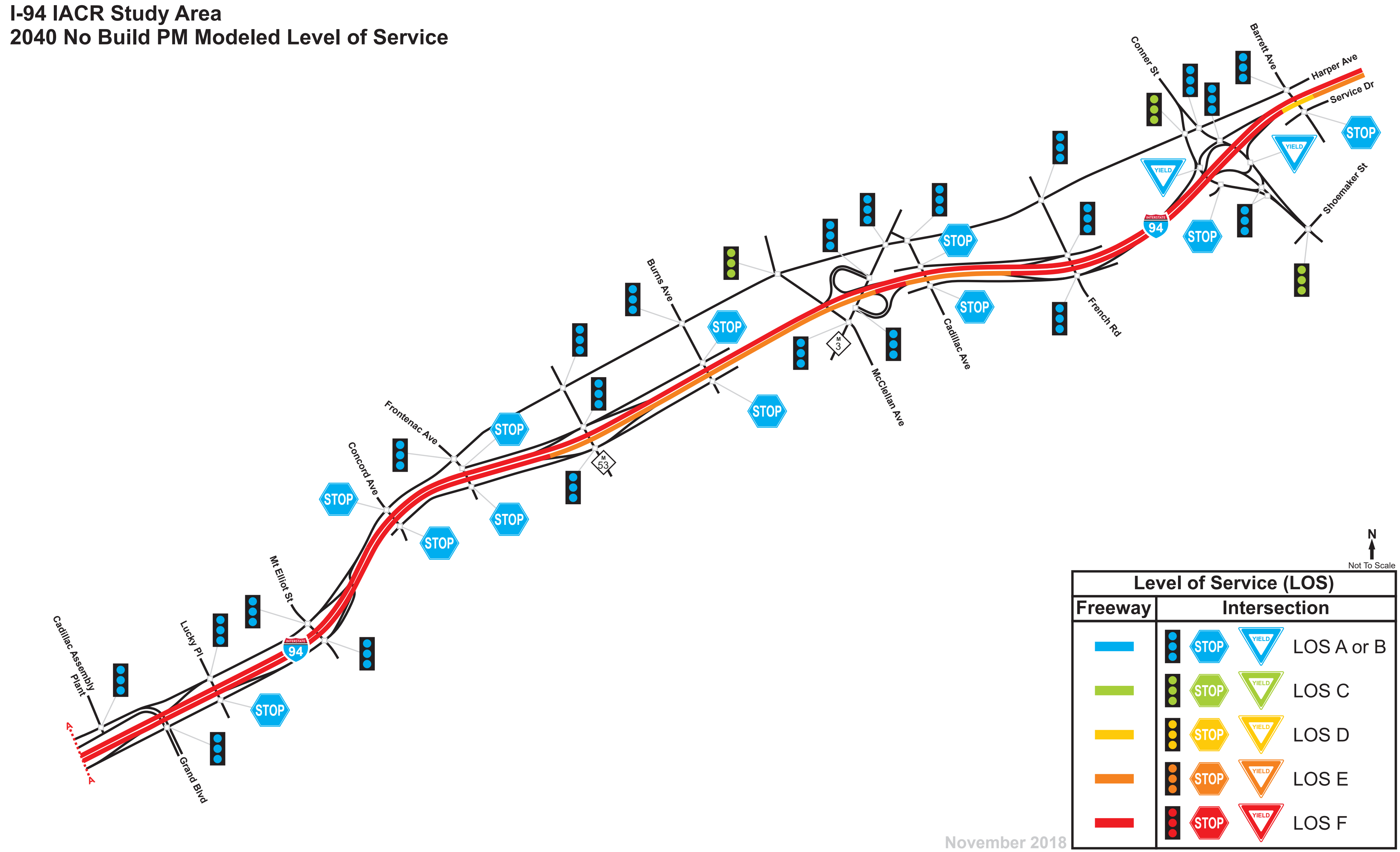


Table G: Existing vs. No-Build LOS

Segment	Segment Type	Existing AM Peak		No Build AM Peak		Existing PM Peak		No Build PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Eastbound I-94									
Grand Blvd Entr Ramp to I-96 Exit Ramp	Weave	45.3	F	69.5	F	27.5	C	71.0	F
Grand River Ave Exit Ramp	Ramp	53.4	F	82.4	F	26.8	C	88.4	F
Grand River Ave Exit Ramp to I-96 S-E Entr Ramp	Basic	84.3	F	125.5	F	38.5	E	124.6	F
I-96 S-E Entr Ramp	Ramp	95.7	F	114.9	F	55.0	F	127.0	F
I-94 N-E Entr Ramp	Ramp	59.2	F	67.5	F	52.0	F	85.1	F
Linwood St Entr Ramp	Ramp	47.7	F	51.9	F	53.8	F	82.5	F
14th St Entr Ramp to Trumbull Ave Exit Ramp	Weave	25.5	C	25.4	C	41.4	E	56.5	F
M-10 Exit Ramps	Ramp	26.5	C	28.6	D	55.6	F	83.6	F
M-10 Exit Ramps to M-10 Entr Ramps	Basic	20.1	C	24.7	C	46.6	F	69.4	F
M-10 Entr Ramps to John R St Exit Ramp	Ramp*	37.5	E	44.6	F	56.9	F	59.2	F
John R St Exit Ramp to I-75 Exit Ramp	Basic	29.6	D	31.2	D	62.6	F	62.0	F
I-75 Exit Ramp	Ramp	28.4	D	30.3	D	95.3	F	98.4	F
I-75 Exit Ramp to Beaubien St Entr Ramp	Basic	14.7	B	17.3	B	102.2	F	81.6	F
Beaubien St Entr Ramp to Russell St Exit Ramp	Weave	13.0	B	14.3	B	92.5	F	71.3	F
Russell St Exit Ramp to I-75 Entr Ramp	Basic	15.2	B	17.4	B	74.9	F	72.9	F
I-75 Entr Ramp to Chene St Exit Ramp	Weave	15.9	B	18.1	B	27.1	C	35.4	E
Chene St Exit Ramp to Chene St Entr Ramp	Basic	21.3	C	23.7	C	32.0	D	71.3	F
Chene St Entr Ramp to Mt Elliott St Exit Ramp	Weave	16.8	B	21.2	C	45.2	F	72.2	F
Mt Elliott St Exit Ramp to Mt Elliott St Entr Ramp	Basic	22.9	C	29.4	D	45.3	F	53.3	F
Mt Elliott St Entr Ramp	Ramp	21.4	C	25.2	C	38.6	E	46.6	F
Mt Elliott St Entr Ramp to M-53 Exit Ramp	Basic	22.9	C	28.1	D	43.8	E	52.4	F
M-53 Exit Ramp	Ramp	28.4	D	37.8	E	58.4	F	69.5	F
M-53 Exit Ramp to M-53 Entr Ramp	Basic	24.9	C	29.5	D	38.9	E	42.7	E
M-53 Entr Ramp to Gratiot Ave Exit Ramp	Ramp*	19.6	B	23.1	C	29.7	D	38.5	E
Gratiot Ave Exit Ramp To Gratiot Ave Entr Ramp	Basic	20.3	C	21.1	C	39.1	E	56.0	F
Gratiot Ave Entr Ramp to French Rd Exit Ramp	Ramp*	17.6	B	18.7	B	32.3	D	42.8	E
French Rd Exit Ramp to French Rd Entr Ramp	Basic	20.2	C	23.0	C	39.6	E	52.3	F
French Rd Entr Ramp to Conner St Exit Ramp	Ramp*	18.7	B	21.0	C	31.6	D	53.0	F
Conner St Exit Ramp to Conner St Entr Ramp	Basic	17.2	B	19.4	C	41.3	E	68.6	F
Conner St Entr Ramp	Ramp	17.1	B	19.6	B	32.7	D	34.1	D
East of Conner St Entr Ramp	Basic	17.6	B	20.2	C	35.3	E	37.4	E
Westbound I-94									
East of Conner St Exit Ramp	Basic	33.9	D	79.7	F	21.2	C	125.6	F
Conner St Exit Ramp	Ramp	36.1	E	85.2	F	21.0	C	130.6	F
Conner St Exit Ramp to Conner St Entr Ramp	Basic	46.5	F	95.2	F	19.2	C	136.9	F
NB & SB Conner St Entr Ramps	Ramp	41.8	E	74.3	F	20.4	C	125.2	F
SB Conner St Entr Ramp to French Rd Entr Ramp	Basic	37.1	E	53.5	F	21.7	C	113.5	F
French Rd Entr Ramp to Gratiot Ave Exit Ramp	Ramp*	42.3	E	62.5	F	24.8	C	121.8	F
Gratiot Ave Exit Ramp to Gratiot Ave Entr Ramp	Basic	42.1	E	61.5	F	25.0	C	115.2	F
Gratiot Ave Entr Ramp to M-53 Exit Ramp	Ramp*	41.9	E	60.4	F	25.3	C	108.6	F
M-53 Exit Ramp to M-53 Entr Ramp	Basic	47.5	F	73.2	F	26.0	C	123.1	F
M-53 Entr Ramp	Ramp	47.4	F	64.5	F	26.7	C	113.1	F
M-53 Entr Ramp to Mt Elliott St Exit Ramp	Basic	47.2	F	55.7	F	27.3	D	103.0	F
Mt Elliott St Exit Ramp	Ramp	46.1	F	54.8	F	26.2	C	105.1	F
Mt Elliott St Exit Ramp to Harper Ave Entr Ramp	Basic	50.4	F	62.8	F	26.4	D	118.2	F
Harper Ave Entr Ramp	Ramp	52.2	F	61.6	F	26.8	C	109.3	F
Harper Ave Entr Ramp to Chene St Entr Ramp	Basic	54.0	F	60.4	F	27.2	D	100.4	F
Chene St Entr Ramp to I-75 Exit Ramp	Weave	40.0	E	43.9	F	24.1	C	63.2	F
I-75 Exit Ramp to Beaubien St Exit Ramp	Basic	41.1	E	45.5	F	21.5	C	69.4	F
Beaubien St Exit Ramp	Ramp	32.7	D	30.6	D	21.3	C	61.9	F
Beaubien St Exit Ramp to I-75 Entr Ramp	Basic	29.5	D	26.1	D	20.5	C	69.4	F
I-75 Entr Ramp	Ramp	41.1	E	35.3	E	31.6	D	109.5	F
I-75 Entr Ramp to John R St Entr Ramp	Basic	46.5	F	38.3	E	41.7	E	120.0	F
John R St Entr Ramp to M-10 Exit Ramps	Ramp*	43.5	F	39.3	E	46.0	F	82.5	F
M-10 Exit Ramps to M-10 Entr Ramps	Basic	26.2	D	36.3	E	59.8	F	89.7	F
M-10 Entr Ramps	Ramp	24.5	C	29.7	D	68.1	F	79.2	F
Trumbull Ave Entr Ramp to Linwood St Exit Ramp	Ramp*	31.1	D	33.4	D	46.7	F	49.5	F
Linwood St Exit Ramp to I-96 Exit Ramp	Basic	34.9	D	36.7	E	50.6	F	52.5	F
I-96 Exit Ramp	Ramp	33.9	D	35.9	E	40.1	E	41.4	E
I-96 Exit Ramp to Grand River Ave Entr Ramp	Basic	21.1	C	23.1	C	21.6	C	23.5	C
Grand River Ave Entr Ramp	Ramp	21.6	C	23.6	C	22.5	C	24.4	C
I-96 Entr Ramp to Grand Blvd Exit Ramp	Weave	20.2	C	22.1	C	23.1	C	24.5	C
Northbound M10									
South of Forest Ave Exit Ramp	Basic	16.8	B	21.8	C	26.1	D	74.8	F
Forest Ave Exit Ramp	Ramp	17.3	B	22.4	C	26.8	C	77.6	F
Forest Ave Exit Ramp to Forest Ave Entr Ramp	Basic	13.6	B	18.2	C	23.5	C	81.1	F
Forest Ave Entr Ramp to I-94 S-E Exit Ramp	Weave	14.3	B	20.2	C	29.9	D	64.6	F
I-94 S-W Exit Ramp	Ramp	15.0	B	21.5	C	30.7	D	59.6	F
I-94 S-W Exit Ramp to I-94 E-N Entr Ramp	Basic	12.9	B	21.5	C	25.2	C	80.3	F
I-94 E-N Entr Ramp to I-94 W-N Entr Ramp	Basic	16.2	B	28.1	D	33.0	D	96.4	F
I-94 W-N Entr Ramp to Milwaukee Ave Exit Ramp	Weave	18.2	B	30.3	D	32.8	D	42.9	E
Milwaukee Ave Exit Ramp to Grand Blvd Entr Ramp	Basic	15.4	B	17.6	B	28.3	D	31.3	D
North of Grand Blvd Entr Ramp	Basic	13.5	B	15.7	B	27.4	D	27.4	D
Southbound M10									
North of Grand Blvd Exit Ramp	Basic	25.1	C	43.7	E	17.0	B	36.8	E
Grand Blvd Exit Ramp to Milwaukee Ave Entr Ramp	Basic	32.1	D	51.2	F	20.2	C	45.4	F
Milwaukee Ave Entr Ramp to I-94 N-W Exit Ramp	Weave	25.2	C	41.4	E	19.7	B	38.7	E
I-94 N-E Exit Ramp	Ramp	30.1	D	57.5	F	20.4	C	37.2	E
I-94 N-E Exit Ramp to I-94 Entr Ramps	Basic	27.1	D	45.4	F	16.6	B	32.5	D
I-94 Entr Ramps to Forest Ave Exit Ramp	Weave	30.7	D	40.1	E	17.6	B	30.6	D
Forest Ave Exit Ramp to Forest Ave Entr Ramp	Basic	26.5	D	31.2	D	16.7	B	25.9	C
Forest Ave Entr Ramp	Ramp	27.8	C	33.0	D	18.6	B	26.8	C
South of Forest Ave Entr Ramp	Basic	27.9	D	33.1	D	18.7	C	26.9	D
Northbound I-75									
South of Warren Ave Exit Ramp	Basic	15.1	B	27.2	D	18.2	C	40.3	E
Warren Ave Exit Ramp to I-94 Exit Ramps	Basic	20.7	C	30.3	D	23.9	C	36.5	E
I-94 Exit Ramps to Warren Ave Entr Ramp	Basic	20.9	C	27.4	D	25.6	C	37.4	E
Warren Ave Entr Ramp	Ramp	22.4	C	28.8	D	27.5	C	38.2	E
Warren Ave Entr Ramp to I-94 E-N Entr Ramp	Basic	22.2	C	28.7	D	29.3	D	41.5	E
I-94 E-N Entr Ramp to I-94 W-N Entr Ramp	Basic	24.0	C	30.1	D	29.4	D	38.9	E
I-94 W-N Entr Ramp to Clay St Exit Ramp	Ramp*	26.5	C	34.0	D	32.7	D	40.9	E
Clay St Exit Ramp to Clay St Entr Ramp	Basic	18.8	C	23.0	C	28.3	D	36.4	E
North of Clay St Entr Ramp	Basic	15.8	B	19.3	C	25.0	C	31.5	D
Southbound I-75									
North of Clay St Exit Ramp	Basic	30.3	D	35.2	E	20.7	C	72.3	F
Clay St Exit Ramp to Clay St Entr Ramp	Basic	36.6	E	39.6	E	27.3	D	107.2	F
Clay St Entr Ramp to I-94 Exit Ramps	Weave	41.0	E	43.2	F	38.1	E	65.1	F
I-94 Exit Ramps to Warren Ave Exit Ramp	Basic	39.0	E	39.1	E	24.2	C	14.8	B
Warren Ave Exit Ramp	Ramp	35.3	E	36.4	E	24.0	C	14.5	B
Warren Ave Exit Ramp to I-94 Entr Ramps	Basic	25.9	C	28.3	D	20.0	C	12.5	B
I-94 Entr Ramps to Warren Ave Entr Ramp	Basic	27.7	D	28.4	D	19.6	C	12.8	B
South of Warren Ave Entr Ramp	Basic	22.6	C	23.2	C	16.9	B	11.9	B

*Overlapping ramp segment
Source: Paramics

2.5 Crash Analysis

Crash data for 2011 through 2015 was obtained from the Transportation Improvement Association (TIA). The TIA is an independent organization focused on transportation safety in Michigan. The TIA houses traffic crash data for the state. Data was collected for the I-94 mainline, ramps, interchanges and approximately 500 feet past each interchange intersection on arterials.

2.5.1 Existing Conditions

The corridor was divided into 19 segments for analysis. Segments represent a change in the characteristics of the roadway, typically these breaks are at merge/diverge points along the mainline. Ramp terminals were analyzed separately, each with a 400-foot radius. Ramp terminals within 400-feet of each other were not overlapped.

Crashes were analyzed based on crash severity and collision type. Crash severity is categorized based on the level of injury during a crash. The state of Michigan uses five categories:

- K – Fatal Injury: An injury which results in death
- A – Incapacitating Injury: Any injury other than fatal which prevents normal activities and generally requires hospitalization
- B – Non-Incapacitating Injury: Any minor injury that is evident at the scene
- C – Possible Injury: Any possible injury that is reported or claimed
- O – No Injury: Also known as a Property Damage Only (PDO) Crash – No indication of injury

The state of Michigan considers the collision type to be the nature of the first impact in an incident. The classification system has 12 categories; however, within the corridor, only 9 categories are represented. Crash types within the corridor include angle, head-on, rear end, rear end – left turn, rear end – right turn, sideswipe – opposite direction, sideswipe – same direction, single motor vehicle, and other. Absent within the corridor are crashes classified as head-on – left turn, backing and unknown.

Mainline Analysis

Between 2011 and 2015, 4,247 incidents occurred along the I-94 mainline within the corridor. Of those incidents, twelve were fatal accounting for 0.25 percent of all crashes. But the data shows that fatal crashes have increased over the five-year period. Over 75 percent of all crashes within the five-year period were PDO crashes. The next highest percent was Injury C (19 percent), meaning possible injuries. **Table H** shows the breakdown in crashes by severity and year.

Table H - Existing Crash Severity by Year

	2011	2012	2013	2014	2015	Total
Fatal	1	1	3	3	4	12
Serious Injury	6	17	14	5	13	55
Minor Injury	35	37	30	34	34	170
Possible Injury	205	167	126	140	149	787
PDO	635	544	620	663	761	3,223
Total	882	766	793	845	961	4,247

Source: TIA

Crash types for the mainline were predominately classified as rear end, sideswipe – same direction, or single motor vehicle crashes. These crash types represent over 90 percent of all crashes within the five-year period. Rear end and sideswipe crashes are typically attributed to lower speed crashes in highly congested areas. Typical causes of single vehicle crashes are substandard roadway geometry (which is prevalent in the I-94 corridor), a vehicle losing control or a vehicle being run off the road. The year 2011 saw an abnormally high amount of angle crashes, which indicates that there may have been a variable that led to the increase, such as construction within the area. **Table I** shows the breakdown of crashes by type.

Table I - Existing Crash Types by Year

Crash Type	2011	2012	2013	2014	2015	Total
Angle	27	6	5	7	7	52
Head On	2	2	1	4	3	12
Rear End	360	308	358	341	463	1,830
Rear End - Left Turn	2	5	1	2	4	14
Rear End - Right Turn	0	1	3	3	3	10
Sideswipe - Opposite Direction	4	1	1	1	1	8
Sideswipe - Same Direction	184	195	199	211	222	1,011
Single Motor Vehicle	251	207	195	232	208	1,093
Other	52	41	30	44	50	217
Total	882	766	793	845	961	4,247

Source: TIA

Crash types for all K/A (Fatal and Incapacitating Injury) for the mainline were predominately single motor vehicle, rear end, or sideswipe – same direction. These crash types account for over 85% of all K/A crashes. No head-on crashes (or assumed wrong-way driving) resulted in K/A injuries. **Table J** shows the breakdown of crash types for K/A crashes along the mainline.

Table J: K/A Crashes on I-94

Crash Type	2011	2012	2013	2014	2015	Total
Angle	0	0	0	0	1	1
Head On	0	0	0	0	0	0
Rear End	3	2	5	2	5	17
Rear End - Left Turn	0	0	0	0	0	0
Rear End - Right Turn	0	0	0	0	0	0
Sideswipe - Opposite Direction	0	0	0	0	0	0
Sideswipe - Same Direction	0	2	5	2	4	13
Single Motor Vehicle	4	11	6	4	3	28
Other	0	3	1	0	4	8
Total	7	18	17	8	17	67

Source: TIA

The density of crashes and the location of high crash areas are important when determining areas to target improvements. Utilizing ArcGIS software, a crash density heat map was developed for the I-94 mainline. It shows high occurrences of crashes near the M-10, I-75 and Mt Elliott Street interchanges. Higher crash densities at the M-10 and I-75 system to system interchanges are expected given the high volume of vehicles. The high density at Mt Elliott Street might be attributed to the non-traditional interchange design at the location. The east facing ramps are at the beginning of a curve segment and the west facing ramps are disconnected. **Figure 17** shows the crash density.

Figure 17 - Existing Crash Density

Source: TIA, ArcGIS

Crash rates were calculated for each segment utilizing 2015 average daily traffic volumes and comparing them to the Michigan statewide average. Statewide averages were not available for the date range of the analysis. After consultation with MDOT it was decided to utilize 10-year averages from 2004 to 2013 as well as a location specific rates calculated using the Highway Safety Manual (HSM). **Table K** displays the statewide crash rates.

Table K: Statewide Crash Rates

Type	Source	Total Crash Rate (HMVMT)	Fatal Crash Rate (HMVMT)
Interstate Routes	2013 Michigan Traffic Crash Facts Report, 2004 to 2013 Average	119	0.4
6 Lane Freeway	2014 to 2016 MDOT HSM Analysis	80.134	0.301

Source: TIA

Table L displays the I-94 mainline crash rates for the study area corridor. When compared to the statewide crash rates found in **Table K**, all but one segment on I-94 have higher total crash rates than the statewide average and many have a higher fatal crash rate (highlighted in yellow). Several segments are rated more than triple the statewide average.

Table L: Mainline Crash Rates

Segment	Total Crashes (2011-2015)	Fatal Crashes (2011-2015)	Total Crash Rate (HMVMT)	Fatal Crash Rate (HMVMT)
I-94 Conner St Interchange	169	1	302.15	1.79
I-94 EB Diverge to Conner St	71	0	409.26	0.00
I-94 WB Ramp Merge from Conner St	87	0	219.40	0.00
French Rd Interchange	176	2	126.05	1.43
I-94 Gratiot Ave East Ramps to French Rd West Ramps	79	0	141.45	0.00
I-94 Hwy 3 Interchange	208	0	302.31	0.00
I-94 Hwy 3 to Van Dyke St	151	1	121.41	0.80
I-94 Van Dyke St Interchange	191	2	208.51	2.18
I-94 Van Dyke St to Mt Elliott St	324	2	188.26	1.16
I-94 Mt Elliott St to Grand Blvd E	427	1	268.29	0.63
I-94 Grand Blvd to St Aubin St	262	0	164.14	0.00
I-94 St Aubin St to I-75 East Ramp Gores	60	0	81.44	0.00
I-94 I-75 Interchange	444	0	296.30	0.00
I-94 I-75 West Ramps to Woodward Ave	381	0	314.31	0.00
I-94 Woodward Ave to Hwy 10 East Ramps	245	0	387.19	0.00
I-94 at Hwy 10 Interchange	401	1	337.85	0.84
I-94 Hwy 10 West Ramps to Trumbull St	183	0	247.15	0.00
I-94 Trumbull St to Linwood St	199	1	215.01	1.08
I-94 Linwood St to I-96 East Ramps	189	1	220.80	1.17

Source: TIA

Intersection Analysis

Fifteen intersections, all of which are ramp terminals within the study area, were analyzed as part of the safety analysis. A 400-foot radius from the center of each intersection was used as the boundary to collect crash data. Between 2011 and 2015, a total of 379 incidents occurred at the fifteen intersections. Of those incidents, two were fatal, accounting for 0.5 percent of all intersection crashes. Over 75 percent of all crashes over the five-year period were PDO crashes. The next closest severity type was Injury C, meaning possible injuries, with 16 percent of the total. **Table M** shows the breakdown of crash severity by year for intersections.

Table M: Intersection Crash Severity

Severity	2011	2012	2013	2014	2015	Total
Fatal	0	0	0	1	1	2
Serious Injury	2	2	1	0	2	7
Minor Injury	2	1	9	4	4	20
Possible Injury	9	10	15	15	13	62
PDO	60	42	65	56	65	288
Total	73	55	90	76	85	379

Source: TIA

Incidents at study intersections were predominately classified as rear end, angle and sideswipe – same direction. These types of crashes represent approximately 75 percent of all crashes within the five-year period. **Table N** shows the breakdown of crashes by type at all intersections.

Table N: Intersection Crash Type

Crash Type	2011	2012	2013	2014	2015	Total
Angle	7	14	15	28	20	84
Head On	3	2	1	1	0	7
Head On - Left Turn	1	1	2	3	4	11
Rear End	26	20	30	16	24	116
Rear End - Left Turn	0	0	0	0	2	2
Rear End - Right Turn	1	0	0	0	0	1
Sideswipe - Opposite Direction	5	1	2	0	2	10
Sideswipe - Same Direction	15	9	22	15	22	83
Single Motor Vehicle	9	2	10	10	5	36
Other	6	6	8	3	6	29
Total	73	55	90	76	85	379

Source: TIA

Four intersections experienced more than 30 crashes over the five-year period. These include the eastbound and westbound ramp terminals at Gratiot Avenue and Mt Elliott Street. These four intersections experienced 215 total crashes over the five-year period, of which 75 percent were rear end, sideswipe – same direction, or angle crashes. As would be expected, these are some of the highest volume arterials in the study area. The highest frequency of incidents was at the eastbound ramp terminal of Gratiot Avenue with 102 crashes over the five-year period. A breakdown of all intersection crashes is included in **Table O**.

Table O: Total Crashes by Intersection

Intersection	Total
Gratiot Ave EB Ramp Terminal	102
Mt Elliott St WB Off Ramp Terminal	45
Mt Elliott St EB On Ramp Terminal	35
Gratiot Ave WB Ramp Terminals	33
Grand River Ave WB On Ramp Terminal	23
Van Dyke Ave WB Ramp Terminals	23
Trumbull St EB Off Ramp Terminal	22
John R St EB Off Ramp Terminal	20
John R St WB On Ramp Terminal	16
Trumbull St WB On Ramp Terminal	15
Van Dyke Ave EB Ramp Terminals	14
French Rd EB Ramp Terminal	10
Linwood St WB Off Ramp Terminal	10
Linwood St EB On Ramp Terminal	7
French Rd WB On Ramp Terminal	4

Source: TIA

2.5.2 Future No-Build

A future predictive crash analysis was conducted using the Interactive Highway Safety Design Model (IHSDM) software developed by the Federal Highway Administration (FHWA) for future no-build and build scenarios. For the purposes of comprehension and comparison, the results of the No-Build are analyzed in detail in **Section 3.3 – Safety Analysis**.

2.6 Summary

Traffic operations were modeled using the year 2014 as the baseline (existing) condition. Operations in both the a.m. and p.m. peak periods show significant delay within the I-94 corridor. These conditions within the I-94 study area, if left unchanged, will severely worsen by the year 2040 with 95% of the corridor operating at a LOS E or F during the p.m. peak period.

The corridor experiences more total crashes per hundred million vehicle miles traveled than the statewide average. Enhancements to the corridor are necessary to improve operations and safety by 2040.

3.0 Policy Point 1: Build Alternative

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

3.1 Description of Build Alternative

The Build Alternative includes the following changes:

1. Adding continuous service drives and surface street intersections in parts of the corridor
2. An additional lane in each direction on I-94
3. Adding auxiliary lanes on I-94
4. Relocating or removing access points to I-94
5. Reconstruction of 15 interchanges on I-94, M-10 and I-75 including:
    a. I-94 / Linwood Avenue and M-5 (Grand River) *
    b. I-94 / 14th Street
    c. I-94 / Trumbull Avenue *
    d. I-94 / M-10
    e. I-94 / John R Street, Brush Street, Beaubien Street, and Hastings Street
    f. I-94 / I-75 *
    g. I-94 / Russell Street
    h. I-94 / Chene Street *
    i. I-94 / Mount Elliott Street
    j. I-94 / Van Dyke Avenue *
    k. I-94 / Gratiot Avenue
    l. I-94 / French Road
    m. I-94 / Conner Avenue
    n. M-10 / Forest Avenue and Calumet/Four Tops
    o. M-10 / Grand Boulevard and Milwaukee Avenue

    *Indicates no change in access

A comprehensive description of all the interchange improvements can be found in **Section 1.4.**

3.2 Peak Period Traffic Operations Analysis

Sections 3.2.1 and **3.2.2** describe the traffic operations for the Build Alternative. The calibrated Paramics models that were used to generate results in the existing and No-Build models were modified to match the roadway design of the Build Alternative for the year 2040.

3.2.1 A.M. Peak Period Operational Results

Exhibit 5 shows the a.m. Build Alternative operational performance of the I-94 corridor, plus surrounding intersections.

Mainline

Eleven percent of the I-94 analysis area performs at a LOS E. None of the I-94 corridor performs at a LOS F. This is an improvement from the No-Build where 51 percent of the I-94 analysis area performed at a LOS E or F. The improved performance compared to the No-Build is a result of the widening of I-94, plus the improvements made to the M-10 and I-75 interchanges. The areas that operate at a LOS E are listed in **Table P**.

The northern limit of southbound M-10 down to Grand Boulevard is the only segment that operates at a LOS F. The northern limit of I-75 southbound down to the I-94 exit-ramp operates at a LOS E. The operations on both southbound segments approaching I-94 are still better compared to the No-Build alternative where LOS E and F extend southward past the I-94 system-to-system interchanges (see **Exhibit 3**).

Table P: A.M. Build Alternative Segments on I-94 with LOS E or F

Segment	Direction	Length (Mi)	Percent of I-94 Study Area Corridor
Analysis area western edge to I-96 exit-ramp	EB	0.24	1.65%
Analysis area eastern edge to Barrett Avenue	WB	0.25	1.72%
Between the Connor Street access ramps	WB	0.16	1.10%
Between M-53 access ramps	WB	0.37	2.55%
Elliot Street exit-ramp to Grand Boulevard	WB	0.59	4.07%
Total of all segments	EB/WB	1.61	11.10%

Note: Analysis area is approximately 14.5 miles (7.25 miles one way). Lengths are an approximation.

Arterial Intersections

All intersections in the a.m. peak period operate at a LOS C or better. **Exhibit 5** displays one-way and two-way intersection operations for the cross streets of John R and Brush. **Section 1.4** also discusses how the City of Detroit has the option to convert the north-south local streets of John R and Brush, within the study area limits, from one-way to two-way. Regardless of which option is chosen, both options are expected to experience LOS A or B in 2040.

3.2.2 P.M. Peak Period Operational Results

Exhibit 6 shows the p.m. Build Alternative operational performance of the I-94 corridor, plus surrounding roadways and intersections.

Mainline

Ninety-five percent of the I-94 corridor operates at an acceptable LOS in the p.m. peak hour of the Build Alternative. The corridor is improved compared to the No-Build Alternative, which is forecasted to have over 95 percent of the corridor operate at a LOS E or F by 2040 (see **Exhibit 4**). **Table Q** shows which segments operate at LOS E or F in the build scenario. A half-mile section from the Conner Street exit-ramp to the eastern limits of the analysis area is the only eastbound segment with LOS E or F. This is due to a transition from four-lanes down to three on I-94. Westbound, LOS E is forecasted between the Linwood Street exit-ramp to the I-96 exit-ramp. The widening of I-94 plus the improvements made to the M-10 and I-75 system-to-system interchanges will minimize bottleneck areas, thus contributing to the improved performance of the corridor.

There are pockets of LOS E and F in the north and southbound directions of M-10 and I-75, but the level of congestion is less than what is projected in the No-Build Alternative. These improvements compared to the No-Build are the result of improved design at the system to system interchanges.

Table Q: P.M. Build Alternative Segments on I-94 with LOS E or F

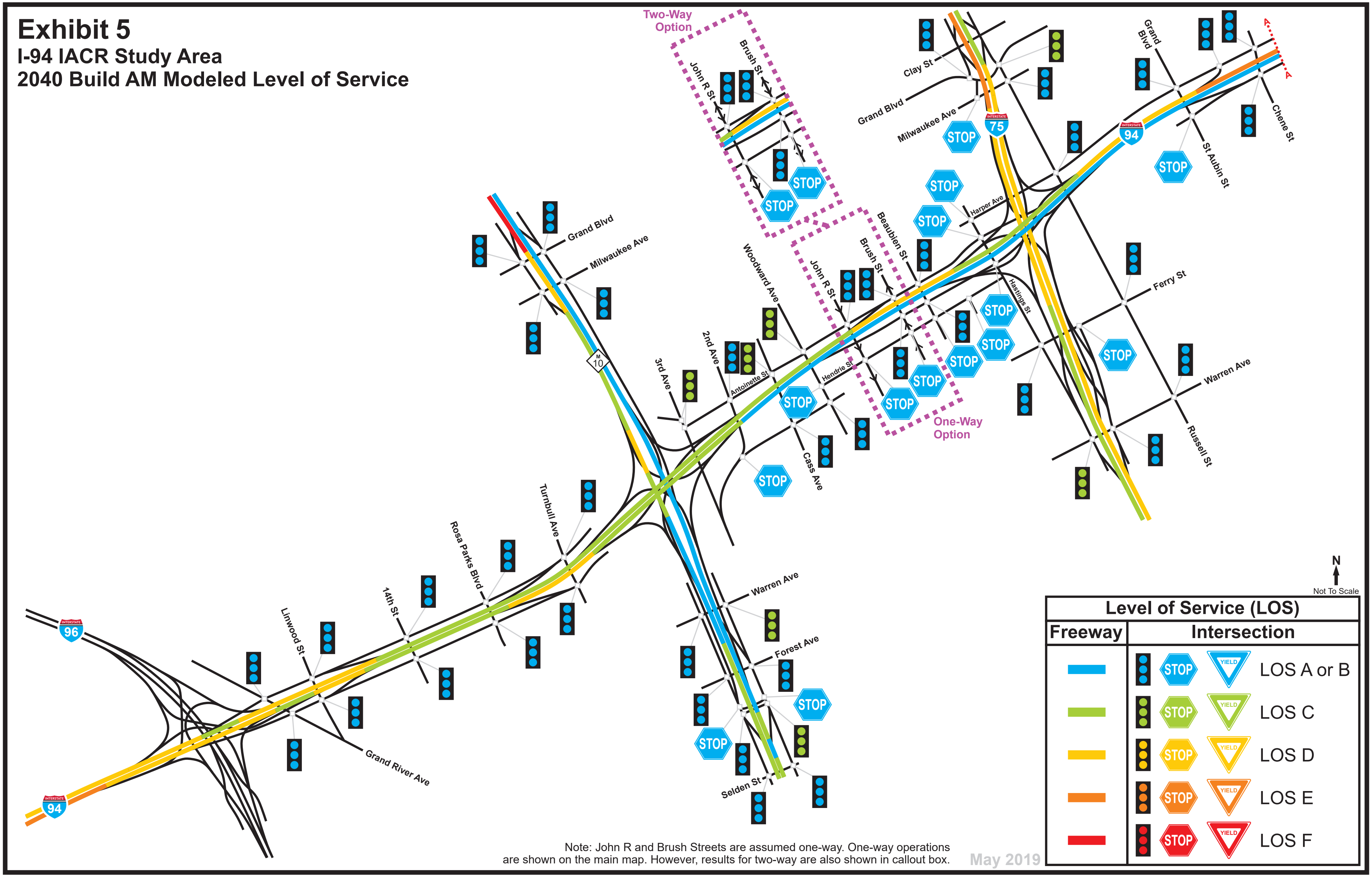
Segment	Direction	Length (Mi)	Percent of I-94 Study Area Corridor
Conner Street exit-ramp to analysis area eastern edge	EB	0.46	3.17%
Linwood Street exit-ramp to I-96 exit-ramp	WB	0.32	2.21%
Total of all segments	EB/WB	0.78	5.38%

Note: Analysis area is approximately 14.5 miles (7.25 miles one way). Lengths are an approximation.

Arterial Intersections

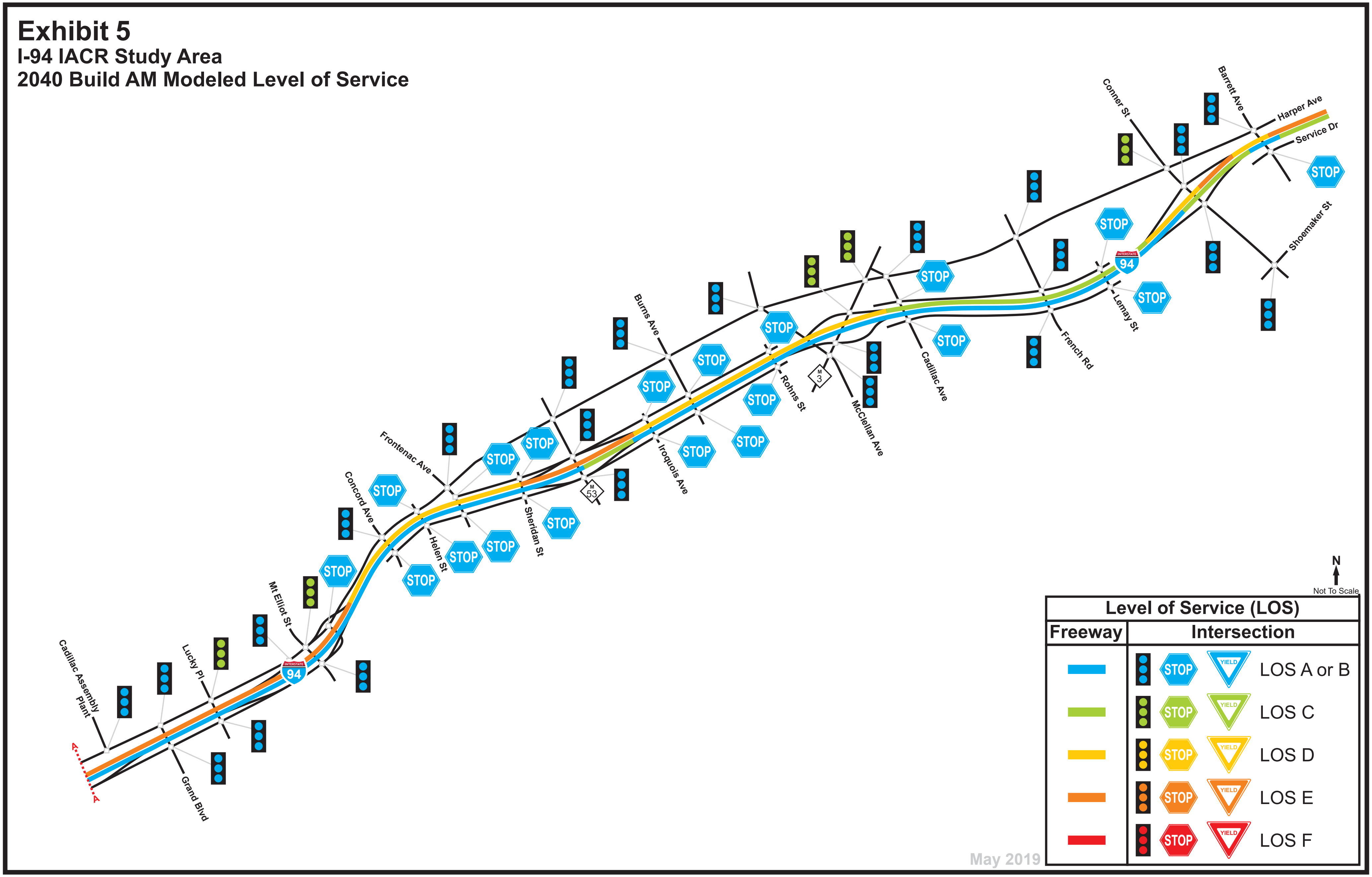
The only intersection forecasted to operate at LOS E is Harper Avenue at Edsel Ford Service Drive.

Exhibit 6 displays one-way and two-way intersection operations for the cross streets of John R and Brush. **Section 1.4** discusses how the City of Detroit has the option to convert the north-south local streets of John R and Brush, within the study area limits, from one-way to two-way. Regardless of which option is chosen, both options are expected to experience acceptable LOS in 2040.



Note: John R and Brush Streets are assumed one-way. One-way operations are shown on the main map. However, results for two-way are also shown in callout box.

Exhibit 5
I-94 IACR Study Area
2040 Build AM Modeled Level of Service



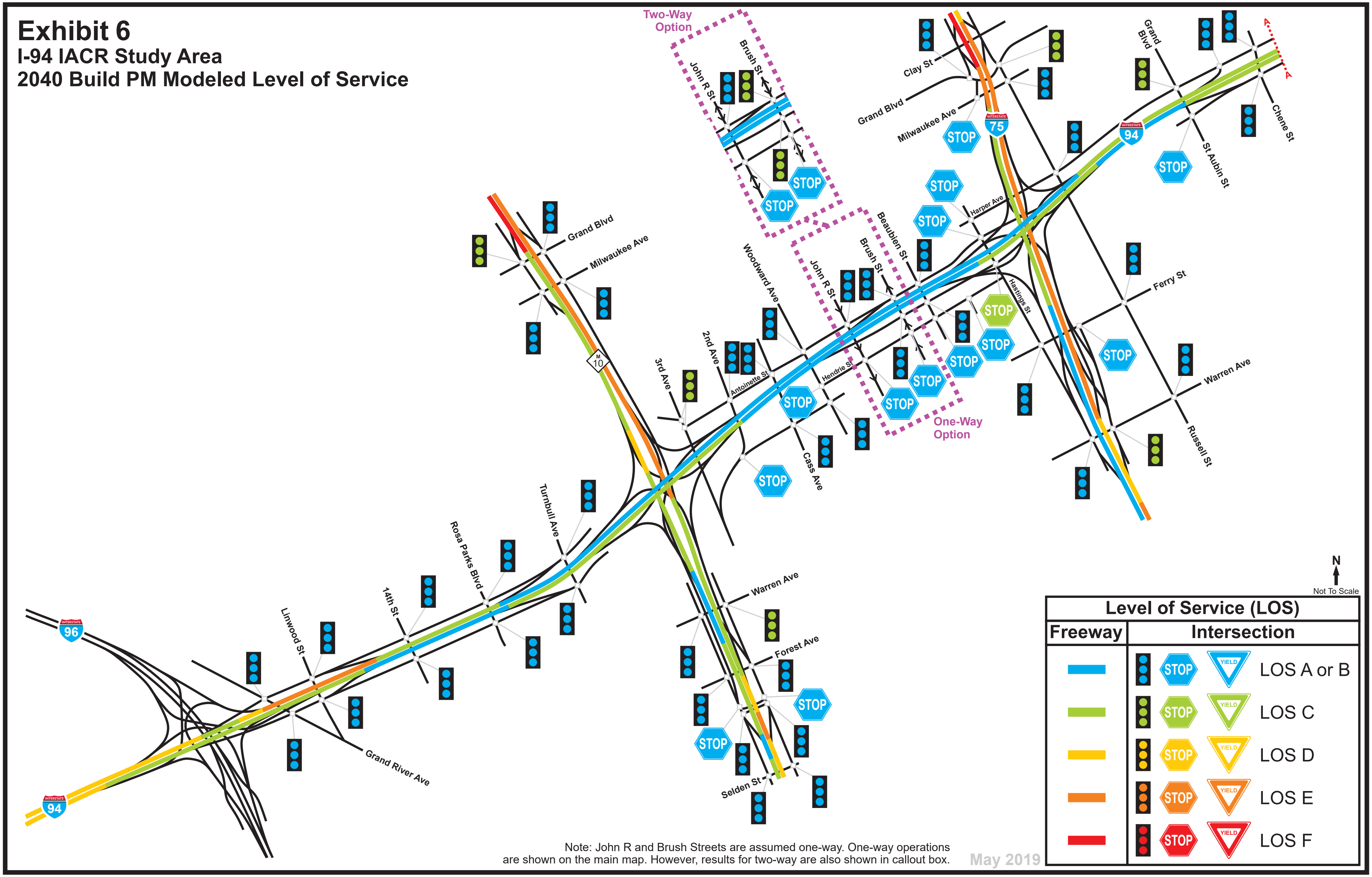


Exhibit 6
I-94 IACR Study Area
2040 Build PM Modeled Level of Service
Two-Way Option
One-Way Option
John R St
Brush St
Beaubien St
Woodward Ave
2nd Ave
3rd Ave
Antoinette St
Hendrie St
Cass Ave
Hastings St
Harper Ave
Clay St
Grand Blvd
Milwaukee Ave
Ferry St
Warren Ave
Russell St
St Aubin St
Chene St
Forest Ave
Selden St
Turnbull Ave
Rosa Parks Blvd
14th St
Linwood St
Grand River Ave
Level of Service (LOS)
Freeway
Intersection
LOS A or B
LOS C
LOS D
LOS E
LOS F
N
Not To Scale
Note: John R and Brush Streets are assumed one-way. One-way operations are shown on the main map. However, results for two-way are also shown in callout box.
May 2019

Exhibit 6
I-94 IACR Study Area
2040 Build PM Modeled Level of Service

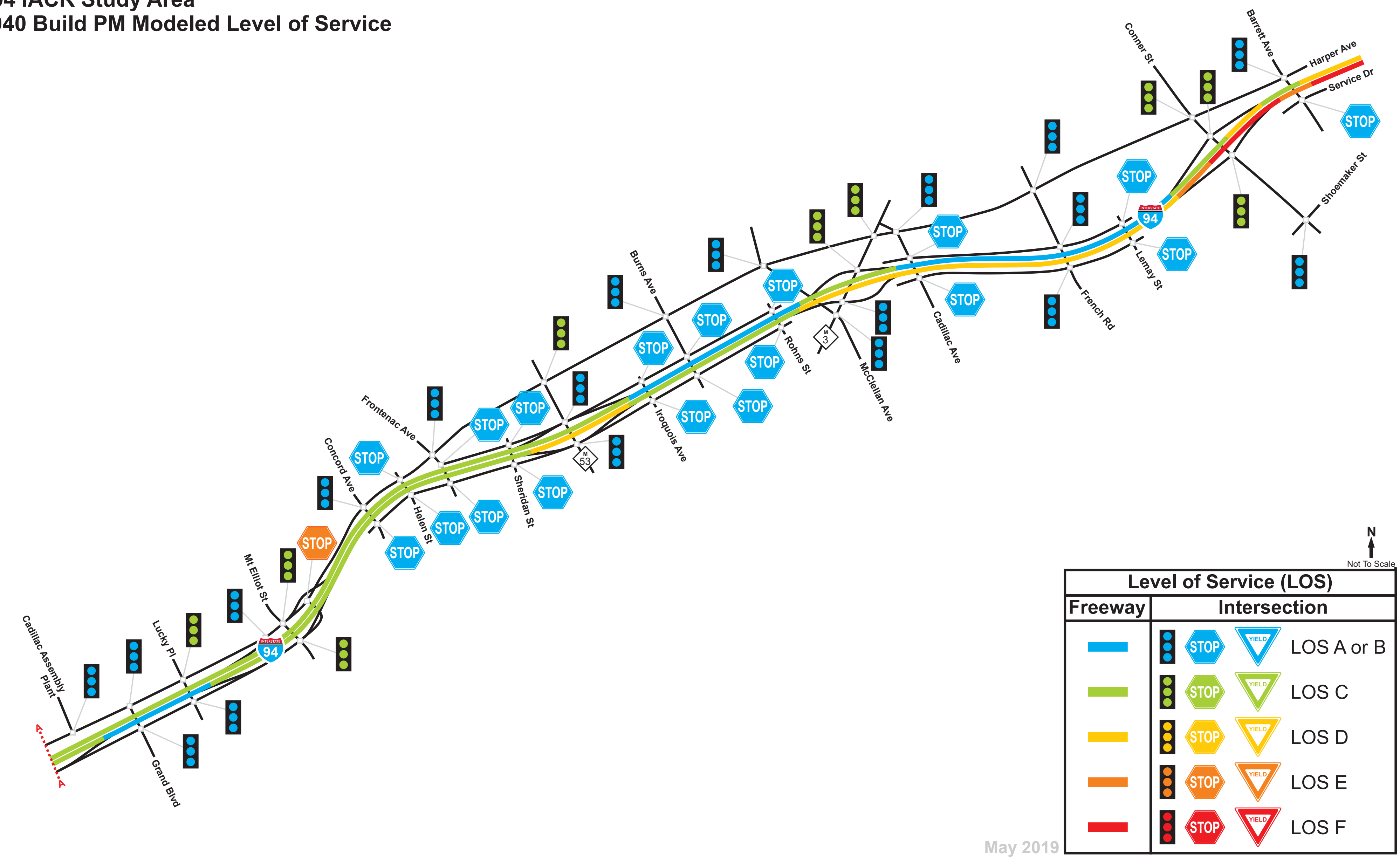


Table R: Build Alternative vs. No-Build Alternative LOS

No-Build Alternative						Build Alternative					
Segment	Segment Type	AM Peak Density (pc/mi/ln)	AM Peak LOS	PM Peak Density (pc/mi/ln)	PM Peak LOS	Segment	Segment Type	AM Peak Density (pc/mi/ln)	AM Peak LOS	PM Peak Density (pc/mi/ln)	PM Peak LOS
Eastbound I-94											
Grand Blvd Entr Ramp to I-96 Exit Ramp	Weave	69.5	F	71.0	F	Grand Blvd Entr Ramp to I-96 Exit Ramp	Weave	36.3	E	35.0	D
Grand River Ave Exit Ramp	Ramp	82.4	F	88.4	F	Grand River Ave Exit Ramp	Ramp	29.8	D	26.7	C
Grand River Ave Exit Ramp to I-96 S-E Entr Ramp	Basic	125.5	F	124.6	F	Grand River Ave Exit Ramp to I-96 S-E Entr Ramp	Basic	29.6	D	25.3	C
I-96 S-E Entr Ramp	Ramp	114.9	F	127.0	F	I-96 S-E Entr Ramp to I-96 N-E Entr Ramp	Basic	25.8	C	20.2	C
I-94 N-E Entr Ramp	Ramp	67.5	F	85.1	F	I-96 N-E Entr Ramp to Linwood St Entr Ramp	Basic	28.1	D	20.4	C
Linwood St Entr Ramp	Ramp	51.9	F	82.5	F	Linwood St Entr Ramp to Trumbull Ave Exit Ramp	Weave	24.6	C	17.0	B
14th St Entr Ramp to Trumbull Ave Exit Ramp	Weave	25.4	C	56.5	F	Trumbull Ave Exit Ramp to M-10 Exit Ramps	Basic	26.8	D	18.5	C
M-10 Exit Ramps	Ramp	28.6	D	83.6	F	M-10 Exit Ramps to M-10 Entr Ramps	Basic	21.4	C	19.4	C
M-10 Exit Ramps to M-10 Entr Ramps	Basic	24.7	C	69.4	F	M-10 Entr Ramps to Brush St Exit Ramp	Weave	16.3	B	15.2	B
M-10 Entr Ramps to John R St Exit Ramp	Ramp*	44.6	F	59.2	F	Brush St Exit Ramp to I-75 Exit Ramps	Basic	15.9	B	13.7	B
John R St Exit Ramp to I-75 Exit Ramp	Basic	31.2	D	62.0	F	I-75 Exit Ramps to Lane Merge	Basic	11.6	B	13.2	B
I-75 Exit Ramp	Ramp	30.3	D	98.4	F	Lane Merge to Hastings St Entr Ramp	Basic	13.9	B	21.6	C
I-75 Exit Ramp to Beaubien St Entr Ramp	Basic	17.3	B	81.6	F	Hastings St Entr Ramp	Ramp	14.9	B	23.9	C
Beaubien St Entr Ramp to Russell St Exit Ramp	Weave	14.3	B	71.3	F	I-75 Entr Ramps to Chene St Exit Ramp	Weave	13.7	B	19.3	B
Russell St Exit Ramp to I-75 Entr Ramp	Basic	17.4	B	72.9	F	Chene St Exit Ramp to Chene St Entr Ramp	Basic	16.3	B	20.1	C
I-75 Entr Ramp to Chene St Exit Ramp	Weave	18.1	B	35.4	E	Chene St Entr Ramp to Mt Elliott St Exit Ramp	Weave	14.0	B	18.9	B
Chene St Exit Ramp to Chene St Entr Ramp	Basic	23.7	C	71.3	F	Mt Elliott St Exit Ramp to Mt Elliott St Entr Ramp	Basic	16.4	B	22.8	C
Chene St Entr Ramp to Mt Elliott St Exit Ramp	Weave	21.2	C	72.2	F	Mt Elliott St Entr Ramp to M-53 Exit Ramp	Weave	13.5	B	20.3	C
Mt Elliott St Exit Ramp to Mt Elliott St Entr Ramp	Basic	29.4	D	53.3	F	M-53 Exit Ramp to Lane Merge	Basic	15.6	B	30.0	D
Mt Elliott St Entr Ramp	Ramp	25.2	C	46.6	F	Lane Merge to M-53 Entr Ramp	Basic	19.4	C	28.2	D
Mt Elliott St Entr Ramp to M-53 Exit Ramp	Basic	28.1	D	52.4	F	M-53 Entr Ramp to Gratiot St Exit Ramp	Weave	15.8	B	23.6	C
M-53 Exit Ramp	Ramp	37.8	E	69.5	F	Gratiot St Exit Ramp to Gratiot St Entr Ramp	Basic	16.9	B	28.3	D
M-53 Exit Ramp to M-53 Entr Ramp	Basic	29.5	D	42.7	E	Gratiot St Entr Ramp to Conner St Exit Ramp	Weave	13.9	B	29.8	D
M-53 Entr Ramp to Gratiot Ave Exit Ramp	Ramp*	23.1	C	38.5	E	Conner St Exit Ramp to Lane Merge	Basic	15.8	B	37.8	E
Gratiot Ave Exit Ramp To Gratiot Ave Entr Ramp	Basic	21.1	C	56.0	F	Lane Merge to Conner St Entr Ramp	Basic	20.8	C	52.1	F
Gratiot Ave Entr Ramp to French Rd Exit Ramp	Ramp*	18.7	B	42.8	E	Conner St Entr Ramp	Ramp	16.2	B	40.9	E
French Rd Exit Ramp to French Rd Entr Ramp	Basic	23.0	C	52.3	F	East of Conner St Entr Ramp	Basic	22.5	C	50.9	F
French Rd Entr Ramp to Conner St Exit Ramp	Ramp*	21.0	C	53.0	F						
Conner St Exit Ramp to Conner St Entr Ramp	Basic	19.4	C	68.6	F						
Conner St Entr Ramp	Ramp	19.6	B	34.1	D						
East of Conner St Entr Ramp	Basic	20.2	C	37.4	E						
Westbound I-94											
East of Conner St Exit Ramp	Basic	79.7	F	125.6	F	East of Conner St Exit Ramp	Basic	43.2	E	30.9	D
Conner St Exit Ramp	Ramp	85.2	F	130.6	F	Conner St Exit Ramp	Ramp	34.0	D	24.3	C
Conner St Exit Ramp to Conner St Entr Ramp	Basic	95.2	F	136.9	F	Conner St Exit Ramp to Lane Add	Basic	39.3	E	27.2	D
NB & SB Conner St Entr Ramps	Ramp	74.3	F	125.2	F	Lane Add to Conner St Entr Ramp	Basic	31.1	D	21.0	C
SB Conner St Entr Ramp to French Rd Entr Ramp	Basic	53.5	F	113.5	F	Conner St Entr Ramp to Gratiot St Exit Ramp	Weave	25.1	C	16.3	B
French Rd Entr Ramp to Gratiot Ave Exit Ramp	Ramp*	62.5	F	121.8	F	Gratiot St Exit Ramp to Gratiot St Entr Ramp	Basic	32.7	D	20.5	C
Gratiot Ave Exit Ramp to Gratiot Ave Entr Ramp	Basic	61.5	F	115.2	F	Gratiot St Entr Ramp to M-53 Exit Ramp	Weave	32.5	D	19.9	B
Gratiot Ave Entr Ramp to M-53 Exit Ramp	Ramp*	60.4	F	108.6	F	M-53 Exit Ramp to M-53 Entr Ramp	Basic	41.1	E	24.5	C
M-53 Exit Ramp to M-53 Entr Ramp	Basic	73.2	F	123.1	F	M-53 Entr Ramp to Mt Elliott St Exit Ramp	Weave	34.1	D	20.5	C
M-53 Entr Ramp	Ramp	64.5	F	113.1	F	Mt Elliott St Exit Ramp to Mt Elliott St Entr Ramp	Basic	44.1	E	24.4	C
M-53 Entr Ramp to Mt Elliott St Exit Ramp	Basic	55.7	F	103.0	F	Mt Elliott St Entr Ramp	Ramp	38.2	E	24.4	C
Mt Elliott St Exit Ramp	Ramp	54.8	F	105.1	F	Mt Elliott St Entr Ramp to Chene St Entr Ramp	Basic	43.0	E	25.7	C
Mt Elliott St Exit Ramp to Harper Ave Entr Ramp	Basic	62.8	F	118.2	F	Chene St Entr Ramp to I-75 Exit Ramps	Weave	28.7	D	21.5	C
Harper Ave Entr Ramp	Ramp	61.6	F	109.3	F	Hastings St Exit Ramp	Ramp	27.3	C	18.3	B
Harper Ave Entr Ramp to Chene St Entr Ramp	Basic	60.4	F	100.4	F	Hastings St Exit Ramp to I-75 Entr Ramps	Basic	24.7	C	16.1	B
Chene St Entr Ramp to I-75 Exit Ramp	Weave	43.9	F	63.2	F	I-75 Entr Ramps	Ramp	30.5	D	14.3	B
I-75 Exit Ramp to Beaubien St Exit Ramp	Basic	45.5	F	69.4	F	Brush St Entr Ramp to M-10 Exit Ramps	Weave	26.4	C	18.7	B
Beaubien St Exit Ramp	Ramp	30.6	D	61.9	F	M-10 Exit Ramps to M-10 Entr Ramps	Basic	24.3	C	17.8	B
Beaubien St Exit Ramp to I-75 Entr Ramp	Basic	26.1	D	69.4	F	M-10 Entr Ramps	Ramp	23.5	C	19.3	B
I-75 Entr Ramp	Ramp	35.3	E	109.5	F	Trumbull Ave Entr Ramp to Linwood St Exit Ramp	Weave	22.2	C	23.2	C
I-75 Entr Ramp to John R St Entr Ramp	Basic	38.3	E	120.0	F	Linwood St Exit Ramp to I-96 Exit Ramps	Basic	34.2	D	35.3	E
John R St Entr Ramp to M-10 Exit Ramps	Ramp*	39.3	E	82.5	F	I-96 Exit Ramps to Lane Merge	Basic	27.6	D	33.5	D
M-10 Exit Ramps to M-10 Entr Ramps	Basic	36.3	E	89.7	F	Lane Merge to Grand River Ave Entr Ramp	Basic	21.8	C	23.7	C
M-10 Entr Ramps	Ramp	29.7	D	79.2	F	Grand River Ave Entr Ramp	Ramp	30.2	D	32.6	D
Trumbull Ave Entr Ramp to Linwood St Exit Ramp	Ramp*	33.4	D	49.5	F	I-96 Entr Ramp to Grand Blvd Exit Ramp	Weave	29.4	D	30.9	D
Linwood St Exit Ramp to I-96 Exit Ramp	Basic	36.7	E	52.5	F						
I-96 Exit Ramp	Ramp	35.9	E	41.4	E						
I-96 Exit Ramp to Grand River Ave Entr Ramp	Basic	23.1	C	23.5	C						
Grand River Ave Entr Ramp	Ramp	23.6	C	24.4	C						
I-96 Entr Ramp to Grand Blvd Exit Ramp	Weave	22.1	C	24.5	C						
Northbound M10											
South of Forest Ave Exit Ramp	Basic	21.8	C	74.8	F	South of Forest Ave Exit Ramp	Basic	21.3	C	34.1	D
Forest Ave Exit Ramp	Ramp	22.4	C	77.6	F	Forest Ave Exit Ramp	Ramp	17.6	B	30.1	D
Forest Ave Exit Ramp to Forest Ave Entr Ramp	Basic	18.2	C	81.1	F	Forest Ave Exit Ramp to I-94 Exit Ramps	Basic	19.0	C	37.4	E
Forest Ave Entr Ramp to I-94 S-E Exit Ramp	Weave	20.2	C	64.6	F	I-94 Exit Ramps	Ramp	16.9	B	29.4	D
I-94 S-W Exit Ramp	Ramp	21.5	C	59.6	F	I-94 Exit Ramps to Forest Ave Entr Ramp	Basic	14.0	B	21.8	C
I-94 S-W Exit Ramp to I-94 E-N Entr Ramp	Basic	21.5	C	80.3	F	Forest Ave Entr Ramp to Milwaukee Ave Exit Ramp	Weave	12.7	B	25.2	C
I-94 E-N Entr Ramp to I-94 W-N Entr Ramp	Basic	28.1	D	96.4	F	Milwaukee Ave Exit Ramp to I-94 Entr Ramps	Basic	10.5	A	43.1	E
I-94 W-N Entr Ramp to Milwaukee Ave Exit Ramp	Weave	30.3	D	42.9	E	I-94 Entr Ramps	Ramp	11.9	B	41.4	E
Milwaukee Ave Exit Ramp to Grand Blvd Entr Ramp	Basic	17.6	B	31.3	D	I-94 Entr Ramps to Grand Blvd Entr Ramp	Basic	15.1	B	36.0	E
North of Grand Blvd Entr Ramp	Basic	15.7	B	27.4	D	North of Grand Blvd Entr Ramp	Basic	15.2	B	35.3	E
Southbound M10											
North of Grand Blvd Exit Ramp	Basic	43.7	E	36.8	E	North of Grand Blvd Exit Ramp	Basic	46.1	F	51.9	F
Grand Blvd Exit Ramp to Milwaukee Ave Entr Ramp	Basic	51.2	F	45.4	F	Grand Blvd Exit Ramp to Lane Add	Basic	48.2	F	51.7	F
Milwaukee Ave Entr Ramp to I-94 N-W Exit Ramp	Weave	41.4	E	38.7	E	Lane Add to Milwaukee Ave Entr Ramp	Basic	27.1	D	24.7	C
I-94 N-E Exit Ramp	Ramp	57.5	F	37.2	E	Milwaukee Ave Entr Ramp to I-94 Exit Ramps	Weave	23.4	C	24.0	C
I-94 N-E Exit Ramp to I-94 Entr Ramps	Basic	45.4	F	32.5	D	I-94 Exit Ramps to Forest Ave Exit Ramp	Basic	30.5	D	29.2	D
I-94 Entr Ramps to Forest Ave Exit Ramp	Weave	40.1	E	30.6	D	Forest Ave Exit Ramp	Ramp	23.0	C	22.5	C
Forest Ave Exit Ramp to Forest Ave Entr Ramp	Basic	31.2	D	25.9	C	Forest Ave Exit Ramp to I-94 Entr Ramps	Basic	17.2	B	20.9	C
Forest Ave Entr Ramp	Ramp	33.0	D	26.8	C	I-94 Entr Ramps	Ramp	17.8	B	16.1	B
South of Forest Ave Entr Ramp	Basic	33.1	D	26.9	D	I-94 Entr Ramps to Forest Ave Entr Ramp	Basic	22.2	C	20.4	C
						Forest Ave Entr Ramp	Ramp	21.8	C	19.7	B
						South of Forest Ave Entr Ramp	Basic	22.8	C	20.7	C
Northbound I-75											
South of Warren Ave Exit Ramp	Basic	27.2	D	40.3	E	South of Warren Ave Exit Ramp	Basic	26.2	D	36.7	E
Warren Ave Exit Ramp to I-94 Exit Ramps	Basic	30.3	D	36.5	E	Warren Ave Exit Ramp to I-94 Exit Ramps	Basic	30.1	D	34.3	D
I-94 Exit Ramps to Warren Ave Entr Ramp	Basic	27.4	D	37.4	E	I-94 Exit Ramps to Warren Ave Entr Ramp	Basic	27.4	D	32.2	D
Warren Ave Entr Ramp	Ramp	28.8	D	38.2	E	Warren Ave Entr Ramp	Ramp	28.9	D	39.1	E
Warren Ave Entr Ramp to I-94 E-N Entr Ramp	Basic	28.7	D	41.5	E	Warren Ave Entr Ramp to I-94 Entr Ramps	Basic	30.9	D	41.8	E
I-94 E-N Entr Ramp to I-94 W-N Entr Ramp	Basic	30.1	D	38.9	E	I-94 Entr Ramps to Clay St Exit Ramp	Weave	28.4	D	37.3	E
I-94 W-N Entr Ramp to Clay St Exit Ramp	Ramp*	34.0	D	40.9	E	Clay St Exit Ramp to Clay St Entr Ramp	Basic	25.1	C	39.1	E
Clay St Exit Ramp to Clay St Entr Ramp	Basic	23.0	C	36.4	E	North of Clay St Entr Ramp	Basic	20.9	C	33.0	D
North of Clay St Entr Ramp	Basic	19.3	C	31.5	D						
Southbound I-75											
North of Clay St Exit Ramp	Basic	35.2	E	72.3	F	North of Clay St Exit Ramp	Basic	39.7	E	64.3	F
Clay St Exit Ramp to Clay St Entr Ramp	Basic	39.6	E	107.2	F	Clay St Exit Ramp to Clay St Entr Ramp	Basic	44.2	E	66.3	F
Clay St Entr Ramp to I-94 Exit Ramps	Weave	43.2	F	65.1	F	Clay St Entr Ramp to I-94 Exit Ramps	Weave	42.8	E	41.5	E
I-94 Exit Ramps to Warren Ave Exit Ramp	Basic	39.1	E	14.8	B	I-94 Exit Ramps to Warren Ave Exit Ramp	Basic	30.0	D	20.2	C
Warren Ave Exit Ramp	Ramp	36.4	E	14.5	B	Warren Ave Exit Ramp	Ramp	25.8	C	17.5	B
Warren Ave Exit Ramp to I-94 Entr Ramps	Basic	28.3	D	12.5	B	Warren Ave Exit Ramp to I-94 Entr Ramps	Basic	20.3	C	16.0	B
I-94 Entr Ramps to Warren Ave Entr Ramp	Basic	28.4	D	12.8	B	I-94 Entr Ramps to Warren Ave Entr Ramp	Basic	25.1	C	17.9	B
South of Warren Ave Entr Ramp	Basic	23.2	C	11.9	B	South of Warren Ave Entr Ramp	Basic	20.5	C	16.0	B

*Overlapping ramp segment

Source: Paramics

3.3 Safety Analysis

A predictive crash analysis was conducted using the Interactive Highway Safety Design Model (IHSDM) software developed by the Federal Highway Administration (FHWA) for the 2040 no-build and build scenarios. A No-Build scenario was considered to establish a baseline for comparison to the Build Alternative. The IHSDM utilizes methodology from the Highway Safety Manual (HSM) to predict crashes based on roadway geometry, characteristics and traffic volumes.

Overall Crashes

Table S shows the predicted crashes per year for the entire study area. The crash types are broken down into two categories: Fatal + Injury (which includes K – Fatal, A – Incapacitating Injury, B – Non-Incapacitating Injury, and C – Possible Injury) and property damage only (PDO) (which includes O – No Injury). Overall, the Build Alternative is estimated to reduce the total crashes by 16 percent per year compared to the No-Build. Injury crashes, including those that are fatal, are forecasted to reduce by eight percent per year and PDO crashes will reduce by 19 percent.

Table S: Predicted Crashes Per Year - No-Build and Build Alternative

Model	Total	Injury + Fatal	Property Damage Only
No-Build	1028.10	296.57	731.00
Build Alternative	861.96	271.75	588.72
Difference	**-166.14**	**-24.82**	**-142.28**
Percent Change	**-16.16%**	**-8.37%**	**-19.46%**

Source: IHSDM
Note: Totals do not add up exactly per IHSDM methodology

Mainline Crashes

Table T shows the predicted crashes for No-Build and Build Alternatives on freeway segments. The total crashes on the mainline of I-94 are predicted to be reduced by 16.86 percent in the Build Alternative compared to the No-Build. The M-10 mainline is expected to have over an eleven percent reduction in crashes compared to the No-Build. On I-75, the total crashes are expected to be reduced by 14.84 percent in the Build Alternative. The overall reduction in crashes is primarily due to the removal of some access ramps to the freeway and the lengthening of other ramp acceleration and deceleration lanes. Even though the French Road interchange is removed, the increase in crashes on I-94 from Gratiot to the Eastern Limit is due to three factors: higher traffic volumes, the through-lane drop in the eastbound direction to tie back into existing three through-lanes, and the relocation of the westbound Gratiot off-ramp from the Mt Elliott to Gratiot segment into this Gratiot to Eastern Limit segment. The crash increase on I-75 from I-94 to the Northern Limit is due to a reconfiguration of the ramps from I-94 to northbound I-75.

Table T: Predicted Highway Crashes Per Year - No-Build and Build Alternative

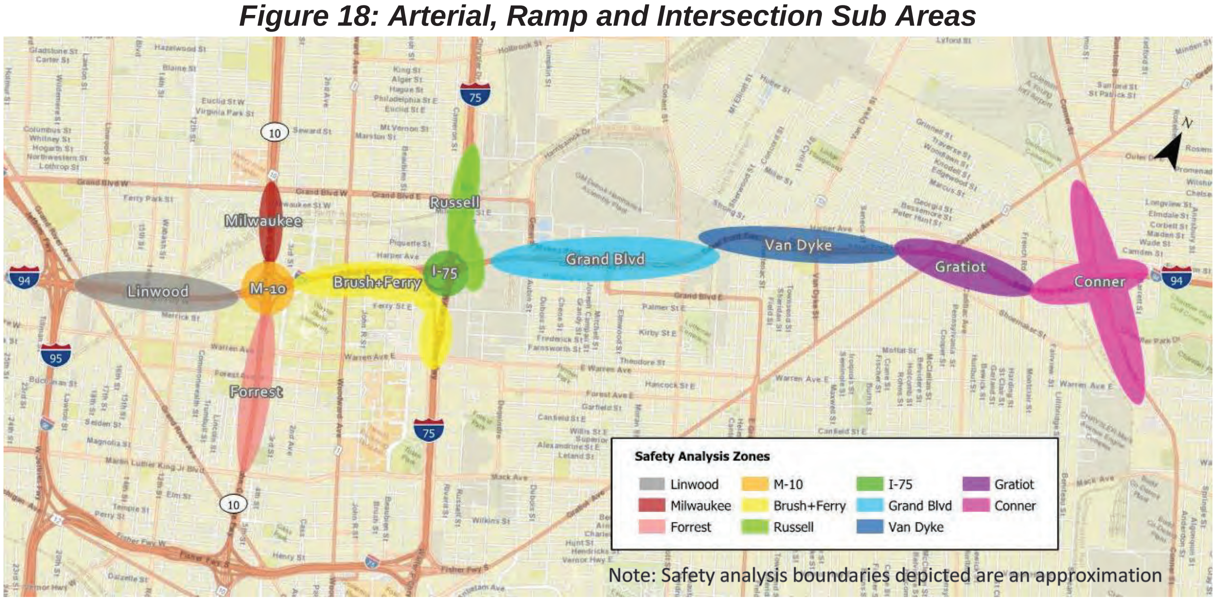
HWY	Segment	No-Build	Build	Difference	Percent Change
I-94	Western Limit to M-10	59.93	40.35	-19.58	-32.68%
	M-10 to I-75	49.04	25.23	-23.81	-48.55%
	I-75 to Mt Elliott	65.70	51.34	-14.36	-21.85%
	Mt Elliott to Gratiot	70.54	61.88	-8.66	-12.27%
	Gratiot to Eastern Limit	51.79	68.11	16.33	31.53%
	Totals:	296.99	246.91	-50.08	-16.86%
M-10	Southern Limit to I-94	30.75	25.48	-5.27	-17.14%
	I-94 to Northern Limit	18.15	17.89	-0.26	-1.42%
	Totals:	48.90	43.38	-5.53	-11.31%
I-75	Southern Limit to I-94	32.03	18.23	-13.80	-43.07%
	I-94 to Northern Limit	33.73	37.77	4.04	11.98%
	Totals:	65.76	56.00	-9.76	-14.84%

Source: IHSDM

Arterials, Ramp and Intersection Crashes

To better analyze the impact of changes under the Build Alternative, the study area was divided into eleven subareas. **Figure 18** shows the limits to all eleven subareas. These subareas are made up of arterial roadways, ramps and intersections only. Overall, the total number of non-mainline crashes is reduced by over 14 percent in the Build Alternative compared to the No-Build. Fatal injury crashes are expected to reduce by seven percent. Property damage only crashes are predicted to be reduced by 17 percent, as shown in **Table U**. The reduction in crashes is primarily due to the removal or simplification of interchanges and ramp terminals.

Figure 18: Arterial, Ramp and Intersection Sub Areas



Source: HNTB

Although the overall crashes in the corridor is expected to be reduced, there are four subareas that are expected to have an increase in crashes of greater than one per year. These areas are at Van Dyke, Linwood, M-10 and Brush+Ferry. All these areas are expected to add traffic, which increases the propensity for crashes. Also, whenever there are additional roadway and intersections constructed, like in the case of the Brush+Ferry and Van Dyke subareas, the potential for incidents increases. **Table U** shows the predicted arterial, ramp and intersection crashes.

Table U: Arterial, Ramp and Intersection Crashes

	Total Crashes			Fatal Injury Crashes			Property-Damage Only Crashes		
	FNB	**Build**	**Change**	**FNB**	**Build**	**Change**	**FNB**	**Build**	**Change**
Linwood	23.89	39.79	15.90	6.82	12.16	5.34	17.06	27.64	10.58
Milwaukee	22.66	15.99	-6.67	5.54	4.07	-1.47	17.11	11.92	-5.19
Forrest	93.20	65.87	-27.33	25.28	17.26	-8.02	67.93	48.59	-19.34
M-10	7.91	16.00	8.09	3.17	6.16	2.99	4.71	9.86	5.15
Brush+Ferry	122.85	135.42	12.57	33.45	37.30	3.85	89.38	98.14	8.76
Russell	3.00	0.74	-2.26	1.57	0.26	-1.31	1.41	0.46	-0.95
I-75	28.14	28.08	-0.06	11.24	10.70	-0.54	16.88	17.38	0.50
Grand Blvd	83.10	61.75	-21.35	21.67	18.47	-3.20	61.38	43.31	-18.07
Van Dyke	24.41	28.69	4.28	6.32	7.92	1.60	18.07	20.78	2.71
Gratiot	151.51	73.70	-77.81	56.57	35.29	-21.28	94.93	38.41	-56.52
Conner	55.78	49.64	-6.14	16.37	20.81	4.44	39.43	28.81	-10.62
Total	616.45	515.67	-100.78	188.00	170.40	-17.60	428.29	345.30	-82.99

Source: IHSDM

Brush and John R. Street One-Way vs. Two Way

Previously mentioned in **Sections 1.4 and 3.2**, this IACR assumes that the local streets of Brush and John R. will remain one-way after construction is complete. The Build Alternative's design does not preclude the two streets from becoming two-way within the study area limits. The safety results, shown above, reflect the one-way assumption on both streets. However, additional analysis was conducted to show safety performance if John R and Brush were converted to two-way. **Table V** shows the predicted safety performance of the surrounding local street and ramp network between the one-way and two-way options. The two-way option is shown to have slightly more crashes, which would be expected because of the potential for head-on collisions and more crossing conflicts of left-turning vehicles. It is important to note that the predicted crashes in **Table V** do not reflect crashes on Brush and John R only. The crashes reflect both streets, plus the surrounding local and ramp network contained within its subarea (see **Figure 18**). The analysis boundaries are consistent between both options.

Table V: One-Way vs. Two-Way Brush and John R

Total Crashes			Fatal Injury Crashes			Property-Damage Only Crashes		
One-Way	Two-Way	Difference	One-Way	Two-Way	Difference	One-Way	Two-Way	Difference
135.42	138.1	2.68	37.3	37.55	0.25	98.14	100.57	2.43

3.4 Conceptual Sign Plan and Pavement Markings

A conceptual sign plan with pavement markings can be found in **Appendix D**. It is anticipated that the build alternative can be sufficiently signed.

3.5 Summary

Upgrading interchanges, reconfiguring ramps and improving the local streets surrounding I-94 will benefit the corridor in terms of operations and safety by the year 2040. The results of the Build Alternative's operational analysis revealed improved levels of service on the I-94 corridor compared to the No-Build Alternative. The Build Alternative is expected to reduce the total number of crashes, including fatal/injury and PDO, compared to the No-Build Alternative.

4.0 Policy Point 2: Access, Movements and Design Standards

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

4.1 Traffic Movements

All new interchange configurations that are constructed in the Build Alternative account for all traffic movements to access the interstate. The two exceptions are at Chene Street and Trumbull Avenue, where partial interchanges exists today. At Trumbull Avenue, a westbound Service Drive is being added, but otherwise the configuration remains the same as existing. At Chene Street, a westbound entrance-ramp will connect with I-94 at a different location than what currently exists, while the rest of the interchange will be reconstructed as it exists today. No westbound exit-ramp will be constructed, but one does not exist today. Chene Street is being reconstructed due to its aging condition. Adding an exit-ramp in the westbound direction would have made Chene Street a full-service interchange. However, there are several constraints that precluded MDOT from adding the additional ramp. These constraints include:

1. **Limited weaving ability** – If a westbound exit-ramp were to be added at Chene Street, it would create an undesirable weave movement between it and the westbound Harper Avenue entrance-ramp.
2. **Minimal usage of the ramp from assembly plant workers** – Coordination with the Cadillac Assembly Plant, located directly north of the interchange, revealed that most workers would not use the ramp to access the plant in favor of the Mt. Elliott Street ramp.

The solution agreed upon by MDOT and FHWA was to reconstruct Chene Street but keep the ramp geometry the same as the existing conditions. Westbound traffic on I-94 can access Chene Street via the Mt. Elliott exit-ramp located less than a mile upstream, as it does today.

4.2 Design Standards and Any Potential Design Exceptions

Traffic analysis and geometric layouts of proposed interchange concepts are based on geometric controls and criteria outlined in the documents ‘A Policy on Design Standards Interstate System’

(AASHTO, May 2016), 'A Policy on Geometric Design of Highways and Streets (Green Book)' (AASHTO, 2011), and the MDOT Road Design Manual. Among several design parameters, the criteria establish basic thresholds to guide the development and evaluation of interchange concepts for this IACR. A list of design exceptions can be found in the *"I-94, I-96 to Conner Detailed Engineering Report – Design Exception Summary"* technical memorandum in **Appendix C** (page C-138). Some of the appendix documents were written prior to the newer policies (listed above) taking effect and may reference previous policy versions. The design adheres to the above listed policies, which supersedes what was written in the older appendix documents.

4.3 Special Considerations

There are specific areas of the corridor that will need enhanced design considerations due to some areas of the network transitioning from two-way to one-way, creating the potential for wrong way driving. These areas are:

- South Edsel Ford Service Drive and Trumbull Avenue
- North Edsel Ford Service Drive and Woodward Avenue
- North Edsel Ford Service Drive and Hastings Street
- Mount Elliott Street and Harper Avenue
- North Edsel Ford Service Drive and Sheridan Street
- South Edsel Ford Service Drive and Sheridan Street
- North Edsel Ford Service Drive and Iroquois Avenue
- South Edsel Ford Service Drive and Iroquois Avenue
- West John C Lodge Service Drive and W Baltimore Avenue

Design techniques that have the potential for reducing wrong way driving include, but are not limited to, barriers, raised pavement, reflective pavement markings and reflective wrong way signage. Detail on how wrong way driving will be mitigated is included in the description of each interchange in Section 1.4. Design considerations will follow MUTCD guidelines.

The traditional vertical clearance passing under structures on the interstate is 16 feet. However, a previous special route designation was granted in 2006 allowing a vertical clearance of 14'-6" within the study area limits. The vertical clearance for the Build Alternative design will be 14'-9" throughout the study area. The request and approval documents of the special route designation for vertical clearances are in **Appendix C** (page C-247).

Within the I-94/I-75 and I-94/M-10 interchanges, the system ramp design speed criteria for horizontal and vertical controls are 40 mph. Due to the existing constrained ROW footprint and the close proximity of the two interchanges (less than one mile), the horizontal radii for several ramps has been designed to a minimum of 485 feet, which relates to a 40 mph design speed with 6% superelevation (MDOT Straight Line Method). The use of this minimum radius requires a horizontal sightline offset (HSO) of almost 24 feet to meet the horizontal sight distance requirements for a 40 mph design speed. This would require a shoulder width of more than 16 feet to meet this criterion. Both MDOT and AASHTO guidelines discourage using shoulder widths greater than 12 feet due to increased risk of traffic utilizing the shoulder for passing. In reviewing the SSD for the system ramps, a 12 foot inside shoulder width only increased the SSD by 30 feet to 40 feet as compared to an 8 foot inside shoulder width. This corresponds to a distance equivalent to approximately 1½ car lengths. The design speeds in each case were only increased by 3 mph or 4 mph. On all ramps but one, the increased design speeds still fell short of the actual ramp design speeds. In addition, a cost benefit analysis determined the cost associated with the 12 foot inside shoulder widths was approximately $10,000,000 greater than the cost for 8 foot inside shoulder widths. In our determination/judgment, a $10 million cost increase was not justified by such nominal sight distance and design speed improvements. Therefore, the MDOT Geometrics Unit supports an 8 foot inside shoulder width.

This, in combination with flipping the left and right side shoulder widths, allowed the use of an 8 foot left shoulder width to increase or meet SSD requirements. Using this method, the SSD was met on additional system ramps but it did not satisfy the minimum criteria for all system ramps. The locations that will require a design exception, including details regarding the design values versus policy values, are listed in the updated I-94 Modernization Project - Approved Selected Alternative with Modifications Design Exception and Variance Summary Technical Memorandum provided in **Appendix C** (page C-138).

5.0 Conclusion

5.1 Recommendation for Safety, Operations and Engineering Acceptability

The Build Alternative configuration contributes to better overall safety within the study area corridor and more efficient traffic operations compared to the No-Build Alternative. The Build Alternative design adheres to current state and federal design standards. The Build Alternative connects to a public road only and provides for all traffic movements.

5.2 NEPA Considerations

A supplemental environmental impact statement (SEIS) is being prepared in parallel to this document. This IACR is considered a supporting document to the SEIS. The FHWA will render decisions on the SEIS and the IACR simultaneously.

Per the updated 2017 FHWA guidance, policy points that were once addressed in the previous 2009 access to the interstate policy are now addressed in the SEIS. **Appendix A** outlines the section location of every policy point in the 2009 version that has now been split between the SEIS and IACR.

5.3 Next Steps

The FHWA will consider the IACR for conditional approval. Final approval of the IACR is contingent upon the approval of the SEIS.

Appendix A – Policy Points Section Reference within the SEIS and IACR Documents

Appendix B – Traffic and Safety Supporting Data

Appendix C – Previous Studies and Technical Memorandums

Appendix D – Build Alternative Design and Conceptual Signing Plan

I-94 Modernization Project

I-96 to Conner Avenue
City of Detroit
Control Section 82024 Job # 122114

Interchange Access Change Request - APPENDICES

Prepared by:

Michigan Department of Transportation

May 2019

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APPENDIX A

Appendix A: Reference Guide for the Policy Points in Previous Version of Access to the Interstate

In 2017, the Federal Highway Administration (FHWA) issued an updated policy regarding requests for additional or revised access to the Eisenhower Interstate Highway System. The policy includes guidance for the justification and documentation needed for such requests. The policy's intent is to ensure that the Interstate System provides the highest levels of safety and mobility to the traveling public. Adequate control of access is critical to providing this service. This policy was originally issued in the Federal Register on October 22, 1990 and was revised as published in the Federal Register on February 11, 1998, and August 29, 2009. The most recent revision was approved on May 22, 2017. This revision reduced the number of policy points from eight to two. The list below identifies the sections in which the eight policy points, previously included in the "Access to the Interstate" 2009 version, are located within the SEIS or IACR. The numbered list below is outlined the same way as the previous 2009 version.

1. The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).

See Sections 2.3 (Existing Peak Period Traffic Operations) and 2.4 (Future No-Build Peak Period Traffic Operations) of the IACR. In SEIS, see Chapter 1 (Purpose and Need) Section 1.4.3 (Traffic) 1.4.4 (Safety), 1.4.5 (Multi-modal Transportation) and 1.4.7 (Connectivity and Mobility).

2. The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).

See Section 3.2 (Peak Period Traffic Operations Analysis), 3.3 (Safety Analysis) and Appendix D (Conceptual Signing Plan) of the IACR.

3. An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety *and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).*

See Section 3.2 (Peak Period Traffic Operations Analysis), 3.3 (Safety Analysis) and Appendix D (Conceptual Signing Plan) of the IACR.

4. The proposed access connects to a public road only and will provide for all traffic movements. Less than ``full interchanges'' may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

See Section 4.1 (Traffic Movements) of the IACR. Also, see Section 3.1.4 (Description of the ASAM) in the SEIS.

5. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.

See Section 4.1.2 (Regional and Statewide Transportation Planning) and Section 4.6 (Land Use) in the SEIS

6. In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).

There are no plans for future multiple interchange additions.

7. When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).

There is no new, expanded, or substantial change in current or future development or land use.

8. The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).

See Chapter 3 (Alternatives) of the SEIS. The SEIS and IACR are being completed concurrent to one-another.

APPENDIX B

AM Period - Build Validation

				AM67					AM78								AM89								AM910				
	Link	Facility	Type	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)
EB I-94	1014:1012	EB I-94 West of I-96	Mainline	4975	320	5295	5131	49.34	5502	470	5972	5996	0.31	36	E	42.96	4683	447	5130	5101	0.41	26	C	51.48	4223	463	4686	4706	52.51
	1018:1019	EB I-94 to SB I-96	Ramp	228	14	242	241		252	21	273	283	0.60	-	-		145	16	161	169	0.62	-	-		136	17	153	158	
	1027:1008	EB I-94 to NB I-96	Ramp	835	22	857	822		920	32	952	953	0.03	-	-		671	33	704	706	0.08	-	-		600	35	635	637	
	1012:1010		Mainline	3905	283	4188	4043	56.11	4322	416	4738	4760	0.32	30	D	55.70	3862	397	4259	4222	0.57	26	D	55.89	3483	410	3893	3912	56.33
	1022:1023	EB I-94 Exit to Grand River	Ramp	173	8	181	181		190	11	201	198	0.21	-	-		190	11	201	199	0.14	-	-		170	11	181	189	
	1010:159		Mainline	3732	275	4007	3847	55.06	4132	405	4537	4559	0.33	30	D	53.78	3672	386	4058	4023	0.55	26	C	54.59	3313	399	3712	3723	54.83
	983:982	NB I-96 to EB I-94	Ramp	530	57	587	590		586	84	670	690	0.77	-	-		420	150	570	608	1.57	-	-		381	160	541	552	
	159:187		Mainline	4262	332	4594	4434	52.99	4718	489	5207	5248	0.57	27	D	50.73	4092	536	4628	4630	0.03	23	C	52.67	3694	559	4253	4276	53.17
	187:158		Mainline	4262	332	4594	4422	57.28	4718	489	5207	5247	0.55	26	C	53.82	4092	536	4628	4631	0.04	22	C	57.09	3694	559	4253	4280	57.29
	979:158	SB I-96 to EB I-94	Ramp	1233	32	1265	1217		1360	42	1402	1411	0.24	-	-		1172	41	1213	1230	0.49	-	-		1051	41	1092	1115	
	158:186		Mainline	5495	364	5859	5629	53.98	6078	531	6609	6655	0.56	28	D	48.71	5264	577	5841	5864	0.30	23	C	54.18	4745	600	5345	5395	54.72
	186:966		Mainline	5495	364	5859	5619	56.01	6078	531	6609	6656	0.58	28	D	50.16	5264	577	5841	5864	0.30	22	C	55.96	4745	600	5345	5397	56.71
	971:966	EB I-94 Entrance from Linwood	Ramp	215	6	221	238		241	10	251	275	1.48	-	-		326	17	343	381	2.00	-	-		292	17	309	358	
	966:959		Mainline	5710	370	6080	5836	56.26	6319	541	6860	6928	0.82	25	C	48.78	5590	594	6184	6252	0.86	20	C	54.58	5037	617	5654	5753	56.20
	975:976	EB I-94 Exit to Trumbull	Ramp	797	7	804	761		876	10	886	902	0.54	-	-		827	10	837	846	0.31	-	-		747	9	756	751	
	959:212		Mainline	4913	363	5276	5062	56.08	5443	531	5974	6016	0.54	30	D	42.55	4763	584	5347	5413	0.90	22	C	51.97	4290	608	4898	5006	57.08
	212:951		Mainline	4913	363	5276	5052	57.51	5443	531	5974	6014	0.52	24	C	51.88	4763	584	5347	5415	0.93	21	C	55.78	4290	608	4898	5006	58.24
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	820	8	828	778		901	10	911	910	0.03	-	-		878	10	888	879	0.30	-	-		785	10	795	791	
	213:944	EB I-94 Exit to NB Hwy 10	Ramp	606	24	630	587		669	38	707	703	0.15	-	-		510	30	540	529	0.48	-	-		460	32	492	489	
	951:943		Mainline	3482	331	3813	3667	53.51	3867	483	4350	4404	0.82	22	C	53.51	3368	543	3911	4006	1.51	20	C	53.03	3038	565	3603	3731	53.22
	943:919		Mainline	3482	331	3813	3655	57.95	3867	483	4350	4399	0.74	20	C	58.18	3368	543	3911	4006	1.51	19	C	57.66	3038	565	3603	3731	57.72
	919:918		Mainline	3482	331	3813	3641	54.83	3867	483	4350	4399	0.74	22	C	53.77	3368	543	3911	4004	1.48	20	C	53.95	3038	565	3603	3732	54.80
	918:912		Mainline	3486	331	3817	3634	53.01	3872	483	4355	4395	0.60	23	C	51.00	3375	543	3918	4004	1.37	21	C	52.02	3044	565	3609	3735	52.87
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	322	6	328	336		355	12	367	374	0.36	-	-		313	27	340	372	1.70	-	-		287	27	314	320	
	937:915	EB I-94 Entrance from SB Hwy 10	Ramp	541	6	547	516		599	9	608	614	0.24	-	-		521	7	528	541	0.56	-	-		468	7	475	512	
	912:449		Mainline	4352	343	4695	4480	56.85	4830	504	5334	5382	0.66	18	B	53.49	4212	577	4789	4916	1.82	16	B	54.95	3801	599	4400	4569	56.05
	449:910		Mainline	4352	343	4695	4468	62.16	4830	504	5334	5381	0.64	16	B	58.83	4212	577	4789	4914	1.79	15	B	59.97	3801	599	4400	4571	61.15
	910:926	EB I-94 Exit to Brush	Ramp	166	16	182	398		188	22	210	485	14.75	-	-		183	24	207	445	13.18	-	-		168	25	193	439	
	910:909		Mainline	4186	327	4513	4053	53.51	4642	482	5124	4891	3.29	17	B	51.09	4029	553	4582	4475	1.59	15	B	52.70	3633	574	4207	4134	53.12
	909:904		Mainline	4186	327	4513	4048	73.43	4642	482	5124	4890	3.31	13	B	64.65	4029	553	4582	4476	1.58	11	B	72.07	3633	574	4207	4133	73.34
	299:314	EB I-94 Exit to SB I-75	Ramp	498	17	515	486		554	27	581	577	0.17	-	-		610	23	633	636	0.12	-	-		551	24	576	592	
	300:302	EB I-94 Exit to NB I-75	Ramp	1032	163	1195	1094		1136	237	1373	1384	0.30	-	-		1024	195	1219	1216	0.09	-	-		925	202	1127	1156	
	904:903		Mainline	2656	147	2803	2443	53.75	2952	218	3170	2928	4.38	12	B	52.47	2395	335	2730	2626	2.01	11	A	53.19	2157	348	2505	2384	53.48
	903:156		Mainline	2656	147	2803	2440	51.52	2952	218	3170	2926	4.42	15	B	51.09	2395	335	2730	2629	1.95	14	B	51.03	2157	348	2505	2384	51.26
	156:890		Mainline	2656	147	2803	2428	57.35	2952	218	3170	2923	4.48	14	B	55.09	2395	335	2730	2632	1.89	12	B	56.65	2157	348	2505	2386	57.19
	900:899	EB I-94 Entrance from Hastings	Ramp	280	6	286	263		308	8	316	304	0.68	-	-		348	11	359	401	2.15	-	-		316	11	327	349	
	890:889		Mainline	2936	153	3089	2689	57.03	3260	226	3486	3224	4.52	12	B	53.90	2743	346	3089	3035	0.98	11	B	56.09	2473	359	2832	2735	56.98
	889:881		Mainline	2936	153	3089	2686	53.05	3260	226	3486	3223	4.54	16	B	50.52	2743	346	3089	3035	0.98	16	B	50.92	2473	359	2832	2735	52.76
	881:878		Mainline	2936	153	3089	2679	56.84	3260	226	3486	3224	4.52	16	B	53.74	2743	346	3089	3034	0.99	15	B	55.37	2473	359	2832	2736	57.43
	281:282	EB I-94 Entrance from SB I-75	Ramp	850	55	905	851		937	77	1014	965	1.56	-	-		685	58	743	778	1.27	-	-		616	60	676	696	
	285:286	EB I-94 Entrance from NB I-75	Ramp	432	20	452	439		478	28	506	489	0.76	-	-		481	23	504	517	0.58	-	-		431	25	456	469	
	878:183		Mainline	4218	228	4446	3959	59.07	4675	331	5006	4680	4.68	14	B	57.03	3909	427	4336	4332	0.06	13	B	57.73	3520	444	3964	3897	59.37
	183:876		Mainline	4218	228	4446	3947	60.48	4675	331	5006	4675	4.76	14	B	59.42	3909	427	4336	4338	0.03	13	B	59.89	3520	444	3964	3897	60.99
	886:887	EB I-94 Exit to Chene	Ramp	330	15	345	102		370	22	392	127	16.43	-	-		337	38	375	144	14.34	-	-		310	39	349	152	
	876:875		Mainline	3888	213	4101	3840	52.01	4305	309	4614	4548	0.98	18	C	52.05	3572	389	3961	4195	3.66	17	B	51.87	3210	405	3615	3745	51.93
	875:872		Mainline	3888	213	4101	3837	60.73	4305	309	4614	4544	1.03	15	B	60.70	3572	389	3961	4197	3.70	15	B	60.52	3210	405	3615	3745	60.65
	872:869		Mainline	3888	213	4101	3817	58.47	4305	309	4614	4543	1.05	16	B	58.26	3572	389	3961	4198	3.71	15	B	58.25	3210	405	3615	3746	58.42
	870:869	EB I-94 Entrance from Chene St	Ramp	157	21	178	181		172	30	202	214	0.83	-	-		224	15	239	264	1.58	-	-		200	15	215	237	
	869:860		Mainline	4045	234	4279	3981	58.83	4477	339	4816	4753	0.91	14	B	58.58	3796	404	4200	4466	4.04	13	B	58.54	3410	420	3830	3984	58.78
	863:864	EB I-94 Exit to Elliot	Ramp	233	15	248	242		260	21	281	281	0.00	-	-		191	31	222	241	1.25	-	-		173	31	204	216	
	860:859		Mainline	3812	219	4031	3725	58.15	4217	318	4535	4476	0.88	16	B	57.90	3605	373	3978	4222	3.81	15	B	57.86	3237	389	3626	3771	58.04
	859:369		Mainline	3809	219	4028	3706	56.32	4213	318	4531	4475	0.83	17	B	56.07	3598	373	3971	4224	3.95	16	B	55.96	3231	389	3620	3772	56.21
	369:365		Mainline	3806	219	4025	3696	57.45	4211	318	4529	4475	0.80	16	B	57.17	3595	372	3967	4224	4.02	16	B	57.09	3229	388	3617	3774	57.35
	365:192		Mainline	3806	219	4025	3690	56.21	4211	318	4529	4476	0.79	17	B	55.91	3595	372	3967	4223	4.00	16	B	55.85	3229	388	3617	3774	56.07
	855:192	EB I-94 Entrance from Elliot	Ramp	80	7	87	99		91	9	100	119	1.82	-	-		118	9	127	136	0.78	-	-		111	9	120	140	
	192:832		Mainline	3886	226	4112	3770	59.19	4302	327	4629	4589	0.59	13	B	58.93	3713	381	4094	4368	4.21	13	B	58.94	3340	397	3737	3913	59.19
	832:829		Mainline	3888	226	4114	3767	58.31	4304	327	4631	4589	0.62	14	B	58.13	3717	381	4098	4369	4.17	13	B	57.88	3344	397	3741	3912	58.07
	829:848	EB I-94 Exit to Van Dyke	Ramp	254	18	272	260		284	26	310	308	0.11	-	-		319	35	354	400	2.37	-	-		290	36	326	352	
	829:827		Mainline	3634	208	3842	3494	57.80	4020	301	4321	4276	0.69	15	B	57.19	3398	346	3744	3974	3.70	14	B	57.49	3054	361	3415	3556	57.61
	827:375		Mainline	3633	208	3841	3485	56.70	4019	301	4320	4273	0.72	16	B	56.02	3396	346	3742	3978	3.80	15	B	56.12	3052	361	3413	3557	56.46
	375:160		Mainline	3633	208	3841	3469	57.48	4019	301	4320	4270	0.76	19	C	57.12	3396	346	3742	3984	3.89	18	C	56.82	3052	361	3413	3557	57.06
	376:842	EB I-94 Entrance from Van Dyke	Ramp	112	23	135	145		119	30	149	155	0.49	-	-		83	14	97	106	0.89	-	-		73	15	88	92	
	160:809		Mainline	3745	231	3976	3601	58.36	4138	331	4469	4422	0.70	16	B	57.98	3479	360	3839	4095	4.06	15	B	57.84	3125	376	3501	3648	58.06
	383:382	EB I-94 Exit to Gratiot	Ramp	480	16	496	470		534	20	554	583	1.22	-	-		590	26	616	670	2.13	-	-		534	27	561	624	
	809:807		Mainline	3265	215	3480	3118	59.44	3604	311	3915	3839	1.22	17	B	58.74	2889	334	3223	3424	3.49	15	B	59.27	2591	349	2940	3028	59.53
	807:380		Mainline	3265	215	3480	3107	59.71	3604	311	3915	3835	1.29	17	B	59.25	2889	334	3223	3429	3.57	15	B	59.46	2591	349	2940	3025	59.69
	380:806		Mainline	3265	215	3480	3093	59.90	3604	311	3915	3838	1.24	17	B	59.60	2889	334	3223	3428	3.55	15	B	59.42	2591	349	2940	3026	59.73
	823:824	EB I-94 Entrance from Gratiot	Ramp	153	7	160	165		166	10	176	164	0.92	-	-		185	10	195	210	1.05	-	-		165	10	175	179	
	806:803		Mainline	3418	222	3640	3255	60.35	3770	321	4091	4001	1.41	14	B	59.85	3074	344	3418	3639	3.72	13	B	60.00	2756	359	3115	3204	60.34
	803:800		Mainline	3418	222	3640	3251	59.44	3770	321	4091	4000	1.43	14	B	59.13	3074	344	3418	3641	3.75	13	B	59.37	2756	359	3115	3203	59.58
	800:6208		Mainline	3418	222	3640	3244	59.83	3770	321	4091	4001	1.41	14	B	59.68	3074	344	3418	3643	3.79	13	B	59.48	2756	359	3115	3203	59.68
	6208:6214		Mainline	3417	222	3639	3224	59.84	3769	321	4090	3996	1.46	14	B	59.62	3073	344	3417	3650	3.92	13	B	59.26	2755	359	3114	3199	59.39
	6214:6215		Mainline	3417	222	3639	3222	61.42	3769	321	4090	3995	1.49	14	B	61.04	3073	344	3417	3651	3.94	13	B	60.57	2755	359	3114	3199	60.69
	6215:6220		Mainline	3417	222	3639	3220	63.91	3769	321	4090	3992	1.54	13	B	63.62	3073	344	3417	3652	3.95	12	B	62.89	2755	359	3114	3200	63.04
	6220:392	EB I-94 Exit to Conner	Ramp	427	24	451	420		471	39	510	533	1.01	-	-		544	46	590	639	1.98	-	-		490	47	537	607	
	6220:395		Mainline	2990	198	3188	2796	57.27	3298	282	3580	3457	2.07	16	B	56.91	2529	298	2827	3014	3.46	14	B	57.14	2265	312	2577	2594	57.62
	395:6229		Mainline	2990	198	3188	2789	58.33	3298	282	3580	3450	2.19	21	C	58.04	2529	298	2827	3019	3.55	18	C	58.28	2265	312	2577	2596	58.79
	6229:6232		Mainline	2990	198	3188	2786	57.47	3298	282	3580	3448	2.23	21	C	56.99	2529	298	2827	3019	3.55	18	C	57.56	2265	312	2577	2598	58.14
	6232:194		Mainline	2990	198	3188	2783	58.01	3298	282	3580	3447	2.24	21	C	57.46	2529	298	2827	3020	3.57	18	C	57.90	2265	312	2577	2598	58.62
	6248:194	EB I-94 Entrance from Conner	Ramp	192	7	199	199		210	11	221	217	0.27	-	-		250	16	266	263	0.18	-	-		230	17	247	245	
	194:195		Mainline	3182	205	3387	2978	58.44	3508	293	3801	3663	2.26	16	B	58.06	2779	314	3093	3283	3.37	15	B	58.08	2495	329	2824	2843	58.85
	195:6234		Mainline	3182	205	3387	2975	59.74	3508	293	3801	3663	2.26	16	B	59.32	2779	314	3093	3283	3.37	15	B	59.51	2495	329	2824	2841	60.19
	6234:6238		Mainline	3179	205	3384	2959	57.20	3505	293	3798	3654	2.36	22	C	56.62	2777	314	3091	3294	3.59	20	C	56.87	2493	329	2822	2840	57.65
	6238:6239	EB I-94 East of Conner	Mainline	3179	205	3384	2934	56.78	3505	293	3798	3649	2.44	23	C	56.09	2777	314	3091	3299	3.68	21	C	56.38	2493	329	2822	2846	57.18
WB I-94	6237:394	WB I-94 East of Conner	Mainline	6024	231	6255	6019	53.90	6663	331	6994	6803	2.30	43	E	53.76	5431	371	5802	5940	1.80	38	E	53.14	4815	380	5195	5210	54.40
	394:6233		Mainline	6024	231	6255	6014	47.23	6663	331	6994	6803	2.30	37	E	47.19	5431	371	5802	5940	1.80	33	D	46.38	4815	380	5195	5210	47.49
	6233:6230		Mainline	6024	231	6255	6008	55.65	6663	331	6994	6802	2.31	32	D	54.89	5431	371	5802	5941	1.81	28	D	54.49	4815	380	5195	5209	56.10
	6230:6246	WB I-94 Exit to Conner	Ramp	203	52	255	237		223	77	300	293	0.41	-	-		295	51	346	352	0.32	-	-		264	51	315	323	
	6230:6228		Mainline	5821	179	6000	5749	57.59	6440	254	6694	6511	2.25	39	E	55.61	5136	320	5456	5592	1.83	34	D	57.69	4551	329	4880	4889	57.88
	6228:161		Mainline	5821	179	6000	5728	55.62	6440	254	6694	6510	2.26	31	D	53.46	5136	320	5456	5598	1.91	27	D	52.62	4551	329	4880	4889	55.75
	161:205		Mainline	5821	179	6000	5721	55.96	6440	254	6694	6510	2.26	31	D	53.28	5136	320	5456	5600	1.94	28	D	52.50	4551	329	4880	4890	56.37
	6218:6217	WB I-94 Entrance from Conner	Ramp	12	1	13	12		13	1	14	14	0.00	-	-		15	1	16	17	0.25	-	-		14	1	15	15	
	205:206		Mainline	6083	185	6268	5993	54.94	6734	261	6995	6833	1.95	27	D	52.09	5577	324	5901	6085	2.38	24	C	51.24	4945	333	5278	5326	55.47
	206:801		Mainline	6083	185	6268	5961	59.19	6734	261	6995	6830	1.98	25	C	55.84	5577	324	5901	6084	2.36	23	C	55.42	4945	333	5278	5333	59.21
	801:204		Mainline	6083	185	6268	5947	60.91	6734	261	6995	6826	2.03	25	C	56.15	5577	324	5901	6089	2.43	22	C	56.55	4945	333	5278	5335	61.10
	391:390	WB I-94 Exit to Gratiot	Ramp	294	19	313	287		327	28	355	332	1.24	-	-		384	35	419	429	0.49	-	-		346	36	382	384	
	204:804		Mainline	5789	166	5955	5641	55.30	6407	233	6640	6476	2.03	33	D	50.10	5193	289	5482	5671	2.53	29	D	50.92	4599	297	4896	4959	55.37
	804:202		Mainline	5789	166	5955	5612	57.48	6407	233	6640	6467	2.14	32	D	50.67	5193	289	5482	5681	2.66	28	D	51.79	4599	297	4896	4960	57.85
	815:816	WB I-94 Entrance from Gratiot	Ramp	849	12	861	838		945	18	963	891	2.36	-	-		866	22	888	893	0.17	-	-		780	23	803	889	
	202:201		Mainline	6638	178	6816	6439	51.78	7352	251	7603	7357	2.84	34	D	44.62	6059	311	6370	6576	2.56	30	D	45.14	5379	320	5699	5850	52.32
	201:810		Mainline	6638	178	6816	6422	55.46	7352	251	7603	7353	2.89	32	D	47.09	6059	311	6370	6584	2.66	28	D	48.36	5379	320	5699	5850	57.11
	837:838	WB I-94 Exit to Van Dyke	Ramp	65	23	88	84		74	29	103	106	0.29	-	-		79	31	110	117	0.66	-	-		70	31	101	115	
	810:828		Mainline	6573	155	6728	6301	47.23	7278	222	7500	7225	3.20	46	F	39.67	5980	280	6260	6499	2.99	40	E	41.48	5309	289	5598	5734	51.59
	828:830		Mainline	6564	155	6719	6283	52.85	7268	222	7490	7220	3.15	37	E	49.19	5966	280	6246	6500	3.18	35	D	48.18	5296	289	5585	5742	53.42
	830:200		Mainline	6564	155	6719	6255	53.81	7268	222	7490	7215	3.21	38	E	48.60	5966	280	6246	6503	3.22	35	E	47.36	5296	289	5585	5747	53.52
	846:374	WB I-94 Entrance from Van Dyke	Ramp	538	21	559	597		591	30	621	670	1.93	-	-		562	30	592	640	1.93	-	-		506	31	537	573	
	200:831		Mainline	7105	176	7281	6845	51.68	7863	252	8115	7885	2.57	35	E	45.13	6531	310	6841	7145	3.64	34	D	43.25	5804	320	6124	6321	51.71
	831:835		Mainline	7105	176	7281	6806	54.17	7863	252	8115	7861	2.84	34	D	47.08	6531	310	6841	7165	3.87	32	D	46.17	5804	320	6124	6328	54.84
	835:367	WB I-94 Exit to Elliot	Ramp	427	10	437	437		476	11	487	503	0.72	-	-		429	17	446	498	2.39	-	-		387	19	406	462	
	835:366		Mainline	6678	166	6844	6360	47.48	7387	241	7628	7352	3.19	47	F	39.89	6102	293	6395	6675	3.46	44	E	38.66	5417	301	5718	5867	49.97
	366:199		Mainline	6678	166	6844	6339	45.02	7387	241	7628	7345	3.27	48	F	38.47	6102	293	6395	6684	3.57	46	F	37.02	5417	301	5718	5874	48.05
	199:858		Mainline	6678	166	6844	6298	49.93	7387	241	7628	7346	3.26	42	E	44.67	6102	293	6395	6689	3.63	39	E	43.71	5417	301	5718	5881	50.00
	866:867	WB I-94 Entrance from Elliott	Ramp	262	14	276	266		290	21	311	320	0.52	-	-		556	30	586	562	0.99	-	-		499	31	530	533	
	858:873		Mainline	6940	180	7120	6517	55.33	7677	262	7939	7664	3.11	38	E	50.99	6658	323	6981	7245	3.14	38	E	48.67	5916	332	6248	6425	54.45
	873:874		Mainline	6940	180	7120	6445	48.61	7677	262	7939	7660	3.16	43	E	45.30	6658	323	6981	7255	3.25	38	E	49.07	5916	332	6248	6429	51.66
	885:874	WB I-94 Entrance from Chene	Ramp	377	22	398	428		416	31	448	506	2.67	-	-		693	43	736	706	1.10	-	-		622	44	665	667	
	874:877		Mainline	7316	202	7518	6842	58.43	8093	293	8386	8166	2.42	28	D	57.94	7351	366	7716	7949	2.63	29	D	56.48	6538	376	6914	7106	56.91
	288:289	WB I-94 Exit to NB I-75	Ramp	572	16	588	539		633	23	656	642	0.55	-	-		454	29	483	520	1.65	-	-		402	30	432	453	
	288:292	WB I-94 Exit to SB I-75	Ramp	1331	47	1378	1217		1469	70	1539	1471	1.75	-	-		1449	72	1521	1526	0.13	-	-		1309	75	1384	1396	
	877:880		Mainline	5435	141	5576	5068	52.77	6014	203	6217	6049	2.15	29	D	53.02	5430	266	5696	5905	2.74	29	D	52.69	4810	273	5083	5260	52.51
	880:891		Mainline	5435	141	5576	5063	64.25	6014	203	6217	6049	2.15	24	C	64.13	5430	266	5696	5902	2.71	24	C	63.81	4810	273	5083	5263	64.15
	891:895	WB I-94 Exit to Hastings	Ramp	674	7	681	610		744	9	753	720	1.22	-	-		781	10	791	852	2.13	-	-		704	10	714	778	
	891:902		Mainline	4761	134	4895	4430	56.31	5270	194	5464	5316	2.02	23	C	55.53	4649	256	4905	5058	2.17	23	C	55.61	4106	263	4369	4487	56.90
	902:188		Mainline	4761	134	4895	4424	55.38	5270	194	5464	5314	2.04	26	D	51.22	4649	256	4905	5060	2.20	26	D	49.41	4106	263	4369	4487	56.21
	277:259	WB I-94 Entrance from NB I-75	Ramp	398	28	426	412		438	41	479	464	0.69	-	-		408	33	441	444	0.14	-	-		369	35	404	396	
	353:278	WB I-94 Entrance from SB I-75	Ramp	1064	65	1129	1065		1177	95	1272	1208	1.83	-	-		987	75	1062	1087	0.76	-	-		887	78	965	1031	
	188:189		Mainline	6223	227	6450	5885	51.97	6885	330	7215	6978	2.81	29	D	41.00	6044	364	6408	6605	2.38	29	D	39.12	5362	376	5738	5916	55.75
	189:905		Mainline	6223	227	6450	5877	48.39	6885	330	7215	6972	2.89	29	D	40.46	6044	364	6408	6605	2.44	27	D	41.32	5362	376	5738	5917	52.82
	905:908		Mainline	6223	227	6450	5869	47.09	6885	330	7215	6971	2.90	34	D	41.96	6044	364	6408	6608	2.48	32	D	42.67	5362	376	5738	5916	50.81
	908:911		Mainline	6223	227	6450	5887	52.16	6885	330	7215	7017	2.35	29	D	49.39	6044	364	6408	6670	3.24	28	D	49.90	5362	376	5738	5960	53.99
	929:930	WB I-94 Entrance from Brush	Ramp	36	4	40	39		41	6	47	53	0.85	-	-		42	7	49	53	0.56	-	-		38	7	45	46	
	911:450		Mainline	6259	231	6490	5878	50.62	6926	336	7262	7017	2.90	29	D	49.04	6086	371	6457	6672	2.65	28	D	49.16	5400	383	5783	5961	52.38
	450:26		Mainline	6259	231	6490	5874	52.81	6926	336	7262	7015	2.92	27	D	51.43	6086	371	6457	6673	2.67	27	D	51.85	5400	383	5783	5963	54.11
	26:913		Mainline	6259	231	6490	5869	66.42	6926	336	7262	7014	2.94	22	C	64.58	6086	371	6457	6674	2.68	21	C	65.52	5400	383	5783	5964	67.92
	220:921	WB I-94 Exit to NB Hwy 10	Ramp	860	9	869	771		948	11	959	918	1.34	-	-		807	13	820	891	2.43	-	-		732	13	745	774	
	220:932	WB I-94 Exit to SB Hwy 10	Ramp	896	17	913	782		992	28	1020	978	1.33	-	-		918	27	945	973	0.90	-	-		825	28	853	845	
	913:30		Mainline	4503	205	4708	4300	50.47	4986	297	5283	5115	2.33	26	D	50.40	4361	331	4692	4814	1.77	25	C	50.91	3843	342	4185	4345	51.09
	30:923		Mainline	4503	205	4708	4293	55.18	4986	297	5283	5112	2.37	24	C	54.94	4361	331	4692	4819	1.84	23	C	55.39	3843	342	4185	4345	55.97
	923:924		Mainline	4503	205	4708	4276	55.53	4986	297	5283	5112	2.40	24	C	55.06	4361	331	4692	4822	1.88	22	C	55.57	3843	342	4185	4344	56.04
	924:185		Mainline	4508	205	4713	4252	55.66	4992	297	5289	5116	2.40	24	C	54.80	4367	331	4698	4823	1.81	22	C	55.95	3848	342	4190	4344	56.07
	350:942	WB I-94 Entrance from SB Hwy 10	Ramp	598	30	628	608		656	44	700	674	0.99	-	-		446	42	488	480	0.36	-	-		408	45	453	492	
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	336	7	343	332		366	10	376	385	0.46	-	-		337	12	349	367	0.95	-	-		307	12	319	314	
	185:954		Mainline	5442	242	5684	5184	52.08	6014	351	6365	6169	2.48	22	C	47.66	5150	385	5535	5675	1.87	19	C	52.60	4563	399	4962	5151	54.87
	954:3607		Mainline	5442	242	5684	5178	52.55	6014	351	6365	6166	2.51	22	C	47.90	5150	385	5535	5680	1.94	19	C	52.33	4563	399	4962	5149	54.76
	3607:955		Mainline	5442	242	5684	5173	65.31	6014	351	6365	6160	2.59	18	B	58.90	5150	385	5535	5687	2.03	15	B	63.65	4563	399	4962	5146	66.76
	955:197		Mainline	5442	242	5684	5160	61.85	6014	351	6365	6151	2.71	28	D	45.41	5150	385	5535	5697	2.16	23	C	50.45	4563	399	4962	5144	53.77
	223:224	WB I-94 Entrance from Trumbull	Ramp	215	8	223	219		236	10	246	249	0.19	-	-		305	8	313	317	0.23	-	-		276	8	284	291	
	197:196		Mainline	5654	250	5904	5369	54.31	6247	361	6608	6399	2.59	22	C	50.32	5452	393	5845	6018	2.25	20	C	51.81	4836	407	5243	5435	55.37
	196:961		Mainline	5654	250	5904	5360	57.77	6247	361	6608	6398	2.60	22	C	49.90	5452	393	5845	6022	2.30	20	C	51.99	4836	407	5243	5435	58.62
	961:964		Mainline	5654	250	5904	5352	60.53	6247	361	6608	6397	2.62	23	C	47.37	5452	393	5845	6027	2.36	20	C	51.09	4836	407	5243	5435	62.33
	964:967	WB I-94 Exit to Linwood	Ramp	184	5	189	186		204	8	212	230	1.21	-	-		182	6	188	213	1.77	-	-		162	6	168	188	
	964:974		Mainline	5470	245	5715	5142	46.90	6043	353	6396	6146	3.16	38	E	33.25	5270	387	5657	5844	2.47	31	D	38.43	4674	401	5075	5248	52.68
	974:994		Mainline	5470	245	5715	5113	46.39	6043	353	6396	6130	3.36	31	D	40.27	5270	387	5657	5870	2.81	28	D	43.36	4674	401	5075	5253	51.29
	1001:1002	WB I-94 Exit to SB I-96	Ramp	700	34	734	645		776	48	824	798	0.91	-	-		717	36	753	827	2.63	-	-		646	38	684	719	
	1001:1004	WB I-94 Exit to NB I-96	Ramp	696	26	722	635		776	39	815	802	0.46	-	-		721	34	755	827	2.56	-	-		647	35	682	711	
	994:225		Mainline	4074	185	4259	3813	46.37	4491	266	4757	4529	3.35	28	D	42.27	3832	317	4149	4221	1.11	24	C	45.10	3381	328	3709	3824	50.42
	225:995		Mainline	4074	185	4259	3805	77.14	4491	266	4757	4528	3.36	22	C	71.23	3832	317	4149	4223	1.14	19	C	75.77	3381	328	3709	3826	79.11
	999:998	WB I-94 Entrance from Linwood	Ramp	41	8	49	46		47	10	57	57	0.00	-	-		47	9	56	61	0.65	-	-		47	9	56	60	
	162:1011		Mainline	4115	193	4308	3832	53.79	4538	276	4814	4582	3.38	30	D	52.00	3879	326	4205	4291	1.32	28	D	54.10	3428	337	3765	3885	55.68
	990:991	WB I-94 Entrance from SB I-96	Ramp	148	7	155	151		160	11	171	178	0.53	-	-		161	21	182	181	0.07	-	-		140	22	162	154	
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	618	66	684	671		680	97	777	779	0.07	-	-		511	105	616	632	0.64	-	-		460	109	569	560	
	1011:1013	WB I-94 West of I-96	Mainline	4881	266	5147	4639	49.99	5378	384	5762	5534	3.03	29	D	48.72	4551	452	5003	5111	1.52	26	C	51.99	4028	468	4496	4597	52.32

AM Period - Build Validation

	Link	Facility	Type	AM67 Auto Volume Lookup	AM67 Truck volume Lookup	AM67 Total Volume Lookup	AM67 Model Output Volume	AM67 Simulation Speed (mph)	AM78 Auto Volume Lookup	AM78 Truck volume Lookup	AM78 Total Volume Lookup	AM78 Model Output Volume	AM78 GEH (Target v. Model)	AM78 Density pc/mi/ln	AM78 LOS	AM78 Simulation Speed (mph)	AM89 Auto Volume Lookup	AM89 Truck volume Lookup	AM89 Total Volume Lookup	AM89 Model Output Volume	AM89 GEH (Target v. Model)	AM89 Density pc/mi/ln	AM89 LOS	AM89 Simulation Speed (mph)	AM910 Auto Volume Lookup	AM910 Truck volume Lookup	AM910 Total Volume Lookup	AM910 Model Output Volume	AM910 Simulation Speed (mph)
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	3074	187	3261	3213	72.45	3396	270	3666	3658	0.13	13	B	71.96	3378	264	3642	3642	0.00	13	B	71.69	3045	272	3317	3319	72.20
	1614:1615		Mainline	3074	187	3261	3207	68.10	3396	270	3666	3656	0.17	14	B	67.89	3378	264	3642	3641	0.02	14	B	67.69	3045	272	3317	3322	67.93
	1615:1618	SB I-96 Exit to Grand	Ramp	287	15	302	307		320	21	341	338	0.16	-	-		310	21	331	327	0.22	-	-		280	22	302	299	
	1615:1599		Mainline	2787	172	2959	2896	53.94	3076	249	3325	3319	0.10	16	B	53.84	3068	243	3311	3313	0.03	16	B	53.51	2765	250	3015	3026	53.73
	1599:1597		Mainline	2787	172	2959	2882	58.46	3076	249	3325	3318	0.12	15	B	58.23	3068	243	3311	3308	0.05	15	B	57.97	2765	250	3015	3029	58.21
	1597:1595		Mainline	2787	172	2959	2874	58.91	3076	249	3325	3319	0.10	15	B	58.75	3068	243	3311	3305	0.10	15	B	58.52	2765	250	3015	3030	58.73
	1595:1593		Mainline	2787	172	2959	2871	60.04	3076	249	3325	3320	0.09	14	B	59.71	3068	243	3311	3305	0.10	14	B	59.54	2765	250	3015	3031	59.86
	1607:1593	SB I-96 Entrance from Grand	Ramp	256	14	270	279		284	20	304	305	0.06	-	-		285	21	306	307	0.06	-	-		256	21	277	282	
	1593:1591		Mainline	3043	186	3229	3145	57.64	3360	269	3629	3622	0.12	13	B	55.90	3353	264	3617	3611	0.10	13	B	56.33	3021	271	3292	3315	57.44
	1591:1589		Mainline	3043	186	3229	3141	57.80	3360	269	3629	3620	0.15	14	B	55.52	3353	264	3617	3615	0.03	13	B	56.58	3021	271	3292	3312	58.35
	990:991	WB I-94 Entrance from SB I-96	Ramp	148	7	155	151		160	11	171	178	0.53	-	-		161	21	182	181	0.07	-	-		140	22	162	154	
	209:979	SB I-96 to EB I-94	Ramp	1233	32	1265	1221		1360	42	1402	1413	0.29	-	-		1172	41	1213	1229	0.46	-	-		1051	41	1092	1113	
	1589:1577		Mainline	1662	147	1809	1739	57.58	1840	216	2056	2026	0.66	9	A	57.39	2020	202	2222	2207	0.32	10	A	57.16	1830	208	2038	2053	57.44
	1577:1574		Mainline	1662	147	1809	1731	59.98	1840	216	2056	2025	0.69	9	A	59.85	2020	202	2222	2203	0.40	10	A	59.51	1830	208	2038	2056	59.59
	1583:1584	SB I-96 Exit to Warren	Ramp	192	15	207	192		210	21	231	211	1.35	-	-		210	21	231	235	0.26	-	-		190	22	212	208	
	1574:1573		Mainline	1470	132	1602	1537	56.05	1630	195	1825	1814	0.26	9	A	56.02	1810	181	1991	1968	0.52	9	A	55.62	1640	186	1826	1847	55.66
	1573:1554		Mainline	1470	132	1602	1532	60.83	1630	195	1825	1815	0.23	8	A	60.74	1810	181	1991	1965	0.58	9	A	60.41	1640	186	1826	1851	60.43
	1018:1019	EB I-94 to SB I-96	Ramp	228	14	242	241		252	21	273	283	0.60	-	-		145	16	161	169	0.62	-	-		136	17	153	158	
	1001:1002	WB I-94 Exit to SB I-96	Ramp	700	34	734	645		776	48	824	798	0.91	-	-		717	36	753	827	2.63	-	-		646	38	684	719	
	1558:1559	SB I-96 Entrance from Warren	Ramp	261	17	278	281		290	24	314	311	0.17	-	-		290	22	312	318	0.34	-	-		260	23	283	267	
	163:1552	SB I-96 South of Entrance from Warren	Mainline	2659	197	2856	2665	58.15	2948	288	3236	3206	0.53	12	B	57.82	2962	255	3217	3275	1.02	12	B	57.87	2682	264	2946	3004	58.00
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	2444	151	2595	2602	53.69	2696	222	2918	2932	0.26	11	B	53.38	2701	304	3005	3069	1.16	12	B	53.45	2431	319	2750	2763	53.66
	1568:1569	NB I-96 Exit to Warren	Ramp	374	27	401	397		410	39	449	438	0.52	-	-		410	39	449	462	0.61	-	-		370	40	410	415	
	1553:1555		Mainline	2070	124	2194	2198	57.06	2286	183	2469	2489	0.40	9	A	56.29	2291	265	2556	2611	1.08	10	A	56.88	2061	279	2340	2348	57.37
	983:982	NB I-96 to EB I-94	Ramp	530	57	587	590		586	84	670	690	0.77	-	-		420	150	570	608	1.57	-	-		381	160	541	552	
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	618	66	684	671		680	97	777	779	0.07	-	-		511	105	616	632	0.64	-	-		460	109	569	560	
	1555:1572		Mainline	922	1	923	919	61.53	1020	2	1022	1016	0.19	4	A	61.09	1360	10	1370	1379	0.24	6	A	60.91	1220	10	1230	1237	61.16
	1580:1579	NB I-96 Entrance from Warren	Ramp	70	7	77	78		80	12	92	86	0.64	-	-		80	13	93	101	0.81	-	-		70	12	82	79	
	1575:1576		Mainline	992	8	1000	990	60.92	1100	14	1114	1099	0.45	5	A	60.55	1440	23	1463	1480	0.44	6	A	60.60	1290	22	1312	1316	60.81
	1576:1588		Mainline	992	8	1000	989	63.84	1100	14	1114	1099	0.45	4	A	63.55	1440	23	1463	1479	0.42	6	A	63.47	1290	22	1312	1317	63.65
	1001:1004	WB I-94 Exit to NB I-96	Ramp	696	26	722	635		776	39	815	802	0.46	-	-		721	34	755	827	2.56	-	-		647	35	682	711	
	1027:1008	EB I-94 to NB I-96	Ramp	835	22	857	822		920	32	952	953	0.03	-	-		671	33	704	706	0.08	-	-		600	35	635	637	
	1588:1590		Mainline	2523	56	2579	2429	51.61	2796	85	2881	2852	0.54	11	B	51.10	2832	90	2922	3018	1.76	12	B	52.28	2537	92	2629	2665	52.59
	1590:1592		Mainline	2523	56	2579	2426	57.21	2796	85	2881	2852	0.54	10	A	56.38	2832	90	2922	3018	1.76	11	A	56.91	2537	92	2629	2666	57.58
	1602:1603	NB I-96 Exit to Grand	Ramp	208	14	222	215		229	20	249	255	0.38	-	-		218	22	240	256	1.02	-	-		198	22	220	222	
	1592:1594		Mainline	2315	42	2357	2208	59.13	2567	65	2632	2595	0.72	11	B	58.66	2614	68	2682	2763	1.55	12	B	59.30	2339	70	2409	2443	59.54
	1594:1596		Mainline	2315	42	2357	2201	55.18	2567	65	2632	2594	0.74	12	B	53.42	2614	68	2682	2768	1.65	13	B	55.66	2339	70	2409	2440	56.79
	1596:1598		Mainline	2306	42	2348	2189	55.40	2557	64	2621	2593	0.55	12	B	54.45	2601	67	2668	2768	1.92	13	B	55.86	2327	69	2396	2438	56.51
	1610:1611	NB I-96 Entrance from Grand	Ramp	174	8	182	168		190	12	202	197	0.35	-	-		190	12	202	201	0.07	-	-		170	12	182	184	
	1613:50	NB I-96 north of Entrance from Grand	Mainline	2480	50	2530	2338	57.36	2747	76	2823	2790	0.62	12	B	57.05	2791	79	2870	2968	1.81	13	B	57.57	2497	81	2578	2623	57.70
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	5400	117	5517	5368	49.96	5970	171	6141	5992	1.91	45	E	33.76	6184	180	6364	6114	3.17	50	F	30.99	5573	187	5760	6141	35.93
	60:1405		Mainline	5400	117	5517	5360	45.76	5970	171	6141	5985	2.00	47	F	32.55	6184	180	6364	6118	3.11	51	F	30.16	5573	187	5760	6141	34.19
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	383	63	446	433		420	92	512	485	1.21	-	-		400	84	484	472	0.55	-	-		360	86	446	471	
	1405:1434		Mainline	5017	54	5071	4908	44.58	5550	79	5629	5490	1.86	48	F	38.23	5784	96	5880	5648	3.06	53	F	35.84	5213	101	5314	5674	38.22
	1434:1407		Mainline	5017	54	5071	4896	49.57	5550	79	5629	5485	1.93	29	D	48.29	5784	96	5880	5649	3.04	36	E	40.04	5213	101	5314	5675	44.01
	1407:1422		Mainline	5017	54	5071	4884	57.16	5550	79	5629	5485	1.93	26	C	53.93	5784	96	5880	5645	3.10	36	E	39.93	5213	101	5314	5678	45.92
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	273	18	291	278		304	26	330	349	1.03	-	-		314	21	335	366	1.66	-	-		298	21	319	328	
	1422:939		Mainline	5290	72	5362	5150	54.53	5854	105	5959	5833	1.64	23	C	50.35	6098	117	6215	6008	2.65	32	D	38.36	5511	122	5633	6008	43.09
	350:942	WB I-94 Entrance from SB Hwy 10	Ramp	598	30	628	608		656	44	700	674	0.99	-	-		446	42	488	480	0.36	-	-		408	45	453	492	
	937:915	EB I-94 Entrance from SB Hwy 10	Ramp	541	6	547	516		599	9	608	614	0.24	-	-		521	7	528	541	0.56	-	-		468	7	475	512	
	939:940		Mainline	4151	36	4187	4014	47.27	4599	52	4651	4540	1.64	33	D	45.56	5131	68	5199	4986	2.98	42	E	40.26	4635	70	4705	5006	41.78
	940:1431		Mainline	4151	36	4187	4004	53.02	4599	52	4651	4535	1.71	29	D	52.67	5131	68	5199	4987	2.97	32	D	52.84	4635	70	4705	5005	52.42
	1431:337		Mainline	4151	36	4187	4001	67.53	4599	52	4651	4535	1.71	23	C	67.07	5131	68	5199	4988	2.96	25	C	67.87	4635	70	4705	5005	67.24
	337:336		Mainline	4151	36	4187	3996	48.71	4599	52	4651	4535	1.71	23	C	48.91	5131	68	5199	4987	2.97	25	C	49.49	4635	70	4705	5004	49.50
	336:338	SB Hwy 10 Exit to Forest	Ramp	1360	7	1367	1304		1503	10	1513	1467	1.19	-	-		1566	10	1576	1506	1.78	-	-		1408	10	1418	1496	
	336:1435		Mainline	2791	29	2820	2683	59.26	3096	42	3138	3066	1.29	17	B	59.71	3565	58	3623	3480	2.40	19	C	60.00	3227	60	3287	3508	59.77
	1435:1441		Mainline	2791	29	2820	2675	59.11	3096	42	3138	3064	1.33	17	B	59.66	3565	58	3623	3478	2.43	19	C	60.02	3227	60	3287	3511	59.70
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	820	8	828	778		901	10	911	910	0.03	-	-		878	10	888	879	0.30	-	-		785	10	795	791	
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	896	17	913	781		992	28	1020	979	1.30	-	-		918	27	945	973	0.90	-	-		825	28	853	845	
	1441:1442		Mainline	4507	54	4561	4218	51.64	4989	80	5069	4952	1.65	19	C	51.61	5361	95	5456	5334	1.66	21	C	51.53	4837	98	4935	5145	52.58
	1442:1443		Mainline	4507	54	4561	4210	58.90	4989	80	5069	4949	1.70	17	B	58.55	5361	95	5456	5334	1.66	18	C	58.45	4837	98	4935	5146	59.36
	1443:1445		Mainline	4507	54	4561	4193	56.13	4989	80	5069	4946	1.74	22	C	56.28	5361	95	5456	5341	1.57	24	C	56.66	4837	98	4935	5143	56.74
	1445:1447		Mainline	4507	54	4561	4176	56.22	4989	80	5069	4949	1.70	22	C	56.35	5361	95	5456	5341	1.57	24	C	56.65	4837	98	4935	5144	56.67
	1447:54		Mainline	4507	54	4561	4170	55.83	4989	80	5069	4949	1.70	22	C	55.95	5361	95	5456	5339	1.59	24	C	56.36	4837	98	4935	5143	56.39
	54:58		Mainline	4507	54	4561	4289	58.59	4989	80	5069	5084	0.21	22	C	58.71	5361	95	5456	5535	1.07	24	C	59.15	4837	98	4935	5316	59.18
	396:228	SB Hwy 10 Entrance from Forest	Ramp	131	6	137	129		141	8	149	141	0.66	-	-		182	11	193	197	0.29	-	-		161	11	172	171	
	58:174	SB Hwy 10 South of Entrance from Forest	Mainline	4638	60	4698	4214	56.10	5130	88	5218	5072	2.04	23	C	56.10	5543	106	5649	5539	1.47	25	C	56.51	4998	109	5107	5318	56.55
NB Hwy 10	175:59	NB Hwy 10 South of Exit to Forest	Mainline	3246	55	3301	3272	58.70	3584	82	3666	3684	0.30	21	C	58.37	3660	112	3772	3862	1.46	23	C	57.86	3307	115	3422	3409	58.52
	59:55		Mainline	3246	55	3301	3266	52.97	3584	82	3666	3683	0.28	18	B	52.80	3660	112	3772	3864	1.49	19	C	51.91	3307	115	3422	3409	52.51
	55:233	NB Hwy 10 Exit to Forest	Ramp	356	14	370	370		390	21	411	404	0.35	-	-		589	13	602	620	0.73	-	-		530	13	543	527	
	55:1448		Mainline	2890	41	2931	2890	58.38	3194	61	3255	3277	0.38	19	C	58.11	3071	99	3170	3246	1.34	19	C	58.42	2777	102	2879	2883	58.61
	1448:1444		Mainline	2890	41	2931	2884	60.02	3194	61	3255	3276	0.37	18	C	59.90	3071	99	3170	3249	1.39	18	C	60.08	2777	102	2879	2881	60.24
	1444:246		Mainline	2890	41	2931	2878	55.49	3194	61	3255	3276	0.37	15	B	55.27	3071	99	3170	3252	1.45	15	B	55.43	2777	102	2879	2880	55.49
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	322	6	328	336		355	12	367	374	0.36	-	-		313	27	340	372	1.70	-	-		287	27	314	320	
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	336	7	343	332		366	10	376	385	0.46	-	-		337	12	349	367	0.95	-	-		307	12	319	314	
	246:1440		Mainline	2234	28	2262	2190	60.34	2475	39	2514	2512	0.04	14	B	60.13	2423	60	2483	2521	0.76	14	B	60.17	2185	63	2248	2242	60.29
	1470:1440	NB Hwy 10 Entrance from Forest	Ramp	371	8	379	371		413	13	426	417	0.44	-	-		581	12	593	591	0.08	-	-		525	13	538	534	
	1440:1439		Mainline	2605	36	2641	2554	60.16	2888	52	2940	2929	0.20	12	B	59.78	3004	72	3076	3112	0.65	13	B	59.58	2710	76	2786	2776	59.85
	1439:1438		Mainline	2605	36	2641	2552	57.50	2888	52	2940	2927	0.24	13	B	57.32	3004	72	3076	3114	0.68	14	B	58.00	2710	76	2786	2775	58.06
	1438:1437		Mainline	2605	36	2641	2547	58.05	2888	52	2940	2927	0.24	13	B	57.38	3004	72	3076	3116	0.72	14	B	58.07	2710	76	2786	2774	58.65
	1437:1436		Mainline	2605	36	2641	2545	57.67	2888	52	2940	2924	0.30	13	B	56.81	3004	72	3076	3119	0.77	14	B	57.52	2710	76	2786	2772	58.36
	342:341	NB Hwy 10 Exit to Milwaukee	Ramp	957	7	964	926		1056	8	1064	1065	0.03	-	-		848	13	861	893	1.08	-	-		765	13	778	770	
	1436:1432		Mainline	1648	29	1677	1612	59.84	1832	44	1876	1853	0.53	10	A	59.69	2156	59	2215	2233	0.38	13	B	59.19	1945	63	2008	2003	59.30
	1432:1430		Mainline	1648	29	1677	1604	59.32	1832	44	1876	1852	0.56	11	A	59.09	2156	59	2215	2236	0.45	13	B	58.56	1945	63	2008	2001	58.62
	220:921	WB I-94 Exit to NB Hwy 10	Ramp	860	9	869	771		948	11	959	918	1.34	-	-		807	13	820	891	2.43	-	-		732	13	745	774	
	944:945	EB I-94 Exit to NB Hwy 10	Ramp	606	24	630	585		669	38	707	702	0.19	-	-		510	30	540	530	0.43	-	-		460	32	492	489	
	1430:938		Mainline	3114	62	3176	2948	55.45	3449	93	3542	3473	1.17	13	B	54.90	3473	102	3575	3658	1.38	13	B	55.29	3137	108	3245	3264	55.64
	938:182		Mainline	3114	62	3176	2944	57.92	3449	93	3542	3473	1.17	12	B	57.35	3473	102	3575	3659	1.40	13	B	57.50	3137	108	3245	3262	58.02
	182:1423		Mainline	3114	62	3176	2941	58.43	3449	93	3542	3470	1.22	12	B	57.78	3473	102	3575	3662	1.45	13	B	57.52	3137	108	3245	3262	58.63
	1423:1408		Mainline	3114	62	3176	2936	64.56	3449	93	3542	3469	1.23	11	B	63.70	3473	102	3575	3665	1.50	12	B	63.50	3137	108	3245	3260	64.10
	1408:1433		Mainline	3114	62	3176	2928	56.84	3449	93	3542	3466	1.28	16	B	56.44	3473	102	3575	3666	1.51	16	B	56.54	3137	108	3245	3260	56.82
	1433:1406		Mainline	3114	62	3176	2920	60.81	3449	93	3542	3466	1.28	15	B	60.41	3473	102	3575	3666	1.51	15	B	60.38	3137	108	3245	3262	60.67
	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	283	17	300	288		310	24	334	322	0.66	-	-		312	21	333	312	1.17	-	-		279	22	301	300	
	1406:61		Mainline	3397	79	3476	3200	57.39	3759	117	3876	3788	1.42	14	B	56.87	3785	123	3908	3982	1.18	14	B	56.76	3416	130	3546	3561	57.32
	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	3397	79	3476	3197	52.44	3759	117	3876	3787	1.44	19	C	51.78	3785	123	3908	3982	1.18	19	C	52.14	3416	130	3546	3562	53.07
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	6068	243	6311	6154	53.96	6679	354	7033	6704	3.97	40	E	34.62	6452	319	6771	6823	0.63	41	E	34.14	5719	330	6049	6279	46.43
	238:239	SB I-75 Exit to Clay	Ramp	235	47	282	281		260	69	329	312	0.95	-	-		260	46	306	321	0.85	-	-		230	48	278	291	
	236:242		Mainline	5833	196	6029	5852	52.38	6419	285	6704	6374	4.08	44	E	37.25	6192	273	6465	6496	0.39	46	F	36.08	5489	282	5771	6015	47.98
	242:244		Mainline	5833	196	6029	5830	48.38	6419	285	6704	6360	4.26	45	E	36.26	6192	273	6465	6501	0.45	48	F	34.85	5489	282	5771	6026	47.04
	253:2851	SB I-75 Entrance from Clay	Ramp	498	9	507	501		552	13	565	576	0.46	-	-		622	10	632	647	0.59	-	-		565	10	575	575	
	247:249		Mainline	6331	205	6536	6303	43.59	6971	298	7269	6929	4.04	43	E	41.34	6814	283	7097	7146	0.58	45	E	40.59	6054	292	6346	6611	43.45
	278:279	WB I-94 Entrance from SB I-75	Ramp	1064	65	1129	1064		1177	95	1272	1207	1.85	-	-		987	75	1062	1087	0.76	-	-		887	78	965	1031	
	281:282	EB I-94 Entrance from SB I-75	Ramp	850	55	905	851		937	77	1014	965	1.56	-	-		685	58	743	778	1.27	-	-		616	60	676	696	
	249:261		Mainline	4417	85	4502	4358	43.65	4857	126	4983	4753	3.30	36	E	45.16	5142	150	5292	5283	0.12	41	E	43.18	4551	154	4705	4890	42.30
	261:262		Mainline	4417	85	4502	4351	52.65	4857	126	4983	4751	3.33	30	D	53.89	5142	150	5292	5283	0.12	35	D	51.39	4551	154	4705	4890	50.92
	262:265		Mainline	4417	85	4502	4346	52.95	4857	126	4983	4750	3.34	30	D	54.26	5142	150	5292	5280	0.17	34	D	52.06	4551	154	4705	4892	52.62
	265:266		Mainline	4417	85	4502	4326	54.60	4857	126	4983	4753	3.30	29	D	55.36	5142	150	5292	5277	0.21	33	D	54.44	4551	154	4705	4894	53.57
	266:301		Mainline	4417	85	4502	4319	60.26	4857	126	4983	4753	3.30	27	D	60.47	5142	150	5292	5274	0.25	30	D	58.73	4551	154	4705	4898	58.18
	301:268		Mainline	4417	85	4502	4315	48.07	4857	126	4983	4751	3.33	25	C	48.64	5142	150	5292	5274	0.25	28	D	47.18	4551	154	4705	4898	46.54
	311:312	SB I-75 Exit to Warren	Ramp	1105	12	1117	1075		1220	16	1236	1191	1.29	-	-		1130	13	1143	1163	0.59	-	-		1021	13	1034	1075	
	268:269		Mainline	3312	73	3385	3223	58.17	3637	110	3747	3561	3.08	21	C	58.53	4012	137	4149	4107	0.65	24	C	57.73	3530	141	3671	3827	57.39
	269:270		Mainline	3312	73	3385	3215	59.91	3637	110	3747	3560	3.09	20	C	60.30	4012	137	4149	4104	0.70	23	C	59.94	3530	141	3671	3829	59.65
	299:314	EB I-94 Exit to SB I-75	Ramp	498	17	515	486		554	27	581	577	0.17	-	-		610	23	633	636	0.12	-	-		551	24	575	592	
	293:294	WB I-94 Exit to SB I-75	Ramp	1331	47	1378	1207		1469	70	1539	1472	1.73	-	-		1449	72	1521	1522	0.03	-	-		1309	75	1384	1400	
	270:320		Mainline	5141	137	5278	4884	53.43	5660	207	5867	5605	3.46	27	D	53.40	6071	232	6303	6256	0.59	30	D	53.25	5390	240	5630	5825	53.04
	320:321		Mainline	5141	137	5278	4876	61.20	5660	207	5867	5603	3.49	23	C	61.30	6071	232	6303	6256	0.59	26	D	61.22	5390	240	5630	5825	60.97
	322:323	SB I-75 Entrance from Warren	Ramp	182	15	197	198		199	22	221	218	0.20	-	-		199	11	210	203	0.49	-	-		180	11	191	187	
	321:69		Mainline	5323	152	5475	5055	57.40	5859	229	6088	5822	3.45	21	C	57.48	6270	243	6513	6452	0.76	23	C	57.33	5570	251	5821	6015	57.19
	69:70	SB I-75 South of Entrance from Warren	Mainline	5323	152	5475	5044	58.65	5859	229	6088	5826	3.39	20	C	58.69	6270	243	6513	6449	0.79	22	C	58.53	5570	251	5821	6016	58.48
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	5055	120	5175	5035	55.17	5585	175	5760	5709	0.67	26	D	44.18	5378	185	5563	5588	0.33	26	C	43.93	4851	196	5047	5043	56.97
	339:340	NB I-75 Exit to Warren	Ramp	77	14	91	90		89	22	111	111	0.00	-	-		89	23	112	112	0.00	-	-		81	26	107	108	
	324:319		Mainline	4978	106	5084	4918	47.66	5496	153	5649	5586	0.84	32	D	44.93	5289	162	5451	5488	0.50	31	D	45.40	4770	170	4940	4933	48.47
	319:317		Mainline	4978	106	5084	4910	55.04	5496	153	5649	5585	0.85	26	C	55.29	5289	162	5451	5489	0.51	25	C	55.27	4770	170	4940	4934	55.01
	276:277	WB I-94 Entrance from NB I-75	Ramp	398	28	426	413		438	41	479	465	0.64	-	-		408	33	441	443	0.10	-	-		369	35	404	396	
	285:286	EB I-94 Entrance from NB I-75	Ramp	432	20	452	439		478	28	506	489	0.76	-	-		481	23	504	517	0.58	-	-		431	25	456	469	
	315:263	NB I-75 to I-94 Ramp Entrance from NB Frontage	Ramp	0	0	0	0		0	0	0	0	0.00	-	-		0	0	0	0	0.00	-	-		0	0	0	0	
	317:271		Mainline	4148	58	4206	4043	56.71	4580	84	4664	4630	0.50	27	D	56.91	4400	106	4506	4531	0.37	27	D	56.60	3970	110	4080	4070	56.50
	306:305	NB I-75 Entrance from Warren	Ramp	374	14	388	384		410	20	430	425	0.24	-	-		390	11	401	401	0.00	-	-		350	11	361	366	
	271:267		Mainline	4522	72	4594	4397	58.55	4990	104	5094	5049	0.63	29	D	58.81	4790	117	4907	4935	0.40	28	D	58.66	4320	121	4441	4437	58.57
	267:264		Mainline	4522	72	4594	4378	57.50	4990	104	5094	5047	0.66	30	D	57.15	4790	117	4907	4939	0.46	29	D	57.03	4320	121	4441	4436	57.76
	264:250		Mainline	4522	72	4594	4372	51.87	4990	104	5094	5045	0.69	33	D	51.18	4790	117	4907	4942	0.50	33	D	51.28	4320	121	4441	4436	52.17
	250:191		Mainline	4522	72	4594	4363	55.31	4990	104	5094	5043	0.72	31	D	54.67	4790	117	4907	4944	0.53	30	D	55.19	4320	121	4441	4435	55.68
	191:190		Mainline	4522	72	4594	4359	56.04	4990	104	5094	5043	0.72	31	D	54.78	4790	117	4907	4946	0.56	30	D	55.82	4320	121	4441	4434	56.35
	190:248		Mainline	4522	72	4594	4355	53.48	4990	104	5094	5043	0.72	33	D	51.47	4790	117	4907	4946	0.56	32	D	52.92	4320	121	4441	4434	53.92
	300:302	EB I-94 Exit to NB I-75	Ramp	1032	163	1195	1094		1136	237	1373	1384	0.30	-	-		1024	195	1219	1216	0.09	-	-		925	202	1127	1156	
	289:290	WB I-94 Exit to NB I-75	Ramp	577	16	593	537		638	24	662	640	0.86	-	-		458	30	488	522	1.51	-	-		405	31	436	452	
	248:245		Mainline	6131	251	6382	5957	54.50	6764	365	7129	7069	0.71	28	D	51.05	6272	342	6614	6687	0.90	26	C	53.41	5650	354	6004	6041	55.50
	255:256	NB I-75 Exit to Clay	Ramp	1323	7	1330	1210		1460	10	1470	1428	1.10	-	-		1221	13	1234	1261	0.76	-	-		1100	13	1113	1132	
	245:243		Mainline	4808	244	5052	4725	57.75	5304	355	5659	5636	0.31	25	C	57.46	5051	329	5380	5429	0.67	24	C	57.58	4550	341	4891	4911	57.72
	243:237		Mainline	4808	244	5052	4714	58.52	5304	355	5659	5632	0.36	25	C	58.42	5051	329	5380	5429	0.67	24	C	58.34	4550	341	4891	4912	58.44
	240:241	NB I-75 Entrance from Clay	Ramp	122	8	130	129		130	11	141	144	0.25	-	-		130	11	141	140	0.08	-	-		120	11	131	130	
	237:74	NB I-75 north of Entrance from Clay	Mainline	4930	252	5182	4833	57.33	5434	366	5800	5774	0.34	21	C	57.17	5181	340	5521	5569	0.64	20	C	57.21	4670	352	5022	5044	57.26

GEH Stats for I-94	
Max	16.45
	1.88
	161
# Over 5	2
% Under 5	99%

AM78

GEH Stats for I-94	
Max	14.34
Average	2.15
# Under 5	161
# Over 5	2
% Under 5	99%

AM89

PM Period - Build Validation

				PM1415					PM1516					PM1617								PM1718								PM1819				
	Link	Facility	Type	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)
EB I-94	1014:1012	EB I-94 West of I-96	Mainline	5099	428	5527	5394	43.76	5299	374	5673	5667	42.43	5388	297	5685	5709	0.32	35	D	41.90	5466	304	5770	5520	3.33	54	F	26.13	3660	224	3884	4267	41.53
	1018:1019	EB I-94 to SB I-96	Ramp	227	45	272	271		240	40	280	263		240	31	271	274	0.18	-	-		280	22	302	281	1.23	-	-		191	15	206	232	
	1027:1008	EB I-94 to NB I-96	Ramp	900	155	1055	1012		929	137	1066	1055		949	111	1060	1042	0.56	-	-		1449	137	1586	1522	1.62	-	-		966	91	1057	1133	
	1012:1010		Mainline	3972	228	4200	4078	56.08	4130	197	4327	4352	55.77	4199	155	4354	4390	0.54	27	D	55.89	3737	145	3882	3714	2.73	22	C	56.76	2503	118	2621	2916	57.13
	1022:1023	EB I-94 Exit to Grand River	Ramp	227	15	242	233		240	13	253	253		240	10	250	241	0.57	-	-		350	10	360	338	1.18	-	-		235	9	244	269	
	1010:159		Mainline	3745	213	3958	3829	55.83	3890	184	4074	4095	55.77	3959	145	4104	4150	0.72	25	C	55.62	3387	135	3522	3384	2.35	20	C	57.81	2268	109	2377	2649	57.24
	983:982	NB I-96 to EB I-94	Ramp	292	113	405	390		298	99	397	414		308	77	385	389	0.20	-	-		222	50	272	278	0.36	-	-		153	41	194	209	
	159:187		Mainline	4039	326	4365	4217	54.91	4190	283	4473	4509	54.73	4269	222	4491	4540	0.73	21	C	54.98	3611	185	3796	3663	2.18	16	B	57.39	2423	150	2573	2859	57.01
	187:158		Mainline	4039	326	4365	4206	57.92	4190	283	4473	4507	58.01	4269	222	4491	4543	0.77	20	C	57.97	3611	185	3796	3662	2.19	16	B	59.60	2423	150	2573	2861	59.31
	979:158	SB I-96 to EB I-94	Ramp	917	38	955	930		947	31	978	993		966	23	989	1009	0.63	-	-		909	0	909	931	0.73	-	-		601	0	601	643	
	158:186		Mainline	4956	364	5320	5126	55.59	5137	314	5451	5501	55.12	5235	245	5480	5551	0.96	21	C	54.99	4520	185	4705	4589	1.70	16	B	56.81	3024	150	3174	3511	57.21
	186:966		Mainline	4962	365	5327	5120	57.23	5143	315	5458	5499	56.76	5241	246	5487	5551	0.86	20	C	56.69	4526	185	4711	4590	1.77	16	B	58.89	3027	150	3177	3515	59.11
	971:966	EB I-94 Entrance from Linwood	Ramp	167	17	184	188		179	15	194	198		179	13	192	206	0.99	-	-		176	0	176	178	0.15	-	-		124	0	124	131	
	966:959		Mainline	5129	382	5511	5294	57.99	5322	330	5652	5695	57.70	5420	259	5679	5755	1.01	17	B	57.81	4702	185	4887	4773	1.64	14	B	58.66	3151	150	3301	3651	59.03
	975:976	EB I-94 Exit to Trumbull	Ramp	408	12	420	411		419	10	429	446		429	7	436	445	0.43	-	-		447	7	454	440	0.66	-	-		296	6	302	347	
	959:212		Mainline	4721	370	5091	4869	58.00	4903	320	5223	5248	57.10	4991	252	5243	5309	0.91	19	C	57.50	4255	178	4433	4335	1.48	15	B	59.09	2855	144	2999	3309	59.58
	212:951		Mainline	4721	370	5091	4857	60.44	4903	320	5223	5248	59.51	4991	252	5243	5309	0.91	18	C	60.02	4255	178	4433	4335	1.48	14	B	61.16	2855	144	2999	3314	62.40
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	397	14	411	399		408	12	420	414		418	9	427	432	0.24	-	-		349	9	358	361	0.16	-	-		232	7	239	264	
	213:944	EB I-94 Exit to NB Hwy 10	Ramp	643	16	659	604		668	14	682	683		679	10	689	683	0.23	-	-		668	19	687	655	1.24	-	-		451	14	465	522	
	951:943		Mainline	3681	340	4021	3836	54.05	3827	294	4121	4154	54.05	3894	233	4127	4191	0.99	20	C	54.01	3238	150	3388	3321	1.16	16	B	54.58	2172	123	2295	2532	54.69
	943:919		Mainline	3681	340	4021	3819	57.88	3827	294	4121	4156	57.86	3894	233	4127	4191	0.99	19	C	57.93	3238	150	3388	3325	1.09	15	B	58.51	2172	123	2295	2534	58.67
	919:918		Mainline	3681	340	4021	3801	54.87	3827	294	4121	4159	54.95	3894	233	4127	4190	0.98	19	C	55.33	3238	150	3388	3327	1.05	15	B	56.88	2172	123	2295	2539	57.87
	918:912		Mainline	3681	340	4021	3791	53.72	3827	294	4121	4159	53.88	3894	233	4127	4189	0.96	20	C	53.79	3238	150	3388	3329	1.02	15	B	55.42	2172	123	2295	2543	56.60
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	594	13	607	600		614	11	625	630		627	9	636	637	0.04	-	-		650	3	653	670	0.66	-	-		433	3	436	450	
	937:915	EB I-94 Entrance from SB Hwy 10	Ramp	525	41	566	559		545	35	580	593		552	26	578	568	0.42	-	-		586	8	594	622	1.14	-	-		390	6	396	449	
	912:449		Mainline	4800	394	5194	4943	57.96	4986	340	5326	5381	57.22	5073	268	5341	5395	0.74	16	B	57.07	4474	161	4635	4620	0.22	13	B	58.58	2995	132	3127	3444	60.11
	449:910		Mainline	4800	394	5194	4932	62.16	4986	340	5326	5380	61.47	5073	268	5341	5397	0.76	15	B	61.74	4474	161	4635	4621	0.21	12	B	62.85	2995	132	3127	3444	60.11
	910:926	EB I-94 Exit to Brush	Ramp	482	73	555	627		500	65	565	693		511	50	561	689	5.12	-	-		510	18	528	639	4.60	-	-		340	15	355	480	
	910:909		Mainline	4317	321	4638	4286	54.82	4485	275	4760	4688	54.86	4561	218	4779	4710	1.00	15	B	54.94	3963	143	4106	3983	1.93	12	B	55.05	2654	117	2771	2972	55.54
	909:904		Mainline	4317	321	4638	4283	76.48	4485	275	4760	4687	75.56	4561	218	4779	4709	1.02	11	A	75.37	3963	143	4106	3984	1.92	9	A	76.74	2654	117	2771	2972	78.55
	299:314	EB I-94 Exit to SB I-75	Ramp	145	14	159	145		150	13	163	165		150	10	160	173	1.01	-	-		159	10	169	158	0.86	-	-		105	8	113	127	
	300:302	EB I-94 Exit to NB I-75	Ramp	973	97	1070	978		1012	86	1098	1086		1032	69	1101	1137	1.08	-	-		799	60	859	821	1.31	-	-		530	46	576	655	
	904:903		Mainline	3199	210	3409	3140	53.04	3323	176	3499	3436	52.16	3379	139	3518	3400	2.01	13	B	52.69	3005	73	3078	3010	1.23	11	B	53.46	2019	63	2082	2193	54.59
	903:156		Mainline	3199	210	3409	3136	47.97	3323	176	3499	3436	46.12	3379	139	3518	3398	2.04	19	C	46.77	3005	73	3078	3012	1.20	15	B	50.12	2019	63	2082	2195	52.03
	156:890		Mainline	3199	210	3409	3111	41.04	3323	176	3499	3432	38.64	3379	139	3518	3401	1.99	22	C	38.95	3005	73	3078	3021	1.03	15	B	50.47	2019	63	2082	2202	56.82
	900:899	EB I-94 Entrance from Hastings	Ramp	515	3	518	464		534	2	536	551		544	2	546	548	0.09	-	-		441	7	448	485	1.71	-	-		295	6	301	441	
	890:889		Mainline	3714	213	3927	3569	40.46	3857	178	4035	3982	39.99	3923	141	4064	3948	1.83	21	C	39.08	3446	80	3526	3510	0.27	15	B	48.57	2314	69	2383	2644	56.01
	889:881		Mainline	3714	213	3927	3561	38.54	3857	178	4035	3982	38.25	3923	141	4064	3949	1.82	27	D	37.12	3446	80	3526	3513	0.22	20	C	44.95	2314	69	2383	2648	52.06
	881:878		Mainline	3714	213	3927	3551	43.04	3857	178	4035	3980	42.89	3923	141	4064	3949	1.82	24	C	41.68	3446	80	3526	3516	0.17	19	C	47.96	2314	69	2383	2650	55.61
	281:282	EB I-94 Entrance from SB I-75	Ramp	1640	111	1751	1627		1703	93	1796	1783		1734	71	1805	1789	0.38	-	-		1666	52	1718	1617	2.47	-	-		1108	38	1146	1423	
	285:286	EB I-94 Entrance from NB I-75	Ramp	586	26	612	582		604	24	628	642		615	15	630	630	0.00	-	-		841	7	848	844	0.14	-	-		561	6	567	601	
	878:183		Mainline	5940	350	6290	5748	51.16	6164	295	6459	6404	51.01	6272	227	6499	6368	1.63	21	C	50.38	5953	139	6092	5979	1.45	19	C	52.49	3983	113	4096	4677	57.94
	183:876		Mainline	5940	350	6290	5728	57.53	6164	295	6459	6402	57.00	6272	227	6499	6367	1.65	19	C	57.14	5953	139	6092	5982	1.42	18	B	56.87	3983	113	4096	4682	59.30
	886:887	EB I-94 Exit to Chene	Ramp	723	28	751	587		756	24	780	652		764	18	782	663	4.43	-	-		857	14	871	723	5.24	-	-		572	13	585	585	
	876:875		Mainline	5217	322	5539	5134	52.04	5408	271	5679	5750	52.05	5508	209	5717	5704	0.17	22	C	52.14	5096	125	5221	5259	0.52	21	C	51.50	3411	100	3511	4100	51.53
	875:872		Mainline	5217	322	5539	5127	60.81	5408	271	5679	5750	60.89	5508	209	5717	5703	0.19	19	C	60.85	5096	125	5221	5259	0.52	18	B	60.37	3411	100	3511	4103	60.29
	872:869		Mainline	5217	322	5539	5100	58.28	5408	271	5679	5747	58.30	5508	209	5717	5703	0.19	20	C	58.37	5096	125	5221	5266	0.62	18	C	57.81	3411	100	3511	4110	58.03
	870:869	EB I-94 Entrance from Chene St	Ramp	641	11	652	622		656	9	665	689		672	8	680	691	0.42	-	-		571	10	581	578	0.12	-	-		386	8	394	414	
	869:860		Mainline	5858	333	6191	5699	57.56	6064	280	6344	6436	57.31	6180	217	6397	6392	0.06	19	C	57.47	5667	135	5802	5850	0.63	17	B	56.98	3797	108	3905	4530	57.99
	863:864	EB I-94 Exit to Elliot	Ramp	159	26	185	170		165	18	183	199		165	15	180	190	0.74	-	-		185	14	199	214	1.04	-	-		124	12	136	165	
	860:859		Mainline	5699	307	6006	5515	56.67	5899	262	6161	6234	56.53	6015	202	6217	6203	0.18	22	C	56.69	5482	121	5603	5641	0.51	20	C	56.33	3673	96	3769	4367	56.99
	859:369		Mainline	5699	307	6006	5481	54.98	5899	262	6161	6233	54.87	6015	202	6217	6205	0.15	23	C	54.89	5482	121	5603	5646	0.57	21	C	54.58	3673	96	3769	4374	55.13
	369:365		Mainline	5697	307	6004	5468	56.07	5897	262	6159	6232	55.89	6013	202	6215	6207	0.10	23	C	55.96	5480	121	5601	5646	0.60	21	C	55.66	3672	96	3768	4376	56.33
	365:192		Mainline	5697	307	6004	5462	54.55	5897	262	6159	6228	54.31	6013	202	6215	6209	0.08	23	C	54.34	5480	121	5601	5646	0.60	21	C	54.05	3672	96	3768	4381	54.97
	855:192	EB I-94 Entrance from Elliot	Ramp	338	15	353	354		350	12	362	373		362	9	371	389	0.92	-	-		441	7	448	442	0.28	-	-		295	7	302	312	
	192:832		Mainline	6035	322	6357	5790	57.02	6247	274	6521	6601	56.23	6375	211	6586	6595	0.11	20	C	56.00	5921	128	6049	6091	0.54	19	C	54.70	3967	103	4070	4705	58.07
	832:829		Mainline	6035	322	6357	5786	54.06	6247	274	6521	6600	50.90	6375	211	6586	6594	0.10	22	C	50.87	5921	128	6049	6093	0.56	21	C	48.08	3967	103	4070	4708	57.08
	829:848	EB I-94 Exit to Van Dyke	Ramp	241	48	289	302		242	39	281	340		253	31	284	327	2.46	-	-		189	13	202	247	3.00	-	-		130	10	140	188	
	829:827		Mainline	5794	274	6068	5454	43.63	6005	235	6240	6255	38.01	6122	180	6302	6267	0.44	33	D	38.72	5732	115	5847	5857	0.13	32	D	37.01	3837	93	3930	4528	52.86
	827:375		Mainline	5794	274	6068	5435	48.94	6005	235	6240	6254	48.76	6122	180	6302	6267	0.44	26	C	49.05	5732	115	5847	5856	0.12	25	C	47.69	3837	93	3930	4538	51.33
	375:160		Mainline	5794	274	6068	5411	56.38	6005	235	6240	6255	56.37	6122	180	6302	6264	0.48	28	D	56.25	5732	115	5847	5861	0.18	27	D	54.60	3837	93	3930	4542	56.21
	376:842	EB I-94 Entrance from Van Dyke	Ramp	141	11	152	160		145	10	155	158		145	8	153	163	0.80	-	-		124	18	142	149	0.58	-	-		85	12	97	95	
	160:809		Mainline	5935	285	6220	5554	56.09	6150	245	6395	6410	55.61	6267	188	6455	6424	0.39	24	C	55.22	5856	133	5989	6014	0.32	23	C	53.59	3922	105	4027	4640	57.80
	383:382	EB I-94 Exit to Gratiot	Ramp	464	39	503	480		480	31	511	568		491	23	514	544	1.30	-	-		401	17	418	460	2.00	-	-		267	13	280	354	
	809:807		Mainline	5471	246	5717	5059	52.49	5670	214	5884	5839	51.51	5776	165	5941	5879	0.81	30	D	49.96	5455	116	5571	5558	0.17	28	D	49.65	3655	92	3747	4291	57.70
	807:380		Mainline	5471	246	5717	5040	57.31	5670	214	5884	5836	57.00	5776	165	5941	5878	0.82	27	D	54.99	5455	116	5571	5564	0.09	26	C	54.35	3655	92	3747	4294	58.90
	380:806		Mainline	5471	246	5717	5016	56.68	5670	214	5884	5831	56.22	5776	165	5941	5879	0.81	29	D	52.10	5455	116	5571	5574	0.04	27	D	52.57	3655	92	3747	4295	59.37
	823:824	EB I-94 Entrance from Gratiot	Ramp	755	28	783	769		792	25	817	831		802	19	821	818	0.10	-	-		980	10	990	952	1.22	-	-		654	7	661	739	
	806:803		Mainline	6226	274	6500	5773	51.20	6462	239	6701	6663	49.63	6578	184	6762	6696	0.80	30	D	44.58	6435	126	6561	6529	0.40	28	D	46.32	4309	99	4408	5038	57.32
	803:800		Mainline	6226	274	6500	5760	52.16	6462	239	6701	6666	49.51	6578	184	6762	6688	0.90	33	D	41.72	6435	126	6561	6540	0.26	31	D	43.01	4309	99	4408	5039	55.98
	800:6208		Mainline	6226	274	6500	5750	55.16	6462	239	6701	6662	50.93	6578	184	6762	6685	0.94	33	D	41.23	6435	126	6561	6546	0.19	31	D	43.09	4309	99	4408	5041	57.86
	6208:6214		Mainline	6226	274	6500	5721	57.59	6462	239	6701	6653	53.34	6578	184	6762	6686	0.93	29	D	47.27	6435	126	6561	6554	0.09	26	D	50.80	4309	99	4408	5057	58.92
	6214:6215		Mainline	6221	273	6494	5717	58.72	6457	238	6695	6651	53.55	6573	184	6757	6686	0.87	28	D	48.47	6429	126	6555	6554	0.01	25	C	52.89	4306	99	4405	5058	60.85
	6215:6220		Mainline	6221	273	6494	5713	60.99	6457	238	6695	6648	54.96	6573	184	6757	6686	0.87	27	D	50.19	6429	126	6555	6555	0.00	24	C	54.47	4306	99	4405	5061	63.75
	6220:392	EB I-94 Exit to Conner	Ramp	225	41	266	249		239	33	272	299		239	27	266	290	1.44	-	-		263	17	280	294	0.83	-	-		176	13	189	259	
	6220:395		Mainline	5996	232	6228	5454	52.45	6218	205	6423	6347	46.03	6334	157	6491	6395	1.20	38	E	42.85	6166	109	6275	6268	0.09	34	D	46.66	4130	86	4216	4805	55.88
	395:6229		Mainline	5996	232	6228	5432	51.12	6218	205	6423	6333	43.49	6334	157	6491	6396	1.18	52	F	41.50	6166	109	6275	6280	0.06	46	F	46.04	4130	86	4216	4811	55.96
	6229:6232		Mainline	5996	232	6228	5418	48.70	6218	205	6423	6331	42.44	6334	157	6491	6396	1.18	53	F	40.70	6166	109	6275	6287	0.15	46	F	45.62	4130	86	4216	4814	54.81
	6232:194		Mainline	5996	232	6228	5407	47.48	6218	205	6423	6329	42.93	6334	157	6491	6395	1.20	51	F	42.25	6166	109	6275	6292	0.21	45	F	46.69	4130	86	4216	4816	55.08
	6248:194	EB I-94 Entrance from Conner	Ramp	445	29	474	450		460	26	486	498		470	20	490	481	0.41	-	-		380	10	390	385	0.25	-	-		252	8	260	260	
	194:195		Mainline	6441	261	6702	5849	46.21	6678	231	6909	6825	42.59	6804	177	6981	6874	1.29	42	E	41.84	6546	119	6665	6681	0.20	36	E	46.34	4382	94	4476	5081	55.15
	195:6234		Mainline	6441	261	6702	5836	46.62	6678	231	6909	6822	43.46	6804	177	6981	6875	1.27	40	E	43.07	6546	119	6665	6686	0.26	36	E	47.27	4382	94	4476	5084	56.97
	6234:6238		Mainline	6441	261	6702	5795	43.79	6678	231	6909	6816	42.08	6804	177	6981	6880	1.21	55	F	42.09	6546	119	6665	6691	0.32	50	F	44.77	4382	94	4476	5095	53.38
	6238:6239	EB I-94 East of Conner	Mainline	6441	261	6702	5745	49.50	6678	231	6909	6820	48.75	6804	177	6981	6876	1.26	48	F	48.82	6546	119	6665	6699	0.42	46	F	49.29	4382	94	4476	5107	52.74
WB I-94	6237:394	WB I-94 East of Conner	Mainline	4298	383	4681	4457	54.65	4477	339	4816	4813	54.45	4556	314	4870	4866	0.06	31	D	54.20	4846	231	5077	5070	0.10	33	D	52.87	3240	170	3410	3482	55.47
	394:6233		Mainline	4298	383	4681	4454	47.41	4477	339	4816	4811	47.44	4556	314	4870	4865	0.07	27	D	47.31	4846	231	5077	5069	0.11	29	D	44.52	3240	170	3410	3485	47.16
	6233:6230		Mainline	4298	383	4681	4452	56.26	4477	339	4816	4810	56.11	4556	314	4870	4863	0.10	22	C	55.92	4846	231	5077	5069	0.11	26	D	49.65	3240	170	3410	3485	53.45
	6230:6246	WB I-94 Exit to Conner	Ramp	285	10	295	290		304	10	314	318		304	6	310	308	0.11	-	-		414	11	425	409	0.78	-	-		279	9	288	308	
	6230:6228		Mainline	4013	373	4386	4147	57.91	4173	329	4502	4494	57.97	4252	308	4560	4557	0.04	27	D	57.79	4432	220	4652	4652	0.00	27	D	57.90	2961	161	3122	3187	58.52
	6228:161		Mainline	4013	373	4386	4132	55.99	4173	329	4502	4492	55.99	4252	308	4560	4558	0.03	21	C	55.90	4432	220	4652	4655	0.04	21	C	56.06	2961	161	3122	3189	56.61
	161:205		Mainline	4013	373	4386	4127	56.97	4173	329	4502	4491	56.94	4252	308	4560	4559	0.01	21	C	56.80	4432	220	4652	4653	0.01	21	C	56.87	2961	161	3122	3191	57.80
	6218:6217	WB I-94 Entrance from Conner	Ramp	13	1	14	13		14	1	15	16		14	0	14	12	0.55	-	-		14	1	15	14	0.26	-	-		9	1	10	10	
	205:206		Mainline	4119	381	4500	4259	57.11	4279	334	4613	4632	57.05	4358	312	4670	4696	0.38	17	B	56.82	4547	220	4767	4806	0.56	17	B	56.52	3042	161	3203	3300	57.86
	206:801		Mainline	4119	381	4500	4237	59.69	4279	334	4613	4633	59.68	4358	312	4670	4688	0.26	16	B	59.60	4547	220	4767	4810	0.62	17	B	59.52	3042	161	3203	3310	60.04
	801:204		Mainline	4119	381	4500	4228	61.07	4279	334	4613	4634	61.08	4358	312	4670	4686	0.23	16	B	61.07	4547	220	4767	4812	0.65	16	B	61.03	3042	161	3203	3310	61.58
	391:390	WB I-94 Exit to Gratiot	Ramp	151	9	160	153		157	6	163	170		157	5	162	164	0.16	-	-		157	10	167	167	0.00	-	-		104	8	112	113	
	204:804		Mainline	3968	372	4340	4055	55.57	4122	328	4450	4463	55.56	4201	307	4508	4519	0.16	21	C	55.57	4390	210	4600	4650	0.74	21	C	55.54	2938	153	3091	3206	56.16
	804:202		Mainline	3968	372	4340	4035	58.07	4122	328	4450	4462	58.02	4201	307	4508	4516	0.12	20	C	58.06	4390	210	4600	4650	0.74	20	C	58.03	2938	153	3091	3220	58.84
	815:816	WB I-94 Entrance from Gratiot	Ramp	749	37	786	789		784	28	812	845		796	25	821	846	0.87	-	-		593	6	599	658	2.35	-	-		402	6	408	433	
	202:201		Mainline	4717	409	5126	4815	53.03	4906	356	5262	5306	52.97	4997	332	5329	5363	0.47	21	C	53.14	4983	216	5199	5307	1.49	20	C	53.27	3340	159	3499	3657	54.35
	201:810		Mainline	4717	409	5126	4802	57.81	4906	356	5262	5306	57.67	4997	332	5329	5363	0.47	19	C	57.75	4983	216	5199	5309	1.52	19	C	57.91	3340	159	3499	3660	58.55
	837:838	WB I-94 Exit to Van Dyke	Ramp	159	31	190	183		166	25	191	194		167	19	186	181	0.37	-	-		184	9	193	190	0.22	-	-		126	7	133	145	
	810:828		Mainline	4558	378	4936	4601	54.99	4740	331	5071	5106	54.71	4830	313	5143	5184	0.57	25	C	54.48	4799	207	5006	5123	1.64	24	C	55.03	3214	152	3366	3519	57.15
	828:830		Mainline	4558	378	4936	4590	55.37	4740	331	5071	5103	55.46	4830	313	5143	5180	0.52	24	C	55.23	4799	207	5006	5125	1.67	24	C	55.63	3214	152	3366	3526	57.27
	830:200		Mainline	4558	378	4936	4571	54.65	4740	331	5071	5102	54.69	4830	313	5143	5175	0.45	25	C	54.31	4799	207	5006	5128	1.71	24	C	54.91	3214	152	3366	3534	55.76
	846:374	WB I-94 Entrance from Van Dyke	Ramp	325	30	355	393		327	26	353	394		339	25	364	399	1.79	-	-		317	0	317	355	2.07	-	-		215	0	215	252	
	200:831		Mainline	4883	408	5291	4961	54.26	5067	357	5424	5494	54.45	5169	338	5507	5576	0.93	22	C	53.41	5116	207	5323	5485	2.20	21	C	54.56	3429	152	3581	3786	56.22
	831:835		Mainline	4883	408	5291	4926	56.54	5067	357	5424	5497	56.66	5169	338	5507	5572	0.87	20	C	56.45	5116	207	5323	5491	2.28	20	C	56.83	3429	152	3581	3792	57.88
	835:367	WB I-94 Exit to Elliot	Ramp	406	15	421	400		427	12	439	470		428	10	438	462	1.13	-	-		357	10	367	396	1.48	-	-		242	9	251	272	
	835:366		Mainline	4477	393	4870	4519	53.18	4640	345	4985	5030	53.57	4741	328	5069	5107	0.53	25	C	53.28	4759	197	4956	5096	1.97	24	C	53.88	3187	143	3330	3521	54.55
	366:199		Mainline	4477	393	4870	4506	54.35	4640	345	4985	5033	55.12	4741	328	5069	5105	0.50	24	C	54.83	4759	197	4956	5099	2.02	24	C	55.14	3187	143	3330	3520	57.09
	199:858		Mainline	4477	393	4870	4481	53.67	4640	345	4985	5036	53.81	4741	328	5069	5102	0.46	24	C	53.93	4759	197	4956	5099	2.02	24	C	54.06	3187	143	3330	3524	55.62
	866:867	WB I-94 Entrance from Elliot	Ramp	322	13	335	344		337	10	347	330		341	10	351	362	0.58	-	-		276	0	276	295	1.12	-	-		185	0	185	183	
	858:873		Mainline	4799	406	5205	4800	57.70	4977	355	5332	5364	57.74	5082	338	5420	5469	0.66	24	C	57.86	5035	197	5232	5389	2.15	24	C	57.81	3372	143	3515	3717	58.25
	873:874		Mainline	4799	406	5205	4754	54.06	4977	355	5332	5364	54.13	5082	338	5420	5467	0.64	26	C	54.96	5035	197	5232	5399	2.29	25	C	54.59	3372	143	3515	3733	56.54
	885:874	WB I-94 Entrance from Chene	Ramp	638	18	656	648		658	17	675	704		670	15	685	709	0.91	-	-		407	9	416	456	1.92	-	-		276	7	283	286	
	874:877		Mainline	5437	424	5861	5381	59.11	5635	372	6007	6066	59.20	5752	353	6105	6171	0.84	21	C	59.19	5442	206	5648	5862	2.82	20	C	59.55	3648	150	3798	4026	60.33
	288:289	WB I-94 Exit to NB I-75	Ramp	974	53	1027	948		1013	46	1059	1088		1032	35	1067	1067	0.00	-	-		812	28	840	896	1.90	-	-		550	20	570	603	
	288:292	WB I-94 Exit to SB I-75	Ramp	917	130	1047	919		948	113	1061	1031		967	91	1058	1051	0.22	-	-		947	50	997	1009	0.38	-	-		632	36	668	706	
	877:880		Mainline	3546	241	3787	3498	53.66	3674	213	3887	3950	53.69	3753	227	3980	4051	1.12	19	C	53.59	3683	128	3811	3961	2.41	19	C	53.78	2466	94	2560	2718	54.10
	880:891		Mainline	3546	241	3787	3494	64.68	3674	213	3887	3950	64.82	3753	227	3980	4050	1.10	16	B	64.52	3683	128	3811	3963	2.44	16	B	64.45	2466	94	2560	2717	65.30
	891:895	WB I-94 Exit to Hastings	Ramp	385	11	396	385		397	11	408	439		407	8	415	455	1.92	-	-		377	9	386	414	1.40	-	-		257	7	264	293	
	891:902		Mainline	3161	230	3391	3087	57.68	3277	202	3479	3508	57.68	3346	219	3565	3593	0.47	16	B	57.64	3306	119	3425	3558	2.25	16	B	57.61	2209	87	2296	2429	58.02
	902:188		Mainline	3161	230	3391	3083	57.84	3277	202	3479	3506	57.71	3346	219	3565	3593	0.47	16	B	57.33	3306	119	3425	3557	2.23	16	B	57.33	2209	87	2296	2433	58.16
	277:259	WB I-94 Entrance from NB I-75	Ramp	301	12	313	302		311	12	323	328		320	10	330	339	0.49	-	-		90	9	99	106	0.69	-	-		62	6	68	67	
	353:278	WB I-94 Entrance from SB I-75	Ramp	638	51	689	620		660	43	703	671		671	41	712	696	0.60	-	-		1030	61	1091	917	5.49	-	-		686	45	731	940	
	188:189		Mainline	4100	293	4393	3997	60.03	4248	257	4505	4503	60.07	4337	270	4607	4628	0.31	13	B	59.88	4426	189	4615	4577	0.56	13	B	59.88	2957	138	3095	3444	60.22
	189:905		Mainline	4100	293	4393	3993	59.16	4248	257	4505	4500	58.94	4337	270	4607	4631	0.35	14	B	58.73	4426	189	4615	4576	0.58	13	B	58.91	2957	138	3095	3447	59.26
	905:908		Mainline	4100	293	4393	3987	57.43	4248	257	4505	4502	57.15	4337	270	4607	4630	0.34	17	B	57.20	4426	189	4615	4577	0.56	16	B	57.14	2957	138	3095	3449	57.30
	908:911		Mainline	4100	293	4393	3987	59.01	4248	257	4505	4502	59.05	4337	270	4607	4630	0.34	16	B	58.95	4426	189	4615	4577	0.56	16	B	58.90	2957	138	3095	3449	59.11
	929:930	WB I-94 Entrance from Brush	Ramp	767	61	828	772		798	51	849	837		814	45	859	866	0.24	-	-		894	66	960	966	0.19	-	-		596	49	645	703	
	911:450		Mainline	4867	354	5221	4740	56.42	5046	308	5354	5335	56.80	5151	315	5466	5502	0.49	20	C	56.48	5320	255	5575	5542	0.44	20	C	56.16	3553	187	3740	4154	57.69
	450:26		Mainline	4867	354	5221	4736	56.88	5046	308	5354	5335	57.34	5151	315	5466	5501	0.47	20	C	56.67	5320	255	5575	5543	0.43	20	C	56.64	3553	187	3740	4154	57.69
	26:913		Mainline	4867	354	5221	4732	70.09	5046	308	5354	5336	69.82	5151	315	5466	5500	0.46	16	B	68.93	5320	255	5575	5543	0.43	16	B	69.28	3553	187	3740	4156	71.03
	220:921	WB I-94 Exit to NB Hwy 10	Ramp	1025	67	1092	975		1054	57	1111	1099		1077	46	1123	1121	0.06	-	-		1027	38	1065	1083	0.55	-	-		690	28	718	778	
	220:932	WB I-94 Exit to SB Hwy 10	Ramp	469	54	523	465		484	46	530	523		494	36	530	542	0.52	-	-		567	28	595	611	0.65	-	-		380	23	403	434	
	913:30		Mainline	3373	233	3606	3278	51.82	3508	205	3713	3717	51.66	3580	233	3813	3835	0.36	20	C	50.42	3726	189	3915	3851	1.03	19	C	51.45	2483	136	2619	2944	52.13
	30:923		Mainline	3373	233	3606	3274	54.67	3508	205	3713	3714	53.91	3580	233	3813	3836	0.37	19	C	51.14	3726	189	3915	3853	0.99	18	C	53.66	2483	136	2619	2947	56.80
	923:924		Mainline	3373	233	3606	3263	57.91	3508	205	3713	3714	57.87	3580	233	3813	3838	0.40	17	B	56.80	3726	189	3915	3850	1.04	17	B	57.46	2483	136	2619	2950	58.94
	924:185		Mainline	3373	233	3606	3245	59.21	3508	205	3713	3715	59.10	3580	233	3813	3839	0.42	17	B	58.83	3726	189	3915	3848	1.08	17	B	58.88	2483	136	2619	2952	59.59
	350:942	WB I-94 Entrance from SB Hwy 10	Ramp	944	63	1007	964		979	55	1034	1021		1000	50	1050	1018	1.00	-	-		890	49	939	1000	1.96	-	-		600	35	635	688	
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	846	13	859	832		871	11	882	882		890	11	901	893	0.27	-	-		711	11	722	732	0.37	-	-		478	6	484	471	
	185:954		Mainline	5159	309	5468	5025	54.86	5354	271	5625	5620	52.31	5466	294	5760	5751	0.12	19	C	52.44	5324	249	5573	5582	0.12	18	C	52.64	3559	177	3736	4113	59.76
	954:3607		Mainline	5159	309	5468	5017	54.20	5354	271	5625	5622	52.74	5466	294	5760	5752	0.11	19	C	52.81	5324	249	5573	5580	0.09	18	B	53.00	3559	177	3736	4116	57.67
	3607:955		Mainline	5159	309	5468	5013	67.29	5354	271	5625	5620	67.17	5466	294	5760	5752	0.11	15	B	66.42	5324	249	5573	5581	0.11	14	B	67.01	3559	177	3736	4117	68.10
	955:197		Mainline	5159	309	5468	5000	53.90	5354	271	5625	5620	54.17	5466	294	5760	5752	0.11	22	C	53.01	5324	249	5573	5582	0.12	21	C	54.14	3559	177	3736	4122	56.49
	223:224	WB I-94 Entrance from Trumbull	Ramp	1202	10	1212	1040		1252	9	1261	1101		1271	9	1280	1099	5.25	-	-		1044	10	1054	1018	1.12	-	-		696	9	705	928	
	197:196		Mainline	6361	319	6680	6029	54.19	6606	280	6886	6720	52.83	6737	303	7040	6848	2.30	23	C	50.35	6368	259	6627	6605	0.27	21	C	53.31	4255	186	4441	5051	56.13
	196:961		Mainline	6361	319	6680	6019	58.37	6606	280	6886	6720	54.56	6737	303	7040	6845	2.34	23	C	50.47	6368	259	6627	6608	0.23	20	C	55.30	4255	186	4441	5054	59.60
	961:964		Mainline	6361	319	6680	6013	62.05	6606	280	6886	6720	55.86	6737	303	7040	6841	2.39	23	C	49.64	6368	259	6627	6614	0.16	20	C	56.85	4255	186	4441	5055	63.34
	964:967	WB I-94 Exit to Linwood	Ramp	100	22	122	133		100	17	117	142		100	15	115	140	2.21	-	-		84	7	91	121	2.91	-	-		54	6	60	81	
	964:974		Mainline	6261	297	6558	5856	52.28	6506	263	6769	6577	43.94	6637	288	6925	6687	2.88	36	E	38.02	6284	252	6536	6517	0.24	29	D	46.57	4201	180	4381	4977	56.98
	974:994		Mainline	6261	297	6558	5829	47.96	6506	263	6769	6569	41.48	6637	288	6925	6677	3.01	35	D	39.21	6284	252	6536	6542	0.07	29	D	46.47	4201	180	4381	4985	58.53
	1001:1002	WB I-94 Exit to SB I-96	Ramp	863	27	890	787		890	25	915	926		910	66	976	963	0.42	-	-		883	64	947	989	1.35	-	-		597	42	639	688	
	1001:1004	WB I-94 Exit to NB I-96	Ramp	866	75	941	848		893	64	957	961		911	66	977	957	0.64	-	-		879	68	947	982	1.13	-	-		597	46	643	697	
	994:225		Mainline	4535	195	4730	4171	41.74	4726	174	4900	4683	36.73	4819	156	4975	4753	3.18	34	D	35.98	4526	120	4646	4577	1.02	28	D	41.25	3010	92	3102	3607	53.44
	225:995		Mainline	4535	195	4730	4161	70.27	4726	174	4900	4684	66.19	4819	156	4975	4753	3.18	24	C	68.03	4526	120	4646	4578	1.00	23	C	68.21	3010	92	3102	3610	78.75
	999:998	WB I-94 Entrance from Linwood	Ramp	133	68	201	194		136	57	193	203		136	8	144	149	0.41	-	-		174	8	182	181	0.07	-	-		118	7	125	133	
	162:1011		Mainline	4668	263	4931	4330	50.26	4862	231	5093	4887	48.65	4955	164	5119	4903	3.05	33	D	50.99	4700	128	4828	4762	0.95	33	D	48.61	3128	99	3227	3752	55.87
	990:991	WB I-94 Entrance from SB I-96	Ramp	209	11	220	214		220	11	231	226		220	10	230	232	0.13	-	-		291	10	301	292	0.52	-	-		192	6	198	205	
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	673	113	786	761		700	100	800	823		710	90	800	801	0.04	-	-		730	83	813	813	0.00	-	-		487	69	556	569	
	1011:1013	WB I-94 West of I-96	Mainline	5550	387	5937	5282	47.93	5782	342	6124	5939	46.18	5885	264	6149	5935	2.75	31	D	49.12	5721	221	5942	5869	0.95	32	D	47.06	3807	174	3981	4533	54.39

PM Period - Build Validation

	Link	Facility	Type	PM1415					PM1516					PM1617								PM1718								PM1819				
				Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	3968	489	4457	4365	70.35	4123	431	4554	4551	70.48	4192	337	4529	4562	0.49	17	B	70.52	4195	365	4560	4571	0.16	17	B	70.63	2798	255	3053	3095	72.56
	1614:1615		Mainline	3968	489	4457	4358	67.09	4123	431	4554	4548	67.19	4192	337	4529	4566	0.55	18	B	67.26	4195	365	4560	4569	0.13	18	B	67.21	2798	255	3053	3097	68.23
	1615:1618	SB I-96 Exit to Grand	Ramp	309	44	353	355		320	38	358	359		330	30	360	364	0.21	-	-		330	30	360	367	0.37	-	-		217	23	240	242	
	1615:1599		Mainline	3659	445	4104	3997	53.27	3803	393	4196	4189	53.28	3862	307	4169	4203	0.53	20	C	53.24	3865	335	4200	4200	0.00	20	C	53.36	2581	232	2813	2859	53.95
	1599:1597		Mainline	3659	445	4104	3977	57.46	3803	393	4196	4191	57.52	3862	307	4169	4198	0.45	19	C	57.43	3865	335	4200	4199	0.02	19	C	57.53	2581	232	2813	2867	58.41
	1597:1595		Mainline	3659	445	4104	3967	58.30	3803	393	4196	4191	58.35	3862	307	4169	4198	0.45	19	C	58.27	3865	335	4200	4201	0.02	19	C	58.34	2581	232	2813	2868	58.90
	1595:1593		Mainline	3659	445	4104	3965	59.21	3803	393	4196	4191	59.24	3862	307	4169	4197	0.43	18	C	59.16	3865	335	4200	4203	0.05	18	C	59.37	2581	232	2813	2869	60.06
	1607:1593	SB I-96 Entrance from Grand	Ramp	449	63	512	510		463	56	519	530		474	44	518	521	0.13	-	-		474	44	518	511	0.31	-	-		318	29	347	358	
	1593:1591		Mainline	4108	508	4616	4467	56.00	4266	449	4715	4723	56.25	4336	351	4687	4715	0.41	18	B	55.59	4339	379	4718	4713	0.07	17	B	56.18	2899	261	3160	3229	58.45
	1591:1589		Mainline	4108	508	4616	4461	58.05	4266	449	4715	4721	57.90	4336	351	4687	4715	0.41	17	B	57.28	4339	379	4718	4717	0.01	17	B	58.01	2899	261	3160	3231	60.92
	990:991	WB I-94 Entrance from SB I-96	Ramp	209	11	220	214		220	11	231	226		220	10	230	232	0.13	-	-		291	10	301	292	0.52	-	-		192	6	198	205	
	209:979	SB I-96 to EB I-94	Ramp	917	38	955	931		947	31	978	994		966	23	989	1011	0.70	-	-		909	0	909	931	0.73	-	-		601	0	601	643	
	1589:1577		Mainline	2986	460	3446	3290	56.57	3103	407	3510	3506	56.43	3154	318	3472	3466	0.10	16	B	56.51	3144	369	3513	3500	0.22	16	B	56.43	2109	255	2364	2388	57.29
	1577:1574		Mainline	2986	460	3446	3273	58.48	3103	407	3510	3506	58.53	3154	318	3472	3464	0.14	16	B	58.54	3144	369	3513	3503	0.17	16	B	58.59	2109	255	2364	2393	59.25
	1583:1584	SB I-96 Exit to Warren	Ramp	203	28	231	229		213	25	238	239		213	19	232	235	0.20	-	-		214	19	233	240	0.46	-	-		143	15	158	159	
	1574:1573		Mainline	2783	432	3215	3039	54.56	2890	382	3272	3265	54.52	2941	299	3240	3231	0.16	16	B	54.56	2930	350	3280	3262	0.31	16	B	54.62	1966	240	2206	2236	55.23
	1573:1554		Mainline	2783	432	3215	3029	59.22	2890	382	3272	3266	59.14	2941	299	3240	3233	0.12	14	B	59.21	2930	350	3280	3262	0.31	15	B	59.24	1966	240	2206	2239	59.96
	1018:1019	EB I-94 to SB I-96	Ramp	227	45	272	271		240	40	280	263		240	31	271	274	0.18	-	-		280	22	302	281	1.23	-	-		191	15	206	232	
	1001:1002	WB I-94 Exit to SB I-96	Ramp	863	27	890	787		890	25	915	926		910	66	976	963	0.42	-	-		883	64	947	989	1.35	-	-		597	42	639	688	
	1558:1559	SB I-96 Entrance from Warren	Ramp	591	86	677	674		610	77	687	706		619	60	679	676	0.12	-	-		570	45	625	628	0.12	-	-		383	38	421	420	
	153:1552	SB I-96 South of Entrance from Warren	Mainline	4464	590	5054	4711	57.05	4630	524	5154	5160	56.93	4710	456	5166	5137	0.40	19	C	56.96	4663	491	5154	5162	0.11	19	C	56.76	3137	335	3472	3598	58.05
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	4266	509	4775	4676	52.58	4428	450	4878	4903	52.49	4509	357	4866	4885	0.27	19	C	52.53	4513	385	4898	4874	0.34	19	C	52.61	3015	270	3285	3312	53.54
	1568:1569	NB I-96 Exit to Warren	Ramp	555	72	627	602		580	64	644	640		590	50	640	641	0.04	-	-		600	50	650	635	0.59	-	-		400	38	438	442	
	1553:1555		Mainline	3711	437	4148	4056	56.49	3848	386	4234	4263	56.47	3919	307	4226	4246	0.31	16	B	56.50	3913	335	4248	4239	0.14	16	B	56.77	2615	232	2847	2877	57.89
	983:982	NB I-96 to EB I-94	Ramp	292	113	405	390		298	99	397	414		308	77	385	389	0.20	-	-		222	50	272	278	0.36	-	-		153	41	194	209	
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	673	113	786	761		700	100	800	823		710	90	800	801	0.04	-	-		730	83	813	813	0.00	-	-		487	69	556	569	
	1555:1572		Mainline	2746	211	2957	2882	59.38	2850	187	3037	3031	59.28	2901	140	3041	3047	0.11	13	B	59.12	2961	202	3163	3152	0.20	14	B	59.19	1975	122	2097	2109	60.23
	1580:1579	NB I-96 Entrance from Warren	Ramp	527	71	598	588		550	62	612	613		560	50	610	593	0.69	-	-		570	57	627	639	0.48	-	-		383	38	421	419	
	1575:1576		Mainline	3273	282	3555	3446	59.07	3400	249	3649	3644	59.23	3461	190	3651	3639	0.20	16	B	59.20	3531	259	3790	3788	0.03	17	B	58.42	2358	160	2518	2540	59.74
	1576:1588		Mainline	3273	282	3555	3441	61.73	3400	249	3649	3643	62.05	3461	190	3651	3640	0.18	15	B	62.01	3531	259	3790	3788	0.03	17	B	58.53	2358	160	2518	2543	62.45
	1001:1004	WB I-94 Exit to NB I-96	Ramp	866	75	941	848		893	64	957	961		911	66	977	957	0.64	-	-		879	68	947	982	1.13	-	-		597	46	643	697	
	1027:1008	EB I-94 to NB I-96	Ramp	900	155	1055	1012		929	137	1066	1055		949	111	1060	1042	0.56	-	-		1449	137	1586	1522	1.62	-	-		966	91	1057	1133	
	1588:1590		Mainline	5039	512	5551	5279	48.36	5222	450	5672	5659	49.63	5321	367	5688	5640	0.64	24	C	49.32	5859	464	6323	6275	0.60	49	F	26.34	3921	297	4218	4388	49.08
	1590:1592		Mainline	5039	512	5551	5272	52.48	5222	450	5672	5659	52.80	5321	367	5688	5640	0.64	22	C	53.50	5859	464	6323	6272	0.64	35	D	37.53	3921	297	4218	4391	53.74
	1602:1603	NB I-96 Exit to Grand	Ramp	518	59	577	541		541	51	592	591		551	40	591	594	0.12	-	-		551	40	591	583	0.33	-	-		366	31	397	418	
	1592:1594		Mainline	4521	453	4974	4723	54.89	4681	399	5080	5067	55.03	4770	327	5097	5047	0.70	23	C	56.06	5308	424	5732	5684	0.64	41	E	36.00	3555	266	3821	3983	54.75
	1594:1596		Mainline	4521	453	4974	4702	38.46	4681	399	5080	5068	37.96	4770	327	5097	5044	0.74	33	D	38.89	5308	424	5732	5679	0.70	60	F	24.59	3555	266	3821	4003	42.51
	1596:1598		Mainline	4521	453	4974	4672	53.90	4681	399	5080	5073	53.57	4770	327	5097	5041	0.79	24	C	53.69	5308	424	5732	5677	0.73	27	D	53.92	3555	266	3821	4013	53.99
	1610:1611	NB I-96 Entrance from Grand	Ramp	464	57	521	537		480	50	530	523		490	40	530	523	0.31	-	-		490	45	535	543	0.34	-	-		330	30	360	359	
	1613:50	NB I-96 north of Entrance from Grand	Mainline	4985	510	5495	5173	57.95	5161	449	5610	5595	57.88	5260	367	5627	5562	0.87	25	C	57.91	5798	469	6267	6219	0.61	28	D	57.84	3885	296	4181	4385	57.66
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	5426	316	5742	5561	29.28	5636	278	5914	5770	27.62	5738	219	5957	5726	3.02	49	F	29.52	5427	167	5594	5811	2.87	48	F	30.97	3622	125	3747	4094	48.29
	60:1405		Mainline	5426	316	5742	5546	27.52	5636	278	5914	5769	26.19	5738	219	5957	5725	3.04	53	F	27.46	5427	167	5594	5815	2.93	51	F	29.15	3622	125	3747	4101	47.98
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	519	132	651	613		540	116	656	649		550	91	641	612	1.16	-	-		480	72	552	593	1.71	-	-		322	54	376	398	
	1405:1434		Mainline	4907	184	5091	4900	33.44	5096	162	5258	5122	32.33	5188	128	5316	5113	2.81	52	F	33.34	4947	95	5042	5230	2.62	52	F	34.13	3300	71	3371	3712	50.80
	1434:1407		Mainline	4907	184	5091	4886	49.20	5096	162	5258	5123	48.01	5188	128	5316	5113	2.81	27	D	48.65	4947	95	5042	5232	2.65	28	D	46.71	3300	71	3371	3716	51.86
	1407:1422		Mainline	4907	184	5091	4874	58.08	5096	162	5258	5121	56.44	5188	128	5316	5114	2.80	23	C	56.97	4947	95	5042	5232	2.65	27	D	48.98	3300	71	3371	3722	59.02
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	900	24	924	925		938	21	959	987		951	21	972	996	0.77	-	-		1149	21	1170	1185	0.44	-	-		784	14	798	825	
	1422:939		Mainline	5807	208	6015	5786	51.86	6034	183	6217	6110	50.80	6139	149	6288	6109	2.27	24	C	51.54	6096	116	6212	6416	2.57	31	D	41.68	4084	85	4169	4552	55.28
	350:942	WB I-94 Entrance from SB Hwy 10	Ramp	944	63	1007	964		979	55	1034	1021		1000	50	1050	1018	1.00	-	-		890	49	939	1000	1.96	-	-		600	35	635	688	
	937:915	EB I-94 Entrance from SB Hwy 10	Ramp	525	41	566	559		545	35	580	593		552	26	578	568	0.42	-	-		586	8	594	622	1.14	-	-		390	6	396	449	
	939:940		Mainline	4338	104	4442	4246	47.46	4510	93	4603	4496	46.29	4587	73	4660	4521	2.05	32	D	47.75	4620	59	4679	4791	1.63	38	E	42.01	3094	44	3138	3425	49.86
	940:1431		Mainline	4338	104	4442	4237	55.07	4510	93	4603	4496	54.57	4587	73	4660	4520	2.07	28	D	54.97	4620	59	4679	4793	1.66	30	D	53.54	3094	44	3138	3425	54.85
	1431:337		Mainline	4338	104	4442	4236	68.52	4510	93	4603	4495	68.33	4587	73	4660	4519	2.08	22	C	68.45	4620	59	4679	4794	1.67	24	C	67.46	3094	44	3138	3426	69.12
	337:336		Mainline	4338	104	4442	4231	50.23	4510	93	4603	4495	50.15	4587	73	4660	4519	2.08	23	C	50.17	4620	59	4679	4795	1.69	25	C	48.97	3094	44	3138	3426	49.05
	336:338	SB Hwy 10 Exit to Forest	Ramp	851	13	864	812		883	12	895	872		901	9	910	872	1.27	-	-		966	9	975	993	0.57	-	-		643	7	650	717	
	336:1435		Mainline	3487	91	3578	3411	58.95	3627	81	3708	3623	59.12	3686	64	3750	3647	1.69	21	C	58.87	3654	50	3704	3800	1.57	22	C	59.14	2451	37	2488	2713	58.28
	1435:1441		Mainline	3487	91	3578	3397	58.54	3627	81	3708	3622	58.77	3686	64	3750	3651	1.63	21	C	58.58	3654	50	3704	3799	1.55	22	C	58.94	2451	37	2488	2712	58.01
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	397	14	411	399		408	12	420	414		418	9	427	432	0.24	-	-		349	9	358	361	0.16	-	-		232	7	239	264	
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	469	54	523	464		484	46	530	523		494	36	530	542	0.52	-	-		567	28	595	612	0.69	-	-		380	23	403	434	
	1441:1442		Mainline	4353	159	4512	4249	53.68	4519	139	4658	4560	53.70	4598	109	4707	4623	1.23	17	B	53.57	4570	87	4657	4773	1.69	18	B	53.89	3063	67	3130	3412	53.64
	1442:1443		Mainline	4353	159	4512	4242	60.85	4519	139	4658	4561	60.89	4598	109	4707	4623	1.23	15	B	60.77	4570	87	4657	4772	1.67	16	B	60.95	3063	67	3130	3416	60.94
	1443:1445		Mainline	4353	159	4512	4225	57.41	4519	139	4658	4562	57.53	4598	109	4707	4622	1.24	20	C	57.35	4570	87	4657	4773	1.69	21	C	57.53	3063	67	3130	3420	57.34
	1445:1447		Mainline	4353	159	4512	4216	57.19	4519	139	4658	4560	57.33	4598	109	4707	4620	1.27	20	C	57.11	4570	87	4657	4777	1.75	21	C	57.35	3063	67	3130	3420	57.23
	1447:54		Mainline	4353	159	4512	4211	56.95	4519	139	4658	4561	56.97	4598	109	4707	4618	1.30	21	C	56.77	4570	87	4657	4780	1.79	21	C	57.02	3063	67	3130	3420	56.83
	54:58		Mainline	4353	159	4512	4210	59.37	4519	139	4658	4577	59.48	4598	109	4707	4625	1.20	20	C	59.32	4570	87	4657	4885	3.30	21	C	59.70	3063	67	3130	3500	59.39
	396:228	SB Hwy 10 Entrance from Forest	Ramp	8	4	12	12		9	3	12	14		9	2	11	10	0.31	-	-		89	7	96	103	0.70	-	-		62	6	68	77	
	58:174	SB Hwy 10 South of Entrance from Forest	Mainline	4361	163	4524	4133	56.67	4528	142	4670	4579	56.73	4607	111	4718	4628	1.32	21	C	56.59	4659	94	4753	4883	1.87	22	C	57.06	3125	73	3198	3524	57.00
NB Hwy 10	175:59	NB Hwy 10 South of Exit to Forest	Mainline	5239	113	5352	5318	55.82	5442	99	5541	5536	55.40	5542	79	5621	5609	0.16	34	D	55.24	5452	30	5482	5504	0.30	33	D	55.11	3643	22	3665	3676	58.77
	59:55		Mainline	5237	113	5350	5310	48.35	5440	99	5539	5535	47.21	5540	79	5619	5614	0.07	30	D	46.92	5450	30	5480	5502	0.30	29	D	47.23	3641	22	3663	3678	52.93
	55:233	NB Hwy 10 Exit to Forest	Ramp	216	28	244	243		228	26	254	249		228	19	247	249	0.13	-	-		247	10	257	250	0.44	-	-		163	8	171	169	
	55:1448		Mainline	5021	85	5106	5055	50.60	5212	73	5285	5284	49.13	5312	60	5372	5369	0.04	37	E	48.14	5203	20	5223	5250	0.37	36	E	49.02	3478	14	3492	3514	57.29
	1448:1444		Mainline	5021	85	5106	5044	56.28	5212	73	5285	5281	55.85	5312	60	5372	5369	0.04	32	D	55.71	5203	20	5223	5252	0.40	31	D	56.19	3478	14	3492	3516	58.96
	1444:246		Mainline	5021	85	5106	5033	53.59	5212	73	5285	5283	53.46	5312	60	5372	5369	0.04	25	C	53.13	5203	20	5223	5253	0.41	25	C	53.62	3478	14	3492	3515	54.77
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	594	13	607	600		614	11	625	630		627	9	636	637	0.04	-	-		650	3	653	670	0.66	-	-		433	3	436	450	
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	846	13	859	832		871	11	882	882		890	11	901	893	0.27	-	-		711	11	722	732	0.37	-	-		478	6	484	471	
	246:1440		Mainline	3581	59	3640	3564	59.76	3727	51	3778	3772	59.66	3795	40	3835	3837	0.03	22	C	59.01	3842	6	3848	3857	0.15	22	C	59.46	2567	5	2572	2603	60.00
	1470:1440	NB Hwy 10 Entrance from Forest	Ramp	1569	47	1616	1547		1634	42	1676	1640		1661	34	1695	1641	1.32	-	-		1417	37	1454	1523	1.79	-	-		942	28	970	1068	
	1440:1439		Mainline	5150	106	5256	5100	57.75	5361	93	5454	5409	57.32	5456	74	5530	5480	0.67	25	C	55.90	5259	43	5302	5380	1.07	24	C	57.06	3509	33	3542	3674	59.18
	1439:1438		Mainline	5150	106	5256	5095	57.46	5361	93	5454	5411	56.23	5456	74	5530	5480	0.67	25	C	54.68	5259	43	5302	5380	1.07	24	C	56.37	3509	33	3542	3675	58.62
	1438:1437		Mainline	5150	106	5256	5088	58.07	5361	93	5454	5409	57.00	5456	74	5530	5481	0.66	25	C	54.92	5259	43	5302	5380	1.07	23	C	57.56	3509	33	3542	3675	58.83
	1437:1436		Mainline	5150	106	5256	5080	57.73	5361	93	5454	5409	55.82	5456	74	5530	5482	0.65	26	D	52.98	5259	43	5302	5382	1.09	24	C	56.91	3509	33	3542	3677	58.68
	342:341	NB Hwy 10 Exit to Milwaukee	Ramp	293	14	307	302		302	12	314	315		310	10	320	328	0.44	-	-		393	5	398	402	0.20	-	-		264	4	268	278	
	1436:1432		Mainline	4857	92	4949	4765	55.50	5059	81	5140	5094	51.43	5146	64	5210	5154	0.78	37	E	46.91	4866	38	4904	4982	1.11	32	D	52.78	3245	29	3274	3404	57.56
	1432:1430		Mainline	4857	92	4949	4740	49.52	5059	81	5140	5092	41.56	5146	64	5210	5155	0.76	46	F	37.64	4866	38	4904	4984	1.14	39	E	43.22	3245	29	3274	3411	56.57
	220:921	WB I-94 Exit to NB Hwy 10	Ramp	1025	67	1092	975		1054	57	1111	1099		1077	46	1123	1121	0.06	-	-		1027	38	1065	1083	0.55	-	-		690	28	718	778	
	944:945	EB I-94 Exit to NB Hwy 10	Ramp	643	16	659	602		668	14	682	683		679	10	689	683	0.23	-	-		668	19	687	654	1.27	-	-		451	14	465	523	
	1430:938		Mainline	6525	175	6700	6303	41.25	6781	152	6933	6872	33.03	6902	120	7022	6961	0.73	46	F	30.20	6561	95	6656	6722	0.81	38	E	35.71	4386	71	4457	4715	54.06
	938:182		Mainline	6525	175	6700	6293	37.26	6781	152	6933	6870	30.28	6902	120	7022	6964	0.69	50	F	28.28	6561	95	6656	6724	0.83	40	E	33.64	4386	71	4457	4718	55.07
	182:1423		Mainline	6525	175	6700	6280	38.70	6781	152	6933	6870	33.75	6902	120	7022	6963	0.71	42	E	33.05	6561	95	6656	6726	0.86	37	E	36.34	4386	71	4457	4722	54.40
	1423:1408		Mainline	6525	175	6700	6269	47.24	6781	152	6933	6866	43.18	6902	120	7022	6968	0.65	33	D	42.79	6561	95	6656	6724	0.83	30	D	45.23	4386	71	4457	4729	60.58
	1408:1433		Mainline	6525	175	6700	6246	48.94	6781	152	6933	6862	46.62	6902	120	7022	6972	0.60	38	E	46.30	6561	95	6656	6726	0.86	35	E	47.79	4386	71	4457	4739	55.22
	1433:1406		Mainline	6525	175	6700	6227	53.98	6781	152	6933	6862	52.29	6902	120	7022	6972	0.60	34	D	51.83	6561	95	6656	6726	0.86	32	D	53.28	4386	71	4457	4750	59.14
	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	355	44	399	389		367	38	405	389		375	30	405	405	0.00	-	-		375	34	409	405	0.20	-	-		250	25	275	284	
	1406:61		Mainline	6880	219	7099	6604	49.28	7148	190	7338	7248	48.60	7277	150	7427	7378	0.57	31	D	47.33	6936	129	7065	7134	0.82	30	D	48.18	4636	96	4732	5038	54.98
	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	6880	219	7099	6596	45.17	7148	190	7338	7246	44.73	7277	150	7427	7379	0.56	43	E	43.54	6936	129	7065	7135	0.83	41	E	44.12	4636	96	4732	5040	50.62
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	4726	432	5158	4929	26.52	4846	367	5213	5151	18.19	5011	284	5295	5268	0.37	64	F	16.84	5001	234	5235	4606	8.97	59	F	16.01	3249	167	3416	4245	30.12
	238:239	SB I-75 Exit to Clay	Ramp	464	44	508	493		480	38	518	523		490	30	520	523	0.13	-	-		420	30	450	397	2.58	-	-		278	23	301	374	
	236:242		Mainline	4262	388	4650	4381	24.56	4366	329	4695	4625	18.55	4521	254	4775	4743	0.46	67	F	18.32	4581	204	4785	4221	8.40	63	F	17.04	2971	144	3115	3907	29.65
	242:244		Mainline	4262	388	4650	4339	22.23	4366	329	4695	4606	18.54	4521	254	4775	4760	0.22	66	F	18.53	4581	204	4785	4224	8.36	65	F	16.67	2971	144	3115	3939	27.35
	253:2851	SB I-75 Entrance from Clay	Ramp	1147	14	1161	1142		1191	11	1202	1183		1210	7	1217	1164	1.54	-	-		1231	7	1238	1239	0.03	-	-		825	6	831	901	
	247:249		Mainline	5409	402	5811	5441	37.00	5557	340	5897	5793	36.81	5731	261	5992	5917	0.97	41	E	36.46	5812	211	6023	5471	7.28	38	E	36.65	3796	150	3946	4859	40.55
	278:279	WB I-94 Entrance from SB I-75	Ramp	638	51	689	620		660	43	703	671		671	41	712	696	0.60	-	-		1030	61	1091	915	5.56	-	-		686	45	731	941	
	281:282	EB I-94 Entrance from SB I-75	Ramp	1640	111	1751	1627		1703	93	1796	1783		1734	71	1805	1789	0.38	-	-		1666	52	1718	1617	2.47	-	-		1108	38	1146	1423	
	249:261		Mainline	3131	240	3371	3160	48.22	3194	204	3398	3341	48.97	3326	149	3475	3432	0.73	24	C	49.19	3116	98	3214	2936	5.01	20	C	49.06	2002	67	2069	2506	48.50
	261:262		Mainline	3131	240	3371	3154	58.56	3194	204	3398	3341	59.21	3326	149	3475	3432	0.73	20	C	59.34	3116	98	3214	2935	5.03	17	B	59.32	2002	67	2069	2509	58.91
	262:265		Mainline	3131	240	3371	3150	58.44	3194	204	3398	3342	59.24	3326	149	3475	3430	0.77	20	C	59.31	3116	98	3214	2937	4.99	17	B	58.93	2002	67	2069	2509	58.76
	265:266		Mainline	3131	240	3371	3139	58.04	3194	204	3398	3342	58.68	3326	149	3475	3427	0.82	20	C	58.73	3116	98	3214	2942	4.90	17	B	58.55	2002	67	2069	2513	58.11
	266:301		Mainline	3131	240	3371	3135	63.14	3194	204	3398	3341	63.62	3326	149	3475	3426	0.83	18	C	63.62	3116	98	3214	2945	4.85	16	B	63.68	2002	67	2069	2511	63.68
	301:268		Mainline	3131	240	3371	3131	52.67	3194	204	3398	3342	53.69	3326	149	3475	3424	0.87	16	B	53.50	3116	98	3214	2946	4.83	14	B	53.43	2002	67	2069	2512	52.86
	311:312	SB I-75 Exit to Warren	Ramp	545	13	558	516		570	12	582	559		580	10	590	576	0.58	-	-		571	10	581	529	2.21	-	-		384	7	391	455	
	268:269		Mainline	2586	227	2813	2605	59.55	2624	192	2816	2785	60.23	2746	139	2885	2846	0.73	16	B	60.04	2545	88	2633	2418	4.28	14	B	60.26	1618	60	1678	2058	59.99
	269:270		Mainline	2586	227	2813	2601	61.00	2624	192	2816	2782	61.60	2746	139	2885	2847	0.71	16	B	61.65	2545	88	2633	2419	4.26	13	B	61.84	1618	60	1678	2059	61.49
	299:314	EB I-94 Exit to SB I-75	Ramp	145	14	159	145		150	13	163	165		150	10	160	173	1.01	-	-		159	10	169	158	0.86	-	-		105	8	113	127	
	293:294	WB I-94 Exit to SB I-75	Ramp	917	130	1047	914		948	113	1061	1030		967	91	1058	1049	0.28	-	-		947	50	997	1012	0.47	-	-		632	36	668	707	
	270:320		Mainline	3648	371	4019	3642	55.13	3722	318	4040	3979	55.32	3863	240	4103	4068	0.55	19	C	55.40	3651	148	3799	3586	3.51	17	B	55.18	2355	104	2459	2903	55.72
	320:321		Mainline	3648	371	4019	3636	62.27	3722	318	4040	3978	62.41	3863	240	4103	4068	0.55	17	B	62.48	3651	148	3799	3587	3.49	15	B	62.47	2355	104	2459	2904	62.67
	322:323	SB I-75 Entrance from Warren	Ramp	364	76	440	437		380	73	453	448		390	64	454	438	0.76	-	-		400	60	460	459	0.05	-	-		269	48	317	313	
	321:69		Mainline	4012	447	4459	4057	57.87	4102	391	4493	4424	57.99	4253	304	4557	4507	0.74	16	B	58.00	4051	208	4259	4053	3.20	14	B	57.98	2624	152	2776	3216	58.22
	69:70	SB I-75 South of Entrance from Warren	Mainline	4012	447	4459	4049	59.06	4102	391	4493	4426	59.17	4253	304	4557	4504	0.79	16	B	59.26	4051	208	4259	4056	3.15	14	B	59.14	2624	152	2776	3219	59.53
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	6094	337	6431	6275	38.60	6333	298	6631	6659	36.57	6443	230	6673	6682	0.11	37	E	37.08	6454	48	6502	6537	0.43	37	E	35.72	4305	35	4340	4388	59.77
	339:340	NB I-75 Exit to Warren	Ramp	245	172	417	405		259	152	411	396		259	118	377	376	0.05	-	-		220	1	221	227	0.40	-	-		148	1	149	156	
	324:319		Mainline	5849	165	6014	5832	43.90	6074	146	6220	6263	44.16	6184	112	6296	6302	0.08	36	E	44.11	6234	47	6281	6319	0.48	36	E	44.22	4157	34	4191	4241	54.06
	319:317		Mainline	5849	165	6014	5823	56.09	6074	146	6220	6263	56.48	6184	112	6296	6302	0.08	29	D	55.61	6234	47	6281	6321	0.50	29	D	55.55	4157	34	4191	4245	56.72
	276:277	WB I-94 Entrance from NB I-75	Ramp	301	12	313	303		311	12	323	328		320	10	330	339	0.49	-	-		90	9	99	105	0.59	-	-		62	6	68	67	
	285:286	EB I-94 Entrance from NB I-75	Ramp	586	26	612	582		604	24	628	642		615	15	630	630	0.00	-	-		841	7	848	844	0.14	-	-		561	6	567	601	
	315:263	NB I-75 to I-94 Ramp Entrance from NB Frontage	Ramp	50	10	60	57		53	10	63	64		53	8	61	60	0.13	-	-		75	6	81	90	0.97	-	-		61	5	66	71	
	317:271		Mainline	5012	137	5149	4975	56.84	5212	120	5332	5358	56.79	5302	95	5397	5393	0.05	32	D	56.27	5378	37	5415	5463	0.65	32	D	56.29	3595	27	3622	3653	56.78
	306:305	NB I-75 Entrance from Warren	Ramp	1384	2	1386	1341		1432	1	1433	1412		1461	1	1462	1417	1.19	-	-		1191	15	1206	1313	3.01	-	-		793	12	805	835	
	271:267		Mainline	6396	139	6535	6267	58.84	6644	121	6765	6764	58.82	6763	96	6859	6810	0.59	39	E	58.54	6569	52	6621	6787	2.03	39	E	58.10	4388	39	4427	4503	59.53
	267:264		Mainline	6396	139	6535	6244	57.13	6644	121	6765	6764	57.09	6763	96	6859	6808	0.62	40	E	57.12	6569	52	6621	6791	2.08	40	E	56.30	4388	39	4427	4506	59.39
	264:250		Mainline	6396	139	6535	6236	52.15	6644	121	6765	6766	52.09	6763	96	6859	6806	0.64	44	E	51.78	6569	52	6621	6794	2.11	44	E	51.39	4388	39	4427	4506	54.04
	250:191		Mainline	6396	139	6535	6219	55.31	6644	121	6765	6767	55.00	6763	96	6859	6808	0.62	42	E	54.23	6569	52	6621	6792	2.09	41	E	54.97	4388	39	4427	4515	57.06
	191:190		Mainline	6396	139	6535	6215	55.29	6644	121	6765	6766	54.90	6763	96	6859	6807	0.63	43	E	53.41	6569	52	6621	6792	2.09	41	E	55.78	4388	39	4427	4518	57.53
	190:248		Mainline	6396	139	6535	6211	52.36	6644	121	6765	6767	52.03	6763	96	6859	6807	0.63	46	F	50.19	6569	52	6621	6793	2.10	43	E	52.82	4388	39	4427	4519	55.01
	300:302	EB I-94 Exit to NB I-75	Ramp	973	97	1070	978		1012	86	1098	1086		1032	69	1101	1137	1.08	-	-		799	60	859	821	1.31	-	-		530	46	576	655	
	289:290	WB I-94 Exit to NB I-75	Ramp	974	53	1027	945		1013	46	1059	1087		1032	35	1067	1068	0.03	-	-		812	28	840	897	1.93	-	-		550	20	570	604	
	248:245		Mainline	8343	289	8632	8104	51.95	8669	253	8922	8933	51.25	8827	200	9027	9019	0.08	37	E	48.85	8180	140	8320	8512	2.09	32	D	54.16	5468	105	5573	5787	57.09
	255:256	NB I-75 Exit to Clay	Ramp	452	12	464	433		467	11	478	486		476	10	486	483	0.14	-	-		566	10	576	596	0.83	-	-		383	7	390	424	
	245:243		Mainline	7891	277	8168	7641	55.92	8202	242	8444	8441	55.70	8351	190	8541	8536	0.05	40	E	54.34	7614	130	7744	7921	2.00	36	E	55.94	5085	98	5183	5371	57.91
	243:237		Mainline	7891	277	8168	7619	57.09	8202	242	8444	8435	57.06	8351	190	8541	8538	0.03	38	E	56.39	7614	130	7744	7923	2.02	35	D	57.12	5085	98	5183	5379	58.57
	240:241	NB I-75 Entrance from Clay	Ramp	479	70	549	562		497	62	559	571		507	49	556	546	0.43	-	-		506	48	554	562	0.34	-	-		336	37	373	364	
	237:74	NB I-75 north of Entrance from Clay	Mainline	8370	347	8717	8159	56.00	8699	304	9003	9010	55.94	8858	239	9097	9080	0.18	33	D	55.84	8120	178	8298	8491	2.11	31	D	55.97	5421	135	5556	5748	57.05

GEH Stats for I-94	
Max	5.25
	0.87
	161
# Over 5	2
% Under 5	99%

PM1617

GEH Stats for I-94	
Max	5.49
Average	1.01
# Under 5	161
# Over 5	2
% Under 5	99%

PM1718

AM Period - Existing Validation

				AM67							AM78										AM89										AM910						
	Link	Facility	Type	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
EB I-94	1014:1012	EB I-94 West of I-96	Mainline	4550	295	4213	4082	53.07			4370	374	4744	4601	2.09	45	F	26.46			3760	360	4120	4181	0.95	30	D	35.86			3390	373	3763	3825	51.34		
	1018:1019	EB I-94 to SB I-96	Ramp	260	17	241	235				250	21	271	269	0.12	-	-				140	16	156	158	0.16	-	-				130	17	147	149			
	1027:1008	EB I-94 to NB I-96	Ramp	780	24	699	682				750	30	780	763	0.61	-	-				610	33	643	659	0.63	-	-				550	34	584	595			
	1012:1010		Mainline	3510	254	3273	3141	57.22	44.50	53.75	3370	323	3693	3532	2.68	53	F	23.06	17.08	31.17	3010	311	3321	3395	1.28	39	E	30.31	16.83	22.08	2710	322	3032	3092	52.06	48.36	40.25
	1022:1023	EB I-94 Exit to Grand River	Ramp	180	8	163	161				170	10	180	170	0.76	-	-				160	10	170	179	0.68	-	-				140	10	150	157			
	1010:159		Mainline	3330	246	3110	2966	55.15	44.50	53.75	3200	313	3513	3290	3.82	84	F	13.62	17.08	31.17	2850	301	3151	3263	1.98	66	F	17.24	16.83	22.08	2570	312	2882	2963	44.62	48.36	40.25
	983:982	NB I-96 to EB I-94	Ramp	490	58	477	462				470	73	543	521	0.95	-	-				340	121	461	480	0.88	-	-				310	125	435	416			
	187:158		Mainline	3820	304	3586	3415	34.90			3670	386	4056	3775	4.49	96	F	13.81			3190	422	3612	3760	2.44	92	F	14.40			2880	437	3317	3399	32.50		
	978:979	SB I-96 to EB I-94	Ramp	1110	26	988	960				1070	33	1103	1105	0.06	-	-				930	40	970	958	0.39	-	-				840	41	881	888			
	186:966		Mainline	4930	330	4574	4351	41.09	39.13	52.00	4740	419	5159	4866	4.14	59	F	28.56	20.40	31.67	4120	462	4582	4720	2.02	58	F	28.53	25.82	27.67	3720	478	4198	4305	39.26	42.36	38.17
	972:971	EB I-94 Entrance from Linwood	Ramp	220	8	198	121				210	10	220	134	6.46	-	-				290	19	309	189	7.60	-	-				260	20	280	178			
	966:965		Mainline	5150	338	4772	4468	38.79	48.10	53.50	4950	429	5379	4998	5.29	46	F	28.13	28.82	39.50	4410	481	4891	4909	0.26	46	F	27.76	36.42	37.17	3980	498	4478	4485	36.79	48.09	45.00
	965:960		Mainline	5150	338	4772	4439	41.49	48.10	53.50	4950	429	5379	4997	5.30	48	F	36.20	28.82	39.50	4410	481	4891	4906	0.21	48	F	36.03	36.42	37.17	3980	498	4478	4495	41.28	48.09	45.00
	962:963	EB I-94 Entrance from 14th St	Ramp	60	8	59	55				60	10	70	61	1.11	-	-				100	11	111	98	1.27	-	-				90	11	101	91			
	960:959		Mainline	5210	346	4831	4488	52.94			5010	439	5449	5056	5.42	26	C	51.61			4510	492	5002	5004	0.03	26	C	51.37			4070	509	4579	4588	52.39		
	975:976	EB I-94 Exit to Trumbull	Ramp	730	8	642	537				700	10	710	619	3.53	-	-				670	10	680	588	3.65	-	-				600	10	610	536			
	959:952		Mainline	4480	338	4190	3941	56.82	52.00	56.67	4310	429	4739	4438	4.44	27	D	56.48	39.43	47.25	3840	482	4322	4414	1.39	28	D	56.29	42.45	45.25	3470	499	3969	4056	56.40	56.00	50.75
	952:951		Mainline	4480	338	4190	3930	57.69	52.00	56.67	4310	429	4739	4435	4.49	27	D	57.84	39.43	47.25	3840	482	4322	4417	1.44	27	D	57.77	42.45	45.25	3470	499	3969	4054	57.50	56.00	50.75
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	760	8	668	637				730	10	740	700	1.49	-	-				730	10	740	746	0.22	-	-				660	10	670	699			
	951:943		Mainline	3720	330	3522	3288	56.67	55.67	55.75	3580	419	3999	3733	4.28	23	C	56.81	50.60	51.33	3110	472	3582	3671	1.48	23	C	56.86	50.83	50.58	2810	489	3299	3357	56.61	55.17	52.83
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	610	26	553	532				590	33	623	574	2.00	-	-				490	29	519	528	0.39	-	-				440	30	470	487			
	943:919		Mainline	3110	304	2969	2749	58.59	55.67	55.75	2990	386	3376	3157	3.83	19	C	58.89	50.60	51.33	2620	443	3063	3142	1.42	20	C	57.56	50.83	50.58	2370	459	2829	2872	58.70	55.17	52.83
	919:918		Mainline	3110	304	2969	2742	57.63	55.67	55.75	2990	386	3376	3153	3.90	19	C	57.47	50.60	51.33	2620	443	3063	3146	1.49	22	C	50.25	50.83	50.58	2370	459	2829	2872	57.56	55.17	52.83
	918:912		Mainline	3110	304	2969	2734	57.01	55.67	55.75	2990	386	3376	3151	3.94	22	C	49.55	50.60	51.33	2620	443	3063	3146	1.49	30	D	37.64	50.83	50.58	2370	459	2829	2875	55.89	55.17	52.83
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	510	13	455	436				490	16	506	495	0.49	-	-				490	37	527	562	1.50	-	-				440	38	478	458			
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	730	10	643	638				700	13	713	697	0.60	-	-				640	11	651	646	0.20	-	-				580	11	591	580			
	912:180		Mainline	4350	327	4067	3801	50.17			4180	415	4595	4342	3.78	25	C	35.71			3750	491	4241	4354	1.72	33	D	27.64			3390	508	3898	3913	48.77		
	180:910		Mainline	4350	327	4067	3788	44.46			4180	415	4595	4343	3.77	40	E	37.51			3750	491	4241	4350	1.66	48	F	32.20			3390	508	3898	3918	42.57		
	926:927	EB I-94 Exit to John R	Ramp	290	18	268	247				280	23	303	291	0.70	-	-				270	24	294	308	0.81	-	-				240	25	265	266			
	910:909		Mainline	4060	309	3799	3525	49.87	49.91	51.42	3900	392	4292	4053	3.70	31	D	45.79	47.09	46.42	3480	467	3947	4039	1.46	35	D	40.92	45.83	45.75	3150	483	3633	3657	46.94	48.92	46.33
	909:906		Mainline	4060	309	3799	3515	51.41	49.91	51.42	3900	392	4292	4046	3.81	28	D	49.69	47.09	46.42	3480	467	3947	4040	1.47	30	D	47.95	45.83	45.75	3150	483	3633	3659	49.63	48.92	46.33
	906:904		Mainline	4060	309	3799	3507	50.38	49.91	51.42	3900	392	4292	4047	3.79	28	D	49.84	47.09	46.42	3480	467	3947	4040	1.47	29	D	49.81	45.83	45.75	3150	483	3633	3661	49.39	48.92	46.33
	299:314	EB I-94 Exit to SB I-75	Ramp	540	20	487	440				520	25	545	518	1.17	-	-				590	22	612	608	0.16	-	-				530	23	553	557			
	300:301	EB I-94 Exit to NB I-75	Ramp	910	143	916	820				870	181	1051	972	2.48	-	-				780	181	961	1001	1.28	-	-				700	187	887	932			
	904:903		Mainline	2610	146	2397	2230	58.54	49.91	51.42	2510	186	2696	2557	2.71	15	B	58.79	47.09	46.42	2110	264	2374	2428	1.10	14	B	59.26	45.83	45.75	1920	273	2193	2176	58.72	48.92	46.33
	903:890		Mainline	2610	146	2397	2228	61.93	49.91	51.42	2510	186	2696	2555	2.75	14	B	62.32	47.09	46.42	2110	264	2374	2430	1.14	14	B	62.98	45.83	45.75	1920	273	2193	2175	62.46	48.92	46.33
	901:900	EB I-94 Entrance from Beaubien	Ramp	160	8	146	140				150	10	160	152	0.64	-	-				210	10	220	228	0.53	-	-				190	10	200	205			
	890:889		Mainline	2770	154	2543	2365	53.71	51.11	50.75	2660	196	2856	2704	2.88	13	B	54.02	52.45	50.08	2320	274	2594	2661	1.31	13	B	53.94	51.83	50.58	2110	283	2393	2380	53.79	51.17	50.33
	892:893	EB I-94 Exit to Russel	Ramp	270	10	243	236				260	13	273	264	0.55	-	-				210	29	239	248	0.58	-	-				190	30	220	221			
	889:881		Mainline	2500	144	2299	2125	56.20	51.11	50.75	2400	183	2583	2441	2.83	15	B	56.11	52.45	50.08	2110	245	2355	2412	1.17	15	B	56.09	51.83	50.58	1920	253	2173	2159	56.11	51.17	50.33
	881:878		Mainline	2500	144	2299	2118	56.58	51.11	50.75	2400	183	2583	2436	2.93	15	B	55.29	52.45	50.08	2110	245	2355	2418	1.29	15	B	56.05	51.83	50.58	1920	253	2173	2157	56.72	51.17	50.33
	281:282	EB I-94 Entrance from SB I-75	Ramp	770	46	710	679				740	58	798	790	0.28	-	-				540	55	595	591	0.16	-	-				490	57	547	554			
	285:286	EB I-94 Entrance from NB I-75	Ramp	480	21	436	410				460	26	486	477	0.41	-	-				460	25	485	486	0.05	-	-				410	26	436	421			
	878:183		Mainline	3750	211	3444	3199	57.33			3600	267	3867	3703	2.67	14	B	55.50			3110	325	3435	3496	1.04	13	B	56.52			2820	336	3156	3131	57.40		
	183:876		Mainline	3750	211	3444	3193	57.61			3600	267	3867	3703	2.67	17	B	56.11			3110	325	3435	3497	1.05	16	B	56.69			2820	336	3156	3130	57.72		
	887:888	EB I-94 Exit to Chene	Ramp	110	8	103	94				110	10	120	118	0.18	-	-				130	11	141	138	0.25	-	-				120	11	131	128			
	876:875		Mainline	3640	203	3342	3092	59.06			3490	257	3747	3584	2.69	21	C	58.71			2980	314	3294	3359	1.13	20	C	59.00			2700	325	3025	3001	59.09		
	875:872		Mainline	3640	203	3342	3084	58.35			3490	257	3747	3582	2.73	21	C	58.21			2980	314	3294	3361	1.16	20	C	58.42			2700	325	3025	3005	58.40		
	872:869		Mainline	3640	203	3342	3068	57.95			3490	257	3747	3576	2.83	21	C	57.83			2980	314	3294	3368	1.28	20	C	57.97			2700	325	3025	3005	58.03		
	871:870	EB I-94 Entrance from Chene St	Ramp	60	21	70	66				60	26	86	79	0.77	-	-				70	10	80	81	0.11	-	-				60	10	70	70			
	869:860		Mainline	3700	224	3412	3122	57.38	58.60	58.75	3550	283	3833	3653	2.94	17	B	56.30	57.73	58.17	3050	324	3374	3451	1.32	16	B	57.08	61.83	58.83	2760	335	3095	3076	57.66	57.78	58.67
	863:864	EB I-94 Exit to Elliot	Ramp	250	19	234	216				240	24	264	239	1.58	-	-				180	33	213	215	0.14	-	-				160	34	194	193			
	860:859		Mainline	3450	205	3178	2897	51.94	58.60	58.75	3310	259	3569	3404	2.79	25	C	47.43	57.73	58.17	2870	291	3161	3246	1.50	22	C	50.63	61.83	58.83	2600	301	2901	2879	52.93	57.78	58.67
	859:192		Mainline	3450	205	3178	2882	55.74	58.60	58.75	3310	259	3569	3402	2.83	21	C	54.87	57.73	58.17	2870	291	3161	3248	1.54	21	C	54.91	61.83	58.83	2600	301	2901	2881	55.94	57.78	58.67
	856:855	EB I-94 Entrance from Elliot	Ramp	100	8	94	95				100	10	110	105	0.48	-	-				130	10	140	144	0.34	-	-				120	10	130	136			
	836:834		Mainline	3550	213	3272	2968	57.40			3410	269	3679	3506	2.89	21	C	56.58			3000	301	3301	3394	1.61	21	C	56.34			2720	311	3031	3020	57.38		
	834:832		Mainline	3550	213	3272	2949	55.64			3410	269	3679	3501	2.97	23	C	55.95			3000	301	3301	3401	1.73	22	C	53.65			2720	311	3031	3024	55.98		
	832:829		Mainline	3550	213	3272	2935	47.72			3410	269	3679	3496	3.06	28	D	42.64			3000	301	3301	3411	1.90	27	D	44.59			2720	311	3031	3023	50.23		
	848:849	EB I-94 Exit to Van Dyke	Ramp	250	18	233	202				240	23	263	246	1.07	-	-				270	31	301	305	0.23	-	-				240	32	272	262			
	829:827		Mainline	3300	195	3039	2715	41.40	58.00	58.67	3170	246	3416	3247	2.93	27	D	43.04	59.20	57.75	2730	270	3000	3109	1.97	26	D	41.35	59.33	57.92	2480	279	2759	2763	43.06	58.00	57.33
	827:160		Mainline	3300	195	3039	2708	52.33	58.00	58.67	3170	246	3416	3244	2.98	21	C	53.66	59.20	57.75	2730	270	3000	3110	1.99	20	C	53.23	59.33	57.92	2480	279	2759	2764	51.72	58.00	57.33
	841:842	EB I-94 Entrance from Van Dyke	Ramp	110	24	117	113				110	30	140	136	0.34	-	-				80	13	93	89	0.42	-	-				70	13	83	78			
	160:826		Mainline	3410	219	3156	2820	56.32			3280	276	3556	3379	3.01	15	B	56.95			2810	283	3093	3200	1.91	15	B	56.96			2550	292	2842	2842	55.84		
	826:809		Mainline	3410	219	3156	2799	59.70			3280	276	3556	3380	2.99	20	C	59.89			2810	283	3093	3202	1.94	19	C	59.71			2550	292	2842	2842	59.27		
	809:807		Mainline	3410	219	3156	2794	56.60			3280	276	3556	3379	3.01	21	C	56.88			2810	283	3093	3204	1.98	20	C	56.35			2550	292	2842	2842	56.03		
	818:819	EB I-94 Exit to Gratiot	Ramp	230	11	210	181				220	14	234	221	0.86	-	-				310	19	329	323	0.03	-	-				280	20	300	290			
	807:806		Mainline	3180	208	2946	2599	53.35	57.83	59.17	3060	262	3322	3155	2.93	20	C	54.04	55.64	59.33	2500	264	2764	2883	2.24	18	C	54.83	60.27	60.00	2270	272	2542	2555	54.04	60.33	58.75
	823:824	EB I-94 Entrance from Gratiot	Ramp	170	8	155	145				160	10	170	165	0.39	-	-				180	10	190	189	0.07	-	-				160	10	170	164			
	803:800		Mainline	3350	216	3101	2734	65.71			3220	272	3492	3321	2.93	18	B	65.57			2680	274	2954	3074	2.19	16	B	65.64			2430	282	2712	2721	65.59		
	6209:6210	EB I-94 Exit to French	Ramp	240	8	216	189				230	10	240	223	1.12	-	-				200	10	210	214	0.27	-	-				180	10	190	193			
	800:6208		Mainline	3110	208	2885	2540	53.09	59.86	59.00	2990	262	3252	3098	2.73	20	C	53.11	62.25	60.00	2480	264	2744	2861	2.21	19	C	53.33	61.00	60.08	2250	272	2522	2529	53.16	60.80	60.25
	6208:6214		Mainline	3110	208	2885	2525	53.05	59.86	59.00	2990	262	3252	3094	2.80	20	C	53.31	62.25	60.00	2480	264	2744	2864	2.27	19	C	53.71	61.00	60.08	2250	272	2522	2529	53.53	60.80	60.25
	6250:6251	EB I-94 Entrance from French	Ramp	90	8	85	85				90	10	100	94	0.61	-	-				70	10	80	76	0.45	-	-				60	10	70	71			
	6215:6220		Mainline	3200	216	2970	2598	59.98			3080	272	3352	3187	2.89	19	C	59.29			2550	274	2824	2944	2.23	18	B	58.32			2310	282	2592	2600	58.18		
	6221:6222	EB I-94 Exit to Conner	Ramp	440	34	412	343				420	43	463	452	0.51	-	-				490	51	541	531	0.43	-	-				440	53	493	508			
	6220:6229		Mainline	2760	182	2558	2250	54.59	57.63	57.75	2660	229	2889	2731	2.98	17	B	54.71	58.11	58.83	2060	223	2283	2417	2.76	15	B	55.13	61.20	58.83	1870	229	2099	2092	54.76	54.44	58.58
	6229:6232		Mainline	2760	182	2558	2247	55.77	57.63	57.75	2660	229	2889	2729	3.02	17	B	55.91	58.11	58.83	2060	223	2283	2418	2.78	15	B	56.78	61.20	58.83	1870	229	2099	2091	56.48	54.44	58.58
	6249:6248	EB I-94 Entrance from Conner	Ramp	170	9	156	156				160	11	171	166	0.39	-	-				190	16	206	206	0.00	-	-				170	17	187	186			
	6234:6238		Mainline	2930	191	2714	2380	58.36			2820	240	3060	2888	3.15	17	B	58.43			2250	239	2489	2637	2.92	16	B	58.44			2040	246	2286	2275	58.31		
	6238:6239	EB I-94 East of Conner	Mainline	2930	191	2714	2362	57.04			2820	240	3060	2883	3.25	18	B	56.94			2250	239	2489	2641	3.00	16	B	57.11			2040	246	2286	2277	57.25		
WB I-94	6237:6233	WB I-94 East of Conner	Mainline	5110	209	4625	4456	53.91			4910	265	5175	5124	0.71	34	D	51.71			3970	290	4260	4310	0.76	34	D	44.30			3580	300	3880	3921	54.38		
	6233:6230		Mainline	5110	209	4625	4451	54.83			4910	265	5175	5115	0.84	36	E	48.48			3970	290	4260	4315	0.84	37	E	40.52			3580	300	3880	3922	55.09		
	6246:6247	WB I-94 Exit to Conner	Ramp	210	58	233	239				200	73	273	255	1.11	-	-				270	47	317	312	0.28	-	-				240	49	289	293			
	6230:6228		Mainline	4900	151	4392	4204	52.74	45.82	53.17	4710	192	4902	4846	0.80	40	E	40.77	26.92	36.08	3700	243	3943	4014	1.13	39	E	35.71	21.33	34.25	3340	251	3591	3631	53.34	37.00	51.08
	6228:161		Mainline	4900	151	4392	4189	51.53	45.82	53.17	4710	192	4902	4827	1.08	50	F	32.64	26.92	36.08	3700	243	3943	4035	1.46	44	E	31.78	21.33	34.25	3340	251	3591	3630	54.57	37.00	51.08
	6224:161	WB I-94 Entrance fromNB Conner	Ramp	310	9	277	264				300	11	311	296	0.86	-	-				250	7	257	254	0.19	-	-				230	7	237	240			
	6218:6217	WB I-94 Entrance from SB Conner	Ramp	260	8	233	231				250	10	260	260	0.00	-	-				380	8	388	384	0.20	-	-				340	8	348	344			
	206:801		Mainline	5470	168	4903	4642	55.28			5260	213	5473	5343	1.77	37	E	48.98			4330	258	4588	4716	1.88	39	E	41.30			3910	266	4176	4217	56.95		
	6213:6212	WB I-94 Entrance from French	Ramp	120	9	112	105				120	12	132	131	0.09	-	-				120	9	129	128	0.09	-	-				110	9	119	129			
	802:804		Mainline	5590	177	5015	4721	53.11			5380	225	5605	5415	2.56	42	E	43.56			4450	267	4717	4904	2.70	45	E	37.73			4020	275	4295	4345	53.38		
	811:812	WB I-94 Exit to Gratiot	Ramp	270	22	254	226				260	28	288	267	1.26	-	-				310	34	344	343	0.05	-	-				280	35	315	321			
	815:816	WB I-94 Entrance from Gratiot	Ramp	660	8	581	553				630	10	640	636	0.16	-	-				570	17	587	600	0.53	-	-				510	18	528	526			
	808:810		Mainline	5980	163	5342	4982	56.30			5750	207	5957	5730	2.97	42	E	46.36			4710	250	4960	5225	3.71	44	E	40.37			4250	258	4508	4556	56.84		
	837:838	WB I-94 Exit to Van Dyke	Ramp	80	22	89	77				80	28	108	98	0.99	-	-				90	33	123	123	0.00	-	-				80	34	114	112			
	810:828		Mainline	5900	141	5253	4892	51.76	48.18	52.33	5670	179	5849	5619	3.04	47	F	40.58	34.45	39.33	4620	217	4837	5114	3.93	50	F	34.92	32.67	37.50	4170	224	4394	4446	51.16	54.36	49.58
	828:830		Mainline	5900	141	5253	4882	52.73	48.18	52.33	5670	179	5849	5605	3.22	48	F	39.23	34.45	39.33	4620	217	4837	5125	4.08	52	F	33.82	32.67	37.50	4170	224	4394	4449	52.11	54.36	49.58
	845:846	WB I-94 Entrance from Van Dayke	Ramp	480	22	437	403				460	28	488	477	0.50	-	-				470	28	498	494	0.18	-	-				420	29	449	446			
	831:833		Mainline	6380	163	5690	5214	53.89			6130	207	6337	6050	3.65	47	F	43.42			5090	245	5335	5644	4.17	53	F	36.24			4590	253	4843	4918	53.42		
	833:835		Mainline	6380	163	5690	5206	56.58			6130	207	6337	6039	3.79	46	F	44.35			5090	245	5335	5648	4.22	53	F	36.23			4590	253	4843	4921	55.49		
	851:852	WB I-94 Exit to Elliot	Ramp	200	8	181	170				190	10	200	185	1.08	-	-				160	19	179	175	0.30	-	-				140	20	160	163			
	835:858		Mainline	6180	155	5509	5003	52.80	55.00	54.17	5940	197	6137	5828	4.00	49	F	40.42	39.60	42.75	4930	226	5156	5492	4.60	59	F	31.89	36.50	39.33	4450	233	4683	4772	51.26	55.64	48.67
	858:861		Mainline	6180	155	5509	4971	52.42	55.00	54.17	5940	197	6137	5798	4.39	52	F	37.98	39.60	42.75	4930	226	5156	5508	4.82	66	F	28.62	36.50	39.33	4450	233	4683	4791	47.68	55.64	48.67
	866:867	WB I-94 Entrance from Elliot	Ramp	390	24	360	344				370	30	400	401	0.05	-	-				580	50	630	603	1.09	-	-				520	52	572	601			
	873:874		Mainline	6570	179	5869	5260	51.66			6310	227	6537	6158	4.76	54	F	38.70			5510	276	5786	6119	4.32	58	F	36.29			4970	285	5255	5429	48.66		
	882:883	WB I-94 Entrance from Chene	Ramp	190	10	174	168				180	13	193	196	0.22	-	-				210	18	228	232	0.26	-	-				190	19	209	223			
	874:877		Mainline	6760	189	6043	5398	46.03			6490	240	6730	6341	4.81	40	E	40.36			5720	294	6014	6354	4.32	41	E	40.03			5160	304	5464	5665	45.08		
	289:290	WB I-94 Exit to NB I-75	Ramp	510	17	458	388				490	22	512	468	1.99	-	-				350	29	379	426	2.34	-	-				320	30	350	357			
	293:294	WB I-94 Exit to SB I-75	Ramp	1270	42	1141	1014				1220	53	1273	1191	2.34	-	-				1140	70	1210	1256	1.31	-	-				1030	72	1102	1137			
	877:880		Mainline	4980	130	4443	3958	43.47	56.00	54.50	4780	165	4945	4668	4.00	41	E	38.47	51.36	50.08	4230	195	4425	4682	3.81	39	E	41.32	47.75	48.75	3810	202	4012	4176	41.86	55.20	49.67
	880:891		Mainline	4980	130	4443	3949	53.25	56.00	54.50	4780	165	4945	4668	4.00	33	D	48.45	51.36	50.08	4230	195	4425	4682	3.81	30	D	53.57	47.75	48.75	3810	202	4012	4177	52.92	55.20	49.67
	896:897	WB I-94 Exit to Beaubien	Ramp	730	8	642	584				700	10	710	655	2.11	-	-				700	11	711	735	0.89	-	-				630	11	641	655			
	891:902		Mainline	4250	122	3802	3353	54.53	55.27	53.00	4080	155	4235	4011	3.49	29	D	47.02	47.40	47.92	3530	184	3714	3950	3.81	25	C	54.61	48.73	48.58	3180	191	3371	3522	54.82	52.70	48.58
	902:188		Mainline	4250	122	3802	3348	54.63	55.27	53.00	4080	155	4235	4011	3.49	30	D	44.71	47.40	47.92	3530	184	3714	3952	3.84	25	C	53.62	48.73	48.58	3180	191	3371	3522	55.90	52.70	48.58
	276:277	WB I-94 Entrance from NB I-75	Ramp	440	29	408	398				420	37	457	450	0.33	-	-				390	32	422	429	0.34	-	-				350	33	383	388			
	278:279	WB I-94 Entrance from SB I-75	Ramp	940	59	869	819				900	75	975	958	0.55	-	-				760	72	832	840	0.28	-	-				690	75	765	768			
	188:189		Mainline	5630	210	5078	4557	53.44	55.27	53.00	5400	267	5667	5417	3.36	32	D	43.85	47.40	47.92	4680	288	4968	5221	3.54	26	D	51.63	48.73	48.58	4220	299	4519	4681	55.41	52.70	48.58
	189:905		Mainline	5630	210	5078	4542	50.87	55.27	53.00	5400	267	5667	5416	3.37	44	E	42.23	47.40	47.92	4680	288	4968	5225	3.60	37	E	48.85	48.73	48.58	4220	299	4519	4681	53.32	52.70	48.58
	905:908		Mainline	5630	210	5078	4524	48.50	55.27	53.00	5400	267	5667	5407	3.49	47	F	39.66	47.40	47.92	4680	288	4968	5231	3.68	39	E	46.27	48.73	48.58	4220	299	4519	4685	51.13	52.70	48.58
	928:929	WB I-94 Entrance from John R	Ramp	280	16	257	248				270	20	290	281	0.53	-	-				270	20	290	284	0.35	-	-				240	21	261	257			
	911:26		Mainline	5910	226	5336	4738	46.27	60.67	57.00	5670	287	5957	5674	3.71	46	F	42.39	58.55	54.25	4950	308	5258	5529	3.69	42	E	45.23	57.00	53.33	4460	320	4780	4944	48.25	54.91	53.92
	26:913		Mainline	5910	226	5336	4736	58.17	60.67	57.00	5670	287	5957	5673	3.72	33	D	58.10	58.55	54.25	4950	308	5258	5529	3.69	32	D	58.51	57.00	53.33	4460	320	4780	4944	59.25	54.91	53.92
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	1110	14	977	848				1070	18	1088	1004	2.60	-	-				910	20	930	991	1.97	-	-				820	21	841	887			
	913:30		Mainline	4800	212	4358	3885	51.73	60.67	57.00	4600	269	4869	4668	2.91	31	D	52.43	58.55	54.25	4040	288	4328	4538	3.15	30	D	52.17	57.00	53.33	3640	299	3939	4059	52.01	54.91	53.92
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	910	22	810	695				870	28	898	856	1.42	-	-				840	28	868	927	1.97	-	-				760	29	789	818			
	30:923		Mainline	3890	190	3548	3178	56.04	60.67	57.00	3730	241	3971	3809	2.60	24	C	55.67	58.55	54.25	3200	260	3460	3616	2.62	22	C	56.35	57.00	53.33	2880	270	3150	3237	56.18	54.91	53.92
	923:924		Mainline	3890	190	3548	3170	51.32	60.67	57.00	3730	241	3971	3803	2.69	27	D	48.26	58.55	54.25	3200	260	3460	3620	2.69	25	C	49.96	57.00	53.33	2880	270	3150	3238	53.34	54.91	53.92
	924:185		Mainline	3890	190	3548	3158	50.61	60.67	57.00	3730	241	3971	3802	2.71	28	D	47.14	58.55	54.25	3200	260	3460	3622	2.72	26	D	48.22	57.00	53.33	2880	270	3150	3238	54.22	54.91	53.92
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	660	28	598	589				630	35	665	644	0.82	-	-				430	41	471	489	0.82	-	-				390	42	432	422			
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	360	8	320	308				350	10	360	367	0.37	-	-				310	11	321	329	0.44	-	-				280	11	291	287			
	954:3607		Mainline	4910	226	4466	4045	50.85	64.50	59.92	4710	286	4996	4806	2.71	25	C	50.24	63.90	57.67	3940	312	4252	4447	2.96	23	C	50.84	59.09	56.75	3550	323	3873	3948	53.20	57.67	57.75
	3607:955		Mainline	4910	226	4466	4044	52.19	64.50	59.92	4710	286	4996	4806	2.71	24	C	52.19	63.90	57.67	3940	312	4252	4447	2.96	22	C	52.51	59.09	56.75	3550	323	3873	3948	54.70	57.67	57.75
	957:958	WB I-94 Entrance from Trumbull	Ramp	240	8	216	204				230	10	240	235	0.32	-	-				290	9	299	294	0.29	-	-				260	9	269	264			
	961:964		Mainline	5150	234	4682	4199	56.81	63.44	59.58	4940	296	5236	5035	2.80	31	D	55.54	68.00	56.83	4230	321	4551	4756	3.01	29	D	56.30	58.89	55.58	3810	332	4142	4214	57.09	57.20	56.50
	967:968	WB I-94 Exit to Linwood	Ramp	190	9	173	154				180	11	191	182	0.66	-	-				160	11	171	175	0.30	-	-				140	11	151	146			
	964:974		Mainline	4960	225	4509	4033	50.37	62.88	60.83	4760	285	5045	4850	2.77	35	D	47.65	69.00	59.17	4070	310	4380	4583	3.03	32	D	49.42	61.50	56.92	3670	321	3991	4069	49.54	60.57	58.42
	974:994		Mainline	4960	225	4509	4017	50.26	62.88	60.83	4760	285	5045	4846	2.83	34	D	49.03	69.00	59.17	4070	310	4380	4587	3.09	32	D	49.55	61.50	56.92	3670	321	3991	4069	49.73	60.57	58.42
	1001:1002	WB I-94 Exit to SB I-96	Ramp	80	14	82	75				80	18	98	86	1.25	-	-				80	13	93	87	0.63	-	-				70	13	83	86			
	1001:1004	WB I-94 Exit to NB I-96	Ramp	1220	46	1101	955				1170	58	1228	1189	1.12	-	-				1090	53	1143	1194	1.49	-	-				980	55	1035	1083			
	994:995		Mainline	3660	165	3326	2965	57.43	63.50	60.75	3510	209	3719	3567	2.52	21	C	57.91	66.17	58.42	2900	244	3144	3312	2.96	20	C	58.00	56.00	57.17	2620	253	2873	2900	57.79	58.33	57.58
	999:998	WB I-94 Entrance from Linwood	Ramp	50	8	50	46				50	10	60	59	0.13	-	-				50	9	59	60	0.13	-	-				50	9	59	61			
	162:1011		Mainline	3710	173	3377	3000	57.41	63.50	60.75	3560	219	3779	3622	2.58	22	C	57.50	66.17	58.42	2950	253	3203	3379	3.07	20	C	58.07	56.00	57.17	2670	262	2932	2961	57.95	58.33	57.58
	990:991	WB I-94 Entrance from SB I-96	Ramp	160	8	146	146				150	10	160	153	0.56	-	-				150	20	170	174	0.30	-	-				140	21	161	164			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	560	62	541	498				540	79	619	594	1.02	-	-				460	101	561	575	0.59	-	-				410	105	515	514			
	1011:1013	WB I-94 West of I-96	Mainline	4430	243	4063	3633	56.24			4250	308	4558	4367	2.86	20	C	55.83			3560	374	3934	4131	3.10	19	C	56.13			3220	388	3608	3633	56.12		

AM Period - Existing Validation

AM67

Section	Link	Facility	Type	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	2750	166	2536	2506	73.39		
	1614:1615		Mainline	2750	166	2536	2503	68.54		
	1615:1618	SB I-96 Exit to Grand	Ramp	300	16	275	260			
	1615:1599		Mainline	2450	150	2261	2239	54.29	63.22	62.25
	1599:1597		Mainline	2450	150	2261	2230	58.98	63.22	62.25
	1597:1595		Mainline	2450	150	2261	2225	59.25	63.22	62.25
	1595:1593		Mainline	2450	150	2261	2223	60.42	63.22	62.25
	1607:1593	SB I-96 Entrance from Grand	Ramp	290	16	266	257			
	1593:1591		Mainline	2740	166	2527	2477	58.62		
	1591:1589		Mainline	2740	166	2527	2473	59.76		
	990:991	WB I-94 Entrance from SB I-96	Ramp	160	8	146	146			
	978:979	SB I-96 to EB I-94	Ramp	1110	26	988	960			
	1589:1577		Mainline	1470	132	1393	1344	57.94	58.75	60.08
	1577:1574		Mainline	1470	132	1393	1338	60.17	58.75	60.08
	1583:1584	SB I-96 Exit to Warren	Ramp	210	16	197	189			
	1574:1573		Mainline	1260	116	1197	1147	56.39	58.75	60.08
	1573:1554		Mainline	1260	116	1197	1144	61.26	58.75	60.08
	1018:1019	EB I-94 to SB I-96	Ramp	260	17	241	235			
	1001:1002	WB I-94 Exit to SB I-96	Ramp	80	14	82	75			
	1558:1559	SB I-96 Entrance from Warren	Ramp	270	16	249	249			
	163:1552	SB I-96 South of Entrance from Warren	Mainline	1870	163	1768	1685	59.17		
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	2200	138	2033	1965	53.99		
	1568:1569	NB I-96 Exit to Warren	Ramp	330	24	308	298			
	1553:1555		Mainline	1870	114	1725	1662	57.64		
	983:982	NB I-96 to EB I-94	Ramp	490	58	477	462			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	560	62	541	498			
	1555:1572		Mainline	820	-6	708	690	60.58	57.00	56.08
	1580:1579	NB I-96 Entrance from Warren	Ramp	60	8	59	61			
	1575:1576		Mainline	880	2	767	744	60.24	57.00	56.08
	1576:1588		Mainline	880	2	767	742	63.48	57.00	56.08
	1001:1004	WB I-94 Exit to NB I-96	Ramp	1220	46	1101	955			
	1027:1008	EB I-94 to NB I-96	Ramp	780	24	699	682			
	1588:1590		Mainline	2880	72	2567	2367	47.84		
	1590:1592		Mainline	2880	72	2567	2364	54.49	66.00	60.42
	1602:1603	NB I-96 Exit to Grand	Ramp	220	16	205	186			
	1592:1594		Mainline	2660	56	2362	2174	58.35	66.00	60.42
	1594:1596		Mainline	2660	56	2362	2170	56.13	66.00	60.42
	1596:1598		Mainline	2660	56	2362	2161	55.57	66.00	60.42
	1610:1611	NB I-96 Entrance from Grand	Ramp	160	8	146	147			
	1613:50	NB I-96 north of Entrance from Grand	Mainline	2820	64	2508	2286	55.62		
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	5620	128	4998	4868	56.77	59.33	62.25
	60:1405		Mainline	5620	128	4998	4860	57.25	59.33	62.25
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	420	69	425	406			
	1405:1434		Mainline	5200	59	4573	4440	54.11	57.75	60.50
	1434:1407		Mainline	5200	59	4573	4429	49.61	57.75	60.50
	1407:1422		Mainline	5200	59	4573	4417	56.80	57.75	60.50
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	520	14	464	463			
	1422:939		Mainline	5720	73	5037	4863	56.12		
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	660	28	598	589			
	939:940		Mainline	5060	45	4439	4268	55.56		
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	730	10	643	638			
	940:1431		Mainline	4330	35	3796	3618	53.49	59.00	57.75
	1431:1435		Mainline	4330	35	3796	3604	52.76	59.00	57.75
	1435:1441		Mainline	4330	35	3796	3596	57.61	59.00	57.75
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	760	8	668	637			
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	910	22	810	695			
	1441:1442		Mainline	6000	65	5274	4916	50.64		
	1442:1443		Mainline	6000	65	5274	4906	42.04		
	1471:1472	SB Hwy 10 Exit to Forest	Ramp	1250	8	1094	1034			
	1443:1445		Mainline	4750	57	4180	3848	57.73	59.60	60.67
	1465:1466	SB Hwy 10 Entrance from Forest	Ramp	150	8	137	131			
	1447:54		Mainline	4900	65	4317	3953	56.70		
	54:58	SB Hwy 10 South of Entrance from Forest	Mainline	4900	65	4317	3946	56.44		
NB Hwy 10	55:1448	NB Hwy 10 South of Exit to Forest	Mainline	2910	51	2575	2527	57.84		
	1448:1444		Mainline	2910	51	2575	2520	56.02		
	1461:1462	NB Hwy 10 Exit to Forest	Ramp	390	15	352	348			
	1444:1446		Mainline	2520	36	2223	2169	59.38		53.17
	1446:1440		Mainline	2520	36	2223	2163	61.42		53.17
	1469:1470	NB Hwy 10 Entrance from Forest	Ramp	660	8	581	557			
	1440:1439		Mainline	3180	44	2803	2713	54.83		
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	510	13	455	436			
	1439:1438		Mainline	2670	31	2349	2270	58.45		53.33
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	360	8	320	308			
	1438:1437		Mainline	2310	23	2029	1956	57.50		53.33
	1437:1436		Mainline	2310	23	2029	1952	57.20		53.33
	1436:1432		Mainline	2310	23	2029	1947	57.66		53.33
	1432:1430		Mainline	2310	23	2029	1940	59.58		53.33
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	1110	14	977	848			
	1430:938		Mainline	3420	37	3006	2781	50.79		53.33
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	610	26	553	532			
	182:1423		Mainline	4030	63	3559	3296	53.76		
	1424:1425	NB Hwy 10 Exit to Milwaukee	Ramp	1200	8	1050	959			
	1423:1408		Mainline	2830	55	2509	2330	61.15		56.08
	1408:1433		Mainline	2830	55	2509	2324	54.48		56.08
	1433:1406		Mainline	2830	55	2509	2319	64.35		56.08
	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	210	16	197	199			
	1406:61		Mainline	3040	71	2705	2512	52.52	68.00	54.17
	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	3040	71	2705	2511	60.09	68.00	54.17
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	7170	245	6448	6222	57.98		
	238:239	SB I-75 Exit to Clay	Ramp	260	47	267	264			
	236:242		Mainline	6910	198	6181	5932	57.35	61.67	61.58
	242:244		Mainline	6910	198	6181	5912	56.19	61.67	61.58
	253:2851	SB I-75 Entrance from Clay	Ramp	520	11	462	461			
	247:249		Mainline	7430	209	6643	6341	47.84		
	279:281	WB I-94 Entrance from SB I-75	Ramp	940	59	869	819			
	281:282	EB I-94 Entrance from SB I-75	Ramp	770	46	710	679			
	249:261		Mainline	5720	104	5064	4822	43.98	60.50	59.08
	261:262		Mainline	5720	104	5064	4812	53.03	60.50	59.08
	262:265		Mainline	5720	104	5064	4805	52.34	60.50	59.08
	265:266		Mainline	5720	104	5064	4790	52.86	60.50	59.08
	266:268		Mainline	5720	104	5064	4774	53.82	60.50	59.08
	311:312	SB I-75 Exit to Warren	Ramp	1210	12	1063	991			
	268:269		Mainline	4510	92	4002	3773	56.86	57.78	58.92
	269:270		Mainline	4510	92	4002	3761	58.31	57.78	58.92
	299:314	EB I-94 Exit to SB I-75	Ramp	540	20	487	440			
	293:294	WB I-94 Exit to SB I-75	Ramp	1270	42	1141	1014			
	270:320		Mainline	6320	154	5630	5193	52.67	57.78	58.92
	320:321		Mainline	6320	154	5630	5185	61.05	57.78	58.92
	322:323	SB I-75 Entrance from Warren	Ramp	200	16	188	185			
	321:69		Mainline	6520	170	5817	5347	57.07		
	69:70	SB I-75 South of Entrance from Warren	Mainline	6520	170	5817	5337	58.14		
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	4510	109	4017	3930	61.03		
	339:340	NB I-75 Exit to Warren	Ramp	90	17	93	90			
	324:319		Mainline	4420	92	3923	3822	54.84	57.14	58.42
	319:317		Mainline	4420	92	3923	3817	56.48	57.14	58.42
	276:277	WB I-94 Entrance from NB I-75	Ramp	440	29	408	398			
	285:286	EB I-94 Entrance from NB I-75	Ramp	480	21	436	410			
	315:263	NB I-75 to I-94 Ramp Entrance from NB Frontage	Ramp	160	14	144	139			
	317:271		Mainline	3660	48	3224	3133	57.27	57.14	58.42
	306:305	NB I-75 Entrance from Warren	Ramp	400	15	361	354			
	267:264		Mainline	4060	63	3585	3446	59.39	53.90	57.17
	300:301	EB I-94 Exit to NB I-75	Ramp	910	143	916	820			
	264:250		Mainline	4970	206	4501	4249	52.59	53.90	57.17
	289:290	WB I-94 Exit to NB I-75	Ramp	510	17	458	388			
	248:245		Mainline	5480	223	4959	4615	53.54		
	255:256	NB I-75 Exit to Clay	Ramp	1200	8	1050	948			
	245:243		Mainline	4280	215	3909	3644	57.89	59.60	58.92
	243:237		Mainline	4280	215	3909	3633	58.54	59.60	58.92
	240:241	NB I-75 Entrance from Clay	Ramp	120	8	111	118			
	237:74	NB I-75 north of Entrance from Clay	Mainline	4400	223	4020	3743	57.20		

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Link	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
49:1614	2640	210	2850	2860	0.19	10	A	72.78		
1614:1615	2640	210	2850	2859	0.17	11	A	68.33		
1615:1618	290	20	310	310	0.00	-	-			
1615:1599	2350	190	2540	2549	0.18	12	B	54.39	54.20	58.67
1599:1597	2350	190	2540	2548	0.16	11	B	58.75	54.20	58.67
1597:1595	2350	190	2540	2546	0.12	11	B	59.07	54.20	58.67
1595:1593	2350	190	2540	2546	0.12	11	A	60.27	54.20	58.67
1607:1593	280	20	300	302	0.12	-	-			
1593:1591	2630	210	2840	2845	0.09	10	A	58.24		
1591:1589	2630	210	2840	2844	0.08	10	A	59.27		
990:991	150	10	160	153	0.56	-	-			
978:979	1070	33	1103	1105	0.06	-	-			
1589:1577	1410	167	1577	1591	0.35	7	A	57.81	48.60	50.00
1577:1574	1410	167	1577	1588	0.28	7	A	59.99	48.60	50.00
1583:1584	200	20	220	214	0.41	-	-			
1574:1573	1210	147	1357	1374	0.46	6	A	56.23	48.60	50.00
1573:1554	1210	147	1357	1374	0.46	6	A	61.08	48.60	50.00
1018:1019	250	21	271	269	0.12	-	-			
1001:1002	80	18	98	86	1.25	-	-			
1558:1559	260	20	280	276	0.24	-	-			
163:1552	1800	206	2006	2003	0.07	7	A	59.03		
1548:1553	2110	175	2285	2268	0.36	9	A	53.73		
1568:1569	320	30	350	338	0.65	-	-			
1553:1555	1790	145	1935	1921	0.32	7	A	55.13		
983:982	470	73	543	521	0.95	-	-			
1020:1021	540	79	619	594	1.02	-	-			
1555:1572	780	-7	773	788	0.54	3	A	60.36	57.25	56.33
1580:1579	60	10	70	70	0.00	-	-			
1575:1576	840	3	843	858	0.51	4	A	59.97	57.25	56.33
1576:1588	840	3	843	858	0.51	3	A	63.33	57.25	56.33
1001:1004	1170	58	1228	1189	1.12	-	-			
1027:1008	750	30	780	763	0.61	-	-			
1588:1590	2760	91	2851	2801	0.94	12	B	46.86		
1590:1592	2760	91	2851	2801	0.94	11	A	53.04	63.14	59.50
1602:1603	210	20	230	226	0.26	-	-			
1592:1594	2550	71	2621	2575	0.90	11	B	57.63	63.14	59.50
1594:1596	2550	71	2621	2572	0.96	12	B	55.77	63.14	59.50
1596:1598	2550	71	2621	2568	1.04	12	B	55.17	63.14	59.50
1610:1611	150	10	160	156	0.32	-	-			
1613:50	2700	81	2781	2725	1.07	13	B	55.09		
63:60	5400	162	5562	5513	0.66	25	C	55.72	64.00	61.83
60:1405	5400	162	5562	5512	0.67	25	C	55.65	64.00	61.83
1416:1417	400	88	488	484	0.18	-	-			
1405:1434	5000	74	5074	5022	0.73	32	D	52.32	59.33	59.33
1434:1407	5000	74	5074	5020	0.76	34	D	49.22	59.33	59.33
1407:1422	5000	74	5074	5020	0.76	30	D	56.64	59.33	59.33
1428:1429	500	18	518	506	0.53	-	-			
1422:939	5500	92	5592	5523	0.93	25	C	55.28		
941:942	630	35	665	644	0.82	-	-			
939:940	4870	57	4927	4879	0.69	30	D	54.30		
937:936	700	13	713	697	0.60	-	-			
940:1431	4170	44	4214	4179	0.54	28	D	50.09	57.80	55.42
1431:1435	4170	44	4214	4172	0.65	28	D	50.65	57.80	55.42
1435:1441	4170	44	4214	4168	0.71	25	C	55.26	57.80	55.42
949:950	730	10	740	700	1.49	-	-			
932:933	870	28	898	856	1.42	-	-			
1441:1442	5770	82	5852	5724	1.68	24	C	48.68		
1442:1443	5770	82	5852	5723	1.70	35	E	40.65		
1471:1472	1200	10	1210	1184	0.75	-	-			
1443:1445	4570	72	4642	4534	1.59	26	D	57.53	62.67	53.83
1465:1466	140	10	150	145	0.41	-	-			
1447:54	4710	82	4792	4678	1.66	28	D	56.49		
54:58	4710	82	4792	4675	1.70	28	D	56.26		
55:1448	2800	65	2865	2860	0.09	17	B	57.38		
1448:1444	2800	65	2865	2857	0.15	17	B	55.67		
1461:1462	370	19	389	393	0.20	-	-			
1444:1446	2430	46	2476	2464	0.24	14	B	58.90	60.40	54.50
1446:1440	2430	46	2476	2459	0.34	13	B	61.33	60.40	54.50
1469:1470	630	10	640	630	0.40	-	-			
1440:1439	3060	56	3116	3083	0.59	14	B	54.33		
916:915	490	16	506	495	0.49	-	-			
1439:1438	2570	40	2610	2588	0.43	15	B	57.91	54.80	54.25
947:948	350	10	360	367	0.37	-	-			
1438:1437	2220	30	2250	2220	0.63	13	B	57.12	54.80	54.25
1437:1436	2220	30	2250	2222	0.59	13	B	56.96	54.80	54.25
1436:1432	2220	30	2250	2223	0.57	13	B	57.37	54.80	54.25
1432:1430	2220	30	2250	2224	0.55	13	B	59.19	54.80	54.25
920:921	1070	18	1088	1004	2.60	-	-			
1430:938	3290	48	3338	3227	1.94	16	B	50.28	54.80	54.25
943:944	590	33	623	574	2.00	-	-			
182:1423	3880	81	3961	3798	2.62	18	C	52.58		
1424:1425	1150	10	1160	1092	2.03	-	-			
1423:1408	2730	71	2801	2701	1.91	15	B	60.70	56.71	56.83
1408:1433	2730	71	2801	2697	1.98	17	B	54.20	56.71	56.83
1433:1406	2730	71	2801	2695	2.02	14	B	63.90	56.71	56.83
1419:1420	200	20	220	214	0.43	-	-			
1406:61	2930	91	3021	2907	2.09	14	B	52.27	50.00	60.75
61:67	2930	91	3021	2905	2.13	12	B	59.82	50.00	60.75
73:236	6890	311	7201	7172	0.34	30	D	48.42		
238:239	250	59	309	311	0.11	-	-			
236:242	6640	252	6892	6863	0.35	36	E	48.37	50.67	50.17
242:244	6640	252	6892	6862	0.36	38	E	46.56	50.67	50.17
253:2851	500	14	514	510	0.18	-	-			
247:249	7140	266	7406	7375	0.36	41	E	45.83		
279:281	900	75	975	958	0.55	-	-			
281:282	740	58	798	790	0.28	-	-			
249:261	5500	133	5633	5627	0.08	44	E	42.72	45.45	49.42
261:262	5500	133	5633	5627	0.08	39	E	49.04	45.45	49.42
262:265	5500	133	5633	5626	0.09	40	E	47.03	45.45	49.42
265:266	5500	133	5633	5618	0.20	37	E	50.57	45.45	49.42
266:268	5500	133	5633	5616	0.22	35	E	53.68	45.45	49.42
311:312	1160	15	1175	1161	0.41	-	-			
268:269	4340	118	4458	4453	0.07	26	D	57.22	62.25	53.92
269:270	4340	118	4458	4450	0.12	26	D	58.59	62.25	53.92
299:314	520	25	545	518	1.17	-	-			
293:294	1220	53	1273	1191	2.34	-	-			
270:320	6080	196	6276	6160	1.47	30	D	52.78	62.25	53.92
320:321	6080	196	6276	6159	1.48	26	D	61.07	62.25	53.92
322:323	190	20	210	214	0.27	-	-			
321:69	6270	216	6486	6373	1.41	24	C	57.05		
69:70	6270	216	6486	6373	1.41	22	C	58.08		
68:324	4330	138	4468	4434	0.51	15	B	59.65		
339:340	90	21	111	113	0.19	-	-			
324:319	4240	117	4357	4315	0.64	21	C	51.99	59.90	57.75
319:317	4240	117	4357	4314	0.65	20	C	55.52	59.90	57.75
276:277	420	37	457	450	0.33	-	-			
285:286	460	26	486	477	0.41	-	-			
315:263	150	18	158	151	0.56	-	-			
317:271	3510	62	3572	3538	0.57	21	C	57.05	59.90	57.75
306:305	380	19	399	395	0.20	-	-			
267:264	3890	81	3971	3928	0.68	22	C	59.51	60.75	57.83
300:301	870	181	1051	972	2.48	-	-			
264:250	4760	262	5022	4897	1.77	24	C	52.31	60.75	56.42
289:290	490	22	512	468	1.99	-	-			
248:245	5250	284	5534	5366	2.28	26	D	52.01		
255:256	1150	10	1160	1118	1.24	-	-			
245:243	4100	274	4374	4254	1.83	19	C	58.01	58.80	58.58
243:237	4100	274	4374	4255	1.81	19	C	58.62	58.80	58.58
240:241	120	10	130	129	0.09	-	-			
237:74	4220	284	4504	4379	1.88	16	B	57.31		

GEH Stats for I-94	
Max	6.46
Average	2.29
# Under 5	141
# Over 5	4
% Under 5	97%

AM78

AM89

Link	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
49:1614	2640	210	2850	2869	0.36	10	A	72.74		
1614:1615	2640	210	2850	2869	0.36	11	A	68.26		
1615:1618	290	20	310	323	0.73	-	-			
1615:1599	2350	190	2540	2544	0.08	12	B	54.14	41.58	58.33
1599:1597	2350	190	2540	2541	0.02	11	B	58.76	41.58	58.33
1597:1595	2350	190	2540	2540	0.00	11	B	59.06	41.58	58.33
1595:1593	2350	190	2540	2540	0.00	11	A	60.33	41.58	58.33
1607:1593	280	20	300	301	0.06	-	-			
1593:1591	2630	210	2840	2843	0.06	10	A	58.06		
1591:1589	2630	210	2840	2844	0.08	10	A	59.62		
990:991	150	20	170	174	0.30	-	-			
978:979	930	40	970	958	0.39	-	-			
1589:1577	1550	150	1700	1704	0.10	8	A	57.71	38.60	46.92
1577:1574	1550	150	1700	1703	0.07	7	A	59.90	38.60	46.92
1583:1584	200	20	220	219	0.07	-	-			
1574:1573	1350	130	1480	1484	0.10	7	A	56.15	38.60	46.92
1573:1554	1350	130	1480	1484	0.10	6	A	61.01	38.60	46.92
1018:1019	140	16	156	158	0.16	-	-			
1001:1002	80	13	93	87	0.63	-	-			
1558:1559	260	20	280	279	0.06	-	-			
163:1552	1830	179	2009	2007	0.04	7	A	59.22		
1548:1553	2110	250	2360	2362	0.04	9	A	53.70		
1568:1569	320	30	350	353	0.16	-	-			
1553:1555	1790	220	2010	2016	0.13	8	A	54.04		
983:982	340	121	461	480	0.88	-	-			
1020:1021	460	101	561	575	0.59	-	-			
1555:1572	990	-2	988	979	0.29	4	A	60.25	43.20	51.42
1580:1579	60	10	70	67	0.36	-	-			
1575:1576	1050	8	1058	1048	0.31	4	A	59.96	43.20	51.42
1576:1588	1050	8	1058	1049	0.28	4	A	63.22	43.20	51.42
1001:1004	1090	53	1143	1194	1.49	-	-			
1027:1008	610	33	643	659	0.63	-	-			
1588:1590	2750	94	2844	2909	1.21	12	B	48.22		
1590:1592	2750	94	2844	2909	1.21	11	A	54.33	58.67	57.92
1602:1603	210	20	230	236	0.39	-	-			
1592:1594	2540	74	2614	2672	1.13	12	B	58.17	58.67	57.92
1594:1596	2540	74	2614	2673	1.15	12	B	55.96	58.67	57.92
1596:1598	2540	74	2614	2674	1.17	12	B	55.37	58.67	57.92
1610:1611	150	10	160	166	0.47	-	-			
1613:50	2690	84	2774	2842	1.28	13	B	55.44		
63:60	5630	179	5809	5790	0.25	27	D	54.99	61.90	59.83
60:1405	5630	179	5809	5792	0.22	26	D	55.64	61.90	59.83
1416:1417	390	79	469	465	0.19	-	-			
1405:1434	5240	100	5340	5329	0.15	34	D	52.66	60.50	58.17
1434:1407	5240	100	5340	5328	0.16	37	E	48.89	60.50	58.17
1407:1422	5240	100	5340	5329	0.15	32	D	55.44	60.50	58.17
1428:1429	560	10	570	580	0.42	-	-			
1422:939	5800	110	5910	5910	0.00	29	D	52.19		
941:942	430	41	471	489	0.82	-	-			
939:940	5370	69	5439	5421	0.24	38	E	47.81		
937:936	640	11	651	646	0.20	-	-			
940:1431	4730	58	4788	4777	0.16	38	E	42.12	56.00	51.75
1431:1435	4730	58	4788	4783	0.07	36	E	44.33	56.00	51.75
1435:1441	4730	58	4788	4786	0.03	34	D	47.47	56.00	51.75
949:950	730	10	740	746	0.22	-	-			
932:933	840	28	868	927	1.97	-	-			
1441:1442	6300	96	6396	6461	0.81	30	D	42.72		
1442:1443	6300	96	6396	6458	0.77	42	E	38.85		
1471:1472	1240	10	1250	1271	0.59	-	-			
1443:1445	5060	86	5146	5183	0.51	30	D	57.80	55.25	52.83
1465:1466	200	10	210	214	0.27	-	-			
1447:54	5260	96	5356	5396	0.55	32	D	56.78		
54:58	5260	96	5356	5397	0.56	32	D	56.50		
55:1448	2860	88	2948	3019	1.30	18	B	56.96		
1448:1444	2860	88	2948	3022	1.35	19	C	55.00		
1461:1462	550	12	562	555	0.30	-	-			
1444:1446	2310	76	2386	2467	1.64	14	B	59.00	53.55	54.58
1446:1440	2310	76	2386	2470	1.70	14	B	61.33	53.55	54.58
1469:1470	820	15	835	849	0.48	-	-			
1440:1439	3130	91	3221	3323	1.78	16	B	54.00		
916:915	490	37	527	562	1.50	-	-			
1439:1438	2640	54	2694	2764	1.34	16	B	57.30	56.36	53.92
947:948	310	11	321	329	0.44	-	-			
1438:1437	2330	43	2373	2437	1.31	14	B	56.92	56.36	53.92
1437:1436	2330	43	2373	2436	1.28	14	B	56.71	56.36	53.92
1436:1432	2330	43	2373	2435	1.26	14	B	57.13	56.36	53.92
1432:1430	2330	43	2373	2437	1.31	14	B	58.84	56.36	53.92
920:921	910	20	930	991	1.97	-	-			
1430:938	3240	63	3303	3430	2.19	17	B	50.05	56.36	53.92
943:944	490	29	519	528	0.39	-	-			
182:1423	3730	92	3822	3964	2.28	19	C	52.35		
1424:1425	970	12	982	1021	1.23	-	-			
1423:1408	2760	80	2840	2949	2.03	16	B	60.54	49.89	54.08
1408:1433	2760	80	2840	2951	2.06	18	C	54.02	49.89	54.08
1433:1406	2760	80	2840	2953	2.10	16	B	63.67	49.89	54.08
1419:1420	200	20	220	224	0.27	-	-			
1406:61	2960	100	3060	3179	2.13	16	B	52.07	62.17	59.25
61:67	2960	100	3060	3180	2.15	14	B	59.85	62.17	59.25
73:236	6740	316	7056	7034	0.26	27	D	53.53		
238:239	250	44	294	290	0.23	-	-			
236:242	6490	272	6762	6736	0.32	32	D	53.27	35.25	40.17
242:244	6490	272	6762	6732	0.37	34	D	51.23	35.25	40.17
253:2851	560	11	571	561	0.42	-	-			
247:249	7050	283	7333	7289	0.51	41	E	45.84		
279:281	760	72	832	840	0.28	-	-			
281:282	540	55	595	591	0.16	-	-			
249:261	5750	156	5906	5859	0.61	49	F	40.37	41.70	45.33
261:262	5750	156	5906	5855	0.67	42	E	46.60	41.70	45.33
262:265	5750	156	5906	5853	0.69	43	E	46.28	41.70	45.33
265:266	5750	156	5906	5849	0.74	39	E	50.46	41.70	45.33
266:268	5750	156	5906	5844	0.81	37	E	53.85	41.70	45.33
311:312	1060	12	1072	1064	0.24	-	-			
268:269	4690	144	4834	4780	0.78	28	D	56.92	55.56	53.17
269:270	4690	144	4834	4777	0.82	28	D	58.23	55.56	53.17
299:314	590	22	612	608	0.16	-	-			
293:294	1140	70	1210	1256	1.31	-	-			
270:320	6420	236	6656	6637	0.23	33	D	51.79	55.56	53.17
320:321	6420	236	6656	6635	0.26	28	D	60.93	55.56	53.17
322:323	190	10	200	199	0.07	-	-			
321:69	6610	246	6856	6832	0.29	24	C	56.89		
69:70	6610	246	6856	6832	0.29	24	C	57.91		
68:324	4170	147	4317	4354	0.56	15	B	59.84		
339:340	90	23	113	119	0.56	-	-			
324:319	4080	124	4204	4242	0.58	21	C	52.44	60.73	58.67
319:317	4080	124	4204	4243	0.60	19	C	55.28	60.73	58.67
276:277	390	32	422	429	0.34	-	-			
285:286	460	25	485	486	0.05	-	-			
315:263	140	7	147	142	0.42	-	-			
317:271	3370	74	3444	3473	0.49	21	C	56.84	60.73	58.67
306:305	370	11	381	368	0.67	-	-			
267:264	3740	85	3825	3854	0.47	22	C	59.40	60.75	57.83
300:301	780	181	961	1001	1.28	-	-			
264:250	4520	266	4786	4860	1.07	24	C	52.05	60.75	57.83
289:290	350	29	379	426	2.34	-	-			
248:245	4870	295	5165	5285	1.66	26	D	52.01		
255:256	970	12	982	1004	0.70	-	-			
245:243	3900	283	4183	4280	1.49	19	C	57.84	61.27	60.92
243:237	3900	283	4183	4276	1.43	19	C	58.42	61.27	60.92
240:241	120	10	130	132	0.17	-	-			
237:74	4020	293	4313	4411	1.48	16	B	57.16		

GEH Stats for I-94	
Max	7.60
Average	1.66
# Under 5	144
# Over 5	1
% Under 5	99%

AM89

AM910

Link	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
49:1614	2380	217	2597	2613	73.03		
1614:1615	2380	217	2597	2615	68.41		
1615:1618	260	21	281	279			
1615:1599	2120	196	2316	2337	54.32	65.17	62.50
1599:1597	2120	196	2316	2339	58.92	65.17	62.50
1597:1595	2120	196	2316	2341	59.25	65.17	62.50
1595:1593	2120	196	2316	2341	60.46	65.17	62.50
1607:1593	250	21	271	265			
1593:1591	2370	217	2587	2605	58.83		
1591:1589	2370	217	2587	2605	60.59		
990:991	140	21	161	164			
978:979	840	41	881	888			
1589:1577	1390	155	1545	1564	57.82	59.00	58.17
1577:1574	1390	155	1545	1566	59.88	59.00	58.17
1583:1584	180	21	201	200			
1574:1573	1210	134	1344	1366	56.19	59.00	58.17
1573:1554	1210	134	1344	1367	60.93	59.00	58.17
1018:1019	130	17	147	149			
1001:1002	70	13	83	86			
1558:1559	230	21	251	254			
163:1552	1640	185	1825	1856	59.11		
1548:1553	1900	259	2159	2155	53.87		
1568:1569	290	31	321	320			
1553:1555	1610	228	1838	1835	57.78		
983:982	310	125	435	416			
1020:1021	410	105	515	514			
1555:1572	890	-2	888	904	60.23	58.44	58.33
1580:1579	50	10	60	60			
1575:1576	940	8	948	961	59.92	58.44	58.33
1576:1588	940	8	948	961	63.27	58.44	58.33
1001:1004	980	55	1035	1083			
1027:1008	550	34	584	595			
1588:1590	2470	97	2567	2639	48.37		
1590:1592	2470	97	2567	2638	54.41	61.63	60.42
1602:1603	190	21	211	214			
1592:1594	2280	76	2356	2424	58.39	61.63	60.42
1594:1596	2280	76	2356	2426	56.14	61.63	60.42
1596:1598	2280	76	2356	2427	55.53	61.63	60.42
1610:1611	140	10	150	163			
1613:50	2420	86	2506	2590	55.62		
63:60	5080	185	5265	5293	56.08	60.57	61.08
60:1405	5080	185	5265	5291	56.65	60.57	61.08
1416:1417	350	82	432	428			
1405:1434	4730	103	4833	4865	53.74	61.56	58.83
1434:1407	4730	103	4833	4864	49.42	61.56	58.83
1407:1422	4730	103	4833	4864	56.63	61.56	58.83
1428:1429	510	10	520	505			
1422:939	5240	113	5353	5370	55.08		
941:942	390	42	432	422			
939:940	4850	71	4921	4949	53.59		
937:936	580	11	591	580			
940:1431	4270	60	4330	4371	50.16	56.36	53.00
1431:1435	4270	60	4330	4368	49.63	56.36	53.00
1435:1441	4270	60	4330	4365	53.48	56.36	53.00
949:950	660	10	670	699			
932:933	760	29	789	818			
1441:1442	5690	99	5789	5882	47.67		
1442:1443	5690	99	5789	5886	40.35		
1471:1472	1120	10	1130	1169			
1443:1445	4570	89	4659	4720	57.35	52.83	53.42
1465:1466	180	10	190	196			
1447:54	4750	99	4849	4920	56.55		
54:58	4750	99	4849	4921	56.30		
55:1448	2580	91	2671	2659	57.55		
1448:1444	2580	91	2671	2658	55.61		
1461:1462	500	12	512	516			
1444:1446	2080	79	2159	2142	59.46	59.33	52.17
1446:1440	2080	79	2159	2143	61.63	59.33	52.17
1469:1470	740	16	756	750			
1440:1439	2820	95	2915	2894	54.52		
916:915	440	38	478	458			
1439:1438	2380	57	2437	2437	57.98	54.25	52.75
947:948	280	11	291	287			
1438:1437	2100	46	2146	2148	57.17	54.25	52.75
1437:1436	2100	46	2146	2149	56.90	54.25	52.75
1436:1432	2100	46	2146	2150	57.35	54.25	52.75
1432:1430	2100	46	2146	2148	59.21	54.25	52.75
920:921	820	21	841	887			
1430:938	2920	67	2987	3036	50.49	54.25	52.75
943:944	440	30	470	487			
182:1423	3360	97	3457	3521	54.01		
1424:1425	870	12	882	885			
1423:1408	2490	85	2575	2633	60.78	55.70	55.42
1408:1433	2490	85	2575	2634	54.22	55.70	55.42
1433:1406	2490	85	2575	2633	63.97	55.70	55.42
1419:1420	180	21	201	197			
1406:61	2670	106	2776	2831	52.38	60.60	60.58
61:67	2670	106	2776	2831	59.93	60.60	60.58
73:236	6080	327	6407	6502	55.39		
238:239	230	46	276	284			
236:242	5850	281	6131	6225	55.57	47.08	49.67
242:244	5850	281	6131	6232	54.26	47.08	49.67
253:2851	510	11	521	519			
247:249	6360	292	6652	6759	47.29		
279:281	690	75	765	768			
281:282	490	57	547	554			
249:261	5180	160	5340	5440	41.96	44.83	49.42
261:262	5180	160	5340	5446	49.59	44.83	49.42
262:265	5180	160	5340	5447	49.13	44.83	49.42
265:266	5180	160	5340	5451	51.32	44.83	49.42
266:268	5180	160	5340	5454	53.49	44.83	49.42
311:312	960	12	972	993			
268:269	4220	148	4368	4463	56.52	52.90	54.42
269:270	4220	148	4368	4466	57.86	52.90	54.42
299:314	530	23	553	557			
293:294	1030	72	1102	1137			
270:320	5780	243	6023	6167	52.09	52.90	54.42
320:321	5780	243	6023	6171	60.75	52.90	54.42
322:323	170	10	180	184			
321:69	5950	253	6203	6355	56.77		
69:70	5950	253	6203	6355	57.81		
68:324	3760	152	3912	3886	61.22		
339:340	80	24	104	95			
324:319	3680	128	3808	3787	55.64	51.82	56.00
319:317	3680	128	3808	3787	56.78	51.82	56.00
276:277	350	33	383	388			
285:286	410	26	436	421			
315:263	130	7	137	130			
317:271	3050	76	3126	3109	57.26	51.82	56.00
306:305	330	11	341	344			
267:264	3380	87	3467	3449	59.41	59.64	56.92
300:301	700	187	887	932			
264:250	4080	274	4354	4376	52.39	59.64	56.92
289:290	320	30	350	357			
248:245	4400	304	4704	4730	53.48		
255:256	870	12	882	890			
245:243	3530	292	3822	3843	57.80	58.40	59.67
243:237	3530	292	3822	3844	58.41	58.40	59.67
240:241	110	10	120	117			
237:74	3640	302	3942	3962	57.18		

PM Period - Existing Validation

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PM1617										PM1718										PM1819						
Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
4250	243	4493	4248	3.71	27	D	39.73			4260	236	4496	4400	1.44	38	E	29.80			3230	204	4040	4070	32.07		
230	26	256	247	0.57	-	-				280	19	299	283	0.94	-	-				220	16	278	263			
730	92	822	833	0.38	-	-				1050	95	1145	1127	0.53	-	-				810	82	1049	1048			
3290	125	3415	3142	4.77	27	D	39.83	26.82	28.25	2930	122	3052	2999	0.96	27	D	38.01	24.42	29.42	2200	106	2713	2761	34.16	41.33	43.50
200	10	210	198	0.84	-	-				280	10	290	290	0.00	-	-				220	9	269	277			
3090	115	3205	2945	4.69	38	E	25.99	26.82	28.25	2650	112	2762	2686	1.46	28	D	32.96	24.42	29.42	1980	97	2444	2505	20.29	41.33	43.50
250	60	310	311	0.06	-	-				180	47	227	222	0.33	-	-				140	41	213	205			
3340	175	3515	3248	4.59	55	F	20.18			2830	159	2989	2898	1.68	46	F	21.45			2120	138	2656	2725	14.35		
780	21	801	789	0.43	-	-				720	1	721	711	0.37	-	-				550	1	648	662			
4120	196	4316	4022	4.55	52	F	26.39	13.78	23.58	3550	160	3710	3581	2.14	59	F	20.67	14.00	23.33	2670	139	3305	3424	17.24	45.86	40.92
150	10	160	123	3.11	-	-				150	1	151	123	2.39	-	-				120	1	142	113			
4270	206	4476	4142	5.09	44	E	24.13	23.44	28.17	3700	161	3861	3700	2.62	56	F	16.73	17.70	25.42	2790	140	3447	3543	14.37	43.00	43.08
4270	206	4476	4138	5.15	55	F	25.54	23.44	28.17	3700	161	3861	3644	3.54	69	F	18.03	17.70	25.42	2790	140	3447	3589	15.07	43.00	43.08
70	10	80	83	0.33	-	-				70	1	71	68	0.36	-	-				50	1	60	58			
4340	216	4556	4225	5.00	41	E	26.16			3770	162	3932	3696	3.82	52	F	18.05			2840	141	3507	3658	16.98		
420	10	430	387	2.13	-	-				440	10	450	376	3.64	-	-				340	9	411	391			
3920	206	4126	3844	4.47	53	F	24.63	24.78	29.17	3330	152	3482	3307	3.00	76	F	14.79	12.88	26.58	2500	132	3096	3269	15.03	30.67	46.92
3920	206	4126	3836	4.60	56	F	23.33	24.78	29.17	3330	152	3482	3285	3.39	86	F	12.99	12.88	26.58	2500	132	3096	3270	13.24	30.67	46.92
360	7	367	358	0.47	-	-				330	6	336	325	0.61	-	-				250	5	300	312			
3560	199	3759	3477	4.69	59	F	20.33	16.64	18.17	3000	146	3146	2955	3.46	97	F	10.38	10.08	15.92	2250	127	2796	2967	10.65	36.50	38.75
590	16	606	590	0.65	-	-				560	21	581	558	0.96	-	-				430	18	527	550			
2970	183	3153	2890	4.78	50	F	19.87	16.64	18.17	2440	125	2565	2383	3.66	84	F	9.69	10.08	15.92	1820	109	2269	2438	9.77	36.50	38.75
2970	183	3153	2901	4.58	45	F	22.10	16.64	18.17	2440	125	2565	2366	4.01	69	F	11.78	10.08	15.92	1820	109	2269	2451	11.64	36.50	38.75
2970	183	3153	2897	4.65	45	E	22.13	16.64	18.17	2440	125	2565	2372	3.88	75	F	10.78	10.08	15.92	1820	109	2269	2456	11.49	36.50	38.75
760	12	772	788	0.57	-	-				710	8	718	741	0.85	-	-				550	7	655	650			
580	26	606	597	0.37	-	-				640	11	651	627	0.95	-	-				490	10	588	578			
4310	221	4531	4278	3.81	40	E	21.96			3790	144	3934	3748	3.00	69	F	11.13			2860	126	3513	3685	12.31		
4310	221	4531	4282	3.75	61	F	23.94			3790	144	3934	3741	3.12	90	F	14.19			2860	126	3513	3684	13.94		
490	41	531	545	0.60	-	-				490	18	508	501	0.31	-	-				380	16	466	476			
3820	180	4000	3740	4.18	59	F	21.75	18.73	21.00	3300	126	3426	3218	3.61	98	F	11.17	16.42	18.50	2480	110	3047	3213	10.91	29.80	35.75
3820	180	4000	3738	4.21	66	F	19.32	18.73	21.00	3300	126	3426	3198	3.96	99	F	10.95	16.42	18.50	2480	110	3047	3228	10.29	29.80	35.75
3820	180	4000	3731	4.33	95	F	13.35	18.73	21.00	3300	126	3426	3194	4.03	127	F	8.56	16.42	18.50	2480	110	3047	3234	8.50	29.80	35.75
150	10	160	157	0.24	-	-				150	10	160	147	1.05	-	-				120	9	152	152			
810	58	868	846	0.75	-	-				640	47	687	672	0.58	-	-				490	41	625	697			
2860	112	2972	2729	4.55	101	F	9.20	18.73	21.00	2510	69	2579	2373	4.14	122	F	6.56	16.42	18.50	1870	60	2271	2386	7.09	29.80	35.75
2860	112	2972	2730	4.53	105	F	8.84	18.73	21.00	2510	69	2579	2371	4.18	120	F	6.66	16.42	18.50	1870	60	2271	2387	6.92	29.80	35.75
490	10	500	502	0.09	-	-				440	9	449	449	0.00	-	-				340	8	409	410			
3350	122	3472	3233	4.13	93	F	8.89	22.89	23.25	2950	78	3028	2824	3.77	100	F	7.15	13.33	18.75	2210	68	2680	2794	7.28	33.25	38.83
120	10	130	130	0.00	-	-				140	10	150	134	1.34	-	-				110	9	140	134			
3230	112	3342	3103	4.21	103	F	10.18	22.89	23.25	2810	68	2878	2686	3.64	112	F	8.10	13.33	18.75	2100	59	2540	2665	8.12	33.25	38.83
3230	112	3342	3105	4.17	62	F	16.96	22.89	23.25	2810	68	2878	2677	3.81	68	F	13.22	13.33	18.75	2100	59	2540	2669	13.18	33.25	38.83
1290	56	1346	1335	0.30	-	-				1300	42	1342	1267	2.08	-	-				1100	36	1336	1339			
590	18	608	598	0.41	-	-				700	12	712	737	0.93	-	-				540	10	647	642			
5110	186	5296	5039	3.58	28	D	36.10			4810	122	4932	4664	3.87	34	D	27.87			3740	105	4524	4660	28.59		
5110	186	5296	5041	3.55	26	D	48.56			4810	122	4932	4666	3.84	24	C	48.82			3740	105	4524	4659	48.46		
640	10	650	622	1.11	-	-				730	10	740	641	3.77	-	-				560	9	669	701			
4470	176	4646	4417	3.40	26	D	57.68			4080	112	4192	4027	2.57	23	C	59.51			3180	96	3854	3957	59.48		
4470	176	4646	4413	3.46	27	D	55.03			4080	112	4192	4031	2.51	23	C	59.06			3180	96	3854	3957	59.20		
4470	176	4646	4416	3.42	37	E	40.74			4080	112	4192	4040	2.37	25	C	53.60			3180	96	3854	3956	58.42		
460	10	470	458	0.56	-	-				420	10	430	423	0.34	-	-				320	9	387	395			
4930	186	5116	4881	3.32	45	F	27.47	30.60	31.83	4500	122	4622	4487	2.00	27	D	42.05	21.18	25.17	3500	105	4241	4348	52.42	32.67	43.00
170	19	189	180	0.66	-	-				190	15	205	204	0.07	-	-				150	13	192	187			
4760	167	4927	4696	3.33	61	F	26.03	30.60	31.83	4310	107	4417	4301	1.76	44	E	32.71	21.18	25.17	3350	92	4049	4163	36.88	32.67	43.00
4760	167	4927	4704	3.21	34	D	47.52	30.60	31.83	4310	107	4417	4302	1.74	29	D	50.60	21.18	25.17	3350	92	4049	4161	54.26	32.67	43.00
290	10	300	293	0.41	-	-				350	10	360	362	0.11	-	-				270	9	328	320			
5050	177	5227	4997	3.22	39	E	43.93			4660	117	4777	4665	1.63	33	D	48.40			3620	101	4378	4483	53.25		
5050	177	5227	4994	3.26	44	E	38.68			4660	117	4777	4675	1.48	38	E	41.73			3620	101	4378	4479	46.09		
5050	177	5227	4992	3.29	58	F	29.00			4660	117	4777	4686	1.32	49	F	32.01			3620	101	4378	4477	35.86		
230	29	259	264	0.31	-	-				180	15	195	198	0.21	-	-				140	13	180	177			
4820	148	4968	4724	3.51	44	E	36.21	27.64	33.42	4480	102	4582	4498	1.25	40	E	38.00	25.42	27.67	3480	88	4198	4295	40.01	46.25	42.17
4820	148	4968	4723	3.52	30	D	53.15	27.64	33.42	4480	102	4582	4497	1.26	28	D	53.55	25.42	27.67	3480	88	4198	4296	53.73	46.25	42.17
140	8	148	152	0.33	-	-				120	17	137	137	0.00	-	-				90	15	124	127			
4960	156	5116	4874	3.42	22	C	56.61			4600	119	4719	4634	1.24	21	C	56.70			3570	103	4321	4423	57.05		
4960	156	5116	4875	3.41	28	D	58.76			4600	119	4719	4634	1.24	27	D	58.96			3570	103	4321	4426	59.88		
4960	156	5116	4874	3.42	37	E	44.22			4600	119	4719	4638	1.18	34	D	46.61			3570	103	4321	4423	54.86		
260	13	273	282	0.54	-	-				240	12	252	244	0.51	-	-				180	10	224	225			
4700	143	4843	4592	3.65	39	E	39.70	36.10	34.67	4360	107	4467	4399	1.02	37	E	40.22	23.64	28.33	3390	93	4098	4189	47.70	46.29	46.50
770	15	785	761	0.86	-	-				940	13	953	946	0.23	-	-				720	11	860	865			
5470	158	5628	5348	3.78	32	D	56.05			5300	120	5420	5347	0.99	33	D	53.80			4110	104	4958	5058	58.65		
160	12	172	172	0.00	-	-				100	9	109	112	0.29	-	-				80	8	104	109			
5310	146	5456	5177	3.83	44	E	39.64	31.82	34.67	5200	111	5311	5235	1.05	49	F	35.79	27.17	31.08	4030	96	4854	4949	42.20	50.57	46.08
5310	146	5456	5178	3.81	39	E	45.33	31.82	34.67	5200	111	5311	5241	0.96	41	E	43.26	27.17	31.08	4030	96	4854	4947	47.33	50.57	46.08
150	9	159	150	0.72	-	-				160	11	171	178	0.53	-	-				120	10	153	152			
5460	155	5615	5327	3.89	32	D	56.89			5360	122	5482	5422	0.81	33	D	56.08			4150	106	5007	5095	58.78		
260	24	284	286	0.12	-	-				290	19	309	301	0.46	-	-				220	16	278	268			
5200	131	5331	5044	3.98	42	E	40.66	37.09	36.17	5070	103	5173	5126	0.65	41	E	42.25	34.00	35.67	3930	90	4729	4824	46.94	47.22	45.08
5200	131	5331	5045	3.97	40	E	42.19	37.09	36.17	5070	103	5173	5128	0.63	40	E	43.21	34.00	35.67	3930	90	4729	4823	47.35	47.22	45.08
450	16	466	455	0.51	-	-				360	14	374	390	0.82	-	-				280	12	344	355			
5650	147	5797	5492	4.06	33	D	56.77			5430	117	5547	5525	0.30	33	D	56.27			4210	102	5073	5186	56.87		
5650	147	5797	5484	4.17	35	E	52.51			5430	117	5547	5539	0.11	36	E	51.39			4210	102	5073	5179	52.89		

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PM1617										PM1718										PM1819						
Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
3140	239	3379	3359	0.34	21	C	54.73			3440	181	3621	3644	0.38	23	C	54.44			2640	156	3289	3265	54.92		
3140	239	3379	3359	0.34	21	C	55.18			3440	181	3621	3646	0.41	23	C	54.53			2640	156	3289	3264	55.05		
320	14	334	332	0.11	-	-				440	13	453	459	0.28	-	-				340	11	413	409			
2820	225	3045	3027	0.33	20	C	53.72	59.33	58.00	3000	168	3168	3188	0.35	20	C	54.14	60.88	56.25	2300	145	2876	2851	54.28	55.78	56.00
2820	225	3045	3031	0.25	19	C	55.06	59.33	58.00	3000	168	3168	3184	0.28	20	C	55.75	60.88	56.25	2300	145	2876	2856	56.11	55.78	56.00
460	7	467	471	0.18	-	-				420	2	422	413	0.44	-	-				320	2	379	376			
130	10	140	138	0.17	-	-				150	3	153	152	0.08	-	-				120	3	145	149			
3410	242	3652	3625	0.45	22	C	57.67			3570	173	3743	3755	0.20	22	C	57.75			2740	150	3400	3383	58.08		
300	10	310	314	0.23	-	-				180	5	185	190	0.37	-	-				140	4	169	183			
3710	252	3962	3929	0.53	25	C	54.57			3750	178	3928	3952	0.38	24	C	55.35			2880	154	3569	3564	55.59		
170	10	180	177	0.22	-	-				170	10	180	174	0.45	-	-				130	9	164	150			
420	20	440	442	0.10	-	-				360	3	363	379	0.83	-	-				280	3	333	314			
3960	262	4222	4197	0.39	25	C	57.04			3940	171	4111	4158	0.73	25	C	57.24			3030	148	3739	3733	57.43		
160	18	178	189	0.81	-	-				170	10	180	186	0.44	-	-				130	9	164	166			
3800	244	4044	4010	0.54	26	D	52.24	58.27	54.92	3770	161	3931	3971	0.64	26	C	52.53	59.50	53.92	2900	139	3575	3570	52.72	62.43	56.58
3800	244	4044	4013	0.49	26	C	53.97	58.27	54.92	3770	161	3931	3971	0.64	25	C	54.37	59.50	53.92	2900	139	3575	3570	54.80	62.43	56.58
300	26	326	325	0.06	-	-				290	3	293	286	0.41	-	-				220	3	262	243			
4100	270	4370	4326	0.67	27	D	54.42			4060	164	4224	4271	0.72	27	D	54.73			3120	142	3838	3811	55.00		
4100	270	4370	4322	0.73	26	D	56.83			4060	164	4224	4274	0.77	25	C	56.98			3120	142	3838	3814	57.26		
220	11	231	228	0.20	-	-				180	10	190	189	0.07	-	-				140	9	175	171			
3880	259	4139	4089	0.78	26	D	53.24	58.67	54.50	3880	154	4034	4086	0.82	26	D	53.27	58.25	53.83	2980	133	3662	3648	53.51	58.90	56.58
3880	259	4139	4098	0.64	26	D	53.56	58.67	54.50	3880	154	4034	4089	0.86	26	C	53.73	58.25	53.83	2980	133	3662	3650	54.26	58.90	56.58
330	17	347	348	0.05	-	-				250	4	254	254	0.00	-	-				190	3	227	234			
4210	276	4486	4454	0.48	27	D	56.25			4130	158	4288	4347	0.90	27	D	55.42			3170	136	3889	3879	57.31		
370	10	380	380	0.00	-	-				190	5	195	193	0.14	-	-				150	4	181	182			
4580	286	4866	4829	0.53	24	C	51.57			4320	163	4483	4556	1.09	23	C	50.58			3320	140	4071	4055	55.57		
820	29	849	837	0.41	-	-				660	19	679	693	0.53	-	-				510	16	619	628			
750	77	827	840	0.45	-	-				730	40	770	774	0.14	-	-				560	35	700	695			
3010	180	3190	3146	0.78	21	C	50.27	40.58	41.50	2930	104	3034	3103	1.25	23	C	45.36	40.13	44.92	2250	89	2752	2734	54.06	51.30	51.50
3010	180	3190	3146	0.78	21	C	50.77	40.58	41.50	2930	104	3034	3106	1.30	23	C	45.99	40.13	44.92	2250	89	2752	2732	56.64	51.30	51.50
410	10	420	394	1.29	-	-				380	10	390	413	1.15	-	-				290	9	352	328			
2600	170	2770	2747	0.44	20	C	47.06	20.83	28.25	2550	94	2644	2699	1.06	22	C	42.51	21.82	28.83	1960	80	2400	2403	55.49	42.70	44.25
2600	170	2770	2742	0.53	21	C	44.37	20.83	28.25	2550	94	2644	2704	1.16	23	C	40.52	21.82	28.83	1960	80	2400	2404	55.98	42.70	44.25
300	8	308	330	1.23	-	-				310	6	316	343	1.49	-	-				240	5	288	305			
520	40	560	585	1.04	-	-				620	46	666	600	2.62	-	-				480	40	612	639			
3420	218	3638	3655	0.28	23	C	41.08	20.83	28.25	3480	146	3626	3649	0.38	26	C	36.40	21.82	28.83	2680	125	3300	3352	54.63	42.70	44.25
3420	218	3638	3638	0.00	34	D	36.71	20.83	28.25	3480	146	3626	3665	0.65	37	E	33.42	21.82	28.83	2680	125	3300	3360	54.01	42.70	44.25
3420	218	3638	3619	0.32	42	E	29.85	20.83	28.25	3480	146	3626	3679	0.88	43	E	28.84	21.82	28.83	2680	125	3300	3378	52.09	42.70	44.25
500	33	533	529	0.17	-	-				560	37	597	592	0.21	-	-				430	32	544	529			
3920	251	4171	4133	0.59	47	F	30.21	33.60	24.58	4040	183	4223	4296	1.12	44	E	33.60	19.60	22.00	3110	157	3844	3930	47.69	34.60	37.00
3920	251	4171	4134	0.57	41	E	34.37	33.60	24.58	4040	183	4223	4296	1.12	36	E	40.72	19.60	22.00	3110	157	3844	3930	57.72	34.60	37.00
840	28	868	860	0.27	-	-				790	15	805	847	1.46	-	-				610	13	733	741			
3080	223	3303	3272	0.54	46	F	24.67	33.60	24.58	3250	168	3418	3452	0.58	37	E	31.57	19.60	22.00	2500	144	3111	3191	47.74	34.60	37.00
480	42	522	505	0.75	-	-				540	32	572	560	0.50	-	-				420	28	527	514			
2600	181	2781	2776	0.09	53	F	17.95	33.60	24.58	2710	136	2846	2900	1.01	42	E	23.63	19.60	22.00	2080	116	2584	2682	50.18	34.60	37.00
2600	181	2781	2771	0.19	61	F	15.54	33.60	24.58	2710	136	2846	2917	1.32	55	F	18.03	19.60	22.00	2080	116	2584	2685	48.57	34.60	37.00
2600	181	2781	2760	0.40	64	F	14.86	33.60	24.58	2710	136	2846	2946	1.86	59	F	16.98	19.60	22.00	2080	116	2584	2690	47.70	34.60	37.00
860	45	905	914	0.30	-	-				810	42	852	865	0.44	-	-				620	36	772	796			
840	10	850	872	0.75	-	-				660	6	666	664	0.08	-	-				510	5	606	634			
4300	236	4536	4554	0.27	66	F	17.72	33.30	22.33	4180	184	4364	4497	2.00	61	F	18.81	27.13	21.08	3210	157	3961	4123	43.79	29.67	34.42
4300	236	4536	4555	0.28	78	F	15.07	33.30	22.33	4180	184	4364	4501	2.06	72	F	16.05	27.13	21.08	3210	157	3961	4124	42.35	29.67	34.42
1010	10	1020	968	1.65	-	-				820	10	830	896	2.25	-	-				630	9	752	821			
5310	246	5556	5513	0.58	47	F	40.28	43.20	34.58	5000	194	5194	5437	3.33	47	F	39.22	29.70	32.25	3840	166	4713	4960	47.88	38.83	40.00
110	18	128	182	4.34	-	-				90	11	101	140	3.55	-	-				70	10	94	153			
5200	228	5428	5336	1.25	51	F	35.93	50.20	45.75	4910	183	5093	5294	2.79	50	F	35.96	47.50	45.67	3770	156	4619	4813	40.38	48.75	46.67
5200	228	5428	5336	1.25	40	E	45.27	50.20	45.75	4910	183	5093	5293	2.78	41	E	43.81	47.50	45.67	3770	156	4619	4819	45.36	48.75	46.67
650	19	669	684	0.58	-	-				630	21	651	658	0.27	-	-				580	18	704	695			
810	84	894	860	1.15	-	-				780	69	849	916	2.26	-	-				510	60	671	722			
3740	125	3865	3795	1.13	22	C	59.46	52.27	51.08	3500	93	3593	3717	2.05	21	C	59.19	53.63	49.33	2680	78	3245	3405	58.23	54.38	52.17
130	10	140	136	0.34	-	-				150	10	160	157	0.24	-	-				120	9	152	146			
3870	135	4005	3928	1.22	22	C	59.26	52.27	51.08	3650	103	3753	3874	1.96	22	C	59.09	53.63	49.33	2800	87	3396	3553	57.95	54.38	52.17
210	12	222	224	0.13	-	-				270	10	280	272	0.48	-	-				210	9	258	263			
680	83	763	769	0.22	-	-				680	76	756	748	0.29	-	-				520	66	689	694			
4760	230	4990	4923	0.95	23	C	54.62			4600	189	4789	4893	1.49	23	C	55.14			3530	162	4344	4509	54.91		

PM Period - Existing Validation

Section	Link	Facility	Type	PM1415 Auto Volume Lookup	PM1415 Truck volume Lookup	PM1415 Total Volume Lookup	PM1415 Model Output Volume	PM1415 Simulation Speed (mph)	PM1415 Avg Hour Speed, Date of Count	PM1415 2mo. Avg Hour Speed
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	3400	416	3469	3344	71.79		
	1614:1615		Mainline	3400	416	3469	3339	67.77		
	1615:1618	SB I-96 Exit to Grand	Ramp	300	37	306	296			
	1615:1599		Mainline	3100	379	3163	3039	53.71	68.60	62.67
	1599:1597		Mainline	3100	379	3163	3025	58.14	68.60	62.67
	1597:1595		Mainline	3100	379	3163	3018	58.64	68.60	62.67
	1595:1593		Mainline	3100	379	3163	3017	59.91	68.60	62.67
	1607:1593	SB I-96 Entrance from Grand	Ramp	480	59	490	483			
	1593:1591		Mainline	3580	438	3653	3493	57.58		
	1591:1589		Mainline	3580	438	3653	3488	59.98		
	990:991	WB I-94 Entrance from SB I-96	Ramp	220	19	217	216			
	978:979	SB I-96 to EB I-94	Ramp	810	33	766	683			
	1589:1577		Mainline	2550	386	2669	2571	56.81	61.57	60.25
	1577:1574		Mainline	2550	386	2669	2561	58.82	61.57	60.25
	1583:1584	SB I-96 Exit to Warren	Ramp	220	27	225	206			
	1574:1573		Mainline	2330	359	2445	2351	54.82	61.57	60.25
	1573:1554		Mainline	2330	359	2445	2346	59.60	61.57	60.25
	1018:1019	EB I-94 to SB I-96	Ramp	240	41	255	253			
	1001:1002	WB I-94 Exit to SB I-96	Ramp	660	30	627	588			
	1558:1559	SB I-96 Entrance from Warren	Ramp	550	68	562	559			
	163:1552	SB I-96 South of Entrance from Warren	Mainline	3380	498	3525	3702	57.73		
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	3640	443	3712	3650	53.19		
	1568:1569	NB I-96 Exit to Warren	Ramp	480	59	490	481			
	1553:1555		Mainline	3160	384	3222	3155	57.21		
	983:982	NB I-96 to EB I-94	Ramp	260	95	323	313			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	710	132	765	737			
	1555:1572		Mainline	2190	157	2134	2090	59.28	60.00	58.58
	1580:1579	NB I-96 Entrance from Warren	Ramp	560	73	575	577			
	1575:1576		Mainline	2750	230	2709	2653	58.94	60.00	58.58
	1576:1588		Mainline	2750	230	2709	2650	62.10	60.00	58.58
	1001:1004	WB I-94 Exit to NB I-96	Ramp	1260	133	1266	782			
	1027:1008	EB I-94 to NB I-96	Ramp	760	146	824	795			
	1588:1590		Mainline	4770	509	4799	4208	45.88		
	1590:1592		Mainline	4770	509	4799	4203	50.58	61.57	60.17
	1602:1603	NB I-96 Exit to Grand	Ramp	540	67	552	528			
	1592:1594		Mainline	4230	442	4247	3669	56.95	61.57	60.17
	1594:1596		Mainline	4230	442	4247	3661	56.34	61.57	60.17
	1596:1598		Mainline	4230	442	4247	3642	55.95	61.57	60.17
	1610:1611	NB I-96 Entrance from Grand	Ramp	460	56	469	470			
	1613:50	NB I-96 north of Entrance from Grand	Mainline	4690	498	4716	4081	56.98		
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	3850	294	3767	3683	57.78	62.25	61.42
	60:1405		Mainline	3850	294	3767	3678	57.88	62.25	61.42
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	550	138	625	609			
	1405:1434		Mainline	3300	156	3142	3054	55.28	61.25	56.92
	1434:1407		Mainline	3300	156	3142	3045	50.34	61.25	56.92
	1407:1422		Mainline	3300	156	3142	3039	57.27	61.25	56.92
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	1070	16	987	959			
	1422:939		Mainline	4370	172	4129	3986	55.24		
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	890	71	874	844			
	939:940		Mainline	3480	101	3255	3135	55.37		
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	600	41	583	555			
	940:1431		Mainline	2880	60	2673	2571	55.45	57.33	51.75
	1431:1435		Mainline	2880	60	2673	2561	54.73	57.33	51.75
	1435:1441		Mainline	2880	60	2673	2558	60.27	57.33	51.75
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	370	11	346	320			
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	500	67	515	473			
	1441:1442		Mainline	3750	138	3535	3346	54.90		
	1442:1443		Mainline	3750	138	3535	3342	45.39		
	1471:1472	SB Hwy 10 Exit to Forest	Ramp	810	16	751	731			
	1443:1445		Mainline	2940	122	2784	2599	57.89	57.50	55.67
	1465:1466	SB Hwy 10 Entrance from Forest	Ramp	320	16	305	284			
	1447:54		Mainline	3260	138	3089	2863	57.44		
	54:58	SB Hwy 10 South of Entrance from Forest	Mainline	3260	138	3089	2856	57.31		
NB Hwy 10	55:1448	NB Hwy 10 South of Exit to Forest	Mainline	4470	102	4156	4094	56.73		
	1448:1444		Mainline	4470	102	4156	4083	55.11		
	1461:1462	NB Hwy 10 Exit to Forest	Ramp	230	32	238	233			
	1444:1446		Mainline	4240	70	3918	3847	57.69	55.50	53.92
	1446:1440		Mainline	4240	70	3918	3835	60.51	55.50	53.92
	1469:1470	NB Hwy 10 Entrance from Forest	Ramp	1480	2	1347	1311			
	1440:1439		Mainline	5720	72	5265	5132	49.18		
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	790	19	735	721			
	1439:1438		Mainline	4930	53	4530	4402	53.35	56.57	52.92
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	870	16	805	789			
	1438:1437		Mainline	4060	37	3725	3599	55.37	56.57	52.92
	1437:1436		Mainline	4060	37	3725	3591	55.57	56.57	52.92
	1436:1432		Mainline	4060	37	3725	3584	55.84	56.57	52.92
	1432:1430		Mainline	4060	37	3725	3572	56.40	56.57	52.92
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	870	44	831	747			
	1430:938		Mainline	4930	81	4555	4313	45.73	56.57	52.92
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	610	25	577	538			
	182:1423		Mainline	5540	106	5133	4833	46.88		
	1424:1425	NB Hwy 10 Exit to Milwaukee	Ramp	490	16	460	439			
	1423:1408		Mainline	5050	90	4673	4385	58.73	57.89	56.25
	1408:1433		Mainline	5050	90	4673	4368	53.18	57.89	56.25
	1433:1406		Mainline	5050	90	4673	4357	61.92	57.89	56.25
	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	820	100	836	818			
	1406:61		Mainline	5870	190	5509	5160	50.61	61.00	58.08
	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	5870	190	5509	5155	57.92	61.00	58.08
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	5200	500	5182	5026	58.61		
	238:239	SB I-75 Exit to Clay	Ramp	480	52	484	473			
	236:242		Mainline	4720	448	4698	4529	54.72	60.58	56.92
	242:244		Mainline	4720	448	4698	4515	45.23	60.58	56.92
	253:2851	SB I-75 Entrance from Clay	Ramp	1020	16	942	940			
	247:249		Mainline	5740	464	5640	5435	38.28		
	278:279	WB I-94 Entrance from SB I-75	Ramp	540	64	549	531			
	281:282	EB I-94 Entrance from SB I-75	Ramp	1400	89	1354	1285			
	249:261		Mainline	3800	311	3737	3594	46.12	54.82	54.08
	261:262		Mainline	3800	311	3737	3587	57.60	54.82	54.08
	262:265		Mainline	3800	311	3737	3581	57.34	54.82	54.08
	265:266		Mainline	3800	311	3737	3566	55.87	54.82	54.08
	266:268		Mainline	3800	311	3737	3552	55.26	54.82	54.08
	311:312	SB I-75 Exit to Warren	Ramp	570	16	533	498			
	268:269		Mainline	3230	295	3205	3044	56.79	57.60	56.25
	269:270		Mainline	3230	295	3205	3036	58.05	57.60	56.25
	299:314	EB I-94 Exit to SB I-75	Ramp	160	16	160	146			
	293:294	WB I-94 Exit to SB I-75	Ramp	780	122	820	744			
	270:320		Mainline	4170	433	4185	3908	53.77	57.60	56.25
	320:321		Mainline	4170	433	4185	3901	61.43	57.60	56.25
	322:323	SB I-75 Entrance from Warren	Ramp	350	44	358	347			
	321:69		Mainline	4520	477	4543	4232	57.14		
	69:70	SB I-75 South of Entrance from Warren	Mainline	4520	477	4543	4225	58.28		
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	5220	294	5013	4879	59.53		
	339:340	NB I-75 Exit to Warren	Ramp	260	148	371	345			
	324:319		Mainline	4960	146	4642	4508	51.89	57.17	57.33
	319:317		Mainline	4960	146	4642	4501	55.45	57.17	57.33
	276:277	WB I-94 Entrance from NB I-75	Ramp	310	13	294	297			
	285:286	EB I-94 Entrance from NB I-75	Ramp	620	29	590	570			
	315:263	NB I-75 to I-94 Ramp Entrance from NB Frontage	Ramp	380	2	347	349			
	317:271		Mainline	4410	106	4105	3972	57.22	57.17	57.33
	306:305	NB I-75 Entrance from Warren	Ramp	1020	2	929	922			
	267:264		Mainline	5430	108	5035	4836	60.82	56.09	57.00
	300:301	EB I-94 Exit to NB I-75	Ramp	840	92	847	760			
	264:250		Mainline	6270	200	5882	5578	53.61	56.09	57.00
	289:290	WB I-94 Exit to NB I-75	Ramp	850	46	815	717			
	248:245		Mainline	7120	246	6696	6267	55.12		
	255:256	NB I-75 Exit to Clay	Ramp	490	16	460	436			
	245:243		Mainline	6630	230	6236	5810	57.53	59.45	60.58
	243:237		Mainline	6630	230	6236	5791	58.17	59.45	60.58
	240:241	NB I-75 Entrance from Clay	Ramp	500	60	509	504			
	237:74	NB I-75 north of Entrance from Clay	Mainline	7130	290	6745	6274	56.44		

Link	PM1617 LOS	PM1617 Simulation Speed (mph)	PM1617 Avg Hour Speed, Date of Count	PM1617 2mo. Avg Hour Speed	PM1718 Auto Volume Lookup	PM1718 Truck volume Lookup	PM1718 Total Volume Lookup	PM1718 Model Output Volume	PM1718 GEH (Target v. Model)	PM1718 Density pc/mi/ln	PM1718 LOS	PM1718 Simulation Speed (mph)	PM1718 Avg Hour Speed, Date of Count	PM1718 2mo. Avg Hour Speed
49:1614	B	72.05			3270	262	3532	3525	0.12	13	B	72.03		
1614:1615	B	67.88			3270	262	3532	3529	0.05	14	B	67.86		
1615:1618	-				290	23	313	300	0.74	-	-			
1615:1599	B	53.74	68.33	64.33	2980	239	3219	3227	0.14	16	B	53.69	63.00	62.17
1599:1597	B	58.23	68.33	64.33	2980	239	3219	3233	0.25	14	B	58.07	63.00	62.17
1597:1595	B	58.73	68.33	64.33	2980	239	3219	3236	0.30	14	B	58.55	63.00	62.17
1595:1593	B	59.85	68.33	64.33	2980	239	3219	3235	0.28	14	B	59.77	63.00	62.17
1607:1593	-				460	37	497	496	0.04	-	-			
1593:1591	B	57.84			3440	276	3716	3729	0.21	13	B	57.64		
1591:1589	B	59.97			3440	276	3716	3731	0.25	13	B	60.04		
990:991	-				270	10	280	272	0.48	-	-			
978:979	-				720	1	721	711	0.37	-	-			
1589:1577	B	56.95	65.63	60.00	2450	265	2715	2746	0.59	13	B	56.80	56.71	56.67
1577:1574	B	58.85	65.63	60.00	2450	265	2715	2746	0.59	12	B	58.66	56.71	56.67
1583:1584	-				210	17	227	242	0.98	-	-			
1574:1573	B	54.87	65.63	60.00	2240	248	2488	2503	0.30	12	B	54.81	56.71	56.67
1573:1554	A	59.71	65.63	60.00	2240	248	2488	2504	0.32	11	B	59.50	56.71	56.67
1018:1019	-				280	19	299	283	0.94	-	-			
1001:1002	-				630	21	651	658	0.27	-	-			
1558:1559	-				530	43	573	557	0.67	-	-			
163:1552	B	57.72			3280	331	3611	4004	6.37	15	B	57.66		
1548:1553	B	53.13			3500	280	3780	3776	0.07	15	B	53.29		
1568:1569	-				460	37	497	502	0.22	-	-			
1553:1555	B	57.14			3040	243	3283	3272	0.19	12	B	57.34		
983:982	-				180	47	227	222	0.33	-	-			
1020:1021	-				680	76	756	748	0.29	-	-			
1555:1572	A	59.12	61.60	59.75	2180	120	2300	2302	0.04	10	A	59.08	60.00	57.58
1580:1579	-				540	43	583	578	0.21	-	-			
1575:1576	B	58.84	61.60	59.75	2720	163	2883	2885	0.04	13	B	58.80	60.00	57.58
1576:1588	B	61.97	61.60	59.75	2720	163	2883	2883	0.00	12	B	61.26	60.00	57.58
1001:1004	-				1180	69	1249	916	10.12	-	-			
1027:1008	-				1050	95	1145	1127	0.53	-	-			
1588:1590	C	46.97			4950	327	5277	4910	5.14	25	C	39.91		
1590:1592	C	51.07	59.67	60.17	4950	327	5277	4908	5.17	22	C	46.96	70.25	59.25
1602:1603	-				520	42	562	561	0.04	-	-			
1592:1594	B	57.29	59.67	60.17	4430	285	4715	4344	5.51	20	C	56.01	70.25	59.25
1594:1596	C	56.33	59.67	60.17	4430	285	4715	4346	5.48	20	C	55.98	70.25	59.25
1596:1598	C	55.89	59.67	60.17	4430	285	4715	4344	5.51	20	C	55.66	70.25	59.25
1610:1611	-				440	35	475	494	0.86	-	-			
1613:50	C	56.95			4870	320	5190	4839	4.96	22	C	56.66		
63:60	B	57.52	55.14	61.58	3680	144	3824	3851	0.44	17	B	57.32	66.20	61.83
60:1405	B	57.90	55.14	61.58	3680	144	3824	3852	0.45	17	B	57.95	66.20	61.83
1416:1417	-				550	71	621	628	0.28	-	-			
1405:1434	C	55.22	57.14	55.83	3130	73	3203	3225	0.39	20	C	55.61	62.17	57.08
1434:1407	C	50.27	57.14	55.83	3130	73	3203	3227	0.42	22	C	50.40	62.17	57.08
1407:1422	C	57.11	57.14	55.83	3130	73	3203	3227	0.42	19	C	57.26	62.17	57.08
1428:1429	-				1000	10	1010	1024	0.44	-	-			
1422:939	C	55.04			4130	83	4213	4254	0.63	20	C	55.04		
941:942	-				810	42	852	865	0.44	-	-			
939:940	C	55.62			3320	41	3361	3392	0.53	20	C	55.59		
937:936	-				640	11	651	627	0.95	-	-			
940:1431	B	55.75	54.29	45.92	2680	30	2710	2764	1.03	17	B	54.99	47.38	45.75
1431:1435	B	54.41	54.29	45.92	2680	30	2710	2767	1.09	17	B	54.23	47.38	45.75
1435:1441	B	59.94	54.29	45.92	2680	30	2710	2769	1.13	16	B	59.67	47.38	45.75
949:950	-				330	6	336	325	0.61	-	-			
932:933	-				540	32	572	560	0.50	-	-			
1441:1442	B	54.73			3550	68	3618	3656	0.63	14	B	54.29		
1442:1443	C	44.97			3550	68	3618	3652	0.56	20	C	44.99		
1471:1472	-				870	10	880	895	0.50	-	-			
1443:1445	B	57.51	60.00	56.92	2680	58	2738	2763	0.48	16	B	58.06	61.33	55.00
1465:1466	-				340	10	350	372	1.16	-	-			
1447:54	C	57.26			3020	68	3088	3142	0.97	18	C	57.85		
54:58	C	57.05			3020	68	3088	3138	0.90	18	C	57.70		
55:1448	D	56.40			4270	22	4292	4259	0.50	25	C	56.42		
1448:1444	D	55.00			4270	22	4292	4261	0.47	26	D	54.16		
1461:1462	-				240	10	250	257	0.44	-	-			
1444:1446	C	57.33	47.00	51.42	4030	12	4042	4003	0.61	25	C	54.49	58.75	47.17
1446:1440	C	59.83	47.00	51.42	4030	12	4042	4002	0.63	25	C	53.40	58.75	47.17
1469:1470	-				1140	10	1150	1220	2.03	-	-			
1440:1439	D	46.81			5170	22	5192	5226	0.47	31	D	41.97		
916:915	-				710	8	718	741	0.85	-	-			
1439:1438	D	52.02	44.91	46.25	4460	14	4474	4491	0.25	30	D	50.51	49.00	38.83
947:948	-				660	6	666	664	0.08	-	-			
1438:1437	C	54.05	44.91	46.25	3800	8	3808	3831	0.37	24	C	52.51	49.00	38.83
1437:1436	C	53.67	44.91	46.25	3800	8	3808	3831	0.37	25	C	50.57	49.00	38.83
1436:1432	C	52.41	44.91	46.25	3800	8	3808	3832	0.39	27	D	47.84	49.00	38.83
1432:1430	D	49.06	44.91	46.25	3800	8	3808	3833	0.40	30	D	42.40	49.00	38.83
920:921	-				790	15	805	847	1.46	-	-			
1430:938	D	36.30	44.91	46.25	4590	23	4613	4683	1.03	39	E	30.36	49.00	38.83
943:944	-				560	21	581	558	0.96	-	-			
182:1423	D	41.02			5150	44	5194	5247	0.73	33	D	39.84		
1424:1425	-				550	10	560	554	0.25	-	-			
1423:1408	D	58.54	43.33	45.33	4600	34	4634	4693	0.86	26	D	59.68	33.80	31.58
1408:1433	D	53.43	43.33	45.33	4600	34	4634	4699	0.95	29	D	53.62	33.80	31.58
1433:1406	D	62.18	43.33	45.33	4600	34	4634	4699	0.95	25	C	62.39	33.80	31.58
1419:1420	-				790	63	853	875	0.75	-	-			
1406:61	D	50.69	43.67	41.00	5390	97	5487	5577	1.21	28	D	50.95	39.00	31.25
61:67	C	58.02	43.67	41.00	5390	97	5487	5578	1.22	24	C	58.63	39.00	31.25
73:236	C	53.34			5060	249	5309	5034	3.82	46	F	22.34		
238:239	-				400	26	426	416	0.49	-	-			
236:242	C	49.23	46.90	46.42	4660	223	4883	4595	4.18	59	F	19.97	38.00	49.67
242:244	D	40.51	46.90	46.42	4660	223	4883	4563	4.66	64	F	18.15	38.00	49.67
253:2851	-				930	10	940	911	0.95	-	-			
247:249	E	39.23			5590	233	5823	5460	4.83	50	F	28.07		
278:279	-				620	46	666	600	2.62	-	-			
281:282	-				1300	42	1342	1267	2.08	-	-			
249:261	D	46.35	38.89	43.08	3670	145	3815	3573	3.98	26	D	46.44	41.83	47.67
261:262	C	57.47	38.89	43.08	3670	145	3815	3574	3.96	21	C	58.92	41.83	47.67
262:265	C	56.75	38.89	43.08	3670	145	3815	3576	3.93	21	C	58.82	41.83	47.67
265:266	C	55.97	38.89	43.08	3670	145	3815	3576	3.93	21	C	57.34	41.83	47.67
266:268	C	55.47	38.89	43.08	3670	145	3815	3573	3.98	21	C	56.57	41.83	47.67
311:312	-				540	10	550	527	0.99	-	-			
268:269	C	56.87	56.33	48.50	3130	135	3265	3044	3.93	18	B	57.96	59.60	52.25
269:270	C	58.15	56.33	48.50	3130	135	3265	3044	3.93	17	B	59.36	59.60	52.25
299:314	-				150	10	160	147	1.05	-	-			
293:294	-				730	40	770	774	0.14	-	-			
270:320	C	53.82	56.33	48.50	4010	185	4195	3968	3.55	19	C	54.70	59.60	52.25
320:321	C	61.40	56.33	48.50	4010	185	4195	3969	3.54	16	B	62.05	59.60	52.25
322:323	-				340	27	367	367	0.00	-	-			
321:69	B	57.20			4350	212	4562	4332	3.45	15	B	57.68		
69:70	B	58.35			4350	212	4562	4332	3.45	15	B	58.85		
68:324	C	58.30			5050	23	5073	5104	0.43	17	B	58.52		
339:340	-				210	1	211	210	0.07	-	-			
324:319	C	50.54	58.42	43.33	4840	22	4862	4901	0.56	24	C	50.29	45.45	38.08
319:317	C	54.87	58.42	43.33	4840	22	4862	4903	0.59	22	C	55.00	45.45	38.08
276:277	-				310	6	316	343	1.49	-	-			
285:286	-				700	12	712	737	0.93	-	-			
315:263	-				400	31	431	445	0.67	-	-			
317:271	C	56.46	58.42	43.33	4230	35	4265	4270	0.08	25	C	56.59	45.45	38.08
306:305	-				850	12	862	883	0.71	-	-			
267:264	D	60.62	55.45	44.58	5080	47	5127	5165	0.53	29	D	60.64	44.11	42.42
300:301	-				640	47	687	672	0.58	-	-			
264:250	D	52.63	55.45	44.58	5720	94	5814	5845	0.41	28	D	53.53	44.11	42.42
289:290	-				660	19	679	693	0.53	-	-			
248:245	D	53.87			6380	113	6493	6551	0.72	30	D	54.73		
255:256	-				550	10	560	563	0.13	-	-			
245:243	D	57.64	56.90	47.50	5830	103	5933	5991	0.75	26	D	57.77	53.78	48.08
243:237	D	58.23	56.90	47.50	5830	103	5933	5996	0.82	26	C	58.39	53.78	48.08
240:241	-				480	38	518	507	0.49	-	-			
237:74	C	56.56			6310	141	6451	6508	0.71	23	C	56.66		

Link	PM1819 Auto Volume Lookup	PM1819 Truck volume Lookup	PM1819 Total Volume Lookup	PM1819 Model Output Volume	PM1819 Simulation Speed (mph)	PM1819 Avg Hour Speed, Date of Count	PM1819 2mo. Avg Hour Speed
49:1614	2510	226	3219	3255	72.19		
1614:1615	2510	226	3219	3254	67.86		
1615:1618	220	20	282	279			
1615:1599	2290	206	2936	2977	53.64	67.00	62.33
1599:1597	2290	206	2936	2978	58.20	67.00	62.33
1597:1595	2290	206	2936	2978	58.66	67.00	62.33
1595:1593	2290	206	2936	2975	59.87	67.00	62.33
1607:1593	350	32	449	450			
1593:1591	2640	238	3386	3426	57.82		
1591:1589	2640	238	3386	3426	60.06		
990:991	210	9	258	263			
978:979	550	1	648	662			
1589:1577	1880	228	2480	2504	56.83	63.00	57.67
1577:1574	1880	228	2480	2501	58.84	63.00	57.67
1583:1584	160	15	206	214			
1574:1573	1720	213	2274	2289	54.93	63.00	57.67
1573:1554	1720	213	2274	2291	59.63	63.00	57.67
1018:1019	220	16	278	263			
1001:1002	580	18	704	695			
1558:1559	410	37	526	541			
163:1552	2530	284	3311	3782	57.95		
1548:1553	2690	242	3449	3438	53.47		
1568:1569	350	32	449	456			
1553:1555	2340	210	3000	2986	57.83		
983:982	140	41	213	205			
1020:1021	520	66	689	694			
1555:1572	1680	103	2098	2089	59.20	63.50	56.83
1580:1579	420	37	538	544			
1575:1576	2100	140	2635	2632	59.26	63.50	56.83
1576:1588	2100	140	2635	2632	62.07	63.50	56.83
1001:1004	910	60	1141	722			
1027:1008	810	82	1049	1048			
1588:1590	3820	282	4826	4412	44.93		
1590:1592	3820	282	4826	4414	50.34	65.50	58.50
1602:1603	400	36	513	517			
1592:1594	3420	246	4313	3898	57.08	65.50	58.50
1594:1596	3420	246	4313	3897	56.16	65.50	58.50
1596:1598	3420	246	4313	3892	55.80	65.50	58.50
1610:1611	340	30	435	430			
1613:50	3760	276	4748	4322	56.94		
63:60	2830	124	3475	3503	57.46	64.67	61.42
60:1405	2830	124	3475	3505	58.21	64.67	61.42
1416:1417	420	61	566	585			
1405:1434	2410	63	2909	2921	55.88	62.86	58.17
1434:1407	2410	63	2909	2918	50.65	62.86	58.17
1407:1422	2410	63	2909	2919	57.33	62.86	58.17
1428:1429	770	9	916	928			
1422:939	3180	72	3826	3846	55.82		
941:942	620	36	772	796			
939:940	2560	36	3054	3050	56.12		
937:936	490	10	588	578			
940:1431	2070	26	2466	2474	55.90	59.00	52.67
1431:1435	2070	26	2466	2476	54.68	59.00	52.67
1435:1441	2070	26	2466	2476	60.12	59.00	52.67
949:950	250	5	300	312			
932:933	420	28	527	514			
1441:1442	2740	59	3293	3301	55.12		
1442:1443	2740	59	3293	3306	45.61		
1471:1472	670	9	799	799			
1443:1445	2070	50	2494	2508	58.18	61.38	56.58
1465:1466	260	9	316	328			
1447:54	2330	59	2811	2838	57.85		
54:58	2330	59	2811	2840	57.54		
55:1448	3280	19	3881	3844	57.12		
1448:1444	3280	19	3881	3841	55.54		
1461:1462	180	9	222	221			
1444:1446	3100	10	3659	3622	58.03	54.00	53.67
1446:1440	3100	10	3659	3619	60.70	54.00	53.67
1469:1470	880	9	1046	1029			
1440:1439	3980	19	4705	4648	51.49		
916:915	550	7	655	650			
1439:1438	3430	12	4049	3998	54.87	54.50	50.00
947:948	510	5	606	634			
1438:1437	2920	7	3444	3364	55.97	54.50	50.00
1437:1436	2920	7	3444	3364	55.93	54.50	50.00
1436:1432	2920	7	3444	3363	56.17	54.50	50.00
1432:1430	2920	7	3444	3367	57.37	54.50	50.00
920:921	610	13	733	741			
1430:938	3530	20	4176	4109	46.99	54.50	50.00
943:944	430	18	527	550			
182:1423	3960	38	4704	4664	48.25		
1424:1425	420	9	505	483			
1423:1408	3540	29	4199	4182	59.22	58.25	52.58
1408:1433	3540	29	4199	4180	53.39	58.25	52.58
1433:1406	3540	29	4199	4184	62.27	58.25	52.58
1419:1420	610	54	781	784			
1406:61	4150	83	4980	4969	50.95	60.60	54.58
61:67	4150	83	4980	4969	58.54	60.60	54.58
73:236	3890	215	4829	4934	33.00		
238:239	310	22	391	383			
236:242	3580	193	4439	4560	30.75	63.82	59.25
242:244	3580	193	4439	4573	28.61	63.82	59.25
253:2851	710	9	846	866			
247:249	4290	202	5285	5452	33.18		
278:279	480	40	612	639			
281:282	1100	36	1336	1339			
249:261	2710	126	3336	3487	45.98	59.27	55.58
261:262	2710	126	3336	3489	58.34	59.27	55.58
262:265	2710	126	3336	3491	57.97	59.27	55.58
265:266	2710	126	3336	3494	56.72	59.27	55.58
266:268	2710	126	3336	3501	56.12	59.27	55.58
311:312	420	9	505	517			
268:269	2290	117	2832	2985	57.55	62.80	57.50
269:270	2290	117	2832	2985	59.00	62.80	57.50
299:314	120	9	152	152			
293:294	560	35	700	695			
270:320	2970	161	3684	3833	54.55	62.80	57.50
320:321	2970	161	3684	3836	62.03	62.80	57.50
322:323	260	23	333	339			
321:69	3230	184	4016	4177	57.58		
69:70	3230	184	4016	4180	58.86		
68:324	3880	20	4588	4629	60.54		
339:340	160	1	189	182			
324:319	3720	19	4399	4444	53.69	56.89	55.00
319:317	3720	19	4399	4442	55.82	56.89	55.00
276:277	240	5	288	305			
285:286	540	10	647	642			
315:263	310	27	396	406			
317:271	3250	31	3860	3898	57.04	56.89	55.00
306:305	650	10	776	788			
267:264	3900	41	4636	4692	60.78	60.14	54.50
300:301	490	41	625	697			
264:250	4390	82	5261	5385	53.78	60.14	54.50
289:290	510	16	619	628			
248:245	4900	98	5880	6011	55.54		
255:256	420	9	505	528			
245:243	4480	89	5375	5489	57.68	60.17	57.33
243:237	4480	89	5375	5483	58.38	60.17	57.33
240:241	370	33	474	483			
237:74	4850	122	5849	5962	56.65		

GEH Stats for I-94	
Max	5.15
Average	1.75
# Under 5	143
# Over 5	[illegible]
% Under 5	99%

PM1617

GEH Stats for I-94	
Max	4.18
Average	1.41
# Under 5	145
# Over 5	0
% Under 5	100%

PM1718

AM Period - No Build Validation

	Link	Facility	Type	AM67							AM78									
				Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
EB I-94	1014:1012	EB I-94 West of I-96	Mainline	5740	375	6115	4277	19.31			5520	475	5995	4106	26.58	70	F	15.37		
	1018:1019	EB I-94 to SB I-96	Ramp	270	17	287	200				260	22	282	183	6.49	-	-			
	1027:1008	EB I-94 to NB I-96	Ramp	960	28	988	713				920	36	956	711	8.49	-	-			
	1012:1010		Mainline	4510	330	4840	3300	36.05	44.50	53.75	4340	417	4757	3210	24.51	82	F	13.58	17.08	31.17
	1022:1023	EB I-94 Exit to Grand River	Ramp	200	9	209	132				190	11	201	129	5.61	-	-			
	1010:159		Mainline	4310	321	4631	3080	30.22	44.50	53.75	4150	406	4556	3086	25.76	125	F	8.58	17.08	31.17
	983:982	NB I-96 to EB I-94	Ramp	630	74	704	568				610	94	704	545	6.36	-	-			
	187:158		Mainline	4940	395	5335	3595	12.11			4760	500	5260	3632	26.41	115	F	11.06		
	978:979	SB I-96 to EB I-94	Ramp	1440	36	1476	1209				1380	45	1425	1346	2.12	-	-			
	186:966		Mainline	6380	431	6811	4763	27.53	39.13	52.00	6140	545	6685	4970	22.47	67	F	25.59	20.40	31.67
	972:971	EB I-94 Entrance from Linwood	Ramp	280	9	289	253				270	11	281	286	0.30	-	-			
	966:965		Mainline	6660	440	7100	5007	26.15	48.10	53.50	6410	556	6966	5257	21.90	56	F	24.52	28.82	39.50
	965:960		Mainline	6660	440	7100	4972	36.41	48.10	53.50	6410	556	6966	5256	21.87	51	F	35.54	28.82	39.50
	962:963	EB I-94 Entrance from 14th St	Ramp	0	0	0	10				0	0	0	13	5.10	-	-			
	960:959		Mainline	6660	440	7100	4974	54.08			6410	556	6966	5269	21.70	25	C	53.95		
	975:976	EB I-94 Exit to Trumbull	Ramp	930	9	939	494				890	11	901	507	14.85	-	-			
	959:952		Mainline	5730	431	6161	4470	56.85	52.00	56.67	5520	545	6065	4760	17.74	29	D	56.64	39.43	47.25
	952:951		Mainline	5730	431	6161	4458	57.72	52.00	56.67	5520	545	6065	4760	17.74	29	D	57.35	39.43	47.25
	984:950	EB I-94 Exit to SB Hwy 10	Ramp	940	9	949	629				900	11	911	679	8.23	-	-			
	951:943		Mainline	4790	422	5212	3822	56.54	55.67	55.75	4620	534	5154	4081	15.79	26	C	56.18	50.60	51.33
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	700	29	729	499				670	37	707	525	7.33	-	-			
	943:919		Mainline	4090	393	4483	3313	58.63	55.67	55.75	3950	497	4447	3558	14.05	22	C	58.29	50.60	51.33
	919:918		Mainline	4090	393	4483	3304	57.39	55.67	55.75	3950	497	4447	3554	14.12	23	C	54.58	50.60	51.33
	918:912		Mainline	4090	393	4483	3295	52.22	55.67	55.75	3950	497	4447	3548	14.22	30	D	41.15	50.60	51.33
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	670	13	683	609				640	17	657	692	1.91	-	-			
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	790	11	801	510				760	14	774	523	9.86	-	-			
	912:180		Mainline	5550	417	5967	4406	39.70			5350	528	5878	4759	15.34	34	D	29.30		
	180:910		Mainline	5550	417	5967	4383	38.56			5350	528	5878	4760	15.33	47	F	35.16		
	926:927	EB I-94 Exit to John R	Ramp	300	18	318	345				290	23	313	399	4.56	-	-			
	910:909		Mainline	5250	399	5649	4021	46.20	49.91	51.42	5060	505	5565	4363	17.06	32	D	47.48	47.09	46.42
	909:906		Mainline	5250	399	5649	4006	50.29	49.91	51.42	5060	505	5565	4360	17.11	30	D	50.05	47.09	46.42
	906:904		Mainline	5250	399	5649	3999	50.31	49.91	51.42	5060	505	5565	4358	17.14	30	D	50.17	47.09	46.42
	299:314	EB I-94 Exit to SB I-75	Ramp	580	21	601	401				560	26	586	418	7.50	-	-			
	300:301	EB I-94 Exit to NB I-75	Ramp	1190	188	1378	883				1140	238	1378	964	12.10	-	-			
	904:903		Mainline	3480	190	3670	2694	58.51	49.91	51.42	3360	241	3601	2981	10.81	18	B	58.27	47.09	46.42
	903:890		Mainline	3480	190	3670	2692	62.02	49.91	51.42	3360	241	3601	2981	10.81	17	B	61.68	47.09	46.42
	901:900	EB I-94 Entrance from Beaubien	Ramp	0	0	0	16				0	0	0	16	5.66	-	-			
	890:889		Mainline	3480	190	3670	2704	54.49	51.11	50.75	3360	241	3601	2994	10.57	14	B	54.13	52.45	50.08
	892:893	EB I-94 Exit to Russel	Ramp	280	11	291	203				270	14	284	237	2.91	-	-			
	889:881		Mainline	3200	179	3379	2496	56.65	51.11	50.75	3090	227	3317	2757	10.16	17	B	56.21	52.45	50.08
	881:878		Mainline	3200	179	3379	2487	55.39	51.11	50.75	3090	227	3317	2753	10.24	18	B	53.89	52.45	50.08
	281:282	EB I-94 Entrance from SB I-75	Ramp	980	61	1041	779				940	77	1017	831	6.12	-	-			
	285:286	EB I-94 Entrance from NB I-75	Ramp	500	24	524	439				480	31	511	500	0.49	-	-			
	878:183		Mainline	4680	264	4944	3699	55.78			4510	335	4845	4081	11.44	16	B	53.99		
	183:876		Mainline	4680	264	4944	3690	56.22			4510	335	4845	4081	11.44	19	C	54.48		
	887:888	EB I-94 Exit to Chene	Ramp	120	9	129	93				120	11	131	107	2.20	-	-			
	876:875		Mainline	4560	255	4815	3590	59.04			4390	324	4714	3974	11.23	23	C	58.43		
	875:872		Mainline	4560	255	4815	3580	58.33			4390	324	4714	3973	11.24	24	C	58.17		
	872:869		Mainline	4560	255	4815	3563	57.74			4390	324	4714	3969	11.31	24	C	57.28		
	871:870	EB I-94 Entrance from Chene St	Ramp	230	30	260	200				220	38	258	232	1.66	-	-			
	869:860		Mainline	4790	285	5075	3753	54.31	58.60	58.75	4610	362	4972	4196	11.46	21	C	51.29	57.73	58.17
	863:864	EB I-94 Exit to Elliot	Ramp	290	21	311	222				280	26	306	237	4.19	-	-			
	860:859		Mainline	4500	264	4764	3511	42.41	58.60	58.75	4330	336	4666	3955	10.83	35	E	38.91	57.73	58.17
	859:192		Mainline	4500	264	4764	3494	54.91	58.60	58.75	4330	336	4666	3953	10.86	25	C	54.49	57.73	58.17
	856:855	EB I-94 Entrance from Elliot	Ramp	110	9	119	106				110	11	121	115	0.53	-	-			
	836:834		Mainline	4610	273	4883	3590	56.72			4440	347	4787	4068	10.81	25	C	55.77		
	834:832		Mainline	4610	273	4883	3566	51.54			4440	347	4787	4064	10.87	28	D	49.98		
	832:829		Mainline	4610	273	4883	3549	39.12			4440	347	4787	4059	10.95	38	E	37.17		
	848:849	EB I-94 Exit to Van Dyke	Ramp	320	24	344	239				310	30	340	275	3.71	-	-			
	829:827		Mainline	4290	249	4539	3288	40.37	58.00	58.67	4130	317	4447	3781	10.38	33	D	39.81	59.20	57.75
	827:160		Mainline	4290	249	4539	3278	54.29	58.00	58.67	4130	317	4447	3781	10.38	24	C	54.39	59.20	57.75
	841:842	EB I-94 Entrance from Van Dyke	Ramp	140	28	168	153				130	35	165	174	0.69	-	-			
	160:828		Mainline	4430	277	4707	3429	57.10			4260	352	4612	3955	10.04	18	C	57.10		
	828:809		Mainline	4430	277	4707	3406	59.93			4260	352	4612	3955	10.04	23	C	59.91		
	809:807		Mainline	4430	277	4707	3399	55.93			4260	352	4612	3953	10.07	25	C	55.59		
	818:819	EB I-94 Exit to Gratiot	Ramp	600	20	620	451				580	25	605	527	3.28	-	-			
	807:806		Mainline	3830	257	4087	2930	56.24	57.83	59.17	3680	327	4007	3422	9.60	21	C	56.25	55.64	59.33
	823:824	EB I-94 Entrance from Gratiot	Ramp	180	9	189	158				170	11	181	183	0.51	-	-			
	803:800		Mainline	4010	266	4276	3081	66.93			3850	338	4188	3602	9.39	19	C	66.92		
	6209:6210	EB I-94 Exit to French	Ramp	0	0	0	0				0	0	0	10	4.47	-	-			
	800:6208		Mainline	4010	266	4276	3065	54.07	59.86	59.00	3850	338	4188	3591	9.57	23	C	54.03	62.25	60.00
	6208:6214		Mainline	4010	266	4276	3042	54.20	59.86	59.00	3850	338	4188	3590	9.59	23	C	54.22	62.25	60.00
	6250:6251	EB I-94 Entrance from French	Ramp	0	0	0	#N/A				0	0	0	#N/A		-	-			
	6215:6220		Mainline	4010	266	4276	3029	60.03			3850	338	4188	3590	9.59	21	C	59.45		
	6221:6222	EB I-94 Exit to Conner	Ramp	540	36	576	379				520	45	565	473	4.04	-	-			
	6220:6229		Mainline	3470	230	3700	2642	55.23	57.63	57.75	3330	293	3623	3119	8.68	20	C	55.47	58.11	58.83
	6229:6232		Mainline	3470	230	3700	2638	56.18	57.63	57.75	3330	293	3623	3119	8.68	19	C	56.56	58.11	58.83
	6249:6248	EB I-94 Entrance from Conner	Ramp	220	9	229	188				210	12	222	220	0.13	-	-			
	6234:6238		Mainline	3690	239	3929	2799	58.92			3540	305	3845	3328	8.63	20	C	58.96		
	6238:6239	EB I-94 East of Conner	Mainline	3690	239	3929	2779	57.45			3540	305	3845	3325	8.68	20	C	57.23		
WB I-94	6237:6233	WB I-94 East of Conner	Mainline	6940	264	7204	5013	26.41			6670	334	7004	4739	29.56	80	F	20.30		
	6233:6230		Mainline	6940	264	7204	4994	23.80			6670	334	7004	4723	29.79	85	F	18.94		
	6246:6247	WB I-94 Exit to Conner	Ramp	220	61	281	199				210	77	287	192	6.14	-	-			
	6230:6228		Mainline	6720	203	6923	4772	21.78	45.82	53.17	6460	257	6717	4519	29.32	93	F	16.54	26.92	36.08
	6228:161		Mainline	6720	203	6923	4733	19.67	45.82	53.17	6460	257	6717	4507	29.50	97	F	15.85	26.92	36.08
	6224:161	WB I-94 Entrance fromNB Conner	Ramp	248	7	254	197				240	8	248	240	0.53	-	-			
	6218:6217	WB I-94 Entrance from SB Conner	Ramp	83	2	85	75				80	3	83	83	0.85	-	-			
	206:801		Mainline	7050	212	7262	4948	38.11			6780	268	7048	4782	26.46	53	F	30.38		
	6213:6212	WB I-94 Entrance from French	Ramp	0	0	0	66				0	0	0	71	11.92	-	-			
	802:804		Mainline	7050	212	7262	4973	34.80			6780	268	7048	4818	25.90	63	F	26.18		
	811:812	WB I-94 Exit to Gratiot	Ramp	350	23	373	254				340	29	369	233	7.84	-	-			
	815:816	WB I-94 Entrance from Gratiot	Ramp	1020	18	1038	809				980	23	1003	877	4.11	-	-			
	808:810		Mainline	7720	207	7927	5406	38.80			7420	262	7682	5405	28.63	60	F	30.35		
	837:838	WB I-94 Exit to Van Dyke	Ramp	80	24	104	75				80	30	110	78	3.30	-	-			
	810:828		Mainline	7640	183	7823	5301	32.46	48.18	52.33	7340	232	7572	5316	28.50	71	F	25.31	34.45	39.33
	828:830		Mainline	7640	183	7823	5279	30.19	48.18	52.33	7340	232	7572	5308	28.71	76	F	23.63	34.45	39.33
	845:846	WB I-94 Entrance from Van Dayke	Ramp	670	28	698	594				640	36	676	658	0.70	-	-			
	831:833		Mainline	8310	211	8521	5785	41.47			7980	268	8248	5935	27.47	56	F	36.08		
	833:835		Mainline	8310	211	8521	5775	41.89			7980	268	8248	5927	27.57	55	F	36.67		
	851:852	WB I-94 Exit to Elliot	Ramp	230	9	239	389				220	11	231	385	8.77	-	-			
	835:858		Mainline	8080	202	8282	5333	38.43	55.00	54.17	7760	257	8017	5553	28.60	58	F	32.27	39.60	42.75
	858:861		Mainline	8080	202	8282	5229	35.03	55.00	54.17	7760	257	8017	5586	29.48	66	F	28.50	39.60	42.75
	866:867	WB I-94 Entrance from Elliot	Ramp	540	30	570	472				520	38	558	554	0.17	-	-			
	873:874		Mainline	8620	232	8852	5603	36.34			8280	295	8575	6139	26.60	60	F	34.46		
	882:883	WB I-94 Entrance from Chene	Ramp	240	12	252	238				230	15	245	270	1.56	-	-			
	874:877		Mainline	8860	244	9104	5808	37.92			8510	310	8820	6395	27.00	44	E	37.04		
	289:290	WB I-94 Exit to NB I-75	Ramp	670	19	689	453				640	24	664	542	4.50	-	-			
	293:294	WB I-94 Exit to SB I-75	Ramp	1530	55	1585	1006				1470	70	1540	1087	12.50	-	-			
	877:880		Mainline	6660	170	6830	4313	36.44	56.00	54.50	6400	216	6616	4763	24.57	45	F	35.48	51.36	50.08
	880:891		Mainline	6660	170	6830	4304	53.60	56.00	54.50	6400	216	6616	4761	24.59	31	D	52.64	51.36	50.08
	896:897	WB I-94 Exit to Beaubien	Ramp	790	9	799	502				760	11	771	568	7.85	-	-			
	891:902		Mainline	5870	161	6031	3791	55.86	55.27	53.00	5640	205	5845	4191	25.03	26	D	54.61	47.40	47.92
	902:188		Mainline	5870	161	6031	3787	56.14	55.27	53.00	5640	205	5845	4191	25.05	26	D	54.48	47.40	47.92
	276:277	WB I-94 Entrance from NB I-75	Ramp	460	33	493	416				440	42	482	482	0.00	-	-			
	278:279	WB I-94 Entrance from SB I-75	Ramp	1230	77	1307	958				1180	97	1277	1018	7.65	-	-			
	188:189		Mainline	7560	271	7831	5151	55.02	55.27	53.00	7260	344	7604	5686	23.65	27	D	53.15	47.40	47.92
	189:905		Mainline	7560	271	7831	5139	53.76	55.27	53.00	7260	344	7604	5684	23.66	38	E	51.60	47.40	47.92
	905:908		Mainline	7560	271	7831	5122	52.59	55.27	53.00	7260	344	7604	5679	23.62	38	E	50.60	47.40	47.92
	928:929	WB I-94 Entrance from John R	Ramp	290	17	307	47				280	22	302	55	18.49	-	-			
	911:26		Mainline	7850	288	8138	5135	49.98	60.67	57.00	7540	366	7906	5732	26.32	40	E	48.43	58.55	54.25
	26:913		Mainline	7850	288	8138	5132	58.21	60.67	57.00	7540	366	7906	5736	26.34	34	D	57.49	58.55	54.25
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	1230	17	1247	672				1180	21	1201	765	13.91	-	-			
	913:30		Mainline	6620	271	6891	4455	50.06	60.67	57.00	6360	345	6705	4965	22.78	34	D	50.03	58.55	54.25
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	1030	23	1053	683				990	29	1019	765	8.50	-	-			
	30:923		Mainline	5590	248	5838	3759	48.24	60.67	57.00	5370	316	5686	4201	21.12	30	D	47.46	58.55	54.25
	923:924		Mainline	5590	248	5838	3746	39.34	60.67	57.00	5370	316	5686	4199	21.15	39	E	37.19	58.55	54.25
	924:185		Mainline	5590	248	5838	3729	38.93	60.67	57.00	5370	316	5686	4195	21.21	39	E	36.68	58.55	54.25
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	690	34	724	572				660	43	703	593	4.32	-	-			
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	390	9	399	337				370	11	381	369	0.62	-	-			
	954:3607		Mainline	6670	291	6961	4624	45.74	64.50	59.92	6400	370	6770	5156	20.90	30	D	44.21	63.90	57.67
	3607:955		Mainline	6670	291	6961	4622	48.25	64.50	59.92	6400	370	6770	5155	20.92	28	D	46.80	63.90	57.67
	957:958	WB I-94 Entrance from Trumbull	Ramp	250	9	259	226				240	11	251	254	0.19	-	-			
	961:964		Mainline	6920	300	7220	4800	55.70	63.44	59.58	6640	381	7021	5400	20.57	33	D	55.36	68.00	56.83
	967:968	WB I-94 Exit to Linwood	Ramp	240	9	249	194				230	12	242	207	2.34	-	-			
	964:974		Mainline	6680	291	6971	4592	48.98	62.88	60.83	6410	369	6779	5186	20.60	37	E	48.43	69.00	59.17
	974:994		Mainline	6680	291	6971	4574	49.78	62.88	60.83	6410	369	6779	5185	20.60	36	E	49.51	69.00	59.17
	1001:1002	WB I-94 Exit to SB I-96	Ramp	825	39	864	527				795	49	844	615	8.46	-	-			
	1001:1004	WB I-94 Exit to NB I-96	Ramp	825	39	864	573				795	49	844	652	7.00	-	-			
	994:995		Mainline	5030	214	5244	3446	57.88	63.50	60.75	4820	272	5092	3922	17.43	23	C	58.07	66.17	58.42
	999:998	WB I-94 Entrance from Linwood	Ramp	50	9	59	52				50	11	61	58	0.39	-	-			
	162:1011		Mainline	5080	223	5303	3482	57.84	63.50	60.75	4870	283	5153	3983	17.36	24	C	57.87	66.17	58.42
	990:991	WB I-94 Entrance from SB I-96	Ramp	170	9	179	147				160	11	171	173	0.15	-	-			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	710	80	790	649				680	102	782	631	5.68	-	-			
	1011:1013	WB I-94 West of I-96	Mainline	5960	312	6272	4263	55.90			5710	396	6106	4784	17.92	22	C	55.90		

Link	AM89										AM910						
	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
1014:1012	4700	450	5150	3983	17.27	69	F	15.20			4240	466	4706	3886	14.19		
1018:1019	150	17	167	172	0.38	-	-				140	18	158	123			
1027:1008	670	35	705	637	2.63	-	-				600	36	636	544			
1012:1010	3880	398	4278	3180	17.98	82	F	13.59	16.83	22.08	3500	412	3912	3207	12.97	48.36	40.25
1022:1023	190	11	201	135	5.09	-	-				170	11	181	146			
1010:159	3690	387	4077	3040	17.38	123	F	8.62	16.83	22.08	3330	401	3731	3057	8.50	48.36	40.25
983:982	440	158	598	523	3.17	-	-				400	164	564	545			
187:158	4130	545	4675	3565	17.29	116	F	10.90			3730	565	4295	3603	11.41		
978:979	1190	42	1232	1258	0.74	-	-				1070	43	1113	1157			
186:966	5320	587	5907	4827	14.74	69	F	24.56	25.82	27.67	4800	608	5408	4762	24.56	42.36	38.17
972:971	370	20	390	393	0.15	-	-				330	21	351	357			
966:965	5690	607	6297	5220	14.19	59	F	23.14	36.42	37.17	5130	629	5759	5119	23.55	48.09	45.00
965:960	5690	607	6297	5221	14.18	52	F	35.16	36.42	37.17	5130	629	5759	5120	34.96	48.09	45.00
962:963	0	0	0	16	5.66	-	-				0	0	0	14			
960:959	5690	607	6297	5236	13.97	26	C	53.59			5130	629	5759	5134	53.24		
975:976	840	11	851	519	12.69	-	-				760	11	771	524			
959:952	4850	596	5446	4716	10.24	29	D	56.85	42.45	45.25	4370	618	4988	4611	56.48	56.00	50.75
952:951	4850	596	5446	4716	10.24	29	D	57.40	42.45	45.25	4370	618	4988	4610	57.44	56.00	50.75
984:950	870	11	881	696	6.59	-	-				780	11	791	715			
951:943	3980	585	4565	4020	8.32	25	C	56.32	50.83	50.58	3590	607	4197	3897	56.50	55.17	52.83
943:944	510	30	540	510	1.31	-	-				460	31	491	431			
943:919	3470	555	4025	3509	8.41	22	C	58.22	50.83	50.58	3130	576	3706	3464	58.66	55.17	52.83
919:918	3470	555	4025	3509	8.41	23	C	53.56	50.83	50.58	3130	576	3706	3468	56.31	55.17	52.83
918:912	3470	555	4025	3518	8.26	31	D	41.15	50.83	50.58	3130	576	3706	3465	47.65	55.17	52.83
916:915	640	39	679	716	1.40	-	-				580	40	620	638			
937:936	670	12	682	425	10.92	-	-				600	12	612	382			
912:180	4780	606	5386	4667	10.14	34	D	28.85			4310	628	4938	4485	35.39		
180:910	4780	606	5386	4675	10.02	47	F	34.93			4310	628	4938	4480	36.84		
926:927	280	25	305	408	5.46	-	-				250	26	276	388			
910:909	4500	581	5081	4266	11.92	33	D	45.50	45.83	45.75	4060	602	4662	4093	44.44	48.92	46.33
909:906	4500	581	5081	4268	11.89	31	D	49.45	45.83	45.75	4060	602	4662	4092	49.08	48.92	46.33
906:904	4500	581	5081	4270	11.86	30	D	50.43	45.83	45.75	4060	602	4662	4093	50.14	48.92	46.33
299:314	620	23	643	444	8.54	-	-				560	24	584	483			
300:301	1030	196	1226	973	7.63	-	-				930	203	1133	931			
904:903	2850	362	3212	2853	6.52	17	B	58.56	45.83	45.75	2570	375	2945	2678	58.55	48.92	46.33
903:890	2850	362	3212	2854	6.50	16	B	62.05	45.83	45.75	2570	375	2945	2678	62.05	48.92	46.33
901:900	0	0	0	23	6.78	-	-				0	0	0	19			
890:889	2850	362	3212	2879	6.03	14	B	54.38	51.83	50.58	2570	375	2945	2696	54.43	51.17	50.33
892:893	220	30	250	234	1.03	-	-				200	31	231	208			
889:881	2630	332	2962	2646	5.97	17	B	56.56	51.83	50.58	2370	344	2714	2491	56.70	51.17	50.33
881:878	2630	332	2962	2651	5.87	17	B	54.46	51.83	50.58	2370	344	2714	2488	55.82	51.17	50.33
281:282	690	58	748	695	1.97	-	-				620	60	680	616			
285:286	480	26	506	502	0.18	-	-				430	27	457	451			
878:183	3800	416	4216	3848	5.80	15	B	55.02			3420	431	3851	3554	56.54		
183:876	3800	416	4216	3851	5.75	18	C	55.40			3420	431	3851	3553	57.04		
887:888	140	12	152	123	2.47	-	-				130	12	142	124			
876:875	3660	404	4064	3728	5.38	22	C	58.48			3290	419	3709	3429	59.17		
875:872	3660	404	4064	3730	5.35	22	C	58.17			3290	419	3709	3427	58.46		
872:869	3660	404	4064	3734	5.28	23	C	57.51			3290	419	3709	3425	57.97		
871:870	290	21	311	270	2.41	-	-				260	22	282	240			
869:860	3950	425	4375	4006	5.70	20	C	53.00	61.83	58.83	3550	441	3991	3668	56.43	57.78	58.67
863:864	210	35	245	227	1.17	-	-				190	36	226	195			
860:859	3740	390	4130	3783	5.52	32	D	41.35	61.83	58.83	3360	405	3765	3478	47.49	57.78	58.67
859:192	3740	390	4130	3781	5.55	24	C	54.56	61.83	58.83	3360	405	3765	3485	54.82	57.78	58.67
856:855	150	11	161	153	0.64	-	-				140	11	151	157			
836:834	3890	401	4291	3936	5.54	25	C	55.39			3500	416	3916	3641	56.74		
834:832	3890	401	4291	3944	5.41	27	D	51.06			3500	416	3916	3639	52.60		
832:829	3890	401	4291	3954	5.25	36	E	38.89			3500	416	3916	3636	40.93		
848:849	350	40	390	324	3.49	-	-				320	41	361	317			
829:827	3540	361	3901	3636	4.32	32	D	40.14	59.33	57.92	3180	375	3555	3320	39.99	58.00	57.33
827:160	3540	361	3901	3637	4.30	23	C	54.20	59.33	57.92	3180	375	3555	3321	54.11	58.00	57.33
841:842	90	15	105	124	1.78	-	-				80	16	96	112			
160:828	3630	376	4006	3762	3.92	17	B	57.36			3260	391	3651	3433	57.24		
828:809	3630	376	4006	3764	3.88	22	C	59.73			3260	391	3651	3435	59.48		
809:807	3630	376	4006	3766	3.85	24	C	55.06			3260	391	3651	3436	54.73		
818:819	650	30	680	609	2.80	-	-				590	31	621	589			
807:806	2980	346	3326	3164	2.84	20	C	56.61	60.27	60.00	2670	360	3030	2845	56.39	60.33	58.75
823:824	190	11	201	187	1.01	-	-				170	11	181	181			
803:800	3170	357	3527	3353	2.97	18	B	66.83			2840	371	3211	3028	66.74		
6209:6210	0	0	0	7	3.74	-	-				0	0	0	7			
800:6208	3170	357	3527	3348	3.05	22	C	54.36	61.00	60.08	2840	371	3211	3019	54.05	60.80	60.25
6208:6214	3170	357	3527	3354	2.95	21	C	54.89	61.00	60.08	2840	371	3211	3018	54.58	60.80	60.25
6250:6251	0	0	0	#N/A		-	-				0	0	0	#N/A			
6215:6220	3170	357	3527	3357	2.90	20	C	59.12			2840	371	3211	3017	58.23		
6221:6222	610	54	664	506	6.53	-	-				550	56	606	546			
6220:6229	2560	303	2863	2849	0.26	18	C	55.40	61.20	58.83	2290	315	2605	2473	55.21	54.44	58.58
6229:6232	2560	303	2863	2850	0.24	18	B	56.59	61.20	58.83	2290	315	2605	2472	56.69	54.44	58.58
6249:6248	250	17	267	269	0.12	-	-				230	18	248	251			
6234:6238	2810	320	3130	3131	0.02	19	C	58.72			2520	333	2853	2719	58.57		
6238:6239	2810	320	3130	3133	0.05	19	C	57.14			2520	333	2853	2724	57.20		
6237:6233	5340	374	5714	3685	29.60	102	F	12.41			4820	387	5207	3836	13.73		
6233:6230	5340	374	5714	3696	29.42	107	F	11.91			4820	387	5207	3831	12.72		
6246:6247	280	49	329	174	9.77	-	-				250	51	301	219			
6230:6228	5060	325	5385	3527	27.83	111	F	10.96	21.33	34.25	4570	336	4906	3602	11.50	37.00	51.08
6228:161	5060	325	5385	3528	27.82	115	F	10.52	21.33	34.25	4570	336	4906	3584	10.92	37.00	51.08
6224:161	368	6	374	332	2.21	-	-				330	6	336	302			
6218:6217	123	2	125	163	3.21	-	-				110	2	112	139			
206:801	5550	333	5883	3988	26.97	71	F	19.23			5010	344	5354	4072	19.96		
6213:6212	0	0	0	62	11.14	-	-				0	0	0	58			
802:804	5550	333	5883	4026	26.38	89	F	15.49			5010	344	5354	4172	17.03		
811:812	400	36	436	184	14.31	-	-				360	37	397	251			
815:816	900	27	927	878	1.63	-	-				810	28	838	825			
808:810	6050	324	6374	4700	22.50	79	F	20.39			5460	335	5795	4799	21.43		
837:838	90	35	125	77	4.78	-	-				80	36	116	86			
810:828	5960	289	6249	4618	22.13	94	F	16.74	32.67	37.50	5380	299	5679	4734	17.56	54.36	49.58
828:830	5960	289	6249	4610	22.24	98	F	16.03	32.67	37.50	5380	299	5679	4743	16.91	54.36	49.58
845:846	610	36	646	662	0.63	-	-				550	37	587	583			
831:833	6570	325	6895	5281	20.69	69	F	26.28			5930	336	6266	5275	26.09		
833:835	6570	325	6895	5281	20.69	70	F	25.68			5930	336	6266	5271	25.32		
851:852	190	20	210	351	8.42	-	-				170	21	191	368			
835:858	6380	305	6685	4894	23.54	84	F	19.86	36.50	39.33	5760	315	6075	4906	19.95	55.64	48.67
858:861	6380	305	6685	4863	23.98	91	F	18.14	36.50	39.33	5760	315	6075	4916	18.28	55.64	48.67
866:867	1010	53	1063	995	2.12	-	-				910	55	965	991			
873:874	7390	358	7748	5861	22.88	57	F	35.08			6670	370	7040	5913	36.34		
882:883	270	19	289	327	2.17	-	-				240	20	260	300			
874:877	7660	377	8037	6195	21.84	43	E	36.46			6910	390	7300	6215	37.00		
289:290	460	30	490	452	1.75	-	-				410	31	441	413			
293:294	1450	73	1523	1055	13.04	-	-				1310	76	1386	1118			
877:880	5750	274	6024	4690	18.23	47	F	34.01	47.75	48.75	5190	283	5473	4684	35.21	55.20	49.67
880:891	5750	274	6024	4693	18.18	31	D	52.28	47.75	48.75	5190	283	5473	4683	54.41	55.20	49.67
896:897	820	12	832	530	11.57	-	-				740	12	752	605			
891:902	4930	262	5192	4166	15.00	26	D	54.47	48.73	48.58	4450	271	4721	4078	57.04	52.70	48.58
902:188	4930	262	5192	4165	15.01	26	D	54.45	48.73	48.58	4450	271	4721	4078	57.76	52.70	48.58
276:277	410	34	444	456	0.57	-	-				370	35	405	415			
278:279	990	77	1067	928	4.40	-	-				890	80	970	889			
188:189	6330	373	6703	5556	14.65	27	D	53.19	48.73	48.58	5710	386	6096	5380	56.78	52.70	48.58
189:905	6330	373	6703	5561	14.58	36	E	52.49	48.73	48.58	5710	386	6096	5380	55.81	52.70	48.58
905:908	6330	373	6703	5565	14.53	37	E	51.71	48.73	48.58	5710	386	6096	5382	54.18	52.70	48.58
928:929	280	21	301	60	17.94	-	-				250	22	272	53			
911:26	6610	394	7004	5630	17.29	39	E	49.01	57.00	53.33	5960	408	6368	5435	50.60	54.91	53.92
26:913	6610	394	7004	5632	17.26	34	D	57.23	57.00	53.33	5960	408	6368	5434	58.29	54.91	53.92
920:921	1040	21	1061	792	8.84	-	-				940	22	962	747			
913:30	5570	373	5943	4841	15.01	33	D	49.90	57.00	53.33	5020	386	5406	4688	51.07	54.91	53.92
932:933	910	29	939	785	5.25	-	-				820	30	850	764			
30:923	4660	344	5004	4055	14.10	29	D	48.66	57.00	53.33	4200	356	4556	3927	51.52	54.91	53.92
923:924	4660	344	5004	4057	14.07	35	E	39.74	57.00	53.33	4200	356	4556	3931	45.21	54.91	53.92
924:185	4660	344	5004	4062	13.99	35	E	39.92	57.00	53.33	4200	356	4556	3934	44.81	54.91	53.92
941:942	450	43	493	406	4.10	-	-				410	45	455	351			
947:948	340	12	352	358	0.32	-	-				310	12	322	305			
954:3607	5450	399	5849	4832	13.92	27	D	45.89	59.09	56.75	4920	413	5333	4588	48.60	57.67	57.75
3607:955	5450	399	5849	4833	13.90	26	D	47.45	59.09	56.75	4920	413	5333	4588	49.81	57.67	57.75
957:958	310	9	319	322	0.17	-	-				280	9	289	288			
961:964	5760	408	6168	5165	13.32	32	D	55.80	58.89	55.58	5200	422	5622	4883	56.66	57.20	56.50
967:968	210	12	222	214	0.54	-	-				190	12	202	199			
964:974	5550	396	5946	4961	13.34	34	D	50.03	61.50	56.92	5010	410	5420	4683	50.80	60.57	58.42
974:994	5550	396	5946	4965	13.28	34	D	50.53	61.50	56.92	5010	410	5420	4677	50.83	60.57	58.42
1001:1002	745	39	784	577	7.92	-	-				670	40	710	612			
1001:1004	745	39	784	657	4.71	-	-				670	40	710	638			
994:995	4060	319	4379	3732	10.16	22	C	58.23	56.00	57.17	3670	330	4000	3427	58.07	58.33	57.58
999:998	50	9	59	63	0.51	-	-				50	9	59	60			
162:1011	4110	328	4438	3793	10.05	23	C	57.88	56.00	57.17	3720	339	4059	3489	57.72	58.33	57.58
990:991	160	21	181	177	0.30	-	-				140	22	162	170			
1020:1021	510	107	617	543	3.07	-	-				460	111	571	534			
1011:1013	4780	456	5236	4518	10.28	21	C	55.93			4320	472	4792	4195	55.89		

AM Period - No Build Validation

Section	Link	Facility	Type	AM67 Auto Volume Lookup	AM67 Truck volume Lookup	AM67 Total Volume Lookup	AM67 Model Output Volume	AM67 Simulation Speed (mph)	AM67 Avg Hour Speed, Date of Count	AM67 2mo. Avg Hour Speed
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	3550	214	3764	3148	72.66		
	1614:1615		Mainline	3550	214	3764	3141	68.19		
	1615:1618	SB I-96 Exit to Grand	Ramp	330	17	347	288			
	1615:1599		Mainline	3220	197	3417	2851	53.99	63.22	62.25
	1599:1597		Mainline	3220	197	3417	2838	58.52	63.22	62.25
	1597:1595		Mainline	3220	197	3417	2829	58.91	63.22	62.25
	1595:1593		Mainline	3220	197	3417	2827	60.19	63.22	62.25
	1607:1593	SB I-96 Entrance from Grand	Ramp	300	17	317	280			
	1593:1591		Mainline	3520	214	3734	3103	57.67		
	1591:1589		Mainline	3520	214	3734	3097	58.16		
	990:991	WB I-94 Entrance from SB I-96	Ramp	170	9	179	147			
	978:979	SB I-96 to EB I-94	Ramp	1440	36	1476	1209			
	1589:1577		Mainline	1910	169	2079	1711	57.73	58.75	60.08
	1577:1574		Mainline	1910	169	2079	1704	60.05	58.75	60.08
	1583:1584	SB I-96 Exit to Warren	Ramp	220	17	237	195			
	1574:1573		Mainline	1690	152	1842	1506	56.22	58.75	60.08
	1573:1554		Mainline	1690	152	1842	1502	60.95	58.75	60.08
	1018:1019	EB I-94 to SB I-96	Ramp	270	17	287	200			
	1001:1002	WB I-94 Exit to SB I-96	Ramp	825	39	864	527			
	1558:1559	SB I-96 Entrance from Warren	Ramp	300	19	319	285			
	1563:1552	SB I-96 South of Entrance from Warren	Mainline	3085	227	3312	2488	58.39		
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	2830	178	3008	2552	51.31		
	1568:1569	NB I-96 Exit to Warren	Ramp	430	31	461	387			
	1553:1555		Mainline	2400	147	2547	2150	51.27		
	983:982	NB I-96 to EB I-94	Ramp	630	74	704	568			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	710	80	790	649			
	1555:1572		Mainline	1060	-7	1053	895	59.99	57.00	56.08
	1580:1579	NB I-96 Entrance from Warren	Ramp	80	10	90	77			
	1575:1576		Mainline	1140	3	1143	966	59.74	57.00	56.08
	1576:1588		Mainline	1140	3	1143	965	63.23	57.00	56.08
	1001:1004	WB I-94 Exit to NB I-96	Ramp	825	39	864	573			
	1027:1008	EB I-94 to NB I-96	Ramp	960	28	988	713			
	1588:1590		Mainline	2925	70	2995	2240	49.80		
	1590:1592		Mainline	2925	70	2995	2236	55.24	66.00	60.42
	1602:1603	NB I-96 Exit to Grand	Ramp	240	17	257	207			
	1592:1594		Mainline	2685	53	2738	2026	58.83	66.00	60.42
	1594:1596		Mainline	2685	53	2738	2020	56.66	66.00	60.42
	1596:1598		Mainline	2685	53	2738	2012	56.24	66.00	60.42
	1610:1611	NB I-96 Entrance from Grand	Ramp	200	10	210	171			
	1613:50	NB I-96 North of Entrance from Grand	Mainline	2885	63	2948	2168	56.19		
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	7880	163	8043	6455	37.82	59.33	62.25
	60:1405		Mainline	7880	163	8043	6438	37.62	59.33	62.25
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	440	73	513	404			
	1405:1434		Mainline	7440	90	7530	6000	38.31	57.75	60.50
	1434:1407		Mainline	7440	90	7530	5981	39.55	57.75	60.50
	1407:1422		Mainline	7440	90	7530	5967	42.21	57.75	60.50
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	550	15	565	333			
	1422:939		Mainline	7990	105	8095	6270	39.39		
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	690	34	724	572			
	939:940		Mainline	7300	71	7371	5688	33.07		
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	790	11	801	510			
	940:1431		Mainline	6510	60	6570	5151	32.20	59.00	57.75
	1431:1435		Mainline	6510	60	6570	5127	42.37	59.00	57.75
	1435:1441		Mainline	6510	60	6570	5115	45.01	59.00	57.75
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	940	9	949	629			
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	1030	23	1053	683			
	1441:1442		Mainline	8480	92	8572	6413	40.45		
	1442:1443		Mainline	8480	92	8572	6401	38.65		
	1471:1472	SB Hwy 10 Exit to Forest	Ramp	1610	9	1619	1251			
	1443:1445		Mainline	6870	83	6953	5117	58.38	59.60	60.67
	1465:1466	SB Hwy 10 Entrance from Forest	Ramp	150	7	157	132			
	1447:54		Mainline	7020	90	7110	5220	56.84		
	54:58	SB Hwy 10 South of Entrance from Forest	Mainline	7020	90	7110	5211	56.60		
NB Hwy 10	55:1448	NB Hwy 10 South of Exit to Forest	Mainline	3760	66	3826	3298	57.19		
	1448:1444		Mainline	3760	66	3826	3287	55.45		
	1461:1462	NB Hwy 10 Exit to Forest	Ramp	410	17	427	381			
	1444:1446		Mainline	3350	49	3399	2903	58.74		53.17
	1446:1440		Mainline	3350	49	3399	2888	61.08		53.17
	1469:1470	NB Hwy 10 Entrance from Forest	Ramp	750	9	759	793			
	1440:1439		Mainline	4100	58	4158	3669	53.75		
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	670	13	683	609			
	1439:1438		Mainline	3430	45	3475	3053	57.13		53.33
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	390	9	399	337			
	1438:1437		Mainline	3040	36	3076	2710	56.86		53.33
	1437:1436		Mainline	3040	36	3076	2707	56.55		53.33
	1436:1432		Mainline	3040	36	3076	2703	56.97		53.33
	1432:1430		Mainline	3040	36	3076	2694	57.63		53.33
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	1230	17	1247	672			
	1430:938		Mainline	4270	53	4323	3361	47.19		53.33
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	700	29	729	499			
	938:1423		Mainline	4970	82	5052	3842	45.60		
	1424:1425	NB Hwy 10 Exit to Milwaukee	Ramp	1280	6	1286	1064			
	1423:1408		Mainline	3710	74	3784	2768	60.07		56.08
	1408:1433		Mainline	3710	74	3784	2756	54.45		56.08
	1433:1406		Mainline	3710	74	3784	2752	64.24		56.08
	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	220	19	239	296			
	1406:61		Mainline	3930	93	4023	3043	52.39	68.00	54.17
	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	3930	93	4023	3040	59.86	68.00	54.17
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	8990	316	9576	7326	43.32		
	238:239	SB I-75 Exit to Clay	Ramp	270	54	324	248			
	236:242		Mainline	8990	262	9252	7044	46.85	61.67	61.58
	242:244		Mainline	8990	262	9252	7014	45.53	61.67	61.58
	253:2851	SB I-75 Entrance from Clay	Ramp	580	12	592	518			
	247:249		Mainline	9570	274	9844	7498	45.15		
	278:279	WB I-94 Entrance from SB I-75	Ramp	1230	77	1307	958			
	281:282	EB I-94 Entrance from SB I-75	Ramp	980	61	1041	779			
	249:261		Mainline	7360	136	7496	5736	43.38	60.50	59.08
	261:262		Mainline	7360	136	7496	5724	51.84	60.50	59.08
	262:265		Mainline	7360	136	7496	5715	50.98	60.50	59.08
	265:266		Mainline	7360	136	7496	5690	51.52	60.50	59.08
	266:268		Mainline	7360	136	7496	5667	53.69	60.50	59.08
	311:312	SB I-75 Exit to Warren	Ramp	1270	13	1283	966			
	268:269		Mainline	6090	123	6213	4688	56.93	57.78	58.92
	269:270		Mainline	6090	123	6213	4677	58.24	57.78	58.92
	299:314	WB I-94 Exit to SB I-75	Ramp	580	21	601	401			
	293:294	EB I-94 Exit to SB I-75	Ramp	1530	55	1585	1006			
	270:320		Mainline	8200	199	8399	6060	53.08	57.78	58.92
	320:321		Mainline	8200	199	8399	6050	61.21	57.78	58.92
	322:323	SB I-75 Entrance from Warren	Ramp	210	18	228	187			
	321:69		Mainline	8410	217	8627	6215	57.04		
	69:70	SB I-75 South of Entrance from Warren	Mainline	8410	217	8627	6208	58.21		
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	5820	140	5960	5047	55.18		
	339:340	NB I-75 Exit to Warren	Ramp	90	17	107	96			
	324:319		Mainline	5730	123	5853	4921	47.67	57.14	58.42
	319:317		Mainline	5730	123	5853	4912	54.82	57.14	58.42
	276:277	WB I-94 Entrance from NB I-75	Ramp	460	33	493	416			
	285:286	EB I-94 Entrance from NB I-75	Ramp	500	24	524	439			
	315:263	NB I-75 to I-94 Ramp Entrance from NB Frontage	Ramp	0	0	0	#N/A			
	317:271		Mainline	4770	66	4836	4042	56.77	57.14	58.42
	306:305	NB I-75 Entrance from Warren	Ramp	430	17	447	397			
	267:264		Mainline	5200	83	5283	4391	59.06	53.90	57.17
	300:301	EB I-94 Exit to NB I-75	Ramp	1190	188	1378	863			
	264:250		Mainline	6390	271	6661	5248	51.85	53.90	57.17
	289:290	WB I-94 Exit to NB I-75	Ramp	670	19	689	453			
	248:245		Mainline	7060	290	7350	5668	51.56		
	255:256	NB I-75 Exit to Clay	Ramp	1520	9	1529	1146			
	245:243		Mainline	5540	281	5821	4497	58.05	59.60	58.92
	243:237		Mainline	5540	281	5821	4483	58.65	59.60	58.92
	240:241	NB I-75 Entrance from Clay	Ramp	140	9	149	129			
	237:74	NB I-75 north of Entrance from Clay	Mainline	5680	290	5970	4605	57.19		

Link	AM78 Auto Volume Lookup	AM78 Truck volume Lookup	AM78 Total Volume Lookup	AM78 Model Output Volume	AM78 GEH (Target v. Model)	AM78 Density pc/mi/ln	AM78 LOS	AM78 Simulation Speed (mph)	AM78 Avg Hour Speed, Date of Count	AM78 2mo. Avg Hour Speed
49:1614	3410	271	3681	3633	0.79	13	B	71.80		
1614:1615	3410	271	3681	3636	0.74	14	B	67.72		
1615:1618	320	21	341	341	0.00	-	-			
1615:1599	3090	250	3340	3291	0.85	16	B	53.04	54.20	58.67
1599:1597	3090	250	3340	3275	1.13	16	B	52.35	54.20	58.67
1597:1595	3090	250	3340	3266	1.29	18	B	48.23	54.20	58.67
1595:1593	3090	250	3340	3259	1.41	19	C	45.35	54.20	58.67
1607:1593	290	21	311	309	0.11	-	-			
1593:1591	3380	271	3651	3556	1.58	18	B	42.20		
1591:1589	3380	271	3651	3555	1.60	16	B	44.76		
990:991	160	11	171	173	0.15	-	-			
978:979	1380	45	1425	1346	2.12	-	-			
1589:1577	1840	215	2055	2007	1.07	9	A	56.59	48.60	50.00
1577:1574	1840	215	2055	2004	1.13	9	A	60.19	48.60	50.00
1583:1584	210	21	231	223	0.53	-	-			
1574:1573	1630	194	1824	1781	1.01	8	A	56.39	48.60	50.00
1573:1554	1630	194	1824	1780	1.04	8	A	61.14	48.60	50.00
1018:1019	260	22	282	183	6.49	-	-			
1001:1002	795	49	844	615	8.46	-	-			
1558:1559	290	24	314	306	0.45	-	-			
1563:1552	2975	289	3264	2878	6.96	10	A	58.37		
1548:1553	2720	226	2946	2462	9.31	26	D	19.69		
1568:1569	410	39	449	369	3.96	-	-			
1553:1555	2310	187	2497	2059	9.18	27	D	15.86		
983:982	610	94	704	545	6.36	-	-			
1020:1021	680	102	782	631	5.68	-	-			
1555:1572	1020	-9	1011	856	5.07	4	A	59.45	57.25	56.33
1580:1579	80	13	93	91	0.21	-	-			
1575:1576	1100	4	1104	948	4.87	4	A	60.38	57.25	56.33
1576:1588	1100	4	1104	948	4.87	4	A	63.64	57.25	56.33
1001:1004	795	49	844	652	7.00	-	-			
1027:1008	920	36	956	711	8.49	-	-			
1588:1590	2815	89	2904	2307	11.69	9	A	50.05		
1590:1592	2815	89	2904	2309	11.65	8	A	55.43	63.14	59.50
1602:1603	230	21	251	208	2.84	-	-			
1592:1594	2585	68	2653	2101	11.31	9	A	58.95	63.14	59.50
1594:1596	2585	68	2653	2100	11.33	9	A	56.83	63.14	59.50
1596:1598	2585	68	2653	2100	11.33	9	A	56.42	63.14	59.50
1610:1611	190	13	203	198	0.35	-	-			
1613:50	2775	81	2856	2296	11.02	10	A	56.47		
63:60	7570	207	7777	6422	16.08	44	E	37.32	64.00	61.83
60:1405	7570	207	7777	6427	16.02	44	E	37.20	64.00	61.83
1416:1417	420	92	512	424	4.07	-	-			
1405:1434	7150	115	7265	6010	15.40	53	F	37.88	59.33	59.33
1434:1407	7150	115	7265	6011	15.39	52	F	39.21	59.33	59.33
1407:1422	7150	115	7265	6006	15.46	48	F	42.08	59.33	59.33
1428:1429	530	19	549	396	7.04	-	-			
1422:939	7680	134	7814	6409	16.66	41	E	39.04		
941:942	660	43	703	593	4.32	-	-			
939:940	7020	91	7111	5817	16.09	58	F	33.92		
937:936	760	14	774	523	9.86	-	-			
940:1431	6260	77	6337	5296	13.65	54	F	32.71	57.80	55.42
1431:1435	6260	77	6337	5290	13.73	43	E	41.54	57.80	55.42
1435:1441	6260	77	6337	5284	13.81	41	E	43.65	57.80	55.42
949:950	900	11	911	679	8.23	-	-			
932:933	990	29	1019	765	8.50	-	-			
1441:1442	8150	117	8267	6727	17.79	34	D	39.83		
1442:1443	8150	117	8267	6726	17.80	44	E	38.30		
1471:1472	1550	11	1561	1296	7.01	-	-			
1443:1445	6600	106	6706	5430	16.38	31	D	58.39	62.67	53.83
1465:1466	140	9	149	145	0.33	-	-			
1447:54	6740	115	6855	5578	16.20	33	D	56.89		
54:58	6740	115	6855	5576	16.22	33	D	56.65		
55:1448	3610	84	3694	3667	0.45	22	C	56.82		
1448:1444	3610	84	3694	3667	0.45	22	C	55.17		
1461:1462	390	22	412	411	0.05	-	-			
1444:1446	3220	62	3282	3255	0.47	19	C	58.36	60.40	54.50
1446:1440	3220	62	3282	3251	0.54	18	C	60.77	60.40	54.50
1469:1470	720	11	731	879	5.22	-	-			
1440:1439	3940	73	4013	4118	1.65	20	C	51.47		
916:915	640	17	657	692	1.35	-	-			
1439:1438	3300	56	3356	3418	1.07	21	C	53.46	54.80	54.25
947:948	370	11	381	369	0.62	-	-			
1438:1437	2930	45	2975	3038	1.15	20	C	52.24	54.80	54.25
1437:1436	2930	45	2975	3025	0.91	20	C	49.88	54.80	54.25
1436:1432	2930	45	2975	3013	0.69	22	C	46.51	54.80	54.25
1432:1430	2930	45	2975	2993	0.33	23	C	43.57	54.80	54.25
920:921	1180	21	1201	765	13.91	-	-			
1430:938	4110	66	4176	3742	6.90	28	D	33.50	54.80	54.25
943:944	670	37	707	525	7.33	-	-			
938:1423	4780	103	4883	4242	9.49	30	D	35.36		
1424:1425	1210	10	1220	1171	1.42	-	-			
1423:1408	3570	93	3663	3066	10.29	18	B	59.08	56.71	56.83
1408:1433	3570	93	3663	3066	10.29	19	C	54.53	56.71	56.83
1433:1406	3570	93	3663	3060	10.40	16	B	64.24	56.71	56.83
1419:1420	210	24	234	333	5.88	-	-			
1406:61	3780	117	3897	3390	8.40	16	B	52.38	50.00	60.75
61:67	3780	117	3897	3389	8.42	14	B	60.02	50.00	60.75
73:236	8900	401	9301	7361	21.25	35	E	42.75		
238:239	260	69	329	261	3.96	-	-			
236:242	8640	332	8972	7103	20.85	39	E	46.10	50.67	50.17
242:244	8640	332	8972	7100	20.88	40	E	44.80	50.67	50.17
253:2851	560	15	575	573	0.08	-	-			
247:249	9200	347	9547	7674	20.18	43	E	45.22		
278:279	1180	97	1277	1018	7.65	-	-			
281:282	940	77	1017	831	6.12	-	-			
249:261	7080	173	7253	5823	17.69	45	F	43.52	45.45	49.42
261:262	7080	173	7253	5823	17.69	38	E	51.22	45.45	49.42
262:265	7080	173	7253	5823	17.69	39	E	49.95	45.45	49.42
265:266	7080	173	7253	5827	17.63	38	E	51.65	45.45	49.42
266:268	7080	173	7253	5827	17.63	36	E	54.07	45.45	49.42
311:312	1220	16	1236	991	7.34	-	-			
268:269	5860	157	6017	4836	16.03	29	D	56.97	62.25	53.92
269:270	5860	157	6017	4837	16.02	28	D	58.27	62.25	53.92
299:314	560	26	586	418	7.50	-	-			
293:294	1470	70	1540	1087	12.50	-	-			
270:320	7890	253	8143	6340	21.19	30	D	53.20	62.25	53.92
320:321	7890	253	8143	6342	21.16	26	D	61.26	62.25	53.92
322:323	200	23	223	233	0.66	-	-			
321:69	8090	276	8366	6569	20.80	23	C	57.11		
69:70	8090	276	8366	6562	20.88	23	C	58.17		
68:324	5590	178	5768	5726	0.55	27	D	42.74		
339:340	90	22	112	108	0.38	-	-			
324:319	5500	156	5656	5617	0.52	32	D	44.84	59.90	57.75
319:317	5500	156	5656	5616	0.53	26	C	55.43	59.90	57.75
276:277	440	42	482	482	0.00	-	-			
285:286	480	31	511	500	0.49	-	-			
315:263	0	0	0	#N/A		-	-			
317:271	4580	83	4663	4633	0.44	27	D	56.92	59.90	57.75
306:305	410	21	431	428	0.14	-	-			
267:264	4990	104	5094	5048	0.65	29	D	59.17	60.75	56.42
300:301	1140	238	1378	964	12.10	-	-			
264:250	6130	342	6472	6009	5.86	30	D	51.19	60.75	56.42
289:290	640	24	664	532	5.40	-	-			
248:245	6770	366	7136	6548	7.11	34	D	49.42		
255:256	1460	11	1471	1328	3.82	-	-			
245:243	5310	355	5665	5217	6.07	23	C	58.23	58.80	58.58
243:237	5310	355	5665	5216	6.09	23	C	58.85	58.80	58.58
240:241	130	11	141	144	0.25	-	-			
237:74	5440	366	5806	5354	6.05	19	C	57.30		

Link	AM89 Auto Volume Lookup	AM89 Truck volume Lookup	AM89 Total Volume Lookup	AM89 Model Output Volume	AM89 GEH (Target v. Model)	AM89 Density pc/mi/ln	AM89 LOS	AM89 Simulation Speed (mph)	AM89 Avg Hour Speed, Date of Count	AM89 2mo. Avg Hour Speed
49:1614	3390	264	3654	3638	0.26	13	B	71.59		
1614:1615	3390	264	3654	3634	0.33	14	B	66.46		
1615:1618	310	21	331	329	0.11	-	-			
1615:1599	3080	243	3323	3306	0.30	17	B	50.16	41.58	58.33
1599:1597	3080	243	3323	3318	0.09	17	B	50.64	41.58	58.33
1597:1595	3080	243	3323	3328	0.09	17	B	49.62	41.58	58.33
1595:1593	3080	243	3323	3332	0.16	18	B	49.33	41.58	58.33
1607:1593	290	21	311	306	0.28	-	-			
1593:1591	3370	264	3634	3644	0.17	16	B	47.28		
1591:1589	3370	264	3634	3645	0.18	16	B	48.77		
990:991	160	21	181	177	0.30	-	-			
978:979	1190	42	1232	1258	0.74	-	-			
1589:1577	2020	201	2221	2217	0.08	10	A	56.63	38.60	46.92
1577:1574	2020	201	2221	2214	0.15	10	A	59.77	38.60	46.92
1583:1584	210	21	231	241	0.65	-	-			
1574:1573	1810	180	1990	1972	0.40	9	A	56.05	38.60	46.92
1573:1554	1810	180	1990	1974	0.36	9	A	60.72	38.60	46.92
1018:1019	150	17	167	172	0.38	-	-			
1001:1002	745	39	784	577	7.92	-	-			
1558:1559	290	22	312	306	0.34	-	-			
1563:1552	2995	258	3253	3030	3.97	11	A	58.37		
1548:1553	2720	309	3029	2517	9.72	65	F	8.13		
1568:1569	410	39	449	369	3.96	-	-			
1553:1555	2310	270	2580	2144	8.97	52	F	8.67		
983:982	440	158	598	523	3.17	-	-			
1020:1021	510	107	617	543	3.07	-	-			
1555:1572	1360	5	1365	1088	7.91	5	A	58.04	43.20	51.42
1580:1579	80	13	93	99	0.61	-	-			
1575:1576	1440	18	1458	1188	7.42	5	A	60.29	43.20	51.42
1576:1588	1440	18	1458	1187	7.45	5	A	63.28	43.20	51.42
1001:1004	745	39	784	657	4.71	-	-			
1027:1008	670	35	705	637	2.63	-	-			
1588:1590	2855	92	2947	2487	8.82	10	A	50.42		
1590:1592	2855	92	2947	2487	8.82	9	A	56.09	58.67	57.92
1602:1603	220	21	241	203	2.55	-	-			
1592:1594	2635	71	2706	2282	8.48	10	A	59.35	58.67	57.92
1594:1596	2635	71	2706	2285	8.42	10	A	56.92	58.67	57.92
1596:1598	2635	71	2706	2284	8.44	10	A	56.58	58.67	57.92
1610:1611	190	13	203	203	0.00	-	-			
1613:50	2825	84	2909	2486	8.14	11	B	56.70		
63:60	8880	228	9108	6245	32.68	45	F	35.12	61.90	59.83
60:1405	8880	228	9108	6243	32.70	44	E	35.60	61.90	59.83
1416:1417	400	83	483	340	7.05	-	-			
1405:1434	8480	145	8625	5903	31.94	54	F	36.48	60.50	58.17
1434:1407	8480	145	8625	5902	31.95	56	F	35.58	60.50	58.17
1407:1422	8480	145	8625	5901	31.96	54	F	36.99	60.50	58.17
1428:1429	600	11	611	406	9.09	-	-			
1422:939	9080	156	9236	6293	33.40	46	F	34.17		
941:942	450	43	493	406	4.10	-	-			
939:940	8630	113	8743	5885	33.42	68	F	28.99		
937:936	670	12	682	425	10.92	-	-			
940:1431	7960	101	8061	5459	31.65	62	F	29.63	56.00	51.75
1431:1435	7960	101	8061	5459	31.65	47	F	38.71	56.00	51.75
1435:1441	7960	101	8061	5459	31.65	49	F	37.34	56.00	51.75
949:950	870	11	881	696	6.59	-	-			
932:933	910	29	939	785	5.25	-	-			
1441:1442	9740	141	9881	6940	32.07	38	E	36.87		
1442:1443	9740	141	9881	6939	32.08	47	F	37.53		
1471:1472	1610	11	1621	1173	11.99	-	-			
1443:1445	8130	130	8260	5764	29.81	33	D	58.22	55.25	52.83
1465:1466	180	11	191	198	0.50	-	-			
1447:54	8310	141	8451	5957	29.38	35	E	56.85		
54:58	8310	141	8451	5961	29.33	35	E	56.63		
55:1448	3690	113	3803	3836	0.53	23	C	56.34		
1448:1444	3690	113	3803	3840	0.60	24	C	54.46		
1461:1462	590	13	603	612	0.37	-	-			
1444:1446	3100	100	3200	3228	0.49	19	C	58.30	53.55	54.58
1446:1440	3100	100	3200	3234	0.60	19	C	58.77	53.55	54.58
1469:1470	940	16	956	1087	4.10	-	-			
1440:1439	4040	116	4156	4335	2.75	23	C	47.87		
916:915	640	39	679	716	1.40	-	-			
1439:1438	3400	77	3477	3629	2.55	25	C	49.62	56.36	53.92
947:948	340	12	352	358	0.32	-	-			
1438:1437	3060	65	3125	3280	2.74	23	C	47.44	56.36	53.92
1437:1436	3060	65	3125	3293	2.97	25	C	44.42	56.36	53.92
1436:1432	3060	65	3125	3306	3.19	26	D	42.70	56.36	53.92
1432:1430	3060	65	3125	3325	3.52	28	D	40.57	56.36	53.92
920:921	1040	21	1061	792	8.84	-	-			
1430:938	4100	86	4186	4133	0.82	32	D	32.38	56.36	53.92
943:944	510	30	540	510	1.31	-	-			
938:1423	4610	116	4726	4672	0.79	30	D	39.89		
1424:1425	1020	13	1033	1092	1.81	-	-			
1423:1408	3590	103	3693	3587	1.76	20	C	59.49	49.89	54.08
1408:1433	3590	103	3693	3591	1.69	22	C	54.15	49.89	54.08
1433:1406	3590	103	3693	3594	1.64	19	C	63.64	49.89	54.08
1419:1420	220	21	241	322	4.83	-	-			
1406:61	3810	124	3934	3921	0.21	19	C	52.04	62.17	59.25
61:67	3810	124	3934	3922	0.19	17	B	59.33	62.17	59.25
73:236	8690	394	9084	7279	19.96	36	E	41.02		
238:239	260	46	306	252	3.23	-	-			
236:242	8430	348	8778	7027	19.70	41	E	43.41	35.25	40.17
242:244	8430	348	8778	7028	19.69	42	E	42.40	35.25	40.17
253:2851	630	12	642	641	0.04	-	-			
247:249	9060	360	9420	7668	18.95	44	E	44.16		
278:279	990	77	1067	928	4.40	-	-			
281:282	690	58	748	695	1.97	-	-			
249:261	7380	225	7605	6055	18.76	48	F	42.86	41.70	45.33
261:262	7380	225	7605	6055	18.76	40	E	51.10	41.70	45.33
262:265	7380	225	7605	6053	18.78	41	E	49.92	41.70	45.33
265:266	7380	225	7605	6049	18.83	39	E	52.04	41.70	45.33
266:268	7380	225	7605	6045	18.88	38	E	54.25	41.70	45.33
311:312	1130	13	1143	931	6.58	-	-			
268:269	6250	212	6462	5113	17.73	31	D	56.78	55.56	53.17
269:270	6250	212	6462	5113	17.73	30	D	58.08	55.56	53.17
299:314	620	23	643	444	8.54	-	-			
293:294	1450	73	1523	1055	13.04	-	-			
270:320	8320	308	8628	6610	23.12	32	D	53.04	55.56	53.17
320:321	8320	308	8628	6608	23.14	28	D	61.15	55.56	53.17
322:323	200	11	211	210	0.07	-	-			
321:69	8520	319	8839	6818	22.84	24	C	57.07		
69:70	8520	319	8839	6820	22.82	24	C	58.15		
68:324	5380	190	5570	5589	0.25	25	C	45.98		
339:340	90	24	114	107	0.67	-	-			
324:319	5290	166	5456	5487	0.42	30	D	46.55	60.73	58.67
319:317	5290	166	5456	5488	0.43	25	C	55.91	60.73	58.67
276:277	410	34	444	456	0.57	-	-			
285:286	480	26	506	502	0.18	-	-			
315:263	0	0	0	#N/A		-	-			
317:271	4400	106	4506	4531	0.37	27	D	57.18	60.73	58.67
306:305	390	12	402	396	0.30	-	-			
267:264	4790	118	4908	4940	0.46	28	D	59.08	60.75	57.83
300:301	1030	196	1226	973	7.63	-	-			
264:250	5820	314	6134	5922	2.73	29	D	51.63	60.75	57.83
289:290	460	30	490	452	1.75	-	-			
248:245	6280	344	6624	6376	3.08	32	D	50.64		
255:256	1220	13	1233	1222	0.31	-	-			
245:243	5060	331	5391	5164	3.12	23	C	58.06	61.27	60.92
243:237	5060	331	5391	5165	3.11	23	C	58.66	61.27	60.92
240:241	130	11	141	146	0.42	-	-			
237:74	5190	342	5532	5311	3.00	19	C	57.19		

Link	AM910 Auto Volume Lookup	AM910 Truck volume Lookup	AM910 Total Volume Lookup	AM910 Model Output Volume	AM910 Simulation Speed (mph)	AM910 Avg Hour Speed, Date of Count	AM910 2mo. Avg Hour Speed
49:1614	3060	273	3333	3336	72.15		
1614:1615	3060	273	3333	3337	68.03		
1615:1618	280	22	302	301			
1615:1599	2780	251	3031	3035	53.84	65.17	62.50
1599:1597	2780	251	3031	3037	58.34	65.17	62.50
1597:1595	2780	251	3031	3039	58.66	65.17	62.50
1595:1593	2780	251	3031	3041	59.21	65.17	62.50
1607:1593	260	22	282	277			
1593:1591	3040	273	3313	3323	56.31		
1591:1589	3040	273	3313	3322	57.04		
990:991	140	22	162	170			
978:979	1070	43	1113	1157			
1589:1577	1830	208	2038	2022	57.39	59.00	58.17
1577:1574	1830	208	2038	2023	59.77	59.00	58.17
1583:1584	190	22	212	220			
1574:1573	1640	186	1826	1803	56.01	59.00	58.17
1573:1554	1640	186	1826	1804	60.73	59.00	58.17
1018:1019	140	18	158	123			
1001:1002	670	40	710	612			
1558:1559	260	23	283	276			
1563:1552	2710	267	2977	2815	58.36		
1548:1553	2450	320	2770	2654	8.75		
1568:1569	370	40	410	396			
1553:1555	2080	280	2360	2266	9.49		
983:982	400	164	564	545			
1020:1021	460	111	571	534			
1555:1572	1220	5	1225	1181	58.12	58.44	58.33
1580:1579	70	13	83	79			
1575:1576	1290	18	1308	1254	60.34	58.44	58.33
1576:1588	1290	18	1308	1254	63.36	58.44	58.33
1001:1004	670	40	710	638			
1027:1008	600	36	636	544			
1588:1590	2560	94	2654	2433	51.13		
1590:1592	2560	94	2654	2432	56.42	61.63	60.42
1602:1603	200	22	222	205			
1592:1594	2360	72	2432	2229	59.82	61.63	60.42
1594:1596	2360	72	2432	2229	57.20	61.63	60.42
1596:1598	2360	72	2432	2228	56.87	61.63	60.42
1610:1611	170	13	183	174			
1613:50	2530	85	2615	2399	56.87		
63:60	8010	236	8246	6242	33.87	60.57	61.08
60:1405	8010	236	8246	6245	34.48	60.57	61.08
1416:1417	360	86	446	326			
1405:1434	7650	150	7800	5919	35.27	61.56	58.83
1434:1407	7650	150	7800	5909	34.94	61.56	58.83
1407:1422	7650	150	7800	5893	36.76	61.56	58.83
1428:1429	540	11	551	365			
1422:939	8190	161	8351	6265	34.53		
941:942	410	45	455	351			
939:940	7780	116	7896	5917	29.44		
937:936	600	12	612	382			
940:1431	7180	104	7284	5540	30.18	56.36	53.00
1431:1435	7180	104	7284	5541	38.86	56.36	53.00
1435:1441	7180	104	7284	5543	37.54	56.36	53.00
949:950	780	11	791	715			
932:933	820	30	850	764			
1441:1442	8780	145	8925	7020	36.73		
1442:1443	8780	145	8925	7018	37.77		
1471:1472	1450	11	1461	1094			
1443:1445	7330	134	7464	5925	58.00	52.83	53.42
1465:1466	160	11	171	176			
1447:54	7490	145	7635	6100	56.56		
54:58	7490	145	7635	6096	56.33		
55:1448	3330	117	3447	3427	56.85		
1448:1444	3330	117	3447	3425	55.01		
1461:1462	530	13	543	550			
1444:1446	2800	104	2904	2875	58.82	59.33	52.17
1446:1440	2800	104	2904	2875	61.20	59.33	52.17
1469:1470	850	17	867	1018			
1440:1439	3650	121	3771	3891	53.30		
916:915	580	40	620	638			
1439:1438	3070	81	3151	3250	56.42	54.25	52.75
947:948	310	12	322	305			
1438:1437	2760	69	2829	2943	56.46	54.25	52.75
1437:1436	2760	69	2829	2940	56.22	54.25	52.75
1436:1432	2760	69	2829	2939	56.59	54.25	52.75
1432:1430	2760	69	2829	2941	58.23	54.25	52.75
920:921	940	22	962	747			
1430:938	3700	91	3791	3689	49.45	54.25	52.75
943:944	460	31	491	431			
938:1423	4160	122	4282	4118	51.59		
1424:1425	920	13	933	928			
1423:1408	3240	109	3349	3189	60.52	55.70	55.42
1408:1433	3240	109	3349	3187	53.97	55.70	55.42
1433:1406	3240	109	3349	3188	63.48	55.70	55.42
1419:1420	200	22	222	299			
1406:61	3440	131	3571	3483	51.94	60.60	60.58
61:67	3440	131	3571	3481	59.51	60.60	60.58
73:236	7840	408	8248	7418	45.79		
238:239	230	48	278	252			
236:242	7610	360	7970	7168	47.57	47.08	49.67
242:244	7610	360	7970	7171	45.38	47.08	49.67
253:2851	570	12	582	599			
247:249	8180	372	8552	7771	45.06		
278:279	890	80	970	889			
281:282	620	60	680	616			
249:261	6670	232	6902	6260	42.42	44.83	49.42
261:262	6670	232	6902	6258	49.44	44.83	49.42
262:265	6670	232	6902	6258	48.54	44.83	49.42
265:266	6670	232	6902	6258	50.30	44.83	49.42
266:268	6670	232	6902	6263	53.67	44.83	49.42
311:312	1020	13	1033	936			
268:269	5650	219	5869	5327	56.67	52.90	54.42
269:270	5650	219	5869	5324	57.85	52.90	54.42
299:314	560	24	584	483			
293:294	1310	76	1386	1118			
270:320	7520	319	7839	6924	52.65	52.90	54.42
320:321	7520	319	7839	6924	60.97	52.90	54.42
322:323	180	11	191	188			
321:69	7700	330	8030	7117	56.90		
69:70	7700	330	8030	7116	57.98		
68:324	4850	197	5047	5068	56.49		
339:340	80	25	105	112			
324:319	4770	172	4942	4956	47.87	51.82	56.00
319:317	4770	172	4942	4956	54.89	51.82	56.00
276:277	370	35	405	415			
285:286	430	27	457	451			
315:263	0	0	0	#N/A			
317:271	3970	110	4080	4092	56.58	51.82	56.00
306:305	350	12	362	356			
267:264	4320	122	4442	4452	58.87	59.64	56.92
300:301	930	203	1133	931			
264:250	5250	325	5575	5387	51.87	59.64	56.92
289:290	410	31	441	413			
248:245	5660	356	6016	5798	51.93		
255:256	1100	13	1113	1078			
245:243	4560	343	4903	4712	57.78	58.40	59.67
243:237	4560	343	4903	4709	58.42	58.40	59.67
240:241	120	11	131	124			
237:74	4680	354	5034	4836	57.06		

GEH Stats for I-94	
Max	29.91
Average	12.97
# Under 5	31
# Over 5	113
% Under 5	22%

AM78

GEH Stats for I-94	
Max	29.60
Average	8.97
# Under 5	52
# Over 5	92
% Under 5	36%

AM89

PM Period - No Build Validation

	Link	Facility	Type	PM1415							PM1516						
				Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
EB I-94	1014:1012	EB I-94 West of I-96	Mainline	5650	478	6128	4900	30.64			5340	385	5725	3669	12.92		
	1018:1019	EB I-94 to SB I-96	Ramp	250	49	299	231				240	40	280	175			
	1027:1008	EB I-94 to NB I-96	Ramp	990	175	1165	936				930	141	1071	744			
	1012:1010		Mainline	4410	254	4664	3638	30.74	43.30	47.33	4170	204	4374	2769	10.28	28.58	25.42
	1022:1023	EB I-94 Exit to Grand River	Ramp	250	16	266	199				240	13	253	153			
	1010:159		Mainline	4160	238	4398	3368	20.60	43.30	47.33	3930	191	4121	2601	6.94	28.58	25.42
	983:982	NB I-96 to EB I-94	Ramp	330	127	457	381				310	102	412	418			
	187:158		Mainline	4490	365	4855	3694	17.00			4240	293	4533	3025	8.11		
	978:979	SB I-96 to EB I-94	Ramp	1030	41	1071	938				970	33	1003	985			
	186:966		Mainline	5520	406	5926	4578	28.00	37.82	42.75	5210	326	5536	4010	15.45	27.09	24.25
	972:971	EB I-94 Entrance from Linwood	Ramp	200	22	222	187				190	18	208	208			
	966:965		Mainline	5720	428	6148	4754	25.98	41.09	47.42	5400	344	5744	4217	13.95	33.45	30.67
	965:960		Mainline	5720	428	6148	4676	28.82	41.09	47.42	5400	344	5744	4236	16.50	33.45	30.67
	962:963	EB I-94 Entrance from 14th St	Ramp	0	0	0	3				0	0	0	4			
	960:959		Mainline	5720	428	6148	4659	29.85			5400	344	5744	4237	18.29		
	975:976	EB I-94 Exit to Trumbull	Ramp	460	14	474	236				430	11	441	198			
	959:952		Mainline	5260	414	5674	4398	27.44	49.30	50.58	4970	333	5303	4026	16.40	33.70	34.75
	952:951		Mainline	5260	414	5674	4348	26.11	49.30	50.58	4970	333	5303	4027	15.32	33.70	34.75
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	440	16	456	343				410	13	423	313			
	951:943		Mainline	4820	398	5218	3988	21.46	44.33	43.33	4560	320	4880	3721	13.20	18.92	21.50
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	710	17	727	522				670	14	684	483			
	943:919		Mainline	4110	381	4491	3420	19.73	44.33	43.33	3890	306	4196	3244	12.70	18.92	21.50
	919:918		Mainline	4110	381	4491	3379	21.64	44.33	43.33	3890	306	4196	3248	16.29	18.92	21.50
	918:912		Mainline	4110	381	4491	3353	22.27	44.33	43.33	3890	306	4196	3254	18.04	18.92	21.50
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	1020	16	1036	755				960	13	973	795			
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	650	48	698	549				610	38	648	586			
	912:180		Mainline	5780	445	6225	4642	23.78			5460	357	5817	4638	20.42		
	180:910		Mainline	5780	445	6225	4625	29.04			5460	357	5817	4628	23.40		
	926:927	EB I-94 Exit to John R	Ramp	530	79	609	557				500	64	564	604			
	910:909		Mainline	5250	366	5616	4038	28.41	37.64	36.25	4960	293	5253	4022	20.29	28.33	25.92
	909:906		Mainline	5250	366	5616	3990	24.03	37.64	36.25	4960	293	5253	4026	16.19	28.33	25.92
	906:904		Mainline	5250	366	5616	3966	18.99	37.64	36.25	4960	293	5253	4022	12.92	28.33	25.92
	299:314	EB I-94 Exit to SB I-75	Ramp	160	16	176	126				150	13	163	104			
	300:301	EB I-94 Exit to NB I-75	Ramp	1080	111	1191	833				1020	89	1109	719			
	904:903		Mainline	4010	239	4249	2970	17.09	37.64	36.25	3790	191	3981	3195	12.32	28.33	25.92
	903:890		Mainline	4010	239	4249	2957	17.85	37.64	36.25	3790	191	3981	3194	13.52	28.33	25.92
	901:900	EB I-94 Entrance from Beaubien	Ramp	0	0	0	184				0	0	0	182			
	890:889		Mainline	4010	239	4249	3122	14.73	52.00	48.92	3790	191	3981	3375	11.45	47.55	40.00
	892:893	EB I-94 Exit to Russel	Ramp	120	16	136	105				120	13	133	110			
	889:881		Mainline	3890	223	4113	2992	14.25	52.00	48.92	3670	178	3848	3265	11.49	47.55	40.00
	881:878		Mainline	3890	223	4113	2956	19.22	52.00	48.92	3670	178	3848	3265	17.15	47.55	40.00
	281:282	EB I-94 Entrance from SB I-75	Ramp	1810	119	1929	1245				1710	96	1806	910			
	285:286	EB I-94 Entrance from NB I-75	Ramp	650	32	682	591				610	26	636	629			
	878:183		Mainline	6350	374	6724	4774	30.01			5990	300	6290	4807	29.87		
	183:876		Mainline	6350	374	6724	4758	37.32			5990	300	6290	4808	32.53		
	887:888	EB I-94 Exit to Chene	Ramp	700	16	716	480				660	13	673	496			
	876:875		Mainline	5650	358	6008	4261	35.09			5330	287	5617	4310	29.81		
	875:872		Mainline	5650	358	6008	4224	25.81			5330	287	5617	4316	23.00		
	872:869		Mainline	5650	358	6008	4146	18.90			5330	287	5617	4327	16.88		
	871:870	EB I-94 Entrance from Chene St	Ramp	960	24	984	684				900	19	919	720			
	869:860		Mainline	6610	382	6992	4774	19.83	59.80	55.33	6230	306	6536	5052	17.69	51.83	47.75
	863:864	EB I-94 Exit to Elliot	Ramp	230	32	262	178				220	26	246	189			
	860:859		Mainline	6380	350	6730	4555	25.46	59.80	55.33	6010	280	6290	4862	23.90	51.83	47.75
	859:192		Mainline	6380	350	6730	4527	43.62	59.80	55.33	6010	280	6290	4854	40.86	51.83	47.75
	856:855	EB I-94 Entrance from Elliot	Ramp	380	16	396	351				360	13	373	379			
	836:834		Mainline	6760	366	7126	4862	40.86			6370	293	6663	5236	38.87		
	834:832		Mainline	6760	366	7126	4821	36.39			6370	293	6663	5225	33.75		
	832:829		Mainline	6760	366	7126	4783	27.30			6370	293	6663	5225	25.24		
	848:849	EB I-94 Exit to Van Dyke	Ramp	310	64	374	239				290	51	341	261			
	829:827		Mainline	6450	302	6752	4510	36.17	56.82	55.58	6080	242	6322	4961	34.81	49.27	47.75
	827:160		Mainline	6450	302	6752	4496	52.51	56.82	55.58	6080	242	6322	4962	51.19	49.27	47.75
	841:842	EB I-94 Entrance from Van Dyke	Ramp	160	16	176	159				150	13	163	166			
	160:826		Mainline	6610	318	6928	4652	55.69			6230	255	6485	5128	54.06		
	826:809		Mainline	6610	318	6928	4618	58.11			6230	255	6485	5126	53.69		
	809:807		Mainline	6610	318	6928	4605	42.68			6230	255	6485	5126	32.32		
	818:819	EB I-94 Exit to Gratiot	Ramp	560	48	608	315				530	38	568	361			
	807:806		Mainline	6050	270	6320	4245	38.91	60.82	59.17	5700	217	5917	4772	30.61	53.20	50.17
	823:824	EB I-94 Entrance from Gratiot	Ramp	840	32	872	777				800	26	826	826			
	803:800		Mainline	6890	302	7192	5004	55.58			6500	243	6743	5589	47.13		
	6209:6210	EB I-94 Exit to French	Ramp	0	0	0	79				0	0	0	77			
	800:6208		Mainline	6890	302	7192	4913	41.14	57.90	59.33	6500	243	6743	5504	31.57	51.00	50.50
	6208:6214		Mainline	6890	302	7192	4874	46.28	57.90	59.33	6500	243	6743	5495	40.33	51.00	50.50
	6250:6251	EB I-94 Entrance from French	Ramp	0	0	0	#N/A				0	0	0	#N/A			
	6215:6220		Mainline	6890	302	7192	4851	50.77			6500	243	6743	5492	39.65		
	6221:6222	EB I-94 Exit to Conner	Ramp	280	48	328	198				270	38	308	208			
	6220:6229		Mainline	6610	254	6864	4630	33.02	55.36	57.75	6230	205	6435	5276	26.02	44.33	50.83
	6229:6232		Mainline	6610	254	6864	4617	37.12	55.36	57.75	6230	205	6435	5274	32.46	44.33	50.83
	6249:6248	EB I-94 Entrance from Conner	Ramp	490	32	522	463				460	26	486	479			
	6234:6238		Mainline	7100	286	7386	5028	56.83			6690	231	6921	5748	56.92		
	6238:6239	EB I-94 East of Conner	Mainline	7100	286	7386	4988	52.49			6690	231	6921	5748	51.57		
WB I-94	6237:6233	WB I-94 East of Conner	Mainline	4750	496	5246	4444	52.13			4490	399	4889	2597	7.41		
	6233:6230		Mainline	4750	496	5246	4419	50.85			4490	399	4889	2593	6.95		
	6246:6247	WB I-94 Exit to Conner	Ramp	300	10	310	265				290	8	298	145			
	6230:6228		Mainline	4450	486	4936	4124	45.90	57.55	56.42	4200	391	4591	2435	6.30	60.30	57.25
	6228:161		Mainline	4450	486	4936	4073	41.45	57.55	56.42	4200	391	4591	2409	6.24	60.30	57.25
	6225:6224	WB I-94 Entrance fromNB Conner	Ramp	113	12	125	101				105	10	115	100			
	6218:6217	WB I-94 Entrance from SB Conner	Ramp	38	4	42	44				35	3	38	46			
	206:801		Mainline	4600	502	5102	4109	46.30			4340	404	4744	2489	8.39		
	6213:6212	WB I-94 Entrance from French	Ramp	0	0	0	205				0	0	0	228			
	802:804		Mainline	4600	502	5102	4213	39.23			4340	404	4744	2704	7.78		
	811:812	WB I-94 Exit to Gratiot	Ramp	180	10	190	152				170	8	178	88			
	815:816	WB I-94 Entrance from Gratiot	Ramp	860	48	908	576				820	38	858	566			
	808:810		Mainline	5280	540	5820	4403	37.09			4990	434	5424	3211	10.00		
	837:838	WB I-94 Exit to Van Dyke	Ramp	180	32	212	151				170	26	196	133			
	810:828		Mainline	5100	508	5608	4202	30.31	57.09	54.42	4820	408	5228	3066	8.48	62.00	53.67
	828:830		Mainline	5100	508	5608	4171	28.68	57.09	54.42	4820	408	5228	3057	8.55	62.00	53.67
	845:846	WB I-94 Entrance from Van Dayke	Ramp	410	48	458	397				380	38	418	411			
	831:833		Mainline	5510	556	6066	4382	29.43			5200	446	5646	3433	11.58		
	833:835		Mainline	5510	556	6066	4352	28.51			5200	446	5646	3424	11.24		
	851:852	WB I-94 Exit to Elliot	Ramp	240	16	256	356				230	13	243	303			
	835:858		Mainline	5270	540	5810	3901	24.01	56.73	51.08	4970	433	5403	3120	9.35	57.91	52.17
	858:861		Mainline	5270	540	5810	3791	21.50	56.73	51.08	4970	433	5403	3124	9.00	57.91	52.17
	866:867	WB I-94 Entrance from Elliot	Ramp	630	32	662	555				600	26	626	601			
	873:874		Mainline	5900	572	6472	4169	24.48			5570	459	6029	3758	12.71		
	882:883	WB I-94 Entrance from Chene	Ramp	480	16	496	442				450	13	463	465			
	874:877		Mainline	6380	588	6968	4544	27.09			6020	472	6492	4220	17.62		
	289:290	WB I-94 Exit to NB I-75	Ramp	1100	64	1164	822				1040	51	1091	785			
	293:294	WB I-94 Exit to SB I-75	Ramp	1010	145	1155	772				950	116	1066	668			
	877:880		Mainline	4270	379	4649	2899	21.36	52.83	48.25	4030	305	4335	2769	13.54	51.33	47.00
	880:891		Mainline	4270	379	4649	2879	23.21	52.83	48.25	4030	305	4335	2772	15.21	51.33	47.00
	896:897	WB I-94 Exit to Beaubien	Ramp	460	16	476	310				430	13	443	282			
	891:902		Mainline	3810	363	4173	2549	19.49	48.92	44.50	3600	292	3892	2484	12.60	49.11	38.42
	902:188		Mainline	3810	363	4173	2540	18.03	48.92	44.50	3600	292	3892	2479	11.74	49.11	38.42
	276:277	WB I-94 Entrance from NB I-75	Ramp	330	16	346	298				310	13	323	331			
	278:279	WB I-94 Entrance from SB I-75	Ramp	700	65	765	632				660	52	712	481			
	188:189		Mainline	4840	444	5284	3442	15.50	48.92	44.50	4570	357	4927	3283	9.32	49.11	38.42
	189:905		Mainline	4840	444	5284	3405	16.07	48.92	44.50	4570	357	4927	3281	9.85	49.11	38.42
	905:908		Mainline	4840	444	5284	3329	14.56	48.92	44.50	4570	357	4927	3290	9.39	49.11	38.42
	928:929	WB I-94 Entrance from John R	Ramp	630	48	678	773				600	38	638	723			
	911:26		Mainline	5470	492	5962	3997	21.87	52.42	48.17	5170	395	5565	4021	16.75	41.18	33.92
	26:913		Mainline	5470	492	5962	3990	22.92	52.42	48.17	5170	395	5565	4022	16.88	41.18	33.92
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	920	48	968	814				860	38	898	805			
	913:30		Mainline	4550	444	4994	3167	16.11	52.42	48.17	4310	357	4667	3218	11.72	41.18	33.92
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	520	64	584	372				490	51	541	371			
	30:923		Mainline	4030	380	4410	2765	13.23	52.42	48.17	3820	306	4126	2835	9.63	41.18	33.92
	923:924		Mainline	4030	380	4410	2734	14.25	52.42	48.17	3820	306	4126	2837	11.03	41.18	33.92
	924:185		Mainline	4030	380	4410	2690	14.99	52.42	48.17	3820	306	4126	2845	12.21	41.18	33.92
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	1060	79	1139	982				1000	64	1064	1050			
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	930	16	946	787				870	13	883	861			
	954:3607		Mainline	6020	475	6495	4423	18.91	53.30	48.75	5690	383	6073	4752	16.60	32.13	29.50
	3607:955		Mainline	6020	475	6495	4417	16.55	53.30	48.75	5690	383	6073	4753	14.53	32.13	29.50
	957:958	WB I-94 Entrance from Trumbull	Ramp	1340	16	1356	836				1270	13	1283	879			
	961:964		Mainline	7360	491	7851	5154	40.29	49.36	48.00	6960	396	7356	5628	39.80	39.75	36.67
	967:968	WB I-94 Exit to Linwood	Ramp	140	32	172	121				130	26	156	127			
	964:974		Mainline	7220	459	7679	5011	36.32	60.63	51.92	6830	370	7200	5504	36.45	48.50	47.67
	974:994		Mainline	7220	459	7679	4989	45.70	60.63	51.92	6830	370	7200	5507	45.23	48.50	47.67
	1001:1002	WB I-94 Exit to SB I-96	Ramp	970	33	1003	649				910	27	937	713			
	1001:1004	WB I-94 Exit to NB I-96	Ramp	970	90	1060	670				910	70	980	731			
	994:995		Mainline	5280	336	5616	3644	59.14	58.58	54.17	5010	273	5283	4060	59.07	52.00	51.67
	999:998	WB I-94 Entrance from Linwood	Ramp	150	90	240	199				140	70	210	215			
	162:1011		Mainline	5430	426	5856	3829	58.86	58.58	54.17	5150	343	5493	4275	58.42	52.00	51.67
	990:991	WB I-94 Entrance from SB I-96	Ramp	230	16	246	217				220	13	233	236			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	740	143	883	763				700	115	815	821			
	1011:1013	WB I-94 West of I-96	Mainline	6400	585	6985	4795	53.65			6070	471	6541	5329	53.91		

Link	PM1617									
	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
1014:1012	5430	301	5731	3935	25.83	71	F	14.24		
1018:1019	240	31	271	181	5.99	-	-			
1027:1008	950	110	1060	788	8.95	-	-			
1012:1010	4240	160	4400	2946	23.99	88	F	11.32	26.82	28.25
1022:1023	240	10	250	163	6.05	-	-			
1010:159	4000	150	4150	2778	23.31	125	F	7.57	26.82	28.25
983:982	320	80	400	395	0.25	-	-			
187:158	4320	230	4550	3168	22.25	127	F	8.53		
978:979	990	26	1016	999	0.54	-	-			
186:966	5310	256	5566	4168	20.04	85	F	16.72	13.78	23.58
972:971	190	14	204	206	0.14	-	-			
966:965	5500	270	5770	4379	19.53	75	F	14.85	23.44	28.17
965:960	5500	270	5770	4393	19.32	84	F	17.95	23.44	28.17
962:963	0	0	0	4	2.83	-	-			
960:959	5500	270	5770	4407	19.11	57	F	19.96		
975:976	440	9	449	212	13.04	-	-			
959:952	5060	261	5321	4208	16.12	80	F	17.96	24.78	29.17
952:951	5060	261	5321	4212	16.06	84	F	17.07	24.78	29.17
949:950	420	10	430	334	4.91	-	-			
951:943	4640	251	4891	3877	15.31	89	F	14.90	16.64	18.17
943:944	680	11	691	507	7.52	-	-			
943:919	3960	240	4200	3381	13.30	82	F	14.09	16.64	18.17
919:918	3960	240	4200	3387	13.20	66	F	17.65	16.64	18.17
918:912	3960	240	4200	3385	13.23	59	F	19.54	16.64	18.17
916:915	980	10	990	765	7.60	-	-			
937:936	620	30	650	589	2.45	-	-			
912:180	5560	280	5840	4740	15.12	44	E	21.91		
180:910	5560	280	5840	4743	15.08	63	F	25.78		
926:927	510	50	560	587	1.13	-	-			
910:909	5050	230	5280	4147	16.50	52	F	27.11	18.73	21.00
909:906	5050	230	5280	4140	16.61	70	F	20.09	18.73	21.00
906:904	5050	230	5280	4136	16.67	98	F	14.32	18.73	21.00
299:314	150	10	160	113	4.02	-	-			
300:301	1040	70	1110	755	11.63	-	-			
904:903	3860	150	4010	3267	12.32	84	F	13.19	18.73	21.00
903:890	3860	150	4010	3264	12.37	77	F	14.46	18.73	21.00
901:900	0	0	0	182	19.08	-	-			
890:889	3860	150	4010	3442	9.31	71	F	12.30	22.89	23.25
892:893	120	10	130	116	1.26	-	-			
889:881	3740	140	3880	3322	9.30	93	F	12.09	22.89	23.25
881:878	3740	140	3880	3319	9.35	64	F	17.69	22.89	23.25
281:282	1740	75	1815	889	25.18	-	-			
285:286	620	20	640	640	0.00	-	-			
878:183	6100	235	6335	4850	19.86	32	D	30.62		
183:876	6100	235	6335	4848	19.89	37	E	33.17		
887:888	670	10	680	494	7.68	-	-			
876:875	5430	225	5655	4354	18.39	47	F	31.57		
875:872	5430	225	5655	4356	18.36	62	F	24.02		
872:869	5430	225	5655	4333	18.71	86	F	17.17		
871:870	920	15	935	730	7.10	-	-			
869:860	6350	240	6590	5049	20.20	72	F	17.81	30.60	31.83
863:864	220	20	240	179	4.21	-	-			
860:859	6130	220	6350	4869	19.77	70	F	23.71	30.60	31.83
859:192	6130	220	6350	4872	19.73	41	E	40.09	30.60	31.83
856:855	370	10	380	386	0.31	-	-			
836:834	6500	230	6730	5249	19.14	47	F	38.21		
834:832	6500	230	6730	5260	18.99	52	F	34.03		
832:829	6500	230	6730	5260	18.99	70	F	25.66		
848:849	300	40	340	259	4.68	-	-			
829:827	6200	190	6390	5001	18.41	48	F	34.92	27.64	33.42
827:160	6200	190	6390	4999	18.43	33	D	51.22	27.64	33.42
841:842	150	10	160	162	0.16	-	-			
160:826	6350	200	6550	5162	18.14	24	C	53.99		
826:809	6350	200	6550	5156	18.22	34	D	51.64		
809:807	6350	200	6550	5142	18.42	59	F	29.75		
818:819	540	30	570	356	9.95	-	-			
807:806	5810	170	5980	4769	16.52	56	F	28.79	36.10	34.67
823:824	810	20	830	827	0.10	-	-			
803:800	6620	190	6810	5592	15.47	43	E	44.13		
6209:6210	0	0	0	74	12.17	-	-			
800:6208	6620	190	6810	5519	16.44	68	F	27.62	31.82	34.67
6208:6214	6620	190	6810	5514	16.51	49	F	38.22	31.82	34.67
6250:6251	0	0	0	#N/A		-	-			
6215:6220	6620	190	6810	5507	16.60	53	F	35.14		
6221:6222	270	30	300	210	5.64	-	-			
6220:6229	6350	160	6510	5295	15.81	76	F	23.59	37.09	36.17
6229:6232	6350	160	6510	5294	15.83	57	F	31.10	37.09	36.17
6249:6248	470	20	490	482	0.36	-	-			
6234:6238	6820	180	7000	5776	15.31	34	D	57.19		
6238:6239	6820	180	7000	5772	15.37	37	E	52.09		
6237:6233	4570	312	4882	2525	38.73	126	F	6.93		
6233:6230	4570	312	4882	2515	38.92	131	F	6.63		
6246:6247	290	6	296	139	10.65	-	-			
6230:6228	4280	306	4586	2370	37.58	136	F	6.00	59.33	58.00
6228:161	4280	306	4586	2372	37.54	137	F	5.96	59.33	58.00
6225:6224	105	8	113	97	1.51	-	-			
6218:6217	35	3	38	50	1.89	-	-			
206:801	4420	316	4736	2525	36.69	114	F	7.67		
6213:6212	0	0	0	223	21.12	-	-			
802:804	4420	316	4736	2692	33.54	122	F	7.62		
811:812	170	6	176	87	7.76	-	-			
815:816	830	30	860	574	10.68	-	-			
808:810	5080	340	5420	3144	34.78	109	F	9.96		
837:838	170	20	190	124	5.27	-	-			
810:828	4910	320	5230	3029	34.25	124	F	8.43	58.27	54.92
828:830	4910	320	5230	3022	34.37	122	F	8.49	58.27	54.92
845:846	390	30	420	403	0.84	-	-			
831:833	5300	350	5650	3467	32.33	103	F	11.57		
833:835	5300	350	5650	3482	32.08	105	F	11.40		
851:852	230	10	240	308	4.11	-	-			
835:858	5070	340	5410	3164	34.30	116	F	9.41	58.67	54.50
858:861	5070	340	5410	3149	34.56	120	F	9.02	58.67	54.50
866:867	610	20	630	600	1.21	-	-			
873:874	5680	360	6040	3741	32.87	100	F	12.80		
882:883	460	10	470	463	0.32	-	-			
874:877	6140	370	6510	4207	31.46	63	F	17.12		
289:290	1060	40	1100	819	9.07	-	-			
293:294	970	91	1061	641	14.40	-	-			
877:880	4110	239	4349	2739	27.04	69	F	13.53	40.58	41.50
880:891	4110	239	4349	2739	27.04	62	F	15.16	40.58	41.50
896:897	440	10	450	281	8.84	-	-			
891:902	3670	229	3899	2463	25.46	67	F	12.55	20.83	28.25
902:188	3670	229	3899	2464	25.44	73	F	11.54	20.83	28.25
276:277	320	10	330	323	0.39	-	-			
278:279	670	41	711	491	8.97	-	-			
188:189	4660	280	4940	3279	25.91	90	F	9.36	20.83	28.25
189:905	4660	280	4940	3283	25.84	115	F	9.79	20.83	28.25
905:908	4660	280	4940	3275	25.98	120	F	9.36	20.83	28.25
928:929	610	30	640	709	2.66	-	-			
911:26	5270	310	5580	3985	23.06	82	F	16.58	33.60	24.58
26:913	5270	310	5580	3983	23.10	83	F	16.50	33.60	24.58
920:921	880	30	910	799	3.80	-	-			
913:30	4390	280	4670	3184	23.71	94	F	11.63	33.60	24.58
932:933	500	40	540	375	7.71	-	-			
30:923	3890	240	4130	2806	22.48	103	F	9.39	33.60	24.58
923:924	3890	240	4130	2798	22.63	88	F	10.92	33.60	24.58
924:185	3890	240	4130	2800	22.59	80	F	11.98	33.60	24.58
941:942	1020	50	1070	1088	0.55	-	-			
947:948	890	10	900	834	2.24	-	-			
954:3607	5800	300	6100	4722	18.73	77	F	15.67	33.30	22.33
3607:955	5800	300	6100	4722	18.73	88	F	13.79	33.30	22.33
957:958	1290	10	1300	915	11.57	-	-			
961:964	7090	310	7400	5620	22.06	50	F	38.64	43.20	34.58
967:968	130	20	150	127	1.95	-	-			
964:974	6960	290	7250	5497	21.96	52	F	35.62	50.20	45.75
974:994	6960	290	7250	5495	21.98	41	E	45.16	50.20	45.75
1001:1002	930	70	1000	692	10.59	-	-			
1001:1004	930	70	1000	719	9.58	-	-			
994:995	5100	150	5250	4088	17.01	23	C	58.94	52.27	51.08
999:998	140	10	150	144	0.49	-	-			
162:1011	5240	160	5400	4230	16.86	24	C	58.69	52.27	51.08
990:991	220	10	230	233	0.20	-	-			
1020:1021	710	90	800	810	0.35	-	-			
1011:1013	6170	260	6430	5273	15.13	25	C	54.85		

Link	PM1718									
	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
1014:1012	5500	301	5801	3358	36.10	80	F	10.82		
1018:1019	280	20	300	141	10.71	-	-			
1027:1008	1450	121	1571	806	22.19	-	-			
1012:1010	3770	160	3930	2420	26.80	100	F	8.20	24.42	29.42
1022:1023	350	10	360	141	13.84	-	-			
1010:159	3420	150	3570	2251	24.45	135	F	5.67	24.42	29.42
983:982	230	58	288	292	0.23	-	-			
187:158	3650	208	3858	2529	23.52	139	F	6.23		
978:979	930	1	931	889	1.39	-	-			
186:966	4580	209	4789	3410	21.54	104	F	11.16	14.00	23.33
972:971	190	1	191	196	0.36	-	-			
966:965	4770	210	4980	3600	21.07	92	F	9.97	17.70	25.42
965:960	4770	210	4980	3560	21.73	100	F	12.10	17.70	25.42
962:963	0	0	0	3	2.45	-	-			
960:959	4770	210	4980	3547	21.95	67	F	13.52		
975:976	460	10	470	175	16.43	-	-			
959:952	4310	200	4510	3364	18.26	102	F	11.25	12.88	26.58
952:951	4310	200	4510	3370	18.16	109	F	10.58	12.88	26.58
949:950	350	10	360	284	4.24	-	-			
951:943	3960	190	4150	3080	17.80	116	F	9.05	10.08	15.92
943:944	670	20	690	419	11.51	-	-			
943:919	3290	170	3460	2642	14.81	100	F	9.07	10.08	15.92
919:918	3290	170	3460	2642	14.81	76	F	11.95	10.08	15.92
918:912	3290	170	3460	2637	14.91	73	F	12.37	10.08	15.92
916:915	920	10	930	834	3.23	-	-			
937:936	680	10	690	600	3.54	-	-			
912:180	4890	190	5080	4065	15.01	62	F	13.38		
180:910	4890	190	5080	4056	15.15	89	F	15.48		
926:927	510	20	530	549	0.82	-	-			
910:909	4380	170	4550	3501	16.53	80	F	14.91	16.42	18.50
909:906	4380	170	4550	3500	16.55	94	F	12.67	16.42	18.50
906:904	4380	170	4550	3501	16.53	116	F	10.22	16.42	18.50
299:314	160	10	170	94	6.61	-	-			
300:301	810	63	873	575	11.08	-	-			
904:903	3410	97	3507	2830	12.03	98	F	9.74	16.42	18.50
903:890	3410	97	3507	2825	12.12	96	F	9.99	16.42	18.50
901:900	0	0	0	163	18.06	-	-			
890:889	3410	97	3507	2983	9.20	87	F	8.70	13.33	18.75
892:893	120	8	128	104	2.23	-	-			
889:881	3290	89	3379	2874	9.03	110	F	8.84	13.33	18.75
881:878	3290	89	3379	2870	9.11	74	F	13.15	13.33	18.75
281:282	1670	54	1724	1020	19.01	-	-			
285:286	850	8	858	863	0.17	-	-			
878:183	5810	151	5961	4733	16.79	42	E	23.02		
183:876	5810	151	5961	4738	16.72	39	E	30.79		
887:888	770	10	780	549	8.96	-	-			
876:875	5040	141	5181	4196	14.39	53	F	26.52		
875:872	5040	141	5181	4200	14.32	77	F	18.35		
872:869	5040	141	5181	4223	13.97	100	F	14.33		
871:870	790	20	810	646	6.08	-	-			
869:860	5830	161	5991	4884	15.01	76	F	16.23	21.18	25.17
863:864	250	20	270	202	4.43	-	-			
860:859	5580	141	5721	4677	14.48	74	F	21.30	21.18	25.17
859:192	5580	141	5721	4674	14.52	47	F	33.75	21.18	25.17
856:855	450	10	460	450	0.47	-	-			
836:834	6030	151	6181	5127	14.02	54	F	32.07		
834:832	6030	151	6181	5113	14.21	58	F	29.77		
832:829	6030	151	6181	5111	14.24	76	F	22.74		
848:849	230	20	250	225	1.62	-	-			
829:827	5800	131	5931	4888	14.18	58	F	28.19	25.42	27.67
827:160	5800	131	5931	4887	14.20	43	E	38.74	25.42	27.67
841:842	130	20	150	161	0.88	-	-			
160:826	5930	151	6081	5049	13.83	33	D	38.82		
826:809	5930	151	6081	5043	13.92	59	F	28.84		
809:807	5930	151	6081	5041	13.95	103	F	16.50		
818:819	440	25	465	328	6.88	-	-			
807:806	5490	126	5616	4716	12.52	82	F	19.49	23.64	28.33
823:824	990	10	1000	1001	0.03	-	-			
803:800	6480	136	6616	5728	11.30	42	E	46.28		
6209:6210	0	0	0	80	12.65	-	-			
800:6208	6480	136	6616	5655	12.27	57	F	33.36	27.17	31.08
6208:6214	6480	136	6616	5663	12.16	47	F	40.92	27.17	31.08
6250:6251	0	0	0	#N/A		-	-			
6215:6220	6480	136	6616	5672	12.04	46	F	41.94		
6221:6222	300	20	320	229	5.49	-	-			
6220:6229	6180	116	6296	5454	10.99	67	F	27.57	34.00	35.67
6229:6232	6180	116	6296	5458	10.93	54	F	34.21	34.00	35.67
6249:6248	380	10	390	400	0.50	-	-			
6234:6238	6560	126	6686	5859	10.44	35	D	56.79		
6238:6239	6560	126	6686	5861	10.42	38	E	51.43		
6237:6233	4860	229	5089	2761	37.16	123	F	7.66		
6233:6230	4860	229	5089	2781	36.79	126	F	7.52		
6246:6247	400	10	410	159	14.88	-	-			
6230:6228	4460	219	4679	2640	33.71	133	F	6.80	60.88	56.25
6228:161	4460	219	4679	2653	33.46	133	F	6.81	60.88	56.25
6225:6224	120	1	121	98	2.18	-	-			
6218:6217	40	0	40	54	2.00	-	-			
206:801	4620	220	4840	2877	31.60	100	F	9.81		
6213:6212	0	0	0	144	16.97	-	-			
802:804	4620	220	4840	3136	26.98	114	F	9.36		
811:812	170	10	180	107	6.09	-	-			
815:816	620	10	630	590	1.62	-	-			
808:810	5070	220	5290	3698	23.75	99	F	12.76		
837:838	190	10	200	146	4.11	-	-			
810:828	4880	210	5090	3570	23.10	110	F	11.03	59.50	53.92
828:830	4880	210	5090	3591	22.75	111	F	11.03	59.50	53.92
845:846	370	1	371	379	0.41	-	-			
831:833	5250	211	5461	4031	20.76	92	F	14.90		
833:835	5250	211	5461	4024	20.87	92	F	14.84		
851:852	190	11	201	327	7.75	-	-			
835:858	5060	200	5260	3722	22.95	101	F	12.57	58.25	53.83
858:861	5060	200	5260	3730	22.82	105	F	12.02	58.25	53.83
866:867	490	1	491	488	0.14	-	-			
873:874	5550	201	5751	4277	20.82	92	F	15.69		
882:883	230	10	240	248	0.51	-	-			
874:877	5780	211	5991	4541	19.98	62	F	18.77		
289:290	840	30	870	794	2.63	-	-			
293:294	950	50	1000	710	9.92	-	-			
877:880	3990	131	4121	3036	18.14	70	F	14.64	40.13	44.92
880:891	3990	131	4121	3037	18.12	58	F	17.88	40.13	44.92
896:897	410	10	420	325	4.92	-	-			
891:902	3580	121	3701	2716	17.39	61	F	15.07	21.82	28.83
902:188	3580	121	3701	2717	17.37	65	F	14.15	21.82	28.83
276:277	90	8	98	117	1.83	-	-			
278:279	1030	61	1091	703	12.95	-	-			
188:189	4700	190	4890	3560	20.46	74	F	12.29	21.82	28.83
189:905	4700	190	4890	3572	20.26	99	F	12.29	21.82	28.83
905:908	4700	190	4890	3597	19.85	111	F	10.98	21.82	28.83
928:929	690	46	736	802	2.38	-	-			
911:26	5390	236	5626	4403	17.27	75	F	19.89	19.60	22.00
26:913	5390	236	5626	4404	17.26	72	F	20.81	19.60	22.00
920:921	830	20	850	868	0.61	-	-			
913:30	4560	216	4776	3539	19.18	81	F	14.97	19.60	22.00
932:933	570	30	600	443	6.87	-	-			
30:923	3990	186	4176	3109	17.68	89	F	11.86	19.60	22.00
923:924	3990	186	4176	3117	17.54	83	F	12.78	19.60	22.00
924:185	3990	186	4176	3120	17.48	76	F	13.91	19.60	22.00
941:942	910	46	956	948	0.26	-	-			
947:948	710	10	720	725	0.19	-	-			
954:3607	5610	242	5852	4808	14.30	65	F	18.84	27.13	21.08
3607:955	5610	242	5852	4810	14.27	74	F	16.48	27.13	21.08
957:958	1060	10	1070	762	10.18	-	-			
961:964	6670	252	6922	5594	16.79	50	F	38.33	29.70	32.25
967:968	110	10	120	114	0.55	-	-			
964:974	6560	242	6802	5473	16.96	52	F	35.56	47.50	45.67
974:994	6560	242	6802	5469	17.02	41	E	44.81	47.50	45.67
1001:1002	900	60	960	739	7.58	-	-			
1001:1004	900	60	960	746	7.33	-	-			
994:995	4760	122	4882	3985	13.47	23	C	59.08	53.63	49.33
999:998	180	10	190	197	0.50	-	-			
162:1011	4940	132	5072	4185	13.04	24	C	58.40	53.63	49.33
990:991	290	10	300	287	0.76	-	-			
1020:1021	730	93	823	807	0.56	-	-			
1011:1013	5960	235	6195	5281	12.07	25	C	54.03		

Link	PM1819						
	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
1014:1012	4230	260	4490	4669	18.13		
1018:1019	220	17	237	228			
1027:1008	1110	105	1215	1117			
1012:1010	2900	138	3038	3376	18.19	41.33	43.50
1022:1023	270	9	279	252			
1010:159	2630	129	2759	3229	12.06	41.33	43.50
983:982	180	50	230	208			
187:158	2810	179	2989	3497	12.05		
978:979	710	1	711	716			
186:966	3520	180	3700	4257	20.88	45.86	40.92
972:971	150	1	151	132			
966:965	3670	181	3851	4401	18.89	43.00	43.08
965:960	3670	181	3851	4471	21.35	43.00	43.08
962:963	0	0	0	2			
960:959	3670	181	3851	4499	24.01		
975:976	350	9	359	262			
959:952	3320	172	3492	4264	22.28	30.67	46.92
952:951	3320	172	3492	4290	21.20	30.67	46.92
949:950	270	9	279	326			
951:943	3050	163	3213	3978	18.26	36.50	38.75
943:944	520	17	537	596			
943:919	2530	146	2676	3423	17.01	36.50	38.75
919:918	2530	146	2676	3446	20.22	36.50	38.75
918:912	2530	146	2676	3466	22.48	36.50	38.75
916:915	710	9	719	737			
937:936	520	9	529	443			
912:180	3760	164	3924	4656	23.70		
180:910	3760	164	3924	4681	25.53		
926:927	390	17	407	592			
910:909	3370	147	3517	4123	21.70	29.80	35.75
909:906	3370	147	3517	4160	18.53	29.80	35.75
906:904	3370	147	3517	4178	14.80	29.80	35.75
299:314	120	9	129	148			
300:301	620	54	674	892			
904:903	2630	84	2714	3155	13.07	29.80	35.75
903:890	2630	84	2714	3169	14.24	29.80	35.75
901:900	0	0	0	139			
890:889	2630	84	2714	3325	12.01	33.25	38.83
892:893	90	7	97	109			
889:881	2540	77	2617	3231	11.59	33.25	38.83
881:878	2540	77	2617	3249	17.07	33.25	38.83
281:282	1280	47	1327	1376			
285:286	650	7	657	591			
878:183	4470	131	4601	5231	29.75		
183:876	4470	131	4601	5231	37.81		
887:888	590	9	599	644			
876:875	3880	122	4002	4588	36.79		
875:872	3880	122	4002	4597	28.80		
872:869	3880	122	4002	4612	21.23		
871:870	610	17	627	437			
869:860	4490	139	4629	5044	18.60	32.67	43.00
863:864	190	17	207	206			
860:859	4300	122	4422	4848	22.86	32.67	43.00
859:192	4300	122	4422	4859	39.90	32.67	43.00
856:855	350	9	359	320			
836:834	4650	131	4781	5185	38.54		
834:832	4650	131	4781	5195	33.19		
832:829	4650	131	4781	5200	25.48		
848:849	180	17	197	218			
829:827	4470	114	4584	4983	35.07	46.25	42.17
827:160	4470	114	4584	4984	52.18	46.25	42.17
841:842	100	17	117	105			
160:826	4570	131	4701	5090	55.59		
826:809	4570	131	4701	5108	55.00		
809:807	4570	131	4701	5126	38.29		
818:819	340	22	362	337			
807:806	4230	109	4339	4813	37.83	46.29	46.50
823:824	760	9	769	691			
803:800	4990	118	5108	5511	56.31		
6209:6210	0	0	0	91			
800:6208	4990	118	5108	5422	39.58	50.57	46.08
6208:6214	4990	118	5108	5429	46.17	50.57	46.08
6250:6251	0	0	0	#N/A			
6215:6220	4990	118	5108	5434	57.50		
6221:6222	230	17	247	257			
6220:6229	4760	101	4861	5183	42.15	47.22	45.08
6229:6232	4760	101	4861	5185	44.54	47.22	45.08
6249:6248	290	9	299	261			
6234:6238	5050	110	5160	5454	57.60		
6238:6239	5050	110	5160	5459	53.36		
6237:6233	3740	198	3938	4937	21.89		
6233:6230	3740	198	3938	4944	21.23		
6246:6247	310	9	319	313			
6230:6228	3430	189	3619	4633	18.86	55.78	56.00
6228:161	3430	189	3619	4657	17.84	55.78	56.00
6225:6224	90	1	91	70			
6218:6217	30	0	30	40			
206:801	3550	190	3740	4809	33.00		
6213:6212	0	0	0	113			
802:804	3550	190	3740	4938	32.22		
811:812	130	9	139	175			
815:816	480	9	489	335			
808:810	3900	190	4090	5171	33.37		
837:838	150	9	159	182			
810:828	3750	181	3931	5003	30.50	62.43	56.58
828:830	3750	181	3931	5014	30.89	62.43	56.58
845:846	280	1	281	248			
831:833	4030	182	4212	5287	31.32		
833:835	4030	182	4212	5307	30.91		
851:852	150	10	160	390			
835:858	3880	172	4052	4953	28.21	58.90	56.58
858:861	3880	172	4052	4991	27.38	58.90	56.58
866:867	380	1	381	331			
873:874	4260	173	4433	5332	28.46		
882:883	180	9	189	159			
874:877	4440	182	4622	5497	28.40		
289:290	650	26	676	864			
293:294	730	43	773	977			
877:880	3060	113	3173	3663	23.62	51.30	51.50
880:891	3060	113	3173	3670	27.80	51.30	51.50
896:897	320	9	329	411			
891:902	2740	104	2844	3263	24.27	42.70	44.25
902:188	2740	104	2844	3264	22.86	42.70	44.25
276:277	70	7	77	71			
278:279	790	53	843	834			
188:189	3600	164	3764	4174	22.52	42.70	44.25
189:905	3600	164	3764	4180	20.87	42.70	44.25
905:908	3600	164	3764	4192	15.94	42.70	44.25
928:929	530	40	570	857			
911:26	4130	204	4334	5063	27.80	34.60	37.00
26:913	4130	204	4334	5063	33.03	34.60	37.00
920:921	640	17	657	1030			
913:30	3490	187	3677	4032	25.32	34.60	37.00
932:933	440	26	466	506			
30:923	3050	161	3211	3526	19.41	34.60	37.00
923:924	3050	161	3211	3531	17.76	34.60	37.00
924:185	3050	161	3211	3533	18.06	34.60	37.00
941:942	700	40	740	672			
947:948	550	9	559	631			
954:3607	4300	210	4510	4841	23.57	29.67	34.42
3607:955	4300	210	4510	4842	21.63	29.67	34.42
957:958	810	9	819	487			
961:964	5110	219	5329	5344	38.39	38.83	40.00
967:968	80	9	89	100			
964:974	5030	210	5240	5248	33.32	48.75	46.67
974:994	5030	210	5240	5250	44.39	48.75	46.67
1001:1002	700	50	750	830			
1001:1004	700	50	750	836			
994:995	3630	110	3740	3582	59.62	54.38	52.17
999:998	140	9	149	132			
162:1011	3770	119	3889	3715	59.65	54.38	52.17
990:991	220	9	229	204			
1020:1021	560	80	640	571			
1011:1013	4550	208	4758	4493	56.95		

PM Period - No Build Validation

Segment	Link	Facility	Type	PM1415 Auto Volume Lookup	PM1415 Truck volume Lookup	PM1415 Total Volume Lookup	PM1415 Model Output Volume	PM1415 Simulation Speed (mph)	PM1415 Avg Hour Speed, Date of Count	PM1415 2mo. Avg Hour Speed	PM1516 Auto Volume Lookup	PM1516 Truck volume Lookup	PM1516 Total Volume Lookup	PM1516 Model Output Volume	PM1516 Simulation Speed (mph)	PM1516 Avg Hour Speed, Date of Count	PM1516 2mo. Avg Hour Speed
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	4390	540	4930	4399	70.67			4150	434	4584	4572	70.46		
	1614:1615		Mainline	4390	540	4930	4392	67.31			4150	434	4584	4572	67.17		
	1615:1618	SB I-96 Exit to Grand	Ramp	340	48	388	351				320	38	358	366			
	1615:1599		Mainline	4050	492	4542	4035	53.39	68.60	62.67	3830	396	4226	4205	53.28	66.22	63.92
	1599:1597		Mainline	4050	492	4542	4013	57.57	68.60	62.67	3830	396	4226	4207	56.95	66.22	63.92
	1597:1595		Mainline	4050	492	4542	4006	58.38	68.60	62.67	3830	396	4226	4205	55.27	66.22	63.92
	1595:1593		Mainline	4050	492	4542	4002	59.31	68.60	62.67	3830	396	4226	4205	53.52	66.22	63.92
	1607:1593	SB I-96 Entrance from Grand	Ramp	500	71	571	522				470	57	527	530			
	1593:1591		Mainline	4550	563	5113	4516	55.68			4300	453	4753	4735	50.15		
	1591:1589		Mainline	4550	563	5113	4510	57.73			4300	453	4753	4737	53.36		
	990:991	WB I-94 Entrance from SB I-96	Ramp	230	16	246	217				220	13	233	236			
	978:979	SB I-96 to EB I-94	Ramp	1030	41	1071	938				970	33	1003	985			
	1589:1577		Mainline	3290	506	3796	3329	56.58	61.57	60.25	3110	407	3517	3511	56.11	62.38	58.33
	1577:1574		Mainline	3290	506	3796	3312	58.70	61.57	60.25	3110	407	3517	3513	58.72	62.38	58.33
	1583:1584	SB I-96 Exit to Warren	Ramp	230	32	262	225				220	26	246	247			
	1574:1573		Mainline	3060	474	3534	3080	54.70	61.57	60.25	2890	381	3271	3265	54.79	62.38	58.33
	1573:1554		Mainline	3060	474	3534	3071	59.38	61.57	60.25	2890	381	3271	3265	59.36	62.38	58.33
	1018:1019	EB I-94 to SB I-96	Ramp	250	49	299	231				240	40	280	175			
	1001:1002	WB I-94 Exit to SB I-96	Ramp	970	33	1003	649				910	27	937	713			
	1558:1559	SB I-96 Entrance from Warren	Ramp	650	95	745	684				610	77	687	698			
	163:1552	SB I-96 South of Entrance from Warren	Mainline	4930	651	5581	4588	57.52			4650	525	5175	4845	57.58		
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	4700	572	5272	4707	52.65			4440	460	4900	4913	52.47		
	1568:1569	NB I-96 Exit to Warren	Ramp	610	79	689	617				580	64	644	649			
	1553:1555		Mainline	4090	493	4583	4075	56.57			3860	396	4256	4262	56.25		
	983:982	NB I-96 to EB I-94	Ramp	330	127	457	381				310	102	412	418			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	740	143	883	763				700	115	815	821			
	1555:1572		Mainline	3020	223	3243	2908	58.69	60.00	58.58	2850	179	3029	3022	58.62	50.43	58.67
	1580:1579	NB I-96 Entrance from Warren	Ramp	580	79	659	595				550	64	614	614			
	1575:1576		Mainline	3600	302	3902	3478	58.56	60.00	58.58	3400	243	3643	3639	58.58	50.43	58.67
	1576:1588		Mainline	3600	302	3902	3472	61.41	60.00	58.58	3400	243	3643	3639	61.39	50.43	58.67
	1001:1004	WB I-94 Exit to NB I-96	Ramp	970	90	1060	670				910	70	980	731			
	1027:1008	EB I-94 to NB I-96	Ramp	990	175	1165	936				930	141	1071	744			
	1588:1590		Mainline	5560	567	6127	5059	45.85			5240	454	5694	5118	46.30		
	1590:1592		Mainline	5560	567	6127	5052	50.32	61.57	60.17	5240	454	5694	5120	51.07	62.33	60.83
	1602:1603	NB I-96 Exit to Grand	Ramp	570	64	634	551				540	51	591	590			
	1592:1594		Mainline	4990	503	5493	4492	57.11	61.57	60.17	4700	403	5103	4530	57.33	62.33	60.83
	1594:1596		Mainline	4990	503	5493	4477	56.13	61.57	60.17	4700	403	5103	4532	56.12	62.33	60.83
	1596:1598		Mainline	4990	503	5493	4451	55.88	61.57	60.17	4700	403	5103	4533	56.17	62.33	60.83
	1610:1611	NB I-96 Entrance from Grand	Ramp	510	64	574	525				480	51	531	528			
	1613:50	NB I-96 north of Entrance from Grand	Mainline	5500	567	6067	4938	57.19			5180	454	5634	5061	57.21		
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	5960	367	6327	5655	54.92	62.25	61.42	5630	295	5925	5911	53.45	64.30	61.92
	60:1405		Mainline	5960	367	6327	5646	54.20	62.25	61.42	5630	295	5925	5910	52.29	64.30	61.92
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	570	145	715	638				540	116	656	668			
	1405:1434		Mainline	5390	222	5612	4987	49.47	61.25	56.92	5090	179	5269	5238	47.52	59.80	58.25
	1434:1407		Mainline	5390	222	5612	4971	47.92	61.25	56.92	5090	179	5269	5239	47.16	59.80	58.25
	1407:1422		Mainline	5390	222	5612	4957	52.57	61.25	56.92	5090	179	5269	5239	51.23	59.80	58.25
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	660	16	676	1023				1140	13	1153	1085			
	1422:939		Mainline	6050	238	6288	5960	50.21			6230	192	6422	6320	49.12		
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	1060	79	1139	982				1000	64	1064	1050			
	939:940		Mainline	4990	159	5149	4970	50.58			5230	128	5358	5268	48.88		
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	650	48	698	549				610	38	648	586			
	940:1431		Mainline	4340	111	4451	4408	47.93	57.33	51.75	4620	90	4710	4681	45.65	60.10	51.00
	1431:1435		Mainline	4340	111	4451	4389	49.99	57.33	51.75	4620	90	4710	4678	48.14	60.10	51.00
	1435:1441		Mainline	4340	111	4451	4379	55.89	57.33	51.75	4620	90	4710	4677	54.08	60.10	51.00
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	440	16	456	343				410	13	423	313			
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	520	64	584	372				490	51	541	371			
	1441:1442		Mainline	5300	191	5491	5087	51.44			5520	154	5674	5359	49.83		
	1442:1443		Mainline	5300	191	5491	5077	41.69			5520	154	5674	5361	40.47		
	1471:1472	SB Hwy 10 Exit to Forest	Ramp	1050	16	1066	933				990	13	1003	996			
	1443:1445		Mainline	4250	175	4425	4118	57.04	57.50	55.67	4530	141	4671	4364	57.17	63.44	57.17
	1465:1466	SB Hwy 10 Entrance from Forest	Ramp	10	5	15	13				10	4	14	13			
	1447:54		Mainline	4260	180	4440	4109	55.24			4540	145	4685	4374	55.12		
	54:58	SB Hwy 10 South of Entrance from Forest	Mainline	4810	180	4990	4099	54.99			4540	145	4685	4377	54.80		
NB Hwy 10	55:1448	NB Hwy 10 South of Exit to Forest	Mainline	5770	127	5897	5079	29.25			5450	102	5552	5271	24.32		
	1448:1444		Mainline	5770	127	5897	5054	27.32			5450	102	5552	5264	23.38		
	1461:1462	NB Hwy 10 Exit to Forest	Ramp	240	32	272	240				230	26	256	245			
	1444:1446		Mainline	5530	95	5625	4802	25.61	55.50	53.92	5220	76	5296	5015	22.25	59.00	54.67
	1446:1440		Mainline	5530	95	5625	4736	23.44	55.50	53.92	5220	76	5296	5017	21.31	59.00	54.67
	1469:1470	NB Hwy 10 Entrance from Forest	Ramp	1850	2	1852	1240				1750	1	1751	1175			
	1440:1439		Mainline	7380	97	7477	5929	24.79			6970	77	7047	6199	24.29		
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	1020	16	1036	755				960	13	973	795			
	1439:1438		Mainline	6360	81	6441	5153	31.02	56.57	52.92	6010	64	6074	5412	31.40	52.00	50.50
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	930	16	946	787				870	13	883	861			
	1438:1437		Mainline	5430	65	5495	4346	26.80	56.57	52.92	5140	51	5191	4555	26.62	52.00	50.50
	1437:1436		Mainline	5430	65	5495	4330	21.61	56.57	52.92	5140	51	5191	4557	21.46	52.00	50.50
	1436:1432		Mainline	5430	65	5495	4299	18.36	56.57	52.92	5140	51	5191	4566	18.27	52.00	50.50
	1432:1430		Mainline	5430	65	5495	4263	16.70	56.57	52.92	5140	51	5191	4557	16.80	52.00	50.50
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	920	48	968	814				860	38	898	805			
	1430:938		Mainline	6350	113	6463	5058	14.29	56.57	52.92	6000	89	6089	5363	14.43	52.00	50.50
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	710	17	727	522				670	14	684	483			
	182:1423		Mainline	7060	130	7190	5545	34.43			6670	103	6773	5846	34.39		
	1424:1425	NB Hwy 10 Exit to Milwaukee	Ramp	510	16	526	346				480	13	493	377			
	1423:1408		Mainline	6550	114	6664	5188	59.51	57.89	56.25	6190	90	6280	5468	59.66	59.22	53.67
	1408:1433		Mainline	6550	114	6664	5172	54.06	57.89	56.25	6190	90	6280	5467	54.11	59.22	53.67
	1433:1406		Mainline	6550	114	6664	5158	63.12	57.89	56.25	6190	90	6280	5467	63.23	59.22	53.67
	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	1030	127	1157	401				970	102	1072	392			
	1406:61		Mainline	7580	241	7821	5546	51.73	61.00	58.08	7160	192	7352	5862	51.83	60.86	52.75
	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	7580	241	7821	5543	59.02	61.00	58.08	7160	192	7352	5861	59.08	60.86	52.75
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	6710	635	7345	4905	18.88			6340	511	6851	3579	10.65		
	238:239	SB I-75 Exit to Clay	Ramp	510	48	558	373				480	38	518	271			
	236:242		Mainline	6200	587	6787	4462	16.56	60.58	56.92	5860	473	6333	3300	8.69	63.42	53.33
	242:244		Mainline	6200	587	6787	4376	14.89	60.58	56.92	5860	473	6333	3286	7.13	63.42	53.33
	253:2851	SB I-75 Entrance from Clay	Ramp	1260	16	1276	1099				1190	13	1203	673			
	247:249		Mainline	7460	603	8063	5423	29.08			7050	486	7536	3951	15.74		
	278:279	WB I-94 Entrance from SB I-75	Ramp	700	65	765	632				660	52	712	481			
	281:282	EB I-94 Entrance from SB I-75	Ramp	1810	119	1929	1245				1710	96	1806	910			
	249:261		Mainline	4950	419	5369	3467	46.44	54.82	54.08	4680	338	5018	2556	44.31	61.27	50.50
	261:262		Mainline	4950	419	5369	3462	59.20	54.82	54.08	4680	338	5018	2556	59.39	61.27	50.50
	262:265		Mainline	4950	419	5369	3457	59.03	54.82	54.08	4680	338	5018	2558	59.69	61.27	50.50
	265:266		Mainline	4950	419	5369	3447	57.92	54.82	54.08	4680	338	5018	2559	58.59	61.27	50.50
	266:268		Mainline	4950	419	5369	3436	57.17	54.82	54.08	4680	338	5018	2559	57.98	61.27	50.50
	311:312	SB I-75 Exit to Warren	Ramp	600	16	616	392				570	13	583	290			
	268:269		Mainline	4350	403	4753	3038	57.85	57.60	56.25	4110	325	4435	2270	58.54	62.20	56.50
	269:270		Mainline	4350	403	4753	3033	59.33	57.60	56.25	4110	325	4435	2272	60.08	62.20	56.50
	299:314	EB I-94 Exit to SB I-75	Ramp	160	16	176	126				150	13	163	104			
	293:294	WB I-94 Exit to SB I-75	Ramp	1010	145	1155	772				950	116	1066	668			
	270:320		Mainline	5520	564	6084	3918	54.68	57.60	56.25	5210	454	5664	3045	55.23	62.20	56.50
	320:321		Mainline	5520	564	6084	3915	62.19	57.60	56.25	5210	454	5664	3044	62.42	62.20	56.50
	322:323	SB I-75 Entrance from Warren	Ramp	370	54	424	426				350	43	393	451			
	321:69		Mainline	5890	618	6508	4327	57.62			5560	497	6057	3497	57.78		
	69:70	SB I-75 South of Entrance from Warren	Mainline	5890	618	6508	4321	58.75			5560	497	6057	3496	58.95		
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	6740	380	7120	6226	39.39			6370	305	6675	6641	36.26		
	339:340	NB I-75 Exit to Warren	Ramp	270	189	459	399				260	152	412	408			
	324:319		Mainline	6470	191	6661	5791	43.60	57.17	57.33	6110	153	6263	6230	42.36	61.36	52.83
	319:317		Mainline	6470	191	6661	5782	53.89	57.17	57.33	6110	153	6263	6229	51.52	61.36	52.83
	276:277	WB I-94 Entrance from NB I-75	Ramp	330	16	346	298				310	13	323	331			
	285:286	EB I-94 Entrance from NB I-75	Ramp	650	32	682	591				610	26	636	629			
	315:263	NB I-75 to I-94 Ramp Entrance from NB Frontage	Ramp	0	0	0	63				0	0	0	64			
	317:271		Mainline	5490	143	5633	4940	52.89	57.17	57.33	5190	114	5304	5329	49.11	61.36	52.83
	306:305	NB I-75 Entrance from Warren	Ramp	1530	2	1532	1321				1440	1	1441	1389			
	267:264		Mainline	7020	145	7165	6176	55.92	56.09	57.00	6630	115	6745	6722	55.07	59.82	55.33
	300:301	EB I-94 Exit to NB I-75	Ramp	1080	111	1191	833				1020	89	1109	719			
	264:250		Mainline	8100	256	8356	6986	48.83	56.09	57.00	7650	204	7854	7441	49.70	59.82	55.33
	289:290	WB I-94 Exit to NB I-75	Ramp	1100	64	1164	822				1040	51	1091	785			
	248:245		Mainline	9200	320	9520	7771	53.21			8690	255	8945	8220	52.27		
	255:256	NB I-75 Exit to Clay	Ramp	510	16	526	392				480	13	493	416			
	245:243		Mainline	8690	304	8994	7348	56.42	59.45	60.58	8210	242	8452	7797	55.00	63.45	57.75
	243:237		Mainline	8690	304	8994	7325	57.33	59.45	60.58	8210	242	8452	7800	56.73	63.45	57.75
	240:241	NB I-75 Entrance from Clay	Ramp	530	79	609	536				500	64	564	565			
	237:74	NB I-75 north of Entrance from Clay	Mainline	9220	383	9603	7843	55.74			8710	306	9016	8365	55.31		

Link	PM1617 Auto Volume Lookup	PM1617 Truck volume Lookup	PM1617 Total Volume Lookup	PM1617 Model Output Volume	PM1617 GEH (Target v. Model)	PM1617 Density pc/mi/ln	PM1617 LOS	PM1617 Simulation Speed (mph)	PM1617 Avg Hour Speed, Date of Count	PM1617 2mo. Avg Hour Speed	PM1718 Auto Volume Lookup	PM1718 Truck volume Lookup	PM1718 Total Volume Lookup	PM1718 Model Output Volume	PM1718 GEH (Target v. Model)	PM1718 Density pc/mi/ln	PM1718 LOS	PM1718 Simulation Speed (mph)	PM1718 Avg Hour Speed, Date of Count	PM1718 2mo. Avg Hour Speed
49:1614	4220	340	4560	4545	0.22	17	B	70.79			4220	340	4560	4574	0.21	18	B	67.79		
1614:1615	4220	340	4560	4548	0.18	18	B	67.36			4220	340	4560	4565	0.07	20	C	59.66		
1615:1618	330	30	360	361	0.05	-	-				330	30	360	367	0.37	-	-			
1615:1599	3890	310	4200	4188	0.19	20	C	53.38	68.33	64.33	3890	310	4200	4189	0.17	24	C	46.00	63.00	62.17
1599:1597	3890	310	4200	4189	0.17	19	C	57.50	68.33	64.33	3890	310	4200	4151	0.76	22	C	48.58	63.00	62.17
1597:1595	3890	310	4200	4190	0.15	19	C	58.27	68.33	64.33	3890	310	4200	4135	1.01	24	C	44.86	63.00	62.17
1595:1593	3890	310	4200	4190	0.15	18	C	58.91	68.33	64.33	3890	310	4200	4126	1.15	25	C	43.03	63.00	62.17
1607:1593	480	45	525	528	0.13	-	-				480	41	521	523	0.09	-	-			
1593:1591	4370	355	4725	4719	0.09	18	B	54.49			4370	351	4721	4634	1.27	23	C	41.49		
1591:1589	4370	355	4725	4714	0.16	17	B	56.22			4370	351	4721	4631	1.32	21	C	45.82		
990:991	220	10	230	233	0.20	-	-				290	10	300	287	0.76	-	-			
978:979	990	26	1016	999	0.54	-	-				930	1	931	889	1.39	-	-			
1589:1577	3160	319	3479	3470	0.15	16	B	56.36	65.63	60.00	3150	340	3490	3420	1.19	16	B	55.76	56.71	56.67
1577:1574	3160	319	3479	3465	0.24	15	B	58.68	65.63	60.00	3150	340	3490	3424	1.12	15	B	59.10	56.71	56.67
1583:1584	220	20	240	246	0.38	-	-				220	20	240	236	0.26	-	-			
1574:1573	2940	299	3239	3222	0.30	15	B	54.69	65.63	60.00	2930	320	3250	3187	1.11	15	B	55.15	56.71	56.67
1573:1554	2940	299	3239	3221	0.32	14	B	59.30	65.63	60.00	2930	320	3250	3190	1.06	14	B	59.70	56.71	56.67
1018:1019	240	31	271	181	5.99	-	-				280	20	300	141	10.71	-	-			
1001:1002	930	70	1000	692	10.59	-	-				900	60	960	739	7.58	-	-			
1558:1559	620	60	680	686	0.23	-	-				570	51	621	618	0.12	-	-			
163:1552	4730	460	5190	4789	5.68	17	B	57.73			4680	491	5171	4686	6.91	17	B	57.63		
1548:1553	4520	360	4880	4874	0.09	19	C	52.58			4520	360	4880	4926	0.66	19	C	52.51		
1568:1569	590	50	640	652	0.47	-	-				600	50	650	668	0.70	-	-			
1553:1555	3930	310	4240	4226	0.22	16	B	56.54			3920	310	4230	4257	0.41	16	B	56.63		
983:982	320	80	400	395	0.25	-	-				230	58	288	292	0.23	-	-			
1020:1021	710	90	800	810	0.35	-	-				730	93	823	807	0.56	-	-			
1555:1572	2900	140	3040	3014	0.47	13	B	58.74	61.60	59.75	2960	159	3119	3165	0.82	14	B	58.44	60.00	57.58
1580:1579	560	50	610	622	0.48	-	-				570	51	621	637	0.64	-	-			
1575:1576	3460	190	3650	3635	0.25	16	B	58.69	61.60	59.75	3530	210	3740	3800	0.98	17	B	58.52	60.00	57.58
1576:1588	3460	190	3650	3634	0.27	15	B	61.51	61.60	59.75	3530	210	3740	3800	0.98	16	B	61.23	60.00	57.58
1001:1004	930	70	1000	719	9.58	-	-				900	60	960	746	7.33	-	-			
1027:1008	950	110	1060	788	8.95	-	-				1450	121	1571	806	22.19	-	-			
1588:1590	5340	370	5710	5138	7.77	23	C	46.88			5880	391	6271	5349	12.10	24	C	45.89		
1590:1592	5340	370	5710	5137	7.78	21	C	51.07	59.67	60.17	5880	391	6271	5349	12.10	22	C	50.76	70.25	59.25
1602:1603	550	40	590	591	0.04	-	-				550	41	591	596	0.21	-	-			
1592:1594	4790	330	5120	4548	8.23	21	C	57.30	59.67	60.17	5330	350	5680	4753	12.83	22	C	56.98	70.25	59.25
1594:1596	4790	330	5120	4549	8.21	21	C	56.15	59.67	60.17	5330	350	5680	4752	12.85	22	C	55.82	70.25	59.25
1596:1598	4790	330	5120	4552	8.17	21	C	56.17	59.67	60.17	5330	350	5680	4752	12.85	22	C	55.94	70.25	59.25
1610:1611	490	40	530	540	0.43	-	-				490	40	530	533	0.13	-	-			
1613:50	5280	370	5650	5093	7.60	23	C	57.33			5820	470	6290	5286	13.20	24	C	57.36		
63:60	5730	231	5961	5930	0.40	36	E	42.58	55.14	61.58	5410	176	5586	5580	0.08	42	E	33.37	66.20	61.83
60:1405	5730	231	5961	5928	0.43	37	E	40.40	55.14	61.58	5410	176	5586	5583	0.04	45	E	31.85	66.20	61.83
1416:1417	550	91	641	617	0.96	-	-				480	72	552	552	0.00	-	-			
1405:1434	5180	140	5320	5306	0.19	47	F	38.19	57.14	55.83	4930	104	5034	5038	0.06	55	F	31.01	62.17	57.08
1434:1407	5180	140	5320	5304	0.22	44	E	40.68	57.14	55.83	4930	104	5034	5038	0.06	54	F	31.17	62.17	57.08
1407:1422	5180	140	5320	5302	0.25	45	E	40.03	57.14	55.83	4930	104	5034	5033	0.01	63	F	26.87	62.17	57.08
1428:1429	1160	10	1170	1106	1.90	-	-				1440	10	1450	1248	5.50	-	-			
1422:939	6340	150	6490	6407	1.03	39	E	41.84			6370	114	6484	6276	2.60	47	F	33.83		
941:942	1020	50	1070	1088	0.55	-	-				910	46	956	948	0.26	-	-			
939:940	5320	100	5420	5313	1.46	37	E	48.08			5460	68	5528	5336	2.61	52	F	34.61		
937:936	620	30	650	589	2.45	-	-				680	10	690	600	3.54	-	-			
940:1431	4700	70	4770	4720	0.73	35	D	45.72	54.29	45.92	4780	58	4838	4735	1.49	48	F	33.01	47.38	45.75
1431:1435	4700	70	4770	4724	0.67	33	D	48.25	54.29	45.92	4780	58	4838	4731	1.55	42	E	37.90	47.38	45.75
1435:1441	4700	70	4770	4725	0.65	29	D	54.00	54.29	45.92	4780	58	4838	4730	1.56	41	E	38.81	47.38	45.75
949:950	420	10	430	334	4.91	-	-				350	10	360	284	4.24	-	-			
932:933	500	40	540	375	7.71	-	-				570	30	600	443	6.87	-	-			
1441:1442	5620	120	5740	5438	4.04	23	C	48.82			5700	98	5798	5453	4.60	33	D	33.00		
1442:1443	5620	120	5740	5434	4.09	36	E	37.96			5700	98	5798	5449	4.65	58	F	23.49		
1471:1472	1010	10	1020	1025	0.16	-	-				1120	10	1130	1090	1.20	-	-			
1443:1445	4610	110	4720	4405	4.66	26	C	57.42	60.00	56.92	4580	88	4668	4361	4.57	25	C	58.38	61.33	55.00
1465:1466	10	3	13	14	0.27	-	-				100	9	109	105	0.39	-	-			
1447:54	4620	113	4733	4419	4.64	27	D	55.59			4680	97	4777	4468	4.54	26	D	57.44		
54:58	4620	113	4733	4418	4.66	27	D	55.31			4680	97	4777	4469	4.53	26	D	57.24		
55:1448	5550	80	5630	5179	6.13	75	F	23.25			5460	30	5490	5288	2.75	73	F	24.38		
1448:1444	5550	80	5630	5189	6.00	78	F	22.46			5460	30	5490	5283	2.82	76	F	23.38		
1461:1462	230	20	250	223	1.76	-	-				250	10	260	250	0.63	-	-			
1444:1446	5320	60	5380	4971	5.69	79	F	21.16	47.00	51.42	5210	20	5230	5031	2.78	77	F	21.96	58.75	47.17
1446:1440	5320	60	5380	4984	5.50	82	F	20.43	47.00	51.42	5210	20	5230	5021	2.92	81	F	20.71	58.75	47.17
1469:1470	1780	1	1781	1178	15.68	-	-				1460	10	1470	1155	8.69	-	-			
1440:1439	7100	61	7161	6155	12.33	65	F	23.92			6670	30	6700	6185	6.42	65	F	23.82		
916:915	980	10	990	765	7.60	-	-				920	10	930	834	3.23	-	-			
1439:1438	6120	51	6171	5386	10.33	60	F	30.23	44.91	46.25	5750	20	5770	5353	5.59	58	F	30.97	49.00	38.83
947:948	890	10	900	834	2.24	-	-				710	10	720	725	0.19	-	-			
1438:1437	5230	41	5271	4546	10.35	59	F	25.80	44.91	46.25	5040	10	5050	4623	6.14	56	F	27.37	49.00	38.83
1437:1436	5230	41	5271	4539	10.45	73	F	20.86	44.91	46.25	5040	10	5050	4621	6.17	67	F	22.86	49.00	38.83
1436:1432	5230	41	5271	4533	10.54	86	F	17.64	44.91	46.25	5040	10	5050	4622	6.15	80	F	19.26	49.00	38.83
1432:1430	5230	41	5271	4533	10.54	94	F	16.11	44.91	46.25	5040	10	5050	4620	6.18	88	F	17.50	49.00	38.83
920:921	880	30	910	799	3.80	-	-				830	20	850	868	0.61	-	-			
1430:938	6110	71	6181	5333	11.18	96	F	13.91	44.91	46.25	5870	30	5900	5481	5.55	91	F	15.08	49.00	38.83
943:944	680	11	691	507	7.52	-	-				670	20	690	419	11.51	-	-			
182:1423	6790	82	6872	5837	12.98	43	E	34.20			6540	50	6590	5897	8.77	43	E	34.29		
1424:1425	490	10	500	367	6.39	-	-				580	10	590	438	6.70	-	-			
1423:1408	6300	72	6372	5472	11.70	31	D	59.97	43.33	45.33	5960	40	6000	5456	7.19	31	D	59.24	33.80	31.58
1408:1433	6300	72	6372	5472	11.70	34	D	54.14	43.33	45.33	5960	40	6000	5457	7.17	34	D	54.00	33.80	31.58
1433:1406	6300	72	6372	5473	11.68	29	D	63.25	43.33	45.33	5960	40	6000	5457	7.17	29	D	63.07	33.80	31.58
1419:1420	990	80	1070	391	25.12	-	-				990	89	1079	418	24.16	-	-			
1406:61	7290	152	7442	5864	19.35	29	D	51.90	43.67	41.00	6950	129	7079	5872	15.00	29	D	51.73	39.00	31.25
61:67	7290	152	7442	5865	19.33	25	C	59.28	43.67	41.00	6950	129	7079	5871	15.01	25	C	58.92	39.00	31.25
73:236	6450	400	6850	3404	48.13	72	F	9.70			6530	325	6855	4027	38.34	64	F	12.93		
238:239	490	30	520	255	13.46	-	-				420	30	450	298	7.86	-	-			
236:242	5960	370	6330	3164	45.95	100	F	8.14	46.90	46.42	6110	295	6405	3740	37.42	88	F	10.84	38.00	49.67
242:244	5960	370	6330	3177	45.73	121	F	6.77	46.90	46.42	6110	295	6405	3776	36.85	106	F	9.15	38.00	49.67
253:2851	1210	10	1220	669	17.93	-	-				1230	10	1240	835	12.57	-	-			
247:249	7170	380	7550	3829	49.33	65	F	15.09			7340	305	7645	4639	38.36	56	F	21.04		
278:279	670	41	711	491	8.97	-	-				1030	61	1091	703	12.95	-	-			
281:282	1740	75	1815	889	25.18	-	-				1670	54	1724	1020	19.01	-	-			
249:261	4760	264	5024	2441	42.28	19	C	43.80	38.89	43.08	4640	190	4830	2949	30.16	22	C	45.02	41.83	47.67
261:262	4760	264	5024	2440	42.30	14	B	59.04	38.89	43.08	4640	190	4830	2949	30.16	17	B	59.17	41.83	47.67
262:265	4760	264	5024	2440	42.30	14	B	59.67	38.89	43.08	4640	190	4830	2949	30.16	17	B	59.51	41.83	47.67
265:266	4760	264	5024	2444	42.22	14	B	58.47	38.89	43.08	4640	190	4830	2944	30.25	17	B	58.32	41.83	47.67
266:268	4760	264	5024	2448	42.14	15	B	57.79	38.89	43.08	4640	190	4830	2940	30.32	17	B	57.60	41.83	47.67
311:312	580	10	590	292	14.19	-	-				570	10	580	349	10.72	-	-			
268:269	4180	254	4434	2156	39.68	13	B	58.40	56.33	48.50	4070	180	4250	2590	28.39	15	B	58.19	59.60	52.25
269:270	4180	254	4434	2153	39.75	12	B	59.90	56.33	48.50	4070	180	4250	2589	28.40	15	B	59.66	59.60	52.25
299:314	150	10	160	113	4.02	-	-				160	10	170	94	6.61	-	-			
293:294	970	91	1061	641	14.40	-	-				950	50	1000	710	9.92	-	-			
270:320	5300	355	5655	2903	42.07	14	B	55.22	56.33	48.50	5180	240	5420	3390	30.59	16	B	55.12	59.60	52.25
320:321	5300	355	5655	2901	42.11	12	B	62.36	56.33	48.50	5180	240	5420	3391	30.57	14	B	62.36	59.60	52.25
322:323	360	34	394	447	2.58	-	-				370	30	400	475	3.59	-	-			
321:69	5660	389	6049	3347	39.42	12	B	57.77			5550	270	5820	3864	28.11	14	B	57.68		
69:70	5660	389	6049	3346	39.44	12	B	58.96			5550	270	5820	3861	28.16	13	B	58.83		
68:324	6480	239	6719	6690	0.35	40	E	33.79			6510	49	6559	6567	0.10	42	E	31.48		
339:340	260	119	379	374	0.26	-	-				220	1	221	227	0.40	-	-			
324:319	6220	120	6340	6314	0.33	38	E	41.76	58.42	43.33	6290	48	6338	6341	0.04	40	E	39.45	45.45	38.08
319:317	6220	120	6340	6312	0.35	31	D	51.24	58.42	43.33	6290	48	6338	6343	0.06	34	D	47.12	45.45	38.08
276:277	320	10	330	323	0.39	-	-				90	8	98	117	1.83	-	-			
285:286	620	20	640	640	0.00	-	-				850	8	858	863	0.17	-	-			
315:263	0	0	0	67	11.58	-	-				0	0	0	93	13.64	-	-			
317:271	5280	90	5370	5415	0.61	37	E	48.62	58.42	43.33	5350	32	5382	5457	1.02	42	E	43.38	45.45	38.08
306:305	1470	1	1471	1400	1.87	-	-				1200	15	1215	1309	2.65	-	-			
267:264	6750	91	6841	6806	0.42	42	E	54.99	55.45	44.58	6550	47	6597	6786	2.31	43	E	52.97	44.11	42.42
300:301	1040	70	1110	755	11.63	-	-				810	63	873	575	11.08	-	-			
264:250	7790	161	7951	7558	4.46	39	E	49.06	55.45	44.58	7360	110	7470	7363	1.24	38	E	48.30	44.11	42.42
289:290	1060	40	1100	819	9.07	-	-				840	30	870	794	2.63	-	-			
248:245	8850	201	9051	8382	7.17	41	E	51.83			8200	140	8340	8155	2.04	40	E	51.45		
255:256	490	10	500	416	3.93	-	-				580	10	590	539	2.15	-	-			
245:243	8360	191	8551	7970	6.39	37	E	54.73	56.90	47.50	7620	130	7750	7613	1.56	35	E	54.59	53.78	48.08
243:237	8360	191	8551	7968	6.41	36	E	56.29	56.90	47.50	7620	130	7750	7617	1.52	34	D	56.38	53.78	48.08
240:241	510	50	560	563	0.13	-	-				510	50	560	561	0.04	-	-			
237:74	8870	241	9111	8529	6.20	31	D	54.92			8130	180	8310	8182	1.41	30	D	55.01		

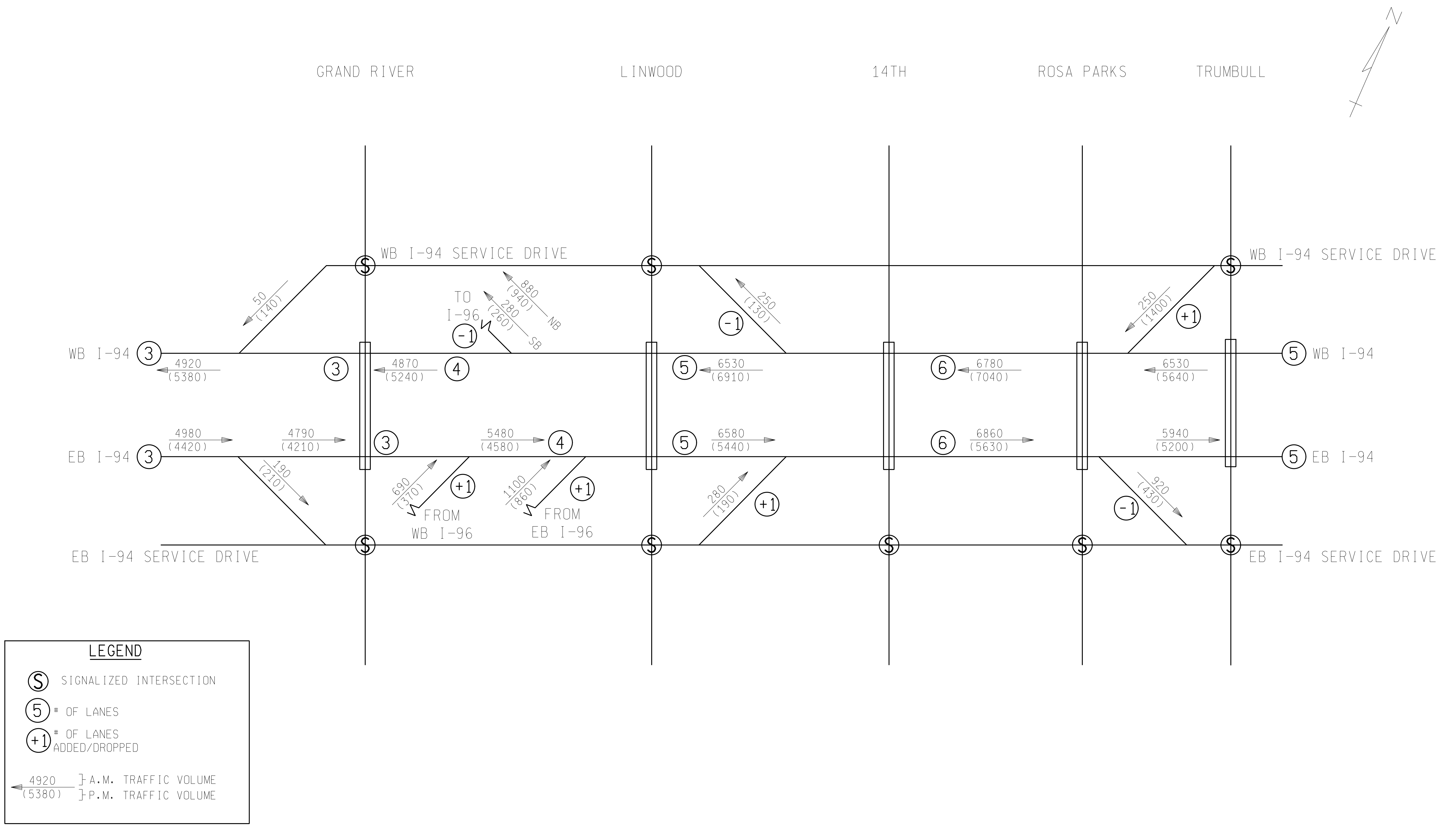
Link	PM1819 Auto Volume Lookup	PM1819 Truck volume Lookup	PM1819 Total Volume Lookup	PM1819 Model Output Volume	PM1819 Simulation Speed (mph)	PM1819 Avg Hour Speed, Date of Count	PM1819 2mo. Avg Hour Speed
49:1614	3240	294	3534	3120	64.54		
1614:1615	3240	294	3534	3128	57.65		
1615:1618	250	26	276	233			
1615:1599	2990	268	3258	2906	45.10	67.00	62.33
1599:1597	2990	268	3258	2951	47.04	67.00	62.33
1597:1595	2990	268	3258	2970	45.48	67.00	62.33
1595:1593	2990	268	3258	2980	43.40	67.00	62.33
1607:1593	370	35	405	360			
1593:1591	3360	303	3663	3359	43.05		
1591:1589	3360	303	3663	3365	48.90		
990:991	220	9	229	204			
978:979	710	1	711	716			
1589:1577	2430	293	2723	2507	56.44	63.00	57.67
1577:1574	2430	293	2723	2513	59.39	63.00	57.67
1583:1584	170	17	187	177			
1574:1573	2260	276	2536	2337	55.36	63.00	57.67
1573:1554	2260	276	2536	2339	60.06	63.00	57.67
1018:1019	220	17	237	228			
1001:1002	700	50	750	830			
1558:1559	440	44	484	426			
163:1552	3620	387	4007	3828	57.86		
1548:1553	3470	311	3781	3368	53.56		
1568:1569	460	43	503	440			
1553:1555	3010	268	3278	2933	57.91		
983:982	180	50	230	208			
1020:1021	560	80	640	571			
1555:1572	2270	138	2408	2162	59.18	63.50	56.83
1580:1579	440	44	484	412			
1575:1576	2710	182	2892	2581	59.20	63.50	56.83
1576:1588	2710	182	2892	2584	61.86	63.50	56.83
1001:1004	700	50	750	836			
1027:1008	1110	105	1215	1117			
1588:1590	4520	337	4857	4521	44.51		
1590:1592	4520	337	4857	4520	50.56	65.50	58.50
1602:1603	420	35	455	417			
1592:1594	4100	302	4402	4102	57.25	65.50	58.50
1594:1596	4100	302	4402	4103	55.90	65.50	58.50
1596:1598	4100	302	4402	4103	55.42	65.50	58.50
1610:1611	380	35	415	377			
1613:50	4480	337	4817	4485	56.48		
63:60	4160	152	4312	3914	55.43	64.67	61.42
60:1405	4160	152	4312	3917	55.16	64.67	61.42
1416:1417	370	62	432	382			
1405:1434	3790	90	3880	3545	51.84	62.86	58.17
1434:1407	3790	90	3880	3555	47.49	62.86	58.17
1407:1422	3790	90	3880	3569	51.29	62.86	58.17
1428:1429	1110	9	1119	982			
1422:939	4900	99	4999	4567	51.83		
941:942	700	40	740	672			
939:940	4200	59	4259	3898	52.78		
937:936	520	9	529	443			
940:1431	3680	50	3730	3465	51.42	59.00	52.67
1431:1435	3680	50	3730	3476	51.61	59.00	52.67
1435:1441	3680	50	3730	3478	56.45	59.00	52.67
949:950	270	9	279	326			
932:933	440	26	466	506			
1441:1442	4390	85	4475	4317	51.28		
1442:1443	4390	85	4475	4325	39.92		
1471:1472	860	9	869	820			
1443:1445	3530	76	3606	3516	57.29	61.38	56.58
1465:1466	80	8	88	75			
1447:54	3610	84	3694	3595	55.96		
54:58	3610	84	3694	3598	55.73		
55:1448	4200	26	4226	4740	20.83		
1448:1444	4200	26	4226	4736	19.68		
1461:1462	190	9	199	226			
1444:1446	4010	17	4027	4504	18.08	54.00	53.67
1446:1440	4010	17	4027	4506	17.33	54.00	53.67
1469:1470	1120	9	1129	1034			
1440:1439	5130	26	5156	5535	20.04		
916:915	710	9	719	737			
1439:1438	4420	17	4437	4802	23.60	54.50	50.00
947:948	550	9	559	631			
1438:1437	3870	8	3878	4176	19.36	54.50	50.00
1437:1436	3870	8	3878	4177	15.89	54.50	50.00
1436:1432	3870	8	3878	4176	14.14	54.50	50.00
1432:1430	3870	8	3878	4179	13.66	54.50	50.00
920:921	640	17	657	1030			
1430:938	4510	25	4535	5211	12.48	54.50	50.00
943:944	520	17	537	596			
182:1423	5030	42	5072	5809	34.34		
1424:1425	450	9	459	423			
1423:1408	4580	33	4613	5388	59.92	58.25	52.58
1408:1433	4580	33	4613	5388	53.93	58.25	52.58
1433:1406	4580	33	4613	5387	63.03	58.25	52.58
1419:1420	760	77	837	275			
1406:61	5340	110	5450	5665	51.91	60.60	54.58
61:67	5340	110	5450	5667	59.30	60.60	54.58
73:236	5020	281	5301	5216	21.51		
238:239	320	26	346	389			
236:242	4700	255	4955	4813	17.89	63.82	59.25
242:244	4700	255	4955	4810	16.07	63.82	59.25
253:2851	950	9	959	1150			
247:249	5650	264	5914	5960	32.29		
278:279	790	53	843	834			
281:282	1280	47	1327	1376			
249:261	3580	164	3744	3769	47.20	59.27	55.58
261:262	3580	164	3744	3770	59.21	59.27	55.58
262:265	3580	164	3744	3769	59.05	59.27	55.58
265:266	3580	164	3744	3766	57.65	59.27	55.58
266:268	3580	164	3744	3762	56.89	59.27	55.58
311:312	440	9	449	449			
268:269	3140	155	3295	3311	57.82	62.80	57.50
269:270	3140	155	3295	3311	59.16	62.80	57.50
299:314	120	9	129	148			
293:294	730	43	773	977			
270:320	3990	207	4197	4432	54.26	62.80	57.50
320:321	3990	207	4197	4431	61.90	62.80	57.50
322:323	280	26	306	323			
321:69	4270	233	4503	4753	57.56		
69:70	4270	233	4503	4753	58.74		
68:324	5000	42	5042	4398	59.83		
339:340	170	1	171	155			
324:319	4830	41	4871	4261	53.72	56.89	55.00
319:317	4830	41	4871	4265	56.03	56.89	55.00
276:277	70	7	77	71			
285:286	650	7	657	591			
315:263	0	0	0	72			
317:271	4110	27	4137	3684	56.96	56.89	55.00
306:305	920	13	933	873			
267:264	5030	40	5070	4580	59.56	60.14	54.50
300:301	620	54	674	892			
264:250	5650	94	5744	5475	52.02	60.14	54.50
289:290	650	26	676	864			
248:245	6300	120	6420	6344	53.77		
255:256	450	9	459	485			
245:243	5850	111	5961	5872	57.02	60.17	57.33
243:237	5850	111	5961	5877	57.60	60.17	57.33
240:241	390	43	433	376			
237:74	6240	154	6394	6253	56.31		

PM1617

GEH Stats for I-94	
Max	38.92
Average	15.16
# Under 5	31
# Over 5	113
% Under 5	22%

PM1718

GEH Stats for I-94	
Max	37.16
Average	12.84
# Under 5	34
# Over 5	110
% Under 5	24%



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB

MDOT Michigan Department of Transportation

NO SCALE

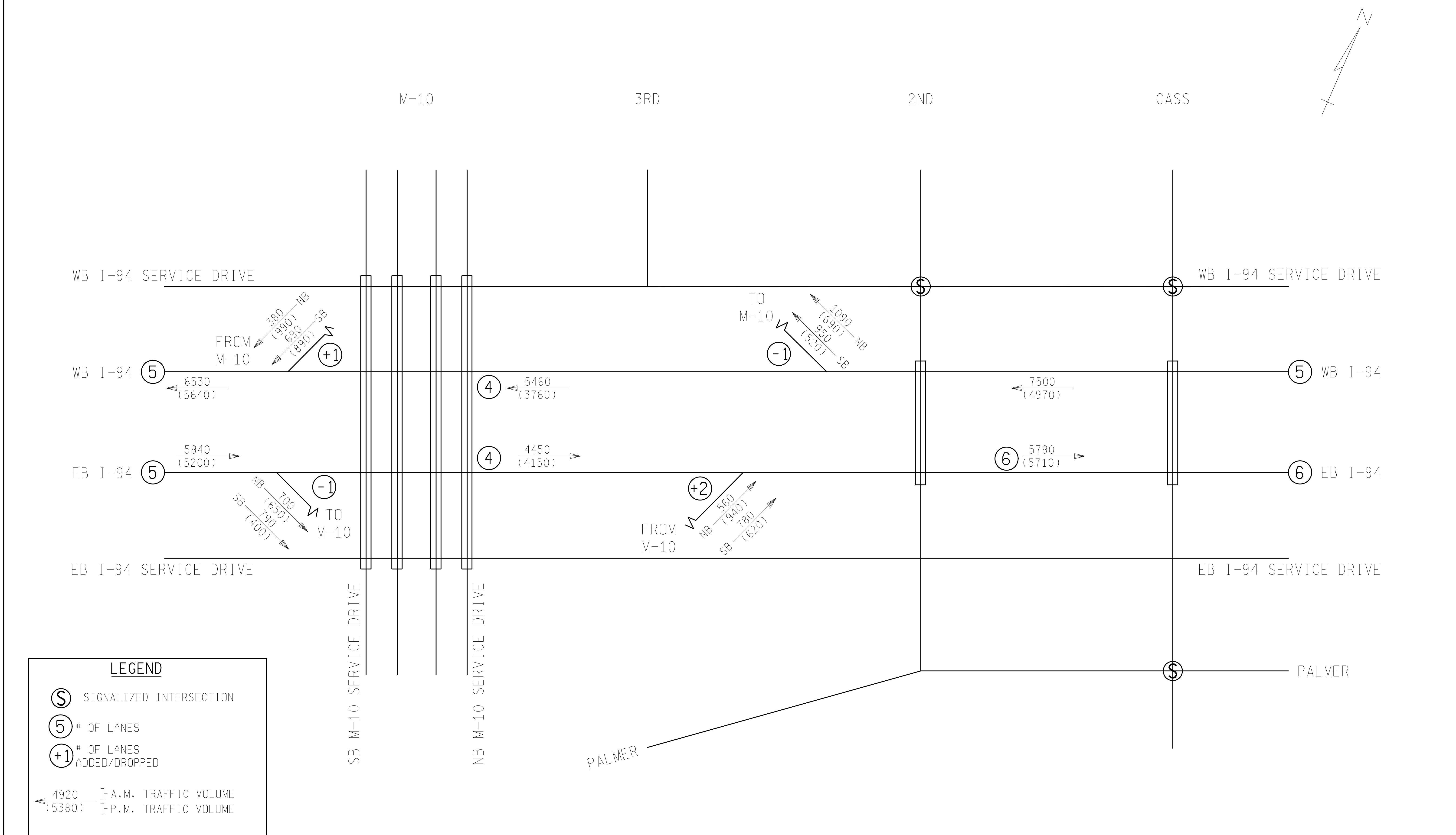
DATE: 12/15/15

CS: 82024

JN: 122114

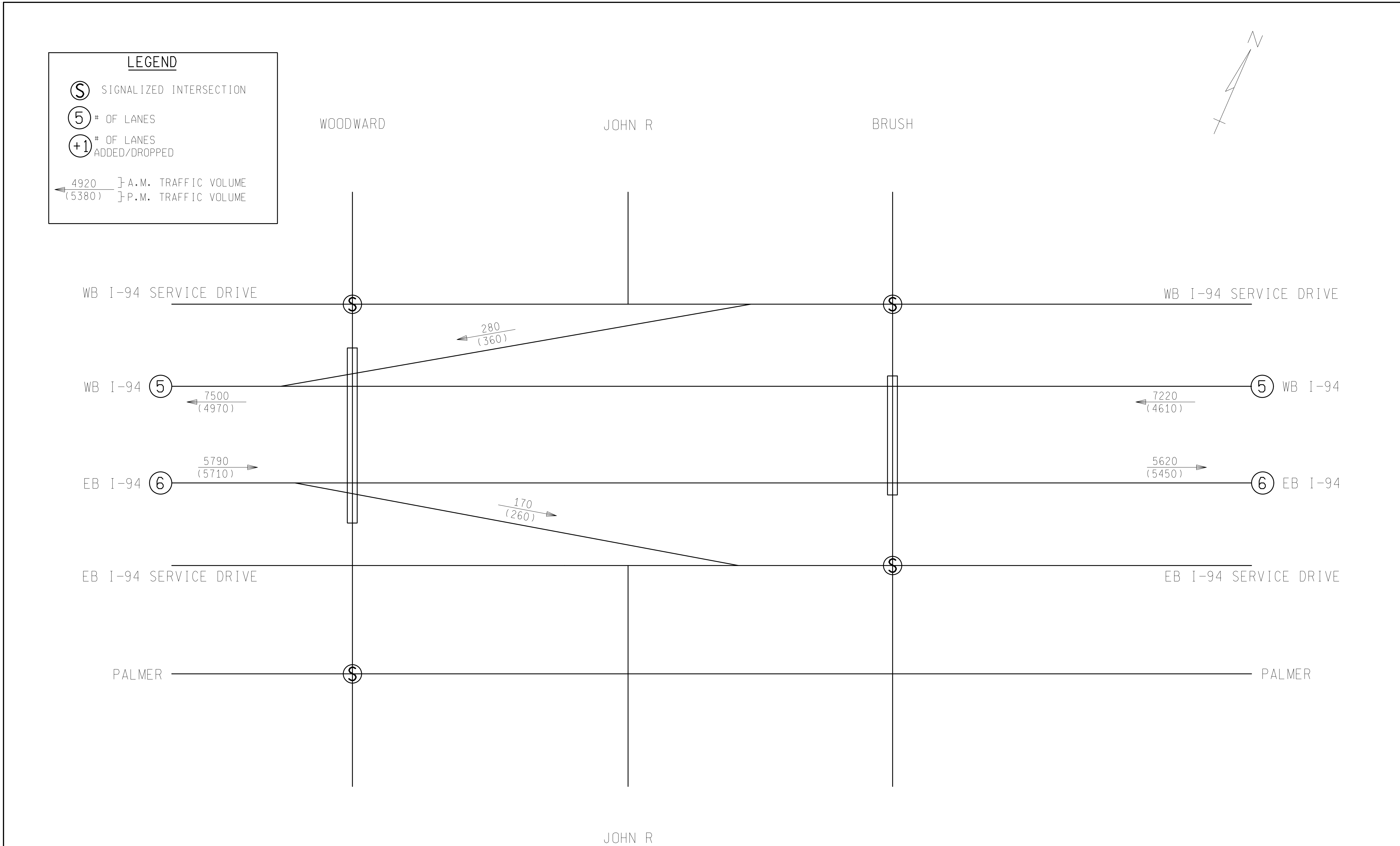
2040 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From Grand River to Trumbull
City of Detroit, Wayne County

DRAWING: A-1 SHEET

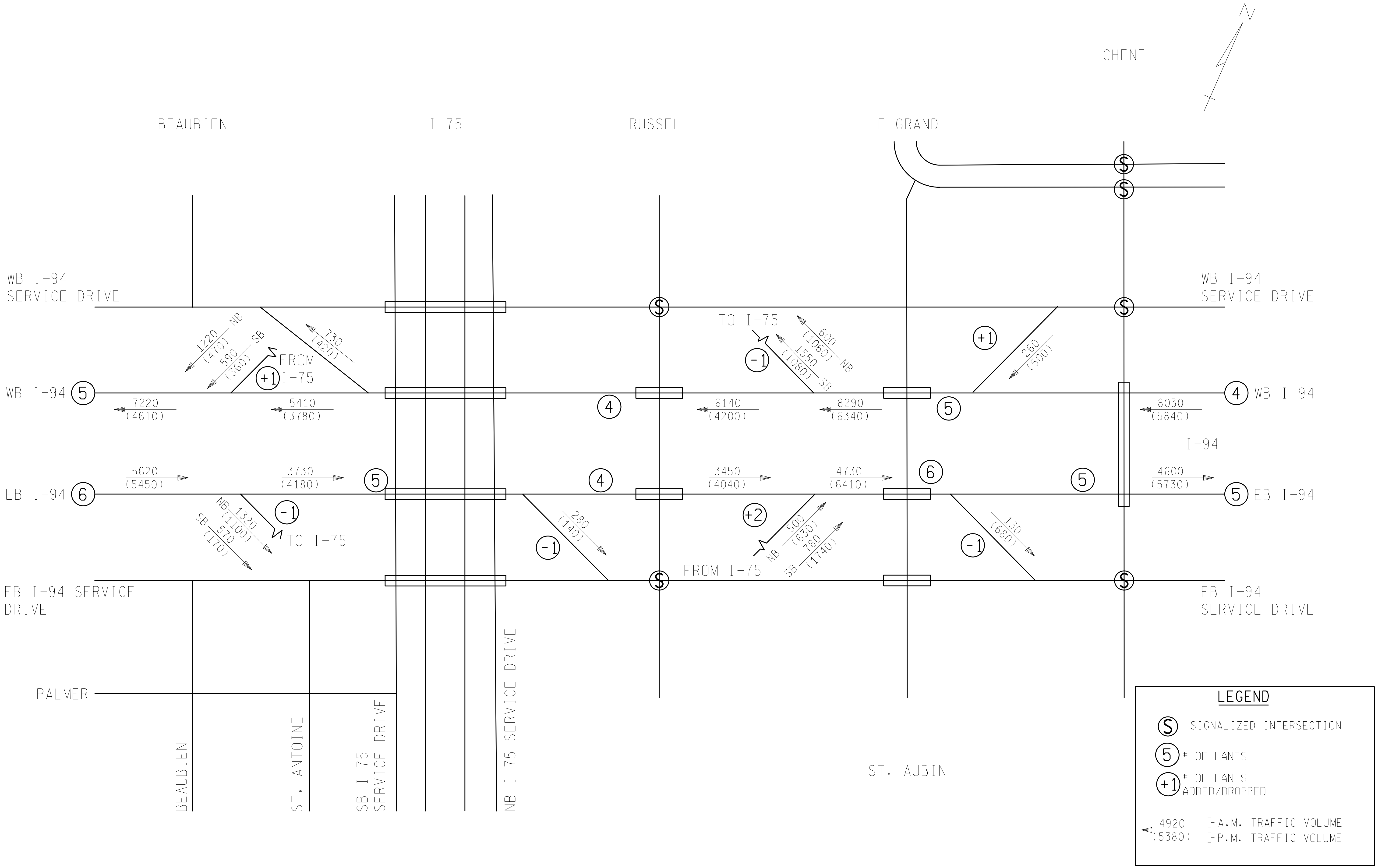


FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)													
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION	HNTB	MDOT Michigan Department of Transportation	NO SCALE	DATE: 12/15/15	CS: 82024 JN: 122114	2040 AM(7-8) & PM(4-5) Peak Hr Volumes I-94 From M-10 to Cass City of Detroit, Wayne County

DRAWING: A-2 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)		HNTB	MDOT Michigan Department of Transportation	NO SCALE	DATE: 12/15/15	CS: 82024 JN: 122114	2040 AM(7-8) & PM(4-5) Peak Hr Volumes I-94 From Woodward to Brush City of Detroit, Wayne County	DRAWING A-3	SHEET
NO. DATE AUTH DESCRIPTION	NO. DATE AUTH DESCRIPTION								



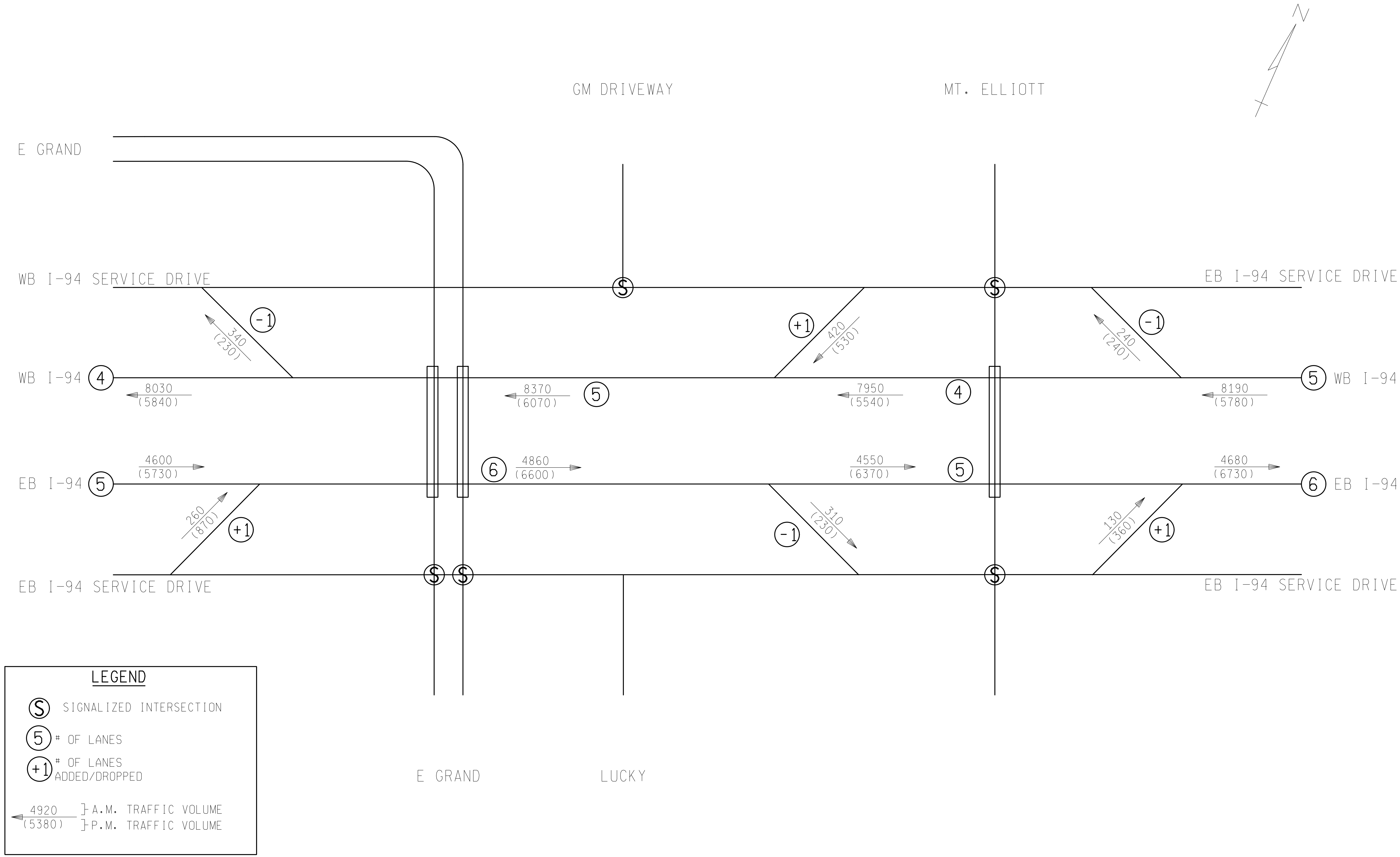
FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 12/15/15 | CS: 82024 | JN: 122114

2040 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From Beaubien to Chene
City of Detroit, Wayne County

DRAWING A-4 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB

MDOT Michigan Department of Transportation

NO SCALE

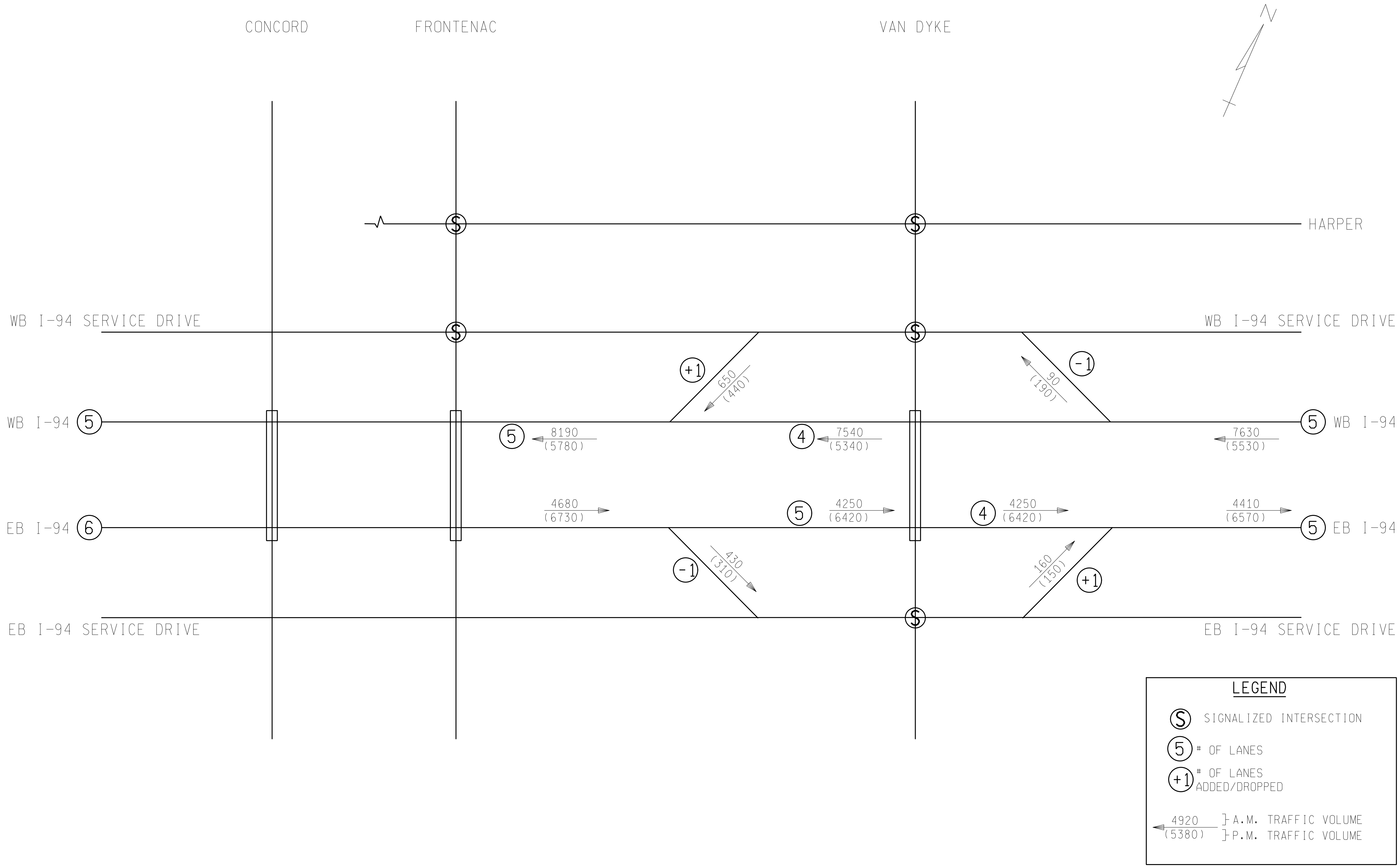
DATE: 12/15/15

CS: 82024

JN: 122114

2040 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From East Grand to Mt Elliott
City of Detroit, Wayne County

DRAWING: A-5 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 12/15/15

CS: 82024

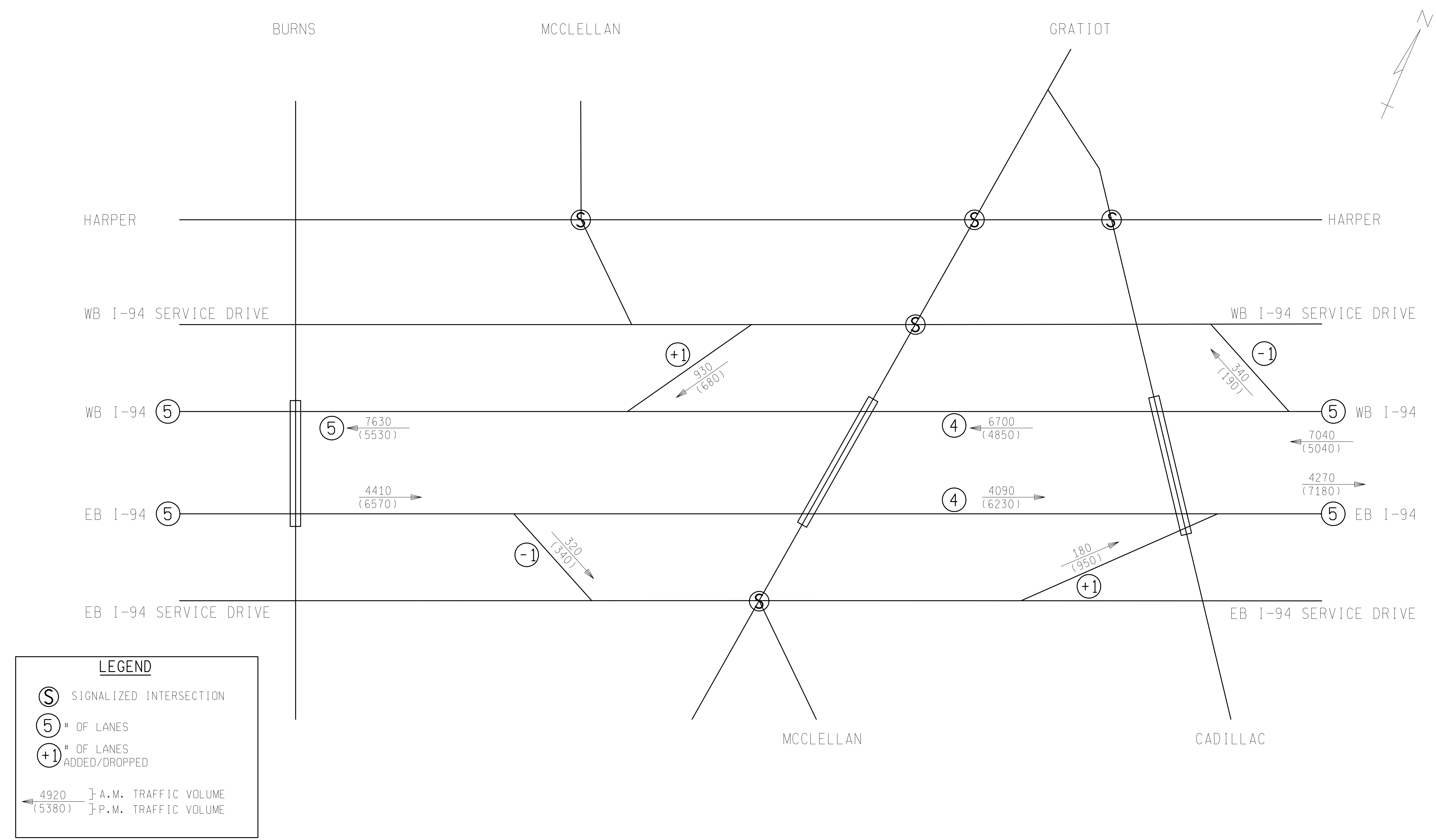
JN: 122114

2040 AM(7-8) & PM(4-5) Peak Hr Volumes

I-94 From Concord to Van Dyke

City of Detroit, Wayne County

DRAWING A-6 | SHEET



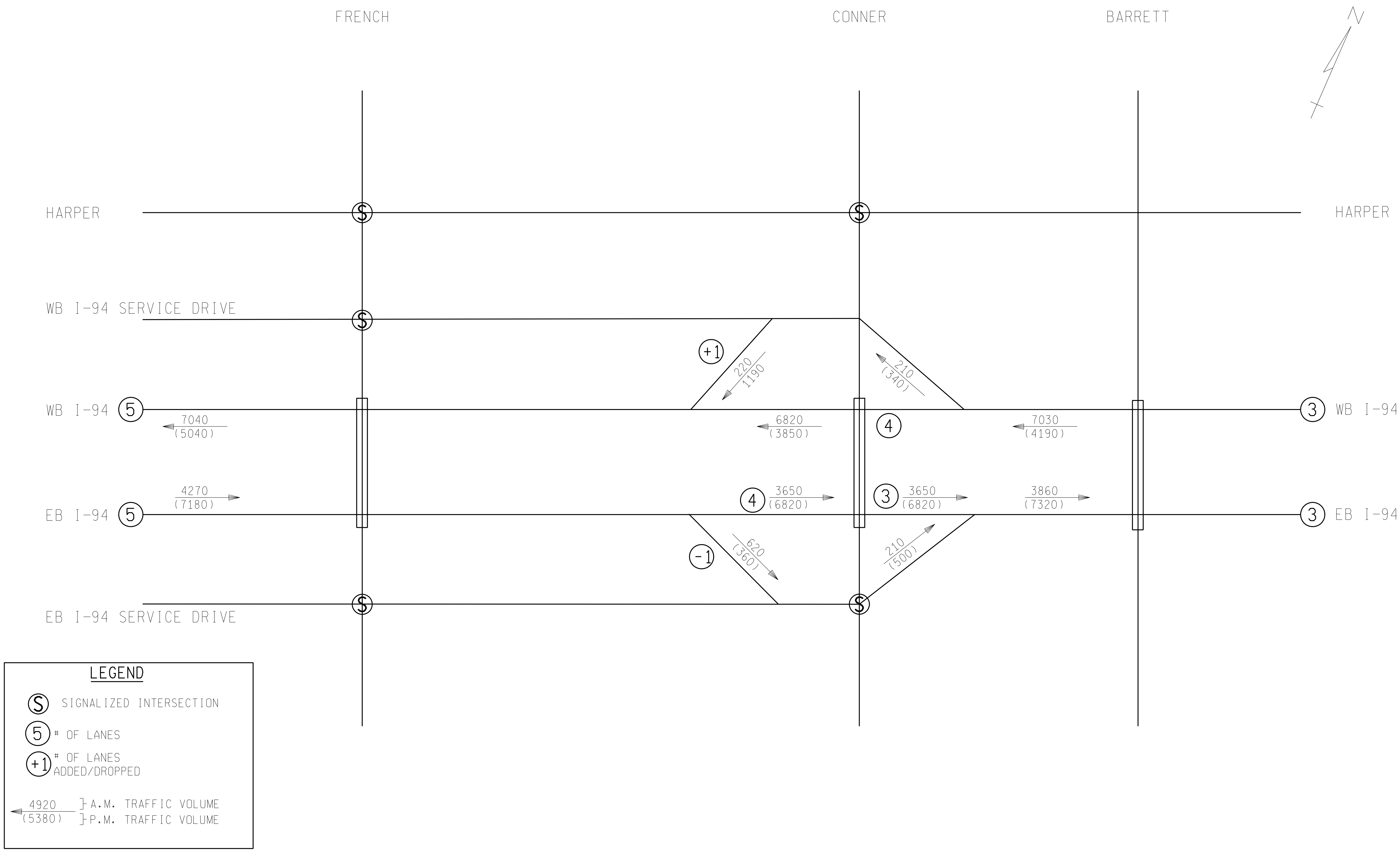
FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

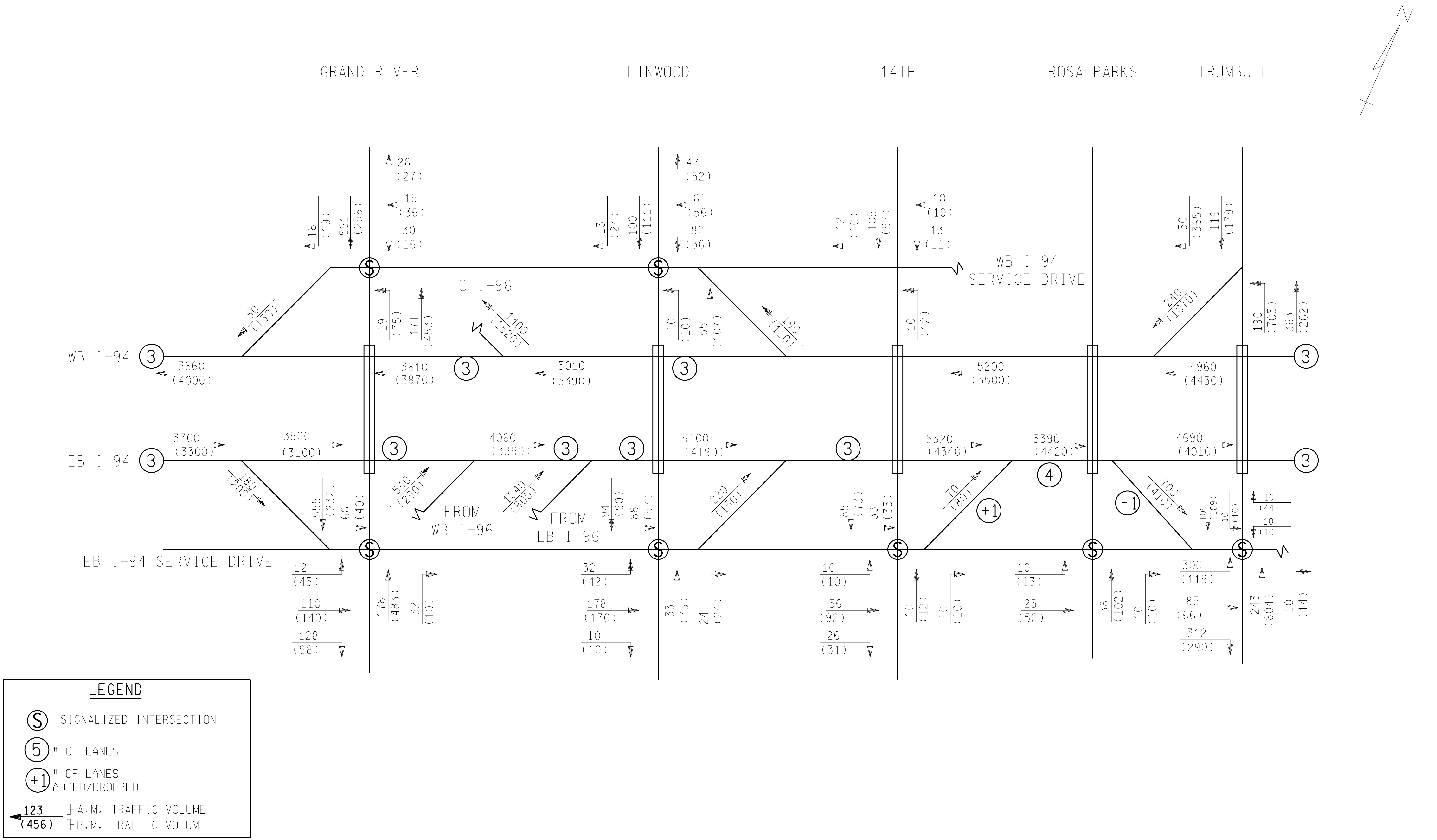
HNTB | MDOT Michigan Department of Transportation | NO SCALE | DATE: 12/15/15 | CS: 82024 | JN: 122114

2040 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From Burns to Cadillac
City of Detroit, Wayne County

DRAWING SHEET A-7



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)								HNTB	MDOT Michigan Department of Transportation	NO SCALE	DATE: 12/15/15	CS: 82024	2040 AM(7-8) & PM(4-5) Peak Hr Volumes	DRAWING	SHEET
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION					JN: 122114	I-94 From French to Barrett	A-8	
													City of Detroit, Wayne County		



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

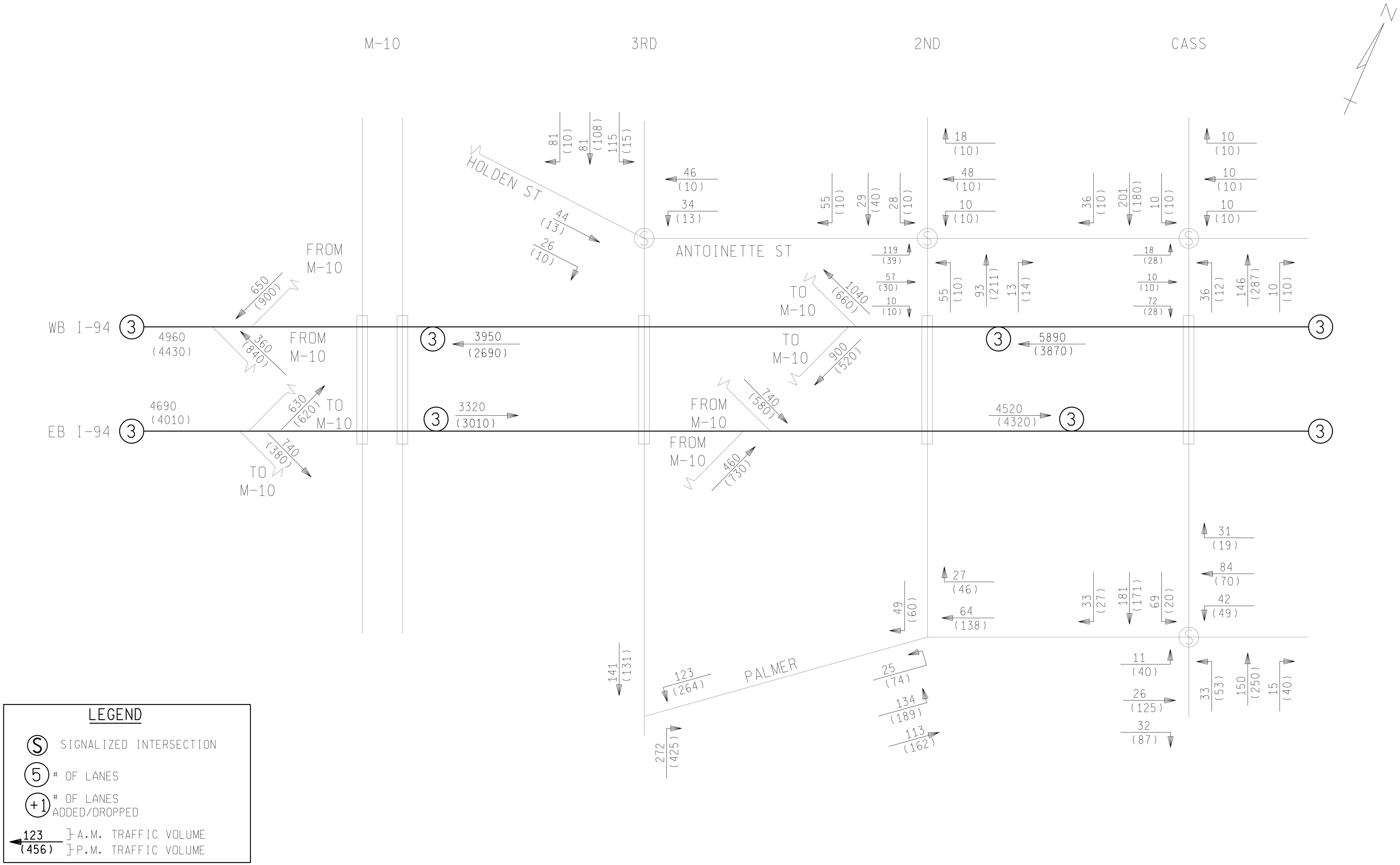
HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 03/13/15

CS: 82024
JN: 122114

2014 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From Grand River to Trumbull
City of Detroit, Wayne County

DRAWING: B-1 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB

MDOT Michigan Department of Transportation

NO SCALE

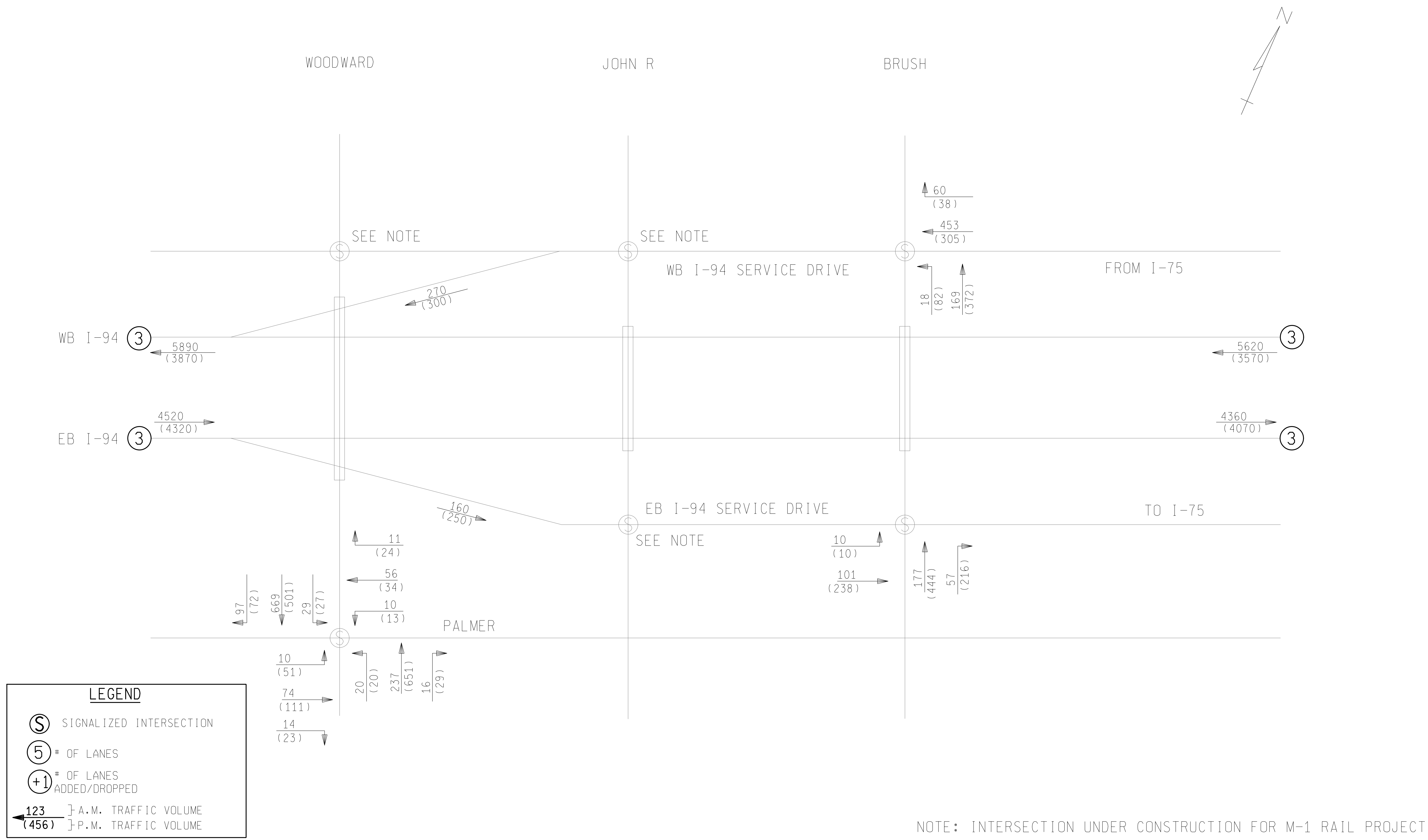
DATE: 03/13/15

CS: 82024

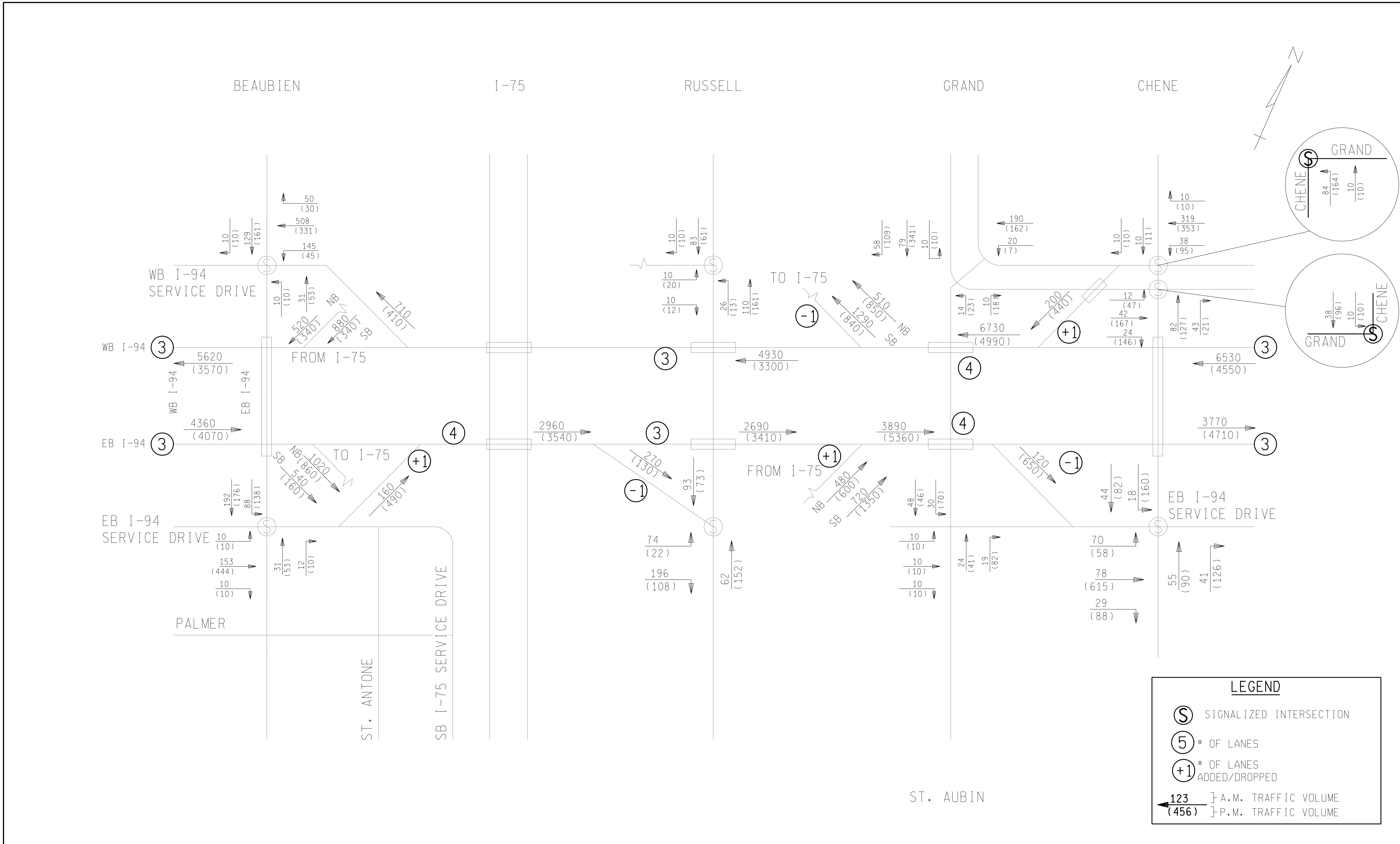
JN: 122114

2014 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From M-10 to Cass
City of Detroit, Wayne County

DRAWING SHEET B-2



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)								HNTB	MDOT Michigan Department of Transportation	NO SCALE	DATE: 03/13/15	CS: 82024	2014 AM(7-8) & PM(4-5) Peak Hr Volumes	DRAWING	SHEET
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION					JN: 122114	I-94 From Woodward to Brush	B-3	
													City of Detroit, Wayne County		



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 03/13/15

CS: 82024

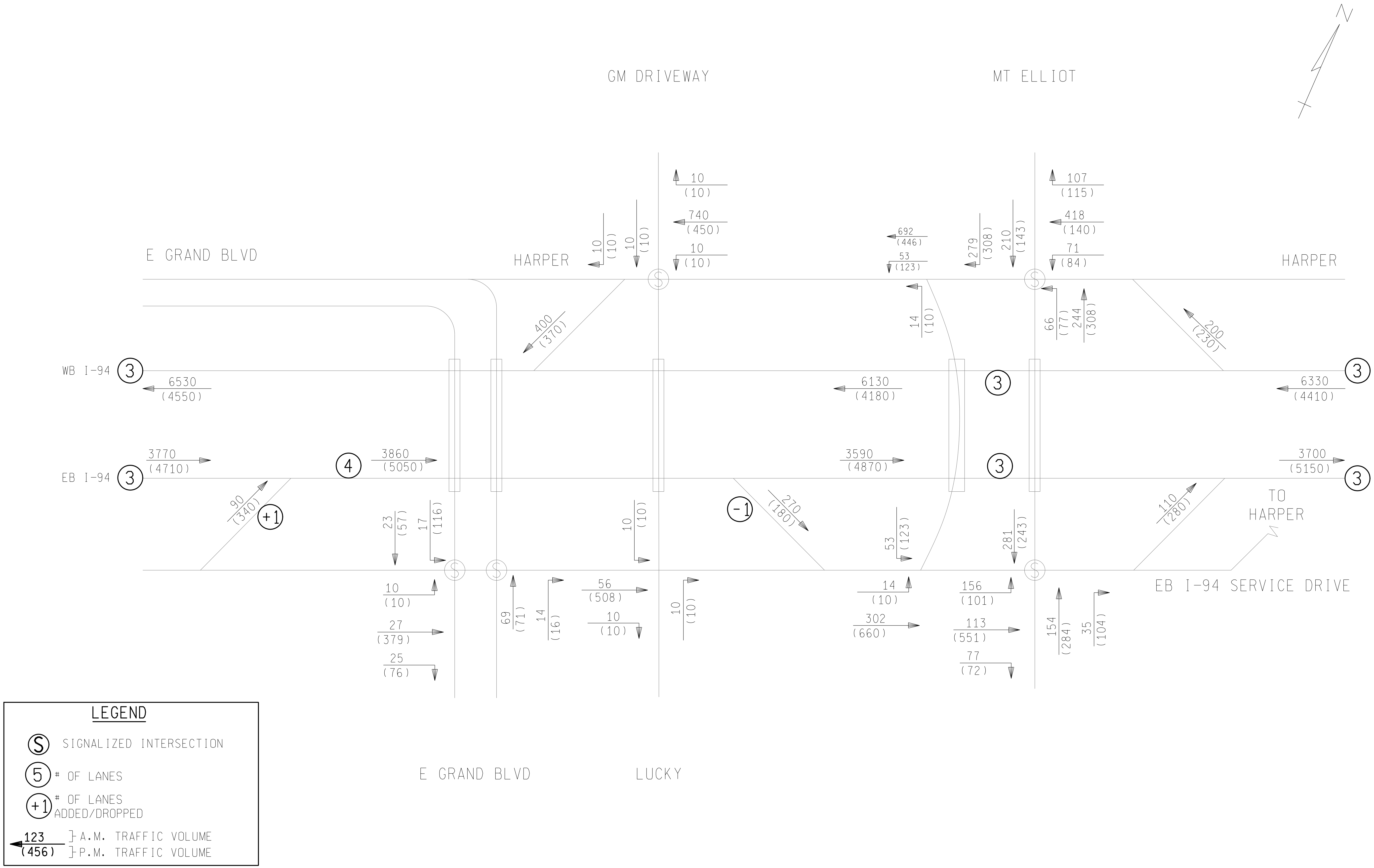
JN: 122114

2014 AM(7-8) & PM(4-5) Peak Hr Volumes

I-94 From Beaubien to Chene

City of Detroit, Wayne County

DRAWING B-4 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 03/13/15

CS: 82024

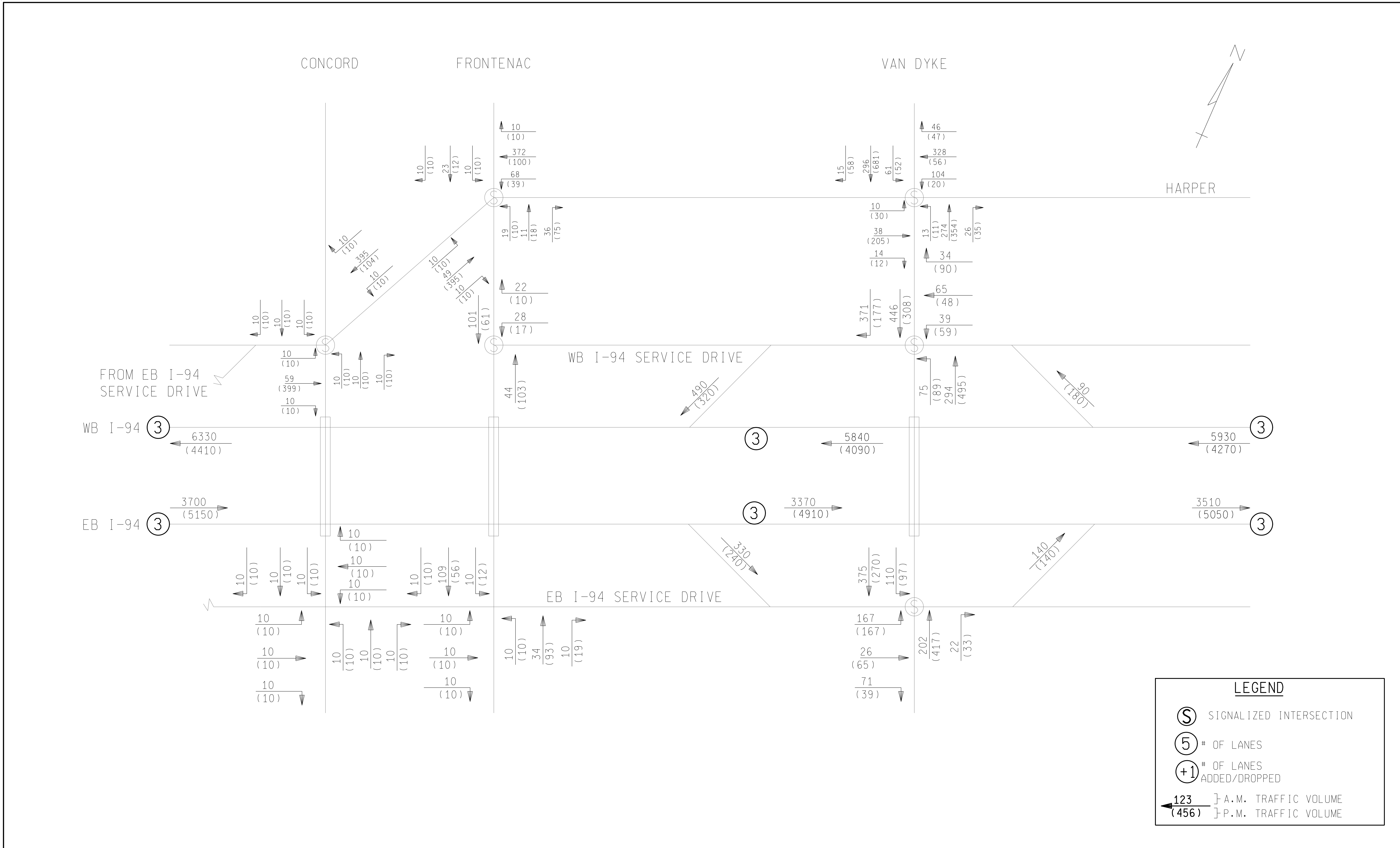
JN: 122114

2014 AM(7-8) & PM(4-5) Peak Hr Volumes

I-94 From East Grand to Mt Elliot

City of Detroit, Wayne County

DRAWING SHEET B-5



NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION
FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							

HNTB

MDOT Michigan Department of Transportation

NO SCALE

DATE: 03/13/15

CS: 82024

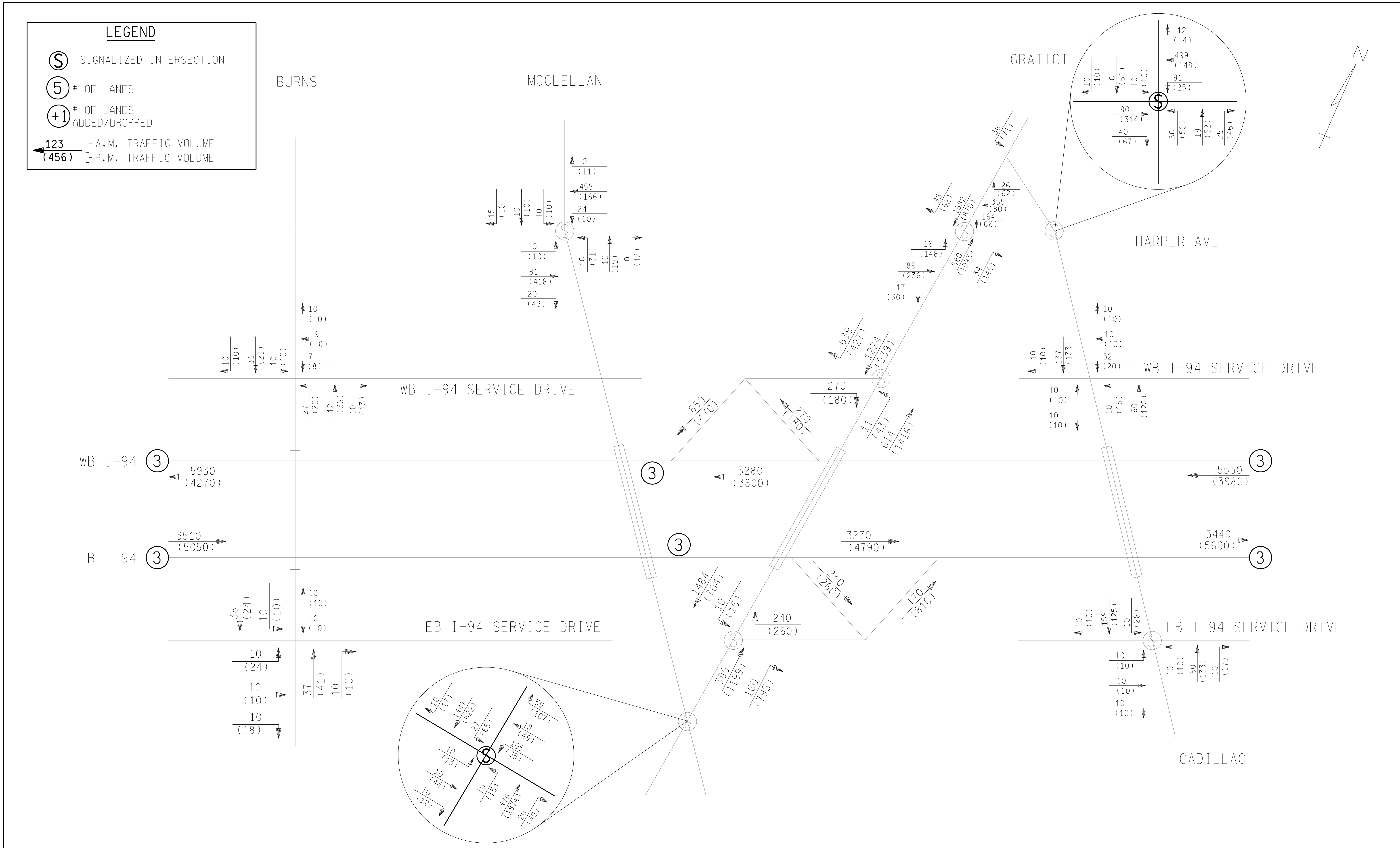
JN: 122114

2014 AM(7-8) & PM(4-5) Peak Hr Volumes

I-94 From Concord to Van Dyke

City of Detroit, Wayne County

DRAWING SHEET B-6

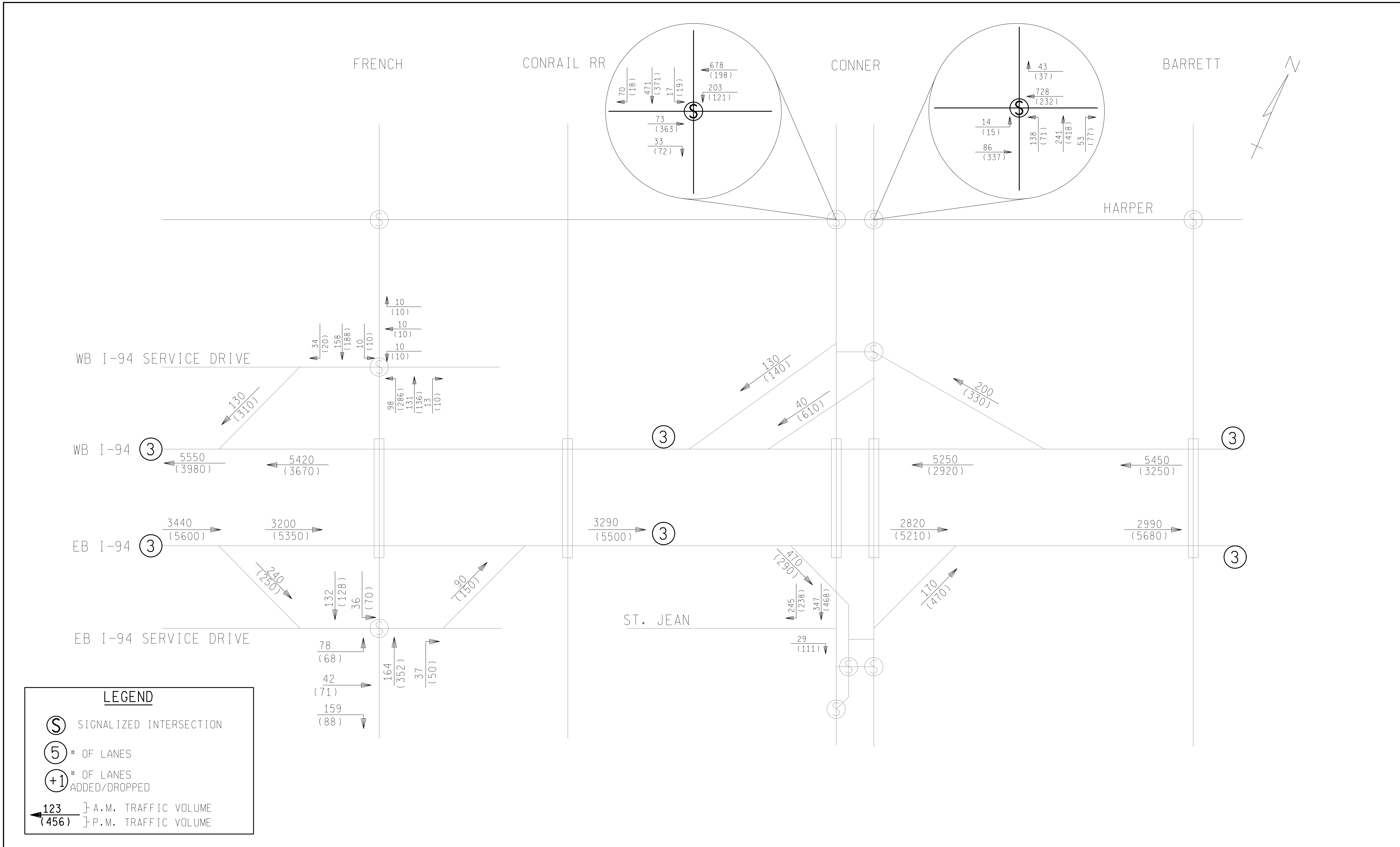


FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE | DATE: 03/13/15 | CS: 82024 | JN: 122114

2014 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From Burns to Cadillac
City of Detroit, Wayne County

DRAWING B-7 | SHEET



NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION
FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							

HNTB

MDOT Michigan Department of Transportation

NO SCALE

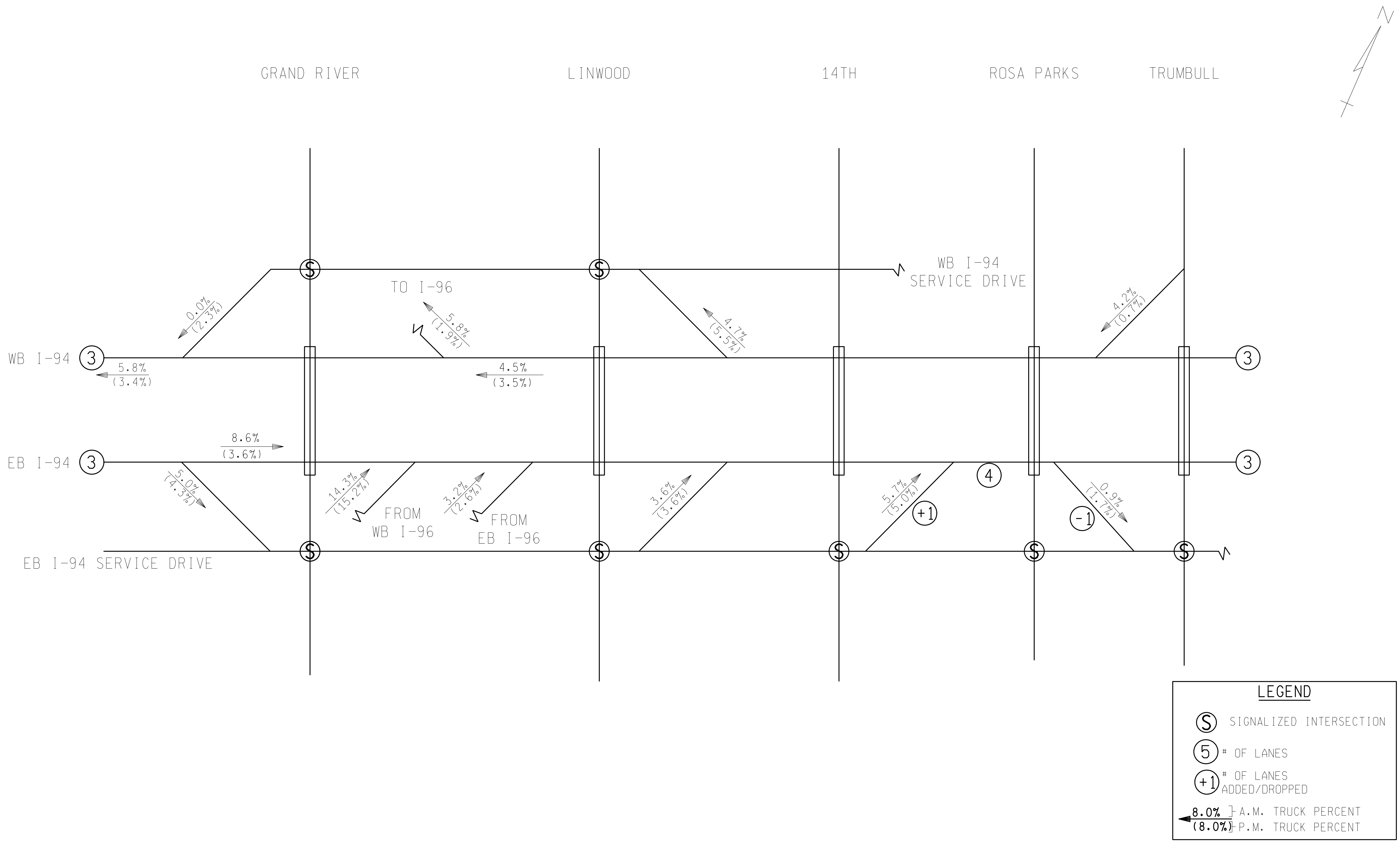
DATE: 03/13/15

CS: 82024

JN: 122114

2014 AM(7-8) & PM(4-5) Peak Hr Volumes
I-94 From French to Barrett
City of Detroit, Wayne County

DRAWING SHEET B-8



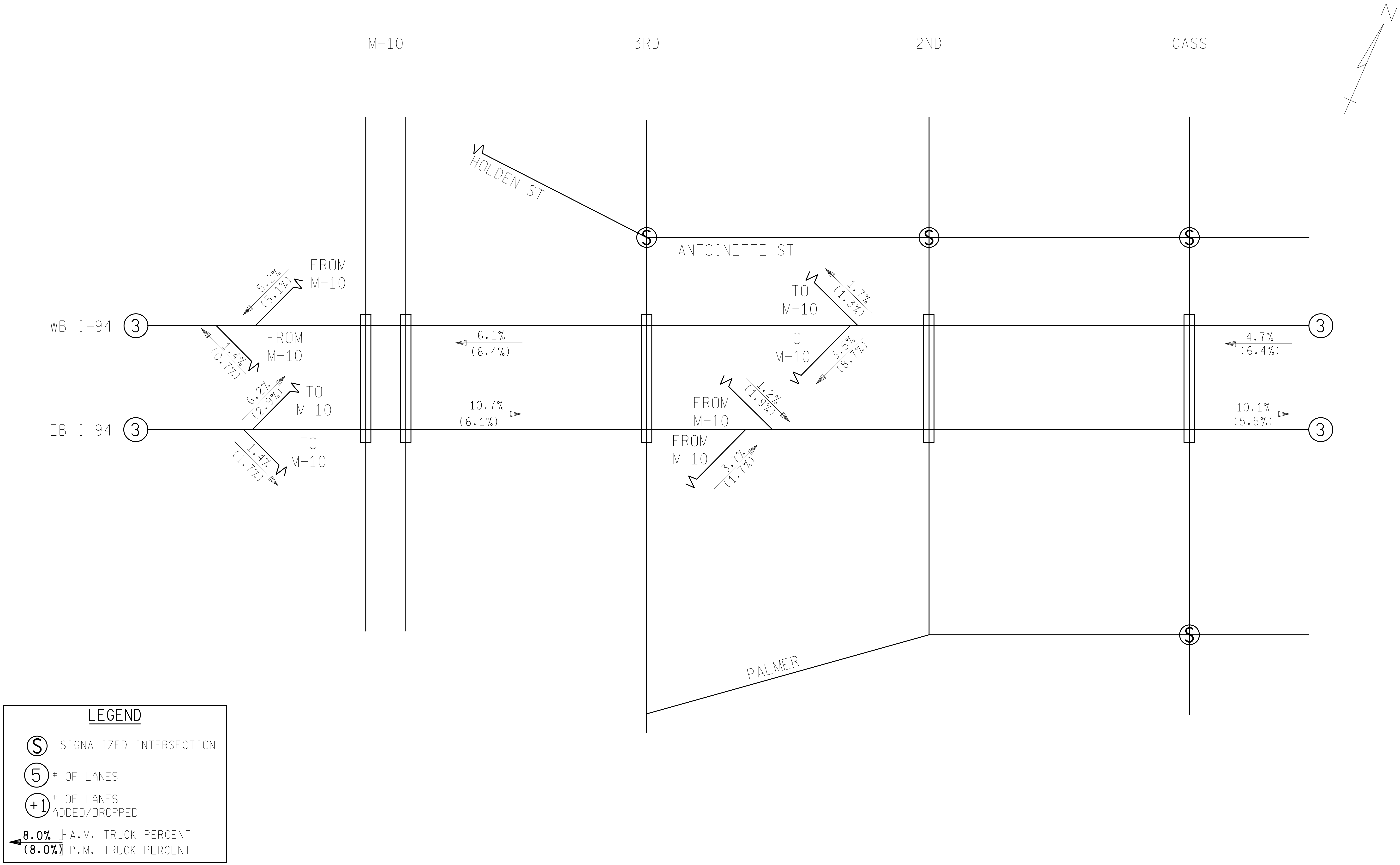
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION
FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 03/13/15 | CS: 82024 | JN: 122114

2014 AM(7-8) and PM(4-5) Peak Hour Truck %
I-94 From Grand River to Trumbull
City of Detroit, Wayne County

DRAWING: B-9 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB

MDOT Michigan Department of Transportation

NO SCALE

DATE: 03/13/15

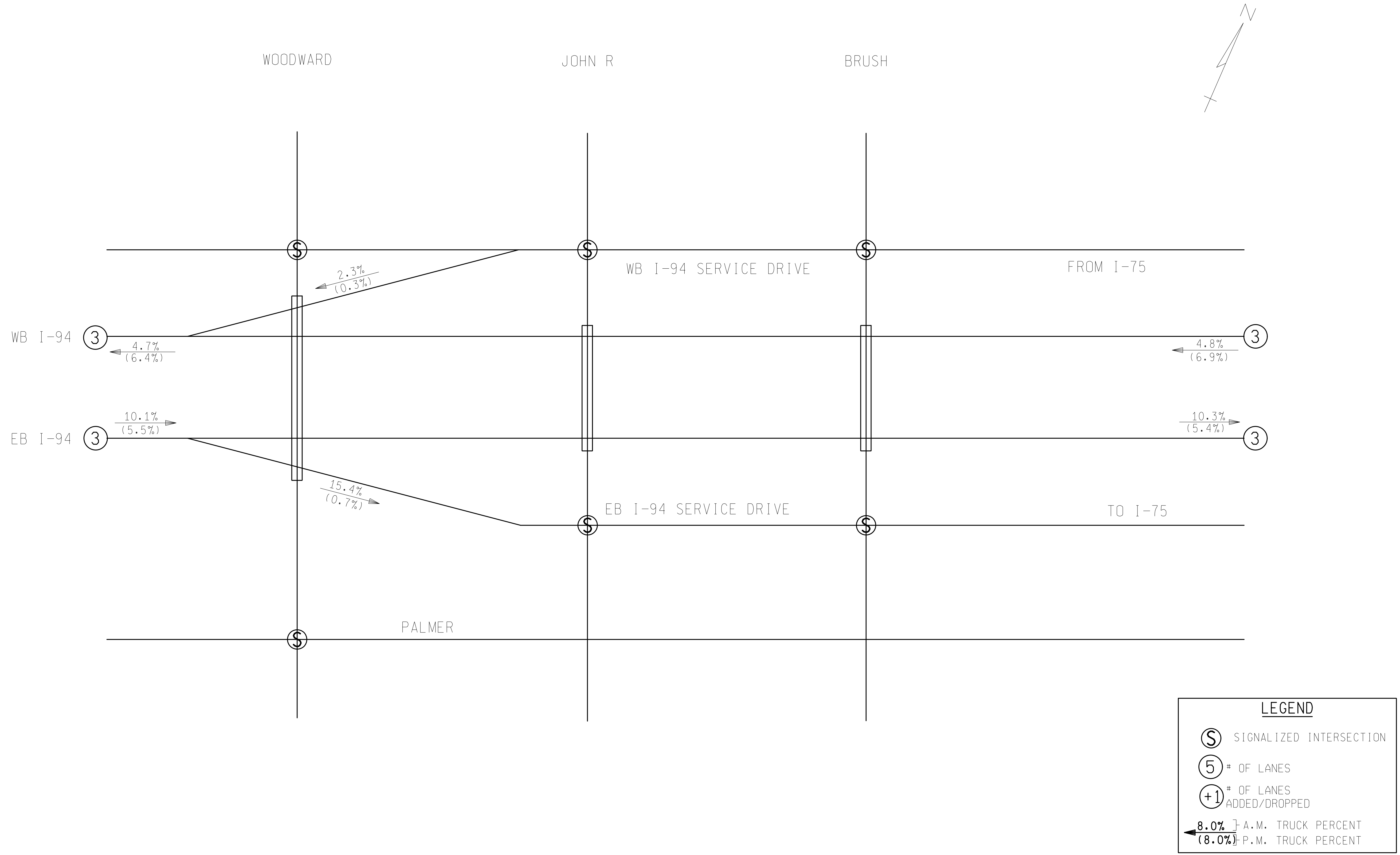
CS: 82024

JN: 122114

2014 AM(7-8) and PM(4-5) Peak Hour Truck %
I-94 From M-10 to Cass
City of Detroit, Wayne County

DRAWING: B-10

SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 03/13/15

CS: 82024

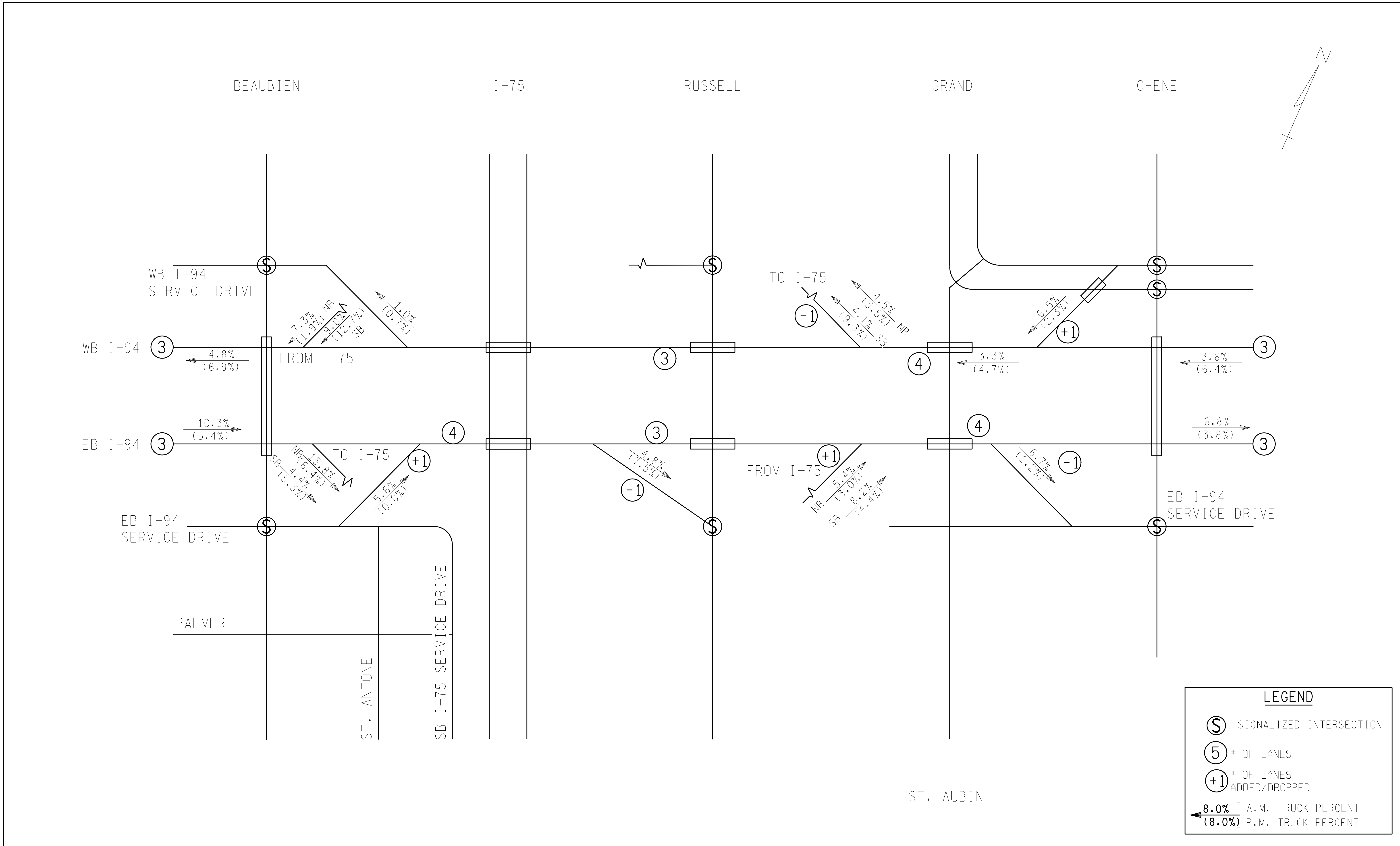
JN: 122114

2014 AM(7-8) and PM(4-5) Peak Hour Truck %

I-94 From Woodward to Brush

City of Detroit, Wayne County

DRAWING B-11 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB

MDOT Michigan Department of Transportation

NO SCALE

DATE: 03/13/15

CS: 82024

JN: 122114

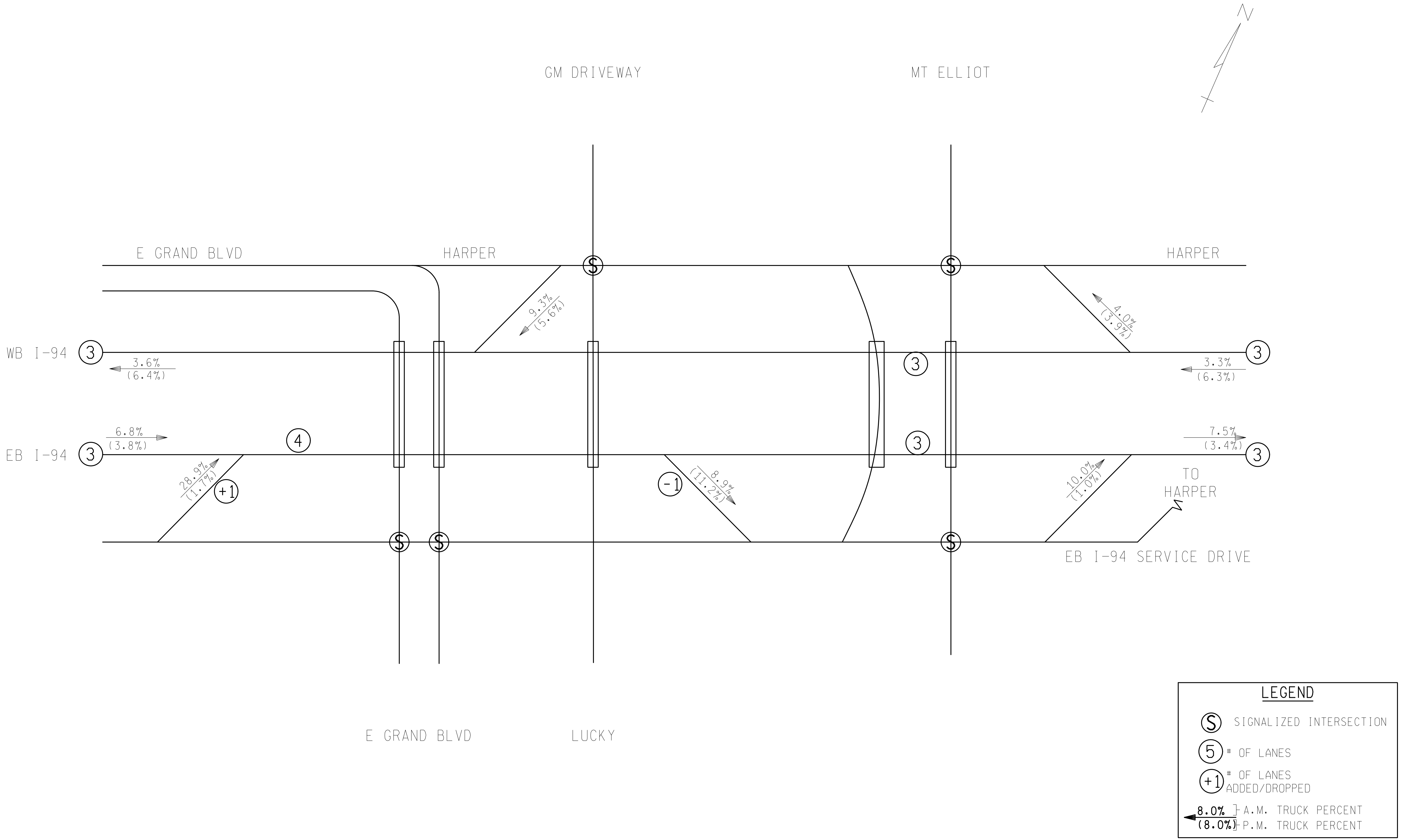
2014 AM(7-8) and PM(4-5) Peak Hour Truck %

I-94 From Beaubien to Chene

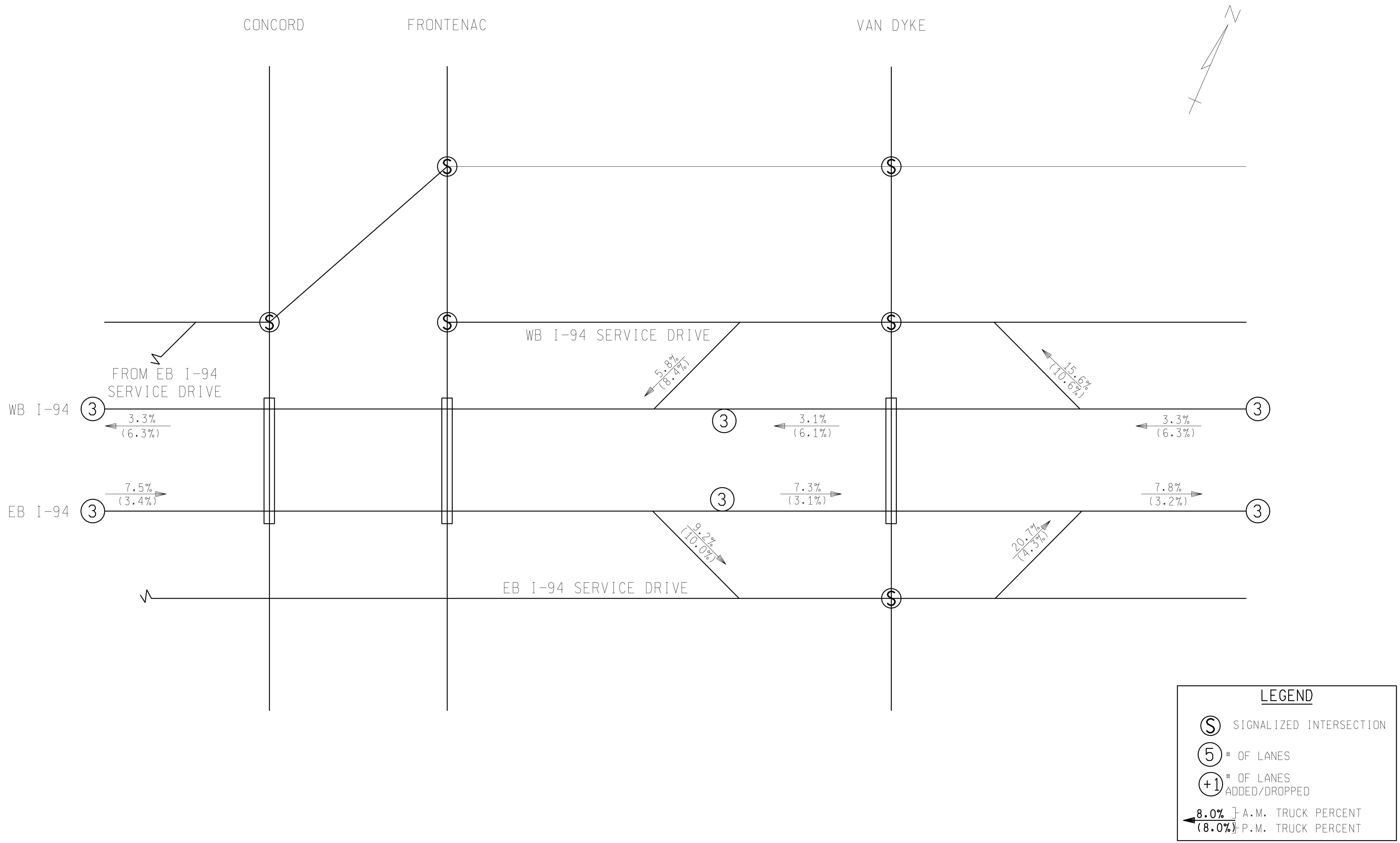
City of Detroit, Wayne County

DRAWING B-12

SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)								HNTB	MDOT Michigan Department of Transportation	NO SCALE	DATE: 03/13/15	CS: 82024 JN: 122114	2014 AM(7-8) and PM(4-5) Peak Hour Truck % I-94 From E Grand to Mt Elliot City of Detroit, Wayne County	DRAWING B-13	SHEET
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION								



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

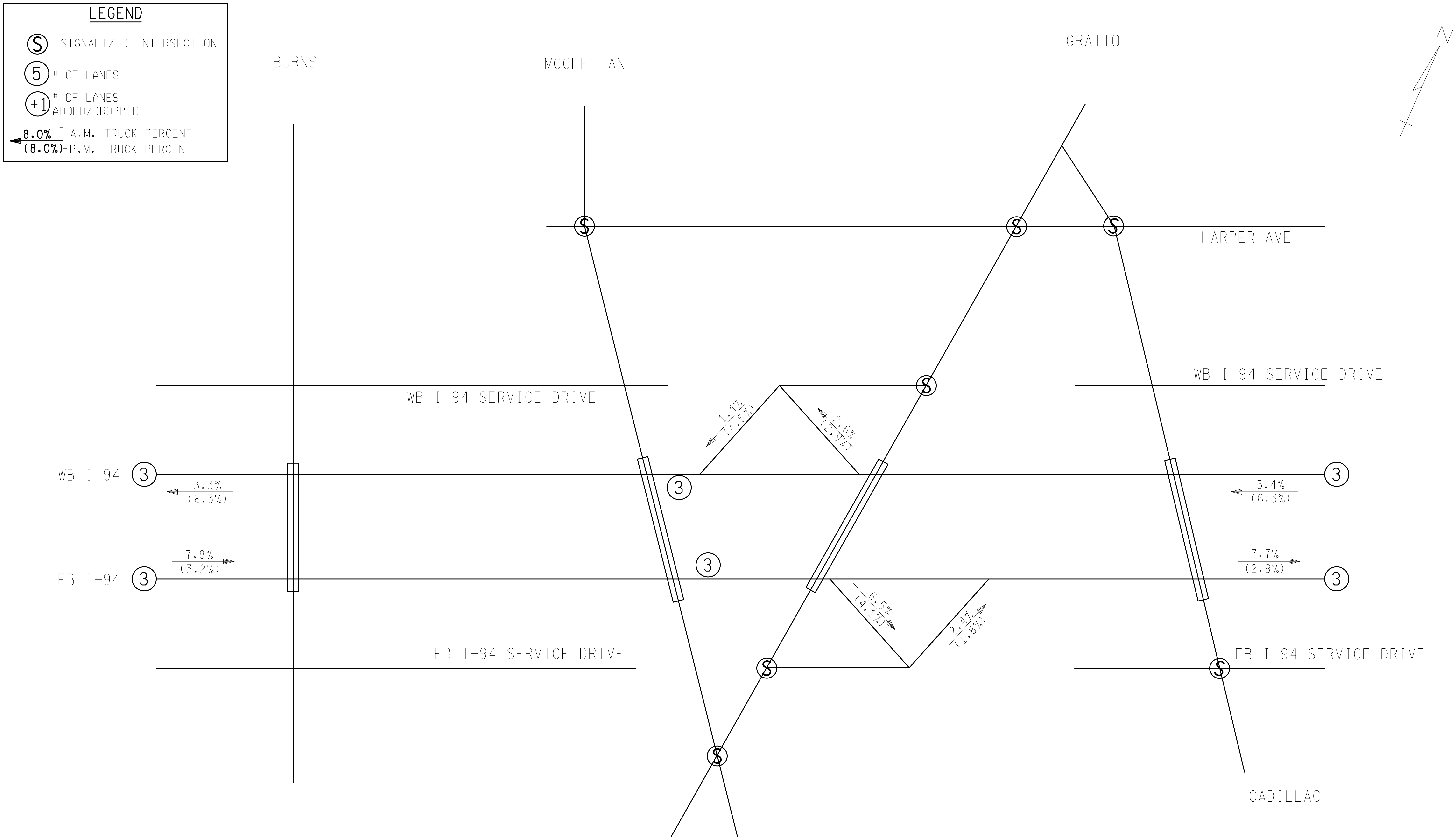
DATE: 03/13/15

CS: 82024

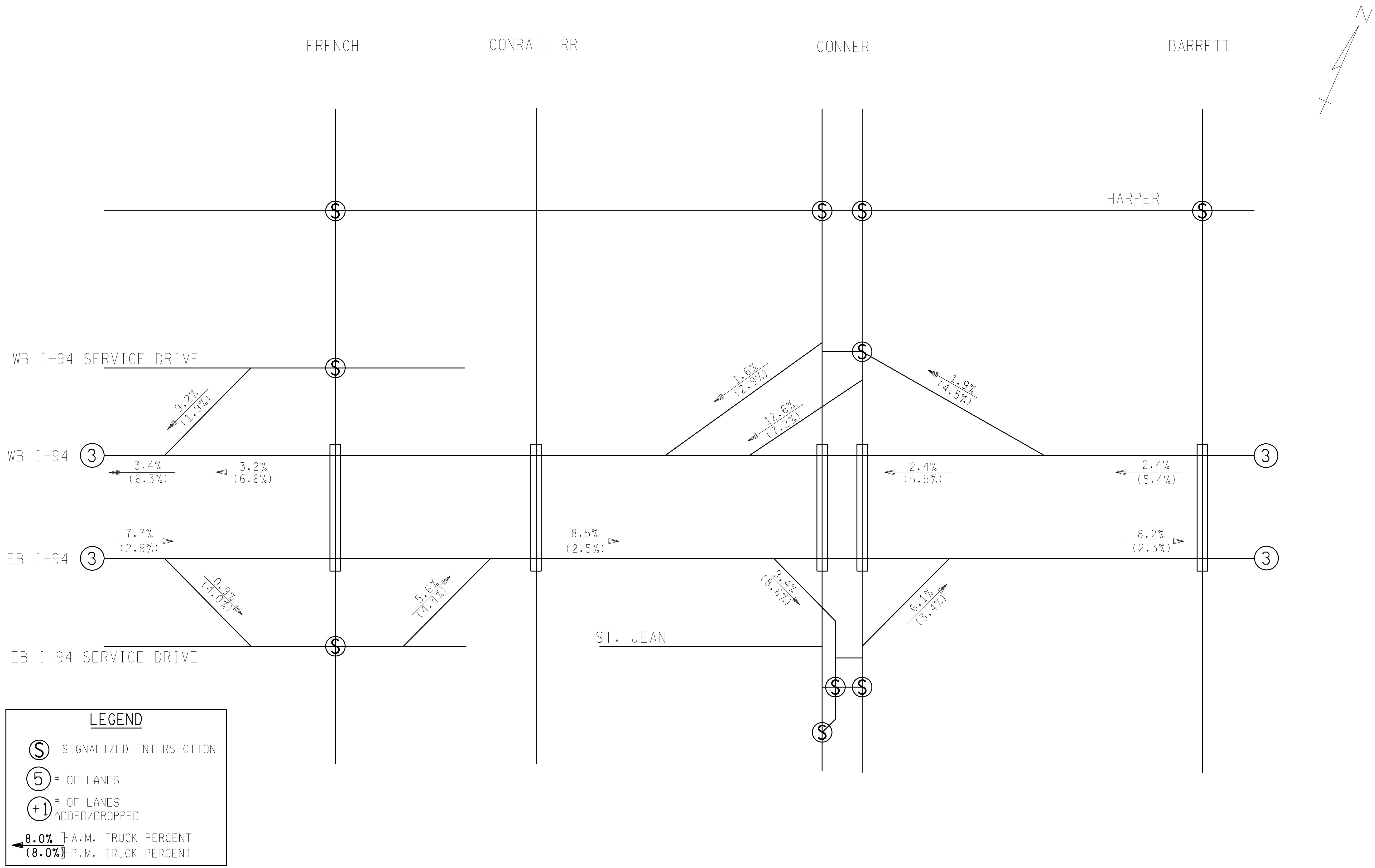
JN: 122114

2014 AM(7-8) and PM(4-5) Peak Hour Truck %
I-94 From Concord to Van Dyke
City of Detroit, Wayne County

DRAWING: B-14 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)								HNTB	MDOT Michigan Department of Transportation	NO SCALE		DATE: 03/13/15	CS: 82024	2014 AM(7-8) and PM(4-5) Peak Hour Truck %	DRAWING	SHEET
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION						JN: 122114	I-94 From Burns to Cadillac	B-15	
														City of Detroit, Wayne County		



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 03/13/15

CS: 82024

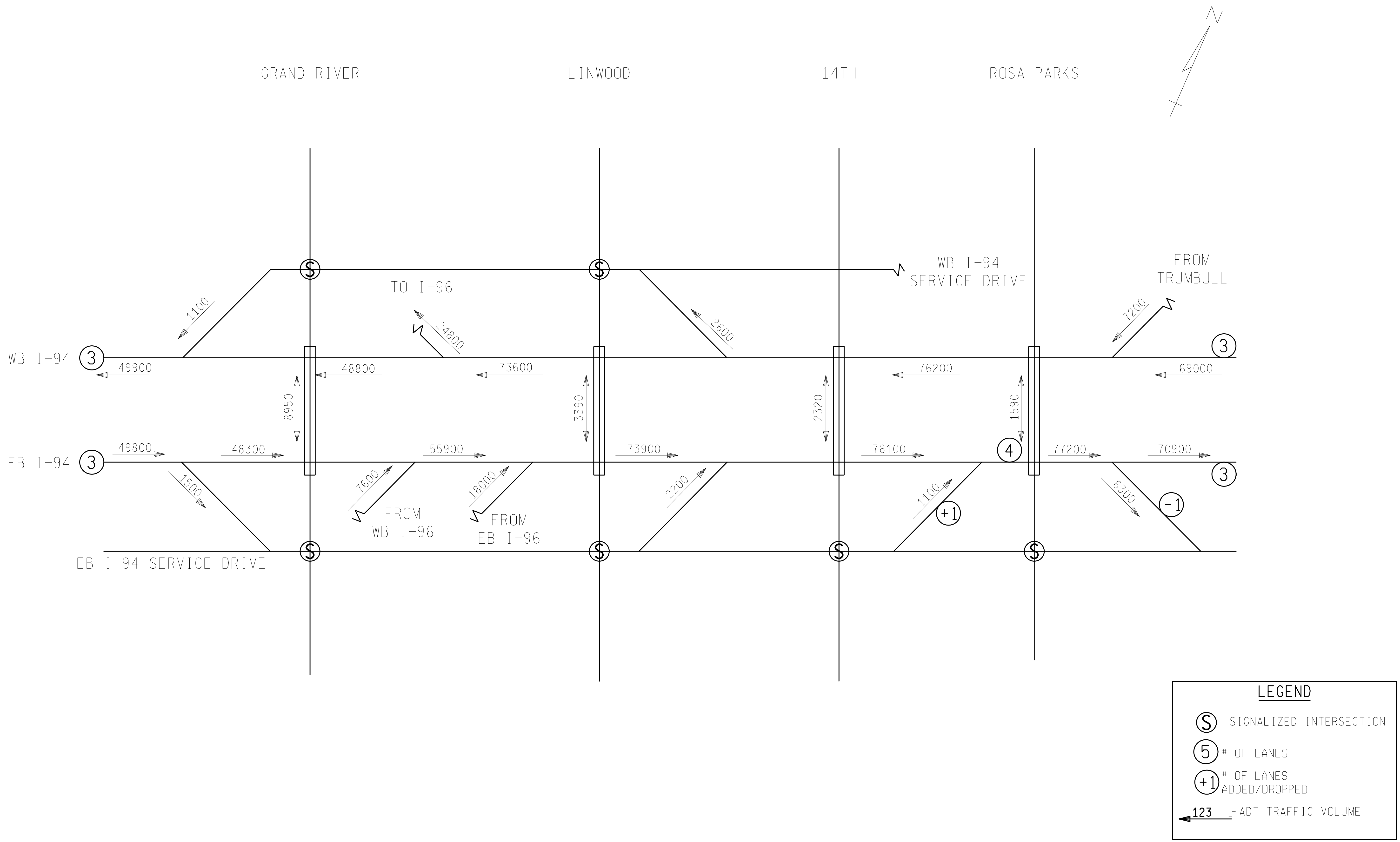
JN: 122114

2014 AM(7-8) and PM(4-5) Peak Hour Truck %

I-94 From French to Barrett

City of Detroit, Wayne County

DRAWING SHEET B-16



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

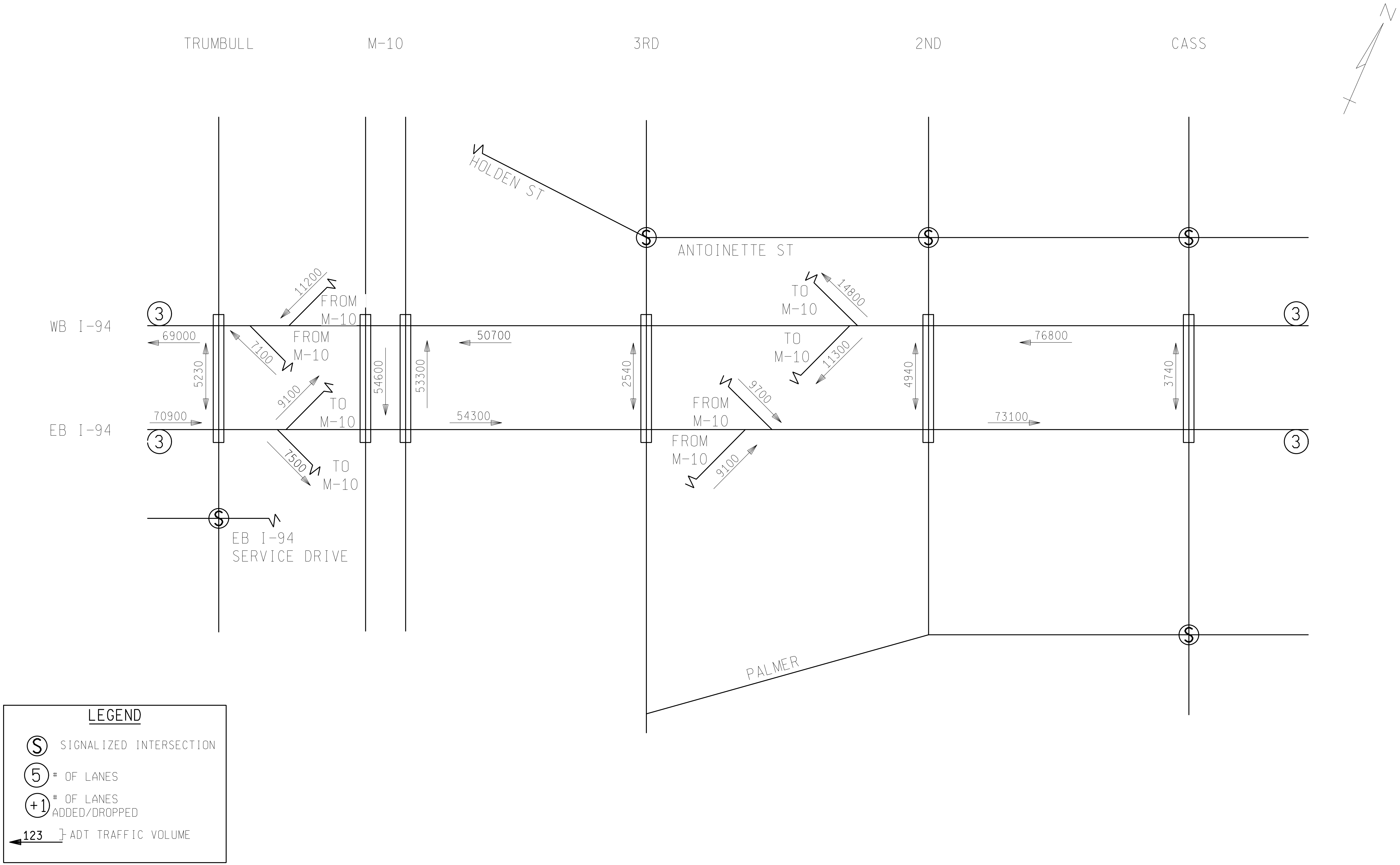
DATE: 03/06/15

CS: 82024

JN: 122114

2014 ADT Traffic Volumes
I-94 From Grand River to Rosa Parks
City of Detroit, Wayne County

DRAWING: C-1 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

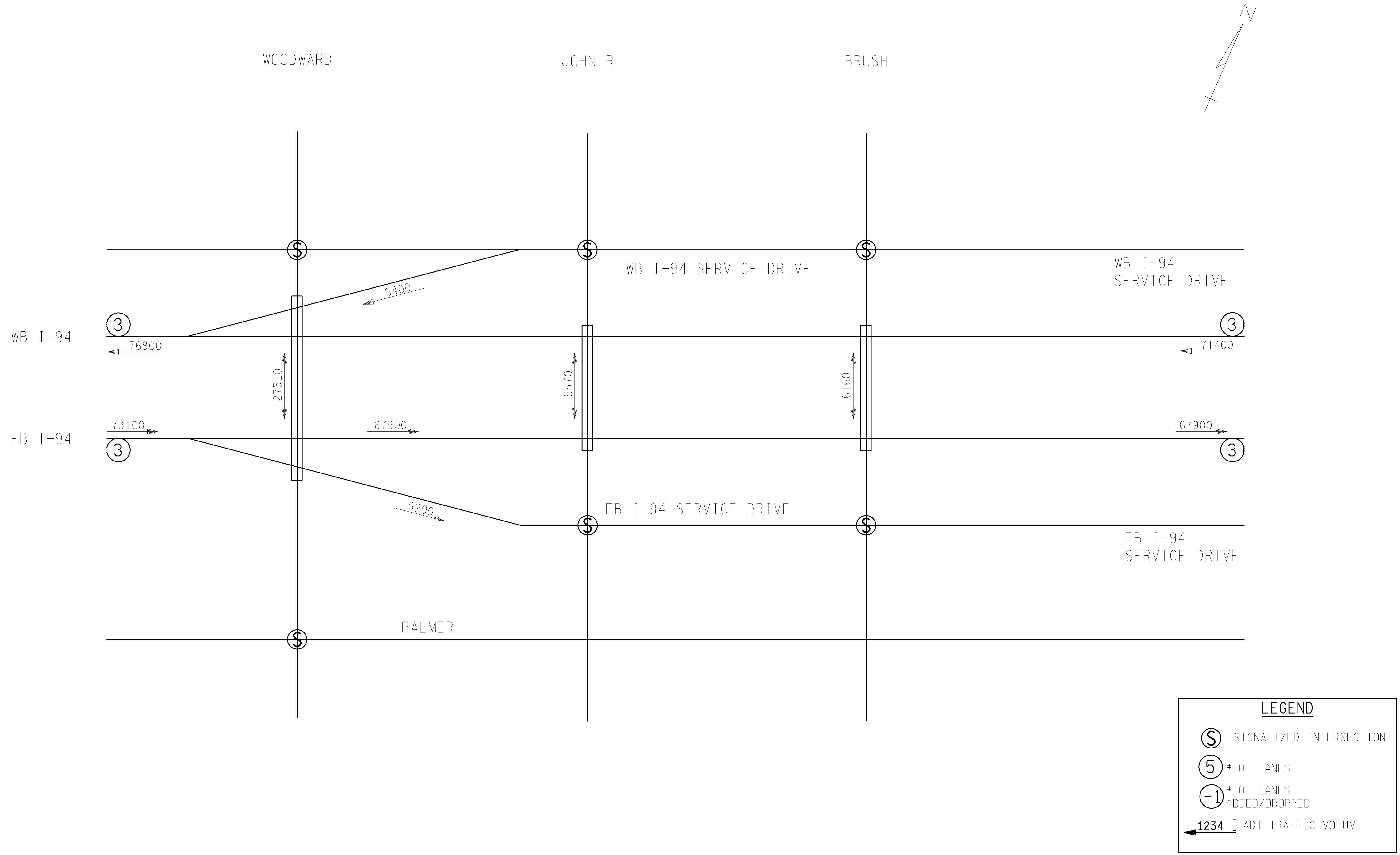
DATE: 03/06/15

CS: 82024

JN: 122114

2014 ADT Traffic Volumes
I-94 From Trumbull to Cass
City of Detroit, Wayne County

DRAWING: C-2 | SHEET



FINAL ROW PLAN REVISIONS	(SUBMITTAL DATE:	)					
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

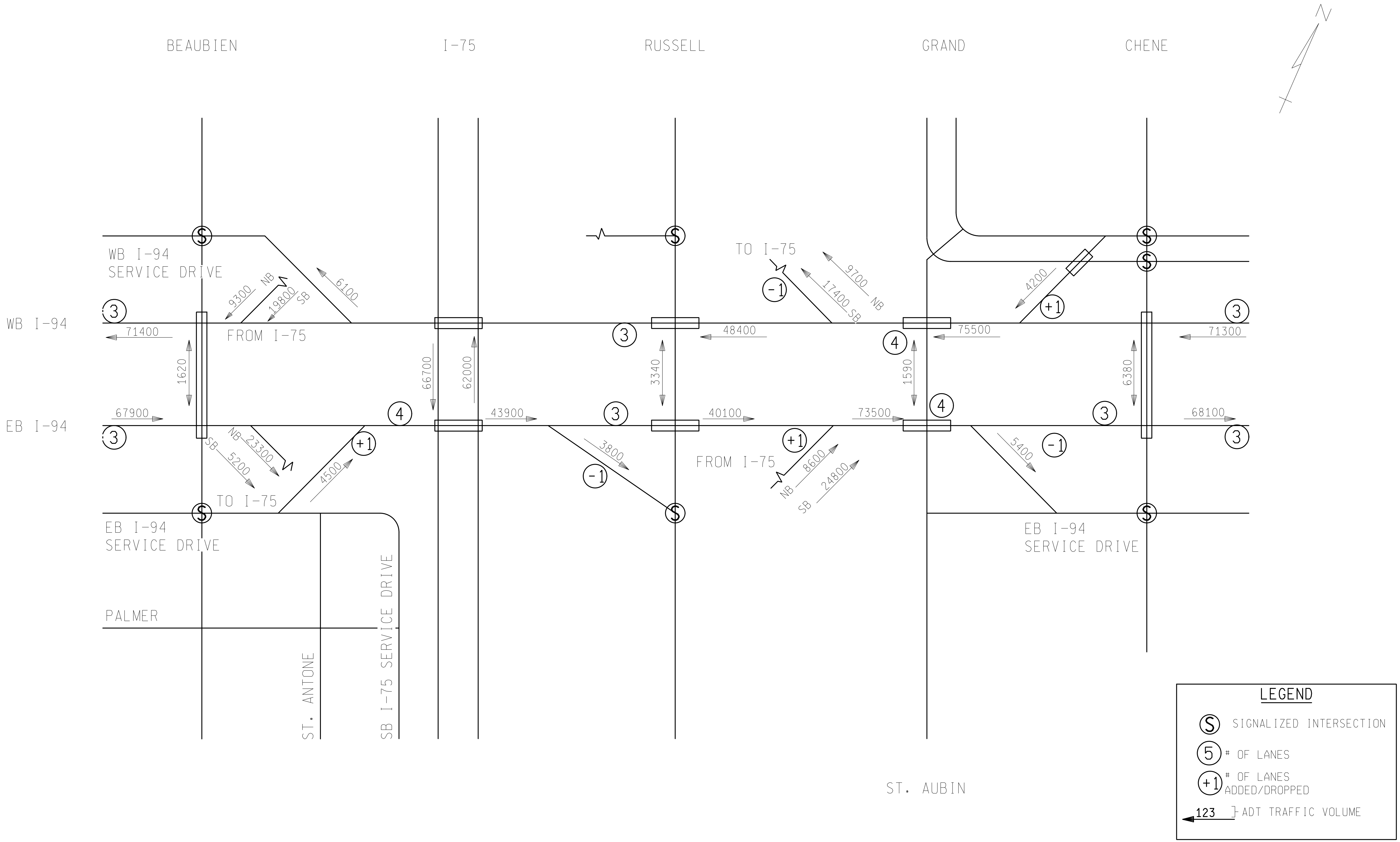
DATE: 03/06/15

CS: 82024

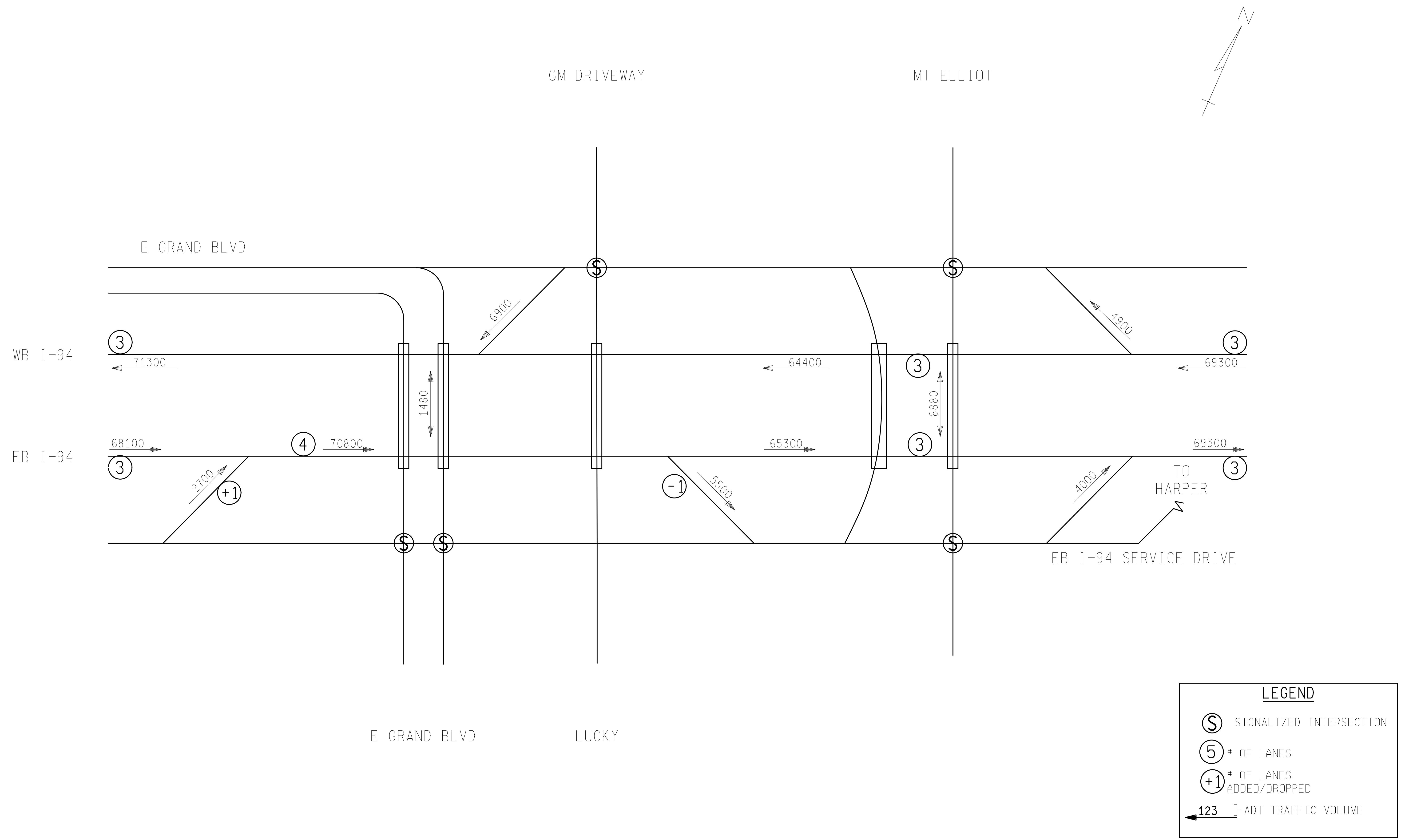
JN: 122114

2014 ADT Traffic Volumes
I-94 From Woodward to Brush
City of Detroit, Wayne County

DRAWING C-3 | SHEET



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)	HNTB	MDOT Michigan Department of Transportation	NO SCALE
DATE: 03/06/15	CS: 82024 / JN: 122114	2014 ADT Traffic Volumes I-94 From Beaubien to Chene City of Detroit, Wayne County	DRAWING C-4 / SHEET



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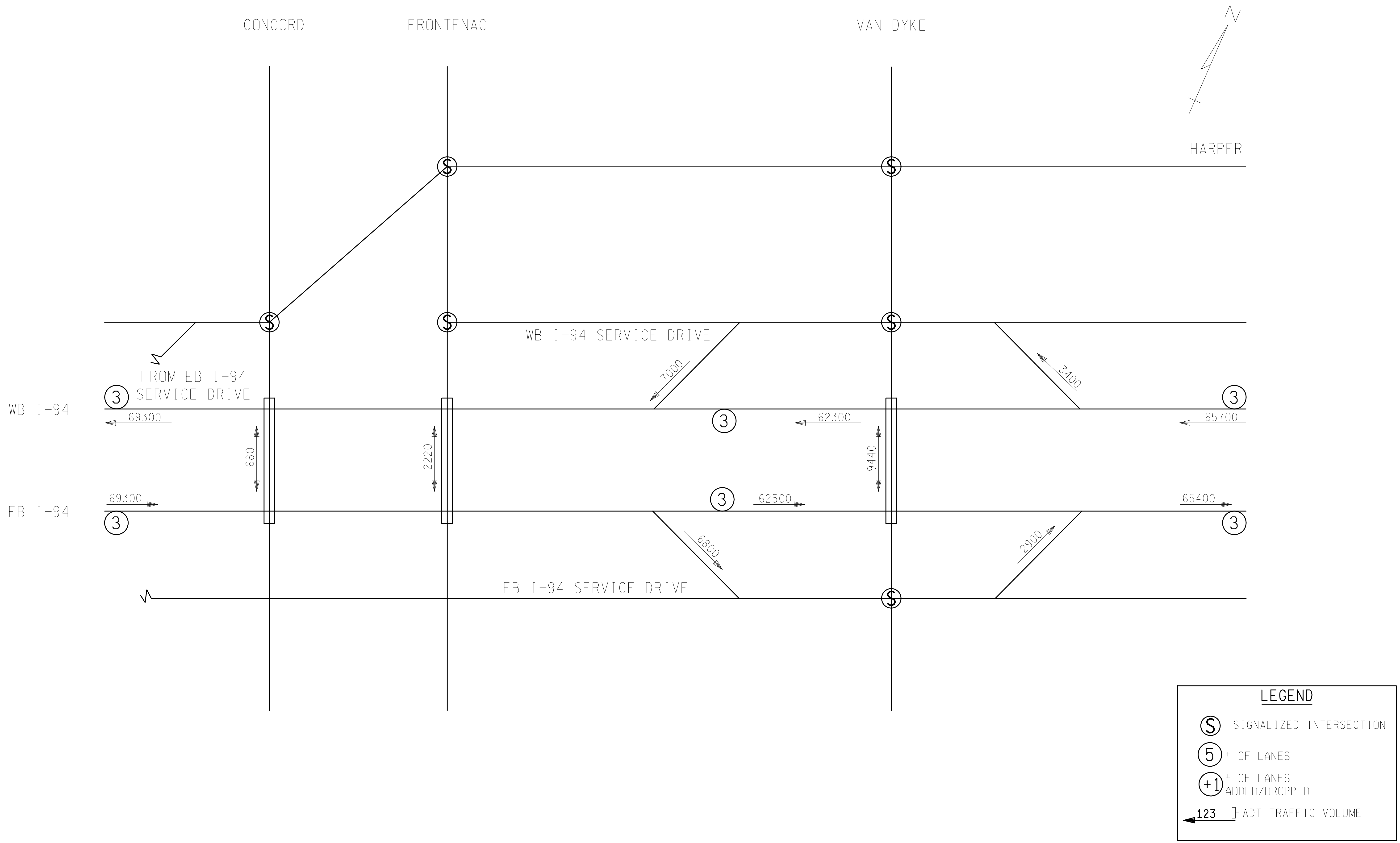
HNTB | MDOT Michigan Department of Transportation | NO SCALE | DATE: 03/06/15 | CS: 82024 | JN: 122114

2014 ADT Traffic Volumes
I-94 From East Grand to Mt Elliot
City of Detroit, Wayne County

DRAWING: C-5 | SHEET



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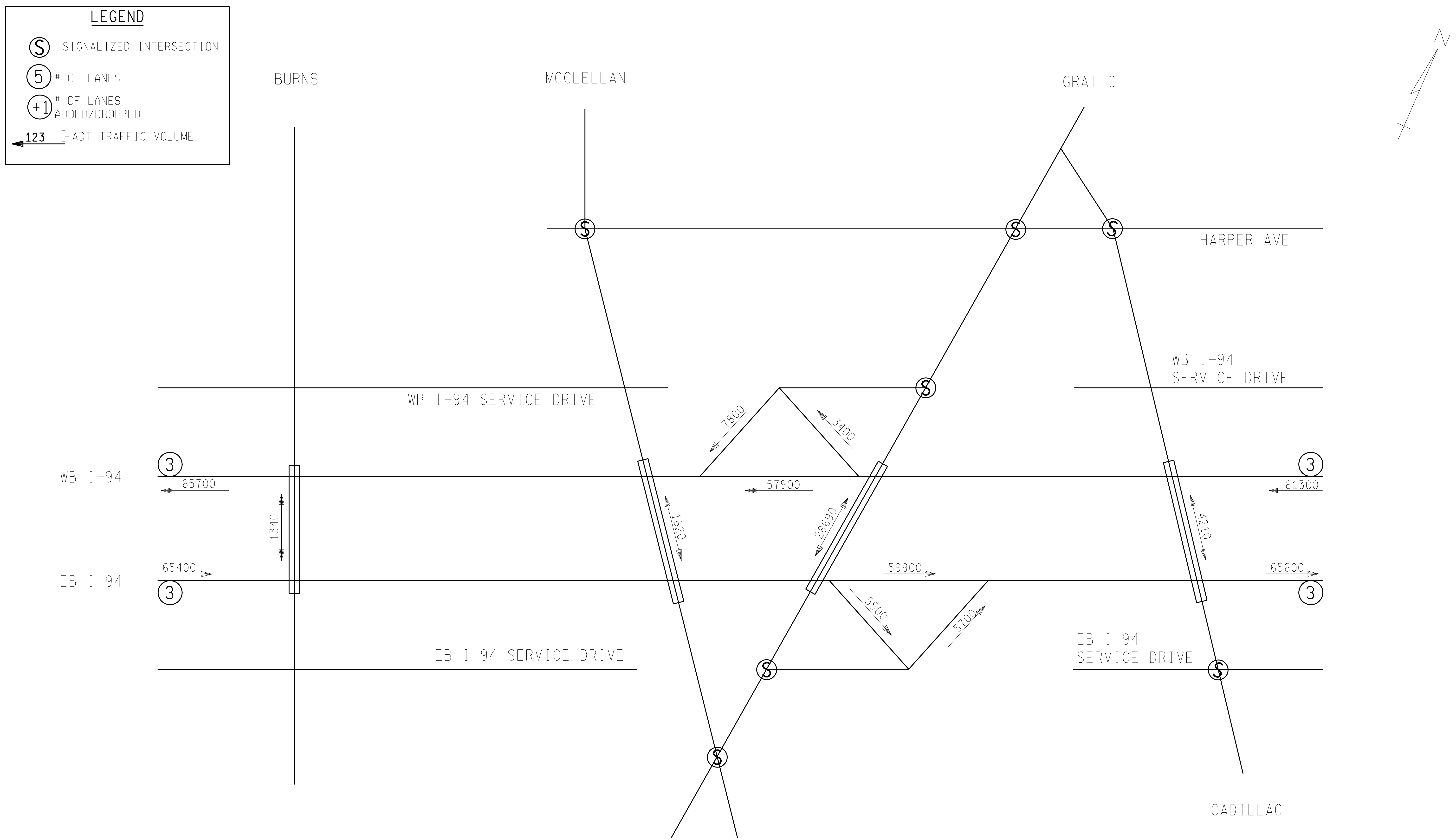
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION						JN: 122114	I-94 From Concord to Van Dyke	C-6	
														City of Detroit, Wayne County		



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

HNTB | MDOT Michigan Department of Transportation | NO SCALE

DATE: 03/06/15

CS: 82024
JN: 122114

2014 ADT Traffic Volumes
I-94 From Mcclellan to Cadillac
City of Detroit, Wayne County

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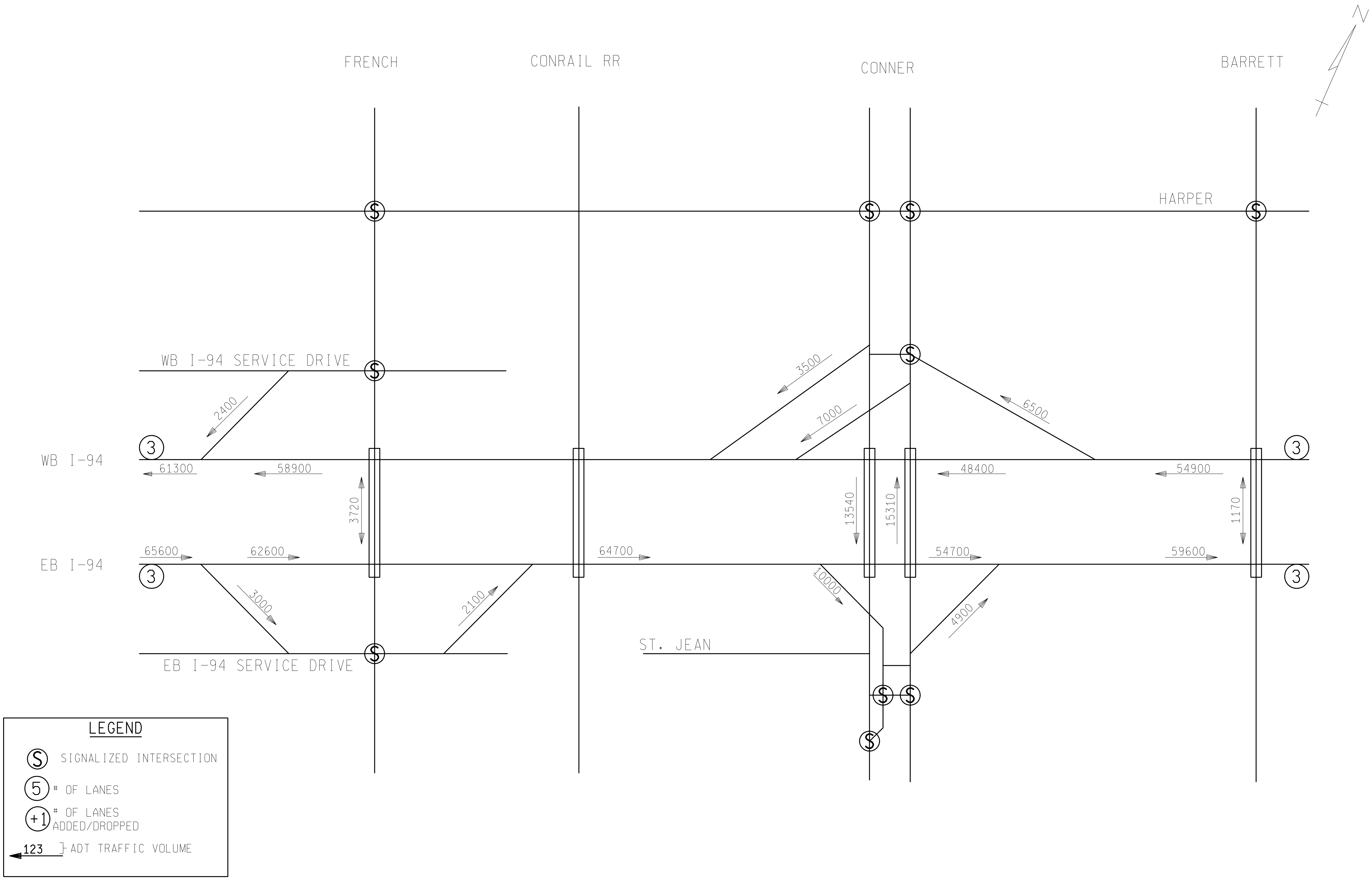
C-7



FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)								HNTB	MDOT Michigan Department of Transportation	NO SCALE		DATE: 03/06/15	CS: 82024	2014 ADT Traffic Volumes	DRAWING	SHEET
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION						JN: 122114	I-94 From French to Barrett	C-8	
														City of Detroit, Wayne County		

TECHNICAL MEMORANDUM

HNTB

I-94 Traffic Volume Forecasting

NO. MDOT – TM 3
May 6, 2015

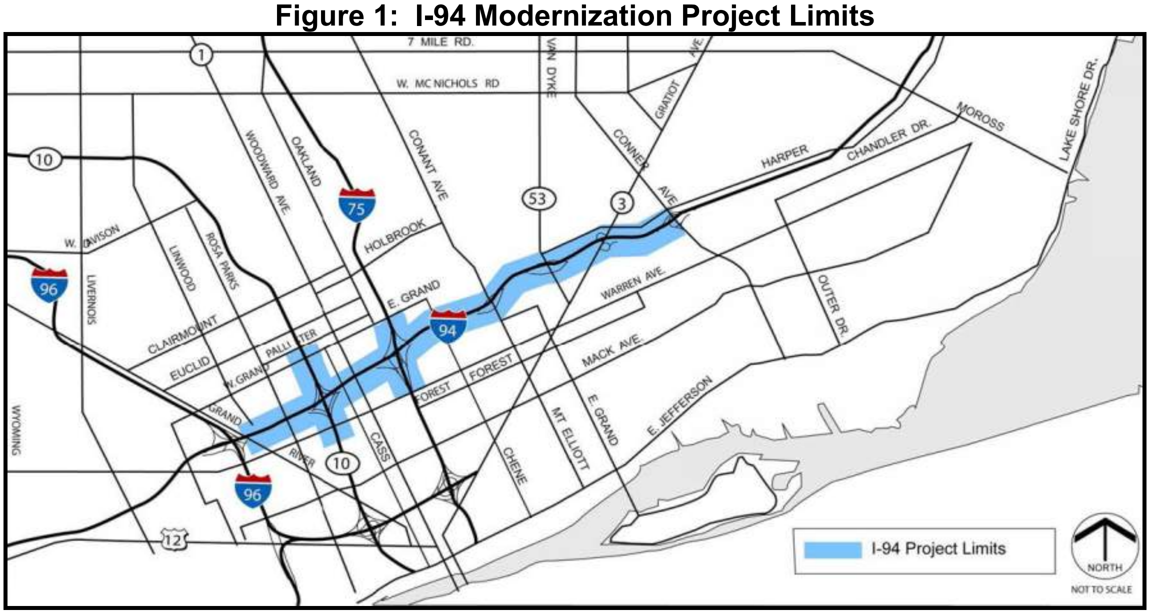
MDOT JN: 122114
Control Section: 82024

Author: Mark Smith, PE, PTOE
Reviewers: Karianne Steffen, PE, PTOE
Matt Simon, PE

Background:
As part of the I-94 Modernization Project Owners Representative Work Task #1, Subtask 2.2 Traffic, this technical memorandum is intended to document the assessment of SEMCOG's 2010 and 2040 Travel Demand Models (TDM) and the discussions with MDOT and SEMCOG on March 6, 2015, March 13, 2015, and May 1, 2015 regarding traffic volume forecasting along the I-94 study corridor.

Existing Project Data:
The limits of the I-94 Modernization Project are located in the City of Detroit between I-96 and Conner Ave, which is approximately seven miles in length, as shown in Figure 1 below. I-94 is currently stripped as a six (6) lane urban freeway that carries three (3) lanes of westbound traffic and three (3) lanes of eastbound traffic. Within these seven miles of urban freeway there are over 50 ramp entrances/exits along the I-94 corridor. Existing traffic conditions indicate that demand for the I-94 corridor has exceeded the available capacity limits given the heavy congestion experienced during the AM and PM peak periods. The recurrent congestion on the I-94 corridor has resulted in a diversion of trips from the I-94 corridor to adjacent facilities. It is expected that once additional capacity is added with the I-94 Modernization Project a large volume of traffic will shift back to the I-94 corridor that had previously diverted due to the heavy congestion.

Figure 1: I-94 Modernization Project Limits



Assessment of SEMCOG Travel Demand Models:

Traffic assignments were obtained from SEMCOG's 2010 and 2040 Travel Demand Models (TDM) to evaluate traffic volume growth along the I-94 study corridor. For background traffic growth the TDM projected a growth rate of 0.07% per year (compounded annually) from 2010 to 2040, prior to the construction of the I-94 Modernization Project. The TDM also projected a growth rate of 0.16% per year (compounded annually) from 2010 to 2040, which is expected after the completion of the I-94 Modernization Project. The traffic projections account for growth due to long term traffic pattern changes plus the socio-economic growth in the I-94 impact area. The I-94 corridor will also see an increase in traffic due to diverted demand that is currently using adjacent facilities. The SECMOG TDM model estimates that I-94 mainline traffic volumes are projected to increase by 23% to 27% depending on when I-94 modernization project is completed (i.e. if project was completed in 2010 traffic shift would have been 23%, if project is completed in 2040 traffic shift is expected to be 27%). Table 1 below summarizes the projected traffic increases for the I-94 corridor. The total traffic increase is based on the average of the annual growth rate and the traffic shift due to the diverted demand since the final completion date of the I-94 Modernization Project is unknown.

Table 1: I-94 Projected Traffic Volume Increases

	Annual Growth Rate (2010 – 2040)	Traffic Shift due to Diverted Demand	Total Traffic Increase (2010 – 2040)
I-94 Modernization Project	0.07% - 0.16% Per Year	23% to 27%	29%

The projected traffic volume increases from SEMCOG's TDM were developed in 2010, during a time of recession. Recent economic changes in Detroit's Midtown area and surrounding communities are not reflected in these projections.

Based on the review of SEMCOG's TDM, the corridor analysis provides the expected traffic growth along the I-94 study corridor. The growth determined from the corridor analysis is limited to the mainline freeway lanes as the level of detail within the TDM does not provide accurate traffic volume projections for surface streets and ramps. Given the limitations of the SEMCOG TDM, separate forecasting methodologies will be used for the I-94 freeway and surface streets / ramps.

Traffic Volume Forecasting Methodology:

<u>I-94 Freeway Traffic Volume Forecasting Methodology</u>

1. Growth rates from SEMCOG's Corridor Analysis (shown in Table 1) will be used to forecast 2040 build I-94 mainline traffic volumes.

<u>I-94 Service Drive and Ramp Traffic Volume Forecasting Methodology</u>

Given the limitations of the TDM to accurately project traffic volumes for the surface streets and ramps, several methods were analyzed for forecasting traffic on the I-94 Service Drives and I-94 Ramps which included:

- Comparing 2010 and 2040 SEMCOG TDM's to evaluate growth based on population, socioeconomic data, and vehicle miles travel within the I-94 study area.
- Reviewing existing traffic volumes within the I-94 study area where continuous service drives exist to estimate volumes for proposed continuous service drives.

- Reviewing existing traffic travel patterns within the I-94 study area to estimate directional distribution percent's for future.
- Reviewing the recently constructed I-96 project in Livonia.
- Minimum safety standards for a service drive would require two lanes for emergency access.
- Best traffic planning and engineering practices

It was suggested that a subarea micro-simulation model could be used. While a subarea micro-simulation model would be the best way to forecast traffic volumes for the surface streets and ramps it would also require an extensive amount of data that is not available. A subarea micro-simulation model would require the collection of additional traffic volumes for all significant alternate routes in the Detroit area surrounding the I-94 corridor. The limits of a subarea model could extend as far as the borders of the map shown previously in Figure 1. In addition to the data collection there would also be a large effort to calibrate the model before it could be used.

With the inherent schedule delays that a subarea micro-simulation model would create it was agreed on May 1, 2015 with MDOT and SEMCOG that triangulating the methods analyzed above would be an acceptable approach to forecast traffic for the I-94 Service Drives and I-94 Ramps in place of a subarea micro-simulation model.

Therefore, based on discussions with MDOT and SEMCOG on May 1, 2015 the proposed methodology for forecasting traffic for the I-94 Service Drives and I-94 Ramps is outlined below. Both MDOT and SEMCOG were in agreement on this approach:

1. A total of 1,000 thru vehicles per hour (VPH) will be applied to the I-94 Service Drives during the AM and PM peak hours. The 1,000 thru vehicles is based on existing peak hour traffic volumes counted at the Chene St and Mt. Elliott St intersections with the I-94 eastbound and westbound service drives. Chene St and Mt. Elliott St were used to develop the thru VPH based on the existing continuous service drives at these locations.

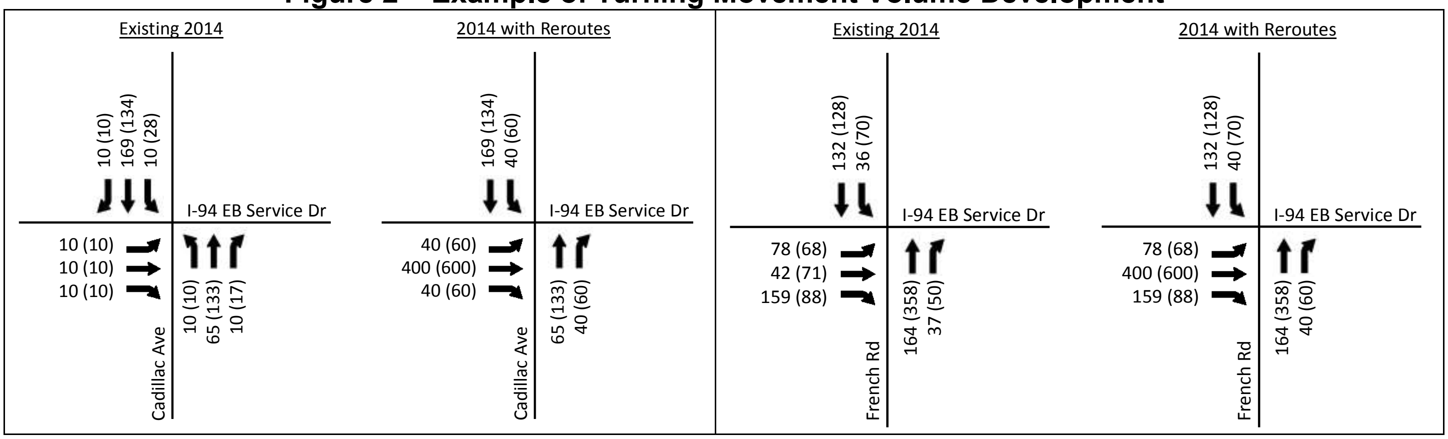
2. Projected directional distributions were developed, as shown in Table 2, based on an evaluation of existing traffic volumes and anticipated travel pattern impacts from the proposed continuous service drives. The directional distributions will be applied to the 1,000 thru VPH to assign peak hour thru volumes on the eastbound and westbound I-94 Service Drives.

Table 2: I-94 Service Drive Projected Directional Distributions

Location	Direction Distribution	
	AM Peak Hour	PM Peak Hour
West of M-10		
WB I-94 Service Drive	40%	60%
EB I-94 Service Drive	60%	40%
Between M-10 and M-1 (Woodward Ave)		
WB I-94 Service Drive	45%	55%
EB I-94 Service Drive	55%	45%
East of M-1 (Woodward Ave)		
WB I-94 Service Drive	60%	40%
EB I-94 Service Drive	40%	60%

3. To develop peak hour turning movement volumes at the study area intersections, 10% of the service drive thru traffic volume will be used. The peak hour turning movement percentage was developed based on review of existing turning movement counts at low volume intersections on the I-94 corridor and the Trumbull Ave Bridge evaluation. Additionally, the I-96 reconstruction project (Newburg Rd to Melvin St) in Livonia was reviewed to confirm the proposed methodology for the I-94 corridor. A review of the I-96 project found that when distributing turning volumes to adjacent signals it was assumed that 10% turned left and 10% turned right which matches the proposed methodology for the I-94 corridor. This methodology will only be used if the existing turning movements are lower than 10% of the service drive thru volume otherwise the existing volume will be used. Two examples of the I-94 Eastbound Service Drive, east of M-1 (Woodward Ave), are shown in Figure 2.

Figure 2 – Example of Turning Movement Volume Development



In addition to the forecasting methods described above, a minimum annual growth rate of 0.16% per year (compounded annually) will be used to forecast I-94 Service Drives, local roads, and I-94 Ramps for the AM and PM peak periods. The minimum annual growth rate of 0.16% matches the highest annual growth that is anticipated for the I-94 Freeway. All adjustments will be made to the existing (2014) traffic volumes to account for the proposed roadway modifications before applying the 0.16% annual growth rate to develop projected 2040 build traffic volumes.

APPENDIX C

I-94 REHABILITATION PROJECT
DETROIT, MICHIGAN

Contract No.: 94-0525P
Control Sections: 82023, 82025

ACCESS JUSTIFICATION REPORT

DRAFT 3

Prepared for:
Michigan Department of Transportation
State Transportation Building
425 West Ottawa Street
Lansing, Michigan 48909

Prepared by:
Parsons Brinckerhoff Michigan, Inc.
535 Griswold Street, Suite 1525
Detroit, Michigan 48226

October 2004

MDOT/FHWA COMMENTS NOT ADDRESSED IN ACCESS JUSTIFICATION REPORT VOLUME 1, DRAFT 3

1.2 Eight Federal Policy Requirements

A comment was made requesting information about the crash rate. A crash rate analysis was not conducted as directed by MDOT, only a crash frequency analysis was performed. Therefore, information on crash rate was not added to this section.

2.1.1.3 I-94 Mainline

Westbound I-96 entrance ramp and eastbound I-96 entrance ramp was circled with no comment. We will need additional clarification on the comment.

2.2 Issues of Concern of Controversy

The words "Build Alternative" were underlined several times on Page 23, more clarification on this comment will be needed in order to address it in the report.

5.7.3 Observations Regarding Adjacent Freeway Segments

A comment was made to add the statement that "With a few exceptions these segments will operate under capacity. The four segments that operate over capacity will have a volume to capacity ratio less than 1.0.". Segments surrounding the study area are operating at or near capacity, with no segments operating under capacity throughout the entire day. Some of the segments are operating under capacity during part of the day, but not the entire day. Some of the segments have a volume to capacity ratio less than 1.0, but not all four surrounding the study area.

MDOT/FHWA COMMENTS NOT ADDRESSED IN ACCESS JUSTIFICATION REPORT VOLUME 2, DRAFT 3

Figure 4D (new Figure 4E)

A comment was made that the lane drop configuration "isn't good" along the southeast side near Russell Street because of the high traffic volume in the PM peak hour. The HCS calculation indicates a LOS A in the AM peak hour and a LOS B in the PM peak hour at the intersection Russell and the eastbound I-94 service drive. The eastbound service drive would have a free-flow movement and not have to yield to the northbound I-75 service drive ramp. These two combined indicate that there would not be congestion along the service drive in this area.

Figure 4N (new Figure 4P)

A comment was made asking why the southbound Service Drive goes to two lanes for a short distance through the interchange. This is due to the southbound I-75 off-ramp that merges with the southbound I-75 Service Drive. When the off-ramp comes together with the Service Drive, the Service Drive was made two lanes for a short distance to accommodate the merging maneuvers from the off-ramp.

Figure 15A

A comment was made asking how the Service Drives start and whether the figure was missing detail. The Service Drives west of I-96 are accurately depicted in Figure 15A. The EB I-94 Service Drive starts in Figure 15B where it is shown that the NB I-96 Service Drive makes approximately a 90-degree bend and becomes the EB I-94 Service Drive just west of Grand River Avenue.

Figure 15B

A comment was also made asking why the Service Drive was not connected to the existing Service Drive west of I-96. The intent of this project was to address congestion east of I-96 to Conner Avenue. The whole I-96 interchange would have to be redesigned to connect the service drives to the west side of the interchange.

Table 10A – Page 203

A comment was made asking why the LOS and Volume to Capacity Ratio (V/C) gets worse with the Build Alternative. The future forecasts indicated that more traffic would be drawn to I-94 based on improvements to the I-94 project corridor. This additional traffic is due to more vehicles staying on the freeway with the Build Alternative compared to the No-Build Alternative, where more vehicles exited the freeway and used surface roads. The study limits for the LOS and V/C analysis extended on both ends past the portion of I-94 where improvements where made. Therefore, these end portions where no improvements were made are attracting more traffic as well because of the improvements made to I-94 in the project area. Since no improvements/geometric changes were made to these end portions and traffic volumes increased when compared to the No-Build Alternative, the LOS and V/C degraded along these end portions for the Build Alternative. See Section 5.7.2 for more description.

I-94 Rehabilitation Project
Detroit, Michigan

Contract No.: 94-0525P
Control Sections: 82023, 82025

DRAFT ACCESS JUSTIFICATION REPORT

Volume 1: Report and Analyses

Prepared for:
Michigan Department of Transportation
State Transportation Building
425 West Ottawa Street
Lansing, Michigan 48909

Prepared by:
Parsons Brinckerhoff Michigan, Inc.
535 Griswold Street, Suite 1525
Detroit, Michigan 48226

October 2004

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Volume 1: Report and Analysis

Volume 2: Tables and Figures

1.0 EXECUTIVE SUMMARY

This report, *Access Justification Report, Volume 1: Report and Analyses*, provides the support and justification for modifying existing interchanges along Interstate 94 (I-94) from east of the I-96 interchange to east of Conner Avenue. This report also includes the purpose and need for these modifications and the supporting traffic analysis. *Access Justification Report, Volume 2: Tables and Figures* contains the tables and figures that accompany this report.

1.1 INTRODUCTION

This section briefly summarizes the purpose of the proposed project and cites the reasons that the project is needed. Both the purpose and the need are explained in detail in Chapter 3.0, Regional Traffic Need.

The purpose of the Interstate 94 (I-94) Rehabilitation Project (from east of I-96 to east of Conner Avenue) is to improve the capacity and condition of the existing I-94 roadway and interchanges to support the mobility needs of local and interstate commerce and national and civil defense. The project would also result in enhanced local traffic circulation by separating local traffic from I-94 traffic via continuous service drives. The project area is shown below, and illustrated in **Figure 1** (see Volume 2).

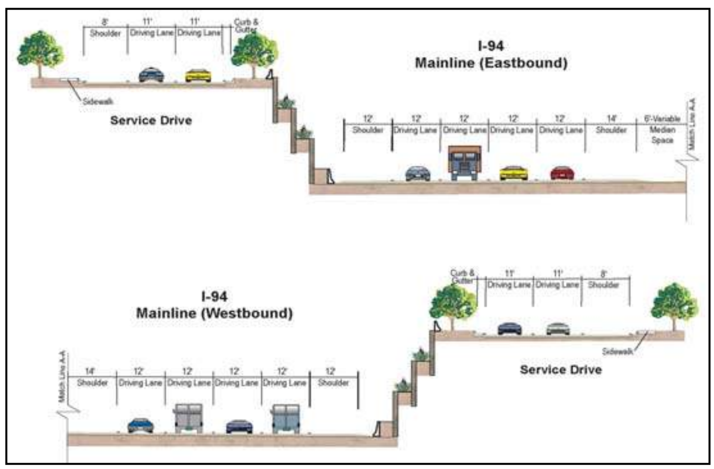
I-94 Rehabilitation Project - Traffic Study and Project Limits

The section of I-94 proposed for rehabilitation was constructed in the late 1940s and early 1950s; it is one of the oldest urban interstate freeways in the country. In 1990, the *Greater Detroit Area Freeway Rehabilitation Program Study* (Michigan Department of Transportation, 1990) identified the project segment of I-94 as the freeway in greatest need of improvement. The corridor is aged and requires frequent maintenance. In addition, various segments and interchanges within the project area are outdated in their design. The current design and high traffic volumes contribute to inadequate capacity, especially during the morning and evening rush hours. The Annual Average Daily Traffic (AADT) in the project area ranges from 120,000 to more than 160,000 vehicles and is expected to grow by more than 35 percent by the year 2025 (approximately 216,000). Truck traffic has been growing steadily on I-94 at a rate of five to seven percent each year. Current truck traffic ranges from five to ten percent of the total traffic within the project limits. Due to I-94's link to international border crossings and the growing economy in southeast Michigan, the volume of heavy truck traffic on southeast Michigan interstates is expected to grow three times faster than the passenger vehicle volume.

I-94 needs major improvements in order to:

- Replace aging pavement and bridges;
- Address congestion and provide for future travel demand;
- Connect important routes in an effective and efficient manner;
- Improve safety;
- Improve local circulation by separating local and through traffic;
- Improve freight mobility;
- Provide improved facilities for pedestrians and bicyclists; and
- Improve the aesthetics of the project area and provide a positive image to visitors.

The Build Alternative for the Final Environmental Impact Statement (also known as the Recommended Alternative) would include an additional lane in each direction along I-94 and provide continuous service drives through the I-94 interchanges with M-10 (the John C. Lodge Freeway) and I-75 (the Chrysler Freeway). Specifically, this alternative would consist of:



Build Alternative Typical Cross-Section

- The addition of one general-purpose lane in each direction of I-94 within the project area (between east of I-96 to the Conner Avenue interchange);
- The redesign and reconstruction of the critical freeway-to-freeway interchanges within the project limits (I-94/M-10 and I-94/I-75), eliminating all left-hand exits and entrances;
- The redesign and reconstruction of all bridges and ramps within the project area, including the addition of auxiliary, acceleration, and deceleration lanes;
- The provision of a 14-foot inside shoulder and a 12-foot outside shoulder on I-94;
- The provision of one-way continuous service drives with two 11-foot travel lanes, an 8-foot shoulder, and adjacent sidewalks parallel to both sides of the I-94 mainline freeway within the project area outside of the freeway-to-freeway interchanges (Based on projected traffic volumes, a three-lane section of the eastbound service drive would be provided along I-94 between M-10 and I-75);
- The provision of a one-lane service drive on both sides of the I-94 mainline freeway through the freeway-to-freeway interchanges; and
- The provision of one-way continuous service drives with two 11-foot travel lanes, an 8-foot shoulder, and adjacent sidewalks located along M-10 from Pallister/Seward Avenues to Forest Avenue and along I-75 from Warren Avenue

to Clay Avenue with one-lane service drives provided through the freeway-to-freeway interchanges.

The proposed typical section is shown on the previous page, and illustrated in **Figure 2** (see Volume 2).

1.2 EIGHT FEDERAL POLICY REQUIREMENTS

The Federal Highway Administration (FHWA) issued a policy that stipulates criteria for justifying new or modified access points to the existing Interstate System. The following information regarding the policy and requirements was taken verbatim from the *FHWA Federal-Aid Policy Guide: Transmittal 23* (June 17, 1998) and is presented in bold text.

The policy for additional access to the interstate system (23 CFR 630) is as follows:

It is in the national interest to maintain the Interstate System to provide the highest level of service in terms of safety and mobility. Adequate control of access is critical to providing such service. Therefore, new or revised access points to the existing Interstate System should meet the following requirements:

(1) The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended by the proposal.

Within the project area, I-94 is currently capacity-deficient. As traffic volumes increase in the future, the level of service would further deteriorate. Without improvements, nearly all segments of I-94 are expected to perform at Level of Service (LOS) F during peak periods by the design year, meaning motorists would be subject to congested, stop-and-go conditions throughout the corridor (see Chapter 5.0). The addition of lane capacity and reduction of weaving maneuvers would be required to accommodate design year traffic demand.

Currently, the existing service drives along I-94, I-75, or M-10 are not continuous. While service drives do exist along parts of I-94, I-75 and M-10 within the study area, these service drives terminate at the freeway to freeway interchanges. This discontinuity makes it difficult for local traffic to navigate through local streets without having to use the freeways.

In addition, geometric deficiencies are prevalent throughout the project area due to the age of the facility. Left-hand entrances and exits, substandard vertical clearances and insufficient acceleration and deceleration lanes all play a role in reducing the capacity and safety of the corridor. Rehabilitation of the existing facility without constructing geometric improvements would not sufficiently address the impact these deficiencies have on operations within the corridor.

The Build Alternative would result in improved freeway capacity to meet future traffic needs by providing an additional through lane in each direction along I-94, along with improved acceleration, deceleration and auxiliary lanes. Continuous service drives would also be provided along I-94, M-10, and I-75 to allow for better connectivity of the surface street system. In addition, the roadway facilities within the corridor would be redesigned to meet current design standards where practical and feasible. Together, these improvements are needed to provide safe and efficient traffic operations in the design year.

(2) All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit, and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.

All reasonable alternatives were developed and evaluated to determine the best option for addressing current and projected travel demands, reducing traffic crashes, and rehabilitating I-94 pavement and bridges. Alternatives that did not meet the purpose and need of the study were eliminated, while other alternatives that did meet the goals, purpose, and need of the study were retained for further analysis. Some of the alternatives could not by themselves meet the goals or purpose and need of the project, but could be implemented to augment the alternatives retained. Once a Build Alternative was chosen, the alternatives retained for further study that were not incorporated into the Build Alternative were eliminated. The status of each alternative evaluated is listed below:

- No-Build. Retained as a Basis of Comparison; Later Eliminated.
- Enhanced No-Build. Retained; Later Eliminated.
- Use of Grand Trunk Western/Conrail Rail Corridor as a Truck Route; Eliminated from Further Consideration.
- Reconstruct I-94. Add High-Occupancy Vehicle (HOV) Lanes without Improvements to the M-10 and I-75 Interchanges; Eliminated from Further Consideration.
- Reconstruct I-94. Add Unconventional Service Drives without Improvements to the M-10 and I-75 Interchanges; Eliminated from Further Consideration.
- Reconstruct I-94: Add Lanes and Provide Reserved Space for Future Expansion without Improvements to the M-10 and I-75 Interchanges. Eliminated from Further Consideration.
- Reconstruct I-94: Improvements to M-10 and I-75 Interchanges with Collector-Distributor Roads. Eliminated from Further Consideration.
- Reconstruct I-94. Original Design of Improvements to the M-10 and I-75 Interchanges with Continuous Service Drives; Eliminated from Further Consideration.
- Reconstruct I-94. Original Design of Improvements to the M-10 and I-75 Interchanges with Braided Ramps; Eliminated from Further Consideration.
- Reconstruct I-94. Refined Design of Improvements to the M-10 and I-75 Interchanges with Continuous Service Drives; Eliminated from Further Study.
- Reconstruct I-94. Refined Design of Improvements to the M-10 and I-75 Interchanges with Braided Ramps; Eliminated from Further Study.
- Reconstruct I-94. Refined Design of Improvements to the M-10 and I-75 Interchanges with Design Elements of Continuous Service Drives and Braided Ramps; Eliminated from Further Study.
- DEIS Build Alternative. Retained for Further Study; Later Eliminated.

- DEIS Build Alternative, Modification One. Retained for Further Study; Later Chosen as the FEIS Build Alternative (Recommended Alternative) with Refinements.
- DEIS Build Alternative, Modification Two. Retained for Further Study; Later Eliminated.
- DEIS Build Alternative, Modification Three. Retained for Further Study; Later Eliminated.
- Light Rail in the I-94 Median. Retained as Compatible with Initial Retained Alternatives; Later Eliminated.
- Transportation Systems Management (TSM) and Intelligent Transportation system (ITS). Retained as Compatible with the Build Alternative, but Eliminated as a Stand-Alone Alternative.
- Transit. Retained as Compatible with the Build Alternative, but Eliminated as a Stand-Alone Alternative:
    - Modifications to Existing Bus Service;
    - Bus Rapid Transit (BRT); and
    - Regional Transit Initiatives.

A discussion of each alternative eliminated from further consideration is included in Chapter 4.0.

Based on the analysis of the alternatives and modifications, as well as comments received on the Draft Environmental Impact Statement (DEIS), the DEIS Build Alternative, Modification One, with refinements, is the recommended FEIS Build Alternative (Build Alternative or Recommended Alternative). This alternative addresses the engineering, community access and circulation, environment, and social and economic needs of the project area. It satisfies the purpose and need for the project and addresses public, stakeholder, and agency concerns.

(3) The proposed access point does not have a significant adverse impact on the safety and operation of the Interstate facility based on an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include an analysis of sections of Interstate to and including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with new or revised access points.

Analysis of the Build Alternative illustrates that the project would have a substantial positive impact on the safety and the operation of the facilities within the project area. Improvements to the geometry of I-94 are anticipated to contribute to a reduction in the number and severity of traffic crashes by eliminating left-hand exits and entrances, reducing weaving maneuvers, and providing auxiliary and acceleration/deceleration lanes for safer movement onto and off of the freeway. In addition, reducing the number of non-standard corridor design features, along with the provision of an additional travel lane in each direction, would enhance the operational efficiency of the corridor, thereby increasing capacity and improving levels of service.

The traffic analysis was conducted under current year 1995 and future year 2025 traffic conditions, and included the I-94 freeway mainline and all interchanges within the project limits, as well as the adjacent interchange beyond either end of the project limits. Since 1995, continual construction projects and numerous detours along I-94 have impacted normal traffic patterns and current traffic counts would not reflect an accurate condition; therefore, it was determined that the 1995 data would best represent the current traffic condition, and the traffic analysis was not updated to the year 2000. The supporting traffic analysis included evaluation of both freeway and surface street operations. Analysis methodology and results are presented in Chapter 5.0.

(4) The proposed access connects to a public road only and would provide for all traffic movements. Less than "full interchanges" for special purpose access for transit vehicles, for HOVs, or into park and ride lots may be considered on a case-by- case basis. The proposed access would be designed to meet or exceed current standards for Federal- aid projects on the Interstate System.

The existing access points within the project area all connect to the public road system. No new access points are provided. One new ramp at Chene Street is proposed; this ramp would complete a partial interchange, making it a "full interchange." All proposed access improvements are designed to meet or exceed American Association of State Highway and Transportation Officials (AASHTO) and Michigan Department of Transportation (MDOT) geometric design standards where practical and feasible.

(5) The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.

The Build Alternative is consistent with regional and statewide plans, as well as having met the acceptance of local officials. The 2015 Regional Transportation Plan (RTP) for southeast Michigan first identified I-94 as a study corridor with capacity, bridge, and pavement deficiencies. The *Greater Detroit Area Freeway Rehabilitation Program Study* concurred with the findings and identified I-94 as the freeway in greatest need for improvement. Subsequently, major improvements to I-94 have been included in the 2020 and 2025 SEMCOG *Regional Transportation Plans*, the MDOT *2004-2008 Five-Year Transportation Plan* and the SEMCOG *Transportation Improvement Program* (TIP) for funding. The Recommended Alternative is included in the SEMCOG 2025 *Regional Transportation Plan* (RTP) for southeast Michigan, adopted on March 20, 2003. The study is also included in the SEMCOG *Transportation Improvement Program* (TIP) adopted on September 26, 2003. It is expected that SEMCOG will adopt the 2030 *Regional Transportation Plan* in November 2004 with the inclusion of the I-94 Rehabilitation Project.

In addition, the Build Alternative is supportive of local land use and transportation plans. The project is consistent with the current City of Detroit Master Plan, dated July 1992, and has been included in the most recent master plan for Wayne State University, dated September 2001. Service drive and surface roadway improvements included in the project would enhance access and beautify the project area. In August 1, 2003, the Detroit City Council unanimously passed a resolution in support of the Build Alternative, which was subsequently approved by the Mayor's Office.

(6) In areas where the potential exists for future multiple interchange additions, all requests for new or revised access are supported by a comprehensive Interstate network study with recommendations that address all proposed and desired access within the context of a long-term plan.

The project is supported by a comprehensive traffic study and is included in the SEMCOG *2025 Regional Transportation Plan and 2004-2006 Transportation Improvement Program,* and in the MDOT *2004-2008 Five-Year Transportation Program*. No new interchanges are being proposed at this time. Current interchange spacing in the project area ranges from 0.07 to 1.02 miles in length. As such, there is no potential for adding a new interchange, as it would violate AASHTO design standards for interchange spacing.

(7) The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.

The revised access points would adequately accommodate the design-year traffic volumes as determined through the SEMCOG travel demand forecasting model. That model allows for regional development. Development coordination and the discussion of the I-94 Recommended Alternative occurred with the city of Detroit Planning and Development Department and the neighborhood clusters. There have not been any requests for new or revised access due to development, other than adding the westbound off-ramp to Chene Street to complete the partial interchange. The majority of the existing I-94 ramps would be replaced in their current locations, or removed and replaced in the same vicinity. No new freeway entrance points are proposed.

These changes to the access points, as well as the continuous service drives, would provide for better roadway connectivity for the local streets and allows for existing and increased development in the area.

(8) The request for new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal.

A Draft Environmental Impact Statement (DEIS) has been prepared for this project. The DEIS was presented to the public in March 2001. The Final Environmental Impact Statement (FEIS) is currently being prepared. The FEIS would be submitted to the FHWA for a Record of Decision (ROD) late 2004 to early 2005.

1.3 DESIGN EXCEPTIONS

Based on the preliminary engineering completed to date, all interchange improvements have been designed to meet or exceed AASHTO and MDOT geometric design standards where practical and feasible. However, some design exceptions would be required, based on constraints within the project corridor. The expected design exceptions are provided in greater detail in Section 6.2; they include:

- I-94 Dequindre Bridge: Shoulder width;

- Eastbound I-94, M-10 entrance ramps, Brush Street exit ramp and I-75 exit ramp: Ramp spacing;
- Eastbound I-94, Northbound and Southbound I-75 entrance ramp and Chene Street exit ramp: Ramp spacing;
- Westbound I-94, Brush Street entrance ramp and northbound and southbound M-10 exit ramp: Ramp spacing;
- Westbound I-94, Chene Street entrance ramp to southbound I-75 exit ramp: Ramp spacing;
- Northbound I-75, Eastbound I-94 entrance ramp and Clay Street exit ramp: Ramp spacing and auxiliary lane too short;
- Southbound I-75, Clay Street entrance ramp and eastbound and westbound I-94 exit ramps: Ramp spacing and auxiliary lane too short; and
- I-94 at the I-75 and M-10 interchanges, Horizontal sight distance (ramps).

1.4 RECOMMENDATIONS

The analyses of traffic operations, traffic crashes, and infrastructure deficiencies demonstrate the need for improvements within the I-94 project area. The Build Alternative provides the best solution to address the transportation needs of the area and region, while maintaining consistency with local and regional land use and transportation plans and goals. The project would have the following benefits:

- Increased capacity and operational efficiency throughout the corridor
- Improved safety through elimination of geometric deficiencies, including left-hand exit and entrance ramps
- Enhanced connectivity and capacity of the regional, interstate and international freight network
- Replacement of all pavement and structurally deficient bridges
- New or enhanced acceleration/deceleration and auxiliary lanes to improve traffic operations and safety
- Increased service drive continuity to:
    - Improve local vehicular and pedestrian access to adjacent properties and developments;
    - Accommodate buses;
    - Provide detours for mainline traffic during traffic incidents;
    - Provide better access for emergency vehicles; and
    - Reduce traffic disruption during construction of the I-94 mainline
- Enhanced sidewalk continuity for pedestrians
- A visually pleasing facility to enhance adjacent communities and provide a pleasant driving experience

The I-94 Rehabilitation Project's Build Alternative is the best option to address the needs of the corridor while balancing impacts and constraints. It would eliminate bottlenecks, maintain connectivity, and reduce the severity and duration of congestion throughout the project corridor. The Build Alternative meets the future traffic demand for the project and satisfies the purpose and need for this project. It is consistent with local and regional transportation and land use plans, and has the expressed support of the city of Detroit. Project implementation would be done in a balanced and cost-effective manner, while impacts to both the human and natural environment are considered.

2.0 INTRODUCTION

Within the project area, I-94 is a six-lane facility with three lanes in each direction. The project area is 6.7 miles long, extending from just east of the I-96 interchange to the Conner Avenue interchange, all within the city of Detroit. The project area is shown below and illustrated in **Figure 1** (see Volume 2). Within a short distance of approximately 1.2 miles, I-94 intersects I-96, M-10, and I-75. The freeway is currently capacity-deficient, with persistent congestion during peak periods. In addition, traffic currently merges and exits at distances less than that required by current American Association of State Highway and Transportation Officials (AASHTO) design standards, which further reduces the efficiency and safety of the corridor.

I-94 Rehabilitation Project - Traffic Study and Project Limits

The I-94 Rehabilitation Project would involve the reconstruction and rehabilitation of the corridor, including the freeway-to-freeway interchanges with M-10 and I-75, which are nearing the end of their useful life. All bridges and ramps within the project area would be redesigned and reconstructed, including the addition of auxiliary, acceleration, and deceleration lanes. The project would include an additional lane in each direction along I-94 and provide continuous service drives through the I-94 interchanges with M-10 and I-75. Full shoulders along the inside and outside lanes of the I-94 project corridor would be included in the design. These improvements would bring the I-94 freeway up to current geometric standards where practical and feasible.

This chapter describes the new or modified access within the project area, issues of concern or controversy over this project, the project's estimated cost, and the distance to adjacent interchanges.

2.1 PROPOSED NEW OR MODIFIED ACCESS

This section describes the general design of the Build Alternative, as well as new or modified access within the project area.

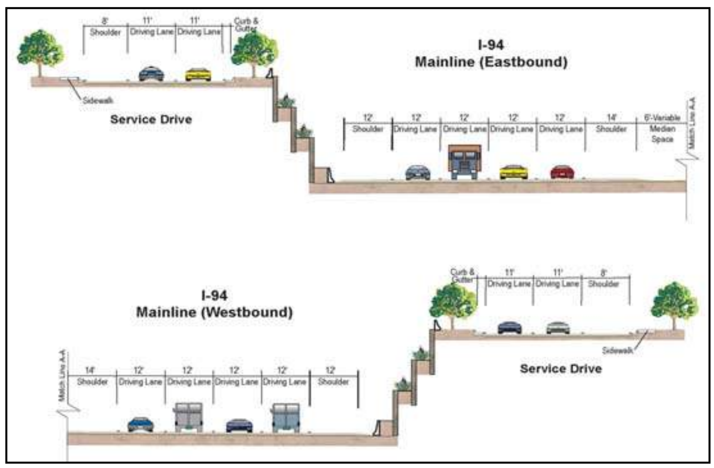
2.1.1 General Design of the Build Alternative

The general roadway design of the Build Alternative is described in this section, which includes a description and illustration of the Build Alternative, where auxiliary lanes would be provided and relocated, and removed access points. **Figures 3A – 3O** and **Figures 4A – 4O** (see Volume 2) depict the existing and Build Alternative configurations of the project area, respectively. Chapter 6.0 contains the design criteria for the Build Alternative, and presents required design exceptions.

2.1.1.1 Typical Section

A typical section illustrating the proposed roadway is shown below, and illustrated in **Figure 2** (see Volume 2). Each lane and the mainline outside shoulder would be 12 feet wide; the inside shoulder would be 14 feet wide. Six to 10 feet of space would be provided within the median.

The continuous service drives would contain two 11-foot wide travel lanes and an 8-foot wide shoulder, based on an agreement between the city of Detroit, the Federal Highway Administration, and the Michigan Department of Transportation. A three-lane service drive would be provided along the eastbound I-94 service drive between M-10 and I-75, based on the projected volume of traffic in this area. One-lane continuous services would be provided in all directions through the I-94 interchanges with M-10 and I-75. Typically, sidewalks adjacent to the continuous service drives would be 6 feet wide.



Build Alternative Typical Cross-Section

2.1.1.2 Continuous Service Drives and Surface Street Intersections

In most cases, the Build Alternative would include two-lane, one-way, continuous service drives adjacent to the I-94 mainline on both the north and south sides. The eastbound I-94 service drive would become a three-lane service drive between M-10 and I-75, based on the projected volume of traffic in this area. The eastbound I-94 continuous service drive would begin east of the I-94/I-96 interchange and would continue through the I-94 / Conner Avenue interchange to become the Conner Avenue on-ramp. The westbound I-94 continuous service drive would begin at the I-94 / Conner Avenue exit ramp and would continue to Grand River Avenue, east of the I-94/I-96 interchange. A one-lane service drive would continue through the I-94/M-10 and the I-94/I-75 interchanges.

The service drives would provide access to nearby residences, businesses, and institutions and would separate local and through trips. The service drives could provide alternative access during traffic incidents and maintenance of the mainline. Sidewalks in compliance with Americans with Disabilities Act design guidelines also would be included.

Continuous service drives with sidewalks would also be added to M-10 and I-75 and connect to existing service drives. The southbound M-10 service drive would begin north of Pallister Avenue and end at the Forest Avenue entrance ramp to southbound M-10. The northbound M-10 service drive would begin at the northbound M-10 exit ramp to Forest Avenue and end north of Seward Avenue. A one-lane service drive would continue through the I-94/M-10 interchange. The northbound I-75 service drive would begin at the northbound I-75 Warren Avenue exit ramp and end at the Clay Avenue entrance ramp. The southbound I-75 service drive would begin at the southbound I-75 exit ramp to Clay Avenue and end at the Warren Avenue exit ramp to southbound I-75. A one-lane service drive would continue through the I-94/I-75 interchange.

Locations where a mainline off-ramp merges with a service drive would be controlled with signage that is consistent with the signage currently being used in merge situations of this type in southeast Michigan. Stop-control for the service road and free movement for the off-ramp is the typical control setup for these merge situations.

The construction and reconfiguration of service drives will also result in numerous surface intersection improvements. The design of service drive intersections under the Build Alternative was based on all necessary and reasonable geometric configurations and traffic controls necessary to operate at acceptable levels of service through the design year (see Section 5.6). In addition, coordinated signal timing was assumed where appropriate to best represent optimum operating conditions. The proposed geometric configurations of surface street intersections are illustrated in **Figures 4A – 4O**.

2.1.1.3 I-94 Mainline

The Build Alternative would include the addition of one driving lane in each direction, redesign of exit and entrance ramps, and elimination of some ramps. The alternative would lengthen acceleration and deceleration lanes to correct many of the deficient weaving movements. Exit and entrance ramps east of I-75 would be redesigned to provide sufficient distances between them to meet current design standards where practical and feasible.

Some bridges over I-94 would be replaced in their existing locations as part of the Build Alternative. The majority of pedestrian overpasses would be reconstructed and some would be combined with vehicular bridges.

Full auxiliary lanes would be added along portions of I-94 between exit and entrance ramps for vehicle merging, acceleration, and deceleration. Acceleration lanes would allow vehicles to accelerate before merging with traffic in the travel lanes. Deceleration lanes would allow vehicles to slow down before exiting I-94. Presently, vehicles trying to enter I-94 move directly from an entrance ramp onto the freeway mainline. No acceleration lanes are available to allow entering vehicles to approach the speed of vehicles already on I-94, and no deceleration lanes are provided for vehicles to slow down to exit the freeway safely.

The locations of the auxiliary lanes for eastbound I-94 would be between:

- Westbound I-96 entrance ramp and eastbound I-96 entrance ramp;
- Eastbound I-96 entrance ramp and Linwood Avenue entrance ramp;
- Linwood Avenue entrance ramp and Trumbull Avenue exit ramp;
- M-10 entrance ramp and Brush Street exit ramp;
- I-75 entrance ramp and Chene Street exit ramp;
- Chene Street entrance ramp and Mt. Elliott Avenue exit ramp;
- Mt. Elliott Avenue entrance ramp and Van Dyke Avenue exit ramp;
- Van Dyke Avenue entrance ramp and Gratiot Avenue exit ramp; and
- Gratiot Avenue entrance ramp and Conner Avenue exit ramp.

The locations of the auxiliary lanes for westbound I-94 would be between:

- Conner Avenue entrance ramp and Gratiot Avenue exit ramp;
- Gratiot Avenue entrance ramp and Van Dyke Avenue exit ramp;
- Van Dyke Avenue entrance ramp and Mt. Elliott Avenue exit ramp;
- Mt. Elliott Avenue entrance ramp and Chene Street exit ramp;
- Chene Street entrance ramp and southbound I-75 exit ramp;
- I-75 entrance ramp and Brush Street entrance ramp;
- M-10 entrance ramp and Trumbull Avenue entrance ramp; and
- Trumbull Avenue entrance ramp and Linwood Avenue exit ramp.

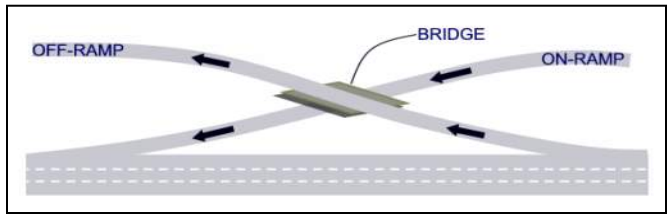
The M-10 and I-75 interchanges would be redesigned to include right-hand exit and entrance ramps. Retaining walls would be used along I-94 to reduce right-of-way acquisition and the number of displacements.

2.1.1.4 M-10 Mainline

The Build Alternative would involve the reconstruction of M-10 from West Grand Boulevard to ½-mile south of Forest Avenue. It would include lengthening of acceleration and deceleration lanes, elimination of inadequate weaves by relocating ramps, and provision of auxiliary lanes approaching and departing two-lane exit and entrance ramps.

Bridges over M-10 would be reconstructed because span lengths are inadequate to accommodate the proposed M-10 cross-section as part of the Build Alternative. The existing Canfield Avenue pedestrian bridge would be removed and replaced with a vehicular/pedestrian bridge near Selden Avenue due to the reconfiguration of the Forest Avenue interchange (see Section 2.1.1.6). Full auxiliary lanes would be added and designed per AASHTO requirements along portions of M-10 approaching two-lane entrance and exit ramp terminals.

Due to the inadequate spacing between the northbound Forest Avenue entrance ramp and the two-lane exit to eastbound and westbound I-94, the Forest Avenue exit and entrance ramps would be “braided” (one ramp bridging over the other) in the Build Alternative. Although the ramp configuration exists, an additional movement is introduced in the proposed configuration; i.e., the northbound M-10 existing exit to westbound I-94 would be converted from a left-hand exit to a right-hand exit. This would shift additional traffic to the right-hand ramp, which may result in operational issues that do not occur under existing conditions. Based on these items, the Forest Avenue exit and entrance ramps would be braided in the Build Alternative. An example of a braided ramp configuration is illustrated below. The 750-foot distance on southbound M-10 between the new eastbound I-94-to-southbound M-10 connector ramp and the existing Forest Avenue exit ramp does not meet the required ramp spacing distance of 2,000 feet. Thus, the Forest off ramp is relocated north of Warren on southbound M-10. Any traffic from eastbound I-94 wanting to go to the southbound M-10 service drive must exit on I-94 at Trumbull and utilize the continuous service drives.



Example: Braided Ramp Configuration

Due to the inadequate spacing between the Milwaukee Avenue entrance ramp to southbound M-10 and the eastbound and westbound I-94 exit ramp, modifications would be made under the Build Alternative. The existing Milwaukee Avenue entrance ramp would remain in its existing location but would be signed for I-94 traffic only; that is, vehicles using this entrance ramp can only access the I-94 ramps. In addition, an auxiliary lane would be provided along southbound M-10 on the approach to the I-94 exit ramp. For vehicles destined for southbound M-10, an additional ramp would be constructed along the southbound M-10 service drive (downstream of the existing Milwaukee Avenue entrance ramp) as a braid under the eastbound and westbound I-94 ramps. This new entrance ramp would be configured as a weave with the Warren Avenue exit ramp. The addition of the auxiliary lane prior to the I-94 exit and eliminating the weave movement between Milwaukee Avenue to southbound M-10 and southbound M-10 to eastbound and westbound I-94 would improve operations considerably.

The locations of the auxiliary lanes for northbound M-10 would be:

- Forest Avenue entrance ramp and I-94 exit ramp; and
- I-94 entrance ramp to M-10.

The locations of the auxiliary lanes for southbound M-10 would be:

- Milwaukee Avenue entrance ramp and Warren Avenue exit ramp;
- M-10 to I-94 eastbound/westbound exit ramp; and
- I-94 eastbound/westbound entrance ramp to Elm Street (Grand River Avenue) as a mandatory exit.

Retaining walls would be used along M-10 to reduce right-of-way acquisition and the number of displacements.

2.1.1.5 I-75 Mainline

The Build Alternative would minimize reconstruction along I-75 to the extent necessary to accommodate the I-94/I-75 interchange. During the development of the engineering report, design elements within the I-94/I-75 interchange would be established so as not to preclude future improvement alternatives along I-75. These might include:

- Providing adequate clear zone between ramp fly-over piers crossing I-75 so as to not preclude future general-purpose lanes;
- Offsetting ramps adjacent to I-75 to reduce future reconstruction to terminals only; and
- Locating service drives and associated retaining walls to provide maximum design flexibility, and other options as appropriate.

No crossroad bridges over I-75 would be replaced/reconstructed as part of the Build Alternative. With the reconstruction of I-94/I-75 interchange, the bridges carrying Ferry Avenue and Piquette Avenue over I-75 would be removed. Access across I-75 would be maintained via the continuous service drives along I-94 and I-75.

To accommodate service drives along I-75, retaining walls would be required at various locations, i.e., where a service drive is located along an existing side-slope, adjacent to new ramps, or to minimize right-of-way or building displacements. The precise limits of reconstruction along I-75 would be determined during the engineering report phase which is tentatively scheduled to begin in late 2004 or early 2005.

2.1.1.6 Relocated and Removed Access Points

In an effort to improve operations and safety, some I-94 ramps would be removed and not replaced. Other I-94 ramps would be removed and replaced at new locations to maximize ramp spacing, increase weave distances, and/or improve ramp geometry:

- The eastbound I-94 entrance ramp from Fourteenth Street would be removed, and access would be provided via the I-94 service drives. Eastbound freeway access is available four blocks west via the eastbound service drive between Linwood and Stanton streets.
- The eastbound I-94 exit ramp to John R Avenue would be removed and replaced with an exit ramp to Brush Street.
- The eastbound I-94 entrance ramp from Beaubien Street would be removed, and access would be provided via the I-94 service drives at Chene Street.
- The eastbound I-94 exit and entrance ramps to and from French Road would be removed, and access would be provided either by the Gratiot Avenue or Conner Avenue ramps. From both interchanges, the continuous service drives along I-94 could be utilized.
- The westbound I-94 entrance ramp from French Road would be removed, and access would be provided by either the Gratiot Avenue or Conner Avenue ramps. From both of these interchanges, the continuous service drives along I-94 could be utilized.
- The westbound I-94 entrance ramp from John R Avenue would be removed and replaced with an entrance ramp from Brush Street.

Three M-10 ramps would be removed from their current locations and replaced at new locations:

- The northbound M-10 entrance ramp from Forest Avenue would be removed and replaced south of the current location. The new entrance ramp would be braided with the Forest Avenue exit ramp.
- The northbound M-10 exit ramp to Milwaukee Avenue would be removed and replaced with an exit ramp located south of Holden Street. Access would be provided by the continuous service drives.
- The southbound M-10 exit ramp to Forest Avenue would be removed and replaced with an exit ramp north of Warren Avenue. Access would be provided by the continuous service drives.

One I-75 ramp would be removed from the current location and replaced at a new location:

- Southbound I-75 exit ramp to Warren Avenue would be removed and replaced with an exit ramp located north of the I-94 mainline. Access would be provided by the continuous service drives.

2.1.1.7 Additional Ramps

The majority of the existing I-94 exit and entrance ramps would be replaced in their current locations, removed from their current locations and not replaced, or removed and replaced at a new location. No new freeway entrance points are proposed. However, a new exit ramp is proposed from westbound I-94 to Chene Street to complete a partial interchange that currently exists. The Build Alternative would eliminate all partial interchanges along I-94 east of I-75 in the project area.

In addition, along southbound M-10, a new Milwaukee Avenue entrance ramp is proposed to maintain existing access while correcting deficient spacing between ramps. Due to the close proximity of the existing Milwaukee Avenue entrance ramp to the I-94 exit ramp, access from Milwaukee Avenue under the Build Alternative would be accomplished using two different ramps:

The existing southbound M-10 Milwaukee Avenue entrance ramp would now have access only to I-94; vehicles could no longer access southbound M-10 from that ramp.

The proposed relocated Milwaukee Avenue entrance ramp would be located further south of the existing ramp. The new ramp would enable vehicles to access southbound M-10 via the service drive south of Holden Street and Elijah McCoy Drive.

The addition of this ramp would maintain the existing access to both I-94 and M-10 from Milwaukee Avenue.

2.1.2 Existing and Proposed Access Changes

Reconstruction of all project area interchanges is proposed under the Build Alternative in order to improve the physical condition of the facilities. Most access points would be rebuilt in their current roadway configuration. However, in order to meet current design standards, including spacing requirements between interchanges, in some cases modification to access points are required. These modifications would improve or maintain access to the area, while increasing safety along the corridor.

The following I-94 interchanges are proposed to reconstructed under the Build Alternative:

- I-94 / Linwood Avenue
- I-94 / Trumbull Avenue
- I-94 / M-10
- I-94 / Brush Street
- I-94 / Beaubien Street
- I-94 / I-75
- I-94 / Russell Street
- I-94 / Chene Street
- I-94 / Mt. Elliott Avenue
- I-94 / Van Dyke Avenue
- I-94 / Gratiot Avenue
- I-94 / Conner Avenue

Based on the reconstruction of the I-94 freeway-to-freeway interchanges with M-10 and I-75, the following ramps would also need to be reconstructed:

- M-10 / Forest Avenue
- M-10 / Milwaukee Avenue
- Southbound I-75 / Warren Avenue exit ramp

In some locations, traffic currently merges and exits at distances less than that required by current AASHTO design standards, which provide greater distances for traffic turbulence to subside. The limited distances between access points results in weaving problems. Some exit and entrance ramps were therefore eliminated from the project area due to the close spacing to adjacent interchanges. In these instances, access would be provided by the continuous service drives running parallel to the freeway. Section 2.1.1.4 lists ramps that would be removed from their current locations and not replaced, and ramps that would be removed from their current locations and replaced at a new location.

The following subsections describe interstate access points that would be rebuilt with a different roadway configuration, relocated to a new location, or eliminated from the proposed design. Non-interstate ramps to local roadways (M-10) do not require a change in access approval, per FHWA guidelines; therefore, they are not included in the following subsections. Details on levels of service (a measure of operational performance and driver frustration) are provided in Section 3.1.5.3, and results under the Build Alternative are summarized in **Figures 19A – 19F** (see Volume 2). Further information on the affects of access changes on anticipated volumes under the Build Alternative can be found in Section 5.3.

2.1.2.1 I-94 / Fourteenth Street Interchange

The Fourteenth Street entrance ramp to eastbound I-94 is a single-lane ramp that currently serves a low volume of traffic (less than 350 vehicles per hour). No acceleration lane is provided for this entrance ramp, and therefore vehicles must enter the freeway at lower speeds than that of mainline traffic. This condition can result in sudden maneuvers by mainline vehicles to accommodate entering traffic, in some cases causing vehicular crashes. The primary crash types in this area of the Fourteenth Street entrance ramp are rear-end crashes, followed by fixed-object and sideswipe-same-direction crashes. These crashes are common where stop-and-go conditions exist.

This entrance ramp would be eliminated in the Build Alternative due to the deficient spacing between the Linwood Avenue entrance ramp and the Trumbull Avenue entrance ramp. The existing Fourteenth Street ramp could not be accommodated geometrically without significant design exceptions. Access would be provided by the continuous service running parallel to the I-94 freeway.

2.1.2.2 I-94 / M-10 Interchange

The I-94/M-10 interchange is a complete system interchange connecting I-94 with M-10, a multi-lane regional freeway. Originally constructed in the early 1950s, the interchange has reached the end of its useful life, as the design life of a highway facility is typically 20 years. Without reconstruction of the interchange, the current condition, both operational and physical, would severely limit the ability to improve mobility and the condition of the I-94 corridor.

The current configuration of the I-94/M-10 interchange, which includes left-hand entrances and exits, results in operational issues and constrained capacity. Within a distance of approximately 1.2 miles, I-94 intersects I-96, M-10, and I-75. The existing left-hand exits, coupled with the close spacing of other interchanges within the project area, encourages vehicles to weave across lanes on I-94 at relatively high speeds. For instance, a 1994 origin-destination study found that approximately 25 percent of southbound M-10 to eastbound I-94 vehicles travel to southbound I-75 during the AM peak hour. Therefore, approximately 25 percent of the vehicles entering eastbound I-94 on the left side at M-10 weave across three lanes of travel to exit to southbound I-75 on the right side over a distance of less than 0.75 miles.

In addition, the interchange has numerous limitations in terms of its physical layout and condition. Vehicular and pedestrian bridges are aging, and the ratings of the physical condition of the bridges that make up the interchange are substandard. The interchange bridges currently have sub-standard vertical underclearance. Furthermore, under the current interchange configuration, the ultimate cross-section for I-94 could not be constructed, since many of the existing interchange pier locations would conflict with the proposed locations of the additional I-94 general-purpose or auxiliary lanes.

The Build Alternative would include the redesign and reconstruction of the I-94/M-10 interchange, eliminating all left-hand ramps. Traffic interchanging between the two freeways would be accommodated via directional fly-over ramps, and would enter and exit on the right. In addition, the new design would accommodate continuous service drives through the interchange. The proposed design is shown in **Figures 4B and 4L**, Volume 2.

2.1.2.3 I-94 / John R Avenue Interchange

Currently, the John R Avenue interchange consists of a one-lane eastbound I-94 exit ramp and a one-lane westbound I-94 entrance ramp. The existing ramp locations, in relation to the M-10 and I-75 interchanges, do not meet AASHTO ramp spacing requirements. More than half the crashes that occur between M-10 and John R Avenue are rear-end crashes, most likely caused by congestion and weaving vehicles.

Based on the redesign of the I-94/M-10 and I-94/I-75 interchanges, the existing John R Avenue ramps could not fit geometrically without additional significant design exceptions. Early in the project, it was suggested that this interchange should be eliminated due to the close proximity with the I-94 interchanges with M-10 and I-75. However, the City of Detroit, New Center Area, Wayne State University, and the Detroit Medical Center all expressed opposition to this suggestion, stating the interchange was vital to their businesses and needs.

In order to reduce the number of design exceptions, the Build Alternative would include relocation of the John R Avenue ramps one block east to Brush Street, keeping the roadway configuration as it is today. The eastbound Brush Street exit ramp would be shifted east to maximize the distance provided for weaving maneuvers along I-94 between M-10 and Brush Street. The westbound Brush Street entrance ramp would be shifted west to meet minimum AASHTO ramp-spacing requirements between the two-lane I-75 entrance ramp and the Brush Street entrance ramp. The additional lanes within this segment of I-94, in addition to proposed design of the I-94/M-10 and I-94/I-75 interchanges, would help to reduce congestion and weaving in this area.

Various lane configurations were analyzed for this section of the freeway. Analysis results are in the I-94 Rehabilitation Project *Traffic Report, Volume 2: Simulation of Future Conditions* (January 2001) and *Traffic Report, Volume 3: Simulation of Year 2025 Conditions* (May 2002). The Volume 3 traffic report indicates that this section of the I-94 freeway is anticipated to operate at acceptable levels of service during the AM and PM peak hours (Level of Service E or better).

Access to John R Avenue from the new ramp locations would be provided by the continuous service drives running parallel to the I-94 mainline. The proposed design is shown in **Figures 4C** (John R Avenue) and **4D** (Brush Street), Volume 2.

2.1.2.4 I-94 / Beaubien Street Interchange

Currently, the Beaubien Street interchange consists of a one-lane eastbound I-94 entrance ramp from Beaubien Street. Based on the redesign of the I-94/M-10 and I-94/I-75 interchanges, the relocation of the John R Avenue ramps to Brush Street, and the location of the Russell Street exit ramp, the existing Beaubien Street entrance ramp could not fit geometrically without significant design exceptions and safety concerns. Due to the proximity between the Beaubien Street entrance ramp and the Russell Street exit ramp (approximately 870 feet separate the ramp gore points), significant weaving maneuvers occur within a short distance.

A design option was proposed that would retain the Beaubien Street entrance ramp and eliminate the Russell Street exit ramp to address the inadequate ramp spacing. However, the Russell Street exit allows truck traffic to access nearby industrial sites in the vicinity without traveling through residential neighborhoods. Several industrial sites (Detroit Department of Transportation garages and offices, the Thorn Apple Valley Plant, and other businesses) are located in the southeast quadrant of the I-94/I-75 interchange, and rely on this ramp for heavy vehicle access to their property. In order to avoid inducing truck traffic on residential streets, the Beaubien Street entrance ramp would be removed and the Russell Street exit ramp retained under the proposed Build Alternative.

The removal of the Beaubien Street entrance ramp would improve safety by eliminating the associated weaving maneuver. Access to I-94 would instead be provided using the Chene Street entrance ramp, which could be accessed using the continuous service drives running parallel to the I-94 mainline.

2.1.2.5 I-94 / I-75 Interchange

The I-94/I-75 interchange is a complete system interchange connecting two multi-lane interstate freeways. Originally constructed in the 1960s, the interchange has reached the end of its useful life, as the design life of a highway facility is typically 20 years. In 2002, portions of the I-94/I-75 interchange were rehabilitated, including deck replacements on all bridges within the interchange (a portion of the northbound/southbound I-75-to-eastbound I-94 ramp was fully reconstructed in early 2004 due to damage from a truck crash). However, while the physical condition of the interchange has been improved, without reconstruction, overall benefits of the Build Alternative, such as construction of additional mainline lanes and continuous service drives, cannot be achieved.

Under the current interchange configuration, the ultimate cross-section for I-94 could not be constructed, since many of the existing interchange pier locations would conflict with the proposed locations of the additional I-94 general-purpose or auxiliary lanes. Accommodating the additional general-purpose lane in each direction without fully reconstructing the interchange would require an elevated structure carrying I-94 traffic over I-75 (see Section 4.1.4). This configuration would significantly increase the cost of the project and would be aesthetically displeasing to people living in the area.

In addition, continuous service drives could not be accommodated without full reconstruction of the interchange. This feature is a critical element of mobility in the corridor, as it enables improved local access while reducing unnecessary freeway trips.

Under the Build Alternative design, all traffic interchanging between I-94 and I-75 would be accommodated via directional fly-over ramps, and would enter and exit on the right. Single-lane exit ramps would be provided for I-94 traffic exiting to I-75, with each ramp splitting to serve the two connecting directions. Traffic connecting from I-75 to I-94 would be served with two-lane exit ramps. Ramp merging is designed based on the volume of the maneuver, and auxiliary lanes are provided where desirable and feasible. In addition, the design would accommodate continuous service drives through the interchange. The proposed design is shown in **Figures 4D** and **4N**, Volume 2.

2.1.2.6 I-94 / Chene Street Interchange

Currently, the I-94 / Chene Street interchange is a partial interchange consisting of eastbound I-94 exit and entrance ramps and an entrance ramp to westbound I-94. All ramps are single-lane ramps, currently located between the I-94 interchanges with I-75 and Mt. Elliott Avenue. The Build Alternative would complete the I-94 / Chene Street interchange by providing a westbound I-94 exit ramp.

The addition of a westbound exit ramp at Chene Street would improve traffic circulation of trucks traveling to the industrial area east of the I-75 interchange by providing a direct connection. The industrial area includes the Detroit Department of Transportation garages and offices, the General Motors Cadillac Plant, and the Thorn Apple Valley

Plant. Currently, heavy vehicles must exit westbound I-94 at either Mt. Elliott Avenue or Beaubien Street and travel along the service drives or through residential neighborhoods. The new exit ramp would keep heavy vehicles off the surface streets and on the freeway for a longer period of time. In addition to the proposed westbound exit ramp, the eastbound I-94 exit ramp to Chene Street would be rebuilt as a two-lane exit ramp. The proposed design is shown in **Figure 4F**, Volume 2.

2.1.2.7 I-94 / Mt. Elliott Avenue Interchange

Currently, the I-94 / Mt. Elliott Avenue interchange is a complete diamond interchange. However, the westbound I-94 entrance ramp is located west of the interchange near Lucky Street. The proposed Build Alternative would shift the westbound I-94 entrance ramp east of its current location to form a standard diamond interchange. All existing access would be maintained under this proposed design. The one-lane exit and entrance ramps would connect to the continuous service drives that run parallel to I-94. Advanced U-turns would be provided to the east and west sides of Mt. Elliott Avenue, allowing service drive traffic to make a U-turn prior to the Mt. Elliott Avenue intersection. The proposed design is shown in **Figure 4H**, Volume 2.

2.1.2.8 I-94 / Gratiot Avenue Interchange

Currently the I-94 / Gratiot Avenue interchange is a partial cloverleaf configuration with ramps in the northwest and southeast quadrants. The eastbound and westbound I-94 exit ramps are one-lane loop ramps, flaring to two-lanes at the intersection. The ramp terminals are signalized and allow right-turn movements only from the off-ramps. One-lane entrance ramps to eastbound and westbound I-94 also are provided.

Presently, the primary crash types in this area are rear-end crashes, followed by fixed-object and sideswipe-same-direction crashes. This crash pattern could be symptomatic of the absence of deceleration and acceleration lanes for Gratiot Avenue traffic entering and exiting I-94. Without acceleration/deceleration lanes, vehicles must enter and exit the freeway at slower speeds than freeway vehicles, which can result in sudden slowing or lane change maneuvers by mainline traffic that can result in crashes.

Under the proposed Build Alternative, the Gratiot Avenue interchange would be reconstructed as a diamond interchange, with all current access being maintained under the new configuration. Safety would be improved with the addition of auxiliary lanes, allowing entering or exiting vehicles to adjust speed without interfering with mainline traffic. The one-lane exit and entrance ramps would connect to the continuous service drives located parallel to the I-94 freeway. All movements would be provided for at the service drive intersections with Gratiot Avenue. An advanced U-turn would be provided on the east side of Gratiot Avenue, allowing the westbound I-94 service drive to make a U-turn prior to the Gratiot Avenue intersection. The proposed design is shown in **Figure 4J**, Volume 2.

2.1.2.9 I-94 / French Road Interchange

The I-94 / French Road interchange is a partial diamond interchange with single-lane eastbound I-94 exit and entrance ramps and westbound I-94 entrance ramp, located between the I-94 interchanges with Gratiot and Conner avenues. This is a low-volume interchange, with ramps anticipated to carry less than 200 vehicles in the AM peak hour and 320 vehicles in the PM peak hour by the year 2025.

Based on the redesign of the Gratiot Avenue and Conner Avenue interchanges to current AASHTO standards, the I-94 / French Street interchange could not fit geometrically without significant design exceptions and safety concerns. Therefore, the interchange would be removed under the proposed Build Alternative. Removal of this interchange would have a positive impact on safety by reducing the number of conflict points (number of ramps intersecting with the freeway). Access would be provided by the continuous service drives located parallel to the I-94 freeway.

2.1.2.10 I-94 / Conner Avenue Interchange

Currently, the I-94 / Conner Avenue interchange is comprised of directional ramps and turnaround lanes in a unique configuration that can be confusing to motorists. Northbound and southbound Conner Avenue diverge through the interchange area to accommodate directional ramps and crossover movements within the median area between the two directions. The existing eastbound I-94 exit ramp merges with southbound Conner Avenue. Vehicles can either continue southbound or use a turnaround to travel northbound. Similarly, the existing westbound I-94 exit ramp connects to northbound Conner Avenue. Vehicles can either turn right to continue along northbound Conner Avenue, or they can continue straight where they loop around and connect on the left side of southbound Conner Avenue. Northbound and southbound Conner Avenue each has a one-lane westbound I-94 entrance ramp. Southbound Conner Avenue must use a turnaround to merge with northbound Conner Avenue vehicles before entering eastbound I-94.

There are a high number of rear-end crashes located east of the interchange along I-94, followed by fixed-object and sideswipe-same-direction crashes. This crash pattern could be symptomatic of the absence of deceleration and acceleration lanes for Conner Avenue traffic entering and exiting I-94. Without acceleration/deceleration lanes, vehicles must enter and exit the freeway at slower speeds than freeway vehicles, which can result in sudden slowing or lane change maneuvers by mainline traffic that can result in crashes.

Under the Build Alternative, the I-94 / Conner Avenue interchange would be reconstructed as a diamond interchange. This configuration would greatly simplify operations while maintaining all access that is currently provided. The one-lane eastbound I-94 exit ramp and the westbound I-94 entrance ramp would connect to the continuous service drives running parallel to the I-94 freeway. The eastbound I-94 service drive would become the Conner Avenue eastbound I-94 entrance ramp, once a vehicle passes through the intersection. The westbound I-94 Conner Avenue exit ramp would become the westbound I-94 service drive, once a vehicle passes through the intersection. All movements would be provided for at the service drive intersections with Conner Avenue. Safety would be improved with the traditional interchange design and the addition of auxiliary, acceleration, and deceleration lanes, allowing vehicles to speed up or slow down prior to mixing with freeway vehicles. An advanced U-turn would be provided on the west side of Conner Avenue, allowing the eastbound I-94 service drive to make a U-turn prior to the Conner Avenue intersection. The proposed design is shown in **Figure 4L**, Volume 2.

2.1.2.11 Southbound I-75 / Warren Avenue exit ramp

The southbound I-75 exit ramp to Warren Avenue is currently part of a braided ramp configuration, where the Warren Avenue exit ramp passes over the entrance ramp from I-94. Presently, I-94 vehicles entering southbound I-75 cannot exit at Warren Avenue.

Under the Build Alternative, the exit ramp to Warren Avenue would be relocated to the north, connecting to the southbound I-75 continuous service drive prior to the eastbound and westbound I-94 entrance ramps merging onto southbound I-75. The relocation of the ramp would improve access to the area for traffic along I-75 by enabling exiting traffic to access Ferry Avenue from the off-ramp as well. The proposed design is shown in **Figure 4P**, Volume 2.

2.2 ISSUES OF CONCERN OR CONTROVERSY

In the late 1990s, concerns were expressed at public meetings and by the City of Detroit about neighborhood cohesion and the number of residential, commercial, and industrial impacts. In order to address these concerns, an engineering value planning team was assembled in 1999 to refine and modify the design of the I-94 interchanges with M-10 and I-75. As a result of the value planning process, significant design enhancements were identified, and property and displacement impacts were reduced. This is included in the Draft Environmental Impact Statement (DEIS).

Comments on the DEIS and the adoption by the SEMCOG General Assembly of the transit report, *Improving Transit in Southeast Michigan: A Framework for Action* (October 2001), caused the study team to consider modifications to the DEIS Build Alternative. The original DEIS Build Alternative included provision of median space for future use for rail transit along the I-94 corridor. However, comments received during the DEIS process indicated that a narrower cross-section was desired by the community to reduce impacts on neighboring properties and reduce displacements. In addition, the *Improving Transit in Southeast Michigan: A Framework for Action* report indicated that while transit was considered for the I-94 corridor, it was not a recommended transit corridor. The study team therefore determined that the reserved space in the median could be eliminated, as there was no adopted regional plan for transit that included the I-94 corridor as a part of a regional transit system for southeast Michigan.

Based on the public comments and the results of the transit report, *Improving Transit in Southeast Michigan: A Framework for Action* (October 2001), three modifications to the DEIS Build Alternative were developed:

1. DEIS Build Alternative Modification One: Reduce the service drives to two 11-foot through lanes with an 8-foot multi-use lane[1] (a 10-foot reduction in width on each side) and eliminate the reserved space in the median reducing the median width to approximately 6 to 10 feet.

[1] Based on an agreement between the City of Detroit, the Federal Highway Administration, and the Michigan Department of Transportation, the 8 feet would be designated as a shoulder in the Build Alternative.

2. DEIS Build Alternative Modification Two: Reduce the service drives to two 11-foot through lanes with an 8-foot multi-use lane[1] (a 10-foot reduction in width on each side) and retain the 30-foot reserved space in the median.

3. DEIS Build Alternative Modification Three: Retain the three-lane service drives on each side of the mainline and eliminate the reserved space in the median reducing the median width to approximately 6 to 10 feet.

It is assumed that each modification to the DEIS Build Alternative would contain 12- to 14-foot inside shoulders on the mainline in addition to the median widths listed above.

The three modifications to the DEIS Build Alternative were evaluated against the following alternatives in order to determine a recommended Build Alternative for the project corridor:

- No-Build Alternative (do nothing except as-needed maintenance)
- Enhanced No-Build Alternative (rebuild the freeway as it exists today with minor roadway improvements)
- DEIS Build Alternative (as listed in the DEIS and in Section 4.1.13)

Based on the comparisons of the three alternatives and three modifications to the DEIS Build Alternative listed above, the DEIS Build Alternative Modification One, with refinements, was selected as the recommended Build Alternative.

In summary, the DEIS Build Alternative Modification One includes four through traffic lanes in each direction along I-94 with improved geometrics, provides a two-lane service drive, and provides a median without reserved space. The refinements include a 14-foot inside shoulder in each direction along the freeway; an 8-foot shoulder in each direction along the service drives instead of a multi-use lane (based on an agreement between the City of Detroit, the Federal Highway Administration, and the Michigan Department of Transportation) and a three-lane section of the eastbound service drive along I-94 between M-10 and I-75 based on projected traffic volumes. The service drives through the freeway-to-freeway interchanges would be one-lane in the study area to minimize impacts. On August 1, 2003, the Detroit City Council provided concurrence on the Build Alternative.

2.3 COST

The estimated cost of the Build Alternative, in year 2004 dollars, is $1,181,000,000 and is based on the preliminary engineering completed to date. The cost estimate assumes a 25 percent contingency. **Table 1** (see Volume 2) summarizes the estimated cost. The funding sources for this project have not been identified to date.

2.4 DISTANCE TO ADJACENT INTERCHANGES

Table 2 (see Volume 2) summarizes the spacing between the Build Alternative interchanges. The table provides the distances between ramp termini of each interchange and the crossroads between each interchange.

Within the project area along eastbound I-94, the spacing between ramps ranges from 635 to 3,315 feet (0.12 to 0.63 miles). Along westbound I-94, the spacing between ramps ranges from 960 to 3,390 feet (0.18 to 0.64 miles). Interchange spacing within the project area ranges from 365 to 5,395 feet (0.07 to 1.02 miles). A brief overview of proposed signing is described in Section 5.8.

The Build Alternative would allow for greater decision time for motorists by improving ramp spacing where practical and feasible. In addition, the elimination of exit and entrance ramps on the left side of the freeway would reduce driver confusion and weaving.

3.0 REGIONAL TRAFFIC NEED

This chapter describes the purpose and need for the I-94 Rehabilitation Project, as well as the traffic operations under the existing (year 1995) and future (year 2025) conditions.

3.1 PURPOSE OF THE PROPOSED ACTION

The purpose of the I-94 Rehabilitation Project is to improve the capacity, safety, and condition of the I-94 corridor to support the mobility needs of local and interstate commerce and national and civil defense. The project would also enhance local traffic circulation by separating local traffic from I-94 traffic. The project corridor, a 6.7-mile segment of I-94 in the City of Detroit, Michigan, is depicted below and in **Figure 1** (see Volume 2).

I-94 Rehabilitation Project - Traffic Study and Project Limits

The section of I-94 proposed for rehabilitation was constructed in the late 1940s and early 1950s; it is one of the oldest urban interstate freeways in the country. The project portion of I-94 is aged and requires frequent maintenance. In addition, the geometric configuration of various elements of the corridor is outdated. The current design and high traffic volumes contribute to inadequate capacity, especially during the morning and evening rush hours. The Annual Average Daily Traffic (AADT) in the project area ranges from 120,000 to more than 160,000 vehicles and is expected to grow by more than 35 percent by the year 2025. Due to I-94's link to international border crossings and the growing economy in southeast Michigan, the volume of heavy truck traffic on southeast Michigan interstates is expected to grow three times faster than the passenger vehicle volume. The Federal Highway Department Freight Analysis Framework stated that freight traffic is forecasted to grow at an annual average rate of over 4-percent to the year 2020.

3.2 PROJECT BACKGROUND

Southeast Michigan is an important industrial center between Toronto and Chicago, and I-94 is the primary east-west freeway corridor linking Michigan to Indiana, Illinois, and Wisconsin, and Ontario, Canada. International trade is increasingly important to Michigan's economy. The North American Free Trade Agreement (NAFTA) increased the globalization of Michigan's economy, and thus the importance of I-94. In 1999, the

Detroit area was the nation's top exporting metropolis, selling a total of $28.0 billion in merchandise to foreign markets (*Metropolitan Area Exports*, US Department of Commerce, 1999). The ability of the region and state to compete successfully depends, in part, on the quality of the region's transportation system.

Several studies completed in the last 18 years by the Michigan Department of Transportation (MDOT), the Southeast Michigan Council of Governments (SEMCOG), and the City of Detroit highlighted I-94's critical role as part of the interstate system in southeast Michigan. They include the following reports:

- *An Image Renaissance: Detroit I-94 – US 10 Entrance Corridor,* Wickens, 1986.
- *Greater Detroit Area Freeway Rehabilitation Program Study*, Michigan Department of Transportation, 1990.
- *2015 Regional Transportation Plan for Southeast Michigan*, Southeast Michigan Council of Governments, 1993.
- *Jump-Starting the Motor City – Detroit Empowerment Zone*, City of Detroit, 1994.
- *A Framework for Action: Recommendations of the Mayor's Land Use Task Force*, City of Detroit, 1995.
- *2020 Regional Transportation Plan for Southeast Michigan*, Southeast Michigan Council of Governments, 1997.
- *2025 Regional Transportation Plan for Southeast Michigan*, Southeast Michigan Council of Governments, 2000

The 2015 Regional Transportation Plan (RTP) for southeast Michigan first identified I-94 as a corridor with capacity, bridge, and pavement deficiencies. The plan recommended that a detailed study of the area be undertaken to find appropriate solutions to the problems evident within the corridor. The *Greater Detroit Area Freeway Rehabilitation Program Study* concurred with the findings and identified I-94 as the freeway in greatest need for improvement. The other reports support the crucial role of I-94 and the need to make transportation investments within the project area to preserve and enhance the region's economic vitality and quality of life.

The contribution of I-94 to the City of Detroit, the region, and to international trade continues to grow at a rapid rate. NAFTA has resulted in sharp growth in the area's cross-border freight traffic. I-94 connects the Michigan interstate system to Detroit and some of the busiest border crossings in North America:

- The Ambassador Bridge;
- The Detroit-Windsor Tunnel in Detroit; and
- The Blue Water Bridge in Port Huron.

Southeast Michigan's three international crossings carry the majority of the US-Canadian border traffic. Approximately 3.3 million commercial vehicles crossed the Ambassador Bridge in 2002. This volume of commercial vehicles exceeded that of any other border crossing in North America. The next busiest crossing at Laredo, Texas, carried approximately one-half that volume of commercial vehicles. The Intermodal Surface Transportation Efficiency Act (ISTEA) designated the I-69 corridor, a north-south and east-west interstate in Michigan, as a "High Priority Corridor." I-94 is a part of that corridor. The designation indicates the corridor's regional importance.

In addition to its importance to international traffic and commerce, I-94 serves as a vital transportation link within the Detroit metropolitan area. I-94, along with I-75 and I-96, form the core of Michigan's interstate highway system, and all intersect within the project area. Traffic from all parts of southeast Michigan use I-94 to access cultural, institutional, and major employment centers in Detroit. The corridor links regional airports in southeast Michigan, including Detroit Metropolitan Wayne County, Willow Run, Detroit City, and Ann Arbor. It is also the primary access to the proposed regional intermodal freight facility in southwest Detroit.

The corridor also has significance to adjoining neighborhoods, where existing activity centers along with ongoing redevelopment efforts drive the need for improved access and mobility. Some of the larger traffic generators that are dependent on I-94 include: Wayne State University (WSU), the New Center area, the General Motors Cadillac Plant, the Detroit Medical Center, Wayne County Community College, the Center for Creative Studies, General Motors World Headquarters, Henry Ford Hospital, the Detroit Institute of Arts, and the Museum of African American History. In addition, the area is experiencing an economic renaissance resulting from numerous redevelopment activities, and the project area includes locations that are candidates for residential, commercial, recreational, and industrial redevelopment.

3.3 DESCRIPTION OF THE PROJECT LIMITS

The project portion of I-94 (also known as the Edsel Ford Freeway) is 6.7 miles long and extends from just east of the I-94/I-96 interchange to the Conner Avenue interchange (**Figure 1**; see Volume 2). The traffic analysis includes an area of I-94 proposed for future projects and includes the major facilities of I-96 (the Jeffries Freeway), M-10 (the John C. Lodge Freeway), and I-75 (the Chrysler Freeway). Within the short distance of approximately 1.2 miles, I-94 intersects I-96, M-10, and I-75. Reconstruction of the M-10 and I-75 interchanges, which are nearly at the end of their useful life, are a part of this study.

The project corridor is an area of dense urban development with closely spaced interchanges. These interchanges serve numerous major traffic generators and provide access to the City of Detroit's central business district. The project area includes two major freeway-to-freeway interchanges and five interchanges with local streets, for a total of seven interchanges within less than seven miles. I-94 has high traffic volumes (1995 AADT volumes up to 160,000 vehicles) and complex operational characteristics due to the numerous system connections, local access connections, and high-volume destinations.

A 1995 travel time and delay study (*Traffic Report Volume I: Existing Conditions*) conducted for this project recorded actual measured peak-hour speeds of 30 miles per hour (mph) within the project area at several locations during the peak periods, particularly in the vicinity of the freeway-to-freeway interchanges. The posted speed limit is 55 mph. This substantial difference between the actual speeds and posted speed limit indicates the severity of the traffic congestion. In addition to having an impact on mainline I-94 traffic, the extent of this congestion at the interchanges with I-75, M-10 and I-96 impedes system connectivity and regional freight mobility. The 1940s – 1950s design of this section of I-94 is outdated and still includes such features as left-side entrance and exit ramps as well as deceleration and acceleration lanes that are inadequate for today's volumes and speeds. The corridor requires an extensive reconfiguration to improve operational flow, reduce congestion, and increase safety.

In 2002, the portion of I-94 east of Conner Avenue to Masonic Boulevard (a distance of approximately 12 miles) underwent a major rehabilitation. The work included:

- Repairing and resurfacing the pavement; and
- Rehabilitating or replacing 51 bridges.

Capacity improvements were not included in the work. West of I-96, the pavement and bridges need repair. A maintenance milling and resurfacing project from Wyoming Avenue to I-96 occurred in Fiscal Year 2003, and several bridges were repaired or replaced. All eastbound trucks over 13.5 feet high are now directed to exit at Wyoming Avenue since numerous overpasses east of Wyoming Avenue provide less than the current standard of 14.75 feet in vertical clearance.

3.3.1 Validation of Project Limits

Federal Highway Administration (FHWA) regulation 23 CFR 771.111 (f) outlines three principles for use in ensuring the meaningful evaluation of alternatives and avoiding commitments to transportation improvements before they are evaluated fully. These principles were used to evaluate the project limits for the I-94 project:

- *Logical Termini:* The project should connect logical termini and be of sufficient length to address environmental matters on a broad scope.
- *Independent Utility:* The project should have independent utility or independent significance. That is, the alignment needs to be usable, and it needs to be a reasonable expenditure of funds even if no additional transportation improvements in the area are made.
- *Other Improvements:* The project should not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Adherence to these principles promotes projects of sufficient length to allow consideration of the full range of environmental impacts that are likely to occur.

3.3.1.1 Logical Termini

I-94 from I-96 to Conner Avenue is identified in the statewide and regional plans as the roadway in most need of improvement in Michigan. While many segments of interstate roadway in the state exhibit congestion, deterioration, and safety issues, I-94 from I-96 to Conner Avenue is among the worst in these categories. In addition, this corridor is critical to Michigan's economic well-being, freight movement, and system connectivity. I-94 experiences average measured speeds less than 30 mph in peak periods at some locations. It contains 50-year-old pavement and bridges nearing the end of their service life. It includes seven closely-spaced interchanges with limited acceleration and deceleration lanes, left-hand entrances and exits, inadequate merging lanes, and high numbers of crashes.

Traffic volumes along I-94 decrease east and west of the project area, reducing congestion in those areas. West of I-96 and east of Conner Avenue, interchanges are spaced farther apart, and more space is available to place ramps and signing. Interchanges with other state, US, or interstate highways also are farther apart, making system connectivity less critical. In addition, between I-96 and Conner Avenue, major traffic generators draw large volumes of traffic and create a heavy reliance on I-94 for their continued success.

The unique circumstances existing between I-96 and Conner Avenue, together with the system connection to I-96 on the west and the 2002 improvements to I-94 to the east make the I-96 interchange and the Conner interchange the logical termini for this proposed improvement.

3.3.1.2 Independent Utility

I-94 is identified in the MDOT *Long-Range Plan 2000–2025* as the Corridor of Highest Significance in Michigan. It needs to be modernized and rehabilitated throughout its length. The section from east of I-96 to east of Conner Avenue exhibits several unique problems and circumstances (congestion, condition, outdated design, safety, and connectivity) which are discussed in this chapter and elsewhere in this document. In addition, the three freeway-to-freeway interchanges within and immediately adjacent to the project area (I-75, M-10 and I-96) elevate the importance of this segment of I-94 as a vital link in the regional freeway system. The unique problems inherent to this segment of I-94 that impede mobility and commerce differentiate it from adjacent segments and other freeways, and must be addressed in addition to the general need to rehabilitate I-94 throughout Michigan. Addressing these specific needs within the proposed project termini improves the performance of I-94 in that location and contributes to the performance of I-94 and the regional freeway system as a whole. The project's usefulness does not depend on other improvements being constructed.

3.3.1.3 Other Improvements

The rehabilitation of I-94 would not change its location, fundamental function, or its connections to other routes. The improvements would match the existing configuration of I-94 at the project termini and would not preclude any future roadway improvements within the corridor. In addition, since the October 2001 report, *Improving Transit in Southeast Michigan: A Framework for Action*, did not include the I-94 corridor in its recommended 12-corridor, 259-mile rapid-transit system, there are no reasonably foreseeable transit corridors along I-94. The continuous service drives would accommodate bus transit and consideration of bus accommodations such as turnouts and shelters for waiting passengers would be considered during design. Coordination with the City of Detroit is ongoing and would continue to ensure that I-94 would be consistent with local road and street improvements. The Build Alternative does not restrict the consideration of alternatives for other reasonably foreseeable transportation improvements.

3.3.2 Conclusion on the Validation of Project Limits

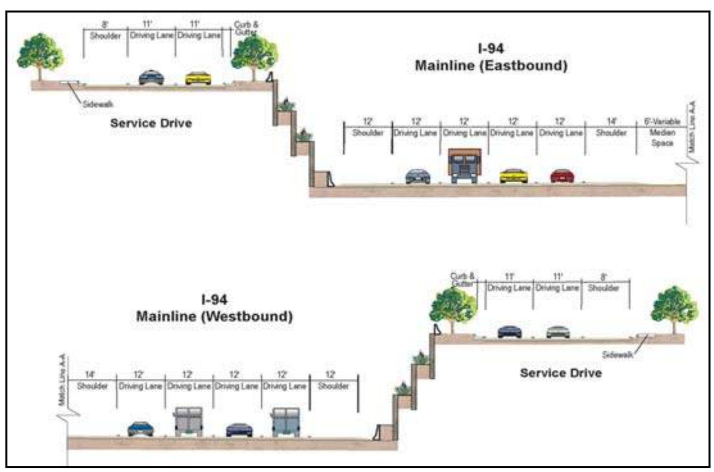
The project limits for the I-94 Rehabilitation Project are considered logical and appropriate due to:

- The recommendation for action in statewide and regional plans;
- The significance of the project area as a linkage in the regional freeway system;
- The unique characteristics and operational issues inherent to this segment of the corridor due to intensification of volumes in the area and an outdated design;
- The extensive reconstruction complete east of Conner Avenue;
- The diminished volume and congestion levels along the corridor west of the I-96 interchange;
- The importance of the project corridor to the regional freight network.

3.4 DESCRIPTION OF THE PROJECT

The Build Alternative would include an additional lane in each direction along I-94 and provide continuous service drives through the I-94 interchanges with M-10 and I-75. Specifically, this alternative would consist of:

- The addition of one general-purpose lane in each direction of I-94 within the project area (the project area is between east of I-96 and the Conner Avenue interchange);
- The redesign and reconstruction of all bridges and ramps within the project area, including the addition of auxiliary, acceleration, and deceleration lanes;
- The elimination of all left-hand exit and entrance ramps;
- Standard shoulders on both the inner and outer lanes of I-94;
- Updated geometric designs for the I-94/M-10 and I-94/I-75 interchanges; and
- One-way continuous service drives with two travel lanes and sidewalks, located parallel to both sides of the I-94 mainline freeway within the project area. A three-lane service drive would be provided along the eastbound I-94 service drive between M-10 and I-75, based on the projected volume of traffic in this area. One-lane service drives would be provided through the freeway-to-freeway interchanges in the study area.
- One-way continuous service drives with two travel lanes and sidewalks, located along M-10 from Pallister/Seward Avenues to Forest Avenue and I-75 from Warren Avenue to Clay Avenue. One-lane service drives would be provided through the freeway-to-freeway interchanges in the study area.



Build Alternative Typical Cross-Section

The proposed typical section is shown at right and in **Figure 2** (see Volume 2).

3.5 NEED FOR THE PROPOSED ACTION

The existing I-94 freeway in the project area was built in the late 1940s and early 1950s and is approaching the end of its service life. The pavement and bridges are in poor condition and require extensive maintenance. The condition of the existing facility drives the need for action.

In addition, other problems must be addressed by any proposed solution. While I-94 was a state-of-the-art freeway when it was built, the configuration of the corridor is outdated and inefficient for modern use. Congestion is pervasive throughout the project area due to high traffic volumes and the deficient design of the corridor. With traffic volumes anticipated to increase by 35% by 2025, congestion would continue to worsen, further impeding regional mobility. As a key corridor for international trade and regional freight movement, the impact of this growing congestion is far-reaching. Michigan manufacturing businesses increasingly depend on integrated supply chain logistics and just-in-time delivery, making freight mobility within this corridor critical to the State's economy. Furthermore, as a point of connection between four major freeways (I-94, I-96, M-10 and I-75), continued congestion within the project corridor would impact not only I-94 traffic, but the connectivity of the broader regional freeway network as well.

Improvements to the corridor are also needed to enhance safety, improve local traffic circulation, and to better provide for non-motorized transportation within the project area. The current spacing of ramps, use of left-hand entrances and exits, and lack of acceleration/deceleration lanes, all play a role in creating safety issues along the corridor. In addition, because of a lack of continuous surface streets, local traffic frequently uses I-94 to complete short trips. The resulting increase in freeway traffic volumes, along with additional weaving movements at entrance and exit ramps, exacerbates congestion and increases crashes. This lack of service drive and local road continuity also has an impact on non-motorized mobility within the project area.

3.5.1 Sufficiency Rating

The condition of I-94 within the project area is described by sufficiency rating scores given to the various segments of I-94 and its interchanges with M-10 and I-75. MDOT produces a sufficiency report, which includes a point system for evaluating and comparing the adequacy of each segment of roadway under state jurisdiction. The sufficiency rating is a combination of points from four categories: number of traffic crashes, roadway capacity, physical condition of the roadway base, and physical condition of the roadway surface. The maximum points for these categories are 30, 30, 15, and 25, respectively. **Table 3** (see Volume 2) shows that a facility in excellent condition has a sufficiency rating between 90 and 100 points.

The MDOT *1998 Sufficiency Rating, Michigan State Trunkline Highways* report rated segments along I-94 within the project area as less than 40. This is the lowest-possible rating in the MDOT Sufficiency Rating Report, and is described as "poor" pavement condition. The 2001 sufficiency rating scores did not improve since no corrective action was taken between the 1998 and 2001 study. **Table 4** (see Volume 2) contains the 2001 sufficiency ratings for I-94, M-10, and I-75.

I-94 within the project area was milled and resurfaced in 2002. The project was a short-term improvement intended to provide an acceptable riding surface until major rehabilitation could be initiated. This improvement is expected to last five to seven years.

3.5.2 Bridge Conditions

Condition ratings for bridge decks, superstructures, and substructures indicate that many of the bridges within the project limits need major repairs. In addition, the bridges on or over I-94 have loading and structural deficiencies and limited vertical clearances (the height of a bridge above the pavement). The vertical clearance at many of the overpass structures is less than the current MDOT minimum standard of 14.75 feet.

SEMCOG's bridge sufficiency ratings indicate that 34 of the project area's 77 bridges are structurally deficient and that 16 of those 34 bridges are functionally obsolete (*Status of Bridges in Southeast Michigan*, SEMCOG, April 2002). Structural adequacy or deficiency is related to a bridge's ability to carry a given weight or load. Functional adequacy or deficiency is related to a bridge's width or vertical clearance over the waterway, railroad, or other highway being crossed. For structural or functional purposes, all bridges in the project area would need to be replaced to accommodate additional through-traffic lanes and wider shoulders for the mainline and meet the MDOT minimum standard of 14.75 feet.

3.5.3 Traffic Congestion

The Annual Average Daily Traffic (AADT) on I-94 in the study area ranges from 120,000 to more than 160,000 vehicles and is expected to grow by more than 35 percent by the year 2025. This growth does not account for future demand by heavy trucks. Truck traffic has been growing steadily on I-94 at a rate of five to seven percent each year. Current truck traffic ranges from five to ten percent of the total traffic within the project limits.

SEMCOG's 2015, 2020, and 2025 Regional Transportation Plans (RTPs) identified I-94 as capacity-deficient. The number of lanes and geometric configuration of interchanges of I-94 within the project area are insufficient to efficiently carry the number of vehicles that use the facility.

Level of service (LOS) is a qualitative measure describing operational conditions of traffic, generally defined in terms of speed and travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. In other words, level of service describes the degree of congestion, where LOS A represents the best operating conditions and LOS F represents the worst. The following are definitions of operating conditions associated with different service levels:

- LOS A: Free flow; no restrictions on operating speed
- LOS B: Stable flow; few speed restrictions
- LOS C: Stable flow, higher volumes; restricted speed and lane change
- LOS D: Approaching unstable flow; little freedom to maneuver
- LOS E: Unstable flow; lower speed with some stops
- LOS F: Forced flow; low speed with many stops

MDOT considers LOS A through D desirable for Michigan roadways and LOS E is acceptable in urban areas if the occurrence of LOS E is limited to peak hours. I-94 currently operates at LOS E and F within the project limits during peak periods. As traffic volumes increase in the future, the level of service would worsen. The 2025 traffic analysis indicates that the project corridor is predicted to experience widespread congestion in both the AM and PM peak hours if improvements are not implemented. Increased congestion would adversely impact the economy of southeast Michigan by increasing the cost of travel, which is a significant component of business cost. It has been estimated that transportation costs and the related burden of carrying excessive inventory can easily swamp direct labor costs. Both of these major expenses are closely tied to the capacity, speed, and flexibility of the transportation infrastructure. The addition of a through-traffic lane in each direction would increase the capacity of the roadway and improve the level of service.

Although I-94 is currently a six-lane facility (three lanes in each direction), the lack of auxiliary and acceleration and deceleration lanes reduces the functional capacity of the outside lanes. Without acceleration lanes, vehicles enter the facility at a reduced speed and cause through vehicles in the outside lanes to slow down. Vehicles exiting I-94 slow down in the outside through lanes since no separate deceleration lanes exist. Therefore, the outside lanes carry relatively little traffic since through traffic uses the inside lanes to avoid these slowdowns and other potential problems associated with entering and exiting vehicles. Traffic merges and diverges at distances less than what is required by current American Association of State Highway and Transportation Officials (AASHTO) design standards, which provide greater distances for traffic turbulence to subside. The short distance results in weaving problems. The addition of acceleration and deceleration lanes would improve operations of through traffic.

Traffic using the corridor during peak hours, particularly the evening period, operate under congested conditions, resulting in frequent stopping of vehicles. This situation is often made worse by traffic incidents which can block the interstate. Inadequate shoulder widths prevent disabled vehicles with mechanical failure or flat tires to park completely out of the outside driving lane. Vehicles in those lanes must slow to avoid the disabled vehicles. Increasing the width of the shoulders would enable disabled vehicles to park out of the driving lanes and would improve safety conditions for drivers and stranded motorists.

3.5.4 Local Traffic

Local traffic has been found to use I-94 to travel short distances due to the lack of connectivity of local roadways within the corridor. This traffic contributes to congestion along the corridor by increasing the overall mainline volume and the frequency of weaving maneuvers over short distances. The Build Alternative proposes the construction of continuous service drives along I-94 through the M-10 and I-75 interchanges. Continuous service drives would separate local traffic from regional traffic, resulting in reduced local trips on the mainline, less local trips on entrance and exit ramps, increased safety, and improved access to adjacent development.

3.5.5 Safety

Traffic crashes cause property damage, injuries, and loss of life, as well as adding to driver delay and frustration. **Tables 5A – 5D** (see Volume 2) provide crash data for the I-94, M-10, and I-75 freeways within the project area, including interchanges adjacent to the project limits. These tables provide the location of each segment, the total and average number of crashes, the number of injury crashes, the injury severity count, and the number of crashes by crash type on that segment for a three-year time frame (1999, 2000, and 2001) by freeway.

Of the 28 freeway segments analyzed along the I-94 freeway, 13 segments have between 50 and 99 crashes, and nine segments have more than 100 crashes during the three-year analysis period within the project area only. The predominant crash types within the 28 segments during the three-year analysis period are rear-end crashes, followed by either sideswipe-same-direction direction or fixed-object crashes. This might indicate that, during congested conditions, vehicles are stopping suddenly and are being hit by the vehicle behind them. Some vehicles might swerve to miss hitting another vehicle and either hit the vehicle in the adjacent lane (sideswipe-same-direction) or hit the barrier wall along the freeway. Within the project area, there were seven fatal crashes during the three-year analysis period; six occurred along segments having more than 100 crashes during the three-year analysis period.

Of the eight freeway segments analyzed along the M-10 freeway, six segments have between 50 and 99 crashes and zero segments have more than 100 crashes during the three-year analysis period within the project area only. The predominant crash types within the eight segments during the three-year analysis period are rear-end crashes, followed by either sideswipe-same-direction or fixed-object crashes. There were no fatal crashes within the project area during the three-year analysis period.

Of the eight freeway segments analyzed along the I-75 freeway, three segments have between 50 and 99 crashes and one segment has more than 100 crashes during the three-year analysis period within the project area only. The predominant crash types within the eight segments during the three-year analysis period are rear-end crashes, followed by sideswipe-same-direction crashes. There were two fatal crashes within the project area during the three-year analysis period.

The configuration of many elements of the corridor contribute to the number and severity of traffic crashes. For instance, the current configuration of the M-10 interchange allows for left-hand exits which, when coupled with the close spacing of other interchanges within the project area, encourages vehicles to weave across lanes on I-94 at relatively high speeds. The lack of auxiliary and acceleration lanes cause vehicles to enter the facility at a reduced speed and cause through vehicles in the outside lanes to slow down. Vehicles exiting I-94 slow down in the outside through lanes since no separate deceleration lanes exist. Traffic merges and diverge at distances less than that required by current AASHTO design standards, which provide greater distances for traffic turbulence to subside. The short distances result in weaving problems, contributing to the number of vehicular crashes.

In addition to human and economic losses that result from these crashes, traffic flow is significantly disrupted. According to SEMCOG's 2020 Regional Transportation Plan, more than 40 percent of all congestion in urban areas is due to traffic incidents, which are predominantly traffic crashes. Traffic management on the interstate system is especially difficult when traffic incidents occur. Traffic along I-94 is often delayed for long periods of time while traffic crashes are investigated and cleared. Since I-94 is used extensively by local and regional traffic and for regional, interstate, and international goods movement, traveler delay and lost productivity caused by traffic crashes can be extensive.

Improvements to the geometric configuration of the I-94 corridor would contribute to the reduction of the number and severity of traffic crashes while at the same time improving the level of service in the study area. The I-94 corridor, including the exit and entrance ramps and the M-10 and I-75 interchanges, would be constructed to meet or exceed current geometric standards where practical and feasible. The addition of auxiliary and acceleration/deceleration lanes would provide motorists a safe area to accelerate to the speed of through traffic when entering the freeway or to slow to a safe speed prior to exiting the freeway. Eliminating left-hand exits would eliminate vehicles traveling at high speeds weaving across the freeway to access a right-hand ramp. The additional travel lane in each direction would increase the capacity of roadway which improves traffic operations. In addition, the provision of 14 foot inside shoulders would provide space for:

- Emergency vehicle access to respond to incidents;
- A refuge area for disabled vehicles;
- An increase in horizontal sight distance;
- Improved capacity by meeting minimum shy-distance offsets: and
- A vehicular recovery area and snow removal/storage space.

3.5.6 Transit, Pedestrians, and Bicyclists

Non-motorized transportation is important to residents in the project area. Twenty-four percent of those responding to a 1995 Citizens' Impact Survey taken in the project area do not own a car, which is consistent with data from the 2000 Census. According to the survey, 16 percent use transit, which makes it an important element in providing mobility to the area's population. Although I-94 is a direct route to downtown Detroit and other important destinations, it is not conducive to bus use. Circuitous surface streets and the lack of continuous service drives are not conducive to bus routes, and can make pedestrian and bicycle trips unnecessarily long.

Pedestrians and bicyclists have no through access adjacent to I-94 because the sidewalks and roadway are discontinuous. Although sidewalks are present along the existing service drives, the sidewalks end where the service drives end. In addition, many of the sidewalks are not compliant with the Americans with Disabilities Act (ADA); the ADA requires lower curbs, ramps, and other features that allow easier access to persons with physical handicaps.

In order to serve the large number of people with no access to automobiles, the Build Alternative would provide sidewalks (at least 6 feet wide) along the service drives, through the interchanges, and on all reconstructed bridges and cross-streets. These proposed continuous sidewalks, together with pedestrian signals at signalized intersections and other pedestrian-friendly features, should improve pedestrian mobility in the project area. Bicyclists also should experience improved mobility with the continuous sidewalks and the possibility of using the multi-purpose lane and bridges along and across the I-94 corridor.

3.5.7 Economic Setting

Another important element of the I-94 project is how the project is needed to accommodate the area's evolving economic setting. New development is occurring at Wayne State University, the New Center Area, the Cultural Center, the new sports stadiums, the medical complex, and infill residential development in the project area. New residential development and a fuel cell research center are planned or underway immediately adjacent to the project corridor.

The I-94 corridor is exhibiting new economic vitality, and I-94 can contribute to (or detract from) that setting. The City of Detroit needs to encourage positive economic growth and to support the growth that is already occurring. A rehabilitated I-94, with adequate capacity and an improved visual image, would contribute to a positive economic climate that would encourage further economic investment.

3.5.8 I-94 System Connectivity and Continuity

An important function of this section of I-94 is to connect a number of freeways, state highways, international border crossings, and major traffic generators. These connections allow I-94 to provide continuous travel through seamless links between multiple highways.

Within the project limits (or immediately adjacent thereto), I-94 intersects I-96, M-10, I-75, M-53 (Van Dyke Avenue), and M-3 (Gratiot Avenue). It also crosses M-1 (Woodward Avenue) but does not provide direct access to M-1. With numerous routes depending on I-94 to provide links to other routes, its condition and capacity have considerable impact beyond the interstate's own limits. If congestion or repairs to an aging facility prevent drivers from using I-94 to make their connections and continue their travel, they would seek other routes through the local street network or secondary connections. The use of other routes would result in circuitous travel, loss of time, and impacts to other neighborhoods.
I-94 provides access to the southeast Michigan international border crossings, and its condition and capacity affect economic efficiency and the well-being of southeast Michigan's economy. It also connects a number of major traffic generators adding to its effect on the economy.

Wayne State University, Henry Ford Hospital, the Detroit Medical Center Complex, the New Center area, the Cultural District, and the General Motors Cadillac Plant are within the project limits. Other nearby major traffic generators include the two professional sports stadiums and the Detroit central business district. The connections and continuity provided by I-94 to other routes, international border crossings, the Interstate system, and businesses contribute to the success and well-being of the traffic generators mentioned above along with other businesses in the area.

3.6 PROJECT GOALS AND OBJECTIVES

The Interagency Coordination Committee (ICC)—composed of representatives of MDOT, SEMCOG, the Detroit Department of Transportation (DDOT), Wayne County, Macomb County, the Suburban Mobility Authority for Regional Transportation (SMART), the City of Detroit, and the Federal Highway Administration (FHWA)—was established to guide development of the I-94 Rehabilitation Project. Based on an analysis of the need for the project and information collected at various meetings held in the initial stages of the study, the ICC developed four goals for the project. The four goals are described below.

Goal 1, Mobility: Maintain and enhance safe and efficient transportation for passengers and freight on I-94 including the M-10 and I-75 interchanges.

Goal 2, Access and Development: Improve access and enhance the potential for economic development in the I-94 rehabilitation corridor and adjacent areas.

Goal 3, Environment: Maintain and enhance the beneficial social, economic, and environmental effects of the I-94 rehabilitation corridor while minimizing adverse impacts.

Goal 4, Cost-Effectiveness: Develop an efficient transportation system that maximizes return on limited resources, recognizing that benefits include enhancements to accessibility, community cohesion, job development potential, and service to transit users.

4.0 REASONABLE ALTERNATIVES

This chapter describes alternatives considered but eliminated from further consideration, as well as alternatives with elements that are compatible with and may potentially complement the Build Alternative. These alternatives are described in greater detail in the *I-94 Rehabilitation Project Draft Environmental Impact Statement* (January 2001) and the *I-94 Rehabilitation Project Recommended Alternative Analysis* report (August 2002).

4.1 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

After evaluation, some alternatives were eliminated from further consideration because they did not meet the purpose and need of the project or the goals and objectives established for the study. The alternatives and the reasons for eliminating them from further consideration are described in this section.

It should be noted that initial alternatives evaluated for the corridor (described in Sections 4.1.1 – 4.1.4) did not consider reconstruction of the M-10 and I-75 interchanges. Reconstruction of these interchanges was added to subsequent alternatives after it was determined that without improvements, they would continue to severely limit the operation of I-94 and the ability to expand the corridor. The locations of existing bridge piers within the interchanges preclude widening of I-94 without significant reconfiguration or construction of cost-prohibitive fly-over bridges to carry the widened roadway over the interchanges. In addition, the existing left-side ramps at the I-94/M-10 interchange would continue to induce weaving maneuvers that represent a safety issue and reduce the operational efficiency of the roadway. It was therefore determined that improvements to these interchanges must occur in order to fully address the needs identified for this project.

4.1.1 Use of Grand Trunk Western/Conrail Rail Corridor as a Truck Route

Use of the Grand Trunk Western/Conrail rail corridor as a truck route was evaluated early in the study process as an option to reduce truck traffic along I-94, thereby decreasing overall traffic volumes and maneuvers in the corridor. The alternative would involve conversion of the existing rail corridor, which runs parallel to and north of I-94, to a truck-only route with appropriate connections to the regional roadway system. It was anticipated that a set of tracks would be vacated as a result of the consolidation of Grand Trunk Western and Conrail operations. However, this alternative was found not to meet the needs of the proposed project and have questionable feasibility for numerous reasons, including:

- Existing active rail service to industrial users would be lost because of track crossings, configurations, and switching requirements.
- The existing elevation of the railway grade is approximately 12 feet above ground level and would preclude access to local roads.
- In a number of areas, commercial and industrial buildings are located adjacent to rail structures. To access local streets from the proposed roadway, the buildings located adjacent to the rail structures would need to be acquired and removed.

- The proposed new roadway would have to be shifted south to allow for either construction of ramps or lowering the grade of the roadway to cross city streets at grade.
- New right-of-way would have to be acquired, and homes and businesses would be displaced.
- The proposal would involve substantial costs.
- None of the existing 18 railroad bridges is suitable for highway use; each would need to be replaced at a significant cost.
- The vertical clearances for existing railroad structures over Detroit roadways are approximately 12 feet which are substandard. The proposed alternative would require raising the railroad and highway elevations or lowering the crossroads, significantly increasing costs of the alternative.
- Funding of this alternative with federal aid would be uncertain because of the distance from I-94 to the proposed truck route. The truck route would not be a true interstate highway and would not be eligible for federal funding. The distance would make it difficult to justify the facility as an interstate service facility dedicated to truck use.
- High-speed rail service now under consideration between Detroit and Chicago would potentially operate within this railroad right-of-way. Consequently, it was not certain that the tracks and right-of-way would be removed from rail use.

This alternative would add substantial costs to the proposed project and address the need of only one group of I-94 users (trucks). Moving trucks to this facility would provide only partial relief to current traffic congestion on I-94 and would not satisfy the need to reduce traffic congestion.

4.1.2 Reconstruct I-94: Add HOV Lanes without Improvements to the M-10 and I-75 Interchanges

The addition of one high-occupancy vehicle (HOV) lane in each direction on I-94 was considered as a way to add roadway capacity while encouraging ride-sharing as a means to control total vehicle trips in the corridor. The HOV lane would be a substitute for a fourth additional general-purpose lane. In addition to HOV lanes, this alternative would include the redesign of all exit and entrance ramps, as well as calling for the elimination of some ramps. Reconstructed ramps would be relocated to provide sufficient distance between ramps to meet current highway design standards. Acceleration and deceleration lanes also would be included as part of this alternative.

This alternative was considered primarily because of its potential to relieve traffic congestion and thereby improve air quality. Congestion and air pollutants would be reduced by moving more people in fewer vehicles. Fewer vehicles would translate into smoother operating conditions.

A region-wide HOV analysis, *Southeast Michigan High-Occupancy Vehicle Feasibility Study* (May 1999), was conducted to determine the viability of the concept. Seven counties were included in the study: Wayne, Macomb, Oakland, Monroe, Livingston, Washtenaw, and St. Clair. The I-94 HOV alternative was included in the analysis as part of a larger regional HOV system. To optimize the benefits and to be most effective, the HOV lanes would have to extend beyond the study limits of the project. The analysis found that I-94 did not meet several of the criteria established for candidate HOV facilities. One important criterion utilized was the number of vehicles per hour forecasted to use the HOV facility. Federal Highway Administration (FHWA) guidelines suggest a minimum threshold of 500 vehicles per hour per lane. The forecast indicated that the I-94 HOV alternative would attract only 300 vehicles per hour.

Due to lack of forecasted use, this alternative would not meet the need to reduce congestion or improve operations or safety. Therefore, the alternative was dropped from further consideration.

4.1.3 Reconstruct I-94: Add Unconventional Service Drives without Improvements to the M-10 and I-75 Interchanges

Under this alternative, a single general-purpose lane in would be added in each direction, along with redesign the ramps, provision of reserve space in the median for future expansion, and construction of continuous service drives adjacent to I-94 without improving the M-10 and I-75 interchanges.

The service drives would be located parallel to I-94 for the length of the project, but would be "unconventional" because they would not be adjacent to I-94 in all locations and would not always be located on both sides of the freeway. In some locations, the service drives would shift to one side of the freeway and become a two-way boulevard. The "boulevard" concept for the service drives would address the City of Detroit's economic development objectives by providing access to redeveloping neighborhoods and business areas. However, as the study progressed, concerns were raised regarding the feasibility of this unconventional service drive concept:

- Access to the freeway would be limited.
- A potential would exist for I-94 traffic to seek alternate routes through the residential neighborhoods, because the service drive would not be adjacent to the interstate.
- Impacts of relocations and neighborhood disruptions required by alignment of the service drives through neighborhoods would result.
- Traffic and noise would increase in neighborhoods through which the alignments of the unconventional service drives would pass.
- Emergency access to I-94 would be poor.
- In the event of an incident on the interstate, all interstate traffic (including heavy trucks) would be forced to use these routes, which would increase noise levels and vibration in adjacent neighborhoods.

As indicated in Section 3.1.6, one of the study goals is to minimize the adverse impacts resulting from implementation of the proposed project. The concerns regarding impacts of this alternative outweighed its benefits. The alternative would not meet the needs of:

- Replacing interchanges; or
- Improving traffic operations and safety on the I-94 mainline.

The concept was eliminated from further consideration.

4.1.4 Reconstruct I-94: Add Lanes and Provide Reserved Space for Future Expansion without Improvements to the M-10 and I-75 Interchanges

This proposed alternative would consist of:

- The addition of a general-purpose lane in each direction;
- Three-lane continuous service drives adjacent to I-94 in each direction;
- The reconstruction of the existing roadway and bridges on I-94; and
- Provision of reserved median space for future use.

The addition of the general-purpose lanes would reduce the level of current and projected traffic congestion on I-94. However, the M-10 and I-75 interchanges would not be improved, which would severely limit the operation of I-94. Without improvements to these interchanges, this alternative could not meet safety, congestion and operational improvement needs, and was eliminated from further consideration.

4.1.5 Reconstruct I-94: Improvements to the M-10 and I-75 Interchanges with Collector-Distributor Roads

This proposed alternative would include the addition of one general-purpose lane in each direction, acceleration/deceleration lanes, continuous service drives, and the reconstruction of the existing roadway and bridges on I-94. It also would include provision of reserved space in the median to accommodate future uses.

Construction of collector-distributor roadways was considered under this alternative to improve operations between the M-10 and I-75 interchanges. A collector-distributor roadway is a facility that collect traffic from the mainline and distribute it to other roads. It is separated from the mainline and allows no access to abutting property. To access an exit ramp, traffic must exit the mainline onto the collector-distributor road prior to the exit ramp and then access the ramp from the collector-distributor road. Similarly, to access the mainline, traffic would use the entrance ramp to access the collector-distributor road that has an entrance onto the mainline. By separating these entering and exiting movement from the mainline, weaving movements are eliminated that reduce the efficiency of the mainline roadway for through traffic flow.

This proposed alternative addresses many of the goals of the study, such as improved mobility and access within the project area. It also would provide added safety by reducing weaving on the mainline. However, construction of collector-distributor roadways would require significant additional right-of-way beyond other alternatives for improving the M-10 and I-75 interchanges without corresponding additional benefits. The alternative was therefore eliminated from further consideration.

4.1.6 Reconstruct I-94: Original Design of Improvements to the M-10 and I-75 Interchanges with Continuous Service Drives

This proposed alternative would consist of the addition of one driving lane in each direction on I-94, acceleration/deceleration lanes, three-lane continuous service drives on each side of I-94, and reconstruction of the pavement, retaining walls, ramps, and bridges on I-94. It also would include provision of reserved space in the median to accommodate future uses. This alternative would include the reconstruction of the M-10 and I-75 interchanges with three-lane, one-way continuous service drives on each side of I-94, M-10, and I-75 to provide connectivity for local traffic to travel through the interchanges. It would remove all left-hand ramps and replace them with right-hand entrances and exit ramps.

The two additional mainline lanes, for a total of four in each direction, would be general-use. The addition of two driving lanes would reduce current and future congestion on I-94. Acceleration and deceleration lanes would reduce the amount of weaving and improve safety and capacity. The design of I-94 under this alternative would accommodate future expansion of I-94 or transit use within the median space, although transit is not considered for implementation as part of this project.

This alternative would require the acquisition of the Research Park Apartments, a building that houses several hundred residents who would require relocation. The Fourth Street neighborhood also would need to be acquired and its residents relocated. For these reasons, this alternative was eliminated from further consideration. However, many of its design concepts were included in a refined alternative.

4.1.7 Refinement of Design of Improvements to the M-10 and I-75 Interchanges with Continuous Service Drives

The concepts of continuous service drives and reconstructed interchanges were retained in this alternative, but the displacement of the residents of the Research Park Apartments and the Fourth Street neighborhood was avoided through design modifications. However, the Fourth Street neighborhood would be located between the mainline roadway and the new service drive.

The Refined Continuous Service Drives Alternative was further refined to reduce right-of-way acquisition and improve access along the remainder of the project.

This alternative was dropped from further consideration since it did not provide the desired access from M-10 and I-94 to the New Center Area via Milwaukee Avenue and the Wayne State University area via Warren Avenue.

4.1.8 Reconstruct I-94: Original Design of Improvements to the M-10 and I-75 Interchanges with Braided Ramps

This alternative would include reconstruction of the M-10 and I-75 interchanges with braided ramps. Braided ramps reduce the amount of right-of-way needed for improvements by constructing one ramp over the top of another (vertical separation), instead of beside one another (horizontal separation). Continuous service drives on M-10 and I-75 through the I-94 interchanges would not be constructed. This alternative would "braid" the Milwaukee Avenue and M-10 ramps to/from I-94, to the north of I-94, and the Warren Avenue and M-10 ramps to/from I-94 to the south of I-94. On I-75, the Milwaukee Avenue ramps would be braided with the I-75 ramps to/from I-94. The M-10 and I-75 interchanges would both need to be rebuilt with right-hand exit and entrance ramps. This proposed alternative would provide the same improvements on I-94 as described in the previously mentioned alternative: one additional driving lane in each direction, three-lane continuous service drives on I-94, acceleration/deceleration lanes, reconstruction of retaining walls, ramps, and bridges, and reserved median space.

This alternative would require the acquisition of the Research Park Apartments and the Fourth Street neighborhood and the subsequent displacement of residents of both, and was therefore eliminated from further consideration. However, many of its design concepts were included in a refined alternative.

4.1.9 Refined Original Design of Improvements to the M-10 and I-75 Interchanges with Braided Ramps

The concept of braided ramps and reconstructed interchanges was retained for this alternative, and the displacement of Research Park Apartment residents was avoided through design modifications. However, the braided ramps located at the Fourth Street neighborhood remained and would still require the acquisition of the structures in the neighborhood.

This alternative was dropped from further consideration because of its adverse impact to the Fourth Street neighborhood and the lack of continuity of the service drives.

4.1.10 Modifications to Existing Transit Service in the I-94 Corridor

A modification to the existing transit service was considered as an alternative. However, without improvement to the project corridor, the lack of continuity of the service drives would limit the ability to provide convenient routes and bus stops in order to improve bus ridership in the corridor. Furthermore, the *Southeast Michigan HOV Study* indicated that an HOV lane, which would be available for bus use, is not justified based on anticipated high-occupancy vehicle demand. Therefore, transit by itself could not significantly reduce the level of congestion experienced on I-94 and would not improve aging conditions or aesthetics.

4.1.11 No-Build Alternative

The No-Build Alternative was retained as a benchmark or basis of comparison for the Build Alternative. The No-Build Alternative would maintain I-94 between I-96 and Conner Avenue in its existing configuration, alignment, and location. No changes would be made. Only routine maintenance would occur to the existing facility on an as-needed basis. Bridges would be replaced if physical conditions would warrant replacement. Traffic would remain congested and become more so during maintenance, and safety would not be improved.

This alternative was dropped from further consideration because it does not meet the purpose and need of the proposed project.

4.1.12 Enhanced No-Build Alternative

The Enhanced No-Build Alternative would include minor improvements over the No-Build Alternative by reconstructing I-94 on the current alignment, with the existing configuration and with limited improvements to shoulders and ramps. It would include construction of acceleration/deceleration lanes, auxiliary lanes, and shoulders. Due to the age and condition of the existing pavement and bridges, the Enhanced No-Build

Alternative would include replacement of bridge structures, ramps, and pavement. The existing service drives would be resurfaced but not extended to make them continuous. This alternative would provide no major changes to the existing design of I-94 and the M-10 and I-75 interchanges. The left-hand exits on the I-94/M-10 interchange would be retained. The Enhanced No-Build Alternative would do little to ease congestion. Safety would be marginally improved with the addition of acceleration/deceleration lanes and auxiliary lanes. It would cost less than the Build Alternative but more than the No-Build Alternative.

This alternative was retained initially for further study because it marginally improves safety with the addition of acceleration/deceleration lanes, and auxiliary lanes and results in fewer adverse impacts than the Build Alternative. However, this alternative was later dropped from further consideration because it does not meet one of the project's goals, that of improving mobility. During peak periods, I-94 would operate at a Level of Service E or worse. The condition would worsen as traffic volumes increase as anticipated by more than 35 percent by 2025. Without eliminating left-hand exits (which cause weaving between the I-96 / M-10 and the M-10 / I-75 interchanges), no significant improvement would be made to safety.

4.1.13 DEIS Build Alternative

The Draft Environmental Impact Statement (DEIS) Build Alternative combines key design elements from both the Refined Continuous Service Drives Alternative (see Section 4.1.7) and the Refined Braided Ramp Alternative (see Section 4.1.9). This proposed alternative is a result of efforts to address concerns expressed at public meetings, as well as City of Detroit concerns regarding neighborhood cohesion and the number of residential, commercial, and industrial impacts. In response, an engineering value planning team was convened to refine and modify the design of the I-94 interchanges with M-10 and I-75.

As a result of the value planning process, significant design enhancements were identified and property and displacement impacts were reduced. The refined design avoids the acquisition of Research Park Apartments and reduces acquisitions in the Fourth Street neighborhood to one residential acquisition and one commercial acquisition. The parking lot that serves the Research Park Apartments would be modified and an additional lot would be constructed to replace parking removed from the existing lot.

This alternative was eliminated from further consideration because, when compared to the subsequent modifications to the DEIS Build Alternative (see Sections 4.1.14 and 4.1.15), it would require more right-of-way without corresponding additional benefits.

4.1.14 DEIS Build Alternative: Modification Two

Comments on the DEIS indicated that a narrower cross-section was desired to further reduce impacts on neighboring properties and reduce displacements. The 2025 traffic analyses indicated that in most locations, the three-lane service drives could be reduced to two lanes and still have adequate capacity, without causing an unacceptable reduction in the level of service.

The DEIS Build Alternative: Modification Two incorporates many design elements of the DEIS Build Alternative, but would include reduced-width service drives with two 11-foot through lanes with an 8-foot lane that could be used for parking or as a shoulder (a 10-foot reduction in width on each side). This modification would retain the 30-foot reserved space in the I-94 median.

The DEIS Build Alternative: Modification Two was eliminated from further consideration because, when compared to Modification Three to the DEIS Build Alternative (see Section 4.1.15), it would require more right-of-way without corresponding additional benefits.

4.1.15 DEIS Build Alternative: Modification Three

The SEMCOG General Assembly adopted *Improving Transit in Southeast Michigan: A Framework for Action* (October 2001). This report indicated that while transit was considered for the I-94 corridor, it was not ultimately included as part of the recommended transit system. Based on this finding, the need for the reserved space in the median was re-evaluated.

Modification Three to the DEIS Build Alternative was developed to evaluate the potential reduction in right-of-way requirements and impacts by eliminating the reserved median space. The alternative retained the three-lane service drives on each side of the I-94 mainline but eliminated the reserved space in the median, reducing the median width to approximately 6 to 10 feet. This modification requires less additional property than the DEIS Build Alternative.

The DEIS Build Alternative: Modification Three was eliminated from further consideration because the three-lane service drives (and associated right-of-way requirements) were found not to be warranted based on 2025 traffic forecasts.

4.1.16 Light Rail in the I-94 Median

Deployment of light rail transit service in the median of I-94 was originally proposed as a stand-alone alternative, but by itself did not meet the purpose and need of the project or the goals and objectives of the study and was eliminated. The Light Rail Transit Alternative would involve construction of facilities in the median of I-94. Sufficient distances between stations would be required to reduce the number of stops and travel time for users. The design would be determined at a later time, but would be similar systems operating within freeway right-of-way, such as several lines operated by the Chicago Transit Authority. A light-rail vehicle could operate on tracks as a single vehicle or in short trains in the median of I-94. This alternative was proposed as a candidate for the reserved space in the median of the DEIS Build Alternative.

The alternative was eliminated from further consideration as a substitute for a fourth additional lane because the estimated 20-year ridership forecasts would not justify the major investment necessary to build and maintain rail operations. The *Southeast Michigan Regional Rail Study* (DeLeuw, 1997) identified the Ann Arbor–Detroit corridor as one of the three most promising rail corridors in southeast Michigan. I-94 is part of that corridor, but is east of this study area.

The rail study projected a daily passenger boarding of approximately 6,681 for the year 2015 for the Ann Arbor–Detroit corridor. The passenger estimate is less than two percent of the total person-trips in the portion of I-94 currently under study. The estimated ridership would not significantly reduce current and future congestion on I-94. To be effective, rail on I-94 would have to extend a greater distance than the project length and include origins and destinations outside of the project limits. A system-wide study would be necessary to identify the optimal distance and origins and destinations.

The recommended Build Alternative does not include the reserved space within the I-94 median; therefore, light rail within the I-94 median no longer would be feasible. Although the *Downtown-Airport Rail Study* (Parsons Brinckerhoff 2001) indicated that rail service between downtown Detroit and Detroit Metropolitan Airport was feasible, light rail would not be proposed for the I-94 median (within the project area).

4.2 TRANSPORTATION MEASURES COMPATIBLE WITH THE BUILD ALTERNATIVE

This section describes transportation actions that were originally proposed as stand-alone alternatives but, by themselves, did not meet the purpose and need of the project or the goals and objectives of the study and were eliminated. These transportation actions depend upon the recommended Build Alternative to facilitate their usefulness and are complementary to it. In conjunction with the Build Alternative, they would enhance the efficiency of I-94, the M-10 and I-75 interchanges, and the transportation system within the project area.

4.2.1 Transportation Systems Management (TSM)

Transportation Systems Management (TSM) refers to activities or strategies that improve the operational efficiency of transportation systems. TSM strategies are typically less capital-intensive enhancements designed to increase the capacity of the freeway through operational improvements. Common strategies include deployment of Intelligent Transportation System (ITS) technologies, and coordinated incident management programs, often coupled with freeway courtesy patrol. These strategies help to better inform travelers, and to provide prompt assistance during a breakdown or crash event, thereby expediting clearing of the roadway. TSM strategies could be implemented with and compliment the Build Alternative.

The Michigan Department of Transportation has extensive experience in the use of ITS, incident management and freeway courtesy patrol to improve freeway operations. ITS technologies, such as variable message signs, vehicle detectors and surveillance cameras are deployed throughout the project area, all controlled by operators at the Michigan Intelligent Transportation System Center (MITSC). State Police dispatchers are co-located with MITSC operators, thereby enabling coordinated dispatch of emergency vehicles after detection of an event. In addition, MDOT operates a regional freeway courtesy patrol program that includes patrol of the project area.

The Build Alternative would allow for the installation of improved communication technologies to replace the existing aged communications infrastructure in the corridor. Enhanced communications capabilities would enable deployment of additional ITS technologies or improved coverage with existing technologies to assist in better surveillance and operation within the corridor. Any improvements to the ITS infrastructure would be coordinated with the National ITS Architecture, a system to ensure national system compatibility.

4.2.2 Transit

Improved transit service throughout the region is a key component of SEMCOG's *2025 Regional Transportation Plan* (RTP), adopted in June 2000. SEMCOG is the metropolitan planning organization responsible for developing the multi-modal regional transportation plan. The 2025 RTP calls for investing approximately six billion dollars in transit, primarily to maintain existing service in southeast Michigan. However, the plan recognizes and advocates for larger investments in transit to meet current and future transit needs that would be tied to the development of the regional transit vision.

Improvement to transit was considered originally as a stand-alone alternative for the I-94 Rehabilitation Project but was eliminated because transit service improvements alone would not meet the purpose and need of the study. Transit enhancements within the corridor could not attract enough passengers to significantly reduce existing and projected congestion. Also, it would not improve the existing aged pavement and bridges that would still need to be replaced, and would have a minimal impact on safety. Transit enhancements could however play a supplementary role to relieve congestion and improve air quality. Therefore, it was retained as an alternative compatible with the Build Alternative.

Three transit options could be implemented within the I-94 project area along with the Build Alternative:

- Modifications to existing transit service;
- Bus Rapid Transit (BRT); and
- Regional transit initiatives.

4.2.2.1 Existing Transit Service

The Detroit Department of Transportation (DDOT) provides bus service throughout the City of Detroit, with limited service to outlying suburban areas. The Suburban Mobility Authority for Regional Transportation (SMART) is the primary transit service provider for the suburban Detroit region, with a network of routes throughout the suburban area, along with feeder routes along major regional corridors to and from the central business district of Detroit. Neither transit provider currently uses I-94, although many of the routes cross or run parallel to I-94.

The Build Alternative provides an opportunity to improve existing transit service in the I-94 project area. With the advent of continuous service drives, transit operators would have better routing options along the I-94 corridor given the improved surface roadway connectivity.

Improvements to the I-94 corridor could also encourage the development of transit service hubs. DDOT is reviewing the possibility of developing transit hubs in Detroit along I-94 at the Gratiot Avenue, Woodward Avenue, and Wyoming Avenue interchanges. In addition, future facilities east of Detroit at I-696 and at 23 Mile Road, as well as west of the city at M-39 and I-275, are being considered. With reduced congestion along I-94, transfer times between these hubs using express bus service along the corridor could be reduced and travel options increased, two important factors in promoting the use of transit services.

4.2.2.2 Bus Rapid Transit (BRT)

Early in the I-94 Rehabilitation Project study, exclusive bus facilities to accommodate Bus Rapid Transit (BRT) operations were proposed as either a substitute for a fourth traffic lane or as a candidate for the reserved space in the median. In the HOV study, the estimates of future ridership did not justify an exclusive bus lane at this time. Therefore, this alternative was dropped from consideration as a substitute for an additional driving lane or the reserved space in the median.

A travel information survey was conducted in the fall of 1995 to supplement existing travel information. The survey indicated that 46 percent of I-94 trips had a Detroit destination. Less than 13 percent of all trips using I-94 during peak periods began and terminated in Detroit. Because the study area is entirely within the City of Detroit, a BRT alternative alone would serve only those who have an origin and destination within the study area limits. It is possible that commuters from outside the City of Detroit might use the facility if convenient park-and-ride facilities were provided.

Based on results from the travel information survey, less than two percent of commuters were likely to use transit service on I-94. Therefore, this alternative would not have an appreciable impact on current and future congestion.

4.2.2.3 Regional Transit Initiatives

Several Transit Initiatives that would impact the I-94 corridor have recently been completed. The I-94 Rehabilitation Project, as it is currently proposed, would accommodate the results of the Regional Transit Initiatives. Foremost among these initiatives is the Southeast Michigan Transit Vision. The project laid out a transit vision and plan to integrate all transit activities and expand transit service in southeast Michigan.

SEMCOG is the appropriate forum for the discussion of regional transit issues and how they relate to the highway network. SEMCOG is responsible for developing the Regional Transportation Plan (RTP)—a multi-modal plan for southeast Michigan. The RTP focuses on the transit needs and the infrastructure necessary to service these needs in the most efficient manner. Some broader issues related to transit include identifying and servicing major destinations and attractions, spatial distribution of the regional population, and other specific demographic concerns such as the aging population. These concerns would be addressed most adequately by the RTP.

Regional transit initiatives are seen as compatible with the I-94 Rehabilitation Project. The Build Alternative would accommodate transit enhancements as determined by the regional transit plan and the operating agencies.

Transit studies that have either started or have been completed recently in the City of Detroit include:

- *Improving Transit in Southeast Michigan: A Framework for Action*. In October 2001, SEMCOG released the results of the regional transit study for southeast Michigan. The proposed transit corridors included Woodward, Gratiot, and Van Dyke Avenues. I-94 was not included as a recommended transit corridor. SEMCOG since has amended the Transportation Improvement Program to include these corridors.

- *Downtown Detroit to Metro Airport Rail Study, Phase 1, 2, and Final Reports*, June 2001: The results of this study indicated that rail service between Downtown and Metro Airport was feasible. This study is currently in the alternative analyses phase and is anticipated to be completed in 2005.

- *The Woodward Transit Alternatives Study*: The initiative was started in 1999 to identify a feasible transit alternative along Woodward Avenue within the City of Detroit. The study identified BRT and light rail as the two most appropriate transit options for the Woodward corridor. No funding has been allocated at this time for further study.

- *Bus Rapid Transit Options Study for Southeast Michigan*: This study, sponsored by the Metropolitan Affairs Coalition (MAC), assessed the feasibility of BRT in southeast Michigan and identified potential BRT corridors. The results of this study have been included as part of SEMCOG's regional Transit Vision Plan.

5.0 TRAFFIC OPERATIONS ANALYSIS

This chapter describes the freeway and surface street traffic operations for the existing and future conditions.

5.1 DESIGN YEAR TRAFFIC PROJECTIONS

Design year traffic projections were prepared using the Southeast Michigan Council of Governments' (SEMCOG) 2025 TRANPLAN Model, a computer model for forecasting regional travel demand based on population and employment forecasts, regional trip-making characteristics and observed travel choices. The model is based on used the regional transportation network adopted by SEMCOG, and covers the seven-county SEMCOG region, including Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne counties, as well as accounting for trips to Windsor, Ontario, and Sarnia, Ontario. The future year model incorporates projects identified in SEMCOG's Transportation Improvement Program (TIP). Trips are generated by the model from approximately 1,500 traffic analysis zones within the region, grouped to form origin-destination pairs, and allocated trips to the network. The resulting traffic estimates represent a forecast of likely future travel demand and its impact upon the transportation system.

For this analysis, the model was extended in several areas to provide the functionality and level of detail required for this study. The enhancement and application of the SEMCOG regional travel forecasting model for use in this study is described in a separate document, *I-94 Rehabilitation Project: Travel Forecasting Methodology Report* (January 1997). The report describes the overall structure of the model, the basis and methods employed to extend the model, the application of the model in this study, and the results of the modeling process.

It should be noted that the limited definition of the model network at the local street level has an impact on forecasting of local street volumes within the project corridor. Without sufficient detail of nearby roadway linkages, the model will tend to over-predict travel demand on the adjacent major roadways. Therefore, in some cases, demand forecasted for surface street intersections may be overstated and not representative of reasonable growth assumptions.

5.2 TRAFFIC ANALYSIS METHODOLOGY

The evaluation of freeway and surface street operations was conducted with the Highway Capacity Software (HCS) 2000. HCS 2000 is an electronic implementation of the procedures outlined in the 2000 *Highway Capacity Manual* (HCM). The HCM is developed and revised under the direction of the Transportation Research Board (TRB) Committee on Highway Capacity and Quality of Service. The Federal Highway Administration (FHWA) has provided guidance in the software's development. The HCM is a resource for transportation engineers and planners, and it represents an assembly of state-of-the-art techniques for estimating capacity and determining level of service.

The HCM is recognized nationally by state departments of transportation and by the Federal Highway Administration. It is the standard method for analyzing traffic operations on road facilities.

The freeway and surface street analyses were performed for the AM and PM peak hours of the day. Peak hour analyses provide a worst-case scenario, as they generally represent the highest volumes experienced throughout the day.

In addition to empirical analyses, a travel time and delay study was conducted as part of the existing conditions analysis to better determine current operating conditions within the study area. The study involved recording of actual travel time and delay data in the field during peak periods using pilot vehicles.

5.3 PEAK HOUR FREEWAY VOLUMES

This section describes where the existing and future freeway volumes were obtained.

5.3.1 Existing Conditions Freeway Volumes

The methodology and sources for obtaining Existing Conditions traffic volumes are described in Section 3.2.1.1. Existing traffic volumes on I-94 are also presented in *Traffic Report, Volume 1: Existing Conditions* (February 1996). As stated previously, current traffic counts would not reflect an accurate condition, based on continual construction projects within and around the project area since 1995. This construction has resulted in numerous detours; therefore, the 1995 data was determined to be the best representation of the current traffic condition and was not updated to the year 2000. The AM peak hour, PM peak hour, and Average Daily Traffic (ADT) volumes for the 1995 Existing Conditions are provided in **Figures 5A – 5N**, **6A – 6N**, **7A –7N**, and **8A – 8C**.

5.3.2 No-Build Alternative Freeway Volumes

The methodology for obtaining 2025 No-Build Alternative volumes is presented in Section 3.2.1.2. The AM peak hour, PM peak hour, and ADT volumes for the 2025 No-Build Alternative are provided in **Figures 9A – 9N**, **10A –- 10N**, **11A – 11N**, and **12A – 12C**, and are included in *Traffic Report, Volume 3: Simulation of Year 2025 Conditions* (August, 2002).

5.3.3 Build Alternative Freeway Volumes

Similar to the No-Build Alternative, traffic forecasts for the Build Alternative were obtained using the 2025 SEMCOG TRANPLAN model. The model network was modified to reflect roadway network improvements proposed as part of the Build Alternative, including the addition of a travel lane in each direction between I-96 and Conner Avenue, reconstruction of the interchanges with M-10 and I-75, and other proposed ramp and service drive modifications. Socioeconomic information used for modeling the No-Build Alternative was retained for this analysis.

Forecasted AM and PM peak hour ramp volumes obtained from the model were compared with 1995 counts and forecasted 2025 No-Build ramp volumes to assess the validity of the forecast. In cases where ramp volumes varied drastically from the 1995 counts and 2025 No-Build forecast, a select link analysis was conducted to better understand the anticipated origins and destinations of the ramp traffic. The ramp analyses were conducted for both the No-Build and Build Alternatives in order to determine where traffic was expected to shift from. More than 20 select link analyses were conducted for the ramps within the project area.

The select link analyses showed that utilization of I-94, and consequently the on- and off-ramps that serve it, is expected to increase under the Build Alternative because of reduced congestion and increased capacity in the corridor. This was particularly true for westbound ramps during the AM peak hour and eastbound ramps during PM peak hour. Under the 2025 No-Build Alternative, vehicles are expected to experienced heavy congestion in the westbound direction during the AM peak hour and in the eastbound direction during the PM peak hour, and are likely to avoid use of I-94 altogether. Under the Build Alternative, the increased capacity and decreased congestion would make I-94 a more attractive route choice, thus increasing ramp volumes to access it. Due to this shift of traffic, entrance ramp volumes increased and the exit ramp volumes decreased overall in the heaviest direction of travel during each peak hour.

In addition to these anticipated changes in traffic patterns due to operational and capacity improvements within the corridor, some shifting of traffic volumes would occur as a result of changes in access that are planned as part of the Build Alternative (see Section 2.1.2). The following describes notable changes in traffic patterns anticipated due to planned access modifications:

French Road Access

Due to the close proximity of the French Road interchange to the Gratiot Avenue and Conner Avenue interchanges, the French Road interchange would be removed under the Build Alternative. As a result, vehicles that once used the French Road interchange are forecasted to use either the Gratiot Avenue or Conner Avenue interchange, and the service drives that connect them. Comparison of the No-Build Alternative and Build Alternative models indicates an increase in the AM and PM peak hour volumes at the Gratiot Avenue and Conner Avenue interchanges in the Build Alternative as expected based on this access modification.

New Center Area Access

Currently, access from I-94 to the New Center Area (in the northeast quadrant of the I-94/M-10 interchange) is primarily provided via northbound M-10 to the Milwaukee Avenue/West Grand Boulevard exit ramp. Under the Build Alternative, this ramp will be relocated south of I-94, meaning I-94 traffic will no longer be able to access the ramp from northbound M-10 and must instead divert to other locations to access this area. The following are the most likely routing patterns from I-94 to the New Center Area based on shortest distance and modeled volume changes:

- Eastbound I-94 to the Trumbull Avenue exit
- Westbound I-94 to Beaubien Street exit

Midtown Area Access

Due to design and interchange spacing requirements, access to the Midtown Area (including Wayne State University, the Detroit Medical Center and the city's Cultural Center) from I-94 would be modified under the Build Alternative. Currently, access to the area (located south of I-94 between M-10 and I-75) from I-94 is provided primarily via exits off of M-10 and I-75. However, under the Build Alternative, the southbound M-10 ramp to Forest Avenue and the southbound I-75 ramp to Warren Avenue would be relocated north of I-94, meaning the following movements would no longer be possible:

- Eastbound or westbound I-94 to southbound M-10 to the Forest/Warren Exit
- Eastbound or westbound I-94 to southbound I-75 to the Warren Avenue Exit

The following summarizes potential alternate routes for access between I-94 and the Midtown Area:

Access FROM I-94:

(FROM Eastbound I-94):
- EB I-94 to Trumbull Avenue Exit
- EB I-94 to Brush Street Exit
- EB I-94 to SB M-10 to Temple/Elm Exit

(FROM Westbound I-94):
- WB I-94 to Beaubien Street Exit
- WB I-94 to SB I-75 to Mack Ave. Exit

Access TO I-94:

(TO Eastbound I-94):
- EB I-94 Service Drive to Chene Street On-Ramp to EB I-94
- Temple/Elm On-Ramp to NB M-10 to EB I-94
- Mack Street On-Ramp to NB I-75 to EB I-94

(TO Westbound I-94):
- Brush Street On-Ramp to WB I-94
- Temple/Elm On-Ramp to NB M-10 to WB I-94
- Mack Avenue On-Ramp to NB I-75 to WB I-94

The AM peak hour, PM peak hour, and ADT volumes for the 2025 Build Alternative are in **Figures 15A – 15N**, **16A – 16N**, **17A – 17N**, and **18A – 18C**. Anticipated 2025 traffic volumes are also presented in *Traffic Report, Volume 3: Simulation of Year 2025 Conditions* (August 2002).

5.4 PEAK HOUR FREEWAY LEVEL OF SERVICE

Level of service (LOS) is a qualitative measure describing operational conditions of traffic, generally defined in terms of:

- Speed and travel time;
- Freedom to maneuver;
- Traffic interruptions;
- Comfort;
- Convenience; and
- Safety.

Existing (1995) freeway conditions were analyzed using the *1994 Highway Capacity Manual* (HCM)—the most current version available at that time. In 2000, prior to conducting the analysis of 2025 conditions, a new version of the HCM was released. Therefore, the 2025 No-Build and Build alternatives were analyzed using the 2000 HCM.

Density is the parameter used to define level of service for freeway operations. The relationship between density and level of service as defined in the *1994 Highway Capacity Manual* is shown in **Table 6** (see Volume 2), which was utilized for the existing conditions analysis. The relationship between density and level of service as defined in the *2000 Highway Capacity Manual* is shown in **Table 7** (see Volume 2), which was utilized for the 2025 analysis.

Figures 13A – 13F, **Figures 14A – 14F**, and **Figures 19A – 19F** illustrate the AM and PM peak hour level of service results for I-94, I-96, M-10, and I-75 for the 1995 Existing Conditions, 2025 No-Build Alternative, and 2025 Build Alternative, respectively. These figures can be found in Volume 2. **Tables 8A – 8D, 9A – 9D,** and **10A – 10D** summarize the HCM analysis type (basic freeway segment, ramp junction, merge or diverge, or weave area analyses), density, LOS, and volume-to-capacity (V/C) ratio for each element evaluated. In cases where a segment under analysis can be characterized as more than one segment type (for instance, a segment that is both a ramp merge and a ramp diverge due to close ramp spacing), both analyses were completed and the worst-case results reported.

Typically, LOS E is representative of freeway conditions at capacity, where operations are volatile because there are virtually no usable gaps in the traffic stream. LOS F is indicative of breakdown conditions, where flow begins to decrease as demand increases. As a result, a freeway segment could be operating at a LOS E while the volume to capacity ratio is over 1.0. This can be due to freeway exit ramps upstream of the segment or slight variations in the capacity of the freeway in certain segments.

The following sections describe the level of service results.

5.4.1 Existing Conditions Freeway Level of Service

Under 1995 Existing Conditions, the majority of the project area operates at acceptable levels of service during both peak hours, with some exceptions. During the AM peak hour, eastbound I-94 operates at LOS E or better throughout the project corridor. Westbound I-94 operates primarily at LOS E or better, with some exceptions as noted. M-10 and I-75 operate at a LOS E or better, except for one segment on southbound I-75.

Highway	Section of Highway
Westbound I-94	Southbound Conner Avenue entrance ramp to the Chene Street entrance ramp
Westbound I-94	John R Avenue entrance ramp to the M-10 exit ramp
Southbound I-75	Clay Avenue entrance ramp to the I-94 exit ramp

Locations Operating at Level of Service F
1995 Existing Conditions - AM Peak Hour

Highway	Section of Highway
Eastbound I-94	M-10 entrance ramp to the John R Avenue exit ramp
Westbound I-94	Beaubien Street exit ramp to the Linwood Avenue exit ramp
Southbound I-75	Clay Avenue entrance ramp to the I-94 exit ramp

Locations Operating at Level of Service F
1995 Existing Conditions - PM Peak Hour

During the PM peak hour, eastbound and westbound I-94 operate primarily at LOS E, with two segments operating at LOS F as noted. M-10 and I-75 operate at a LOS E or better, except for one segment of southbound I-75 segment.

It should be noted that the level of service results obtained from HCM analysis in some cases contradict the findings of the travel time and delay study conducted in 1995. As indicated in the travel time and delay study, the majority of the I-94 corridor, particularly upstream of the I-96, M-10 and I-75 interchanges, operates under congested conditions, with speeds of less than 40 miles per hour, throughout both peak periods.

The AM and PM peak hour freeway level of service results for the 1995 Existing Conditions are provided in **Figures 13A – 13F** (see Volume 2).

As shown in **Tables 8A – 8D** (see Volume 2), none of the I-94, M-10, or I-75 freeway segments within the project area have a volume to capacity (V/C) ratio greater than or equal to 1.00 under the Existing Conditions.

5.4.2 No-Build Alternative Freeway Level of Service

Under 2025 No-Build Alternative conditions, the majority of the I-94 corridor is anticipated to operate at LOS F during both peak periods. During the AM peak hour the entire corridor is expected to operate under severely congested (LOS F) conditions in the westbound direction. In the eastbound direction, LOS F operating conditions are expected generally between the I-96 and I-75 interchanges, where traffic volumes and weaving maneuvers are the highest. No segments of M-10 are expected to perform at LOS F during the AM peak hour.

During the PM peak hour, the majority of the I-94 project corridor in both directions is anticipated to experience LOS F operating conditions by 2025. In addition, both directions of I-75 between Clay Avenue and I-94 are expected to perform at LOS F. No segments of M-10 are expected to perform at LOS F during the PM peak hour.

Highway	Section of Highway
Eastbound I-94	Eastbound I-96 entrance ramp to the M-10 exit ramp
Eastbound I-94	M-10 entrance ramp to the I-75 exit ramp
Westbound I-94	Conner Avenue exit ramp to the I-96 exit ramp (entire length of corridor)
Northbound I-75	I-94 entrance ramp to the Clay Avenue exit ramp

Locations Anticipated to Operate at Level of Service F
2025 No-Build Alternative - AM Peak Hour

Highway	Section of Highway
Eastbound I-94	Eastbound I-96 entrance ramp to the I-75 exit ramp
Eastbound I-94	Russell Street exit ramp to the Gratiot Avenue exit ramp
Eastbound I-94	Gratiot Avenue entrance ramp to the Conner Avenue entrance ramp
Westbound I-94	French Road entrance ramp to the Gratiot Avenue entrance ramp
Westbound I-94	Gratiot Avenue entrance ramp to the Van Dyke Avenue exit ramp
Westbound I-94	Van Dyke Avenue entrance ramp to the Chene Street entrance ramp
Westbound I-94	I-75 exit ramp to the M-10 entrance ramp
Westbound I-94	Trumbull Avenue exit ramp to the I-96 exit ramp
Northbound I-75	I-94 entrance ramp to the Clay Avenue exit ramp
Southbound I-75	Clay Avenue exit ramp to the Warren Avenue exit ramp

Locations Anticipated to Operate at Level of Service F
2025 No-Build Alternative - PM Peak Hour

The AM and PM peak hour freeway level of service results for the 2025 No-Build Alternative are provided in **Figures 14A – 14F** (see Volume 2). **Figures 9A – 9N** and **Figures 10A – 10N** illustrate the 2025 No-Build Alternative volumes, and indicate results for all HCS analyses performed, as well as the type of HCS analysis performed (e.g., ramp merge, ramp diverge, freeway segment, or weave).

As indicated in **Tables 9A – 9D** (see Volume 2), several I-94 freeway segments are expected to have a volume-to-capacity ratio greater than or equal to 1.00 during one or both peak hours. During the AM peak hour, volume is expected to exceed capacity along the majority of eastbound I-94 between I-96 and I-75, and along nearly the entire corridor in the westbound direction. In addition, a segment of M-10 between I-94 and Milwaukee Avenue is anticipated to have a V/C of greater than 1.0 during the AM peak hour.

Similarly, during the PM peak hour, nearly the entire I-94 project corridor is expected to experience V/C of greater than 1.0 in the eastbound direction, with over-capacity conditions in the westbound direction primarily between the I-96 and M-10 interchanges. None of the I-75 freeway segments within the project area are expected to have a V/C ratio greater than or equal to 1.00 during either the AM or PM peak hour.

Highway	Section of Highway
Eastbound I-94	Eastbound I-96 entrance ramp to the M-10 exit ramp
Eastbound I-94	M-10 entrance ramp to John R Avenue exit ramp
Westbound I-94	Northbound Conner Avenue entrance ramp to the Gratiot Avenue exit ramp
Westbound I-94	Gratiot Avenue entrance ramp to the Beaubien Street exit ramp
Westbound I-94	I-75 entrance ramp to the M-10 exit ramp
Westbound I-94	M-10 entrance ramp to the I-96 exit ramp
Northbound M-10	I-94 entrance ramp to the Milwaukee Avenue exit ramp

Locations with Volume/Capacity (V/C) Ratios > 1.0
2025 No-Build Alternative - AM Peak Hour

Highway	Section of Highway
Eastbound I-94	Eastbound I-96 entrance ramp to the M-10 exit ramp
Eastbound I-94	M-10 entrance ramp to the I-75 exit ramp
Eastbound I-94	Chene Street entrance ramp to the Mt. Elliott Street exit ramp
Eastbound I-94	Mt. Elliott Street entrance ramp to the Gratiot Avenue exit ramp
Eastbound I-94	Gratiot Avenue entrance ramp to the Conner Avenue exit ramp
Westbound I-94	Van Dyke Avenue entrance ramp to the Chene Street entrance ramp
Westbound I-94	I-75 exit ramp to the M-10 entrance ramp
Westbound I-94	M-10 entrance ramp to the I-96 exit ramp
Northbound M-10	I-94 entrance ramp to the Milwaukee Avenue exit ramp

Locations with Volume/Capacity (V/C) Ratios > 1.0
2025 No-Build Alternative - PM Peak Hour

5.4.3 Build Alternative Freeway Level of Service

The HCS analysis of year 2025 conditions under the Build Alternative indicates that improvements to the corridor would restore operating conditions to LOS D throughout a majority of the project area, with some segments expected to operate at LOS E (considered acceptable for urban areas). Most notably, all segments of I-94 between the I-96 and I-75 interchanges are anticipated to perform at LOS E or better. This forecasted improvement is attributable to increased capacity and reduced weaving movements within this confined segment of the corridor that is expected to experience the worst congestion under the No-Build Alternative.

HCS analysis does indicate that some segments of project area freeways are anticipated to perform at LOS F under the 2025 Build Alternative. During the AM peak hour, two segments of westbound I-94 were shown to perform at LOS F. These two segments, both classified as basic freeway segments, are expected to have hourly traffic flow rates that exceed the maximum flow rate threshold based on the *2000 Highway Capacity Manual* (2,350 vehicles per hour per lane at 65 mph free-flow speed). Based on HCS analysis, these freeway segments are considered to operate at LOS F,. However, an analysis of the corridor conducted in CORSIM found both segments to operate at LOS E during the AM peak hour as a result of a metering of traffic at upstream locations. Results of the CORSIM analysis can be found in *Traffic Report, Volume 3: Simulation of Year 2025 Conditions*.

Highway	Section of Highway
Westbound I-94	Mt. Elliott Avenue exit ramp to the Mt. Elliott entrance ramp*
Westbound I-94	Chene Street exit ramp to the Chene Street entrance ramp*
Northbound I-75	I-94 exit ramp to the westbound I-94 entrance ramp
Northbound I-75	Eastbound I-94 entrance ramp to the Clay Avenue entrance ramp

**Note: Forecasted flow rate exceeds maximum program threshold. Segment is expected to perform at LOS E based on CORSIM analysis.*

Locations Anticipated to Operate at Level of Service F 2025 Build Alternative - AM Peak Hour

Highway	Section of Highway
Southbound I-75	Clay Avenue exit ramp to the Warren Avenue exit ramp
Southbound I-75	Eastbound I-94 entrance ramp to the westbound I-94 entrance ramp

Locations Anticipated to Operate at Level of Service F 2025 Build Alternative - PM Peak Hour

During both the AM and PM peak hours, several segments of I-75 are expected to operate at LOS F under the 2025 Build Alternative. This decrease in performance as compared to the No-Build Alternative is a result of a forecasted increase in demand for the improved I-94. Some of the additional traffic expected to utilize I-94 would access the corridor via I-75, thereby degrading operating conditions.

The I-94 Rehabilitation Project includes only the reconstruction of the I-94/I-75 interchange and immediately adjacent elements necessary to accommodate the new configuration. The improvements necessary to maintain acceptable levels of service along northbound and southbound I-75 through the design year would not be built as part of this project, but are presented herein as improvements to be considered in a future MDOT I-75 corridor study per MDOT direction. The cost of these improvements is not included in the project cost estimate presented in this report.

The following is a summary of measures necessary to improve performance along all segments of I-75 to LOS E or better during both peak hours under the 2025 Build Alternative:

Northbound I-75

- I-94 exit ramp to Warren entrance ramp: add additional freeway lane;
- Warren entrance ramp to westbound I-94 entrance ramp: extend acceleration lane (from Warren entrance ramp) to 2,000 feet; and
- Eastbound I-94 entrance ramp to Clay exit ramp: add full auxiliary lane between the entrance and exit ramp.

Southbound I-75

- Clay entrance ramp to I-94 exit ramp: add full auxiliary lane between the entrance and exit ramp;
- I-94 exit ramp to Warren exit ramp: extend deceleration lane (to Warren exit ramp) to 900 feet; and
- Eastbound I-94 entrance ramp to westbound I-94 entrance ramp: extend acceleration lane (from eastbound I-94 entrance ramp) to 1,500 feet.

The AM and PM peak hour freeway level of service results for the 2025 Build Alternative are provided in **Figures 19A – 19F** (see Volume 2). **Figures 15A – 15N** and **Figures 16A – 16N** illustrate the volumes and the results for the HCS freeway analyses performed, as well as the type of HCS analysis performed (for example, ramp merge, ramp diverge, freeway segment, or weave) for the AM and PM peak hours.

Tables 10A – 10D indicate that none of the I-94, M-10, and I-75 freeway segments within the project area are expected to have a volume-to-capacity ratio greater than or equal to 1.00 under the Build Alternative.

5.5 PEAK HOUR SURFACE STREET VOLUMES

The origin of peak hour surface street volumes under Existing Conditions is described in Section 3.2.1.1. The existing traffic on I-94 also was presented in *Traffic Report, Volume 1: Existing Conditions* (February 1996). Based on continual construction projects within and around the project area since 1995 (which has resulted in numerous detours), current traffic counts would not reflect an accurate condition. Therefore, the 1995 data was determined to be the best representation of the current traffic condition and was not updated to the year 2000. The AM peak hour, PM peak hour, and Average Daily Traffic (ADT) volumes for the 1995 Existing Conditions are provided in **Figures 5A – 5N**, **6A – 6N**, **7A – 7N**, and **8A – 8C**.

AM and PM peak hour turning-movement volumes for the No-Build and Build Alternatives were developed using traffic volumes generated from the 2025 TRANPLAN model. The process of deriving peak hour turning-movement volumes consisted of balancing the number of vehicles entering and leaving each of the study intersections. It was assumed that future traffic would use similar driving patterns as the existing traffic. Therefore, the percentage of vehicles turning for each approach to an intersection remained constant with the 1995 turn percentages in most locations. All volumes were rounded to the nearest five vehicles.

The AM peak hour, PM peak hour, and ADT volumes for the 2025 No-Build Alternative are provided in **Figures 9A – 9N**, **10A – 10N**, **11A – 11N**, and **12A – 12C**. The AM peak hour, PM peak hour, and ADT volumes for the 2025 Build Alternative are provided in **Figures 15A – 15N**, **16A – 16N**, **17A – 17N**, and **18A – 18C**. Year 2025 traffic volumes are also presented in *Traffic Report, Volume 3: Simulation of Year 2025 Conditions* (August 2002).

5.6 PEAK HOUR SURFACE STREET LEVEL OF SERVICE

The following sections present a summary of the operations analysis of surface street intersections based on the three commonly used measures of effectiveness:

Capacity

Intersection capacity is an objective engineering concept which measures the physical adequacy of the intersection to accommodate the traffic demand (or "traffic flow"). It is represented by the critical Volume/Capacity (V/C) ratio. An intersection with the critical V/C of over 1.0 is considered to have insufficient capacity to accommodate the projected traffic demand.

Level of Service

Level of Service (LOS) is a subjective measure of the quality of intersection operations as experienced by the average driver. For intersections, control delay (the average delay as a result of the signal or sign control regulating the intersection) is used as a proxy measure to assess the driving experience. As control delay increases, the driver experience and the perceived level of service decreases. Similar to freeway analysis, level of service for intersections is represented with letter grades A through F, with A being the best performance (with drivers experiencing the least control delay).

For the 1995 Existing Conditions, the level of service criteria for signalized intersections is based on stopped delay and is provided in the *1994 Highway Capacity Manual*. The level of service criteria for signalized intersections is shown in **Table 11** (see Volume 2). The level of service criteria for unsignalized intersections is provided in **Table 12** (see Volume 2).

For the 2025 No-Build and Build Alternatives, the level of service criteria for signalized intersections are based on control delay and are in the *2000 Highway Capacity Manual, Special Report 209*. The level of service criteria for signalized intersections is shown in **Table 13** (see Volume 2). The level of service criteria for unsignalized intersections is provided in **Table 14** (see Volume 2).

Queuing

Queue length is an empirically-derived value of the approximate length of a queue of vehicles based on the arrival pattern and the number of vehicles that would not clear an intersection during a given green phase. 90^{th} percentile queue length is reported for critical intersection movements, representing a conservative queuing condition during peak demand periods from which to gauge potential storage overflow issues.

5.6.1 Existing Conditions Surface Street Level of Service

Tables 15A – 15C (see Volume 2) provide the level of service results for the 1995 Existing Conditions analysis along the I-94, M-10, and I-75 corridors, respectively. These tables show the overall intersection level of service and the critical volume-to-capacity ratio for each intersection during the AM and PM peak hours. The 90th percentile queue, and the potential for surface street vehicles to back up onto the freeway ramp, is also indicated for surface street intersections located immediately downstream from a freeway exit ramp or at the terminus of a ramp.

Level of Service and Critical Volume/Capacity Ratio

Based on HCS analysis results, all surface street intersections currently perform at LOS D or better during both peak periods except for the southbound M-10 Service Drive at Warren Avenue, which operates at LOS F during both the AM and PM peak hours. In addition, all intersections currently operate with V/C less than 1.0, with the exception of the southbound M-10 Service Drive at Pallister Avenue, which has a critical V/C of greater than 1.0 during the AM peak hour.

Queuing

Based on existing traffic volumes, two locations have the potential for traffic to "spillback" onto the freeway ramp: southbound M-10 Service Drive at Forest Avenue (PM peak hour) and at Pallister Avenue (AM and PM peak hours). This assumes that spillback occurs only on the freeway ramp, when in fact it might occur on the service drive. If the intersection is congested, vehicles may spillback due to inadequate storage on the surface streets.

5.6.2 No-Build Alternative Surface Street Level of Service

Tables 16A – 16C (see Volume 2) summarize the level of service results for the 2025 No-Build Alternative for intersections along the I-94, M-10, and I-75 corridors, respectively. These tables show the overall intersection level of service and the critical volume-to-capacity ratio for each intersection during the AM and PM peak hours. The 90th percentile queue, and the potential for surface street vehicles to back up onto the freeway ramp, is also indicated for surface street intersections located immediately downstream from a freeway exit ramp or at the terminus of a ramp. There are four ramps along I-94 and three ramps along M-10 that could potentially backup onto the ramp in the No-Build Alternative. Three of the ramps along I-94 have the potential to have a queue greater than 500-feet, however, none of these spillbacks enter the freeway.

Level of Service

The majority of the surface street study intersections along I-94, M-10, and I-75 are expected to operate at LOS D or better in the AM and PM peak hours under the No-Build Alternative. However, nine intersections are expected to operate at LOS E or F in the year 2025 due to the increase in projected traffic:

- Grand River Avenue and the westbound I-94 service drive: LOS F (PM)
- Mt. Elliott Avenue and westbound Harper Avenue: LOS E (AM) and LOS F (PM)
- Van Dyke Avenue and Harper Avenue: LOS E (AM) and LOS F (PM)
- Van Dyke Avenue and the westbound I-94 service drive: LOS E (PM)
- McClellen Avenue and Gratiot Avenue: LOS F (AM and PM)
- Gratiot Avenue and Harper Avenue: LOS E (AM)
- Gratiot Avenue and the westbound I-94 exit/entrance ramp: LOS E (AM)
- Gratiot Avenue and the eastbound I-94 exit/entrance ramp: LOS F (PM)
- Southbound M-10 service drive and West Grand Boulevard: LOS E (PM)

Synchro was used to evaluate intersections with one or more approaches that include a shared turn-movement along with an exclusive turn lane. HCS does not have the capability of modeling this geometric configuration. Cases where Synchro results are displayed are noted in the tables. Note that Synchro does not provide critical volume/capacity ratio as an output.

Critical Volume/Capacity Ratio

Seven study intersections along I-94, M-10, and I-75 have a critical V/C ratio greater than or equal to 1.00 under the No-Build Alternative:

- Mt. Elliott Avenue/Westbound Harper Avenue (PM)
- Van Dyke Avenue/Harper Avenue (AM and PM)
- Van Dyke Avenue/Westbound I-94 Service Drive (PM)
- Gratiot Avenue/Harper Avenue (AM)
- Gratiot Avenue/Westbound exit/entrance ramp (AM and PM)
- Gratiot Avenue/Eastbound exit/entrance ramp (PM)
- Northbound I-75 Service Drive/Ferry Street (PM)

Queuing

Seven locations were found to have a potential for traffic to “spillback” onto the freeway ramp under 2025 No-Build Alternative conditions:

- Mt. Elliott Avenue/Westbound Harper Avenue (AM)
- Van Dyke Avenue/Westbound I-94 Service Drive (AM)
- Van Dyke Avenue/Eastbound I-94 Service Drive (AM and PM)
- French Road/Eastbound I-94 Service Drive (AM)
- Southbound M-10 Service Drive/Forest Avenue (AM and PM)
- Southbound M-10 Service Drive/West Grand Boulevard (AM)
- Southbound M-10 Service Drive/Pallister Avenue (AM and PM)

Spillback occurs when the intersection is congested and there is inadequate storage on the surface streets. While the spillback could potentially enter onto the freeway ramp, it will mostly occur on the service drive. There are three locations where the 90^{th} percentile queue exceeds 500-feet and still less than 1000-feet. In all the locations, the spillback will not enter the mainline freeway and, at most, be contained on the freeway ramp.

5.6.3 Build Alternative Surface Street Level of Service

Tables 17A – 17C (see Volume 2) summarize the level of service results for the 2025 Build Alternative for intersections along the I-94, M-10, and I-75 corridors, respectively. These tables show the overall intersection level of service and the critical volume-to-capacity ratio for each intersection during the AM and PM peak hours. The 90th percentile queue, and the potential for surface street vehicles to back up onto the freeway ramp, is also indicated for surface street intersections located immediately downstream from a freeway exit ramp or at the terminus of a ramp.

The proposed design of some intersections have been modified since the release of the *Traffic Report, Volume 3: Simulation of Year 2025 Conditions* (August 2002) to improve individual traffic movements, reduce critical volume-to-capacity ratios, and mitigate potential spillback concerns that arose during design refinement and analysis. **Table 18** (see Volume 2) presents these design changes.

Level of Service

All study intersections are anticipated to perform at LOS D or better during both peak hours under the Build Alternative, with one exception: The northbound approach of the intersection of Gratiot Avenue/McClellan Avenue is expected to perform at LOS F during the PM peak hour. The proposed design of this intersection has been modified since the release of the *Traffic Report, Volume 3: Simulation of Year 2025 Conditions*. Under the updated Build Alternative, the intersection would be unsignalized, with right-turn-in/right-turn-out operation only for McClellan Avenue, in order to reduce closely spaced signals and associated congestion in the vicinity of the I-94/Gratiot Avenue interchange. Under this operation, the stop sign-controlled approach (northbound McClellan Avenue) is anticipated to operate at LOS F during the PM peak hour, based on forecasted volume levels given the current intersection operation. However, the change in operation at this location is anticipated to result in a natural redistribution of traffic to other surface streets, thereby reducing northbound volume levels. In addition, the HCS analysis conducted for this location does not take into account the effects of adjacent traffic signals, which meter flow along the corridor and provide gap opportunities for mid-block traffic to enter the roadway. Therefore, based on these considerations, no further design refinements are proposed at this time to improve forecasted level of service. The Michigan Department of Transportation would monitor this intersection in the future to determine whether remedial action may be necessary to maintain an acceptable level of service.

As stated previously, in cases where the geometry of an intersection includes a shared turn-movement along with an exclusive turn lane on the same approach, Synchro analysis results are provided in **Tables 17A – 17C**. HCS is not capable of modeling this geometric configuration.

Critical Volume/Capacity Ratio

All but one of the study intersections along I-94, M-10, and I-75 has a critical V/C ratio greater than or equal to 1.00 under the Build Alternative: The Gratiot Avenue/Eastbound I-94 Service Drive intersection is expected to have a critical V/C ratio greater than 1.00 during the PM peak hour; However, the overall intersection is forecasted to operate at LOS D. It should be noted that where Synchro was used to evaluate intersection performance, the critical volume/capacity ratio is not reported because it is not an output of Synchro.

Queuing

Four intersections within the immediate project area have been identified as locations where vehicle queuing could potentially spillback onto the freeway ramp. Spillback occurs when the intersection is congested and there is inadequate storage on the surface streets. While the spillback could potentially enter onto the freeway ramp, it will mostly occur on the service drive. There are three locations where the queue exceeds 500-feet and still less than 1000-feet. In all the locations, the spillback will not enter the mainline freeway and, at most, be contained onto the freeway ramp.

- Brush Street/Eastbound I-94 Service Drive (PM)
- Russell Street/Eastbound I-94 Service Drive (PM)
- Chene Street/Harper Avenue (Eastbound I-94 Service Drive) (PM)
- Gratiot Avenue/Eastbound I-94 Service Drive (PM)

In addition, a fifth location with the potential for spillback onto a freeway ramp has been identified within the study area, but outside of the Build Alternative project area:

- Southbound M-10 Service Drive/Pallister Avenue (AM and PM)

Modifications to this intersection and exit ramp are not included in the Build Alternative.

It should be noted that for locations where Synchro was used to evaluate intersection performance, the queuing estimate reported represents the estimated 95th percentile queue, as opposed to the 90th percentile queue as reported by HCS. This represents a more conservative estimate of queuing potential.

5.7 FREEWAY SEGMENT RESULTS ADJACENT TO PROJECT LIMITS FOR THE YEAR 2025

Analyses of adjacent segments of I-94 were conducted in order to better understand how the corridor is expected to perform outside of the immediate study area. The following segments were included in this analysis:

- West Extension: Between 30th Street and the I-96 Interchange
- East Extension: Between Conner Avenue and Whittier Road/Harper Avenue

The volumes forecasts for adjacent freeway segments for the year 2025 are based on the SEMCOG TRANPLAN model. This section provides the HCS results for the 2025 No-Build and Build Alternatives for those freeway segments adjacent to the project area.

5.7.1 No-Build Alternative

The HCS analysis of the No-Build Alternative indicates that adjacent freeway segments would be expected to operate primarily at LOS E or F during the AM and PM peak hours by the year 2025. During the AM peak hour, westbound I-94 both east and west of the project area is expected to operate primarily at LOS F. During the PM peak hour, eastbound I-94 east of Conner Avenue (the eastern limit of the project area) and westbound I-94 west of I-96 (the western limit of the project area) are both expected to perform primarily at LOS F. Level of service results can be found in **Table 9** and **Figure 14**, see Volume 2.

5.7.2 Build Alternative

Under the Build Alternative, the east and west limits of the project area represent the transition between the proposed eight-lane freeway section and the existing six-lane section. The adjacent freeway segments are assumed to be unchanged in geometry from their existing condition, and therefore under the same constraint of capacity as exists today.

HCS analysis indicates that the majority of I-94 both east and west of the project area would operate at LOS E or F during both peak hours by the year 2025. Eastbound I-94 west of I-96 (the western limit of the project area) is expected to operate at LOS F between the 30th Street entrance ramp and the West Grand Boulevard entrance ramp during the AM and PM peak hours. Once vehicles pass through the project area (east of Conner Avenue), the freeway is expected to operate primarily at LOS F during the PM peak hour.

As with the No-Build Alternative, traffic operations for vehicles entering the project area from the east (or along westbound I-94, west of Whittier Road) are expected to primarily operate at LOS F during the AM peak hour. The freeway is expected to operate at LOS E or F during the AM and PM peak hours once vehicles leave the project area to the west (westbound I-94, west of I-96).

In comparing the No-Build Alternative with the Build Alternative, eastbound I-94 is anticipated to be more congested entering the study area under the Build Alternative during the PM peak hour and slightly more congested in the AM peak hour. Westbound I-94 is expected to be slightly more congested entering the study area in the AM and PM peak hours with the Build Alternative compared to the No-Build Alternative. This increase in congestion adjacent to the project area is anticipated as a direct result of increased demand for I-94 within the project area due to improvements proposed under the Build Alternative. Congestion within the project area is forecasted to decrease under the Build Alternative, relative to the No-Build condition.

A slight increase in congestion is expected on adjacent segments of I-94 exiting the project area during the AM and PM peak hours under the Build Alternative relative to the No-Build condition. This is anticipated as a result of the increase in vehicle throughput within the project area relative to the adjacent segments where throughput is more constrained.

Level of service results can be found in **Table 10** and **Figure 19 (**see Volume 2).

5.7.3 Observations Regarding Adjacent Freeway Segments

The freeway segments along I-94 adjacent to the project area are expected to remain three lanes in each direction through the 2025 analysis year. Based on forecasted traffic volumes, these segments would operate either at or near capacity during peak periods. In most cases, segments forecasted to perform at LOS F are operating near the boundary between LOS F and LOS E, with volumes approximately 100 vehicles per hour over the LOS F threshold.

5.8 ADDITIONAL PROPOSED TRAFFIC SIGNALIZATION AND SIGNING

The construction of a continuous service drive along I-75 through Milwaukee Avenue will require a new signal installation to maintain acceptable intersection performance through the year 2025. In addition, the Cadillac Avenue intersections with the eastbound and westbound I-94 service drives, currently stop-controlled intersections, would require traffic signals with the capability for left-turn phasing in order to maintain acceptable levels of service through the year 2025. No other new traffic signals are proposed under the Build Alternative.

A traffic signal at the intersection of Gratiot Avenue and McClellan Avenue would be removed under the Build Alternative, due to the proposed change in operation at this location. Based on the proximity of the intersection to the relocated ramp terminal for the I-94 eastbound off-ramp, a change in operation to right-turn in/right-turn out only is proposed, which would negate the need to maintain a traffic signal at this intersection.

Traffic signal optimization should be provided at all signalized intersections along the project corridor once all freeway and surface street improvements have been implemented and traffic patterns have been established. Traffic projections for the future year 2025 are estimates based on a travel-demand forecasting model; actual traffic volumes might vary from these projections.

Permanent signing plans have not yet been completed for this project. Some proposed changes in access and interchange reconfiguration will require modified signage. The majority of existing signage that is still applicable under the No-Build Alternative would be able to remain in place, as most overpass locations would not change with the Build Alternative. Because the Build Alternative would eliminate left-hand entrances and exits and improve ramp spacing, greater options for sign locations would exist, and overall signage requirements would likely be reduced.

6.0 ACCESS CONNECTIONS AND DESIGN

This chapter details the design criteria used for development of the Build Alternative, along with identifying necessary exceptions from the currently adopted American Association of State Highway and Transportation Officials (AASHTO) Interstate Design Standards.

6.1 DESIGN CRITERIA

The following design criteria, where applicable, were applied to the Build Alternative. The criteria are derived from American Association of State Highway and Transportation Officials, 2001 4th Edition, *A Policy on Geometric Design of Highways and Streets* (Green Book). The Build Alternative was designed to meet these criteria wherever practical and feasible. Exceptions are discussed in Section 6.2.

Criteria Category	Criteria for Mainline
1. Design Speed	50 – 70 mph (60 mph desirable), AASHTO 2001, p. 507
2. Lane Width	12.0 ft.
3. Shoulder Width	• Median Shoulder: 12.0 ft. with 2.0 ft. shy distance • Outside Shoulder: 12.0 ft. • Auxiliary Lane Shoulder: 8.0 ft. to 12.0 ft. for sight distance
4. Bridge Width	Approach Roadway, AASHTO 2001 p. 510
5. Structural Capacity	HS-25-44
6. Horizontal Alignment	Exhibit 3-14, AASHTO 2001, p. 145
7. Vertical Alignment	Exhibit 3-76 and 3-79 (Project is lighted), AASHTO 2001 pp. 274 and 280
8. Grades	Exhibit 8-1 (Level Terrain) 3 – 4% (Urban) max. 0.5% min., AASHTO 2001 p. 510
9. Stopping Sight Distance	Exhibit 3-1 and 3-2, AASHTO 2001 pp. 112 and 115
10. Cross-slopes	2.0% for Lanes and Median Shoulder and 4% for Outside Shoulders
11. Superelevation	Exhibit 3-22 (emax = 6%), AASHTO 2001 p. 509
12. Vertical Clearance	14.75 ft. across roadway and usable shoulder (14.5 ft. minimum clearance plus 0.25 ft. accommodation for future resurfacing), AASHTO 2001 p. 510
13. Horizontal Clearance	Minimum Width = Normal Shoulder Width, AASHTO 2201, p. 765

Design Criteria for I-94, M-10 and I-75 Mainline

Criteria Category	Criteria for System Interchange Ramps
1. Design Speed	Loop Ramps: 30 mph, AASHTO 2001, p. 829 Direct Ramps: 35 – 45 mph (40 mph desirable), Exhibit 10-56 Middle Range, AASHTO 2001, p. 830
2. Lane Width	• Two lanes: 12.0 ft. • One lane: 16.0 ft.
3. Shoulder Width	• Left Shoulder 8.0 ft. to 12.0 ft. for sight distance on curves • Right Shoulder 8.0 ft. to 12.0 ft. for sight distance on curves
4. Bridge Width	Approach Roadway, AASHTO 2001, p. 510
5. Structural Capacity	HS-25-44
6. Horizontal Alignment	Exhibit 3-14, AASHTO 2001, p. 145
7. Vertical Alignment	Exhibit 3-76 and 3-79* (Project is lighted), AASHTO 2001, pp. 274 and 80
8. Grades	4-6% (4% desirable) max. 0.5% min., AASHTO 2001 p. 833 Maximum grades shown are for short tangent distances.
9. Stopping Sight Distance	Exhibits 3-1 and 3-2, AASHTO 2001, pp. 112 and 115
10. Cross-slopes	2.0%
11. Superelevation	Exhibit 3-22 (emax = 6%), AASHTO 2001, p. 509
12. Vertical Clearance	14.75 ft. across roadway and usable shoulder (14.5 ft. minimum clearance plus 0.25 ft. accommodation for future resurfacing), AASHTO 2001 p. 510
13. Horizontal Clearance	Minimum Width = Normal Shoulder Width, AASHTO 2201, p. 765

Design Criteria for System Interchange Ramps

Criteria Category	Criteria for Service Drives
1. Design Speed	30 mph, AASHTO 2001 p. 434
2. Lane Width	11 ft, AASHTO 2001 p. 437
3. Shoulder Width	• Left Shoulder: 0.0 ft. • Right Shoulder: 8.0 ft to 11.0 ft. AASHTO 2001 p. 438
4. Bridge Width	Approach Roadway plus Sidewalk, AASHTO 2001, p. 440
5. Structural Capacity	HS-25-44
6. Horizontal Alignment	Exhibit 3-44, AASHTO 2001, p. 196
7. Vertical Alignment	Exhibit 6-2* (Project is lighted), AASHTO 2001, p. 426
8. Grades	6-9% max., 0.3%min.; AASHTO 2001, p. 435, and Exhibit 6-8, AASHTO 2001, p. 436 Maximum grades shown are for short tangent distances.
9. Stopping Sight Distance	Exhibits 3-1 and 3-2, AASHTO 2001, pp. 112 and 115
10. Cross-slopes	2.0- 3.0%, AASHTO 2001, p. 435
11. Superelevation	Exhibit 3-44, AASHTO 2001, p. 196
12. Vertical Clearance	14.75 ft. across roadway and usable shoulder (14.5 ft. minimum clearance plus 0.25 ft. accommodation for future resurfacing), AASHTO 2001 p. 510
13. Horizontal Clearance	Minimum Width = Normal Shoulder Width, AASHTO 2201, p. 765

Design Criteria for Service Drives

6.2 DESIGN EXCEPTIONS AND JUSTIFICATIONS

For interstate projects, the FHWA has developed a list of 13 controlling design criteria. Design elements falling under these criteria must adhere to full interstate standards as contained in the 2001 AASHTO Green Book and are typically applied to the interstate mainline corridor. The design criteria utilized in this project are presented in Section 6.1. The 13 controlling criteria are as follows:

1. Design speed;
2. Lane width;
3. Shoulder width;
4. Bridge width;
5. Structural capacity;
6. Horizontal alignment;
7. Vertical alignment;
8. Grades;
9. Stopping sight distance;
10. Cross-slopes;
11. Superelevation;
12. Vertical clearance; and
13. Horizontal Clearance.

It should be noted that there are important design features in addition to those identified in the 13 controlling criteria which must be given careful consideration during the project development process. These include capacity, lane balance, weaving, acceleration-deceleration lengths, ramp and lane tapers, and other elements of sound design. In addition, safety features must conform to the *Roadside Design Guide* relative to clear-zones, side-slopes, ditches, roadway features, and barriers associated with medians, bridges, obstacles, etc. These features are not controlling criteria and do not require processing a formal design exception. Design exceptions will be required in this category as well and include criteria related to ramp spacing, exit and entrance ramp terminals, capacity, ramp horizontal sight distance, etc.

Based on the preliminary engineering completed to date, all interchange improvements are designed to meet or exceed AASHTO and Michigan Department of Transportation (MDOT) geometric design standards where practical and feasible. However, two design exceptions and one design justification are necessary at various locations based on constraints within the project corridor and the highly developed nature of the project area:

- Design Exception: Freeway Mainline Shoulder Width / Horizontal Clearance
- Design Exception: Horizontal Stopping Sight Distance (potential)
- Design Jusification: Ramp Terminal Spacing

The following sections present each of these design exceptions and the locations where they are required.

6.2.1 Design Exception: Freeway Mainline Inside Shoulder Width / Horizontal Clearance

A design exception for the horizontal clearance based on the inside shoulder width along a mainline freeway section is required at the following location:

6.2.1.1 I-94 Dequindre Bridge

The Dequindre Bridge along I-94 is located just east of I-75, beginning at Russell Street (west abutment) and ending at St. Aubin Avenue (east abutment). The structure is approximately 2,350 feet long and was rehabilitated in 2000 at an approximate cost of $50 million to mitigate severe deterioration. The rehabilitated bridge includes 4-foot inside shoulders, based on the design criteria for a "long bridge" from *A Policy on Design Standards-Interstate System*, AASHTO, 1991, which was used for design of the rehabilitation project. This criteria states that "On long bridges, offsets to parapet, rail or barrier shall be at least 4 feet measured from the edge of the nearest traffic lane on both the left and the right.".

Adherence to current design criteria for inside shoulder width would have impacts on adjacent property (including special or hazardous waste sites), as well as adding significant costs to the proposed project. As a result, the study team has been directed by MDOT with FHWA's concurrence to maintain the recently completed Dequindre Bridge rehabilitation inside shoulder width of 4 feet. While maintaining the inside shoulder width of 4-foot along the bridge, a design exception is needed for the horizontal clearance.

Proposed Geometry

Under the Build Alternative, the existing Dequindre Bridge would be widened to accommodate ramp reconfigurations, auxiliary lanes, and additional lanes (one in each direction). The majority of the widening is proposed on the northern side of I-94 in an effort to minimize building impacts to the south. The outside shoulders will be 12-foot to match the approach mainline.

The proposed alignment of I-94 generally follows the existing alignment, as illustrated in **Figure 4F** (see Volume 2). The horizontal alignment contains a long tangent on the west side of the bridge, in proximity to the I-75 ramps and flat horizontal curves to the east by St. Aubin Avenue. The ramps on the Dequindre Bridge to and from Chene Street and the on-ramp from northbound and southbound I-75 to eastbound I-94 are essentially maintained at their current locations. The off-ramp configuration from westbound I-94 to northbound and southbound I-75 has been maintained as a collector-distributor configuration with one exit to I-75 from westbound I-94. This was necessitated by the inclusion of the fly-over ramp to southbound I-75 to provide for required vertical clearances and providing recommended standard ramp grades. Other design criteria used include:

- Horizontal sight distance westbound I-94 (existing and proposed)
- Radius = 3300 feet
- Middle Ordinate = 10 feet, provides for design speed of 57 miles per hour (mph)
- Middle Ordinate required for 60 mph design speed = 12.5 feet

Basis for Design Exception

While the inside shoulder width of 4-feet on the Dequindre Bridge meets the minimum standard, this width results in a horizontal clearance below the minimum design standards. Reconfiguration and additional widening of the Dequindre Bridge to accommodate 12- foot inside shoulders would require acquisition of additional right-of-way, and impacts on known special or hazardous waste sites. Construction cost of increasing inside shoulder widths to meet current AASHTO standards is estimated at $9 – 10 Million, not including right-of-way acquisition or hazardous/special waste cleanup costs.

In order to determine the relative safety of the existing configuration, a crash analysis was conducted based on data obtained for the period 1999 - 2001. Tables **5A and 5B** (see Volume 2) present a summary of the crash data (frequency and type) and injury crashes (number and severity) within and adjacent to the I-94 project limits. The Dequindre Bridge segment includes the following ramps:

- The westbound I-94 off-ramp to northbound and southbound I-75
- The northbound and southbound I-75 on-ramp to eastbound I-94; and
- The Chene Street ramps (entrance to westbound I-94 and exit from eastbound I-94).

The crash data within the limits of the Dequindre Bridge structure indicates that a three-year total of 85 crashes occurred on the structure, which ranks 9th out of 19 segments within the project area. A total of ten fixed-object crashes (a indicator of the adequacy of buffer space between travel lanes and the bridge rail or barrier) occurred in the three-year analysis period on the Dequindre Bridge, which ranked 10th out of 19 segments. In addition, nine sideswipe crashes occurred on the structure over the three-year period, which ranked 11th, along with four other segments. Injury crashes, within the bridge limits, based on both frequency and severity, ranked 11th in each category with no fatalities or type A (incapacitating) injuries.

A crash rate analysis was performed in the *Traffic Report, Volume 1: Existing Conditions* and the *Traffic Report, Volume 1 - Addendum for the I-94 Rehabilitation Project* using crash data from 1990 through 1993. The crash rate data within the Dequindre Bridge area shows a crash rate of 178 crashes per million vehicle miles (MVM) along westbound I-94 and 280 crashes per MVM for eastbound I-94. The average crash rate for interstates in southeast Michigan is 350 crashes per MVM.

From the above, the crashes occurring within the Dequindre Bridge segment do not show an over-represented frequency, rate, or crash pattern that can be attributed to the 4-foot wide inside shoulder.

Conclusions

While maintaining the minimum inside shoulder width of 4-feet on the Dequindre Bridge, the horizontal clearance does not meet minimum standards. However, reconfiguration of the recently rehabilitated I-94 Dequindre Bridge, which adhered to AASHTO Design Standards for long bridges when it was designed, to meet current standards would result in significant additional property and hazardous waste impacts, as well as cost.

Furthermore, the existing Dequindre Bridge inside shoulder width (4 feet) does not appear to have a significant effect on crashes and safety, even under the extremely congested conditions that exist along the mainline and ramps in this area today. It can be expected that with the implementation of the Build Alternative, including the addition of auxiliary lanes at ramps and an additional through lane in each direction, safety and operations would improve.

6.2.2 Design Exception: Horizontal Stopping Sight Distance (Ramps)

Within the I-94/I-75 and I-94/M-10 interchange complexes, ramp design speed criteria for horizontal and vertical controls are 40 miles per hour (mph). Based on the ultimate combination of horizontal and vertical alignments, it is probable that design exceptions would be required within some ramp segments due to the height of the concrete safety barriers along the inside of curves. For example, if the concrete safety barrier is higher than 2.75 feet (height at the mid-point of sight line) on a horizontal curve with a minimum radius for 40 mph, the middle ordinate required to provide stopping sight distance at 40 mph would be 22 feet. However, the middle ordinate on a one-lane ramp would be 16 feet, (comprised of an 8-foot inside shoulder and 8 feet to the centerline of a one-lane ramp), which would provide for adequate stopping sight distance for a maximum of 35 mph, using a minimum ramp radius for 40 mph. Exact locations where horizontal sight distance design exceptions may be necessary would be determined during the Engineering Report phase.

A possible solution that could be investigated during detailed geometric studies is to provide a 32-inch-high barrier along the inside of curves, where the sight distance restriction occurs, and a 42-inch barrier on the outside of curves, where impacts typically occur. In addition, a wider inside shoulder could be used in the design to increase sight distance. These options would be evaluated during the Engineering Report phase to minimize or eliminate any necessary design exceptions.

6.2.3 Design Justification: Ramp Terminal Spacing

Due to the urban, densely developed nature of the area and the 50+ year-old design of the project corridor, ramp terminal spacing in most instances do not currently meet minimum standards established by AASHTO. While all reasonable attempts have been made to increase ramp spacing under the Build Alternative, in some cases it is not feasible to adhere current standards.

Since geometrics have not been defined precisely during this stage of the project development process, a conservative approach has been used in measuring distances between ramp terminals. The distances identified within this section are approximated by measuring between the painted noses rather than physical or gore noses. Therefore, the values indicated in the next section should not be compared with the distances used in the capacity analyses since those distances were measured as defined in the *Highway Capacity Manual*.

Since there are no design criteria for ramp terminal spacing, a design exception is not required. However, a design justification for ramp terminal spacing based on AASHTO minimum standards would be required at the following locations:

6.2.3.1 Eastbound I-94: M-10 Entrance Ramps, Brush Street Exit Ramp, and I-75 Exit Ramp

Along eastbound I-94, the proposed distance between the M-10 northbound and southbound entrance ramps, the Brush Street exit ramp, and the I-75 exit ramps do not meet the minimum ramp spacing requirements stipulated in AASHTO. The following table summarizes the approximate ramp terminal spacing within this segment under the Build Alternative, as well as AASHTO minimum requirements. The Build Alternative configuration for this segment is illustrated in **Figures 4C – 4D** (see Volume 2).

Ramp Terminals		Terminal Spacing (feet)	
Upstream	**Downstream**	**Build Alternative**	**AASHTO Minimum**
M-10 Entrance	Brush St. Exit	1,500	2,000
Brush St. Exit	I-75 Exit	800	1,000

Ramp Terminal Spacing Design Exceptions
Eastbound I-94: M-10 to I-75

In order to maximize spacing between the three ramp terminals, the location of the Brush Street exit ramp has been shifted downstream to the point where the weaving distance between M-10 and Brush Street has been maximized, to the extent possible, relative to the location of the ensuing exit ramp to I-75. With the relocation of the John R Avenue exit ramp to Brush Street, the exit ramp gore would be relocated approximately 600 feet further downstream from the M-10 interchange. Ramp spacing between the M-10 entrance ramp and the Brush Street exit ramp would therefore increase significantly relative to the existing condition.

Basis for Design Justification

The existing distance along I-94 between M-10 and I-75 is slightly over one mile. Accommodating system-to-system ramps within this segment, in addition to a service interchange, provides little flexibility in meeting spacing requirements.

The only reasonable potential for adhering to minimum spacing standards within this segment is through elimination of the existing John R Avenue exit ramp, which was considered as part of the project development process. However, after a public outcry over the proposed removal of this existing access point, it was agreed that access would be maintained, but modified to better meet geometric requirements. Hence, under the Build Alternative, the proposed ramp (providing direct access to Brush Street) would be located approximately 600 feet downstream from the existing ramp in order to maximize ramp spacing to the extent possible.

A review of average crash rates shows that the segment of eastbound I-94 between the M-10 entrance ramps and John R Avenue exit ramp experiences 355 crashes per MVM, which is approximately equal to the average crash rate in southeastern Michigan. The existing left-hand entrance ramp, sub-standard taper-type entrance ramp terminals and imbalance of lane use all have a significant negative impact on safety and mobility within this segment. Under the Build Alternative, elimination of the left-hand entrance, addition of auxiliary lanes and improved lane balance will all contribute to improving the safety and operation of this segment, which currently experiences an average crash rate relative to other freeway segments in southeast Michigan.

A capacity analysis of the segments within this area indicates that the freeway is expected to perform at LOS F under the 2025 No-Build Alternative during both the AM and PM peak hours. However, under the 2025 Build Alternative, the segment between the Brush Street exit ramp and the I-75 exit ramp is anticipated to operate at LOS B during both peak hours. The segment between the M-10 entrance ramp and Brush Street exit ramp, which is forecasted to operate at LOS D during the AM peak hour and LOS E during the PM peak hour. It should be noted that, due to the number of lanes within this segment (four through lanes and two auxiliary lanes), it was necessary to modify the HCS analysis, as Highway Capacity Software does not permit an input of six lanes for a freeway analysis. The analysis was instead run as a five-lane section, with 1,000 vehicles deducted from the through volume per MDOT and FHWA direction. Actual level of service is likely to be better than what is reported, as this approach represents a highly conservative analysis (since the capacity of a lane is 2,200 vehicles per hour per lane (vphpl) rather than 1,000 vphpl).

Conclusions

Operations and safety along this segment of eastbound I-94 would be significantly improved under the Build Alternative through increased ramp spacing over the existing condition, the addition of a general-purpose lane, elimination of the left-hand ramps at the M-10 interchange, and inclusion of an auxiliary lane between the M-10 entrance ramp and the Brush Street exit ramp. These improvements will reduce congestion and weaving. The proposed ramp spacing would therefore not adversely affect operations and safety.

6.2.3.2 Eastbound I-94: Northbound and Southbound I-75 Entrance Ramp and Chene Street Exit Ramp

Along eastbound I-94, the proposed distance of 1,400 feet between the northbound and southbound I-75 entrance ramp and the Chene Street exit ramp under the Build Alternative would not meet the minimum AASHTO requirement of 2,000 feet. The existing ramp spacing is approximately 1,300 feet. The segment is depicted in **Figure 4E-F** (see Volume 2).

Basis for Design Justification

The existing Chene Street exit ramp serves considerable truck and passenger vehicle traffic destined for industrial complexes in the area, including the Detroit Department of Transportation garages and offices, the General Motors Cadillac Plant, and the Thorn Apple Valley Plant. Shifting the exit ramp downstream to East Grand Avenue was investigated, as it would provide for adequate ramp spacing. However, the East Grand Avenue entrance ramp to eastbound I-94 would then overlap with the Mount Elliott Street exit ramp, making this unfeasible. In addition, the Chene Street exit ramp would provide more direct access to the industrial areas from eastbound I-94.

A crash analysis of this segment indicated that eastbound I-94 currently experiences a crash rate of 280 crashes per million vehicle miles (MVM), less than the southeastern Michigan average crash rate of 350 crashes per MVM. There currently are three through lanes and an auxiliary lane along eastbound I-94 between the northbound and southbound I-75 entrance ramp and the Chene Street exit ramp. The Build Alternative proposes four through lanes and two auxiliary lanes in this same section. One of the auxiliary lanes is proposed as an exit-only lane to Chene Street, while the second would allow the option of exiting or remaining on eastbound I-94, thereby facilitating weaving from eastbound I-94 to the Chene Street exit ramp while not forcing I-75 entrance ramp traffic to change lanes (Type B weave) to remain on eastbound I-94. The auxiliary lane is retained for capacity purposes and continues to Van Dyke Avenue where it is dropped as the exit ramp. Therefore, under the proposed configuration, safety would be enhanced considerably over existing conditions.

A capacity analysis indicates that this segment would operate at LOS C during the AM peak hour and LOS E during the PM peak hour under the Build Alternative. The proposed configuration of this section of eastbound I-94 would include four through lanes and two auxiliary lanes, for a total of six lanes. Since the Highway Capacity Software does not permit an input for six lanes, the analyses were run assuming a five-lane section, with a deduction of 1,000 vehicles from the forecasted through volume per MDOT and FHWA direction. Actual level of service is likely to be better than what is reported, as this approach represents a highly conservative analysis (since the capacity of a lane is 2,200 vehicles per hour per lane (vphpl) rather than 1,000 vphpl)..

Conclusions

Operations and safety would be improved significantly under the Build Alternative since congestion would be reduced with the addition of a general-purpose lane and the safety enhanced by increasing ramp spacing and providing (in addition to the existing mandatory exit lane) an additional auxiliary lane that would be a optional exit/through lane. The proposed ramp spacing would not adversely affect operations and safety.

6.2.3.3 Westbound I-94: Brush Street Entrance Ramp and Northbound and Southbound M-10 Exit Ramp

Along westbound I-94, the proposed distance between the Brush Street entrance ramp and the M-10 exit ramp of 1,300 feet would not meet the minimum AASHTO requirement of 2,000 feet between ramp terminals. The existing spacing between the John R Avenue entrance ramp (which would be replaced by the Brush Street entrance ramp under the Build Alternative) and the M-10 exit ramp is 1,240 feet. The segment is depicted in **Figure 4D** (see Volume 2).

Basis for Design Justification

The existing distance along I-94 between M-10 and I-75 is slightly over one mile. Accommodating system-to-system ramps within this segment, in addition to a service interchange, provides little flexibility in meeting spacing requirements. Under the Build Alternative, AASHTO minimum spacing requirements would be met between the I-75 entrance ramp and the Brush Street entrance ramp to westbound I-94.

Design alternatives were reviewed in an attempt to meet spacing requirements along this segment. Were the Brush Street entrance ramp to be moved further east to increase the spacing, the spacing and merge-distance requirements for the northbound and southbound I-75 two-lane entrance ramp would be violated. Contrarily, moving the northbound and southbound M-10 exit ramp further west would exceed the maximum criteria for profile grade for the fly-over ramp to southbound M-10 and result in a sharper horizontal ramp alignment and consequently lower the design speed (40 mph) for the fly-over and outside ramp. Therefore, horizontal and vertical constraints preclude increasing ramp spacing in this direction.

Similar to this segment in the eastbound direction, the only reasonable potential for adhering to minimum spacing standards is through elimination of the existing John R Avenue exit ramp, which was considered as part of the project development process. This access was retained, however, after public outcry over the potential of closing this interchange. The proposed ramp would be 300 feet further upstream of M-10, therefore increasing the ramp terminal spacing over the existing condition.

The crash rate along westbound I-94 from the existing John R Avenue entrance ramp to the M-10 exit ramp is 297 crashes per million vehicle miles (MVM), which below the average crash rate of 350 crashes per MVM. This segment is currently characterized by a lack of auxiliary, acceleration or deceleration lanes, a left-hand exit to southbound M-10, and poor lane balance at the M-10 interchange. Under the Build Alternative, the segment would be upgraded to include an additional travel lane, an auxiliary lane, improve acceleration/deceleration distances and elimination of the existing left-hand exit, all of which will contribute to improved operations and safety.

The capacity analysis of the corridor indicates that under the 2025 No-Build Alternative, this segment of I-94 is expected to operate at LOS F during both the AM and PM peak hours. Under the Build Alternative, westbound I-94 between the northbound and southbound I-75 entrance ramp to the Brush Street entrance ramp is anticipated to perform at LOS D during both peak hours. Between the Brush Street entrance ramp and the M-10 exit ramp, westbound I-94 is forecasted to operate at LOS B during both the AM and PM peak hours under the Build Alternative.

Conclusions

Operations and safety along this segment of westbound I-94 would be significantly improved under the Build Alternative through the addition of a general-purpose lane, elimination of the left-hand ramps at the M-10 interchange, and inclusion of an auxiliary lane between the Brush Street entrance ramp and the M-10 exit ramp. These improvements will reduce congestion and weaving, and increase the ramp spacing over the existing condition. The proposed ramp spacing would therefore not adversely affect operations and safety.

6.2.3.4 Westbound I-94: Chene Street Entrance Ramp to I-75 Exit Ramp

Along westbound I-94, the proposed ramp spacing between the Chene Street entrance ramp and the I-75 exit ramp of 955 feet would not meet the AASHTO minimum requirement of 2,000 feet. The existing ramp spacing is approximately 1,600 feet. The segment is depicted in **Figure 4F** (see Volume 2).

Basis for Design Justification

Under the Build Alternative, the ramp spacing between the Chene Street entrance and the I-75 exit would be increased by approximately 50 feet. However, meeting the AASHTO minimum spacing of 2,000 feet would require removal or major relocation of the Chene Street entrance ramp, which was determined to be not feasible or desirable, as the ramp provides critical access to a major industrial area. Removal or relocation of the ramp would result in diversion of truck traffic through adjacent neighborhoods to reach the area.

The crash rate along westbound I-94 between the Chene Street entrance ramp and the I-75 exit ramp is 178 crashes per million vehicle miles (MVM), well below the average crash rate of 350 crashes per MVM for southeast Michigan. Safety is expected to be improved under the Build Alternative through the addition of a general purpose lane, which will reduce congestion and improve conditions for weaving between the two ramps.

The capacity analysis illustrates that this segment is expected to perform at level of service (LOS) F in the AM peak hour and a LOS E in the PM peak hour under the 2025 No-Build Alternative. Under the 2025 Build Alternative, the segment is anticipated to operate at LOS E in the AM peak hour and LOS D in the PM peak hour. Therefore, it is expected that the Build Alternative would increase capacity and mobility within the segment.

Conclusion/Mitigation

The Build Alternative would improve operations along westbound I-94 between the Chene Street entrance ramp and I-75 exit ramp by providing a slight increase in ramp spacing and through the addition of a general purpose lane, while maintaining the existing auxiliary lane between the two ramps. The increased capacity within this segment would reduce friction and improve opportunities for weaving maneuvers.

6.2.3.5 Northbound I-75: Eastbound I-94 Entrance Ramp and Clay Street Exit Ramp

Along northbound I-75, the existing ramp spacing between the eastbound I-94 entrance ramp to the Clay Street exit ramp of 1,050 feet does not meet the minimum AASHTO requirement of 2,000 feet. Since reconstruction of I-75 is not included this project beyond what is needed to accommodate the system-to-system interchange and service drives, ramp spacing and all other existing elements along I-75 would remain unchanged. The ramps from I-94 to I-75 would transition into the existing entrance ramp to I-75; therefore, all gore area and terminals would remain at their present locations. The segment is depicted in **Figure 4Q** (see Volume 2).

MDOT anticipates that a rehabilitation project would be initiated along I-75 in this section a considerable time before the projected year 2025 time frame. At that time, ramp spacing and auxiliary lane options would be developed and implemented.

Basis for Design Justification

In order to increase ramp spacing at this location, major improvements to I-75 would be required, or the Clay Street exit ramp would need to be eliminated. It was found to be neither practical nor feasible to relocate the I-94 entrance ramp to northbound I-75 further south to increase the ramp spacing based on geometric constraints and right-of-way required. In addition, operational improvements, such as the addition of an auxiliary lane, were found to be cost prohibitive, as any widening of I-75 would require replacement of the East Grand Boulevard and Grand Truck Railroad over I-75 bridges, both of which are in satisfactory condition. Therefore, the existing configuration is proposed to remain in place under the Build Alternative until such as time as MDOT initiates improvements to the I-75 corridor.

Conclusions

Based on limitations in the size and scope of this project, ramp spacing at this location would remain as it exists today until such a time that MDOT initiates improvements to the I-75 corridor. The Build Alternative would match into the existing entrance ramp at this location and would therefore result in no operational changes from the existing condition. Improvements would be required along I-75 at this location to maintain acceptable levels of service through the design year.

Although not all deficiencies along northbound I-75 would be addressed as part of this project, safety would be enhanced with the proposed improvement since the I-94 and I-75 interchange complex would be reconstructed. The existing ramps within the interchange are sub-standard relative to horizontal curvature, sight distance, merge and diverge tapers, etc. The Build Alternative would provide an interchange that is safer since existing deficiencies would be brought up to higher standards.

6.2.3.6 Southbound I-75: Clay Street Entrance Ramp and Eastbound and Westbound I-94 Exit Ramps

Along southbound I-75, the existing distance between the Clay Street entrance ramp and the eastbound and westbound I-94 exit ramp of 1,050 feet does not meet the minimum AASHTO ramp spacing criteria of 2,000 feet. Since reconstruction of I-75 is not included this project beyond what is needed to accommodate the system-to-system interchange and service drives, ramp spacing and all other existing elements along I-75 would remain unchanged. The ramps from I-94 to I-75 would transition into the existing entrance ramp to I-75; therefore, all gore area and terminals would remain at their present locations. This segment is depicted in **Figure 4Q** (see Volume 2).

MDOT anticipates that a rehabilitation project would be initiated along I-75 in this section a considerable time before the projected year 2025 time frame. At that time, ramp spacing and auxiliary lane options would be developed and implemented.

Basis for Design Justification

Adjustments to increase ramp spacing at this location were evaluated during project development, but were deemed to be detrimental to the overall design of the I-94/I-75 interchange. Ramp spacing could be increased by providing maximum allowable grades on the exit ramps to I-94. However, the marginal increase in ramp spacing gained by this adjustment would not warrant the negative effects of increasing the grades on these ramps, such as reduced operating speeds. Furthermore, even with this adjustment, it would not be feasible to meet AASHTO ramp spacing standards.

In addition, operational improvements, such as the addition of an auxiliary lane, were found to be cost prohibitive, as any widening of I-75 would require replacement of the East Grand Boulevard and Grand Truck Railroad over I-75 bridges, both of which are in satisfactory condition. Therefore, the existing configuration is proposed to remain in place under the Build Alternative until such as time as MDOT initiates improvements to the I-75 corridor.

Conclusions

As stated previously, based on limitations in the size and scope of this project, ramp spacing at this location would remain as it exists today until such a time that MDOT initiates improvements to the I-75 corridor. The Build Alternative would match into the existing entrance ramp at this location and would therefore result in no operational changes from the existing condition. Improvements would be required along I-75 at this location to maintain acceptable levels of service through the design year.

Although not all deficiencies along southbound I-75 would be addressed as part of this project, safety would be enhanced with the proposed improvement since the I-94 and I-75 interchange complex would be reconstructed. The existing ramps within the interchange are sub-standard relative to horizontal curvature, sight distance, merge and diverge tapers, etc. The Build Alternative would provide an interchange that is safer since existing deficiencies would be brought up to higher standards.

7.0 TRANSPORTATION PLANS, LAND USE PLANS, AND THE NEPA PROCESS

This chapter describes how the I-94 Rehabilitation Project is incorporated into the environmental process.

7.1 TRANSPORTATION AND LAND USE PLANS

The I-94 Rehabilitation Project has been developed to be consistent with regional and local land use and transportation plans. The 2015, 2020, and 2025 Regional Transportation Plans for southeast Michigan prepared by SEMCOG, the organization responsible for regional planning, identify the need to widen I-94 within the project area from six to eight lanes. This project would satisfy this need, as the Build Alternative would include construction of an additional lane in each direction.

The proposed I-94 Rehabilitation Project is included in the SEMCOG *2025 Regional Transportation Plan* and *Transportation Improvement Program* (TIP) as a study. Upon completion of the study, the recommended Build Alternative would be included in the SEMCOG regional transportation plan and TIP as a proposed project. The recommended Build Alternative would be included in the SEMCOG air quality analysis to determine conformity with the State Implementation Plan (SIP) for air quality. The proposed project conforms with the SIP if the project does not add excess pollutants to the state's air quality budget. FHWA might issue clearance for the project after the proposed project is included in the TIP and found to be in conformance with the SIP.

In addition, the Build Alternative is supportive of local land use and transportation plans. The project is consistent with the current City of Detroit Master Plan, dated July 1992, and has been included in the most recent master plan for Wayne State University, dated September 2001. Service drive and surface roadway improvements Included in the project would enhance access and beautify the project area. In March, 2001, the City of Detroit Department of Public Works issued a letter of support of the project. In August 1, 2003, the Detroit City Council unanimously passed a resolution in support of the Build Alternative, which was subsequently approved by the Mayor's Office. Appendix A contains official agency and municipal letters of support for the I-94 Rehabilitation Project.

7.2 NEPA ENVIRONMENTAL PROCESS

A Draft Environmental Impact Statement (DEIS) has been prepared for this project. The DEIS was presented to the public in March 2001. The Final Environmental Impact Statement (FEIS) is currently being prepared and will be submitted by Fall 2004 to the FHWA for a Record of Decision (ROD) by Spring 2005.

The Recommended Alternative is included in the SEMCOG 2025 Regional Transportation Plan (RTP) for southeast Michigan, adopted on March 20, 2003. The study is also included in the SEMCOG Transportation Improvement Program (TIP) adopted on September 26, 2003. It is expected that SEMCOG will adopt the 2030 Regional Transportation Plan in November 2004 with the inclusion of the I-94 Rehabilitation Project.

8.0 COORDINATION

The Michigan Department of Transportation (MDOT) employs a comprehensive public participation and agency coordination process for alternatives analyses and environmental documentation. This process was initiated at the beginning of the project in December 1994 and has continued throughout project development. The process involves two main elements:

- Community participation by citizen groups and organizations as well as individuals; and
- Coordination with federal, state, and local governments, and agencies, and other interested entities.

This chapter summarizes the local, public, and agency meetings held as part of the I-94 Rehabilitation Project. Letters of support for this project are included in Appendix A.

8.1 PROJECT MEETINGS

This section summarizes the local, public, and agency meetings held as part of this project.

8.1.1 Local and Public Meetings

Early in the project development process a Citizens Advisory Committee (CAC) was established. Representatives of special-interest groups, block clubs, community organizations, churches, school district administration, and business and institutional groups attended four CAC meetings and assisted in disseminating project information to constituencies. The CAC reviewed proposed alternatives and provided input to the study team. Input from the CAC was used in defining and evaluating the alternatives considered in this study.

Ten public information meetings were conducted to present project status and alternatives to interested parties. The meetings were publicized using major local print media, television stations, radio, and specialty minority news networks. Meeting dates and locations are listed below:

- 05/23/95, Crockett Vocational/Technical Center
- 05/24/95, Crockett Vocational/Technical Center
- 12/12/95, Cobo Conference and Exhibition Center
- 04/23/96, Kettering Sr. High School
- 04/24/96, Northwestern High School
- 04/25/96, Wayne County Community College, Eastern Campus
- 05/12/99, Kettering Sr. High School
- 05/13/99, Museum of African American History
- 10/21/03, Museum of African American History
- 10/22/03, Wayne County Community College, Eastern Campus

The following issues were voiced most often at the public information meetings and have been important in the development of the Build Alternative:

- Noise levels and other environmental issues
- Impacts on schools and bus routes
- Displacement of households and businesses
- Role of transit
- Construction schedule
- Increased traffic impacts
- Right-of-way and property appraisals
- Reserved space in median
- Retaining walls and noise barrier walls
- Continuous-service-drive impacts to neighborhoods
- Speed limits
- Bridge replacements and pedestrian walkways

Approximately 100 meetings were also held with various groups by request. Meetings were held with local institutions, business associations, neighborhood councils, churches, and other local organizations. In some cases, follow-up meetings were held. After redesign of the I-94/M-10 interchange, meetings were held with residents of the Fourth Street neighborhood and Research Park Apartments, as well as representatives of Wayne State University (WSU), to discuss the changes. Numerous meetings were also held with individual community members and business owners.

Key issues discussed in these group meetings include project timelines, funding, property displacements, noise abatement, freeway aesthetics, access during construction, exit and entrance ramp placement, neighborhood development initiatives, emergency vehicle access, compatibility with business, and institutional expansion plans. All comments by community and special groups were considered as part of this study.

A telephone survey was conducted in September 1995 to assess the awareness, usage, impact, and concerns of local residents and businesses in the I-94 project area. More than 450 residents and small business owners were contacted as part of the survey. Demographic information and public reaction regarding proposed modifications were collected from responders.

Two project-area focus group studies, both conducted on August 17, 1995, helped to identify critical issues and to design quantitative research data-collection instruments. One focus group consisted of 16 adult residents living within one mile of the I-94 project area. The second focus group consisted of seven small-business owners within the same area.

Public hearings were held on March 5, 2001, at the Charles H. Wright Museum of African American History and on March 6, 2001, at Kettering Sr. High School. The hearings gave the public an opportunity to learn more about the project, ask questions, and have their concerns added to the public record. The Public Hearing was an open-house format, allowing attendees to study project exhibits and ask questions. Court reporters were available to record and document the comments of individuals.

Oral comments from the Public Hearing and written comments were reviewed, considered, and evaluated. The Draft Environmental Impact Statement (DEIS) Build

Alternative was modified based on public input, benefits to the community and travelers, and evaluation of the social, economic, and environmental impacts of the alternatives. A recommended Build Alternative was selected by MDOT and FHWA in October 2002. On August 1, 2003, the Detroit City Council approved the recommended Build Alternative.

8.1.2 Agency Meetings

In January 1995, coordination letters describing the proposed project were distributed to interested agencies. The purpose of the letters was to inform agencies of the project and to promote the agencies' involvement in project planning.

The Interagency Coordination Committee (ICC) was established as a steering committee for the I-94 project. Members of the ICC include representatives of:

- MDOT;
- The City of Detroit;
- SEMCOG;
- FHWA;
- Wayne County;
- The Detroit Department of Transportation (DDOT);
- The Suburban Mobility Authority for Regional Transportation (SMART); and
- Macomb County.

More than 30 meetings with the ICC have been conducted since December 1994. The alternatives studied in this DEIS were influenced by the ICC, and the group continues to provide oversight to the study.

Since December 1994, numerous meetings have been conducted with public officials and agency representatives to discuss project issues relevant to specific areas of interest and jurisdiction. Meetings included representatives of federal, state, and local agencies and other entities. Many issues were discussed, including improved collaboration among agencies, cooperative planning, technical input, and design aspects of the project. Informational presentations and updates to planning and design of alternatives were provided as needed. Comments from these meetings are incorporated in the evaluation of the alternatives.

8.2 LETTERS OF SUPPORT

There have been many responses to the Draft Environmental Impact Statement (DEIS) that agree that the freeway is congested and needs to be repaired. Letters of support for this project have been received. In March, 2001, the City of Detroit Department of Public Works issued a letter of support of the project. On August 1, 2003, the Detroit City Council provided concurrence on the recommended Build Alternative. Appendix A contains official agency and municipal letters of support for the I-94 Rehabilitation Project.

8.3 PRIVATE, STATE, AND LOCAL COMMITMENTS OF NON-INTERCHANGE IMPROVEMENTS

The I-94 Rehabilitation Project is one of many projects intended to improve the transportation system in the City of Detroit and southeast Michigan. This project is not driven by private, state, or local commitments of non-interchange improvements that are required for adequate operation of the freeway system.

8.4 OTHER PROJECTS

Numerous projects on other interstate freeways and highways are scheduled within Detroit to improve the city's transportation infrastructure. These roadway improvements surrounding the project area would compliment the I-94 Rehabilitation Project:

- Ambassador Bridge Gateway Project
- Replace the DDOT downtown transit terminal.
- Modify the I-375 / east Jefferson Avenue interchange and improve access to local roads at this interchange.
- Rehabilitate, replace superstructures, and/or replace bridge decks along various bridges along I-75 and M-10 in Wayne County.
- Replace bridge decks at M-10 and I-94
- Replace various bridge decks on I-94 in Wayne County.
- Structure replacement of two bridges at the I-94/I-96 interchange.
- Replace deck on the eastbound I-96 to I-94 eastbound ramp.
- Geometric changes, signal revisions, and signal modernization throughout the City of Detroit at frequent crash locations and various locations.
- Pavement markings, stop bars, crosswalks, and symbols at more than 375 intersections throughout the City of Detroit.
- Resurface/Reconstruct various roadways throughout the City of Detroit.

These projects are listed in the Fiscal Year 2004 – 2006 Transportation Improvement Program and are scheduled to occur between 2004 to 2006.

Appendix A: Letters of Support

TRUE COPY CERTIFICATE

Form C of D—16-CE

STATE OF MICHIGAN,
City of Detroit } ss.

CITY CLERK'S OFFICE, DETROIT

I, JACKIE L. CURRIE , City Clerk of the City of Detroit, in said State, do hereby certify that the annexed paper is a TRUE COPY OF RESOLUTION

(Adjourned)

adopted (passed) by the City Council at session of

AUGUST 1 ~~19~~ 2003

and approved by Mayor

AUGUST 12 ~~19~~ 2003

as appears from the Journal of said City Council in the office of the City Clerk of Detroit, aforesaid; that I have compared the same with the original, and the same is a correct transcript therefrom, and of the whole of such original.

In Witness Whereof, I have hereunto set my hand and affixed the corporate seal of said City, at Detroit, this 16TH

day of SEPTEMBER A. D. ~~19~~ 2003

JACKIE L. CURRIE
CITY CLERK

DETROIT CITY COUNCIL RESOLUTION ADOPTED ON AUGUST 1, 2003
APPROVED BY THE MAYOR'S OFFICE ON AUGUST 12, 2003

City Planning Commission

July 31, 2003

Honorable City Council:

Re: Proposed Expansion of I-94 (Departmental Status Report and Resolution).

On August 1, 2003 the Michigan Department of Transportation (MDOT) will give a presentation to your Honorable Body on its current plan for the I-94 Rehabilitation Project. MDOT is requesting the City Council's support for this revised plen at your August 1, Adjourned Session so that the planning process for the Project will not be disrupted.

In 2001 the City Council approved the attached resolution supporting the Build Alternative included in the draft Environmental Impact Statement of the I-94 Project with 11 changes (Attachment A). This resolution was e result of a recommendation of the City Planning Commission (CPC) and the City Council's request that CPC staff meet with representatives from the Department of Public Works and other affected Executive Branch departments to come to a consensus regarding the City's position and recommendation to MDOT regarding the project. A meeting did take plece between CPC and the departments, and recommendations and the resolution that was approved by Council were developed. That resolution substantially reflected the recommendation made by CPC.

Since the time that resolution was passed, the design of the freeway has continued to evolve and your Honorable Body's comments were taken Into account. CPC steff has attended several meetings with MDOT and its consultants and, most recently, representatives from the Mayor's office, DPW, and DDOT. The most recent iteration of the design, as described in the "I-94 Rehabilitation Project Recommended Alternatives Analysis Final Report", appears to substantially address the concerns raised in your previous resolution. The following briefly describes how the current design addresses each of the changes requested by your Honorable Body in the previous resolution, with the recommended change in italics.

1. *The removal of the fifty-five foot wide center median.* This has been done.

2. *The addition of continuous 38 feet wide service drives in each direction (two 11 foot wide traffic lanes and a 16 foot wide multi-purpose lane for potential mass transit use).* The Federal Highway Administration (FHA) will only pay for two 11 foot wide traffic lanes and an eight (8) foot wide shoulder thet can be used for parking If justified and for bus stops. The 16 foot lane cannot be funded with federal dollars and also some residents expressed fears that a wide service drive would lead to speeding.

3. *In conjunction with the continuous service drive concept, the addition of a street east of Woodward and parallel to the service drive for local traffic in order to protect the residences along Hendrie St.* This has been included east of the new freeway exit east of Woodward. MDOT will distribute an example of what this could look like at its presentation on August 1.

4. *The preparation of an Environmental Assessment considering the impact of the proposed widening over the entire I-94 corridor from Wyoming to I-696.* This will be done.

5. *The inclusion in the EIS of consideration of the Detroit Intermodal Freight Terminal Study's impact on truck treffic on I-94.* This has been done.

6. *The reduction in the spacing between the euxiliary lanes and mainline lanes as much as possible and the "tightening" of ramping geometrics in order to limit the taking of private property.* This has been preliminarily done (and much improved), and will be further analyzed as the final design is entered into.

7. *The provision of special consideration to the schools along the corridor regarding noise mitigation, including that they not be treated es residences in determining whether noise barriers are justified.* The MDOT guidelines state that public use areas such as schools shall be counted as 10 dwellings (which seems very low, given that there are hundreds of children in the school)

8. *The provision of a close examination in the EIS of using rapid transit as a traffic construction mitigation component, using flexible TEA 21 funding in the corridor.* MDOT is agreeeble to funding DDOT operations along the I-94 corridor. SEMCOG has not identified a direct rail alternative to I-94, and so there presently are not any rail alternatives that could be funded using the TEA 21 funds. This is not to say that a rail alternative could not be developed before the freeway expansion occurs, or that MDOT could not encourage the development of such alternatives as part of a larger route.

9. *The correction by MDOT of ell existing noise and air quality violetions es part of any reconstruction of the freeway, per federal guidelines.* This will be done.

10. *The securing by MDOT of all funding for the noise barrers — walls, landscaping, buffering, etc.* — as well es *funding for modifications of streets intersecting the service drives and on-going maintenance of the barrier walls before any highway approvals are given.* Memorandums of understanding will be developed between the City and MDOT describing exact maintenance responsibilities. If the City knows which streets it would like modified, MDOT requests that it be provided with this information so that those improvements can be a part of the package presented to FHA.

11. *The analysis of the railroad right-of-way east of I-75 and south of I-94 for use as both a vehicular road and continuing as a railroad line, given its importance as a link in the railroad line linking Metro Airport/Ann Arbor and downtown Detroit.* This will remain a rail corridor.

Staff hopes that this information will assist your Honorable Body in considering MDOT's request to approve a resolution in support of the reconstruction of I-94. A resolution (Attachment B) is submitted for your consideration if you choose to act on this matter. It is a revision of the previous resolution with the deletion of the previously recommended changes and an update of the eighth "whereas", regarding a regional transit agenda.

Respectfully submitted,
MARSHA S. BRUHN
Director
GREGORY F. MOOTS
Staff

ATTACHMENT B

By Council Member Bates:

Whereas, The City of Detroit, through various departments, including Public Works, Transportation, and Planning and Development, and the City Planning Commission (CPC), has been involved with the Michigan Department of Transportation (MDOT) in the planning of the reconstruction and expansion of the I-94 Expressway between Connor and I-96; and

Whereas, MOOT has produced a draft Environmental Impact Statement (DEIS); and

Whereas, As part of the DEIS, a Build Alternative was proposed; and

Whereas, That Build Alternative contains numerous significant modifications, many of which improve the functioning and safety of the freeway; and

Whereas, Both the City Council and the CPC have held public heerings on the DEIS and received many constructive comments from the public urging the inclusion of provisions for mass transit and expressing concerns about the widening of the right-of-way; and

Whereas, Upon review of the document, the City Planning Commission found that mass transit alternatives or mass transit complements to the selected design do not appear to have been adequately explored or, if explored, are not properly represented within the DEIS; and

Whereas, Near-in suburbs and those lining the highway network are facing the impacts of improvement to that network, necessiteted by a decaying end/or inefficient infrastructure, existing traffic congestion and projected future demand; and

Whereas, The formation of the Detroit Area Regional Transit Authority provides a mechanism whereby a regional transit agenda may be pursued and developed; and

Whereas, I-94 is a key component of the area's transportation network, linking the City with many suburban cities; and

Whereas, Both the CPC and Executive Branch departments have met and developed a joint recommendation regarding the DEIS;

Now, Therefore, Be It Resolved, That the Detroit City Council supports the proposed Build Alternative;

And Be It Further Resolved, That a copy of this resolution be forwarded to the Michigan Department of Transportation, the Federal Highway Administration, SEMCOG, the Detroit Regional Chamber of Commerce and others as appropriate.

Adopted as follows:

Yeas — Council Members Bates, K. Cockrel, Jr., S. Cockrel, Collins, Everett, McPhall, Tinsley-Talabl, Watson, and President Mahaffey — 9.

Nays — None.

Printed in the Detroit Legal News dated 8/14/03, Pg. 10.

SEMCOG . . . *Local Governments Advancing Southeast Michigan*

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http://www.semcog.or

April 2, 2001

Ronald S. Kinney, Manager
Michigan Department of Transportation
Project Planning Division/Environmental Section
P.O. Box 30050
Lansing, Michigan 48909

RE: Draft Environmental Impact Statement (DEIS) from the U.S. Department of Transportation/Federal Highway Administration for a project entitled "I-94 Freeway Rehabilitation Project, East of I-96 to Conner Avenue, Detroit, Wayne County, Michigan"
Regional Clearinghouse Code: TR 010033

Dear Mr. Kinney:

SEMCOG, the Southeast Michigan Council of Governments, has processed a review for the above Draft EIS according to intergovernmental review procedures established in NEPA and Federal agency guidelines

As the designated regional planning agency for Southeast Michigan, we notified the following local government agencies of your project:

Wayne County Planning Division
Detroit Planning & Development Department
Suburban Mobility Authority for Regional Transportation

As of this date, no comments have been received. We will forward comments, if any, for your information and attention.

SEMCOG's staff has reviewed the Draft EIS which you submitted and offers attached comments from our Transportation Program staff (C. Palombo 3/30/2001) and Environmental Program staff (B. Parkus 3/6/2001).

We look forward to your response and the Final EIS when it is completed.

Sincerely,

Richard W. Pfaff, Jr.
Regional Review Coordinator

RWP/bar

Attachments

SEMCOG

MEMO

Southeast Michigan Council of Governments
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March 30, 2001

TO: Rich Pfaff

FROM: Carmine Palombo

SUBJECT: I-94 Draft Environmental Impact Statement & Section 4(f) Evaluation

The Transportation Department has reviewed the *I-94 Draft Environmental Impact Statement & Section 4(f) Evaluation* and offers the following comments.

General comments

The I-94 corridor is a valuable transportation asset in Southeast Michigan. We support the efforts of the Michigan Department of Transportation to rehabilitate the corridor from I-96 to Conner Avenue in the City of Detroit, thereby improving freeway capacity, safety, and pavement conditions as well as local traffic circulation. The I-94 Rehabilitation Project is listed as a study in the *2025 Regional Transportation Plan for Southeast Michigan* (2025 RTP). The project is clearly consistent with 2025 RTP goals and we anticipate the movement of this study to the next phases of design and construction.

Evaluation Summary

- 6.6 Air Quality (page 15) — The project is in the current RTP and TIP as a study only and has not been modeled for air quality conformity. The entire project must be in a conforming RTP and at least one phase of the project in the TIP, including funding sources, and FHWA and FTA must issue a finding of conformity before the Record of Decision can be submitted for approval.

Draft Environmental Impact Statement and Section 4(f) Evaluation

- 2.2 Project Background (page 2-4) — The I-94 study is also listed in the 2025 RTP.

- 2.5.6 Transit, Pedestrians, and Bicyclists (page 2-14) — It is not enough to suppose the new service drives will provide "opportunities for improved transit." MDOT should commit to working with DDOT and SMART to enhance transit service in and through the area. Are routes along the service drives likely to be added? Have the transit agencies been involved during development of the Preferred Alternative? Are there plans and committed funding sources for amenities, including shelters along the service drives to protect transit users from increased traffic, etc.? (This represents a potential environmental justice issue.)

- 4.5.2 Transit (page 4-22) — The 2025 RTP calls for investing $5.5 billion in transit, not more than $6 billion as the text currently reads.

- 4.7.1 Goal 1 - Mobility (page 4-34) — With respect to analyzing the Recommended Alternative for commercial traffic, SEMCOG's commercial vehicle model is tentatively scheduled to be available in January 2002. If that time line corresponds to the analysis of the Recommended Alternative, it can be used for evaluation purposes.

- 5.1.1.4 Non-Motorized Mobility (page 5-15) — While SEMCOG agrees the addition of continuous service drives with sidewalks and sidewalks on vehicular bridges over the freeway should enhance non-motorized access, specific attention should continue to be paid to this issue. In particular, the safety of pedestrians and bicyclists along and across the service drives and bridges is a concern. Pedestrian facilities must be more than just sidewalks; they must consist of properly designed walkways, accessible and properly placed crosswalks, etc. Also of concern is the removal/consolidation of some pedestrian bridges. The report states that the high percentage of households without autos increases citizen reliance on non-motorized travel and transit travel (which also requires pedestrian access to transit stops). Therefore, any plans to modify non-motorized access along and across the freeway should be carefully scrutinized with respect to the impacts on local citizens and community connectivity and should be subject to review by the citizens. An organized meeting of the consultants, citizens, non-motorized experts, and MDOT is also recommended during the design phase.

- 5.1.5 Environmental Justice (page 5-23) — USDOT and FHWA do not specifically outline how environmental justice analyses should be performed. SEMCOG is working with FHWA to develop appropriate regional analysis tools, which may be used to analyze this project upon submittal for inclusion in the RTP and TIP.

- 5.1.5.2 Actions to Address Disproportionately High and Adverse Effects (page 5-26) — A toll-free number for comments/complaints does not seem sufficient. Is there an approachable project office located in the area for residents to access information and convey complaints and concerns during construction?

- 5.5.3.2 Attainment Status of the Project Area (page 5-49) — Southeast Michigan is a maintenance area for 1-hour ozone, not an attainment area as the text currently reads.

- 5.2 Economic Environment
  - The text states that the build alternative would displace five businesses (page 5-31) but also references Table 5-7 (page 5-18) which indicates 15 business structure displacements. Do the five businesses occupy multiple structures? Please clarify.
  - It is acknowledged that businesses relocated some distance away from their original locations would have to reestablish a customer base and could lose money temporarily. Non-displaced businesses could also experience temporary losses during construction. It is suggested that mitigation expand beyond relocation assistance. (This represents a potential environmental justice issue.) For example:
    - a special fund could be set up to cover interim operating losses to sustain businesses during construction,

- focused assistance could be offered to help business owners take full advantage of empowerment and renaissance zones where they exist, and
- incentives could be offered for businesses to relocate in the same general area to continue serving the community (the report notes that Segment B particularly depends on corner stores for basic shopping).

• 5.11.2.1 Existing Historic Resources (page 5-80) — The text states that 15 additional buildings must be surveyed to determine NRHP eligibility. Why were these structures not surveyed prior to issuing the DEIS? If they are found to be eligible, how will that impact the continuation of the project?

SEMCOG

MEMO

Southeast Michigan Council of Governments
660 Plaza Drive, Suite 1900
Detroit, MI 48226
(313) 961-4266
Fax (313) 961-4869
http://www.semcog.org/

March 6, 2001

TO: Rich Pfaff, Jr.

FROM: Bill Parkus

SUBJECT: Draft Environmental Impact Statement, I-94 Freeway Rehabilitation Project
Regional Clearinghouse Code: TR 010033
Michigan Department of Transportation

SEMCOG staff has reviewed the above referenced Draft Environmental Impact Statement and finds it to be consistent with the *Water Quality Management Plan for Southeast Michigan*. In general, no impacts from storm water are expected. Storm water is conveyed from the expressway in Detroit's combined-sewers for treatment at the wastewater treatment plant, then released to the Detroit River. However, Thirty contaminated sites could potentially impact the project. At contaminated sites in which the soil will likely be disturbed due to construction, sewer manholes and catch basins should be protected from contaminated runoff to the extent possible. Thus, a permit under Part 91 (Soil Erosion and Sedimentation Control) of P.A. 451 of 1994, the Natural Resources and Environmental Protection Act, may be required.

City of Detroit
Department of Public Works
Administrative Division - Director's Office

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March 27, 2001

Jose A. Lopez, Public Hearing Officer
Bureau of Transportation Planning
Michigan Department of Transportation
P.O. Box 30050
Lansing, Michigan 48909

RE: Comments on the Draft Environmental Impact Statement (DEIS) for the I-94 Rehabilitation Project

Dear Mr. Lopez:

The City of Detroit (City) has reviewed the DEIS for the I-94 Rehabilitation Project. We believe the study thus far has addressed many of the issues set forth by the City in the past. The current build alternative addressed our issues regarding reserving space on the freeway for Transit, minimizing the impact on two key neighborhoods and correcting the current design of the M-10 and I-75 interchanges.

We favor moving this alternative forward to the next phase but ask that some additional analysis and refinement address the remaining concerns.

Those concerns are outlined below:
1) Vehicular and pedestrian overpasses - more discussion as to the locations and number of overpasses necessary to address access issues for both Pedestrians and Transit.

> Criteria for removal of any pedestrian bridges should be evaluated to ensure pedestrian friendly environment. The distance for pedestrians to walk in order to cross the freeway shall be minimized and signalized locations shall be made available for safe pedestrian crossing. The City shall have the option to determine whether removal of a pedestrian bridge for re-locating the pedestrian bridges on a case by case basis during the design phase of the project.
>
> During the early part of the design phase, the City will like to have a list of properties to be acquired for the project for determining impact on the neighborhood.
>
> Brush is currently one way north bound at I-94. The project includes new ramp at brush with an assumption that the Brush street will be modified for two way operation. Further discussion with the City is necessary before final determination is made.

2) Continuous Service Drives - speed and signalization is still a concern.

The additional length of service drives and lanes will require further review with the state to compensate for additional maintenance cost.

The city shall modify the lane usage of service drives as and when necessary.

The addition of a third multipurpose lane is most beneficial if the land strips along service drives are planned for commercial developments.

Any street that is required to be discontinued/cut off from accessing the service drive will be evaluated by City to determine its relevance to safety and geometric issues. This can only be determined during the design phase.

Treatment of the discontinued/cut off streets and alternatives provided to the city to determine the best proposal in minimizing the impact on residences as well as business shall be discussed in detail during design phase of the project. The alternative should also be effective in mitigating the impact on garbage pick-up, snow removal, fire emergency vehicles and delivery services to serve the affected business/residences. Modifications required must be part of the design cost.

3) Maintenance and impact on City facilities and the city's ability to maintain operations before during and after construction.

During re-construction of I-94, accessing major business/traffic generators such as City Airport, Wayne state University, Cultural Center, New Center Area and Downtown should be prioritized to minimize the impact.

Russell Street will be discontinued at I-94, the north bound traffic will be maintained using the proposed new road way (west of Grand Trunk RR), but the south bound traffic will not be able to use the new roadway south of west bound service drive. The southbound surface access will require use of East Grand Blvd/ St. Aubin and loop around I-94 ramp for FWY access. There will be major impact on City facilities which may affect city services to the public. We seek more discussion and perhaps a traffic study and construction plan to determine impacts and mitigation necessary. Also, more discussion on the bypass road proposed to replace Russell Street is necessary. Since Russell Street is a commercial frontage road, alternatives suggested may impact residential property.

4) Retaining walls and noise buffers -additional discussion on the proposed retaining walls and/or noise barriers.

What noise abatement measures will be done for residents that live along areas of the freeway where noise barriers will not be constructed?

5) Other projects underdevelopment or underway how will they be comprehended in the

I-94 Rehabilitation project such as the Intermodal Freight Project or the proposed Light Rail Project from Metropolitan Airport

6) We reviewed the air quality data and put the following question comments.

Why was air quality monitoring data for the project area taken from the Livonia monitoring station? This question was based upon information provided in section 5.5.4.2 "Existing conditions." Tables 5-10 and 5-11 on pages 5-52, 5-53 shows air quality monitoring stations that were located in Detroit, within the project area. More traffic, and therefore, air quality would be impacted there!

Is this project going to remove green space along the side of the freeway, and if so, how will this affect the storm water runoff?

The Air Quality Impacts need to be revised in light of the Courts decision on Ozone (O_3) and Particulate Matter 2.5 microns or smaller ($PM_{2.5}$). Based upon the monitoring data Detroit will be designated non-attainment for Ozone (see attached maps). In addition, the State Implementation Plan (SIP) calls for a reduction in Nitrogen Oxides (NO_X) which may go beyond the reduction in NO_X emissions the Environmental Protection Agency (EPA) is seeking from the Utilities.

The project is required to comply with the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Asbestos, Code of Federal Regulations, Title 40, Part 61, Subpart M, before preceding with the demolition of acquired commercial, industrial and residential structures part of the project.

How will the proposal address Vehicle Miles Traveled (VMT) and corresponding increase in NO_X? What NOx offsets occur as a result of congestion mitigation, if any?

VMT analysis is essential to determine what extra lanes are to be used for. Analysis needs to be done now or it will never be done.

Southeast Michigan has had (3) three ozone excursions in 1999 and consequently are in maintenance. What measures have been done to assure that the project will not cause future ozone excursions.

Michigan is presently evaluating its NO_X compliance and is developing a SIP to comply. Industries within the Detroit Metropolitan area have been called to examine their contributions to NO_X and negociate the allowances. What are we doing about mobile sources?

Other issues for further discussion is the potential for the construction of land bridges and the funding. If you would like to discuss these comments further please let me know.

Sincerely,

Stephanie R. Green
Interim Director

SRG/lt

xc: A. Nwankwo
N. Seabrooks
G. Robinson
M. Patel

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May 11, 2001

Jose A. Lopez, Public Hearing Officer
Bureau of Transportation Planning
Michigan Department of Transportation
P.O. Box 30050
Lansing, Michigan 48909

DELIVERED VIA EMAIL & FAX

RE: I-94 Rehabilitation Project (DEIS) Draft Environmental Impact Statement

Attached are my comments for the City of Detroit, Planning and Development Department, regarding the referenced subject. I have also included a map of development projects along the I-94 corridor.

Sincerely

Donald-Ray Smith

Donald-Ray Smith
Principal City Planner

drs/DRS

cc: S. Green (DPW)
A. Nwankwo (Parsons Brinckerhoff)

DENNIS W. ARCHER, MAYOR

May 10, 2001

Donald-Ray Smith
Principal City Planner

City of Detroit
Planning and Development Department (P&DD)
Planning Division

I-94 Rehabilitation Project DEIS (Draft Environmental Impact Statement)

Comments concerning the Build Alternative

It is vital to the City of Detroit that I-94 continues to provide a safe and effective means of transportation to the community, the City of Detroit and the region well into the 21-century. It is clear that the Interagency Coordination Committee (the "ICC") has continued to challenge MDOT's consultants to develop alternatives that do not impact the communities adjacent to I-94, but still meets the growing demand the region has on the interstate system.

Review of the alternatives suggests that the Build Alternative will give the City of Detroit and the region increased flexibility to meet the transportation challenges it will face in the coming decades. The Build Alternative has several long-range benefits included in the proposed design. They are as follows:

- Improvements to the I-94/M-10 and I-94/I-75 interchanges,
- Inclusion of right-of-way for a transit option, still to be determined,
- Removal of all the left-hand exit ramps,
- Additional lanes for increased capacity,
- Separation of local and through traffic, and
- Increased accessibility and aesthetics

However, the report identifies several impacts the proposed Build Alternative would have on the community and the City of Detroit. These impacts can be mitigated as the project moves forward in the final design phase of the project. Discussion and development of acceptable mitigation measures and alternatives that are compatible with the Build Alternative should be continued with the public, the City of Detroit (and its departments) and the ICC. Identified below are impacts caused by the proposed Build Alternative and compatible alternatives, requiring further discussion:

1. **Transportation Systems Management** – The inclusion of Transportation Systems Management (TSM) can exponentially increase the usefulness, safety and longevity of the Recommended Alternative. Installation of the hardware for TSM, specifically, Intelligent Transportation Systems (ITS), should be completed during the construction of the alternative.

2. **Transit Options** – The Build Alternative includes a transit option, which is a great benefit to the region

and community. Light Rail, Bus Rapid Transit and other options can be included in the design in the future. It would be beneficial to identify and understand any limitations the construction of the right-of-way for the transit option has on the operation, funding or ownership of a future transit system.

3. **Mainline Design Speed** – The design, posted and desired speed of commuters can be difficult to forecast and control. The design of Interstate 696 and current speed limit enforcement issues are an example of this issue. Speed also effects the desired speed of commuters on adjacent service drives, noise levels adjacent to the interstate and the severity of accidents. The design speed of the Recommended Alternative should be evaluated (reduced) to limit the disadvantages associated with over-designing the alternative.

4. **Continuous Service Drive** – There are several concerns with the continuous service drive (the "CSD"). One of the concerns focuses on the impact the CSD would have on the adjacent residential communities. The width and limited access of the proposed CSD might promote higher commuter speeds. Resulting in the increase of noise levels and decreasing pedestrian safety. Reducing the lane width and providing signalized crosswalks could be investigated to reduce commuter speed.

   The width of the multi-use lane could also be reduced temporally, to study the effects of a narrower pavement width. Additional margin width between the curb and sidewalk could be added to enhance the pedestrian area.

   Traffic access into the adjacent residential neighborhoods from the CSD could be reduced, as suggested, by cul-de-sacs and landscaped areas/walls. Maintenance, snow removal, refuse removal and law enforcement of these areas will require additional input from MDOT, Detroit Police Department and the City of Detroit, Department of Public Works (DPW).

5. **Noise Barriers** – Noise abatement measures should be provided for residents that live, work or attend schools in areas along the freeway corridor where noise barriers are not being proposed. As currently proposed noise abatement will not be provided in neighborhoods where a $30,000 cost criteria for being reasonable and feasible is exceeded. The use of noise barriers should not be disregarded until assessments and studies can be made after the alternative is constructed.

6. **Drainage and Water Quality** – The Recommended Alternative should include storm water retention and treatment designs, during construction and in the final design. The design period of the project and the current condition of Detroit's sewerage system can not be assumed to remain "as is" for the design-life of this project. Water quality and storm water issues for the Detroit are a regional concern.

7. **Displacement of Woodbridge Historic District, United Sound Systems Recording Studios** – The impact the Build Alternative has on the Woodbridge Historic District and the United Sound Systems Recording Studio should be reviewed with continued community interest a priority.

8. **Pedestrian Bridges and Pedestrian Safety** – Pedestrian safety and pedestrian access across the Build Alternative is very important to the community and can have economic effects to local businesses. Pedestrian walkways, crosswalks and bike lanes should be included into the alternative wherever possible. Aesthetics should be included into the design of the pedestrian bridges, not only for the interstate motorist but for the pedestrians. Pedestrian mobility will seriously be restricted through the elimination of current pedestrian bridges, and the inclusion of the cul-de-sac design.

9. **Traffic Impacts, DPW Facility** – Any concern DPW has regarding the impact that the alternative would have on the operation of its facility should be documented, and addressed as part of the mitigation measures.

10. **Air Quality Monitoring** – Data should be applied from monitoring stations along or near the project area. Monitoring data used in the DEIS was taken from a Livonia monitoring station. It seems reasonable that air quality would be impacted in the project area by increased traffic and congestion.

Potential improvements concerning the current DEIS

1. Explore the feasibility of scaling back the preferred "Build Alternative". There would be less displacement and construction impacts; creating funding that could be used for potential mass transit. This balanced approach is supported by the 1990 (City of Detroit) Master Plan of Policies. Policy 203-42, pp. II-77 notes: "Considering the transit system as a public utility much like electricity, gas and water . . . and . . . as an adjunct to the traffic system. Utilizing earmarked trafficway funds on the basis of transit freeing trafficway space and better management of the trafficway system." This coincides with the concept of flexible (flex) funding, which is particularly relevant for highway projects such as the I-94 rehabilitation project and its impact on future mass transit initiatives. It is also consistent with recent transportation funding legislation (ie: The Intermodal Transportation Efficiency Act (ISTEA, 1991) and The Transportation Equity Act for the 21st Century (TEA 21, 1998).

2. It is recommended that the future center multi-modal lanes be moved to the outside (curb) lane of the service drives. Such a configuration would be pedestrian friendly, and is more accommodating for potential mass transit stations and transfers. Use of this approach may require the elimination of at least one driving lane on both the east and west service drives. A benefit is that only two lanes of through traffic, with accompanying side walks, would discourage potential speeding. The reserved multi-modal space should be sufficiently landscaped and buffered from the surrounding land uses.

Potential improvements concerning the current DEIS (continued)

3. The Planning Division "Urban Design Unit" requires additional plans indicating the extent of the R.O.W. (Right-of-Way) on adjacent land parcels to be absorbed by the project, so they can study the physical impact realistically.

   A portion of the I-94 project crosses through the lower and middle Woodward areas which is the location of Detroit's principal cultural and institutional establishments, (as well as) an important business and residential corridor. This area would benefit from an urban design that enhances the immediate and surrounding environment.

4. Recommend a special I-94 freeway R.O.W. treatment between the Lodge and I-75 freeway's to highlight its passage through the University-Cultural Center, the Art and Medical Centers at the lower Woodward area, and also to highlight its passage through the Harper-Brush residential area and the New Center Business sections in the middle Woodward area.

Development Projects within the project area

The following current and proposed development projects lie within a half (½) mile buffer, along the I-94 Rehabilitation Project corridor:

- West Pointe Homes (I-94 to the south, Epworth to the west, Tireman to the north and Beechwood to the east) - scattered site of residential homes (approx. 60 units)

- Thyssen Steel - expansion of existing steel factory on land currently used for the Atkinson playfield. P&DD is working with DEGC to acquire additional property for the playfield replacement project.

- Core City Neighborhoods - in-fill residential development project within the boundaries identified on attached map. Immediately south of shaded area is the Jeffries Hope VI project which consists of mixed-income residential development on the existing project site and scattered in-fill in the areas bounded by Warren, Jeffries Freeway, Fisher Freeway and Lodge Freeway.

- Habitat for Humanity (Core City) - residential development for low to moderate income households. Project area is bounded by Michigan Ave., W. Grand Blvd., M.L. King Blvd., and the Jeffries Fwy.

- Virginia Park Development Plan - Redevelopment Plan just north of the I-94 project area. Plan is being modified and land should be available for disposition in the Fall, 2001. Proposed project consists of residential developments (scattered site and contiguous projects, where appropriate) throughout designated development plan area.

- North Village aka New Amsterdam Project (Woodward Ave. and Burroughs) - consists of the rehabilitation of five buildings into residential, retail/commercial and parking along with the construction of new loft residential and commercial space. In total, the project will produce approximately 60,000 sq. ft of retail/commercial space, 237 units of rehabilitated housing, 153 newly constructed housing units and 361 parking spaces.

- New Amsterdam/Gateway/Smart Zone (Tech Park)- The sponsors of the smart zone" research and technology park in the vicinity of Wayne State University (WSU) and Detroit's New Center District. In the first phase, the former Chevy Creative Services Building would be renovated into Tech Park One, comprised of 34,000 square feet of research and technology incubator space, 11,000 square feet of businesses assistance agencies and 73,000 square feet of multi-tenant space. The WSU/City of Detroit Smart Zone Project is a great opportunity to develop a certified technology park within the City of Detroit and have it affiliated with one of Michigan's premier research institutions. Project is bounded by Warren Ave. to the north and Forest Ave. to the south.

- Piety Hill (bounded by Pingree, Woodward, Russell and Grand Trunk railroad right-of-way) - in-fill residential housing project targeted toward low and moderate income households.

- Africantown Development - proposed retail/commercial development. Area specific sites have not been identified, to date. Project area is E. Grand Blvd and Hastings.

- Bing/Van Residential Development (see attached map) - scattered site in-fill residential project.

- Forest Park (Mystery Tenant) - developer cannot disclose tenant until site plan review process is initiated. Tenant is a high tech light manufacturing/warehouse facility on the Forest Park site currently being leased to Greektown Casino for parking.

- I-94 Industrial Park Project -- a total of 2.2 million square feet of warehouse/industrial buildings. The industrial park will comply with the Michigan Economic Development Corporations standards for a Modern Industrial Park certification (meaning landscaping, modern amenities, and special land use restrictions). Project is bounded by Grinnell and Huber to the north; Mount Elliott to the west; Miller to the south; and St. Cyril to the east.

- Genesis Villas (see attached map) – three phase townhouse development project. Over 120 units of new construction low to moderate in-fill housing development.

Lastly, the I-94 Rehabilitation Project is a significant transportation project with impacts to both the community and region. These impacts should continue to be mitigated through continued engineering design and community input.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 11 2001

REPLY TO THE ATTENTION OF:

B-19J

Mr. James A. Kirschensteiner
Federal Highway Administration
Programs & Environmental Engineer
315 West Allegan
Room 211
Lansing, Michigan 48933

Re: Comments on the Draft Environmental Impact Statement (DEIS)/Section 4(f) Evaluation for the I-94 Rehabilitation Project from I-96 to Conner Avenue, Detroit, Wayne County, Michigan, EIS No. 010041

Dear Mr. Kirschensteiner:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, we have reviewed the Draft Environmental Impact Statement (DEIS)/Section 4(f) Evaluation for the I-94 Rehabilitation Project from I-96 to Conner. This DEIS evaluates transportation improvements proposed for a 6.7-mile portion of I-94 from I-96 on the west to Conner Avenue on the east. Two major interchanges in this segment, the M-10 Lodge freeway and the I-75 interchanges are also being proposed for reconstruction.

Information provided in the DEIS indicates that there are problems that need to be addressed along this 6.7-mile long section. This section of I-94 was built in the 1940's and 1950's. The geometrics, pavement and bridge conditions are below standard. Currently, the mainline of I-94 is 6-lanes (three in each direction), there are incomplete acceleration/deceleration lanes, and some service drives exist but they are not continuous. The DEIS states that traffic volumes are heavy during most daylight hours with some segments operating over capacity during peak periods. Under the No-Build scenario, most segments of I-94 would operate at LOS D or F in the year 2020 during the peak hours. It is clear that some action is needed in this area in order to improve capacity, safety, pavement and bridge conditions on I-94. The action is also needed to enhance local traffic circulation in the area.

Three alternatives are evaluated in detail in the DEIS: (1) the No-Build Alternative, (2) the Enhanced No-Build Alternative, and (3) the Build Alternative. The No-Build Alternative would involve no construction on I-94 and would only include maintenance of the existing facility and replacement of bridges as they deteriorate. The Enhanced No Build Alternative would reconstruct the existing freeway and bridges, improve shoulders and ramps, construct auxiliary, acceleration and deceleration lanes while maintaining the freeway, interchanges and bridges. The Build Alternative would consist of addition of two driving lanes on the I-94 mainline (one in each direction), acceleration/deceleration lanes and three-lane continuous service drives on both sides of the interstate. The existing roadway and bridges would be reconstructed and space would be reserved in the median to accommodate future lane expansion or transit.

U.S. EPA has reviewed the DEIS and other associated documents. Our review has identified several issues that were not adequately addressed in the DEIS. These issues are in the areas of Scope of Analysis, Purpose and Need, Alternatives Analysis, Air Quality, Noise, Pedestrian and Bioyclist Impacts, Costs, and Cumulative Impacts. Our detailed comments are provided in the enclosure titled: *U.S. EPA Comments on the I-94 Rehabilitation Project Draft Environmental Impact Statement (DEIS)/Section 4(f) Evaluation, May 2001.* Based on these comments, the U.S. EPA rates the DEIS as "EO-2." A copy of our rating criteria is enclosed.

Thank you for the opportunity to comment on this DEIS. We are always available to discuss these comments if you would find that useful. Please contact Sherry Kamke of my staff at 312-353-5794 for any questions or concerns that you would like for us to address.

Sincerely,

Kenneth A. Westlake, Chief
Environmental Planning and Evaluation Branch
Office of Strategic Environmental Analysis

cc: Jeff Saxby, MDOT
Gerald Fulcher, MDEQ

U.S. EPA Comments on the I-94 Rehabilitation Project
Draft Environmental Impact Statement (DEIS)/Section 4(f) Evaluation
May 2001

Scope of Analysis

The proposed action would involve improvements to a 6.7-mile portion of I-94 from I-96 on the west to Conner on the east yet the traffic study limits extend past this area to include additional segments on the east and west of this project. The DEIS makes a reference on page 3-5 to "a series of proposed projects to improve the transportation system in Detroit and southeast Michigan" and references that this project "is the first of other I-94 improvement projects in southeast Michigan." No other specific details are included in the DEIS. U.S. EPA sought additional information regarding other I-94 projects that were being contemplated. MDOT's Five-year Road and Bridge Program - Volume III 2001-2005 (p.81) indicates that the I-94 project from I-96 to Connor Avenue is the first phase of a larger project extending from Wyoming Avenue in the city of Detroit to I-696 in Macomb County. The Build Alternative that is evaluated in detail in the DEIS makes more sense as part of an improvement program for a larger segment of I-94 than what is evaluated within this DEIS. Otherwise, the improvements to the mainline, auxiliary and service drive lanes will end at this project's termini, which has the potential to create bottlenecks at a point where the roadway capacity drastically decreases.

Due to the issues discussed above, we question whether the evaluation conducted in this DEIS meets the requirements specified in the Federal Highway Administration (FHWA) NEPA implementing regulations at Title 23 Code of Federal Regulations (CFR) Part 771.111 (f). The regulations discuss what scope of analysis is appropriate in order to ensure a meaningful evaluation of alternatives and in order to avoid commitment to transportation improvements before full evaluation. We have concerns related to how this project's scope meets the requirements for logical termini, independent utility and appropriate consideration of alternatives for other foreseeable transportation improvements on I-94. We suggest that FHWA reconsider its termini points. We recommend that FHWA and MDOT evaluate I-94 improvements using a tiered EIS process. The first tier would evaluate improvements on the 18-mile segment of I-94 from Wyoming Avenue to I-696 and then segment-specific EISs would tier off from that first tier EIS. This approach would allow for a broad consideration of improvements along the entire corridor.

Purpose and Need

The information presented in the DEIS clearly shows that there are problems that need to be addressed in the I-94 Corridor from I-96 to Connor. The problems of deteriorating pavement and bridges, along with the lack of shoulders and substandard interchanges, are apparent. It is clearly prudent to address the need for system improvements at the same time infrastructure maintenance is addressed. We note that there is a long history of planning and major investment study work conducted in this area. We believe that it is important to draw on these previous studies wherever possible while recognizing changes that have occurred since those studies were conducted.

EPA concurs that there is a real need for improvements in the I-94 corridor. However, as we have mentioned under "Scope of Analysis" above, we question why MDOT and FHWA have scoped the project as they have.

We have additional questions regarding statements made in DEIS regarding truck traffic on I-94. We note that the Purpose and Need Section on page 2-12 states that Average Annual Daily Traffic (AADT) is at 120,000 - 160,000, and it is expected to grow by more than 25 percent by the year 2020. This growth doesn't include international border crossings and the associated amount of heavy-truck traffic, which is expected to grow at a rate three times faster than passenger vehicle volume. The DEIS mentions the North American Free Trade Agreement (NAFTA) and how international trade is increasingly important to Michigan's economy. However, there is no information in the DEIS that discussed how NAFTA has affected international traffic and what that might mean for the Detroit area. If the I-94 corridor is experiencing increasing traffic or will likely be experiencing increased traffic because of NAFTA, additional information should be provided in NEPA documentation reflecting this.

Similarly, the DEIS shows a location of the proposed intermodal freight facility in Figure 2-1, a figure depicting the Traffic Study, Project Limits and Intermodal Freight Facility. No other information is presented within the text of the DEIS to explain how the siting of an intermodal freight facility may impact local, regional and international truck and rail traffic patterns. More information on the current and future projections for local, regional and international freight traffic should be included in subsequent NEPA documentation.

Alternatives Analysis

The DEIS evaluates a No-Build Alternative, an Enhanced No-Build Alternative and the Build Alternative. U.S. EPA views the Build Alternative as consisting of five components: (1) Rebuild/enhance capacity on existing I-94 mainline with addition of shoulders and auxiliary lanes, (2) Interchange improvements (including acceleration/deceleration lanes), (3) Bridge replacements, (4) Service drive enhancements, and (5) Preservation of median space for future expansion.

The DEIS summarizes the process by which alternatives were selected for further evaluation. Although the Alternatives section does an adequate job of describing why many highway design options were eliminated, it does not provide enough of information to substantiate why transit alternatives were eliminated from consideration. It appears, based on information presented on page 4-15, that the only transit alternative that was evaluated is a bus alternative that would utilize High Occupancy Vehicle (HOV) lanes. The HOV lane alternative was eliminated because the FHWA guideline for a minimum threshold of 500 vehicles per hour per lane would not have been met. The rationale for the elimination of the HOV lane alternative stated "to optimize the benefits and be most effective, the HOV lanes would have to extend beyond the study limits of the project."

It isn't clear from the information presented in the DEIS what segment length was used in the HOV analysis. Also, it wasn't clear what traffic projections (current or design year [2020]) were used. The NEPA documentation should describe in more detail what the basis was for eliminating this alternative from consideration.

Similarly, the DEIS does not provide an adequate discussion as to why the Build Alternative being proposed has the components that are being proposed. The lack of information regarding the need for reserve median space and three continuous service drives stands out as examples of where relevant information is lacking. Without Information specifying why 54.5-feet of median space are needed and why three lanes of continuous service drive (two 12-foot lanes and one 16-foot multi-use lane) are needed, questions will remain regarding what function the median space and the service drives will provide. We note that the DEIS makes several references to how the redesign of I-94 would facilitate future transit options along I-94. According to the DEIS, the reserved space in the median, continuous service drives and increased height of the bridges would all accommodate future transit use. U.S. EPA supports efforts to accommodate transit in project design wherever possible. However, it isn't clear if there will actually be a transit component to this project. Without some specific tie-in to a transit vision or plan that utilizes this corridor, it appears just as likely, or possibly more likely, that the reserved median space and the multi-use lane of the continuous service drive will be used to provide additional highway capacity.

As we have stated in our comments on the I-375 Environmental Assessment comment letter, dated February 12, 2001, we support comprehensive transportation planning for the Detroit area that includes both highway and transit components. This comprehensive planning is the only way to ensure that appropriate linkages between the systems are planned for and potential conflicts are remedied. We very much support the Transit Visioning Process for the Detroit area, which is being led by the Southeast Michigan Council of Governements (SEMCOG). We look for the visioning process to lead to viable transit projects that will benefit the region by increasing transportation choices for users and result in environmental benefits. In the case of this project, it would be prudent to not only accommodate transit scenarios involving I-94 that arise from the visioning process, but also to consider integrating transit components with highway improvements.

Since the level of service goals would be more than adequately met by implementation of the Build Alternative [LOS B,C, D would be achieved and LOS D/E is usually the goal within an urban setting], an alternative that scales down one or more of the components (mainline, service drives and/or median) might be viable. We believe there may be additional feasible alternatives that have not yet been evaluated that would meet project goals and objectives. The DEIS states that several transit alternatives (modified bus service, bus rapid transit, and light rail) were retained as compatible with a practical alternative, but eliminated as a stand-alone alternative. No evaluation was conducted of an alternative that included both highway and transit improvements. We would like to see additional build alternatives, including one with a transit component, be evaluated in more detail.

Air Quality

Conformity Analysis - The DEIS commits to performing a Regional transportation conformity analysis following the selection of a recommended alternative. The conformity analysis should be performed before and included in the Final EIS.

Carbon Monoxide (CO) microscale analysis - The U.S. EPA has identified three types of information that needs to be included in the CO analysis write-up. The areas that require additional information disclosure are in the areas of: (1) fleet makeup, (2) background monitor, and (3) persistence factors.

The DEIS provided information on the makeup of vehicle type used in the microscale analysis. However, the DEIS did not provide information on how these values compare to those used in local area planning and the State Implementation Plan for the Detroit-Ann Arbor area. A short description how these values compare should be provided.

A key component of a Carbon Monoxide (CO) microscale analysis is the background concentration. The DEIS uses background concentrations from the Livonia air monitoring station in the analysis. This monitor is part of the U.S. EPA approved monitoring network. However, the DEIS did not include a rationale as to why data from this monitor was used to establish background concentrations.

U.S. EPA guidance calls for the use of a 0.70 default factor to estimate 8-hour concentrations from 1-hour concentrations unless local air quality monitoring data is used. A description of how MDOT derived the persistence factor equal to 0.60 should be provided.

Air Toxics work - The U.S. EPA is cosponsoring a cooperative effort between Michigan Department of Environmental Quality and Wayne County Department of the Environment, the Detroit Air Toxics Pilot Project, as part of its national air toxics monitoring program. The project is measuring levels of eighteen (18) air toxic compounds, including volatile organic compounds, semi-volatile compounds, carbonyl compounds and trace metals. There is one monitoring location that is near a high-traffic intersection, which will serve as a mobile source oriented site. The project officially started April 19, 2001. Results will be forthcoming from the project on a quarterly basis. Information about the program can be viewed at: http://www.deq.state.mi.us/adq/eval/amu/pilot.html. Information from this project should be referenced in subsequent NEPA documentation.

Noise

The DEIS provides little information regarding how the project would be phased in if the Build Alternative was selected for implementation. Plans for the phasing of the project may itself be the cause of significant noise and air quality issues especially if mainline traffic is detoured other local roads. The DEIS makes references to the service drives acting to reduce traffic disruption during construction of the I-94 mainline. In the scoping document for this project, a reference is made to using the continuous service roads as detours during the construction of I-94. This would have the effect of routing a large amount of interstate traffic at the same level and just adjacent to neighborhoods that meet the definition of environmental justice communities. Noise and other impacts associated with this detour plan should be evaluated. Appropriate mitigation measures should be considered and implemented.

In the discussion of noise impacts, the DEIS discusses FHWA's June 12, 1995 revised guidance on traffic noise analysis. In that guidance, all State Highway agencies were required to adopt written noise policies according to the revised FHWA guidance with respect to cost-per-residence criteria. Those criteria were used to provide a rationale as to why noise walls were not required at two schools. Based on the information provided in the DEIS, it isn't clear if this is an appropriate use of this criteria. Subsequent NEPA documentation should address this point.

Pedestrian and Bicyclist Impacts

A statement was made on page 1-8 of the DEIS that the Build alternative will improve pedestrian access. This is difficult to objectively assess because there is little data presented in the DEIS that discusses the existing pedestrian access. The discussion on pedestrian and bicyclist access topic is limited to page 2-14. The information presented indicates that sidewalks are present along existing service drives but the service drives are not continuous. Some of the pedestrian bridges (used by both pedestrians and bicyclists) are in disrepair. The DEIS did not present information regarding the pedestrian and bicycle access needs in the area. The build alternative would combine vehicular bridges with pedestrian bridges and would eliminate stand-alone pedestrian bridges. The DEIS did not evaluate how these changes would impact pedestrian and bicycle activity in the area. Subsequent NEPA documentation should evaluate these impacts and other community impacts in more detail.

Costs

Cost information is presented in the DEIS in a Table entitled "I-94 Rehabilitation Project Cost Estimates" on page 4-38. The table provides estimated costs for alternatives broken done by construction, right-of-way, design and construction engineering and total. There is little substantiation provided with these estimates. Without providing additional information to support the numbers shown in the table, it is difficult for the reader to compare alternatives on a very important variable. At no place in the DEIS was the matter of maintenance costs discussed. The project being evaluated in this DEIS represents a large investment in highway infrastructure. It would be important to know whether there were significant differences in maintenance costs between the studied alternatives. We recommend that this type of information be included.

Cumulative Impacts

The DEIS includes a section on cumulative impacts starting on page 5-94. The section lists a number of transportation projects that were recently completed or included in the SEMCOG's Transportation Improvement Program (TIP) and the MDOT Five Year Road and Bridge Program. The impacts associated with these projects all appear to be important to include in an cumulative impact analysis. The DEIS does not really include any evidence that a cumulative impact analysis looking at both benefits and adverse impacts was conducted. The cumulative impact section is written as a subjective summary. No analysis has been provided to support the claim that noise, visual quality, economy and pedestrian mobility would be improved or that the cumulative beneficial impacts to the economy and social environment would far exceed the adverse impacts.

Other projects on I-94 and other transportation projects in the area and their impacts should be included in an analysis in the DEIS. Resources and impacts of particular concern to U.S. EPA include: Air Quality, Noise, Impacts to Environmental Justice communities, and land use changes.

Introduction

This document serves as an addendum to the "*I-94 Detroit_Existing Paramics Speeds_Response to FHWA*" memo which was sent to FHWA on September 13, 2018. The memo documented the history of FHWA comments and HNTB responses regarding existing Paramics model speed calibration, including a revised speed validation comparison to two-month field speed averages from the HERE database. The contents of the memo were discussed with FHWA in a meeting on September 14, 2018. In that meeting FHWA asked about the availability of speed data specific to the days that volume data was collected as well as the variability of the two-month speed data used for model speed validation. FHWA also indicated that if other historical speed data was available from MDOT that it could be used to cross reference and validate the two-month speed data from the HERE database. The purpose of this addendum is to address FHWA's questions on the one-day and two-month speed data.

Speed Data

HNTB reviewed the "one-day" speed data for the dates when volume data was collected for the corridor. Due to the time of year and the data collection method (aerial photography), AM and PM peak period volume data was not collected on the same day. AM peak period data was collected on November 5, 2014 and the PM peak period data was collected on October 8, 2014. A review of the one-day speeds found that about 40% of the hourly analysis period data (7-9AM and 4-6PM) was incomplete and therefore was not viable for model validation purposes.

HNTB also reviewed the two-month speed data to determine the variability of average weekday (Tuesday, Wednesday, and Thursday) speeds in October and November 2014. Data from Thursday, November 27th, 2014 (Thanksgiving) was not included. The two-month speed validation comparison from the September 13th memo has been updated to include the two-month speed range for each segment (**Table 1**). The two-month speed ranges vary considerably for all segments and hours in both directions of the I-94 corridor. Of the twelve segments that did not meet the speed validation criteria (within 10 mph) for all directions and hours, half are within the two-month speed range including two (#5 and #10) of four segments on I-94 EB from 5-6PM. An additional segment (#11) on I-94 EB during the 5-6PM hour is within 2 mph of the upper end of the two-month speed range.

Conclusion

The one-day speed data from the HERE database is incomplete for the days that volume data was collected and therefore comparing model speeds to the one-day speed data is not reasonable. As noted in previous documentation, at least 87% of hourly directional segment model speeds are within the 10 mph validation criteria of the two-month average field speed except for I-94 EB during the 5-6PM hour (73%). However, two of the four segments (#5 and #10) outside of the 10 mph range are within the range of speeds reported for Tuesdays, Wednesdays, and Thursdays from October to November 2014 in that hour. Therefore, the model can be said to replicate conditions that actually exist in the field.

Table 1 - Existing Paramics Model: Updated Two-Month Speed Validation Summary

Fwy/Dir	Segment #	Location	7-8 AM					8-9 AM					4-5 PM					5-6 PM				
			Avg Speed (mph)			Meet Threshold?	Within Range?	Avg Speed (mph)			Meet Threshold?	Within Range?	Avg Speed (mph)			Meet Threshold?	Within Range?	Avg Speed (mph)			Meet Threshold?	Within Range?
			Model	2 Month (Oct-Nov)				Model	2 Month (Oct-Nov)				Model	2 Month (Oct-Nov)				Model	2 Month (Oct-Nov)			
				Avg	Range				Avg	Range				Avg	Range				Avg	Range		
	1	West of I-96	40.5	39.8	23.6 - 61.7	✔	-	25.6	29.8	15.3 - 59.6	✔	-	43.2	40.5	15.5 - 60.1	✔	-	32.7	42.6	16.2 - 63.6	✔	-
I-94 EB	2	Grand River Ave Exit - I-96 System Ramps	18.3	31.2	17.1 - 52.9	✘	✔	23.8	22.1	13.3 - 48.6	✔	-	32.9	28.3	8.4 - 52.8	✔	-	35.5	29.4	7.3 - 59.1	✔	-
	3	I-96 System Ramps - Linwood St Entr Ramp	28.6	31.7	19.6 - 49.7	✔	-	28.5	27.7	20.5 - 43.8	✔	-	26.4	23.6	11.1 - 51.5	✔	-	20.7	23.3	10.2 - 53.6	✔	-
	4	Linwood St Entr Ramp - 14th St Entr Ramp	36.2	39.5	28.8 - 53.9	✔	-	36.0	37.2	32.1 - 48.0	✔	-	25.5	28.2	14.2 - 53.7	✔	-	18.0	25.4	12.6 - 56.3	✔	-
	5	Trumbull Ave Exit Ramp - M10 System Ramps	57.3	47.3	36.2 - 53.6	✔	-	57.2	45.3	40.4 - 54.2	✘	✘	23.8	29.2	14.4 - 60.0	✔	-	13.7	26.6	11.1 - 57.0	✘	✔
	6	Thru M10 Interchange	55.6	51.3	33.3 - 57.3	✔	-	49.0	50.6	48.1 - 54.6	✔	-	21.4	18.2	8.0 - 40.3	✔	-	10.8	15.9	7.4 - 37.8	✔	-
	7	John R St Exit Ramp - I-75 System Ramps	52.0	46.4	26.5 - 54.8	✔	-	50.4	45.8	40.6 - 52.7	✔	-	15.8	21.0	15.1 - 31.7	✔	-	9.3	18.5	12.4 - 26.9	✔	-
	8	Beaubien St Entr - I-75 System Ramps	55.3	50.1	35.8 - 57.0	✔	-	55.7	50.6	44.9 - 54.8	✔	-	13.7	23.3	13.2 - 33.1	✔	-	10.8	18.8	13.3 - 30.5	✔	-
	9	I-75 System Ramps - Chene St Entr Ramp	58.1	57.2	48.3 - 60.7	✔	-	58.3	57.3	50.9 - 61.5	✔	-	48.1	22.7	17.9 - 28.4	✘	✘	56.3	19.5	13.3 - 38.3	✘	✘
	10	Chene St Entr Ramp - Mt Elliott St Entr Ramp	53.1	58.2	47.2 - 62.4	✔	-	54.3	58.8	53.4 - 63.9	✔	-	35.0	31.8	17.8 - 40.3	✔	-	42.7	25.2	16.7 - 42.7	✘	✔
	11	Van Dyke Ave (M53) Exit Ramp - Van Dyke Ave (M53) Entr Ramp	45.8	57.8	49.9 - 62.3	✘	✘	45.8	57.9	52.9 - 62.9	✘	✘	42.5	33.4	21.2 - 42.5	✔	-	43.8	27.7	20.5 - 42.4	✘	✘
	12	Gratiot Ave (M3) Exit Ramp - Gratiot Ave (M3) Entr Ramp	54.0	59.3	52.8 - 62.2	✔	-	54.8	60.0	54.7 - 64.3	✔	-	39.7	34.7	19.8 - 46.7	✔	-	38.2	28.3	18.1 - 47.4	✔	-
	13	French Rd Exit Ramp - French Rd Entr Ramp	53.3	60.0	50.1 - 64.1	✔	-	53.6	60.1	54.5 - 64.4	✔	-	44.3	34.7	20.6 - 51.4	✔	-	35.8	31.1	21.3 - 48.6	✔	-
	14	Conner St Exit Ramp - Conner St Entr Ramp	55.2	58.8	51.4 - 64.7	✔	-	55.8	58.8	46.6 - 66.0	✔	-	41.3	36.2	23.9 - 48.0	✔	-	42.6	35.7	23.2 - 45.4	✔	-
	15	East of Conner St	56.0	60.2	51.5 - 65.1	✔	-	56.1	61.3	56.5 - 64.4	✔	-	55.4	46.6	37.4 - 54.8	✔	-	55.2	45.2	27.1 - 56.6	✔	-

Fwy/Dir	Segment #	Location	7-8 AM					8-9 AM					4-5 PM					5-6 PM				
			Avg Speed (mph)			Meet Threshold?	Within Range?	Avg Speed (mph)			Meet Threshold?	Within Range?	Avg Speed (mph)			Meet Threshold?	Within Range?	Avg Speed (mph)			Meet Threshold?	Within Range?
			Model	2 Month (Oct-Nov)				Model	2 Month (Oct-Nov)				Model	2 Month (Oct-Nov)				Model	2 Month (Oct-Nov)			
				Avg	Range				Avg	Range				Avg	Range				Avg	Range		
	16	East of Conner St	40.5	34.1	24.5 - 63.6	✔	-	48.5	31.0	13.6 - 62.5	✘	✔	55.2	59.3	49.0 - 65.6	✔	-	54.5	58.3	22.0 - 66.8	✔	-
	17	Conner St Exit Ramp - Conner St Entr Ramp	35.8	36.1	24.3 - 61.0	✔	-	33.3	34.3	19.1 - 61.4	✔	-	54.5	58.0	50.4 - 63.1	✔	-	55.1	56.3	26.0 - 63.3	✔	-
	18	Conner St Entr Ramp - French St Entr Ramp	49.0	36.4	19.7 - 60.7	✘	✔	41.3	34.1	19.3 - 62.4	✔	-	57.7	56.7	41.5 - 62.4	✔	-	57.8	56.0	15.1 - 65.1	✔	-
	19	French St Entr Ramp - Gratiot Ave (M3) Exit Ramp	43.6	36.5	24.0 - 61.3	✔	-	37.7	34.4	19.3 - 61.0	✔	-	54.6	55.8	41.8 - 63.6	✔	-	55.3	55.1	16.7 - 64.6	✔	-
	20	Van Dyke Ave (M53) Exit Ramp - Van Dyke Ave (M53) Entr Ramp	40.0	39.3	29.4 - 57.6	✔	-	34.4	37.5	24.3 - 56.5	✔	-	53.0	54.9	38.4 - 63.6	✔	-	53.3	53.9	14.6 - 64.1	✔	-
	21	Mt Elliott St Exit Ramp - Mt Elliott St Entr Ramp	39.1	42.8	28.8 - 58.6	✔	-	30.1	39.3	26.8 - 57.8	✔	-	53.4	54.5	30.0 - 62.3	✔	-	53.5	53.8	15.0 - 61.7	✔	-
	22	Mt Elliott St Entr Ramp - Chene St Exit Ramp	38.7	46.0	30.6 - 55.1	✔	-	36.3	42.4	33.6 - 57.0	✔	-	56.2	51.6	29.3 - 60.3	✔	-	55.4	53.4	37.0 - 61.1	✔	-
	23	I-75 System Ramps - Beaubien St Exit Ramp	41.6	50.1	37.4 - 56.7	✔	-	45.2	48.8	31.5 - 53.4	✔	-	50.4	41.5	18.7 - 55.0	✔	-	45.6	44.9	30.3 - 56.9	✔	-
	24	Beaubien St Exit Ramp - John R St Entr Ramp	42.8	47.9	33.8 - 54.5	✔	-	50.0	48.6	39.3 - 55.7	✔	-	37.9	28.3	13.6 - 47.6	✔	-	35.0	28.8	16.6 - 52.6	✔	-
	25	Thru M10 Interchange	50.3	54.3	41.2 - 59.5	✔	-	51.4	53.3	46.2 - 57.1	✔	-	16.5	24.6	9.2 - 53.0	✔	-	20.0	22.0	7.4 - 51.5	✔	-
	26	M10 System Ramps - Trumbull Ave Entr Ramp	50.6	57.7	27.3 - 64.2	✔	-	51.1	56.8	49.7 - 61.8	✔	-	17.2	22.3	9.9 - 50.4	✔	-	18.3	21.1	8.6 - 54.0	✔	-
	27	Trumbull Ave Entr Ramp - Linwood St Exit Ramp	55.5	56.8	31.6 - 65.0	✔	-	56.3	55.6	48.6 - 63.1	✔	-	40.3	34.6	22.3 - 49.8	✔	-	39.2	32.3	17.1 - 54.1	✔	-
	28	Linwood St Exit Ramp - I-96 System Ramps	48.5	59.2	35.2 - 67.0	✘	✔	49.5	56.9	51.6 - 64.0	✔	-	41.5	45.8	22.1 - 54.0	✔	-	40.6	45.7	29.8 - 56.3	✔	-
I-94 WB	29	Thru I-96 Interchange	57.8	58.4	43.4 - 66.2	✔	-	58.0	57.2	52.5 - 61.8	✔	-	59.4	51.1	23.5 - 57.6	✔	-	59.2	49.3	28.7 - 57.8	✔	-
	30	West of I-96	57.8	60.1	49.9 - 64.1	✔	-	57.5	58.7	42.7 - 65.7	✔	-	57.6	54.3	16.1 - 61.9	✔	-	57.8	53.6	30.1 - 60.7	✔	-

Notes:

Model speed is calculated using the weighted average of model link lengths within each segment

Threshold = Average model speed within 10 mph of 2 Month average speed

2 Month Range = Tues-Thurs from October-November 2014 (excluding Thanksgiving)

Threshold Summary

Dir	7-8 AM	8-9 AM	4-5 PM	5-6 PM
I-94 EB	87%	87%	93%	73%
I-94 WB	87%	93%	100%	100%
Total	88%		92%	

Introduction

Technical Memo No. 6 (TM 6) documented the calibration and validation of the existing (2014) I-94 corridor Paramics AM and PM peak period models. The peak period models simulate 6-10AM and 2-7PM conditions, which captures the buildup and dissipation of traffic congestion within the I-94 corridor for a typical weekday. Two hours in each model period (7-9AM and 4-6PM) represent the analysis periods. Validation statistics for model volumes and speeds were reported for the I-94 corridor for each hour of the analysis period. Field speed data was collected from the Nokia HERE speed database for October-November 2014 weekdays. The speed data was summarized for both the specific day that volume data was collected for the peak periods and the two-month average.

TM 6 indicated that model speeds were validated against a combination of the one-day and two-month field speed data with the goal to maximize the number of segments that are within 10 mph of the field speed range. The speed validation statistics (TM 6, Tables 3-6) were summarized as ranges to help focus on the day to day variability of the field speeds. Reported directional model speeds were calculated using weighted averages of the number of links included within each speed range. FHWA reviewed TM 6 and provided comments on the speed validation criteria and results (August 9th, 2018). FHWA's main concern was that the models should not just maximize the number of links within 10 mph of the field speed range, but rather achieve speeds within 10 mph for 85% of all model links. The 85% threshold was taken from Florida DOT and Oregon DOT standards.

To address FHWA's comment, HNTB calculated the total number of links within 10 mph of the field speed range for both analysis periods using the same reported model speed data. As indicated in **Table 1**, both the AM and PM peak periods met the 85% speed validation criteria. A response from HNTB along with this data was provided to FHWA on August 13th, 2018.

***Table 1* - Existing Analysis Period Link-Based Speed Validation Results**

Corridor	Analysis Period	
	AM	PM
I-94	86%	85%

FHWA provided follow up comments to the August 13th response from HNTB (August 30th, 2018), which indicated that concerns remained with the model speed calibration as the analysis period averages barely exceeded the 85% validation criteria. This indicated that issues could remain in the model where directional and hourly speed differences could be masked by other directions/hours with potentially easier calibration if they have lesser volumes and/or greater average speeds. As such, FHWA requested that the model speed validation should be reported by segment direction and hour, and compared against the 85% validation criteria.

HNTB summarized the existing model speed data as requested by FHWA based on the segmentation of the HERE field data. HERE segmentation does not always follow typical corridor segmentation guidelines (i.e. between consecutive interchange ramps, etc.) and sometimes includes multiple ramps or interchanges. Model links were grouped to approximate the HERE segmentation within the existing Paramics model network. Segmentation of the I-94 corridor is shown in **Table 3**. Model speed data was reported based on the average of 7 seeds and weighted based on the link lengths contained within each HERE segment. For the segment comparison, HNTB only included the two-month field speed average due to the variability of day to day field speeds at some locations. The two-month average speeds are more representative of the average weekday corridor condition that the model represents.

As reported in **Table 2** below, the segment-based model speeds meet the 85% validation criteria for both directions and analysis hours, except for I-94 EB from 5-6PM (73%). **Table 3** provides a more detailed summary of model and two-month average speeds by segment for each direction and hour.

Table 2 - Existing Analysis Hours Segment-Based Speed Validation Results

Dir	7-8 AM	8-9 AM	4-5 PM	5-6 PM
I-94 EB	87%	87%	93%	73%
I-94 WB	87%	93%	100%	100%
Total	88%		92%	

The following section discusses the factors preventing model speeds from meeting the speed validation criteria along I-94 EB during the 5-6PM hour.

Modeling

Along I-94 EB during the PM peak period, traffic congestion originates near the I-75 interchange, more specifically at the system ramp entrance, due to the lane configuration between I-75 and the Chene St exit ramp. The I-75 system ramps from the north and south to the east merge into one lane near the I-94 mainline gore and create an auxiliary lane between the I-75 interchange and the Chene St exit ramp (four lanes total). I-94 is three lanes upstream and downstream of the I-75 entrance ramp. Almost all traffic from I-75 to the east continues on I-94 EB and 640-740 vehicles exit to Chene St during the PM peak period. As a result, more than 2,600 vehicles per hour are changing lanes in this area from 4-6PM, which is the main cause of turbulence and resulting flow breakdown. The segment nearest this area is #8 in **Table 3** (two-month average = 18.8 mph from 5-6PM).

Congestion on I-94 EB between I-75 and Chene St due to weaving propagates upstream and impacts the I-94 EB mainline as well as adjacent major (M10 and I-96) and service interchanges, which is reflected in the two-month average field speeds reported for segments #2-8 (15.9-29.4 mph from 5-6PM). Outside of segment #5 (I-94 EB between Trumbull Ave and the M10 system interchange), the existing PM peak period model accurately reflects upstream slow speeds and congestion due to the operational issues between I-75 and Chene St. Local calibration of the existing PM peak model to match the upstream speeds required extensive testing of incremental adjustments to various local model parameters on I-94 at and near the I-75 interchange. The local calibration process determined that there was one set of parameters that resulted in the appropriate amount of upstream congestion on I-94 in the hours preceding 5PM, but also did not create unrealistic operations at the I-75, M10, or I-96 interchanges or mainlines due to I-94 congestion, as well as releasing all I-94 demand within the model period (i.e. no unmet demand). Local model parameters were applied uniformly to all hours within the model period.

However, with the local calibration parameters, average model speeds are on the slow end of the acceptable 10 mph speed range for segments #6-8. As a result, model throughput is reduced on I-94 EB at the I-75 interchange (but still within the acceptable GEH threshold), which limits the formation of downstream mainline congestion (segments #9-11) as traffic recovers to speeds faster than the two-month field data suggests. Segments #9-11 include portions of I-94 EB between the I-75 system interchange and the Van Dyke Ave (M53) service interchange. This encompasses a reverse curve between Mt Elliott St and Van Dyke Ave with narrow shoulders and a retaining wall adjacent to the outside shoulder, which may influence field speeds through this area.

Conclusion

The existing I-94 Paramics models meet the additional FHWA speed validation request (85% of segments within 10 mph by direction and hour), except for I-94 EB during the 5-6PM hour (73% of segments within 10 mph of field data). Local calibration on I-94, particularly at and near the I-75 interchange, was complicated by other mainlines (I-75, M10, and I-96) which field data did not suggest were affected by I-94 congestion. Difficulties with calibration of I-94 upstream of the I-75 interchange resulted in faster downstream model speeds (segments #9-11) than the two-month average.

Recommendation

Model parameters are calibrated to try to match field speed data across all analysis hours. While some of the modeled speeds on I-94 EB from 5-6PM are less than the 85% threshold requested by FHWA, on an hourly basis at least 87% of segments in both directions are within 10 mph. Including both directions and both analysis periods, the modeled results exceed 88% of field targets. The 5-6PM field speeds for I-94 EB follow the same trend as 4-5PM from west to east, but the magnitude of speeds is slightly less overall which makes it harder to calibrate to speeds in both hours. Any adjustments to the existing Paramics models to meet the 85% speed validation criteria for I-94 EB from 5-6PM in this one area may have unintended temporal model effects, particularly during the 4-5PM hour, due to the complicated nature of the network and could cause other segments in either PM peak hour to not be within the acceptable 10 mph range. Modifying local parameters only in the 5-6PM hour to better match field speed data in that hour implies that driver behavior in the corridor is different for only one hour (5-6PM) in comparison to the other hours (2-5PM, 6-7PM) of a single analysis period.

Additionally, the proposed alternative addresses the existing operational issue on I-94 at the I-75 interchange based on Highway Capacity Software analysis and the Build scenario Paramics models. Any existing model adjustments carried forward to the future models would likely have little to no effect on future year conditions under either the No Build or Build scenarios. As a result, HNTB recommends that no adjustments are made to the existing Paramics models and documentation related to the model speed calibration/validation discussion between HNTB, MDOT, and FHWA be included in an update to TM 6 or a supplemental memo.

Table 3 - Existing Paramics Model: Revised Speed Validation Summary

Fwy/Dir	Segment #	Location	7-8 AM			8-9 AM			4-5 PM			5-6 PM		
			Avg Speed (mph)		Meet	Avg Speed (mph)		Meet	Avg Speed (mph)		Meet	Avg Speed (mph)		Meet
			Model	2 Mon	Threshold?	Model	2 Mon	Threshold?	Model	2 Mon	Threshold?	Model	2 Mon	Threshold?
	1	West of I-96	40.5	39.8	✓	25.6	29.8	✓	43.2	40.5	✓	32.7	42.6	✓
I-94 EB	2	Grand River Ave Exit - I-96 System Ramps	18.3	31.2	✗	23.8	22.1	✓	32.9	28.3	✓	35.5	29.4	✓
	3	I-96 System Ramps - Linwood St Entr Ramp	28.6	31.7	✓	28.5	27.7	✓	26.4	23.6	✓	20.7	23.3	✓
	4	Linwood St Entr Ramp - 14th St Entr Ramp	36.2	39.5	✓	36.0	37.2	✓	25.5	28.2	✓	18.0	25.4	✓
	5	Trumbull Ave Exit Ramp - M10 System Ramps	57.3	47.3	✓	57.2	45.3	✗	23.8	29.2	✓	13.7	26.6	✗
	6	Thru M10 Interchange	55.6	51.3	✓	49.0	50.6	✓	21.4	18.2	✓	10.8	15.9	✓
	7	John R St Exit Ramp - I-75 System Ramps	52.0	46.4	✓	50.4	45.8	✓	15.8	21.0	✓	9.3	18.5	✓
	8	Beaubien St Entr - I-75 System Ramps	55.3	50.1	✓	55.7	50.6	✓	13.7	23.3	✓	10.8	18.8	✓
	9	I-75 System Ramps - Chene St Entr Ramp	58.1	57.2	✓	58.3	57.3	✓	48.1	22.7	✗	56.3	19.5	✗
	10	Chene St Entr Ramp - Mt Elliott St Entr Ramp	53.1	58.2	✓	54.3	58.8	✓	35.0	31.8	✓	42.7	25.2	✗
	11	Van Dyke Ave (M53) Exit Ramp - Van Dyke Ave (M53) Entr Ramp	45.8	57.8	✗	45.8	57.9	✗	42.5	33.4	✓	43.8	27.7	✗
	12	Gratiot Ave (M3) Exit Ramp - Gratiot Ave (M3) Entr Ramp	54.0	59.3	✓	54.8	60.0	✓	39.7	34.7	✓	38.2	28.3	✓
	13	French Rd Exit Ramp - French Rd Entr Ramp	53.3	60.0	✓	53.6	60.1	✓	44.3	34.7	✓	35.8	31.1	✓
	14	Conner St Exit Ramp - Conner St Entr Ramp	55.2	58.8	✓	55.8	58.8	✓	41.3	36.2	✓	42.6	35.7	✓
	15	East of Conner St	56.0	60.2	✓	56.1	61.3	✓	55.4	46.6	✓	55.2	45.2	✓

Fwy/Dir	Segment #	Location	7-8 AM			8-9 AM			4-5 PM			5-6 PM		
			Avg Speed (mph)		Meet	Avg Speed (mph)		Meet	Avg Speed (mph)		Meet	Avg Speed (mph)		Meet
			Model	2 Mon	Threshold?	Model	2 Mon	Threshold?	Model	2 Mon	Threshold?	Model	2 Mon	Threshold?
	16	East of Conner St	40.5	34.1	✓	48.5	31.0	✗	55.2	59.3	✓	54.5	58.3	✓
	17	Conner St Exit Ramp - Conner St Entr Ramp	35.8	36.1	✓	33.3	34.3	✓	54.5	58.0	✓	55.1	56.3	✓
	18	Conner St Entr Ramp - French St Entr Ramp	49.0	36.4	✗	41.3	34.1	✓	57.7	56.7	✓	57.8	56.0	✓
	19	French St Entr Ramp - Gratiot Ave (M3) Exit Ramp	43.6	36.5	✓	37.7	34.4	✓	54.6	55.8	✓	55.3	55.1	✓
	20	Van Dyke Ave (M53) Exit Ramp - Van Dyke Ave (M53) Entr Ramp	40.0	39.3	✓	34.4	37.5	✓	53.0	54.9	✓	53.3	53.9	✓
	21	Mt Elliott St Exit Ramp - Mt Elliott St Entr Ramp	39.1	42.8	✓	30.1	39.3	✓	53.4	54.5	✓	53.5	53.8	✓
	22	Mt Elliott St Entr Ramp - Chene St Entr Ramp	38.7	46.0	✓	36.3	42.4	✓	56.2	51.6	✓	55.4	53.4	✓
	23	I-75 System Ramps - Beaubien St Exit Ramp	41.6	50.1	✓	45.2	48.8	✓	50.4	41.5	✓	45.6	44.9	✓
	24	Beaubien St Exit Ramp - John R St Entr Ramp	42.8	47.9	✓	50.0	48.6	✓	37.9	28.3	✓	35.0	28.8	✓
	25	Thru M10 Interchange	50.3	54.3	✓	51.4	53.3	✓	16.5	24.6	✓	20.0	22.0	✓
	26	M10 System Ramps - Trumbull Ave Entr Ramp	50.6	57.7	✓	51.1	56.8	✓	17.2	22.3	✓	18.3	21.1	✓
	27	Trumbull Ave Entr Ramp - Linwood St Exit Ramp	55.5	56.8	✓	56.3	55.6	✓	40.3	34.6	✓	39.2	32.3	✓
	28	Linwood St Exit Ramp - I-96 System Ramps	48.5	59.2	✗	49.5	56.9	✓	41.5	45.8	✓	40.6	45.7	✓
I-94 WB	29	Thru I-96 Interchange	57.8	58.4	✓	58.0	57.2	✓	59.4	51.1	✓	59.2	49.3	✓
	30	West of I-96	57.8	60.1	✓	57.5	58.7	✓	57.6	54.3	✓	57.8	53.6	✓

Notes:

Model speed is calculated using the weighted average of model link lengths within each segment

Threshold = Average model speed within 10 mph of 2 Month average speed

Dir	7-8 AM	8-9 AM	4-5 PM	5-6 PM
I-94 EB	87%	87%	93%	73%
I-94 WB	87%	93%	100%	100%
Total	88%		92%	

Introduction

As part of Federal Highway Administration (FHWA) review of the Interstate 94 (I-94) Interstate Access Change Request (IACR) report, concerns were raised by FHWA Resource Center staff regarding future weaving operations between the M10 and Brush Street interchanges. FHWA requested the project team to analyze the lane utilization, speeds and gaps of vehicles within the weaving area, as well as upstream and downstream of the entrance and exit ramps.

HNTB utilized the Paramics model representing the preferred design alternative to measure the potential operations. Through a combination of a dense pattern of vehicle detection and vehicle trajectory data, the following is a summary of seven runs of the peak period models which is in line with the methodology other modeling analysis.

Summary

The summary of operations below is based on observations of the Paramics microsimulation model and the tables of results included in this document.

NOTE: As referenced below, Lane 1 is the median lane and increases to the right shoulder.

AM peak period summary:

Speeds	Notes
EB	Generally, exceed 50 mph with only a couple spot locations/hours with speeds less than 50 mph
	Nothing that would suggest excessive turbulence or friction on adjacent lanes due to lane changing
WB	Speeds in lanes 4-6 near the western end of the analysis area range between 38 and 53 mph (6-9AM) as there is a significant amount of I-75 traffic merging into the I-94 mainline and then trying to change lanes to continue on I-94 WB (rather than exit to M10). This creates some turbulence and congestion between I-75 and Brush St.[1]
	Lanes 4 and 5 downstream of the Brush St entrance average 46+ mph during all hours
	Speeds recover to 50+ mph approaching the M10 interchange and downstream on I-94 WB
Gaps	**Notes**
EB	Lane 3 (center left) upstream of M10 entrance has gaps less than 2 sec due to increased lane utilization
	Lanes 5 and 6 (right and aux) have gaps of 2.5+ sec which should be acceptable for Brush St/M10 weaving vehicles
WB	Lane 5 (right) upstream of Brush St has significant gaps due to most I-75 entrance ramp traffic moving left to continue on I-94 WB. This allows for more than acceptable gaps for Brush St entrance ramp traffic to merge onto the mainline.

[1] These operations were documented in memos concerning the lane width testing evaluation.

WB (cont.)	Lane 4 (center right) has gaps of about 1 sec which could limit opportunities for Brush traffic to change lanes to the left. However, based on the average speeds there is little turbulence in this area and therefore lane changing does not seem to be an issue.
Lane Utilization	**Notes**
EB	Lane 3 has upwards of 40+% of the volume upstream of the M10 interchange. Based on the trajectory file most of the traffic in this lane is destined for I-75. This volume tends to more evenly distribute itself between lanes 3-5 downstream of Brush St.
WB	Lane 5 has less than 10% of the volume upstream of Brush St due to traffic from I-75 shifting to the left to continue on I-94 WB
	Lane 4 has the most traffic between Brush St and M10 (39+%) due to mainline traffic setting up for the exit to M10
	Traffic is more evenly distributed downstream of the M10 gore with lane 1 having the least amount of traffic (12-14%).

PM peak period summary:

Speeds	Notes
EB	Similar to the AM peak period, speeds exceed 50 mph with only a couple spot locations/hours with speeds less than 50 mph
	Little to no turbulence is observed due to lane changing
WB	Speeds exceed 50 mph during all hours as there is less weaving/lane changing in comparison the AM peak period
	Little to no congestion is observed
Gaps	**Notes**
EB	Lane 3 upstream of M10 entrance has gaps of about 1.5 sec due to I-75 lane utilization
	Lanes 5 and 6 have gaps of more than 3.5 sec which allows for smooth lane changing between Brush St and M10 weaving vehicles
WB	Lane 5 upstream of Brush St has gaps of more than 12 sec due to I-75 entrance ramp traffic merging left to continue on I-94 WB, which allows for acceptable gaps for Brush St traffic
	Lane 4 has gaps of more than 1.5 sec which may limit opportunities for Brush traffic to merge left, similar to the AM peak period. However, based on the average speeds there is little to no congestion in this area and so Brush St traffic can still change lanes prior to the M10 interchange.

Lane Utilization	Notes
EB	Similar to the AM peak period, Lane 3 has more than 45% of traffic upstream of the M10 interchange. Based on the trajectory file, the majority of traffic in this lane is destined for I-75 and traffic tends to more evenly distribute to the right lanes downstream of Brush St.
WB	Lane 5 has less than 6% of vehicles upstream of Brush St due to I-75 traffic shifting to the left to continue on I-94 WB
	Lane 4 has 30-34% of traffic between Brush St and M10 due to mainline traffic setting up for the exit to the M10 interchange
	Traffic is shifted to the left lanes downstream of the M10 interchange exit. Lane 1 has less than 10% of the volume as traffic is avoiding the right lane further downstream due to the M10 entrance ramp.

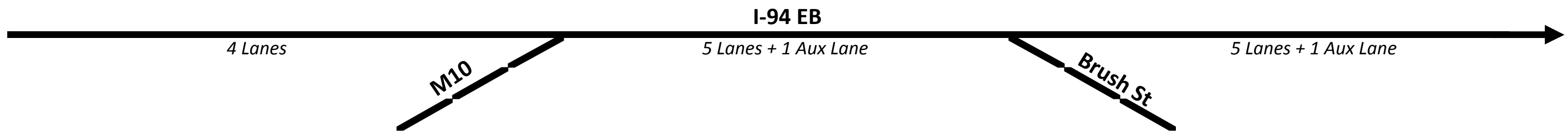
Conclusion

The findings indicate that there may be some turbulence in the design year near the Brush St interchange in both directions (particularly during the AM peak period), but it is not expected to decrease operations to unacceptable conditions. Operations near Brush St are mostly controlled by I-75 and M10 weaving traffic. AM peak period speeds in the right most lanes in each direction are expected to exceed 46 mph near the Brush St ramps. I-94 WB gaps in Lane 4 (center right) are expected to be tight between vehicles (about 1 sec) during the AM peak period due to the amount of lane changing due to the M10 interchange. Utilization of the center right lane in each direction is expected to be heavy during the peak periods.

I-94 Modernization

Preferred Alternative (M10 to Brush St)

Build AM Peak Period - Speeds by Lane



6-7 AM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	61	61	62	62	63	63	63	63	63	63	63	64	63	65	65	65	65	65	64	65	65	65	65	65	65	65	65	65
2	57	56	56	56	56	57	59	60	60	60	60	61	61	62	64	64	65	65	63	65	65	64	64	64	64	64	64	64
3	55	54	54	52	53	54	54	55	55	55	55	56	56	58	59	60	61	61	60	61	61	61	60	60	60	60	60	60
4	51	51	51	51	51	51	51	51	51	51	51	54	52	54	55	56	56	57	56	56	57	57	57	57	57	57	56	56
5											60	56	52	52	52	53	53	54	54	56	56	56	56	56	56	56	55	55
Right (6)											56	55	54	53	54	54	54	52	59	56	55	54	53	52	52	51	51	51

7-8 AM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	59	58	59	61	62	63	63	64	64	64	63	64	63	65	65	66	66	66	64	66	66	65	65	65	65	65	65	65
2	54	53	53	53	53	55	57	58	59	59	59	60	59	61	62	63	64	64	63	64	64	64	63	63	63	63	63	63
3	53	52	51	49	51	51	52	53	53	53	53	54	53	55	57	58	59	60	59	59	59	59	59	58	58	58	58	58
4	51	51	50	50	51	51	51	51	51	50	49	52	49	50	52	53	55	55	54	55	55	55	55	54	54	54	54	53
5											58	53	49	49	50	51	52	52	53	55	55	55	55	54	54	53	52	52
Right (6)											55	54	53	51	52	53	53	51	58	55	54	54	53	52	51	51	50	50

8-9 AM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	60	60	61	62	62	63	63	63	63	64	63	64	63	65	65	65	65	65	64	65	65	65	65	65	65	65	65	65
2	56	55	54	55	54	56	58	59	59	60	59	60	59	61	63	64	64	64	63	64	64	64	64	64	64	64	64	64
3	54	53	53	51	52	53	53	54	54	54	53	55	54	56	58	59	60	61	59	60	60	60	60	60	60	60	59	59
4	51	51	50	50	50	51	50	50	50	50	49	52	49	51	52	54	55	56	55	56	56	56	56	56	56	55	55	55
5											59	54	50	50	51	52	52	53	54	55	56	56	56	55	55	55	54	54
Right (6)											55	54	53	52	53	53	53	51	58	55	54	53	53	52	51	51	51	50

9-10 AM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	61	61	61	62	63	63	63	63	63	64	63	64	63	65	65	65	65	65	64	65	65	65	65	65	65	65	65	65
2	56	56	55	56	55	57	58	59	60	60	60	61	60	62	63	64	65	65	63	64	65	64	64	64	64	64	64	64
3	55	54	54	52	53	54	54	55	55	55	55	56	56	58	59	60	61	61	60	61	61	61	60	60	60	60	60	60
4	51	51	51	50	51	51	51	51	51	50	50	54	51	53	54	55	56	56	55	56	57	57	56	56	56	56	56	56
5											59	55	51	51	52	52	53	53	54	56	56	56	56	56	56	55	55	54
Right (6)											56	55	53	53	53	54	53	51	59	55	54	53	52	52	51	51	51	50

Legend	
Color	Speed Range (mph)
	0-30 mph
	30-40 mph
	40-50 mph
	50-55 mph
	55+ mph

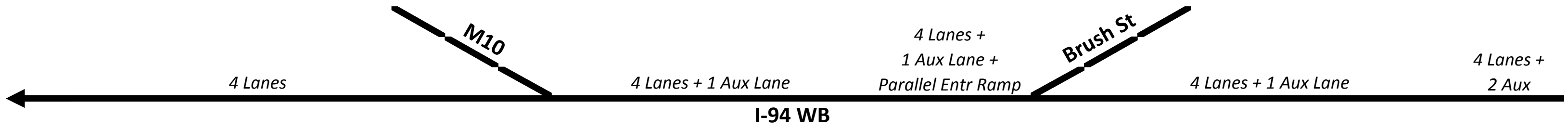
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (Brush St to M10)

Build AM Peak Period - Speeds by Lane



6-7 AM (Shoulder Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												50	53
5 ←											51	51	50	50	49	48	49	50	51	50	50	50	49	48	50	50	51	52	51
4 ←	51	51	51	51	52	52	52	53	53	53	51	50	50	49	49	49	52	52	52	52	51	50	49	47	47	46	46	47	48
3 ←	56	57	57	58	58	58	58	58	58	58	59	58	58	57	56	56	57	57	57	57	57	56	55	54	54	54	54	55	55
2 ←	57	56	56	56	57	57	57	58	58	58	60	61	61	62	62	62	62	63	63	63	63	63	62	61	60	60	59	61	61
Left (1) ←	60	60	60	60	60	60	60	60	60	59	61	63	63	63	63	63	64	65	65	65	65	65	65	64	63	62	62	63	63

7-8 AM (Analysis Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												44	46
5 ←											51	51	50	49	48	47	49	49	50	49	48	48	47	45	46	44	45	46	43
4 ←	51	51	51	52	52	52	53	53	53	53	49	48	47	46	46	46	49	49	49	48	47	46	44	42	40	39	38	38	39
3 ←	56	57	57	57	58	58	58	58	58	58	58	58	57	56	55	54	55	55	55	54	53	53	51	50	50	49	48	49	48
2 ←	56	56	56	56	56	56	57	57	57	57	59	61	61	61	61	61	62	62	62	62	62	61	61	59	58	58	57	58	58
Left (1) ←	60	59	59	59	59	59	59	59	59	58	61	63	63	64	64	64	64	65	65	65	65	65	65	64	63	62	62	63	62

8-9 AM (Analysis Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												42	44
5 ←											51	51	50	49	48	48	49	50	50	49	49	48	47	45	47	46	46	48	45
4 ←	51	51	51	52	52	52	52	53	53	53	50	49	48	47	47	47	50	50	50	50	49	48	46	44	43	42	41	42	43
3 ←	56	57	57	58	58	58	59	58	58	58	59	58	57	56	55	55	56	56	56	55	55	54	53	52	51	51	50	51	50
2 ←	57	56	57	57	57	57	58	58	58	58	60	61	61	62	61	62	62	62	62	62	62	62	61	60	59	58	58	59	58
Left (1) ←	60	59	59	59	59	59	59	59	59	58	61	63	63	64	64	64	64	65	65	65	65	65	65	64	63	62	62	63	63

9-10 AM (Shoulder Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												56	54
5 ←											51	51	51	50	49	48	50	51	51	51	51	51	50	50	52	52	54	56	54
4 ←	51	51	51	51	51	52	52	52	53	54	52	52	51	51	51	51	53	53	53	53	53	52	51	50	50	50	49	51	51
3 ←	56	57	57	58	58	58	58	58	58	58	59	59	58	58	57	57	58	58	58	58	58	57	57	56	57	57	57	58	58
2 ←	58	57	58	58	58	58	58	58	59	58	60	62	62	62	62	62	62	63	63	63	63	63	63	62	61	61	61	62	62
Left (1) ←	61	60	60	60	60	60	60	60	60	59	62	63	63	63	64	64	64	65	65	65	65	65	65	64	63	63	62	63	63

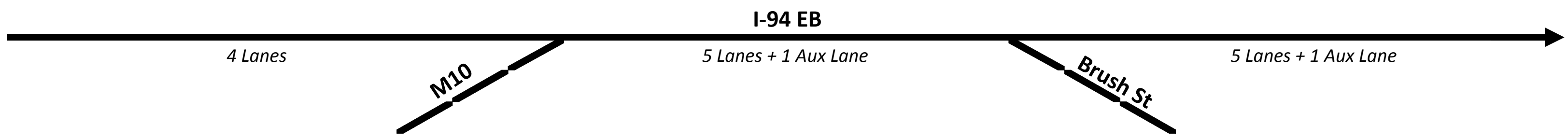
Legend	
Color	Speed Range (mph)
(red)	0-30 mph
(light orange)	30-40 mph
(yellow)	40-50 mph
(light green)	50-55 mph
(green)	55+ mph

FINAL

I-94 Modernization

Preferred Alternative (M10 to Brush St)

Build AM Peak Period - Gaps by Lane



6-7 AM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	8.3	8.7	10.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	12.2	13.0	13.2	13.5	13.5	13.6	13.6	13.7	13.8	13.8	14.1	14.2	14.3	14.4	14.4	14.5	14.5	14.5
2	3.8	3.9	4.2	5.1	4.9	4.9	4.9	4.9	4.9	4.9	5.1	5.6	5.9	6.2	6.4	6.4	6.5	6.5	6.6	6.8	7.3	7.7	8.0	8.2	8.4	8.6	8.7	8.8
3	1.7	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.6	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.7	2.8	3.0	3.1	3.2	3.3	3.4	3.4
4	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.0	3.5	3.4	3.8	3.8	3.9	4.0	4.1	4.2	3.7	3.2	3.0	2.9	2.8	2.8	2.8	2.8	2.7
5											6.4	3.4	3.0	3.1	3.0	3.0	3.0	2.9	3.0	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.6	2.5
Right (6)											12.8	10.5	9.4	7.9	7.6	7.3	7.2	7.0	27.3	13.1	14.6	15.1	15.9	16.5	16.8	17.1	17.3	17.3

7-8 AM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	6.1	6.6	7.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	9.3	10.0	10.2	10.4	10.5	10.5	10.5	10.5	10.6	10.8	11.1	11.2	11.3	11.4	11.4	11.5	11.5	11.6
2	3.1	3.2	3.5	4.2	4.0	4.0	4.0	4.0	4.0	4.0	4.2	4.6	5.0	5.2	5.4	5.5	5.5	5.5	5.7	5.8	6.3	6.6	6.9	7.1	7.3	7.5	7.7	7.8
3	1.5	1.5	1.3	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.7	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.2	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.2
4	3.9	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.3	2.9	2.7	3.0	3.1	3.1	3.2	3.3	3.4	3.1	2.7	2.5	2.4	2.4	2.3	2.3	2.3	2.3
5											5.6	3.1	2.8	2.8	2.7	2.6	2.6	2.5	2.6	2.8	2.7	2.6	2.5	2.4	2.3	2.3	2.2	2.1
Right (6)											11.6	9.4	8.3	7.0	6.5	6.3	6.1	6.0	23.9	11.8	12.8	13.2	13.7	14.0	14.2	14.4	14.4	14.5

8-9 AM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	8.1	8.7	10.2	11.3	11.2	11.2	11.2	11.3	11.3	11.3	11.9	13.1	13.4	13.7	13.7	13.8	13.8	13.9	13.9	14.1	14.4	14.6	14.7	14.7	14.7	14.7	14.7	14.8
2	3.6	3.7	4.1	4.9	4.7	4.7	4.7	4.7	4.7	4.7	4.9	5.3	5.6	5.9	6.1	6.2	6.2	6.2	6.4	6.6	7.1	7.5	7.8	8.2	8.4	8.5	8.6	8.9
3	1.6	1.6	1.4	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.5	1.9	1.9	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.6	2.8	2.9	3.1	3.2	3.3	3.4	3.5
4	4.0	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.4	3.1	2.9	3.2	3.3	3.4	3.4	3.5	3.6	3.3	2.9	2.7	2.6	2.5	2.5	2.5	2.5	2.5
5											6.2	3.3	2.9	2.9	2.8	2.8	2.8	2.7	2.8	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3
Right (6)											12.0	9.9	8.8	7.5	7.1	6.8	6.7	6.5	26.2	11.7	12.7	13.2	13.7	14.0	14.3	14.4	14.5	14.7

9-10 AM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	9.3	10.0	11.6	12.6	12.5	12.5	12.5	12.5	12.5	12.5	13.6	15.0	15.3	15.5	15.6	15.6	15.7	15.7	15.7	15.9	16.3	16.3	16.4	16.5	16.5	16.5	16.6	16.6
2	4.0	4.1	4.5	5.5	5.2	5.3	5.3	5.3	5.3	5.3	5.5	6.2	6.4	6.8	7.0	7.1	7.2	7.2	7.3	7.6	8.1	8.5	8.9	9.2	9.4	9.7	9.8	10.0
3	1.7	1.7	1.6	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.6	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.5	2.8	3.0	3.2	3.3	3.5	3.6	3.7	3.7
4	4.5	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	3.7	3.5	3.3	3.7	3.7	3.8	3.8	4.0	4.1	3.7	3.2	3.0	2.9	2.8	2.8	2.8	2.8	2.8
5											6.6	3.5	3.1	3.1	3.0	3.0	2.9	2.9	3.0	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.5
Right (6)											14.2	10.4	9.4	7.8	7.4	7.2	7.1	6.9	31.0	13.3	14.5	15.0	15.4	16.1	16.3	16.6	16.6	16.8

Legend	
Color	Gap Range (sec)
(red)	0-1 sec
(light orange)	1-2 sec
(light yellow)	2-3 sec
(light green)	3-5 sec
(green)	5+ sec

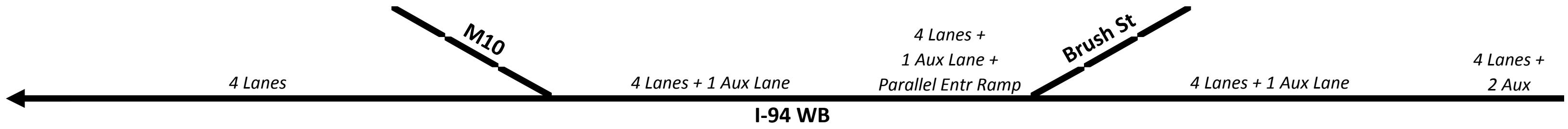
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (Brush St to M10)

Build AM Peak Period - Gaps by Lane



6-7 AM (Shoulder Hour)

Lane	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
Right (6) ←																												>100	>100
5 ←											11.0	10.9	10.9	10.9	10.7	10.8	10.7	10.6	10.4	10.8	10.3	9.7	9.1	8.3	7.9	6.9	8.3	8.4	7.5
4 ←	5.5	5.0	4.5	3.8	3.3	3.2	3.1	3.1	3.0	2.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.4	1.3	1.3	1.4
3 ←	1.8	1.8	1.9	2.2	2.3	2.4	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.2	3.1	3.0	3.0	2.9	2.8	2.7	2.5	2.5	2.3	2.3	2.4	2.3
2 ←	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6
Left (1) ←	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.1	3.1	3.1	3.1

7-8 AM (Analysis Hour)

Lane	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
Right (6) ←																												>100	>100
5 ←											7.8	7.8	7.7	7.7	7.6	7.8	7.8	7.7	7.7	8.2	7.9	7.5	6.9	6.4	6.1	5.3	6.3	6.4	5.6
4 ←	5.4	4.9	4.4	3.7	3.2	3.1	3.0	2.9	2.9	2.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.3	1.2	1.2	1.3
3 ←	1.6	1.7	1.8	2.0	2.2	2.3	2.3	2.3	2.4	3.2	3.2	3.2	3.1	3.1	3.0	3.0	2.9	2.9	2.8	2.8	2.7	2.6	2.4	2.3	2.2	2.0	2.0	2.0	1.9
2 ←	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2
Left (1) ←	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5

8-9 AM (Analysis Hour)

Lane	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
Right (6) ←																												>100	>100
5 ←											8.6	8.6	8.6	8.5	8.5	8.7	8.7	8.7	8.7	9.6	9.1	8.7	8.1	7.3	6.9	6.1	7.2	7.5	6.6
4 ←	5.8	5.2	4.7	3.9	3.4	3.3	3.2	3.2	3.1	2.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.4
3 ←	1.8	1.9	1.9	2.2	2.4	2.4	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.3	3.3	3.2	3.1	3.1	3.0	3.0	2.9	2.7	2.6	2.5	2.3	2.2	2.1	2.2	2.1
2 ←	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.5	2.4
Left (1) ←	2.6	2.5	2.5	2.5	2.5	2.6	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5

9-10 AM (Shoulder Hour)

Lane	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
Right (6) ←																												>100	>100
5 ←											13.5	13.4	13.2	13.0	12.7	12.7	12.4	12.1	11.9	13.2	12.5	11.8	10.9	9.8	9.2	8.1	10.1	10.2	9.2
4 ←	5.7	5.2	4.7	3.9	3.4	3.3	3.2	3.2	3.1	2.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.5
3 ←	1.8	1.9	2.0	2.3	2.4	2.5	2.6	2.6	2.6	3.5	3.5	3.5	3.5	3.4	3.4	3.3	3.3	3.1	3.1	3.0	3.0	2.8	2.7	2.6	2.5	2.4	2.4	2.4	2.4
2 ←	3.0	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.0	3.1	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.9
Left (1) ←	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4

Legend	
Color	Gap Range (sec)
	0-1 sec
	1-2 sec
	2-3 sec
	3-5 sec
	5+ sec

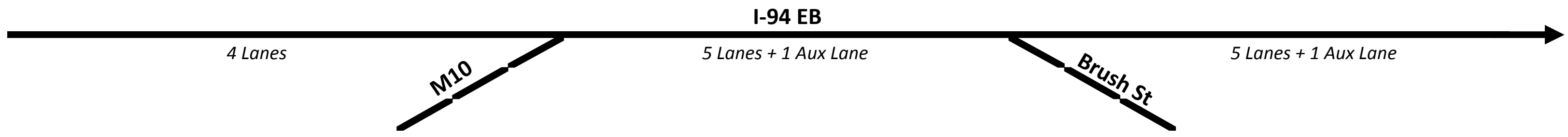
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (M10 to Brush St)

Build AM Peak Period - Total Lane Utilization



6-7 AM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	11%	11%	10%	8%	8%	8%	8%	8%	8%	8%	6%	6%	5%	5%	5%	7%	6%	5%	6%	5%	5%	6%	6%	6%	5%	5%	6%	5%
2	23%	22%	21%	17%	18%	18%	18%	18%	18%	18%	15%	13%	12%	12%	11%	11%	11%	11%	12%	12%	11%	10%	10%	10%	10%	9%	9%	9%
3	48%	49%	51%	56%	55%	55%	55%	55%	55%	55%	45%	34%	33%	32%	32%	31%	31%	31%	34%	32%	29%	27%	26%	25%	24%	24%	23%	23%
4	18%	18%	18%	19%	19%	19%	19%	19%	19%	19%	15%	20%	20%	19%	19%	18%	18%	18%	19%	21%	24%	26%	27%	27%	28%	28%	28%	28%
5											12%	20%	22%	23%	23%	23%	24%	24%	26%	24%	25%	26%	26%	27%	28%	29%	29%	30%
Right (6)											7%	7%	8%	9%	10%	10%	10%	11%	3%	6%	6%	5%	5%	5%	5%	5%	5%	5%

7-8 AM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	13%	13%	10%	9%	9%	9%	9%	9%	9%	9%	7%	7%	6%	6%	6%	6%	7%	5%	6%	7%	6%	7%	7%	6%	6%	6%	7%	6%
2	24%	23%	22%	18%	19%	19%	19%	19%	19%	19%	16%	14%	13%	12%	12%	12%	12%	12%	13%	12%	11%	11%	10%	10%	10%	10%	9%	9%
3	44%	45%	48%	53%	52%	52%	52%	52%	52%	52%	42%	33%	32%	31%	30%	30%	29%	29%	32%	30%	28%	26%	25%	24%	23%	23%	22%	21%
4	19%	19%	20%	20%	20%	20%	20%	20%	20%	20%	16%	20%	21%	20%	20%	19%	19%	19%	20%	22%	25%	26%	27%	28%	28%	28%	28%	29%
5											12%	19%	21%	22%	22%	23%	23%	24%	26%	23%	24%	25%	26%	27%	28%	28%	29%	30%
Right (6)											7%	7%	7%	9%	10%	10%	10%	11%	3%	6%	6%	5%	5%	5%	5%	5%	5%	5%

8-9 AM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	10%	10%	8%	8%	8%	8%	8%	8%	8%	8%	6%	6%	7%	6%	5%	5%	5%	5%	6%	5%	6%	6%	5%	4%	6%	6%	5%	5%
2	23%	22%	21%	17%	18%	18%	18%	18%	18%	18%	15%	13%	12%	12%	12%	11%	11%	11%	12%	12%	11%	10%	10%	10%	9%	9%	9%	9%
3	46%	47%	50%	54%	53%	53%	53%	53%	53%	53%	43%	33%	32%	31%	30%	30%	30%	30%	32%	30%	27%	26%	25%	24%	23%	22%	22%	21%
4	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	17%	21%	21%	20%	20%	20%	20%	19%	20%	22%	25%	26%	27%	28%	28%	29%	29%	29%
5											12%	20%	21%	22%	23%	24%	24%	24%	27%	24%	25%	26%	27%	28%	28%	29%	30%	31%
Right (6)											7%	7%	7%	9%	10%	10%	10%	11%	3%	7%	6%	6%	6%	6%	6%	5%	5%	5%

9-10 AM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	11%	10%	9%	8%	8%	8%	8%	8%	8%	8%	6%	5%	4%	5%	5%	5%	4%	5%	6%	7%	5%	5%	5%	6%	6%	5%	5%	6%
2	22%	22%	20%	16%	17%	17%	17%	17%	17%	17%	14%	12%	12%	11%	11%	11%	11%	11%	11%	11%	10%	10%	10%	9%	9%	9%	9%	9%
3	47%	48%	51%	55%	54%	54%	54%	54%	54%	54%	44%	34%	33%	31%	31%	31%	31%	30%	33%	31%	28%	27%	25%	24%	23%	23%	22%	21%
4	20%	20%	20%	21%	21%	21%	21%	21%	21%	21%	17%	21%	21%	20%	19%	19%	19%	18%	20%	21%	25%	26%	27%	28%	28%	28%	28%	28%
5											12%	21%	22%	23%	24%	24%	24%	25%	27%	24%	26%	26%	27%	28%	29%	30%	31%	31%
Right (6)											7%	7%	8%	10%	10%	10%	11%	11%	3%	6%	6%	6%	6%	5%	5%	5%	5%	5%

Legend	
Color	Lane Utilization (%)
(red)	50+%
(light orange)	35-50%
(yellow)	25-35%
(light green)	10-25%
(green)	0-10%

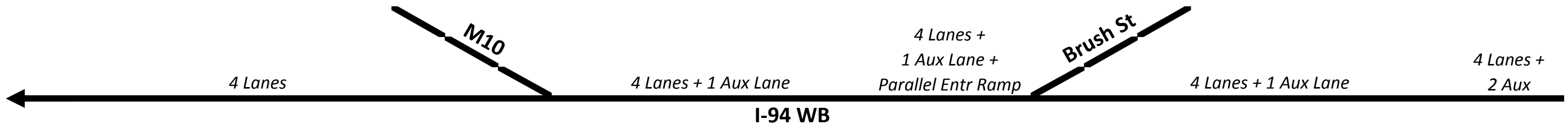
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (Brush St to M10)

Build AM Peak Period - Total Lane Utilization



6-7 AM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	6%	6%	7%	7%	8%	7%	7%	7%
4	13%	15%	16%	19%	22%	22%	23%	23%	24%	31%	44%	44%	44%	44%	43%	43%	43%	42%	42%	42%	41%	40%	39%	37%	35%	33%	34%	34%	33%
3	39%	38%	36%	33%	31%	30%	29%	29%	29%	21%	16%	16%	16%	16%	16%	16%	17%	17%	18%	18%	18%	19%	20%	21%	21%	22%	22%	22%	22%
2	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%	19%	19%	19%	19%	19%	19%	19%	19%	19%	20%	20%	20%	20%	20%	20%	20%	21%	21%	21%
Left (1)	22%	21%	22%	22%	21%	22%	22%	22%	21%	22%	16%	16%	16%	16%	17%	17%	16%	17%	16%	15%	16%	15%	15%	15%	17%	17%	16%	16%	17%

7-8 AM (Analysis Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	7%	7%	8%	8%	9%	8%	8%	9%
4	12%	13%	15%	18%	20%	21%	21%	22%	22%	28%	41%	41%	41%	41%	40%	40%	40%	39%	39%	39%	38%	37%	36%	34%	32%	30%	30%	31%	29%
3	36%	35%	34%	31%	28%	28%	27%	27%	27%	20%	15%	15%	15%	15%	16%	16%	16%	16%	16%	17%	17%	18%	19%	20%	21%	22%	22%	22%	22%
2	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%	19%	19%	19%	19%	19%	19%	19%	19%	20%	20%	20%	20%	20%	20%	21%	21%	21%	21%	21%
Left (1)	26%	26%	25%	25%	26%	25%	26%	25%	25%	26%	19%	19%	19%	19%	19%	19%	19%	20%	19%	18%	19%	18%	18%	18%	18%	18%	19%	18%	19%

8-9 AM (Analysis Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											6%	6%	6%	6%	6%	6%	6%	6%	6%	5%	6%	6%	7%	7%	8%	8%	7%	7%	8%
4	12%	13%	15%	18%	20%	21%	21%	21%	22%	28%	42%	42%	42%	42%	41%	41%	41%	40%	40%	40%	39%	38%	37%	35%	33%	31%	31%	31%	30%
3	36%	35%	33%	31%	28%	28%	27%	27%	27%	20%	15%	15%	15%	15%	15%	15%	16%	16%	16%	17%	17%	18%	19%	19%	21%	22%	22%	22%	22%
2	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	18%	18%	18%	18%	18%	18%	18%	18%	18%	19%	19%	19%	19%	19%	20%	20%	20%	20%	20%
Left (1)	27%	27%	27%	26%	27%	26%	27%	27%	26%	27%	19%	19%	19%	19%	20%	20%	19%	20%	20%	19%	19%	19%	18%	20%	18%	19%	20%	20%	20%

9-10 AM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											4%	4%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	6%	6%	7%	6%	6%	6%
4	14%	15%	16%	20%	22%	23%	23%	24%	24%	31%	45%	45%	45%	45%	44%	44%	44%	43%	43%	42%	42%	41%	39%	38%	36%	34%	35%	35%	34%
3	39%	38%	36%	33%	30%	30%	29%	29%	29%	22%	16%	16%	16%	16%	17%	17%	17%	18%	18%	18%	19%	19%	20%	21%	22%	23%	23%	23%	23%
2	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	19%	19%	19%	19%	19%	19%	19%	19%
Left (1)	22%	22%	23%	22%	23%	22%	23%	22%	22%	22%	17%	17%	16%	16%	16%	16%	16%	16%	16%	17%	16%	16%	17%	16%	17%	17%	17%	17%	18%

Legend	
Color	Lane Utilization (%)
(red)	50+%
(light orange)	35-50%
(yellow)	25-35%
(light green)	10-25%
(green)	0-10%

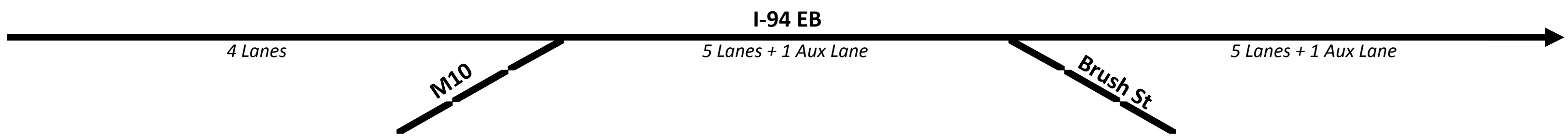
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (M10 to Brush St)

Build PM Peak Period - Speeds by Lane



2-3 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	61	61	62	62	63	63	63	63	63	63	62	63	63	64	65	65	65	65	63	65	65	65	65	65	65	65	64	64
2	57	56	56	56	56	57	58	59	59	59	59	60	59	62	63	64	64	64	63	64	64	64	64	63	63	63	63	63
3	54	54	53	52	53	54	54	55	55	55	54	55	55	57	58	59	60	60	59	60	60	60	60	60	60	60	60	60
4	53	53	52	52	52	52	52	52	52	52	51	54	52	53	54	55	56	56	56	56	57	57	57	57	57	57	57	57
5											60	56	52	52	53	54	54	55	55	56	57	57	56	56	56	56	56	56
Right (6)											55	54	52	51	52	52	51	49	59	59	59	57	56	55	54	53	53	52

3-4 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	61	61	62	62	62	63	63	63	63	63	62	63	63	64	65	65	65	65	63	65	65	65	65	65	64	64	64	64
2	57	57	57	57	56	58	58	59	60	60	59	61	60	62	63	64	64	64	63	64	64	64	64	63	63	63	63	63
3	54	54	54	52	54	54	55	55	55	55	55	56	56	57	58	59	60	60	59	60	60	60	60	60	60	60	60	60
4	53	53	52	52	52	52	52	52	52	52	51	55	52	53	54	55	56	57	56	57	57	57	57	57	57	57	57	57
5											60	57	52	53	53	54	55	55	55	56	57	57	57	56	56	56	56	56
Right (6)											55	54	52	52	52	52	51	49	59	59	59	58	57	55	54	53	53	52

4-5 PM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	61	61	61	62	62	62	63	63	63	63	62	63	63	64	65	65	65	65	63	65	65	65	65	64	64	64	64	64
2	56	56	55	55	55	57	58	59	59	60	59	60	60	62	63	64	64	64	63	64	64	64	64	63	63	63	63	63
3	54	53	53	51	53	53	54	54	55	55	54	55	55	57	58	59	60	60	59	59	60	60	60	60	60	59	59	59
4	52	52	52	52	52	52	52	52	52	52	51	54	52	53	54	55	56	57	56	57	57	57	57	57	57	57	57	57
5											60	56	52	53	53	54	55	55	55	56	57	57	57	56	56	56	56	56
Right (6)											55	54	52	52	52	52	52	50	59	59	59	58	57	55	54	53	53	52

5-6 PM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	63	63	64	63	64	64	64	64	64	64	63	64	63	65	65	66	66	65	64	65	65	65	65	65	65	65	65	65
2	59	58	58	58	58	59	60	60	61	61	60	61	61	63	64	64	64	64	63	64	64	64	64	64	64	64	63	63
3	56	56	55	54	55	55	56	56	56	56	55	57	57	58	59	60	60	61	59	60	60	60	60	60	60	60	60	60
4	53	53	53	53	53	53	53	53	53	53	52	56	53	54	55	56	56	57	56	57	57	57	57	58	57	57	57	57
5											61	58	54	54	55	55	55	56	56	57	57	57	57	57	57	57	57	57
Right (6)											54	54	52	52	52	52	51	49	59	59	59	58	56	55	54	53	53	52

6-7 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Speed (mph)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	64	64	64	64	64	64	64	64	64	64	63	64	63	65	65	65	65	65	63	65	65	65	65	65	65	65	65	65
2	60	60	60	60	60	60	60	61	61	61	61	62	62	64	64	65	65	64	63	64	64	64	64	64	64	64	64	64
3	57	57	57	56	56	56	57	57	57	57	56	59	59	60	61	61	61	61	60	60	61	60	60	60	60	60	60	60
4	54	54	54	54	54	54	54	54	54	54	53	57	56	56	57	57	57	57	56	57	58	58	58	58	58	58	58	58
5											62	59	56	56	56	56	56	56	56	57	58	58	58	58	57	57	57	57
Right (6)											55	56	54	55	55	54	54	51	59	59	58	57	56	54	53	52	52	52

Legend	
Color	Speed Range (mph)
(red)	0-30 mph
(orange)	30-40 mph
(yellow)	40-50 mph
(light green)	50-55 mph
(green)	55+ mph

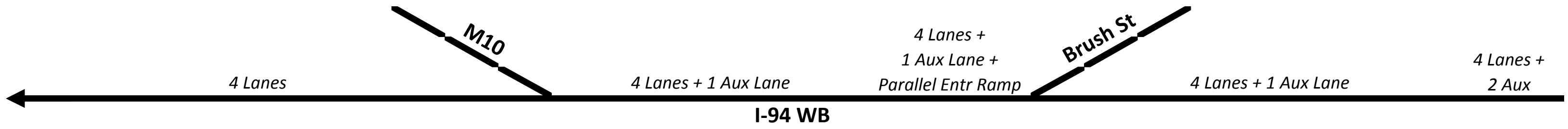
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (Brush St to M10)

Build PM Peak Period - Speeds by Lane



2-3 PM (Shoulder Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												58	58
5 ←											51	52	52	53	53	53	53	54	54	50	51	51	51	51	54	55	57	58	58
4 ←	52	51	52	52	52	53	53	53	54	55	55	55	55	55	55	55	56	56	56	57	57	56	56	55	55	56	56	57	57
3 ←	56	55	56	58	58	59	59	59	59	58	59	59	59	59	59	59	59	59	59	59	59	60	60	59	59	59	59	60	60
2 ←	55	57	57	57	57	58	59	59	59	59	61	62	62	63	63	63	63	63	63	63	64	64	63	62	62	62	61	62	62
Left (1) ←	59	59	58	58	59	59	60	60	60	59	62	64	64	64	64	64	65	65	65	65	65	65	65	64	63	63	62	63	63

3-4 PM (Shoulder Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												58	57
5 ←											51	52	52	53	53	53	53	54	54	50	51	51	51	51	54	55	57	58	57
4 ←	52	51	52	52	52	53	53	53	54	55	56	56	55	55	55	55	56	56	56	57	56	56	56	55	55	55	55	57	57
3 ←	56	55	56	58	58	59	59	59	59	58	59	59	59	59	59	59	59	59	59	59	59	60	60	59	59	59	59	60	60
2 ←	55	56	57	57	57	58	58	59	59	59	61	62	62	63	63	63	63	63	63	63	64	64	63	62	62	62	61	62	62
Left (1) ←	58	58	58	58	58	59	59	60	60	59	62	64	64	64	64	64	65	65	65	65	65	65	65	64	63	63	62	63	63

4-5 PM (Analysis Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												58	58
5 ←											51	52	52	53	53	53	53	54	54	51	51	51	52	52	55	55	57	58	58
4 ←	52	51	51	52	52	52	53	53	54	55	55	55	55	55	55	55	56	56	56	56	56	56	56	55	55	55	55	57	57
3 ←	56	54	56	57	58	58	59	59	58	58	59	59	59	59	59	59	59	59	59	59	59	60	60	59	59	59	59	60	60
2 ←	54	55	55	55	56	56	57	58	58	58	60	62	62	62	62	62	63	63	63	63	64	64	63	62	62	62	61	62	62
Left (1) ←	56	56	56	56	56	57	58	58	58	58	61	63	64	64	64	64	65	65	65	65	65	65	65	64	63	63	62	63	63

5-6 PM (Analysis Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												58	58
5 ←											51	52	52	53	53	52	53	54	54	51	51	51	52	52	55	55	57	58	58
4 ←	52	51	52	52	52	53	53	53	54	55	55	55	55	55	54	54	56	56	56	56	56	56	56	55	55	55	55	57	57
3 ←	55	54	55	57	57	58	58	58	58	58	59	59	59	59	59	58	59	59	59	59	59	60	59	59	59	59	59	60	60
2 ←	53	55	55	55	55	56	57	58	58	58	60	62	62	62	62	63	63	63	63	63	64	64	63	62	61	61	61	62	62
Left (1) ←	57	57	56	56	56	57	58	58	58	58	61	63	63	64	64	64	65	65	65	65	65	65	65	64	63	63	62	63	63

6-7 PM (Shoulder Hour)

Lane	← 1000 ft →										← 840 ft →						← 350 ft →			← 1000 ft →									
	Detector - Speed (mph)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6) ←																												59	59
5 ←											52	53	53	54	54	54	54	55	54	51	52	52	53	53	56	56	58	59	59
4 ←	52	52	52	52	52	52	53	53	54	55	56	56	56	56	56	56	57	57	57	57	57	57	57	56	56	56	57	58	58
3 ←	57	57	58	59	59	59	59	59	59	58	60	60	60	60	59	59	60	60	60	59	59	60	60	59	60	60	60	61	61
2 ←	57	59	59	59	59	59	60	60	60	60	61	62	63	63	63	63	63	63	63	64	64	64	64	63	62	62	61	62	62
Left (1) ←	61	61	61	61	61	61	62	62	62	61	63	64	64	64	64	64	65	65	65	65	65	65	65	64	63	63	62	63	63

Legend	
Color	Speed Range (mph)
(red)	0-30 mph
(light orange)	30-40 mph
(yellow)	40-50 mph
(light green)	50-55 mph
(green)	55+ mph

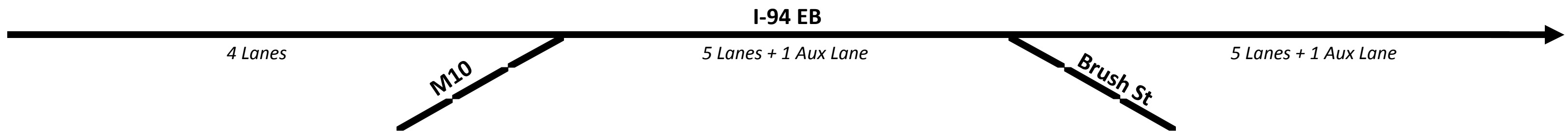
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (M10 to Brush St)

Build PM Peak Period - Gaps by Lane



2-3 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	6.1	6.4	6.9	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.8	7.8	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.1	8.2	8.2	8.3	8.3	8.3	8.3	8.3
2	3.3	3.3	3.5	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.2	4.3	4.5	4.6	4.7	4.7	4.7	4.7	4.8	4.9	5.1	5.1	5.3	5.4	5.4	5.5	5.5	5.6
3	1.7	1.6	1.6	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.5	2.6	2.7	2.7	2.8	2.8	2.9
4	5.3	5.2	5.1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.2	3.5	3.3	3.7	3.7	3.8	3.8	3.9	3.9	3.5	3.1	2.9	2.8	2.7	2.7	2.6	2.6	2.6
5											5.9	4.0	3.6	3.8	3.8	3.7	3.7	3.7	3.8	3.9	3.7	3.6	3.5	3.5	3.4	3.3	3.3	3.2
Right (6)											7.0	5.8	5.4	4.8	4.5	4.4	4.3	4.3	23.5	20.4	26.3	30.8	34.7	38.4	40.5	43.3	44.4	46.6

3-4 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	5.8	6.1	6.6	7.1	7.0	7.0	7.1	7.1	7.1	7.1	7.3	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.9	8.0	8.0	8.0	8.1	8.1	8.1	8.1
2	3.2	3.3	3.5	4.0	3.9	3.9	3.9	3.9	3.9	3.9	4.0	4.3	4.4	4.6	4.6	4.7	4.7	4.7	4.7	4.8	5.0	5.1	5.2	5.3	5.3	5.4	5.4	5.5
3	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.4	2.5	2.6	2.6	2.7	2.7	2.8
4	5.3	5.2	5.1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.2	3.5	3.3	3.7	3.7	3.8	3.8	3.9	4.0	3.5	3.1	2.9	2.8	2.7	2.6	2.6	2.6	2.5
5											5.8	3.8	3.5	3.6	3.6	3.6	3.6	3.5	3.6	3.7	3.5	3.5	3.4	3.3	3.2	3.2	3.1	3.1
Right (6)											7.0	5.8	5.3	4.7	4.4	4.3	4.2	4.2	21.9	19.4	25.1	28.7	32.1	35.8	38.9	41.5	43.5	46.7

4-5 PM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	5.6	5.9	6.4	6.8	6.8	6.8	6.8	6.8	6.8	6.8	7.1	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7
2	3.2	3.2	3.4	4.0	3.9	3.9	3.9	3.9	3.9	3.9	4.0	4.2	4.4	4.5	4.5	4.6	4.6	4.6	4.6	4.7	4.9	5.0	5.1	5.2	5.3	5.3	5.4	5.4
3	1.6	1.6	1.5	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.7
4	5.3	5.2	5.1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.1	3.4	3.2	3.6	3.6	3.7	3.7	3.8	3.9	3.5	3.0	2.8	2.8	2.7	2.6	2.6	2.6	2.5
5											5.9	3.8	3.5	3.7	3.6	3.6	3.6	3.5	3.6	3.6	3.5	3.4	3.4	3.3	3.2	3.1	3.1	3.0
Right (6)											6.7	5.7	5.2	4.6	4.5	4.4	4.3	4.2	21.7	19.6	24.5	28.2	31.8	36.5	40.0	41.5	43.7	46.2

5-6 PM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	6.7	7.0	7.5	7.8	7.8	7.8	7.8	7.8	7.8	7.8	8.2	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7
2	4.7	4.8	5.3	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.2	6.6	6.8	6.9	7.0	7.1	7.1	7.1	7.2	7.3	7.5	7.7	7.9	8.0	8.1	8.1	8.2	8.3
3	2.0	1.9	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.9	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.5	2.7	2.8	2.9	3.0	3.1	3.1	3.2	3.2
4	6.5	6.5	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	4.9	3.7	3.5	3.9	4.0	4.0	4.0	4.1	4.1	3.7	3.2	3.0	2.9	2.8	2.7	2.7	2.7	2.6
5											5.5	4.2	4.0	4.1	4.1	4.1	4.1	4.1	4.3	4.3	4.2	4.2	4.1	4.1	4.0	3.9	3.9	3.8
Right (6)											6.5	5.8	5.3	4.8	4.6	4.5	4.5	4.4	22.8	20.7	27.5	32.5	36.0	41.6	44.5	47.6	50.8	54.7

6-7 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Gap (sec)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	11.0	11.2	11.8	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.6	12.9	13.1	13.2	13.2	13.2	13.2	13.3	13.3	13.3	13.4	13.5	13.5	13.5	13.5	13.5	13.5	13.5
2	6.2	6.4	6.9	7.9	7.7	7.7	7.7	7.7	7.7	7.7	7.9	8.5	8.7	8.9	9.0	9.0	9.0	9.0	9.1	9.2	9.5	9.6	9.7	9.8	9.9	10.0	10.0	10.1
3	2.6	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	3.0	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.4	3.7	3.9	4.0	4.2	4.2	4.3	4.3	4.4
4	9.4	9.3	9.2	9.0	9.0	9.0	9.0	9.0	9.0	9.0	7.3	5.4	5.3	5.8	5.8	5.9	5.9	6.0	6.1	5.3	4.5	4.3	4.2	4.0	3.9	3.9	3.9	3.9
5											7.7	5.7	5.4	5.6	5.6	5.6	5.6	5.5	5.7	5.9	5.6	5.5	5.4	5.3	5.3	5.2	5.2	5.1
Right (6)											10.2	8.3	7.7	6.9	6.7	6.6	6.5	6.4	33.6	29.8	39.0	44.1	50.5	59.5	62.9	65.6	68.7	69.7

Legend	
Color	Gap Range (sec)
	0-1 sec
	1-2 sec
	2-3 sec
	3-5 sec
	5+ sec

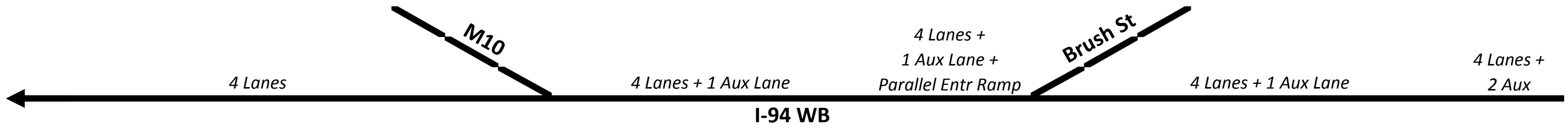
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (Brush St to M10)

Build PM Peak Period - Gaps by Lane



2-3 PM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												>100	>100
5											5.2	5.1	5.1	5.1	4.9	4.8	4.6	4.6	4.4	24.9	23.6	21.9	20.4	17.9	15.8	14.6	20.7	20.8	19.6
4	15.9	12.8	9.5	7.1	6.1	5.9	5.6	5.5	5.4	3.6	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.0	1.9	1.9	2.0	2.2	2.3	2.2	2.2	2.2
3	5.8	4.9	4.1	3.4	3.1	3.1	3.2	3.2	3.3	4.1	4.1	4.1	4.1	4.1	4.0	4.0	4.0	3.9	3.9	3.9	4.0	4.0	3.8	3.7	3.5	3.4	3.3	3.4	3.3
2	2.4	2.6	2.8	3.3	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.7	3.7	3.7
Left (1)	2.4	2.6	2.7	3.1	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.4	3.6	3.8	4.1	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5

3-4 PM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												>100	>100
5											4.7	4.6	4.6	4.5	4.5	4.4	4.2	4.1	4.0	23.4	22.1	20.8	19.4	16.9	15.3	14.2	20.5	20.5	18.9
4	14.5	11.6	8.9	6.5	5.6	5.4	5.2	5.1	5.1	3.4	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.9	2.0	1.8	1.7	1.8	1.9	2.0	2.1	2.1	2.0	2.1
3	5.5	4.5	3.8	3.1	2.9	2.9	3.0	3.0	3.0	3.9	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.6	3.6	3.6	3.7	3.7	3.6	3.5	3.3	3.2	3.1	3.2	3.1
2	2.2	2.3	2.6	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3
Left (1)	2.2	2.4	2.5	2.9	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.2	3.4	3.6	4.0	4.7	4.7	4.7	4.6	4.6	4.6	4.6	4.5

4-5 PM (Analysis Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												>100	>100
5											4.6	4.6	4.5	4.5	4.4	4.3	4.0	4.0	3.9	21.6	20.7	19.4	17.7	15.7	14.1	12.9	18.4	18.6	17.4
4	14.1	11.3	8.4	6.3	5.4	5.3	5.1	5.0	4.9	3.3	1.6	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.8	1.7	1.8	1.8	2.0	2.1	2.0	2.0	2.0
3	5.3	4.3	3.7	3.0	2.8	2.9	2.9	3.0	3.0	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.7	3.6	3.6	3.6	3.6	3.6	3.5	3.4	3.2	3.1	3.1	3.1	3.1
2	2.1	2.3	2.5	2.9	3.4	3.4	3.4	3.4	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.5	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3
Left (1)	2.1	2.3	2.4	2.8	2.9	2.9	2.9	3.0	3.0	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.2	3.4	3.8	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3

5-6 PM (Analysis Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												>100	>100
5											4.3	4.3	4.2	4.2	4.1	4.0	3.8	3.7	3.6	22.8	21.1	19.8	18.2	15.9	13.9	12.9	18.1	18.4	17.2
4	14.8	11.5	8.2	6.2	5.3	5.2	5.0	4.9	4.8	3.3	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.9	1.9	2.0	1.9	1.8	1.8	1.9	2.0	2.1	2.1	2.1	2.1
3	5.6	4.5	3.7	3.1	2.9	3.0	3.0	3.1	3.1	4.0	4.0	4.0	3.9	3.9	3.9	3.8	3.8	3.7	3.7	3.7	3.8	3.8	3.7	3.6	3.4	3.2	3.2	3.2	3.2
2	2.1	2.3	2.6	3.0	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3
Left (1)	2.1	2.3	2.4	2.7	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.1	3.2	3.4	3.8	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4

6-7 PM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Gap (sec)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												>100	>100
5											6.0	6.0	5.9	5.9	5.8	5.7	5.4	5.3	5.1	33.1	30.0	27.7	25.6	20.9	17.7	15.8	20.7	20.7	20.0
4	19.6	15.7	10.6	7.1	5.9	5.8	5.6	5.5	5.4	3.5	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.3	2.5	2.6	2.6	2.6	2.6
3	7.5	6.5	5.4	3.9	3.5	3.6	3.7	3.7	3.8	5.1	5.1	5.1	5.1	5.0	5.0	5.0	5.0	4.9	4.9	5.0	5.2	5.4	5.3	5.0	4.7	4.5	4.5	4.5	4.5
2	2.8	2.9	3.2	3.9	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.7	4.7	4.7	4.6	4.6	4.6	4.6	4.6
Left (1)	2.9	3.0	3.3	4.2	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.8	4.9	5.2	5.5	6.2	7.3	7.3	7.2	7.2	7.2	7.1	7.1	7.1

Legend	
Color	Gap Range (sec)
	0-1 sec
	1-2 sec
	2-3 sec
	3-5 sec
	5+ sec

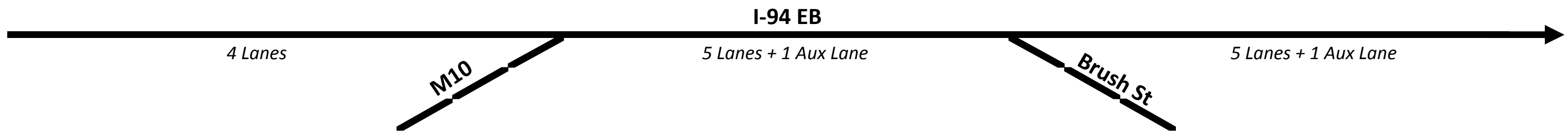
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (M10 to Brush St)

Build PM Peak Period - Total Lane Utilization



2-3 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	14%	14%	13%	11%	11%	11%	11%	11%	11%	11%	9%	9%	9%	8%	9%	8%	8%	8%	9%	9%	9%	8%	9%	9%	8%	9%	9%	8%
2	25%	24%	23%	20%	21%	21%	21%	21%	21%	21%	16%	15%	14%	14%	14%	14%	14%	14%	16%	15%	15%	15%	14%	14%	14%	14%	14%	14%
3	45%	46%	48%	52%	51%	51%	51%	51%	51%	51%	39%	31%	31%	30%	29%	29%	29%	29%	33%	32%	29%	29%	28%	27%	27%	26%	26%	25%
4	16%	16%	16%	17%	17%	17%	17%	17%	17%	17%	13%	18%	18%	17%	17%	17%	17%	17%	19%	21%	24%	25%	26%	27%	27%	27%	27%	28%
5											12%	16%	16%	17%	17%	17%	17%	17%	20%	19%	20%	20%	21%	21%	22%	22%	22%	23%
Right (6)											11%	11%	12%	14%	14%	15%	15%	15%	3%	4%	3%	3%	2%	2%	2%	2%	2%	2%

3-4 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	15%	14%	13%	12%	12%	12%	12%	12%	12%	12%	9%	9%	8%	9%	8%	9%	8%	8%	10%	10%	9%	10%	10%	10%	9%	9%	8%	10%
2	25%	24%	23%	20%	21%	21%	21%	21%	21%	21%	16%	15%	14%	14%	14%	14%	14%	14%	15%	15%	15%	14%	14%	14%	14%	14%	14%	13%
3	45%	46%	48%	52%	51%	51%	51%	51%	51%	51%	39%	31%	31%	30%	30%	30%	30%	29%	33%	32%	30%	29%	28%	27%	27%	26%	26%	25%
4	15%	16%	16%	16%	16%	16%	16%	16%	16%	16%	13%	18%	18%	17%	17%	16%	16%	16%	18%	20%	23%	24%	25%	26%	26%	27%	27%	27%
5											12%	16%	17%	17%	17%	17%	17%	18%	20%	19%	20%	20%	21%	21%	22%	22%	23%	23%
Right (6)											11%	11%	12%	13%	14%	14%	15%	15%	4%	4%	3%	3%	2%	2%	2%	2%	2%	2%

4-5 PM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	15%	15%	13%	12%	12%	12%	12%	12%	12%	12%	9%	8%	9%	9%	8%	8%	9%	9%	10%	10%	9%	10%	10%	10%	9%	9%	9%	9%
2	25%	24%	23%	20%	21%	21%	21%	21%	21%	21%	16%	15%	14%	14%	14%	14%	14%	14%	16%	15%	15%	14%	14%	14%	14%	14%	13%	13%
3	45%	46%	48%	52%	51%	51%	51%	51%	51%	51%	39%	32%	31%	30%	30%	30%	29%	29%	33%	32%	30%	29%	28%	27%	27%	26%	26%	26%
4	15%	15%	16%	16%	16%	16%	16%	16%	16%	16%	13%	18%	18%	17%	17%	17%	17%	16%	18%	20%	23%	24%	25%	26%	26%	27%	27%	27%
5											12%	16%	16%	17%	17%	17%	17%	17%	19%	19%	20%	20%	21%	21%	22%	22%	23%	23%
Right (6)											11%	11%	12%	13%	14%	14%	14%	15%	4%	4%	3%	3%	2%	2%	2%	2%	2%	2%

5-6 PM (Analysis Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	15%	14%	13%	13%	14%	14%	14%	14%	14%	14%	9%	9%	9%	9%	9%	9%	10%	9%	10%	11%	9%	10%	11%	10%	9%	10%	10%	8%
2	21%	21%	20%	17%	17%	17%	17%	17%	17%	17%	12%	11%	11%	11%	11%	11%	10%	10%	12%	12%	12%	11%	11%	11%	11%	11%	11%	11%
3	48%	49%	51%	54%	53%	53%	53%	53%	53%	53%	39%	31%	30%	30%	29%	29%	29%	29%	34%	32%	30%	29%	28%	27%	27%	26%	26%	26%
4	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	12%	19%	19%	18%	18%	18%	18%	18%	20%	22%	26%	27%	28%	29%	30%	30%	30%	31%
5											15%	17%	17%	17%	17%	17%	17%	18%	20%	19%	20%	20%	20%	21%	21%	21%	21%	22%
Right (6)											13%	13%	14%	15%	16%	16%	16%	16%	4%	4%	3%	3%	2%	2%	2%	2%	2%	2%

6-7 PM (Shoulder Hour)

Lane	1000 ft										870 ft								1000 ft									
	Detector - Lane Utilization (%)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Left (1)	13%	12%	12%	11%	12%	12%	12%	12%	12%	12%	8%	8%	8%	7%	8%	8%	8%	8%	8%	9%	10%	8%	10%	9%	8%	8%	9%	9%
2	22%	22%	20%	18%	18%	18%	18%	18%	18%	18%	13%	12%	12%	12%	11%	11%	11%	11%	13%	13%	12%	12%	12%	12%	12%	12%	12%	12%
3	50%	51%	53%	56%	55%	55%	55%	55%	55%	55%	41%	32%	31%	31%	31%	31%	31%	30%	35%	33%	30%	29%	28%	27%	27%	27%	26%	26%
4	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	11%	18%	18%	17%	17%	17%	17%	17%	19%	21%	25%	27%	27%	28%	29%	29%	29%	29%
5											15%	18%	18%	18%	18%	18%	18%	18%	21%	20%	20%	21%	21%	22%	22%	22%	22%	22%
Right (6)											12%	12%	13%	15%	15%	15%	15%	16%	4%	4%	3%	3%	2%	2%	2%	2%	2%	2%

Legend	
Color	Lane Utilization (%)
(red)	50+%
(light orange)	35-50%
(yellow)	25-35%
(light green)	10-25%
(green)	0-10%

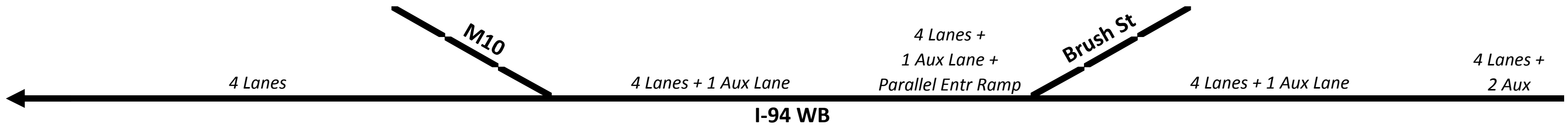
FINAL

10/29/2018

I-94 Modernization

Preferred Alternative (Brush St to M10)

Build PM Peak Period - Total Lane Utilization



2-3 PM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											13%	13%	14%	14%	14%	14%	15%	15%	15%	3%	3%	4%	4%	5%	5%	6%	4%	4%	4%
4	6%	8%	10%	14%	16%	17%	18%	18%	18%	24%	34%	34%	34%	33%	33%	32%	32%	31%	32%	36%	38%	39%	38%	37%	35%	33%	35%	35%	34%
3	17%	20%	23%	28%	31%	30%	30%	29%	29%	23%	16%	16%	16%	16%	17%	17%	17%	17%	17%	20%	20%	20%	21%	21%	23%	23%	24%	23%	24%
2	38%	36%	33%	28%	25%	24%	24%	24%	24%	24%	17%	17%	17%	17%	17%	17%	17%	17%	17%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%
Left (1)	39%	36%	34%	30%	28%	29%	28%	29%	29%	29%	20%	20%	19%	20%	19%	20%	19%	20%	19%	20%	18%	16%	16%	16%	16%	17%	16%	17%	17%

3-4 PM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											13%	13%	14%	14%	14%	14%	15%	15%	16%	3%	4%	4%	4%	5%	5%	6%	4%	4%	4%
4	6%	8%	10%	14%	16%	17%	17%	18%	18%	24%	33%	33%	33%	33%	32%	32%	31%	31%	31%	35%	37%	39%	38%	36%	34%	33%	34%	34%	34%
3	17%	20%	23%	28%	30%	30%	29%	29%	29%	23%	16%	16%	16%	16%	17%	17%	17%	17%	17%	20%	20%	20%	21%	21%	22%	23%	23%	23%	23%
2	39%	36%	33%	28%	25%	25%	25%	25%	25%	25%	18%	18%	18%	18%	18%	18%	18%	18%	18%	21%	21%	22%	22%	22%	22%	22%	22%	22%	22%
Left (1)	38%	36%	34%	30%	29%	28%	29%	28%	28%	28%	20%	20%	19%	19%	19%	19%	19%	19%	18%	21%	18%	15%	15%	16%	17%	16%	17%	17%	17%

4-5 PM (Analysis Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											13%	13%	13%	14%	14%	14%	15%	15%	15%	3%	4%	4%	4%	5%	5%	6%	4%	4%	4%
4	6%	8%	11%	14%	16%	17%	17%	18%	18%	24%	34%	34%	33%	33%	33%	32%	31%	31%	31%	35%	37%	39%	38%	36%	34%	33%	34%	34%	33%
3	17%	20%	23%	28%	30%	30%	29%	29%	28%	22%	16%	16%	16%	16%	16%	16%	16%	17%	17%	20%	20%	20%	20%	21%	22%	23%	23%	23%	23%
2	39%	36%	33%	28%	25%	25%	25%	25%	25%	25%	17%	17%	17%	17%	17%	17%	18%	18%	18%	21%	21%	21%	21%	21%	22%	22%	22%	22%	22%
Left (1)	38%	36%	33%	30%	29%	28%	29%	28%	29%	29%	20%	20%	21%	20%	20%	21%	20%	19%	19%	21%	18%	16%	17%	17%	17%	16%	17%	17%	18%

5-6 PM (Analysis Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											14%	14%	14%	15%	15%	15%	16%	16%	17%	3%	4%	4%	4%	5%	6%	6%	4%	4%	5%
4	6%	8%	11%	14%	17%	17%	18%	18%	18%	24%	33%	33%	33%	32%	32%	31%	31%	30%	30%	34%	37%	39%	38%	36%	34%	32%	34%	34%	33%
3	16%	20%	23%	28%	29%	29%	29%	28%	28%	22%	15%	15%	15%	16%	16%	16%	16%	16%	16%	20%	19%	19%	20%	21%	22%	22%	23%	23%	23%
2	39%	36%	32%	28%	25%	25%	25%	25%	25%	25%	17%	17%	17%	17%	17%	17%	17%	17%	17%	21%	21%	22%	22%	22%	22%	22%	22%	22%	22%
Left (1)	39%	36%	34%	30%	29%	29%	28%	29%	29%	29%	21%	21%	21%	20%	20%	21%	20%	21%	20%	22%	19%	16%	16%	16%	16%	18%	17%	17%	17%

6-7 PM (Shoulder Hour)

Lane	1000 ft										840 ft						350 ft			1000 ft									
	Detector - Lane Utilization (%)																												
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Right (6)																												<1%	<1%
5											14%	14%	14%	14%	14%	14%	15%	16%	16%	3%	3%	4%	4%	5%	6%	7%	5%	5%	5%
4	6%	8%	11%	16%	20%	20%	21%	21%	21%	29%	36%	36%	36%	35%	35%	35%	34%	34%	34%	39%	41%	43%	42%	40%	38%	36%	37%	37%	37%
3	16%	18%	21%	29%	32%	32%	31%	31%	30%	23%	16%	16%	16%	16%	16%	16%	17%	17%	17%	20%	19%	18%	19%	20%	21%	22%	22%	22%	22%
2	40%	38%	34%	28%	24%	24%	24%	24%	24%	24%	17%	17%	17%	17%	17%	17%	17%	17%	17%	20%	21%	21%	21%	21%	21%	21%	22%	22%	22%
Left (1)	38%	36%	34%	27%	24%	24%	24%	24%	25%	24%	17%	17%	17%	18%	18%	18%	17%	16%	16%	18%	16%	14%	14%	14%	14%	14%	14%	14%	14%

Legend	
Color	Lane Utilization (%)
	50+%
	35-50%
	25-35%
	10-25%
	0-10%

FINAL

10/29/2018

I-94 Modernization Project - Approved Selected Alternative with Modifications Design Exception and Variance Summary

Technical Memorandum No. MDOT – TM-55
April 22, 2019

Project Title: I-94 Modernization Project
MDOT JN: 122367
Control Section: 82024

Author: Edward Strada, PE
Reviewer: John Baldauf, PE

1. Design Exceptions

The purpose of this memorandum is to summarize the potential design exceptions identified during the Approved Selected Alternative with Modifications (ASAM) conceptual design developed for the Supplemental Environmental Impact Statement (SEIS). The reference material used in determining the criteria is listed in the design criteria section.

Design Speed

The following design speeds are used for the ASAM conceptual design:

- I-94, M-10 & I-75 Mainline – 60 mph
- Service Ramps – 30-45 mph
- System Ramps – 60 mph (desirable), 40 mph (minimum)
- Service Drives – 30 mph
- Crossroads – 30-40 mph

No design exceptions are anticipated for design speed.

Lane Width

The following lane widths are used for the ASAM conceptual design:

- I-94, M-10 & I-75 Mainline – 12 ft.
- Service Ramps – 12 ft. for urban slip ramp otherwise 16 ft.
- System Ramps – 16 ft. for single lane and 12 ft. for two lane ramps

No design exceptions are anticipated for lane width.

<u>Shoulder Width</u>
The following shoulder widths are used for the ASAM conceptual design:

- I-94, M-10 & I-75 Mainline – median (10 ft. min. and 12 ft. typ.), outside (10 ft. min. and 12 ft. typ.), auxiliary (8 ft. min. and 12 ft. typ.)
- Service Ramps (Urban) – 0 ft. left side and 5 ft. right side
- Service Ramp (Other) – 6 ft. left side and 8 ft. right side
- System Ramps – 6 ft. left side and 8 ft. right side

Dequindre Bridge: Per the FEIS, a design exception for the inside shoulder width of 4 feet along I-94 is required at the Dequindre Bridge just east of the I-75 interchange. The bridge was rehabilitated in 2000 keeping the 4-foot inside shoulders width. During the development of the ASAM conceptual design, it was determined that the existing Dequindre bridge could be widened to the north to accommodate the additional width needed to increase the inside shoulder width from 4 feet to 12 feet. This will eliminate the need for a design exception and not impact the original ROW footprint shown in the FEIS.

I-94 Mainline: An 8 foot outside shoulder width has been provided along the auxiliary lanes between 14th Street and Rosa Parks Boulevard to minimize the impacts to the ROW footprint established during the FEIS. The reduced shoulder width allows for shorter span lengths for the Railroad bridge over I-94 (X02/X02-8 of 82023). This meets the minimum criteria for auxiliary lane shoulder width.

I-75 Mainline: During the FEIS and the ASAM conceptual design of the project, the design has been based on the assumption that the I-75 mainline pavement will not be reconstructed and remains in place. The existing median width along I-75 is 26 feet and only allows for two 11 feet - 8 inch shoulders with a concrete median barrier. With the reconstruction of the interchange, the preliminary system ramp pier design features an 8 foot diameter column within the existing median of I-75. This design reduces the median shoulder width from 11 feet - 8 inch to 9 feet. AASHTO states that freeways with six or more lanes should have a minimum median shoulder width of 10 feet. Since 9 feet is the maximum shoulder width available at each system ramp pier, a design exception will be required. The pier design will be further evaluated during the detailed engineering phase to attempt to eliminate the design exception.

M-10 Mainline: The existing M-10 inside shoulder is currently sub-standard (<6-ft) within as well as north and south of the project limits. Due to the limited ROW the inside shoulder was designed to match the existing condition to improve geometrics for the outside shoulder and entrance/exit ramps. Vehicle refuge areas in the M-10 median will be provided where feasible at the request of MDOT. A design exception will be required for the reduced shoulder width.

System Ramps: During the ASAM conceptual design of the project, the system ramp shoulder widths were designed to meet the minimum requirements noted above. In order to improve stopping sight distance along some ramps, the left and right sides were flipped to provide more width on the inside of the curves. In such cases, the minimum widths used were 8 ft on the left side and 6 ft on the right side. The ramps where this was applied are:

- *WB I-94 to NB M-10, Ramp A*
- *NB M-10 to EB I-94, Ramp B*
- *EB I-94 to SB M-10, Ramp C*
- *SB M-10 to WB I-94, Ramp D*
- *NB M-10 to WB I-94, Ramp E*
- *EB I-94 to NB M-10, Ramp F*
- *SB M-10 to EB I-94, Ramp G*
- *WB I-94 to SB M-10, Ramp H*

Other ramps will be further evaluated during the detailed engineering phase to improve sight distance where necessary.

Horizontal Alignment

The following horizontal alignment criteria are used for the ASAM conceptual design:

- I-94, M-10 & I-75 Mainline – 60 mph – minimum radii of 1333 ft. based on e_{max}=6%
- Service Ramps – 30-45 mph – minimum radii of 232-643 ft. based on e_{max}=6%
- System Ramps – 40 mph – minimum radii of 485 ft. based on e_{max}=6%

Per the MDOT Road Design Manual, Section 3.04.03, the maximum superelevation for urban freeways and urban ramps, with a design speed of 60 mph, is 5%. The I-94 Rehabilitation Detailed Engineering Report - June 2010, Appendix G Section A.1, states that the "team concurs with Traffic and Safety (T&S) that 6% superelevation is desirable due to it facilitating higher posted speeds in the future. We propose to maintain the recommendation from the AJR to use 6% and only use the 5% as a minimum in case of tight constraints prohibiting the use of 6%."

No design exceptions are anticipated for horizontal alignment.

Maximum Grade

The following maximum grades are used for the ASAM conceptual design:

- I-94, M-10 & I-75 Mainline – max. 4%
- Service Ramps – max. 5%
- System Ramps – max. 5%

No FHWA design exceptions are anticipated for grades; however, there are several locations where the 5% maximum grade was exceeded along system and service ramps. Even though the 5% maximum grades were exceeded, the grades were within the guidelines shown in the AASHTO 2011 Green Book of less than 6%. At these locations MDOT only design exceptions will be required.

WB I-94 to NB I-75, Ramp A – This ramp has a down-grade of 5.55% for approximately 350 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade was necessary to provide acceptable cross slope and roll-over values in the gore with the EB I-94 to NB I-75 Ramp F.

NB I-75 to WB I-94, Ramp E – This ramp has a down-grade of 5.18% for approximately 650 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade was necessary to provide acceptable cross slope and roll-over values in the gore with the SB I-75 to WB I-94 Ramp D.

EB I-94 to NB I-75, Ramp F – This ramp has a down-grade of 5.94% for approximately 700 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade was necessary to provide acceptable cross slope and roll-over values in the gore with the WB I-94 to NB I-75 Ramp A.

Brush Street WB Entrance Ramp D – This ramp has a down-grade of 5.18% for approximately 60 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade improves acceleration up to the WB I-94 posted speed. The steeper grade was necessary to improve ramp spacing between the I-94/M-10 system interchange ramps.

Conner Street WB Exit Ramp A – This ramp has an up-grade of 5.83% for approximately 100 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for up-grades on ramps with a design speed of 40 mph. The steeper grade improves deceleration down to the service drive posted speed. The steeper grade was necessary to avoid additional residential property acquisitions and provide room for the pedestrian bridge.

Conner Street EB Entrance Ramp B – This ramp has a down-grade of 6.00% for approximately 90 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade improves acceleration up to the EB I-94 posted speed. The steeper grade was necessary to avoid additional residential property acquisitions and provide room for the pedestrian bridge.

Conner Street WB Entrance Ramp D – This ramp has a down-grade of 5.49% for approximately 50 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade improves acceleration up to the WB I-94 posted speed. The steeper grade was necessary to avoid additional residential property acquisitions and provide room for the pedestrian bridge.

Mt. Elliott Street WB Exit Ramp A – This ramp has an up-grade of 5.55% for approximately 50 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for up-grades on ramps with a design speed of 40 mph. The steeper grade improves deceleration down to the service drive posted speed. The steeper grade was necessary to allow two-way Harper Avenue to pass over the ramp with the required vertical clearance.

Mt. Elliott Street EB Entrance Ramp B – This ramp has a down-grade of 5.62% for approximately 130 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade improves acceleration up to the EB I-94 posted speed. The steeper grade was necessary to pass under the East Service Drive bridge to Harper Avenue with the required vertical clearance.

Mt. Elliott Street EB Exit Ramp C – This ramp has an up-grade of 5.39% for approximately 110 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for up-grades on ramps with a design speed of 40 mph. The steeper grade improves deceleration down to the service drive posted speed. The steeper grade was necessary to avoid additional residential property acquisitions.

Van Dyke Avenue EB Exit Ramp C – This ramp has an up-grade of 5.81% for approximately 70 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for up-grades on ramps with a design speed of 40 mph. The steeper grade improves deceleration down to the service drive posted speed. The steeper grade was necessary to provide the required underclearance at Sherwood Ave and to provide adequate distance from the ramp to the intersection at Van Dyke Avenue.

Van Dyke Avenue WB Entrance Ramp D – This ramp has a down-grade of 5.55% for approximately 90 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade improves acceleration up to the WB I-94 posted speed. The steeper grade was necessary to provide the required underclearance at Sherwood Avenue.

Calumet Street SB Entrance Ramp C – This ramp has a down-grade of 5.90% for approximately 150 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade improves acceleration up to the SB M-10 posted speed. The steeper grade was necessary to provide the required underclearance at Selden Street.

Forest Avenue NB Entrance Ramp A – This ramp has a down-grade of 5.94% for approximately 40 feet. The speed provided at this location is near 40 mph, which according to AASHTO's 2011 Green Book, is within the limits (4% - 6%) for down-grades on ramps with a design speed of 40 mph. The steeper grade improves acceleration up to the NB M-10 posted speed. The steeper grade was necessary to provide the required underclearance at Warren Avenue.

<u>Stopping Sight Distance (SSD)</u>

The following SSD are used for the ASAM conceptual design:

- I-94, M-10 & I-75 Mainline – 60 mph – 570 ft. minimum
- Service Ramps – 30-45 mph – 200 ft. to 360 ft. minimum
- System Ramps – 40 mph – 305 ft. minimum

Within the I-94/I-75 and I-94/M-10 interchanges, the system ramp design speed criteria for horizontal and vertical controls are 40 mph. Due to the existing constrained ROW footprint and the close proximity of the two interchanges (less than one mile), the horizontal radii for several ramps has been designed to a minimum of 485 feet, which relates to a 40 mph design speed with 6% superelevation (MDOT Straight Line Method). The use of this minimum radius requires a horizontal sightline offset (HSO) of almost 24 feet to meet the horizontal sight distance requirements for a 40 mph design speed. This would require a shoulder width of more than 16 feet to meet this criterion. Both MDOT and AASHTO guidelines discourage using shoulder widths greater than 12 feet due to increased risk of traffic utilizing the shoulder for passing. A 12' inside shoulder width was evaluated and it was found that increasing from an 8' inside shoulder width to a 12' inside shoulder width did not result in significant SSD improvements. A 12' inside shoulder width only increased the SSD by 30' to 40', which is a distance equivalent to approximately 1½ car lengths and a design speed increase of 3-4 mph. The costs associated with a 12' inside shoulder width was determined to be approximately $10,000,000 greater and it was determined that the cost increase was not justified by such nominal improvements. For this reason, a design exception will be necessary for the Horizontal Stopping Sight Distance (SSD) for the following interchange ramps:

WB I-94 to NB M-10, Ramp A – This ramp has a horizontal radius of 485 feet and a superelevation rate of 6.0% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 19.54 feet or a 12 foot inside shoulder.

NB M-10 to EB I-94, Ramp B – This ramp has a horizontal radius of 598 feet and a superelevation rate of 4.8% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 19.09 feet or a 12 foot inside shoulder.

EB I-94 to SB M-10, Ramp C – This ramp has a horizontal radius of 350 feet and a superelevation rate of 5.8% which meets a 35 mph design speed. The horizontal sight offset (HSO) required for this ramp is 21.60 feet or a 14 foot inside shoulder.

SB M-10 to WB I-94, Ramp D – This ramp has a horizontal radius of 598 feet and a superelevation rate of 4.8% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 19.09 feet or a 12 foot inside shoulder.

NB M-10 to WB I-94, Ramp E – This ramp has a horizontal radius of 584 feet and a superelevation rate of 5.0% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 19.54 feet or a 12 foot inside shoulder.

EB I-94 to NB M-10, Ramp F – This ramp has a horizontal radius of 835 feet and a superelevation rate of 6.0% which meets a 50 mph design speed. The horizontal sight offset (HSO) required for this ramp is 26.65 feet or a 19 foot inside shoulder.

SB M-10 to EB I-94, Ramp G – This ramp has a horizontal radius of 584 feet and a superelevation rate of 5.0% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 19.09 feet or a 12 foot inside shoulder.

WB I-94 to SB M-10, Ramp H – This ramp has a horizontal radius of 858 feet and a superelevation rate of 6.0% which meets a 50 mph design speed. The horizontal sight offset (HSO) required for this ramp is 26.18 feet or a 19 foot inside shoulder.

WB I-94 to NB I-75, Ramp A – This ramp has a horizontal radius of 485 feet and a superelevation rate of 6% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 23.78 feet or a 16 foot inside shoulder.

EB I-94 to SB I-75, Ramp C – This ramp has a horizontal radius of 500 feet and a superelevation rate of 5.80% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 23.08 feet or a 15 foot inside shoulder.

SB I-75 to WB I-94, Ramp D – This ramp has a horizontal radius of 485 feet and a superelevation rate of 6% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 23.78 feet or a 16 foot inside shoulder.

NB I-75 to WB I-94, Ramp E – This ramp has a horizontal radius of 525 feet and a superelevation rate of 5.55% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 22.00 feet or a 14 foot inside shoulder.

SB I-75 to EB I-94, Ramp G – This ramp has a horizontal radius of 485 feet and a superelevation rate of 6% which meets a 40 mph design speed. The horizontal sight offset (HSO) required for this ramp is 23.78 feet or a 16 foot inside shoulder.

Cross Slope

The following cross slopes are used for the ASAM conceptual design:

- I-94, M-10 & I-75 Mainline – 2% for travel lanes and 4% for shoulders

- Service Ramps – 2% for travel lanes and 4% for shoulders
- System Ramps – 2% for travel lanes and 4% for shoulders

The maximum roll-over rate or algebraic difference in cross slope criteria for the project is 6%.

A design exception is anticipated for exceeding the established criteria at the following locations:

- Milwaukee Ramp C – A 17.9% gore cross slope was necessary to increase the ramp spacing between the I-94/M-10 interchange ramps and improve operational efficiency. The SB M-10 service drive and Milwaukee Ramp C horizontal alignments are constrained by an existing building adjacent to the right-of-way, which limits the possible geometric adjustments without impacting additional right-of-way. The location of the ramp cannot be moved or eliminated and also maintain access to I-94 as shown in the IACR.
- Calumet Ramp B – A 23.2% gore cross slope was necessary due to right-of-way constraints along the NB M-10 service drive. The NB M-10 service drive and Calumet Ramp B horizontal alignments are constrained by a school and a city park adjacent to the right-of-way, which limits the possible geometric adjustments without impacting additional right-of-way. The location of the ramp is also constrained by the proposed bridge at Calumet and cannot be moved or eliminated and also maintain access.

Superelevation Rate

For the ASAM conceptual design, the MDOT Straight Line Method with 6% maximum superelevation rate was used. The distribution of the superelevation transition entering and exiting the horizontal curves was 33% inside the curve and 67% outside the curve.

No design exceptions are anticipated for superelevation rates.

Vertical Clearance

The I-94 project falls within the “Special Routes” section as described in the MDOT RDM section 3.12G, and as approved in FHWA Document No. 91575 dated January 27, 2006, which requires a vertical clearance of 14ft.-6in. minimum and 14ft.-9in. desirable. The ASAM conceptual design set the final condition vertical clearances to 14ft.-9in. and the interim condition (maintenance of traffic and advanced bridge work) to 14ft.-6in.

No design exceptions are anticipated for vertical clearance.

Design Loading Structural Capacity

No design exceptions are anticipated for design loading structural capacity.

2. Design Variances

The purpose of this section is to summarize the potential design variances identified during the Approved Selected Alternative with Modifications conceptual design developed for the Supplemental Environmental Impact Statement.

Lane Width

The following lane widths are used for the ASAM conceptual design:

- Service Drives – 11 feet
- Crossroads – 10-12 feet

No design variances are anticipated for lane width.

Shoulder Width

The following shoulder widths are used for the ASAM conceptual design:

- Service Drives – 0 feet left side and 8 feet right side
- Crossroads – 0 feet (curb or curb & gutter used)

No design variances are anticipated for shoulder width.

Horizontal Alignment

The following horizontal alignment criteria are used for the ASAM conceptual design:

- Service Drives – 30 mph – minimum radii of 333 ft. based on AASHTO Low-Speed Urban Streets
- Crossroads – 30-40 mph – minimum radii of 232-485 ft. based on e_{max}=6%

No design variances are anticipated for horizontal alignment.

Maximum Grade

The following grades are used for the ASAM conceptual design:

- Service Drives – max. 9%
- Crossroads – max. 7%-9%

No design variances are anticipated for maximum grade.

Stopping Sight Distance (SSD)

The following SSD are used for the ASAM conceptual design:

- Service Drives – 30 mph – 200 feet minimum
- Crossroads – 30-40 mph – 200 ft. to 305 ft. minimum

No design variances are anticipated for stopping sight distance.

Cross Slope

The following cross slopes are used for the ASAM conceptual design:

- Service Drives – 2% for lanes and shoulders (shoulder utilized as multiuse lane for non-motorized/transit traffic)
- Crossroads – 2% for travel lanes

No design variances are anticipated for cross slope.

Superelevation Rate and Superelevation Transitions

For the ASAM conceptual design, AASHTO Low-Speed Urban Streets criteria was used. The minimum radius of the horizontal curve was used so as to maintain normal crown on the roadway.

No design variances are anticipated for superelevation rates.

Ramp Acceleration/Deceleration Length

The minimum acceleration/deceleration lengths and tapers rates used in the ramp design for the development of the ASAM conceptual design are in accordance with the MDOT Geometric Design Guide for a ramp design speed of 45 mph and mainline speed of 60 mph. No design exceptions are anticipated for ramp acceleration/deceleration lane lengths and tapers.

Ramp Distance From Intersection

The spacing between the intersection and the entrance ramps were reduced at some locations from 200 feet as shown in MDOT Geometric Design Guides to 100 feet to increase ramp spacing along the mainline and ramp length to avoid design exceptions in vertical alignment and/or grades.

The spacing between the intersection and the exit ramp gores were reduced at some location from 425 feet desirable, as shown in the MDOT Geometric Design Guides, to 300 feet minimum to increase the ramp spacing along the mainline and ramp length to avoid design exceptions in vertical alignment and/or grades.

Lane Taper Drop Rate

The FEIS geometry was modified at the WB I-94 exit ramp to I-96 to provide more lane balance and eliminates the 5 lane to 3 lane transition at the POB. A 600’ (50:1 taper) lane drop was provided just west of the ramp gore to accommodate the 4 lane to 3 lane transition. The 50:1 taper is the maximum taper rate obtainable to avoid impacting the I-96 mainline bridges going over I-94, which are outside the limits defined by the FEIS. The current AASHTO 2011 Green

Book states the minimum taper rate for a lane drop should be 50:1, and the desirable taper rate is 70:1.

Trumbull Avenue (S21 of 82023) over I-94 Lane Configuration Verification

NO. MDOT – TM 1
December 16, 2014

MDOT JN: 122114
Control Section: 82024

Author: Mark Smith, PE, PTOE
Reviewer: Karianne Steffen, PE, PTOE
Jason Kessler, PE

Background:
As part of the I-94 Modernization Project Owners Representative Work Task #1, Subtask 2.2 Traffic, this technical memorandum is intended to verify the future lane configuration at Trumbull over I-94 based on 2014 traffic data and additional information provided by MDOT.

Discussion:
In response to the recent request from MDOT, a traffic analysis has been completed for Trumbull Ave over I-94 in Detroit, MI to verify the lane configuration for the proposed bridge reconstruction. The traffic analysis was based on year 2035 projections with a goal of achieving a Level of Service (LOS) of D or better on all movements at the intersection of Trumbull Ave & Eastbound (EB) I-94 Service Drive and the intersection of Trumbull Ave & Westbound (WB) I-94 Service Drive.

Existing Project Data:
Trumbull Ave over I-94 is currently striped as a three (3) lane bridge, with one thru lane in each direction, and a center left turn lane. The existing intersection of Trumbull Ave & EB I-94 Service Drive is signalized with a left turn lane / thru lane / right lane on the EB approach, a thru lane / thru-right lane on the Northbound (NB) approach, and a left turn lane / thru lane on the Southbound (SB) approach. The existing intersection of Trumbull Ave & WB I-94 Service Drive is unsignalized with no WB leg, a left turn lane / thru lane on the NB approach and a thru lane / right turn lane on the SB approach. Existing turning movement counts were completed by HNTB on 9/30/14 and 10/2/14 and can be seen in Appendix A. Existing turning movement counts were also provided by MDOT on 10/17/14 from hose counts taken in April 2014 and from data in the I-94 Rehabilitation Project Traffic Report, Volume 3 Addendum: Modifications to the Recommended Alternative, dated August 2004 which can be seen in Appendix A.

Future Conditions:
The future condition of the intersections at Trumbull Ave & EB I-94 Service Drive and Trumbull Ave & WB I-94 Service drive will include a continuous two (2) lane service drive in the EB and WB directions. The intersection at Trumbull Ave & EB I-94 Service Drive and Trumbull Ave & WB I-94 Service Drive will both be signalized.

The existing turning movement counts obtained from HNTB and the counts provided by MDOT were both analyzed as part of the lane configuration verification. Projected traffic data for 2035 was based on a 0.5% - 1% growth rate. A growth rate of 0.5% was used to calculate future traffic volumes on all legs except the EB service drive to NB Trumbull and the SB Trumbull to

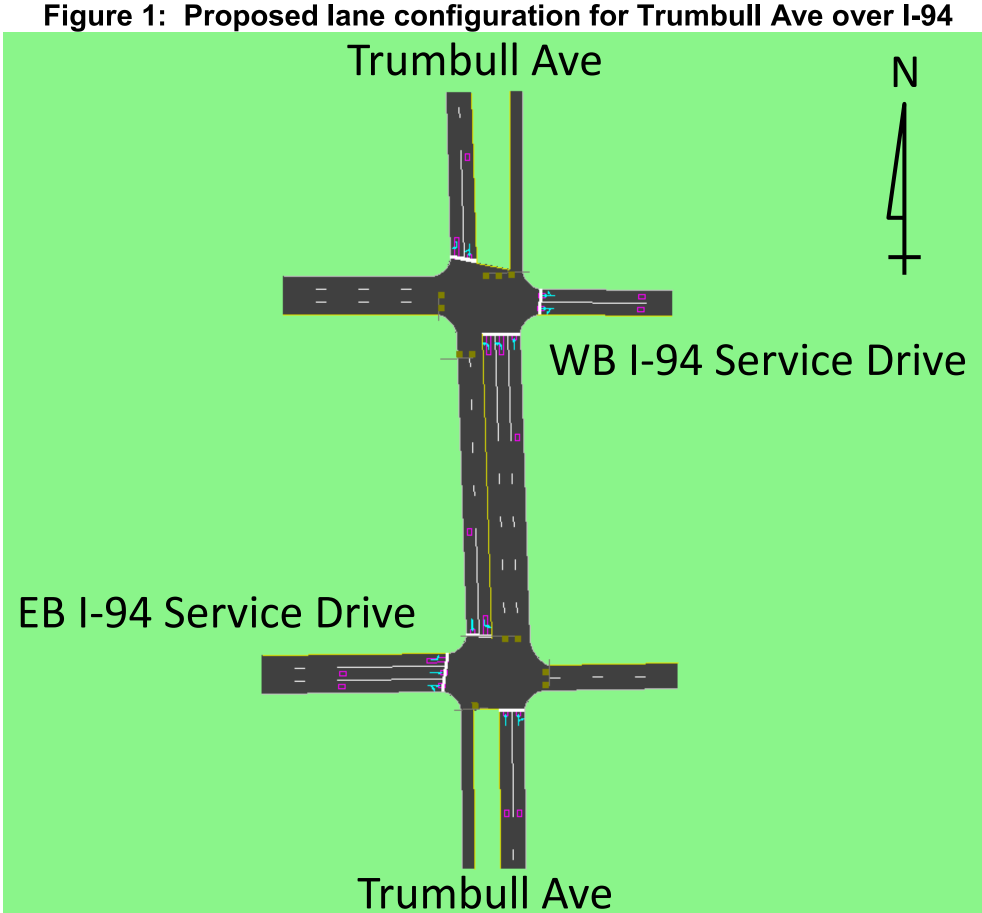
Attachments

WB Service Drive movements which were grown at 1% due to the connection to the Henry Ford Health System. The projected volumes (year 2035) can be seen in Appendix B.

Traffic Analysis:
Synchro/Simtraffic was used to complete the traffic analysis for Trumbull Ave over I-94. The goal of the traffic analysis was to optimize the number of lanes while achieving a LOS of D or better on all movements and 95th percentile queue lengths that are less than available storage lengths at the intersection of Trumbull Ave & EB I-94 Service Drive and the intersection of Trumbull Ave & WB I-94 Service Drive. This was accomplished by testing several scenarios of varying lane configurations and signal timings to achieve a LOS D at all movements. After achieving a LOS D or better at all movement's further analysis was completed by adjusting signal timings and offsets to improve the coordination between the two signals and to reduce queuing.

The final lane configuration that was evaluated using the traffic data obtained by HNTB and provided by MDOT is a five (5) lane bridge over I-94, with one thru lane in each direction, two NB left turn lanes and one SB left turn lane. The intersection of Trumbull Ave & EB Service Drive is signalized with a left turn lane / thru lane / thru-right lane on the EB approach, a thru lane / thru-right lane on the NB approach, and a left turn lane / thru lane on the SB approach. The intersection of Trumbull Ave & WB Service Drive is signalized with a thru-left lane / thru-right lane on the WB approach, a dual left turn lane / thru lane on the NB approach, and a thru-right / right turn lane on the SB approach. Figure 1 below shows the proposed lane configuration for Trumbull Ave over I-94.

Figure 1: Proposed lane configuration for Trumbull Ave over I-94



Attachments

Table 1 below shows the intersection LOS for both the traffic data obtained by HNTB and the traffic data provided by MDOT.

Table 1: Intersection LOS for year 2035 at Trumbull Ave over I-94

Intersection	Year 2035	Traffic Data Obtained from HNTB (9/30/14 and 10/2/14)	Traffic Data provided by MDOT (April 2014 / August 2004)
Trumbull Ave & EB I-94 Service Drive	AM Peak Hour	LOS C	LOS B
	PM Peak Hour	LOS D	LOS C
Trumbull Ave & WB I-94 Service Drive	AM Peak Hour	LOS C	LOS B
	PM Peak Hour	LOS C	LOS C

The five (5) lane bridge section is the recommended cross section after discussions with MDOT on December 12, 2014. An alternate four (4) lane bridge section was initially considered as it provided an acceptable LOS of D or better, but was dismissed because queue lengths for the NB and SB left turns on Trumbull Ave exceed available storage lengths.

Outputs from Synchro/Simtraffic for individual movements which include LOS, delay, V/C ratio, and the 95th Percent Queue lengths are summarized in Appendix B. The output sheets from Synchro/Simtraffic are included in Appendix C.

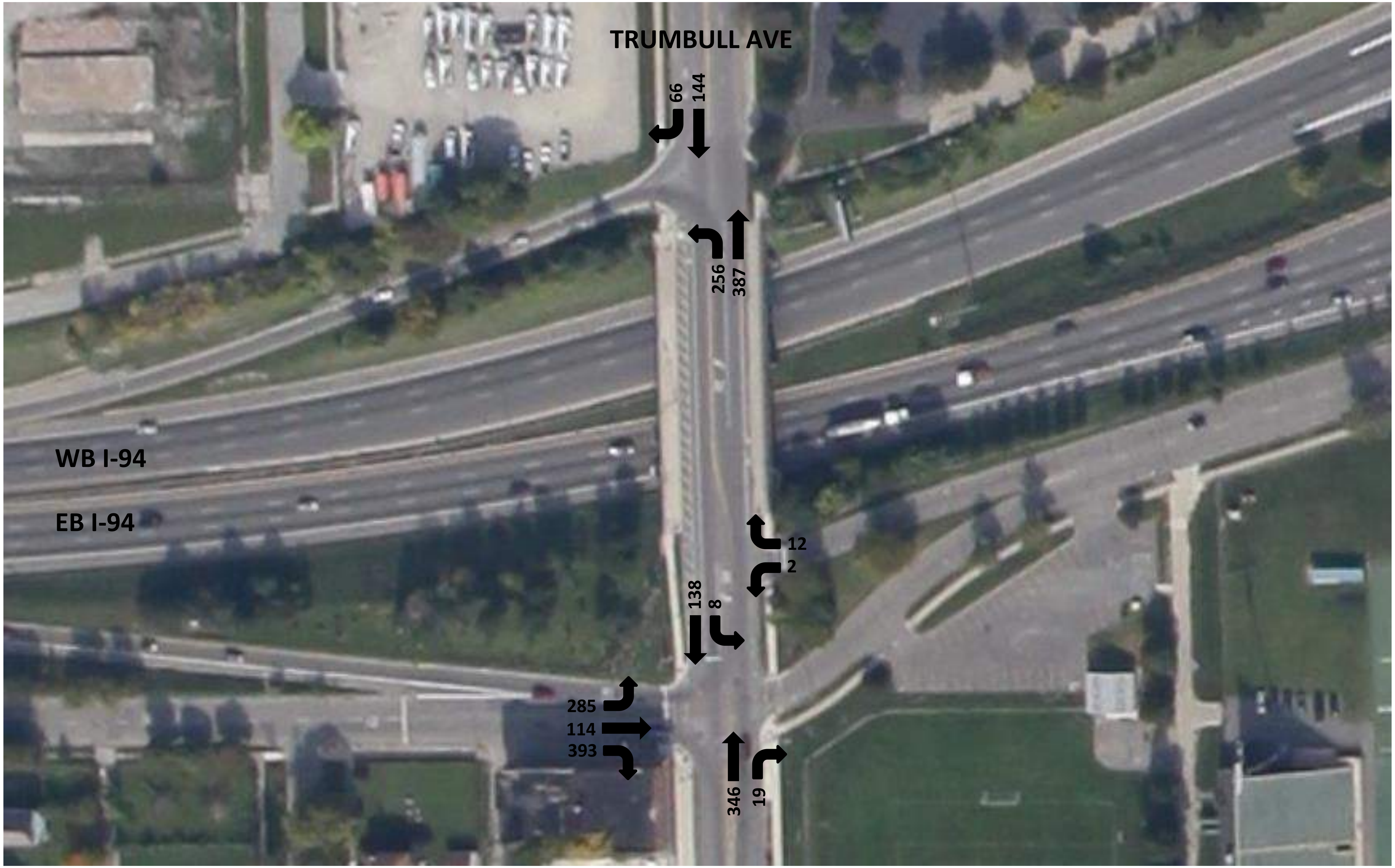
Recommendation:
A review of the traffic analysis on Trumbull Ave over I-94 indicates that a five (5) lane bridge will be required to accommodate the traffic based on year 2035 projections. The results of traffic data obtained by HNTB and the traffic data provided by MDOT both indicated that an intersection LOS of D or better is projected for year 2035, with all individual movements at a LOS D or better.

Attachments

APPENDIX A

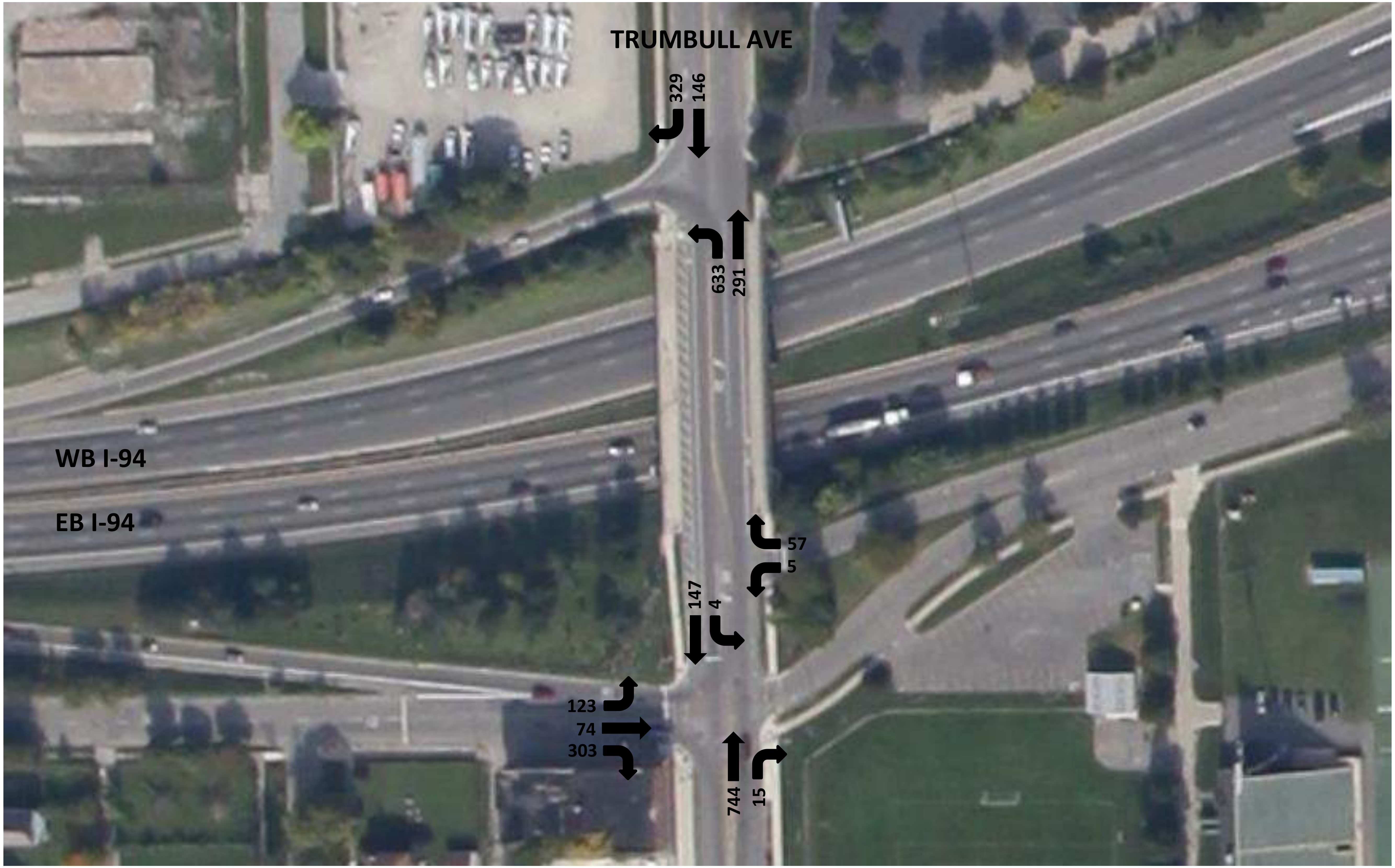
EXISTING TURNING MOVEMENT COUNT DATA

Trumbull Ave at I-94 AM Peak Hour (7:30 AM – 8:30 AM)



Date of Count: 9/30/14

Trumbull Ave at I-94 PM Peak Hour (4:30 PM – 5:30 PM)



Date of Count: 10/2/14

MDOT Michigan Department of Transportation

OFFICE MEMORANDUM

DATE: April 10, 2014

TO: Kyle Kopper, Bridge Design

FROM: Amy Lipset, Asset Management

SUBJECT: TAR #2748: Trumbull Avenue over I-94, JN 113888D

Traffic Information

The following tables contain the requested traffic information for Trumbull Avenue over I-94 (CS 82023, MP 2.3) in Wayne County. Current traffic volumes were calculated from hose counts taken in April 2014 and from data in the I-94 Rehabilitation Project Traffic Report, Volume 3 Addendum: Modifications to the Recommended Alternative, dated August 2004. A growth rate of 0.5% - 1% was used to calculate future traffic volume. This number is based on nearby land uses, the addition of the new I-94 service drives and population projections in Wayne County.

Northbound Trumbull Ave	2014	2015	2035
Total Average Daily Traffic (ADT)	8,200	8,250	9,100
% Commercial of ADT	2.5 %		
Commercial DDHV	22	22	25
AM Peak Hour (7:15 – 8:15)	510	510	565
PM Peak Hour (4:45 – 5:45)	740	745	820

Southbound Trumbull Ave	2014	2015	2035
Total Average Daily Traffic (ADT)	1,550	1,560	1,725
% Commercial of ADT	4.5 %		
Commercial DDHV	7	7	8
AM Peak Hour (7:45 – 8:45)	105	105	115
PM Peak Hour (4:45 – 5:45)	140	140	155

	Rigid	Flexible
Growth Rate	0.5 %	0.5 %
Growth Type	Compound	Compound
Initial Yearly 18-kip ESAL (both directions)	56,210	42,160
Direction Distribution Factor	84 %	84 %
Lane Distribution Factor	100 %	100 %
Total 18 Kip Axle Loadings	990,560	742,960

The design hour volume (DHV) is 11%. If you have any questions regarding this traffic analysis, please contact me at 517.373.2909.

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2015 AM Peak
7:30 - 8:30

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		580	
	181		399
59	122	0	
RIGHT	THRU	LEFT	

Leg 4: WB I-94 On Ramp
West Leg

WB	213		
TOTAL 213		0	LEFT
EB	0	0	THRU
		0	RIGHT

Leg 2: Apartment driveway (clos
East Leg

RIGHT	0		
THRU	0	0	WB
LEFT	0		0 TOTAL
		0	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	155	399	0
122		554	
SB	676	NB	
	TOTAL		

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2035 AM Peak

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		738	
	221		517
72	149	0	
RIGHT	THRU	LEFT	

Leg 4: WB I-94 Service Drive
West Leg

WB	551		
TOTAL 551		0	LEFT
EB	0	0	THRU
		0	RIGHT

Leg 2: WB I-94 Service Drive
East Leg

RIGHT	55		
THRU	300	405	WB
LEFT	50		405 TOTAL
		0	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	179	462	0
199		641	
SB	841	NB	
	TOTAL		

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2015 PM Peak
4:45 - 5:45

Leg 1: Trumbull Ave
North Leg

		TOTAL	
	SB	742	NB
	474		268
307	167	0	
RIGHT	THRU	LEFT	

Leg 4: WB I-94 On Ramp
West Leg

WB	831			
TOTAL	831		0	LEFT
EB		0	0	THRU
			0	RIGHT

Leg 2: Apartment driveway (clos
East Leg

RIGHT	0			
THRU	0	0	WB	
LEFT	0		0	TOTAL
		0	EB	

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	524	268	0
167		792	
SB	959	NB	
	TOTAL		

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2035 PM Peak

Leg 1: Trumbull Ave
North Leg

		TOTAL	
	SB	942	NB
	575		367
430	145	0	
RIGHT	THRU	LEFT	

Leg 4: WB I-94 Service Drive
West Leg

WB	1809			
TOTAL	1809		0	LEFT
EB		0	0	THRU
			0	RIGHT

Leg 2: WB I-94 Service Drive
East Leg

RIGHT	70			
THRU	800	975	WB	
LEFT	105		975	TOTAL
		0	EB	

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	579	297	0
250		876	
SB	1126	NB	
	TOTAL		

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2015 AM Peak
7:30 - 8:30

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		675	
	122		554
0	117	5	
RIGHT	THRU	LEFT	

Leg 4: EB I-94 Service Drive
West Leg

WB	0			
TOTAL 685			333	LEFT
EB	685		87	THRU
			265	RIGHT

Leg 2: EB I-94 Service Drive
East Leg

RIGHT	0		
THRU	0	0	WB
LEFT	0		99 TOTAL
		99	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	0	220	7
381		227	
SB	609	NB	
	TOTAL		

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2035 AM Peak

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		850	
	200		650
0	130	70	
RIGHT	THRU	LEFT	

Leg 4: EB I-94 Service Drive
West Leg

WB	0			
TOTAL 1730			407	LEFT
EB	1730		1000	THRU
			323	RIGHT

Leg 2: EB I-94 Service Drive
East Leg

RIGHT			
THRU		0	WB
LEFT			1078 TOTAL
		1078	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	0	243	8
453		251	
SB	704	NB	
	TOTAL		

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2015 PM Peak
4:45 - 5:45

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
Movement	0	160	7

SB	TOTAL	NB
167	959	792

Leg 2: EB I-94 Service Drive
East Leg

	RIGHT	THRU	LEFT
Movement	80	0	0

WB	TOTAL	EB
80	165	84

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Movement	0	629	10

SB	TOTAL	NB
383	1022	639

Leg 4: EB I-94 Service Drive
West Leg

	LEFT	THRU	RIGHT
Movement	83	67	223

WB	TOTAL	EB
0	374	374

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2035 PM Peak

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
Movement	0	175	75

SB	TOTAL	NB
250	1125	875

Leg 2: EB I-94 Service Drive
East Leg

	RIGHT	THRU	LEFT
Movement	0	0	0

WB	TOTAL	EB
0	925	925

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Movement	0	725	60

SB	TOTAL	NB
395	1180	785

Leg 4: EB I-94 Service Drive
West Leg

	LEFT	THRU	RIGHT
Movement	150	790	220

WB	TOTAL	EB
0	1160	1160

MDOT
Michigan Department of Transportation

OFFICE MEMORANDUM

DATE: May 27, 2014

TO: Kyle Kopper, Bridge Design

FROM: Amy Lipset, Asset Management

SUBJECT: TAR #2748A: Trumbull Avenue over I-94, JN 113888D

Traffic Information

The following graphs contain the actual counted traffic information for Trumbull Avenue at the I-94 service drives in Wayne County. Traffic volumes were calculated from hose counts taken in April 2014. A growth rate of 0.5% was used to calculate future traffic volume on all legs except the EB service drive to NB Trumbull and the SB Trumbull to WB service drive movements which were grown at 1% due to the connection to the Henry Ford Health System. If you have any questions regarding this traffic analysis, please contact me at 517.373.2909.

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2015 AM Peak
7:30 - 8:30

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT	
TOTAL			577	
SB / NB		180		397
Movements	58	122	0	

Leg 4: WB I-94 On Ramp
West Leg

WB	212	
TOTAL	212	
EB	0	
LEFT		0
THRU		0
RIGHT		0

Leg 2: Apartment driveway (closed)
East Leg

RIGHT	0	
THRU	0	
LEFT	0	
WB		0
TOTAL		0
EB		0

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Movements	154	397	0
SB / NB	122		551
TOTAL		673	

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2035 AM Peak

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT	
TOTAL			693	
SB / NB		206		487
Movements	72	134	0	

Leg 4: WB I-94 Service Drive
West Leg

WB	242	
TOTAL	242	
EB	0	
LEFT		0
THRU		0
RIGHT		0

Leg 2: Apartment driveway (closed)
East Leg

RIGHT	0	
THRU	0	
LEFT	0	
WB		0
TOTAL		0
EB		0

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Movements	170	487	0
SB / NB	134		657
TOTAL		792	

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2015 PM Peak
4:45 - 5:45

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		740	
	472		268
306	166	0	
RIGHT	THRU	LEFT	

Leg 4: WB I-94 On Ramp
West Leg

WB	830		
TOTAL	830		0 LEFT
EB		0	0 THRU
			0 RIGHT

Leg 2: Apartment driveway (closed)
East Leg

RIGHT	0		
THRU	0	0	WB
LEFT	0		0 TOTAL
		0	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	524	268	0
166		792	
SB	958	NB	
	TOTAL		

Trumbull Ave AT WB I-94 Service Drive

Turn Movement Diagram:

2035 PM Peak

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		855	
	558		297
375	183	0	
RIGHT	THRU	LEFT	

Leg 4: WB I-94 Service Drive
West Leg

WB	954		
TOTAL	954		0 LEFT
EB		0	0 THRU
			0 RIGHT

Leg 2: Apartment driveway (closed)
East Leg

RIGHT	0		
THRU	0	0	WB
LEFT	0		0 TOTAL
		0	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	579	297	0
183		876	
SB	1059	NB	
	TOTAL		

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2015 AM Peak
7:30 - 8:30

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		674	
	122		552
0	117	5	
RIGHT	THRU	LEFT	

Leg 4: EB I-94 Service Drive
West Leg

WB	0		
TOTAL 682		332	LEFT
EB	682	86	THRU
		263	RIGHT

Leg 2: EB I-94 Service Drive
East Leg

RIGHT	0		
THRU	0	0	WB
LEFT	0		99 TOTAL
		99	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	0	220	7
380		227	
SB	607	NB	
	TOTAL		

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2035 AM Peak

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		785	
	134		650
0	129	6	
RIGHT	THRU	LEFT	

Leg 4: EB I-94 Service Drive
West Leg

WB	0		
TOTAL 794		407	LEFT
EB	794	96	THRU
		291	RIGHT

Leg 2: EB I-94 Service Drive
East Leg

RIGHT	0		
THRU	0	0	WB
LEFT	0		109 TOTAL
		109	EB

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	0	243	8
420		251	
SB	671	NB	
	TOTAL		

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2015 PM Peak
4:45 - 5:45

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		948	
	156		792
0	150	6	
RIGHT	THRU	LEFT	

Leg 4: EB I-94 Service Drive
West Leg

WB	0			
TOTAL	374		83	LEFT
EB		374	67	THRU
			223	RIGHT

Leg 2: EB I-94 Service Drive
East Leg

RIGHT	80			
THRU	0	80	WB	
LEFT	0		164	TOTAL
		83	EB	

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	0	629	10
373		639	
SB	1012	NB	
	TOTAL		

Trumbull Ave AT EB I-94 Service Drive

Turn Movement Diagram:

2035 PM Peak

Leg 1: Trumbull Ave
North Leg

	SB	TOTAL	NB
		1058	
	172		886
0	166	7	
RIGHT	THRU	LEFT	

Leg 4: EB I-94 Service Drive
West Leg

WB	0			
TOTAL	423		102	LEFT
EB		423	74	THRU
			247	RIGHT

Leg 2: EB I-94 Service Drive
East Leg

RIGHT	89			
THRU	0	89	WB	
LEFT	0		181	TOTAL
		92	EB	

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
	0	694	11
412		706	
SB	1118	NB	
	TOTAL		

APPENDIX B

PROJECTED TRAFFIC VOLUMES AND SYNCHRO/SIMTRAFFIC SUMMARY

Trumbull Ave at WB I-94 Service Drive
Turn Movement Diagram
2035 AM Peak
7:30 - 8:30 AM

2035 traffic volumes based on existing counts obtained by HNTB on 9/30/14. A growth Rate of 0.5% was used to calculate future year (2035) traffic volume on all legs except the EB service drive to NB Trumbull and SB Trumbull to WB Service drive movements. Traffic volumes were also adjusted for volume balancing.

Intersection

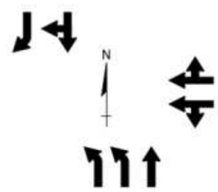
LOS	C
Delay	20.3
V/C Ratio	0.49

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	35	122	n/a
V/C Ratio	0.05	0.22	n/a
Delay	11.7	13.3	n/a
LOS	B	B	n/a
Volume	82	179	n/a

Leg 4: WB I-94 Service Drive
West Leg

	95th Queue	V/C Ratio	Delay	LOS	Volume
LEFT	n/a	n/a	n/a	n/a	n/a
THRU	n/a	n/a	n/a	n/a	n/a
RIGHT	n/a	n/a	n/a	n/a	n/a



Leg 2: WB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	55	D	41.5	0.68	182
THRU	300	D	41.5	0.68	182
LEFT	50	D	41.5	0.68	210

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	286	451	n/a
LOS	C	A	n/a
Delay	21.7	4.7	n/a
V/C Ratio	0.63	0.37	n/a
95th Queue	147	174	n/a

Notes:
1. NB left turn storage length is 250 feet.

Trumbull Ave at EB I-94 Service Drive
Turn Movement Diagram
2035 AM Peak
7:30 - 8:30 AM

Intersection

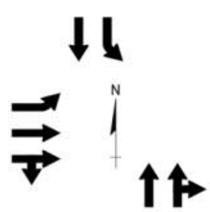
LOS	C
Delay	20.8
V/C Ratio	0.73

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	n/a	138	109
V/C Ratio	n/a	0.38	0.49
Delay	n/a	26.1	45.1
LOS	n/a	C	D
Volume	n/a	154	10

Leg 4: EB I-94 Service Drive
West Leg

	95th Queue	V/C Ratio	Delay	LOS	Volume
LEFT	178	0.38	10.1	B	352
THRU	286	0.82	18.0	B	1000
RIGHT	335	0.82	18.0	B	485



Leg 2: EB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	n/a	n/a	n/a	n/a	n/a
THRU	n/a	n/a	n/a	n/a	n/a
LEFT	n/a	n/a	n/a	n/a	n/a

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	n/a	385	23
LOS	n/a	C	C
Delay	n/a	33.8	33.8
V/C Ratio	n/a	0.53	0.53
95th Queue	n/a	174	170

Notes:
1. SB left turn storage length is 250 feet.

Trumbull Ave at WB I-94 Service Drive
Turn Movement Diagram
2035 PM Peak
4:30 - 5:30 PM

2035 traffic volumes based on existing counts obtained by HNTB on 10/2/14. A growth Rate of 0.5% was used to calculate future year (2035) traffic volume on all legs except the EB service drive to NB Trumbull and SB Trumbull to WB Service drive movements. Traffic volumes were also adjusted for volume balancing.

Intersection

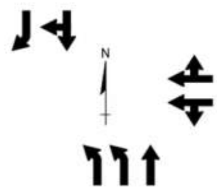
LOS	D
Delay	35.4
V/C Ratio	0.84

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	262	313	n/a
V/C Ratio	0.69	0.80	n/a
Delay	45.5	52.0	n/a
LOS	D	D	n/a
Volume	407	181	n/a

Leg 4: WB I-94 Service Drive
West Leg

95th Queue	V/C Ratio	Delay	LOS	Volume	
n/a	n/a	n/a	n/a	n/a	LEFT
n/a	n/a	n/a	n/a	n/a	THRU
n/a	n/a	n/a	n/a	n/a	RIGHT



Leg 2: WB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	70	D	48.8	0.95	355
THRU	800	D	48.8	0.95	355
LEFT	105	D	48.8	0.95	388

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	704	324	n/a
LOS	B	B	n/a
Delay	12.7	19.7	n/a
V/C Ratio	0.76	0.33	n/a
95th Queue	211	224	n/a

Notes:
1. NB left turn storage length is 250 feet.

Trumbull Ave at EB I-94 Service Drive
Turn Movement Diagram
2035 PM Peak
4:30 - 5:30 PM

Intersection

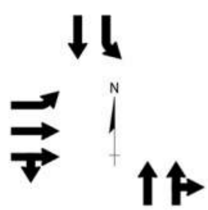
LOS	C
Delay	26.5
V/C Ratio	0.77

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	n/a	132	118
V/C Ratio	n/a	0.30	0.59
Delay	n/a	15.1	16.2
LOS	n/a	B	B
Volume	n/a	205	81

Leg 4: EB I-94 Service Drive
West Leg

95th Queue	V/C Ratio	Delay	LOS	Volume	
165	0.30	17.8	B	201	LEFT
326	0.89	32.5	C	790	THRU
349	0.89	32.5	C	375	RIGHT



Leg 2: EB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	n/a	n/a	n/a	n/a	n/a
THRU	n/a	n/a	n/a	n/a	n/a
LEFT	n/a	n/a	n/a	n/a	n/a

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	n/a	827	18
LOS	n/a	C	C
Delay	n/a	24.1	24.1
V/C Ratio	n/a	0.65	0.65
95th Queue	n/a	268	245

Notes:
1. SB left turn storage length is 250 feet.

Trumbull Ave at WB I-94 Service Drive
Turn Movement Diagram
2035 AM Peak
7:30 - 8:30 AM

2035 traffic volumes from MDOT memo provided to HNTB on 10/17/14. Volumes based on hose counts taken in April 2014 and from data in the I-94 Rehabilitation Project Traffic Report, Volume 3 Addendum: Modifications to the Recommended Alternative, dated August 2004. A growth Rate of 0.5% was used to calculate future year (2035) traffic volume on all legs except the EB service drive to NB Trumbull and SB Trumbull to WB Service drive movements.

Intersection

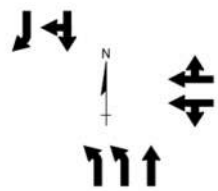
LOS	B
Delay	19.5
V/C Ratio	0.47

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	18	124	n/a
V/C Ratio	0.05	0.17	n/a
Delay	10.4	11.4	n/a
LOS	B	B	n/a
Volume	72	149	n/a

Leg 4: WB I-94 Service Drive
West Leg

	95th Queue	V/C Ratio	Delay	LOS	Volume
LEFT	n/a	n/a	n/a	n/a	n/a
THRU	n/a	n/a	n/a	n/a	n/a
RIGHT	n/a	n/a	n/a	n/a	n/a



Leg 2: WB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	55	D	41.5	0.68	185
THRU	300	D	41.5	0.68	185
LEFT	50	D	41.5	0.68	207

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	179	462	n/a
LOS	C	A	n/a
Delay	21.9	3.2	n/a
V/C Ratio	0.49	0.38	n/a
95th Queue	114	112	n/a

Notes:
1. NB left turn storage length is 250 feet.

Trumbull Ave at EB I-94 Service Drive
Turn Movement Diagram
2035 AM Peak
7:30 - 8:30 AM

Intersection

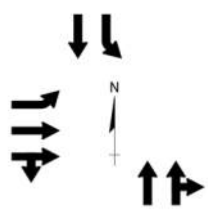
LOS	B
Delay	17.9
V/C Ratio	0.61

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	n/a	116	100
V/C Ratio	n/a	0.29	0.28
Delay	n/a	22.1	34.8
LOS	n/a	C	C
Volume	n/a	130	70

Leg 4: EB I-94 Service Drive
West Leg

	95th Queue	V/C Ratio	Delay	LOS	Volume
LEFT	262	0.46	11.4	B	407
THRU	320	0.76	16.7	B	1000
RIGHT	329	0.76	16.7	B	323



Leg 2: EB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	n/a	n/a	n/a	n/a	n/a
THRU	n/a	n/a	n/a	n/a	n/a
LEFT	n/a	n/a	n/a	n/a	n/a

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	n/a	243	8
LOS	n/a	C	C
Delay	n/a	28.0	28.0
V/C Ratio	n/a	0.29	0.29
95th Queue	n/a	128	102

Notes:
1. SB left turn storage length is 250 feet.

Trumbull Ave at WB I-94 Service Drive
Turn Movement Diagram
2035 PM Peak
4:45 - 5:45 PM

2035 traffic volumes from MDOT memo provided to HNTB on 10/17/14. Volumes based on hose counts taken in April 2014 and from data in the I-94 Rehabilitation Project Traffic Report, Volume 3 Addendum: Modifications to the Recommended Alternative, dated August 2004. A growth Rate of 0.5% was used to calculate future year (2035) traffic volume on all legs except the EB service drive to NB Trumbull and SB Trumbull to WB Service drive movements.

Intersection

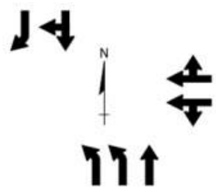
LOS	C
Delay	34.5
V/C Ratio	0.78

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	236	287	n/a
V/C Ratio	0.69	0.79	n/a
Delay	46.6	51.9	n/a
LOS	D	D	n/a
Volume	430	145	n/a

Leg 4: WB I-94 Service Drive
West Leg

	95th Queue	V/C Ratio	Delay	LOS	Volume
LEFT	n/a	n/a	n/a	n/a	n/a
THRU	n/a	n/a	n/a	n/a	n/a
RIGHT	n/a	n/a	n/a	n/a	n/a



Leg 2: WB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	70	D	44.6	0.92	349
THRU	800	D	44.6	0.92	349
LEFT	105	D	44.6	0.92	389

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	579	297	n/a
LOS	B	B	n/a
Delay	11.9	16.3	n/a
V/C Ratio	0.62	0.31	n/a
95th Queue	211	178	n/a

Notes:
1. NB left turn storage length is 250 feet.

Trumbull Ave at EB I-94 Service Drive
Turn Movement Diagram
2035 PM Peak
4:45 - 5:45 PM

Intersection

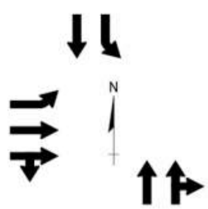
LOS	C
Delay	24.0
V/C Ratio	0.69

Leg 1: Trumbull Ave
North Leg

	RIGHT	THRU	LEFT
95th Queue	n/a	138	93
V/C Ratio	n/a	0.24	0.43
Delay	n/a	15.6	8.4
LOS	n/a	B	A
Volume	n/a	175	75

Leg 4: EB I-94 Service Drive
West Leg

	95th Queue	V/C Ratio	Delay	LOS	Volume
LEFT	129	0.24	18.9	B	150
THRU	319	0.83	30.1	C	790
RIGHT	299	0.83	30.1	C	220



Leg 2: EB I-94 Service Drive
East Leg

	Volume	LOS	Delay	V/C Ratio	95th Queue
RIGHT	n/a	n/a	n/a	n/a	n/a
THRU	n/a	n/a	n/a	n/a	n/a
LEFT	n/a	n/a	n/a	n/a	n/a

Leg 3: Trumbull Ave
South Leg

	LEFT	THRU	RIGHT
Volume	n/a	725	60
LOS	n/a	C	C
Delay	n/a	20.6	20.6
V/C Ratio	n/a	0.57	0.57
95th Queue	n/a	237	216

Notes:
1. SB left turn storage length is 250 feet.

APPENDIX C
SYNCHRO/SIMTRAFFIC
OUTPUT SHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	50	300	55	286	451	0	0	179	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0		4.6	4.6			4.6	4.6
Lane Util. Factor					0.95		0.97	1.00			0.95	0.95
Frt					0.98		1.00	1.00			0.99	0.85
Flt Protected					0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)					3446		3433	1863			1758	1504
Flt Permitted					0.99		0.95	1.00			1.00	1.00
Satd. Flow (perm)					3446		3433	1863			1758	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	54	326	60	311	490	0	0	195	89
RTOR Reduction (vph)	0	0	0	0	16	0	0	0	0	0	1	38
Lane Group Flow (vph)	0	0	0	0	424	0	311	490	0	0	203	42
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)					18.0		14.3	71.4			52.5	52.5
Effective Green, g (s)					18.0		14.3	71.4			52.5	52.5
Actuated g/C Ratio					0.18		0.14	0.71			0.52	0.52
Clearance Time (s)					6.0		4.6	4.6			4.6	4.6
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					620		490	1330			922	789
v/s Ratio Prot							c0.09	c0.26			0.12	
v/s Ratio Perm					0.12							0.03
v/c Ratio					0.68		0.63	0.37			0.22	0.05
Uniform Delay, d1					38.3		40.4	5.5			12.8	11.6
Progression Factor					1.00		0.48	0.72			1.00	1.00
Incremental Delay, d2					3.1		2.3	0.7			0.6	0.1
Delay (s)					41.5		21.7	4.7			13.3	11.7
Level of Service					D		C	A			B	B
Approach Delay (s)		0.0			41.5			11.3			12.9	
Approach LOS		A			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	352	1000	485	0	0	0	0	385	23	75	154	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95						0.95		1.00	1.00	
Frt	1.00	0.95						0.99		1.00	1.00	
Flt Protected	0.95	1.00						1.00		0.95	1.00	
Satd. Flow (prot)	1593	3029						3158		1593	1676	
Flt Permitted	0.95	1.00						1.00		0.38	1.00	
Satd. Flow (perm)	1593	3029						3158		631	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	383	1087	527	0	0	0	0	418	25	82	167	0
RTOR Reduction (vph)	0	59	0	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	383	1555	0	0	0	0	0	439	0	82	167	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)	63.0	63.0						26.4		26.4	26.4	
Effective Green, g (s)	63.0	63.0						26.4		26.4	26.4	
Actuated g/C Ratio	0.63	0.63						0.26		0.26	0.26	
Clearance Time (s)	6.0	6.0						4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0						3.0		3.0	3.0	
Lane Grp Cap (vph)	1003	1908						833		166	442	
v/s Ratio Prot		c0.51						c0.14			0.10	
v/s Ratio Perm	0.24									0.13		
v/c Ratio	0.38	0.82						0.53		0.49	0.38	
Uniform Delay, d1	9.0	14.1						31.5		31.1	30.1	
Progression Factor	1.00	1.00						1.00		1.13	0.79	
Incremental Delay, d2	1.1	4.0						2.4		10.0	2.4	
Delay (s)	10.1	18.0						33.8		45.1	26.1	
Level of Service	B	B						C		D	C	
Approach Delay (s)		16.5			0.0			33.8			32.3	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: Trumbull Ave & I-94 WB Service Drive

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	TR	L	L	T	TR	R
Maximum Queue (ft)	217	178	165	149	221	138	67
Average Queue (ft)	146	105	89	90	92	68	7
95th Queue (ft)	210	182	147	137	174	122	35
Link Distance (ft)	849	849	253	253	253	544	544
Upstream Blk Time (%)					0		
Queuing Penalty (veh)					0		
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Trumbull Ave & I-94 EB Service Drive

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	T	TR	T	TR	L	T
Maximum Queue (ft)	229	332	420	195	194	131	154
Average Queue (ft)	101	188	208	117	97	57	77
95th Queue (ft)	178	286	335	174	170	109	138
Link Distance (ft)	776	776	776	434	434	253	253
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	105	800	70	704	324	0	0	181	407
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0		4.6	4.6			4.6	4.6
Lane Util. Factor					0.95		0.97	1.00			0.95	0.95
Frt					0.99		1.00	1.00			0.94	0.85
Flt Protected					0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)					3482		3433	1863			1661	1504
Flt Permitted					0.99		0.95	1.00			1.00	1.00
Satd. Flow (perm)					3482		3433	1863			1661	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	114	870	76	765	352	0	0	197	442
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	23	64
Lane Group Flow (vph)	0	0	0	0	1055	0	765	352	0	0	311	241
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)					32.0		29.4	57.4			23.4	23.4
Effective Green, g (s)					32.0		29.4	57.4			23.4	23.4
Actuated g/C Ratio					0.32		0.29	0.57			0.23	0.23
Clearance Time (s)					6.0		4.6	4.6			4.6	4.6
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					1114		1009	1069			388	351
v/s Ratio Prot							c0.22	0.19			c0.19	
v/s Ratio Perm					0.30							0.16
v/c Ratio					0.95		0.76	0.33			0.80	0.69
Uniform Delay, d1					33.2		32.1	11.2			36.1	35.0
Progression Factor					1.00		0.32	1.70			1.00	1.00
Incremental Delay, d2					15.7		2.5	0.8			15.9	10.5
Delay (s)					48.8		12.7	19.7			52.0	45.5
Level of Service					D		B	B			D	D
Approach Delay (s)		0.0			48.8			14.9			48.9	
Approach LOS		A			D			B			D	

Intersection Summary			
HCM 2000 Control Delay	35.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	201	790	375	0	0	0	0	827	18	81	205	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95						0.95		1.00	1.00	
Frt	1.00	0.95						1.00		1.00	1.00	
Flt Protected	0.95	1.00						1.00		0.95	1.00	
Satd. Flow (prot)	1593	3031						3175		1593	1676	
Flt Permitted	0.95	1.00						1.00		0.20	1.00	
Satd. Flow (perm)	1593	3031						3175		335	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	859	408	0	0	0	0	899	20	88	223	0
RTOR Reduction (vph)	0	58	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	218	1209	0	0	0	0	0	917	0	88	223	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)	45.0	45.0						44.4		44.4	44.4	
Effective Green, g (s)	45.0	45.0						44.4		44.4	44.4	
Actuated g/C Ratio	0.45	0.45						0.44		0.44	0.44	
Clearance Time (s)	6.0	6.0						4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0						3.0		3.0	3.0	
Lane Grp Cap (vph)	716	1363						1409		148	744	
v/s Ratio Prot		c0.40						c0.29			0.13	
v/s Ratio Perm	0.14									0.26		
v/c Ratio	0.30	0.89						0.65		0.59	0.30	
Uniform Delay, d1	17.5	25.2						21.7		21.0	17.8	
Progression Factor	1.00	1.00						1.00		0.33	0.82	
Incremental Delay, d2	0.2	7.3						2.3		9.4	0.5	
Delay (s)	17.8	32.5						24.1		16.2	15.1	
Level of Service	B	C						C		B	B	
Approach Delay (s)		30.3			0.0			24.1			15.4	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: Trumbull Ave & I-94 WB Service Drive

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	TR	L	L	T	TR	R
Maximum Queue (ft)	419	402	237	218	244	351	306
Average Queue (ft)	281	244	134	126	140	212	142
95th Queue (ft)	388	355	211	197	224	313	262
Link Distance (ft)	849	849	253	253	253	737	737
Upstream Blk Time (%)			0	0	0		
Queuing Penalty (veh)			0	0	1		
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Trumbull Ave & I-94 EB Service Drive

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	T	TR	T	TR	L	T
Maximum Queue (ft)	193	359	404	302	267	141	161
Average Queue (ft)	94	226	240	187	155	58	71
95th Queue (ft)	165	326	349	268	245	118	132
Link Distance (ft)	776	776	776	461	461	253	253
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	50	300	55	179	462	0	0	149	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0		4.6	4.6			4.6	4.6
Lane Util. Factor					0.95		0.97	1.00			0.95	0.95
Frt					0.98		1.00	1.00			0.99	0.85
Flt Protected					0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)					3446		3433	1863			1757	1504
Flt Permitted					0.99		0.95	1.00			1.00	1.00
Satd. Flow (perm)					3446		3433	1863			1757	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	54	326	60	195	502	0	0	162	78
RTOR Reduction (vph)	0	0	0	0	16	0	0	0	0	0	1	31
Lane Group Flow (vph)	0	0	0	0	424	0	195	502	0	0	169	39
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)					18.0		11.5	71.4			55.3	55.3
Effective Green, g (s)					18.0		11.5	71.4			55.3	55.3
Actuated g/C Ratio					0.18		0.12	0.71			0.55	0.55
Clearance Time (s)					6.0		4.6	4.6			4.6	4.6
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					620		394	1330			971	831
v/s Ratio Prot							c0.06	c0.27			0.10	
v/s Ratio Perm					0.12							0.03
v/c Ratio					0.68		0.49	0.38			0.17	0.05
Uniform Delay, d1					38.3		41.5	5.6			11.1	10.3
Progression Factor					1.00		0.50	0.44			1.00	1.00
Incremental Delay, d2					3.1		1.0	0.8			0.4	0.1
Delay (s)					41.5		21.9	3.2			11.4	10.4
Level of Service					D		C	A			B	B
Approach Delay (s)		0.0			41.5			8.4			11.1	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	407	1000	323	0	0	0	0	243	8	70	130	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95						0.95		1.00	1.00	
Frt	1.00	0.96						1.00		1.00	1.00	
Flt Protected	0.95	1.00						1.00		0.95	1.00	
Satd. Flow (prot)	1593	3069						3170		1593	1676	
Flt Permitted	0.95	1.00						1.00		0.55	1.00	
Satd. Flow (perm)	1593	3069						3170		928	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	442	1087	351	0	0	0	0	264	9	76	141	0
RTOR Reduction (vph)	0	34	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	442	1404	0	0	0	0	0	271	0	76	141	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)	60.0	60.0						29.4		29.4	29.4	
Effective Green, g (s)	60.0	60.0						29.4		29.4	29.4	
Actuated g/C Ratio	0.60	0.60						0.29		0.29	0.29	
Clearance Time (s)	6.0	6.0						4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0						3.0		3.0	3.0	
Lane Grp Cap (vph)	955	1841						931		272	492	
v/s Ratio Prot		c0.46						c0.09			0.08	
v/s Ratio Perm	0.28									0.08		
v/c Ratio	0.46	0.76						0.29		0.28	0.29	
Uniform Delay, d1	11.1	14.8						27.3		27.2	27.2	
Progression Factor	1.00	1.00						1.00		1.19	0.76	
Incremental Delay, d2	0.4	1.9						0.8		2.5	1.4	
Delay (s)	11.4	16.7						28.0		34.8	22.1	
Level of Service	B	B						C		C	C	
Approach Delay (s)		15.4			0.0			28.0			26.5	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: Trumbull Ave & I-94 WB Service Drive

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	TR	L	L	T	TR	R
Maximum Queue (ft)	224	204	133	114	153	139	29
Average Queue (ft)	141	98	64	52	53	66	3
95th Queue (ft)	207	185	114	99	112	124	18
Link Distance (ft)	849	849	253	253	253	241	241
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Trumbull Ave & I-94 EB Service Drive

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	T	TR	T	TR	L	T
Maximum Queue (ft)	326	367	358	144	126	123	138
Average Queue (ft)	145	206	206	75	48	49	61
95th Queue (ft)	262	320	329	128	102	100	116
Link Distance (ft)	776	776	776	276	276	253	253
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	105	800	70	579	297	0	0	145	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0		4.6	4.6			4.6	4.6
Lane Util. Factor					0.95		0.97	1.00			0.95	0.95
Frt					0.99		1.00	1.00			0.92	0.85
Flt Protected					0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)					3482		3433	1863			1633	1504
Flt Permitted					0.99		0.95	1.00			1.00	1.00
Satd. Flow (perm)					3482		3433	1863			1633	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	114	870	76	629	323	0	0	158	467
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	36	64
Lane Group Flow (vph)	0	0	0	0	1055	0	629	323	0	0	290	235
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)					32.8		29.4	56.6			22.6	22.6
Effective Green, g (s)					32.8		29.4	56.6			22.6	22.6
Actuated g/C Ratio					0.33		0.29	0.57			0.23	0.23
Clearance Time (s)					6.0		4.6	4.6			4.6	4.6
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					1142		1009	1054			369	339
v/s Ratio Prot							c0.18	0.17			c0.18	
v/s Ratio Perm					0.30							0.16
v/c Ratio					0.92		0.62	0.31			0.79	0.69
Uniform Delay, d1					32.4		30.5	11.4			36.4	35.5
Progression Factor					1.00		0.36	1.37			1.00	1.00
Incremental Delay, d2					12.2		1.0	0.7			15.5	11.1
Delay (s)					44.6		11.9	16.3			51.9	46.6
Level of Service					D		B	B			D	D
Approach Delay (s)		0.0			44.6			13.4			49.4	
Approach LOS		A			D			B			D	

Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	790	220	0	0	0	0	725	60	75	175	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95						0.95		1.00	1.00	
Frt	1.00	0.97						0.99		1.00	1.00	
Flt Protected	0.95	1.00						1.00		0.95	1.00	
Satd. Flow (prot)	1593	3081						3149		1593	1676	
Flt Permitted	0.95	1.00						1.00		0.24	1.00	
Satd. Flow (perm)	1593	3081						3149		404	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	859	239	0	0	0	0	788	65	82	190	0
RTOR Reduction (vph)	0	27	0	0	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	163	1071	0	0	0	0	0	847	0	82	190	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)	42.1	42.1						47.3		47.3	47.3	
Effective Green, g (s)	42.1	42.1						47.3		47.3	47.3	
Actuated g/C Ratio	0.42	0.42						0.47		0.47	0.47	
Clearance Time (s)	6.0	6.0						4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0						3.0		3.0	3.0	
Lane Grp Cap (vph)	670	1297						1489		191	792	
v/s Ratio Prot		c0.35						c0.27			0.11	
v/s Ratio Perm	0.10									0.20		
v/c Ratio	0.24	0.83						0.57		0.43	0.24	
Uniform Delay, d1	18.7	25.7						19.0		17.4	15.7	
Progression Factor	1.00	1.00						1.00		0.26	0.97	
Incremental Delay, d2	0.2	4.4						1.6		4.0	0.3	
Delay (s)	18.9	30.1						20.6		8.4	15.6	
Level of Service	B	C						C		A	B	
Approach Delay (s)		28.7			0.0			20.6			13.4	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: Trumbull Ave & I-94 WB Service Drive

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	TR	L	L	T	TR	R
Maximum Queue (ft)	415	387	244	212	217	258	237
Average Queue (ft)	288	245	137	111	102	214	127
95th Queue (ft)	389	349	211	177	178	287	236
Link Distance (ft)	849	849	253	253	253	241	241
Upstream Blk Time (%)			0	0	0	7	0
Queuing Penalty (veh)			0	0	0	0	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Trumbull Ave & I-94 EB Service Drive

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	T	TR	T	TR	L	T
Maximum Queue (ft)	172	355	327	261	259	120	150
Average Queue (ft)	70	221	205	153	129	44	71
95th Queue (ft)	129	319	299	237	216	93	138
Link Distance (ft)	776	776	776	276	276	253	253
Upstream Blk Time (%)				0	0		
Queuing Penalty (veh)				0	0		
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 0

Introduction

As part of Federal Highway Administration (FHWA) review of the Interstate 94 (I-94) Interstate Access Change Request (IACR) report, concerns were raised by FHWA Resource Center staff regarding the speed data used in the calibration and validation of a microsimulation model of existing conditions. FHWA requested the project team to review additional data, where available, to supplement the HERE data utilized in 2015.

MDOT only had historical speed data in 2012 and 2014 for I-94 WB east of 14th St. The speed data was broken down by day and number of reads grouped within specific speed ranges. The location corresponds to segment #27 of the HERE data in the previous existing Paramics speed summary.

Summary

MDOT data was pulled for specific days in 2012 and 2014 corresponding to field data collection dates. HERE 2-month average hourly speeds and 2-month speed ranges were overlaid on the MDOT data. The following observations were found:

- In general, MDOT speed data indicate faster speeds than HERE data based on the bin data, more so during the PM peak period.
    - AM Peak Period:
        - MDOT bin speed data indicates at least 20% of vehicles travel at speeds between 61-66 mph for all four hours (6-10AM) on Oct 10, 2012
        - MDOT data indicates that vehicles travel at speeds between 71-76 mph for at least three of four hours on the other three dates (Nov. 7 2012, Oct. 8 2014, and Nov. 5 2014)
        - HERE 2-month average speed data averages 55-60 mph for all four hours
        - HERE 2-month data indicate that speeds can degrade to as slow as 31 mph during the AM peak period. This trend is not followed by the MDOT data for any of the four dates:
            - MDOT data indicate that 70-90% of vehicles travel between 51-76 mph during the AM peak period
            - Almost 50% of reported MDOT vehicle speeds (averaged for all four days) are greater than the upper bound of the HERE 2-month speed range during the AM peak period
    - PM Peak Period:
        - MDOT data for Oct 10, 2012 indicates that PM peak period speeds are between 61-66 mph, except for 5-6PM which is closer to 41-51 mph
            - Other three dates indicate that speeds from 5-7PM range from 41-51 mph
        - HERE 2-month average speed data degrade from 2-3PM (48 mph) to 3-4PM (37 mph) to 4-6PM (32-35 mph) and recovers to about 40 mph from 6-7PM
        - HERE 2-month data indicate that hourly speeds can degrade to as slow as 12-17 mph from 5-7PM and 22-23 mph from 2-5PM
            - MDOT data also generally has a wide range of PM peak period speeds (about 30 mph), but nothing slower than 36-41 mph with a significant percentage of the hourly speed

- About 56% of reported MDOT vehicle speeds (averaged for all four days) are greater than the upper bound of the HERE 2-month speed range during the PM peak period

The attached tables summarize the percent of vehicle reads in the 5-mph bins as provided by MDOT. The black boxes and red number indicate the HERE data range and average speeds, respectively.

Conclusion & Recommendation

The project team recommends to not utilize the MDOT speed data for the following reasons:

1) Limited days and only one location is available for comparison
2) A majority of the MDOT detected speeds are faster than HERE data, and that do not align with known congestion
3) The temporal pattern of MDOT speeds detected do not match the pattern of the HERE data.

I-94 WB east of 14th St (HERE Segment #27)

October 10, 2012 (Eqv PM Data Collection Date)

Hour	MDOT Speed Range (MPH)															
	0-21	21-26	26-31	31-36	36-41	41-46	46-51	51-56	56-61	61-66	66-71	71-76	76-81	81-86	86-91	91-100
12:00 AM	0%	0%	0%	0%	0%	0%	1%	6%	14%	25%	16%	25%	7%	4%	1%	1%
1:00 AM	0%	0%	0%	0%	0%	0%	1%	6%	14%	28%	17%	24%	5%	3%	1%	1%
2:00 AM	0%	0%	0%	0%	0%	0%	2%	6%	15%	25%	17%	23%	6%	3%	2%	1%
3:00 AM	0%	0%	0%	0%	0%	0%	2%	7%	13%	21%	16%	26%	8%	4%	3%	1%
4:00 AM	0%	0%	0%	0%	0%	0%	1%	6%	12%	25%	18%	24%	7%	5%	2%	1%
5:00 AM	0%	0%	0%	0%	0%	0%	1%	7%	14%	23%	19%	23%	7%	3%	1%	0%
6:00 AM	0%	0%	0%	0%	0%	0%	3%	12%	***15%***	26%	18%	20%	4%	1%	0%	0%
7:00 AM	0%	0%	0%	0%	0%	1%	7%	17%	***18%***	24%	18%	12%	1%	0%	0%	0%
8:00 AM	0%	0%	0%	0%	1%	2%	8%	***15%***	16%	22%	18%	15%	4%	1%	0%	1%
9:00 AM	0%	0%	0%	0%	0%	1%	6%	16%	***16%***	21%	16%	18%	5%	1%	0%	0%
10:00 AM	0%	0%	0%	1%	2%	3%	6%	14%	15%	19%	15%	17%	5%	2%	0%	0%
11:00 AM	0%	0%	0%	0%	0%	1%	5%	15%	16%	21%	14%	21%	6%	2%	0%	1%
12:00 PM	0%	0%	0%	0%	0%	1%	4%	16%	18%	22%	15%	17%	4%	1%	0%	0%
1:00 PM	0%	0%	0%	0%	0%	0%	4%	15%	17%	24%	17%	18%	4%	1%	0%	0%
2:00 PM	0%	0%	0%	0%	0%	1%	***5%***	15%	18%	22%	15%	19%	5%	1%	0%	0%
3:00 PM	0%	0%	0%	0%	***0%***	2%	9%	16%	19%	22%	15%	13%	3%	1%	0%	0%
4:00 PM	0%	0%	1%	***4%***	7%	11%	12%	15%	12%	15%	11%	9%	2%	0%	0%	0%
5:00 PM	0%	0%	0%	***4%***	10%	20%	19%	17%	10%	8%	6%	4%	0%	0%	0%	1%
6:00 PM	0%	0%	0%	0%	***0%***	1%	5%	15%	18%	23%	18%	15%	3%	1%	0%	0%
7:00 PM	0%	0%	0%	0%	0%	0%	5%	13%	17%	22%	16%	20%	5%	1%	0%	0%
8:00 PM	0%	0%	0%	0%	0%	1%	4%	12%	17%	22%	16%	20%	4%	1%	1%	1%
9:00 PM	0%	0%	0%	0%	0%	0%	3%	11%	18%	24%	15%	21%	4%	2%	0%	1%
10:00 PM	0%	0%	0%	0%	0%	0%	2%	10%	17%	25%	17%	20%	6%	2%	1%	0%
11:00 PM	0%	0%	0%	0%	0%	0%	1%	8%	15%	25%	15%	24%	8%	3%	1%	1%

Legend

- HERE 2 Month Speed Average (Oct-Nov 2014)

\# - HERE 2 Month Speed Range (Oct-Nov 2014)

Version 2 10/3/2018

I-94 WB east of 14th St (HERE Segment #27)

November 7, 2012 (Eqv AM Data Collection Date)

Hour	MDOT Speed Range (MPH)															
	0-21	21-26	26-31	31-36	36-41	41-46	46-51	51-56	56-61	61-66	66-71	71-76	76-81	81-86	86-91	91-100
12:00 AM	0%	0%	0%	0%	0%	0%	1%	8%	15%	24%	14%	24%	7%	4%	2%	1%
1:00 AM	0%	0%	0%	0%	0%	0%	1%	7%	15%	22%	16%	22%	8%	5%	2%	1%
2:00 AM	0%	0%	0%	0%	0%	0%	2%	6%	16%	27%	17%	21%	7%	4%	2%	1%
3:00 AM	0%	0%	0%	0%	0%	0%	2%	6%	15%	23%	15%	26%	5%	4%	2%	2%
4:00 AM	0%	0%	0%	0%	0%	0%	0%	5%	14%	23%	14%	25%	8%	4%	2%	4%
5:00 AM	0%	0%	0%	0%	0%	0%	1%	4%	13%	20%	17%	29%	9%	4%	1%	1%
6:00 AM	0%	0%	0%	0%	0%	0%	0%	3%	*9%*	15%	12%	32%	16%	10%	2%	1%
7:00 AM	0%	0%	0%	0%	0%	0%	0%	6%	*12%*	18%	15%	30%	12%	5%	1%	0%
8:00 AM	0%	0%	0%	0%	0%	1%	3%	*10%*	14%	19%	14%	24%	9%	4%	1%	0%
9:00 AM	0%	0%	0%	0%	0%	1%	5%	13%	*16%*	19%	14%	21%	7%	2%	1%	1%
10:00 AM	0%	0%	0%	0%	0%	1%	6%	15%	16%	19%	12%	20%	6%	2%	0%	0%
11:00 AM	0%	0%	0%	0%	0%	1%	6%	15%	16%	20%	14%	18%	6%	2%	0%	1%
12:00 PM	0%	0%	0%	0%	1%	1%	6%	12%	19%	20%	15%	17%	6%	2%	0%	1%
1:00 PM	0%	0%	0%	0%	0%	1%	8%	16%	19%	21%	15%	15%	4%	1%	0%	0%
2:00 PM	0%	0%	0%	1%	1%	2%	*10%*	16%	17%	20%	14%	15%	4%	1%	0%	1%
3:00 PM	0%	0%	0%	2%	*4%*	7%	13%	16%	15%	16%	13%	10%	2%	1%	0%	2%
4:00 PM	0%	0%	0%	*3%*	9%	17%	20%	16%	12%	9%	6%	4%	1%	1%	1%	1%
5:00 PM	0%	0%	1%	*6%*	18%	28%	27%	13%	3%	1%	0%	1%	1%	1%	1%	1%
6:00 PM	0%	0%	1%	8%	*20%*	29%	24%	9%	2%	1%	1%	2%	1%	1%	0%	0%
7:00 PM	0%	0%	1%	6%	14%	19%	18%	9%	6%	7%	6%	6%	3%	2%	1%	3%
8:00 PM	0%	0%	0%	0%	0%	1%	7%	15%	17%	21%	14%	17%	4%	1%	1%	1%
9:00 PM	0%	0%	0%	0%	0%	1%	4%	11%	17%	25%	16%	18%	5%	2%	0%	0%
10:00 PM	0%	0%	0%	0%	0%	0%	4%	13%	16%	23%	16%	18%	5%	3%	1%	0%
11:00 PM	0%	0%	0%	0%	0%	0%	1%	8%	15%	24%	15%	25%	8%	3%	1%	1%

Legend

(red box) - HERE 2 Month Speed Average (Oct-Nov 2014)

(black box) - HERE 2 Month Speed Range (Oct-Nov 2014)

I-94 WB east of 14th St (HERE Segment #27)

October 8, 2014 (PM Data Collection Date)

Hour	MDOT Speed Range (MPH)															
	0-21	21-26	26-31	31-36	36-41	41-46	46-51	51-56	56-61	61-66	66-71	71-76	76-81	81-86	86-91	91-100
12:00 AM	0%	0%	0%	0%	0%	0%	1%	7%	16%	24%	16%	24%	8%	3%	1%	1%
1:00 AM	0%	0%	0%	0%	0%	0%	1%	7%	16%	23%	18%	24%	6%	3%	1%	1%
2:00 AM	0%	0%	0%	0%	0%	0%	2%	9%	15%	27%	16%	22%	5%	2%	1%	1%
3:00 AM	0%	0%	0%	0%	0%	0%	1%	4%	13%	30%	13%	26%	7%	4%	1%	0%
4:00 AM	0%	0%	0%	0%	0%	0%	1%	5%	12%	24%	14%	28%	8%	6%	2%	1%
5:00 AM	1%	0%	0%	0%	0%	0%	0%	3%	8%	19%	15%	32%	11%	8%	3%	1%
6:00 AM	0%	0%	0%	0%	0%	0%	0%	3%	***8%***	17%	13%	30%	17%	9%	2%	1%
7:00 AM	0%	0%	0%	0%	0%	0%	2%	9%	***13%***	20%	16%	27%	8%	3%	0%	0%
8:00 AM	0%	0%	0%	0%	0%	2%	5%	***14%***	15%	19%	17%	19%	5%	2%	0%	0%
9:00 AM	0%	0%	0%	0%	1%	2%	7%	14%	***13%***	20%	16%	19%	6%	1%	0%	0%
10:00 AM	1%	0%	0%	0%	0%	2%	7%	15%	17%	19%	15%	16%	5%	1%	0%	0%
11:00 AM	1%	0%	0%	0%	0%	1%	6%	17%	16%	20%	15%	17%	5%	2%	0%	0%
12:00 PM	1%	0%	0%	0%	0%	1%	6%	16%	16%	20%	15%	17%	5%	1%	0%	0%
1:00 PM	1%	0%	0%	0%	0%	2%	7%	16%	17%	20%	15%	16%	5%	1%	0%	0%
2:00 PM	1%	0%	0%	0%	1%	2%	***7%***	15%	17%	21%	15%	16%	3%	1%	0%	1%
3:00 PM	1%	0%	0%	1%	***3%***	7%	12%	19%	16%	16%	11%	9%	2%	1%	0%	1%
4:00 PM	1%	0%	0%	***2%***	8%	18%	21%	20%	13%	8%	4%	2%	1%	0%	0%	1%
5:00 PM	1%	0%	0%	***2%***	10%	18%	19%	18%	11%	10%	6%	4%	1%	0%	0%	0%
6:00 PM	0%	0%	0%	3%	***13%***	25%	24%	14%	6%	5%	3%	3%	1%	1%	0%	2%
7:00 PM	1%	0%	0%	3%	9%	19%	19%	14%	10%	9%	6%	7%	2%	1%	0%	1%
8:00 PM	0%	0%	0%	0%	0%	2%	7%	16%	17%	20%	14%	17%	4%	1%	0%	1%
9:00 PM	0%	0%	0%	0%	1%	2%	5%	12%	17%	23%	15%	17%	4%	1%	0%	0%
10:00 PM	0%	0%	0%	0%	0%	0%	3%	14%	18%	24%	15%	17%	5%	1%	0%	1%
11:00 PM	0%	0%	0%	0%	0%	0%	2%	9%	16%	26%	16%	20%	7%	2%	1%	0%

Legend

- ***#*** (red box) - HERE 2 Month Speed Average (Oct-Nov 2014)
- # (black box) - HERE 2 Month Speed Range (Oct-Nov 2014)

I-94 WB east of 14th St (HERE Segment #27)

November 5, 2014 (AM Data Collection Date)

Hour	MDOT Speed Range (MPH)															
	0-21	21-26	26-31	31-36	36-41	41-46	46-51	51-56	56-61	61-66	66-71	71-76	76-81	81-86	86-91	91-100
12:00 AM	0%	0%	0%	0%	0%	0%	2%	8%	17%	23%	16%	22%	7%	3%	1%	1%
1:00 AM	0%	0%	0%	0%	0%	0%	1%	5%	10%	26%	21%	24%	7%	4%	1%	1%
2:00 AM	0%	0%	0%	0%	0%	0%	2%	8%	15%	24%	15%	23%	6%	3%	2%	1%
3:00 AM	0%	0%	0%	0%	0%	0%	2%	6%	12%	24%	18%	25%	6%	3%	0%	3%
4:00 AM	1%	0%	0%	0%	0%	0%	1%	6%	15%	23%	16%	25%	8%	5%	1%	0%
5:00 AM	0%	0%	0%	0%	0%	0%	0%	3%	9%	20%	16%	31%	11%	7%	1%	1%
6:00 AM	0%	0%	0%	0%	0%	0%	0%	3%	*8%*	19%	15%	30%	14%	8%	2%	0%
7:00 AM	0%	0%	0%	0%	0%	0%	2%	9%	*14%*	20%	17%	26%	9%	2%	0%	0%
8:00 AM	0%	0%	0%	0%	0%	1%	6%	*12%*	15%	20%	16%	22%	6%	1%	0%	0%
9:00 AM	1%	0%	0%	0%	0%	2%	8%	15%	*16%*	17%	15%	18%	6%	2%	0%	0%
10:00 AM	1%	0%	0%	0%	0%	2%	9%	16%	16%	19%	15%	16%	5%	1%	0%	0%
11:00 AM	1%	0%	0%	0%	0%	1%	6%	17%	16%	20%	13%	17%	5%	2%	0%	1%
12:00 PM	1%	0%	0%	0%	0%	2%	9%	17%	16%	20%	15%	15%	4%	1%	0%	0%
1:00 PM	1%	1%	2%	6%	7%	7%	10%	13%	12%	15%	11%	10%	3%	1%	0%	1%
2:00 PM	1%	0%	0%	0%	1%	3%	*9%*	17%	16%	20%	13%	14%	3%	1%	0%	0%
3:00 PM	1%	0%	0%	1%	*7%*	15%	18%	18%	13%	10%	6%	7%	2%	2%	0%	0%
4:00 PM	1%	0%	0%	*4%*	15%	28%	27%	16%	6%	2%	1%	0%	0%	1%	0%	1%
5:00 PM	1%	0%	0%	*1%*	5%	13%	20%	19%	13%	13%	7%	5%	1%	0%	0%	1%
6:00 PM	1%	0%	2%	5%	*14%*	24%	21%	12%	3%	2%	2%	3%	2%	3%	1%	4%
7:00 PM	1%	0%	0%	4%	15%	22%	21%	13%	7%	6%	4%	4%	1%	1%	0%	1%
8:00 PM	0%	0%	0%	0%	0%	1%	8%	15%	17%	20%	15%	16%	5%	2%	0%	0%
9:00 PM	1%	0%	0%	0%	0%	0%	3%	11%	19%	23%	16%	18%	5%	2%	1%	1%
10:00 PM	0%	0%	0%	0%	0%	0%	2%	11%	16%	25%	15%	20%	6%	2%	1%	0%
11:00 PM	1%	0%	0%	0%	0%	0%	1%	8%	16%	23%	16%	22%	8%	3%	1%	1%

Legend

- HERE 2 Month Speed Average (Oct-Nov 2014)

- HERE 2 Month Speed Range (Oct-Nov 2014)

Version 2 10/3/2018

Roadway Design Criteria for the I-94 Detailed Engineering Report, I-96 to Conner Avenue, City of Detroit (CS 82024 – JN 32587)

Introduction and Organization

This document compiles the proposed roadway design criteria and cross-sectional elements for the I-94 Detroit Detailed Engineering Report. This criterion will be used to advance the design of the Recommended Alternative of the I-94 corridor, from I-96 to Conner Avenue in Detroit, as presented in the approved Final Environmental Impact Statement (FEIS) and Access Justification report (AJR).

1. Design Criteria Discussion Issues

During the review of the FEIS, AJR and its associated documents, CH2M HILL has determined that some design elements could be modified from current direction and tailored to provide flexibility to the project design, or incorporated to achieve project cost savings.

A. Variations from the AJR

There are several cross-sectional items that we would like to modify in order to meet current MDOT design criteria. We are requesting the following modifications to the AJR criteria.

A.1 Superelevation Rate

The CH2M HILL team concurs with Traffic and Safety (T&S) that 6% superelevation is desirable due to it facilitating higher posted speeds in the future. We propose to maintain the recommendation from the AJR to use 6% and only use the 5% as a minimum in case of tight constraints prohibiting the use of 6%.

A.2 System Interchange Ramp Cross Section

The CH2M HILL team has reviewed the recommended alternative which indicates 12′ ramp lanes with 8′ left & right shoulders for both the single and two lane ramps within the system interchanges to support the design. The design criteria within the AJR show 16′ lane widths for single lane ramps and 12′ lane widths for two lane ramps. The AJR criteria also proposes shoulder widths of 8-12′ depending on sight distance. The CH2M HILL team is proposing to utilize the criteria specified in the AJR for lane widths recognizing this could have an impact to the system interchange alignments. The proposing minimums for ramp shoulder widths are 6′ for the left side and 8′ for the right side for the two lane ramps and 8′ for left and right sides for single lane ramps. Increasing the left shoulder width from 8′ to 12′ for sight distance consideration was evaluated but not utilized because it would add additional cost to the project and still not satisfy the sight distance requirements for the ramp geometry.

A.3 Service Drive Cross Section

The CH2M HILL team has recommended a shed section (a unidirectional cross-slope) for the service drives, which has both lanes and shoulder at 2% sloping in the same direction down towards the ROW. The following are some advantages of implementing these changes:

- Will consolidate the need for drainage structures to one side of the roadway realizing cost savings..
- Match better with the grading/profile of the crossroads.
- Reduce the number of superelevation transitions and points of 0% cross slope.
- Reduce the number of utility conflicts by not having to transition the drainage trunk line or installing cross leads to the other side of the roadway.
- Make it easier to construction and maintain traffic by reducing the number of drainage crossings.

Where horizontal curves are used which would normally require superelevation per MDOT standards (radius of 3150' or less for a 30 mph design speed), the "adverse" crown will be removed (i.e. the pavement must be sloped at 1% to 2% in the direction of the curve).

B. Exceptions to Current MDOT Practices

The following items vary from standard MDOT practice. They are, however, well within the realm of proper design per AASHTO. CH2M HILL would like to propose the incorporation of the following design elements:

B.1 I-94 Mainline Point of Rotation (POR) Location

Per MDOT guidelines for a six-lane divided freeway, the POR is located on the inside edge of the median through lane. MDOT does not have a standard plan for an eight-lane divided freeway; however, the following has been the general MDOT practice for freeways greater than the six-lane divided section: to minimize superelevation transition lengths, facilitate drainage across lanes and not exceed AASHTO criteria for maximum relative gradient, the crown point and POR is proposed to be located in the middle of each roadbed (between the 2^{nd} and 3^{rd} through lanes).

B.2 Cross slope for freeway auxiliary lanes

The general MDOT practice is to maintain the mainline 2% cross slope across the freeway auxiliary lanes. Many jurisdictions allow steeper cross-slopes for auxiliary lanes (up to 3%) in order to provide better cross-drainage. For this project, this also provides more flexibility to achieve required underclearances. The CH2M HILL team will use 2% cross slope for all freeway and auxiliary lanes recognizing any variance will require an MDOT design exception even if it falls within AASHTO criteria.

B.3 Right shoulder width at auxiliary lanes

Per MDOT Geometric Guideline, accel/decel lanes are not considered to be "auxiliary" lanes in the sense that AASHTO does. As such, the full mainline freeway shoulder width should be provided adjacent to the accel/decel lanes.

Per FHWA guidelines, an auxiliary lane greater than one mile in length is considered to be a through lane; therefore, all auxiliary lanes must be one mile or less in length to be considered as such.

The CH2M HILL team's approach will be to only use 8′ minimum right shoulder width along auxiliary lanes in areas where the auxiliary lane is less than one mile in length and where limited ROW is available to provide the full 12′ shoulder width.

C. Retaining Walls Considerations

C.1 Shortened Retaining Walls

The CH2M HILL team recognizes that the optional tiered wall concept presented in the FEIS was only used to break up the overall wall height. We understand that the public was informed during the FEIS that plantings are not feasible on these tiers, so this wall type has been removed from further study. For the shortened wall option with fill slopes, further consideration will be given for maintenance of the slope and providing positive separation from the service road and the slope.

2. Roadway Design Criteria Tables

The following tables show the proposed project Roadway Design Criteria. Tables for Freeway, Ramp, Service Drive and Local Crossroads are included.

List of Design Criteria References

AASHTO 2004, Policy on Highways and Streets

AJR – I-94 Access Justification Report, 2005

Roadside Design Guide 2002

MDOT Road Design Manual

MDOT Standard Plans

R-28-F	Sidewalk Ramp and Warning Details
R-29-E	Driveway Opening & Approaches
R-30-E	Concrete Curb and Concrete Curb & Gutter
R-33-F	Concrete Valley Gutter & Urban Freeway Curb
R-49-F	Concrete Barrier
R-98-B	Chain Link Fence
R-107-G	Superelevation and Pavement Crowns

MDOT Geometric Design Guides

GEO-110-C	Two Lane Entrance Ramp
GEO-120-C	Successive Entrance Ramps
VII-202A	12′ Width Urban Entrance and Exit Slip Ramps
VII-205	16′ Width Urban Exit Ramp
VII-240A	Urban Two-Lane Exit Ramps
VII-400A	Urban Diamond Interchange
VII-650C	Flares and Intersection Details
GEO-680-A	Commercial Driveways

Applicable for FREEWAYS

Item		Reference	I-94, I-75, M-10 Mainline
General Elements			
Roadway Classification		AASHTO 2004, p. 513	Freeway, Urban
Design Speed (mph)		Interstate Guidelines pg. 2, MDOT 3.11.03A RDM, AASHTO p. 68, p.503	60
Stopping Sight Distance (ft)		AASHTO 2004 Ex. 3-1 p. 112	570
Cross-Sectional Elements			
General			
Existing Number of Through Lanes		N/A	3
Proposed Number of Through Lanes		N/A	4
Lane Widths (ft)		Interstate Guidelines pg. 4, MDOT RDM Appendix 3A	12
Normal Cross Slope (%)		AASHTO 2004 pg 143, MDOT RDM Appendix 3-A	2
Normal Shoulder Slope (%)		MDOT RDM 6.05.04, MDOT RDM 3.11.03.I	4.00
Maximum Rollover of Shoulder (%)		MDOT SD R-107-G	6(1)
Clear Zone Distance (ft)		RDG 3-6 (Table 3.1), MDOT 7.01.11 RDM	1:6 fill: 30; 1:5,1:4 fill: 36; 1:6 cut: 26 ; 1:5,1:4 cut: 24; 1:3 cut: 20
Backslope		MDOT 2.03.01 RDM	Des: 1:4; Max: 1:2
Foreslope		MDOT 2.03.01 RDM	Des: 1:6; Max: 1:2
Shoulder Width (ft)	Left	MDOT RDM 6.05.04.C,AASHTO 2004 pgs. 314-315	Min: 12
	Right	MDOT RDM 6.05.04.C,AASHTO 2004 pgs. 314-315	12
	Auxillary(2)	MDOT RDM 6.05.04.C,AASHTO 2004 pgs. 314-315	Des: 12, Min: 8
Horizontal Clearance		AASHTO 2004, p. 507	Des. width = normal shoulder width + 2' Min. width = normal shoulder width
Curb and Gutter (Type & Width)	Left	MDOT 6.06.10 RDM, MDOT SP R-33-F, R-49-F, R-76-D	Conc. Valley & Gutter (4.0') adjacent to concrete median barrier w/ glare screen
	Right	MDOT 6.06.10 RDM, MDOT SP R-33-F	Type G2 at back of shoulder adjacent to C/F section, or ret. wall
Horizontal Alignment			
Minimum Radius (ft)		MDOT RDM 3.04.03 MDOT SP R-107-G	1333 1412
Compound Circular Curve Ratio		AASHTO 2004 p. 164	2:1
Middle Ordinate for HSD (ft)		AASHTO 2004, p. 227	$HSO = R\left[\left(1 - \cos\frac{28.65 * S}{R}\right)\right]$
Maximum Superelevation (%)		MDOT RDM 3.04.03 MDOT SD R-107-G	6% (des.) 5% (min.)(3)
Vertical Alignment			
Max. Longitudinal Grade(%)		AASHTO 2004 p. 506 exh. 8-1, MDOT 2.02.01 RDM	4
Min. Longitudinal Grade(%)		AASHTO 2004 pg. 236, MDOT 2.02.01 RDM, MDOT RDM Appendix 3A	Curbed: 0.3 (min), 0.5 (des. min.)
Min. length of curve (ft)		AASHTO 2004, p. 269, MDOT RDM 2.02.02	180
Design Curve K-Value (Crest)		AASHTO 2004 Exh. 3-72 p. 272	151
Design Curve K-Value (Sag)		AASHTO 2004 Exh. 3-75 p. 277	136
Min. Vertical Clearance Freeway (over) (ft)		MDOT 3.12 RDM, MDOT 7.01.08 BDM	**Special Route** Des: 14'9" Min: 14'6"
Min. Vertical Clearance Freeway (under) (ft)		MDOT 3.12 RDM, MDOT 7.01.08 BDM	**Special Route** Des: 14'9" Min: 14'6"

(1) Any shoulder rollover break greater than 6% will require an MDOT design exception. AASHTO allows an 8% maximum shoulder rollover break.
(2) A auxiliary lane must be <= 1.0 mile in length

(3) 6% will be used wherever possible, 5% will be used as a min. in case there are areas of 6% that are problematic due to transition length or placement and underclearance.

Applicable for RAMPS

Item		Reference		
General Elements				
Roadway Classification		AASHTO 2004	System Interchange Ramp	Slip Ramp
Design Speed (mph)		MDOT 3.07.02 RDM, AASHTO 2004 Exh. 10-56, AASHTO 2004 p.826	40	45 mph min at Mainline Intersection 30 mph min at Serv Dr Intersection
Stopping Sight Distance (ft)		AASHTO 2004, Ex. 3-1, p. 112	360	360
Acceleration/Deceleration Lengths		GDG	VII-202, VII205, VII-240	VII-202, VII205, VII-240
Ramp Terminal Spacing		AJR	varies, see AJR	varies, see AJR
Shoulder Width Transition Rate		GDG	1:15 min, 1:25 des	1:15 min, 1:25 des
Cross-Sectional Elements				
General				
Lane Widths (ft)		2004 AASHTO, Ramp Traveled-Way Widths, pp. 842-843, Exhibit 10-67 Typical	1 lane: 16' 2: lane 24'	1 lane: 12' (if slip ramp, otherwise 16')
Cross Slope (%)		AASHTO 2004 pg 143, MDOT RDM Appendix 3-A	2.00	2.00
Normal Shoulder Slope (%)		MDOT RDM Appendix 3-A	4.00	4.00
Maximum Rollover of Shoulder (%)		MDOT SD R-107-G	6.00	6.00
Clear Zone Distance (ft)		RDG 3-6 (Table 3.1) MDOT 7.01.11 RDM	1:6 fill: 20; 1:5,1:4 fill: 24; 1:6 cut: 20 ; 1:5,1:4 cut: 18; 1:3 cut: 15	1:6 fill: 20; 1:5,1:4 fill: 24; 1:6 cut: 20 ; 1:5,1:4 cut: 18; 1:3 cut: 16
Backslope		MDOT 2.03.01 RDM, MDOT R 105-D	Des: 1 on 4 Max: 1 on 3	Des: 1 on 4 Max: 1 on 3
Foreslope		MDOT 2.03.01 RDM, MDOT R-105-D	Des: 1 on 6 Max: 1 on 2	Des: 1 on 6 Max: 1 on 2
Shoulder Width (ft)	Left	AASHTO 2004, p. 839-840, MDOT RDM Appendix 6-A	6-12 ft dep on sight dist	1 lane: 0 (curb)
	Right	AASHTO 2004, p. 839-840, MDOT RDM Appendix 6-A	8-12 ft dep on sight dist	1 lane: 5 (slip ramp only)
Horizontal Clearance		AASHTO 2004, p. 838-840	Min. width = normal shoulder width	Min. width = normal shoulder width
Curb and Gutter	Left	MDOT RDM Appendix 6-A, MDOT R-30-E	Curb Type D or Valley Gutter, Conc	Curb and Gutter, Type D
	Right	MDOT RDM Appendix 6-A, MDOT R-30-E	Curb Type G or Valley Gutter, Conc	Curb and Gutter, Type G1
Horizontal Alignment				
Minimum Radius (ft)		MDOT RDM 3.04.03 MDOT SP R-107-G	643	643
Compound Circular Curve Ratio		AASHTO 2004 p. 164	2:1	2:1
Middle Ordinate for HSD (ft)		AASHTO 2004, p. 227	$HSO = R\left[\left(1-\cos\frac{28.65*S}{R}\right)\right]$	$HSO = R\left[\left(1-\cos\frac{28.65*S}{R}\right)\right]$
Maximum Superelevation (%)		MDOT RDM 3.04.03 MDOT SD R-107-G	6 (Note: All Loop Ramps use 7%)	6 (Note: All Loop Ramps use 7%)
Vertical Alignment				
Max. Longitudinal Grade(%)		AASHTO 2004 p. 829, MDOT 2.02.01 RDM	5	5
Min. Longitudinal Grade(%)		AASHTO 2004 pg. 236, MDOT 2.02.01 RDM, MDOT RDM Appendix 3A	Curbed: 0.3 (min), 0.5 (des. min.)	Curbed: 0.3 (min), 0.5 (des. min.)
Min. length of curve (ft)		AASHTO 2004, p. 269, MDOT RDM 2.02.02	135	135
Design Curve K-Value (Crest)		AASHTO 2004 Exh. 3-72 p. 272	61	61
Design Curve K-Value (Sag)		AASHTO 2004 Exh. 3-75 p. 277	79	79
Min. Vertical Clearance Ramp (over) (ft)		MDOT 3.12 RDM, MDOT 7.01.08 BDM	**Special Route** Des: 14'9" Min: 14'6"	**Special Route** Des: 14'9" Min: 14'6"
Min. Vertical Clearance Ramp (under) (ft)		MDOT 3.12 RDM, MDOT 7.01.08 BDM	**Special Route** Des: 14'9" Min: 14'6"	**Special Route** Des: 14'9" Min: 14'6"

*These are median values for ramp design speed from AASHTO guidelines. Each ramp will have its own design speed established, with the minimums listed as a starting point.

Applicable for SERVICE DRIVES

Item		Reference	Service Drives
General Elements			
Roadway Classification		AASHTO 2004, p. 419	Urban Collector
Design Speed (mph)		AASHTO 2004, p. 430	30
Stopping Sight Distance (ft)		AASHTO 2004, Ex. 3-1, p. 112	200
Design Vehicle		*Type of Intersection:* Trunkline (M-1, M-3, M-53) Collectors (Linwood, Mt. Elliot, East Grand Blvd., Conner) All other local intersections	 WB-62 WB-50 BUS
Intesection Sight Distance		Signalized (AASHTO 2004, p. 671)	First vehicle stopped on approaches (Stop Bar) Left/Right Turns ISD = 355
		All-way Stop (AASHTO 2004, p. 674)	First vehicle stopped on approaches (Stop Bar)
Cross-Sectional Elements			
General			
Lane Widths (ft)		AASHTO 2004, p. 433, MDOT RDM Appendix 3-A	11
Cross Slope (%)		AASHTO 2004 pg 143, MDOT RDM Appendix 3-A	2.00
Normal Shoulder Slope (%)		MDOT RDM Appendix 3-A	2.00 (utilized as multiuse lane for non-motorized/transit traffic)
Maximum Rollover of Shoulder (%)		MDOT SD R-107-G	6.00
Shoulder Width (ft)	Left	MDOT RDM 6.05.04C, AJR, AASHTO 2004, p. 433	0 (curb)
	Right	MDOT RDM 6.05.04C, AJR, AASHTO 2004, p. 434	8
Curb and Gutter (Type & Width)		MDOT 6.06.09 RDM, MDOT R-30-E, AJR	Curb Type F3, 2.0
Sidewalk Width - Min (ft)		AJR	6
Horizontal Clearance (ft)		AASHTO 2004, p. 437	1.5' min, 2' des. (beyond face of curb)
Horizontal Alignment			
Minimum Radius (ft)		AASHTO 2004, Exh. 3-16 , p. 151	thomas
Compound Circular Curve Ratio		AASHTO 2004 p. 164	2:1
Middle Ordinate for HSD (ft)		AASHTO 2004, p. 227	$HSO = R\left[\left(1 - \cos\frac{28.65 * S}{R}\right)\right]$
Maximum Superelevation (%)		MDOT SD R-107-G	2.00
Vertical Alignment			
Max. Longitudinal Grade(%)		AASHTO 2004, Exh. 6-8 p. 432, MDOT RDM Appendix 3-A	9
Min. Longitudinal Grade(%)		AASHTO 2004 pg. 236, MDOT 2.02.01 RDM, MDOT RDM Appendix 3A	Curbed: 0.3 (min), 0.5 (des. min.)
Min. length of curve (ft)		AASHTO 2004, p. 269, MDOT RDM 2.02.02	90
Design Curve K-Value (Crest)		AASHTO 2004 Exh. 3-72 p. 272	19
Design Curve K-Value (Sag)		AASHTO 2004 Exh. 3-75 p. 277	37
Min. Vertical Clearance Side Road/Service Drive (over) (ft)		MDOT 3.12 RDM, MDOT 7.01.08 BDM	**Special Route** Des: 14'9" Min: 14'6"
Min. Vertical Clearance Side Road/Service Drive (under) (ft)		MDOT 3.12 RDM, MDOT 7.01.08 BDM	**Special Route** Des: 14'9" Min: 14'6"

Applicable for Crossroads

Item	Reference			
General Elements		Various applicable Design Speeds shown -- detail per actual crossroad forthcoming during design		
Roadway Class	AASHTO 2004, p. 419	Urban Collector	Urban Collector	Urban Collector
Design Speed (mph)	AASHTO 2004, p. 430	30	35	40
Stopping Sight Distance (ft)	AASHTO 2004, Ex. 3-1, p. 112	200	250	305
Cross-Sectional Elements				
Roadway Approach Lane Widths (ft)	FEIS Recommended Alternative	11	11	12
Cross Slope (%)	AASHTO 2004 pg 143, MDOT RDM Appendix 3-A	2.0	2.0	2.0
Normal Shoulder Slope (%)	MDOT RDM Appendix 3-A	4.0	4.0	4.0
Maximum Rollover of Shoulder (%)	MDOT SD R-107-G	6.0	6.0	6.0
Right Shoulder Width (ft)	MDOT RDM 6.05.04C, AASHTO 2004, p. 433	0 (curb)	0 (curb)	0 (curb)
Left Shoulder Width (ft)		0 (curb)	0 (curb)	0 (curb)
Curb and Gutter (Type & Width)	MDOT RDM 6.06.06C, MDOT R-30-E, AJR	F3 (2.0)	F3 (2.0)	F3 (2.0)
Horizontal Clearance (ft)	AASHTO 2004, p. 437	1.5	1.5	1.5
Sidewalk Width-Min (ft)	RDM 12.12.04D	6	6	6
Horizontal Alignment				
Minimum Radius (ft)	AASHTO 2004, Exh. 3-16 , p. 151	273	408	593
Compound Circular Curve Ratio	AASHTO 2004 p. 164	2:1	2:1	2:1
Middle Ordinate for HSD (ft)	AASHTO 2004, p. 227	$HSO = R\left[\left(1 - \cos\frac{28.65 * S}{R}\right)\right]$	$HSO = R\left[\left(1 - \cos\frac{28.65 * S}{R}\right)\right]$	$HSO = R\left[\left(1 - \cos\frac{28.65 * S}{R}\right)\right]$
Maximum Superelevation (%)	MDOT SD R-107-G & AASHTO 2004 p. 151, Ex. 3-16	2 (min.)	2 (min.)	2 (min.)
Vertical Alignment				
Max. Longitudinal Grade(%)	AASHTO 2004, Exh. 6-8 p. 431, MDOT RDM Appendix 3-A	5.0	5.0	5.0
Min. Longitudinal Grade(%)	AASHTO 2004 pg. 236, MDOT 2.02.01 RDM, MDOT RDM Appendix 3A	Curbed: 0.3 (min), 0.5 (des. min.)	Curbed: 0.3 (min), 0.5 (des. min.)	Curbed: 0.3 (min), 0.5 (des. min.)
Min. length of curve (ft)	AASHTO 2004, p. 269, MDOT RDM 2.02.02	90	105	120
Design Curve K-Value (Crest)	AASHTO 2004 Exh. 3-72 p. 272	19	29	44
Design Curve K-Value (Sag)	AASHTO 2004 Exh. 3-75 p. 277	37	49	64
Min. Vertical Clearance Crossroad (over) (ft)	MDOT 3.12 RDM, MDOT 7.01.08 BDM	**Special Route** Des: 14'9" Min: 14'6"	**Special Route** Des: 14'9" Min: 14'6"	**Special Route** Des: 14'9" Min: 14'6"

I-94 Traffic Volume Forecasting

NO. MDOT – TM 3
May 6, 2015

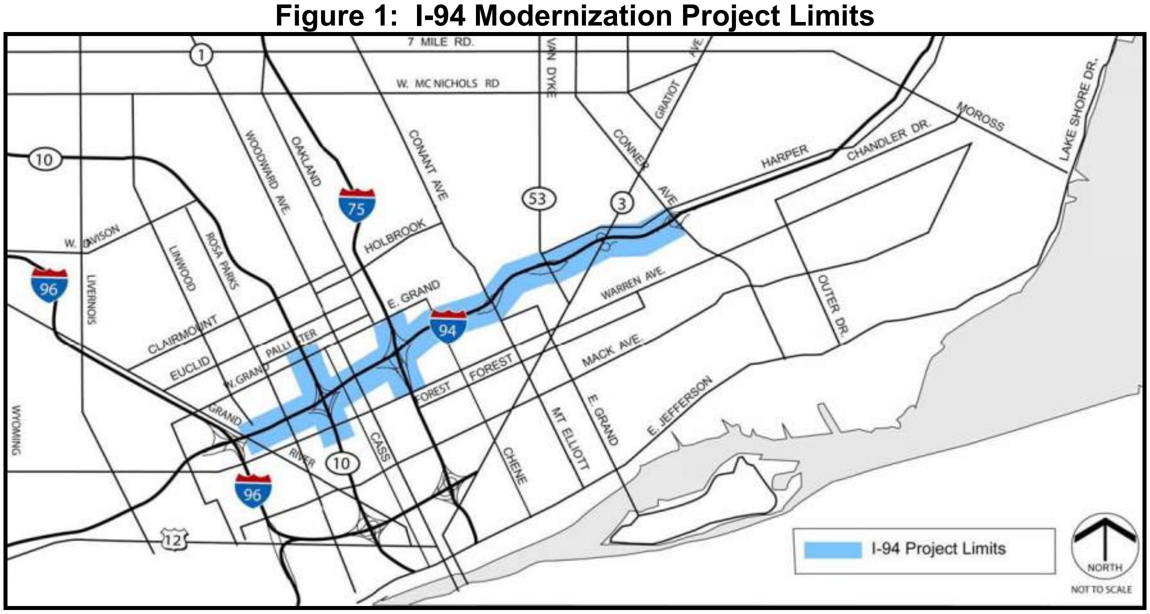
MDOT JN: 122114
Control Section: 82024

Author: Mark Smith, PE, PTOE
Reviewers: Karianne Steffen, PE, PTOE
Matt Simon, PE

Background:
As part of the I-94 Modernization Project Owners Representative Work Task #1, Subtask 2.2 Traffic, this technical memorandum is intended to document the assessment of SEMCOG's 2010 and 2040 Travel Demand Models (TDM) and the discussions with MDOT and SEMCOG on March 6, 2015, March 13, 2015, and May 1, 2015 regarding traffic volume forecasting along the I-94 study corridor.

Existing Project Data:
The limits of the I-94 Modernization Project are located in the City of Detroit between I-96 and Conner Ave, which is approximately seven miles in length, as shown in Figure 1 below. I-94 is currently stripped as a six (6) lane urban freeway that carries three (3) lanes of westbound traffic and three (3) lanes of eastbound traffic. Within these seven miles of urban freeway there are over 50 ramp entrances/exits along the I-94 corridor. Existing traffic conditions indicate that demand for the I-94 corridor has exceeded the available capacity limits given the heavy congestion experienced during the AM and PM peak periods. The recurrent congestion on the I-94 corridor has resulted in a diversion of trips from the I-94 corridor to adjacent facilities. It is expected that once additional capacity is added with the I-94 Modernization Project a large volume of traffic will shift back to the I-94 corridor that had previously diverted due to the heavy congestion.

Figure 1: I-94 Modernization Project Limits



Assessment of SEMCOG Travel Demand Models:

Traffic assignments were obtained from SEMCOG's 2010 and 2040 Travel Demand Models (TDM) to evaluate traffic volume growth along the I-94 study corridor. For background traffic growth the TDM projected a growth rate of 0.07% per year (compounded annually) from 2010 to 2040, prior to the construction of the I-94 Modernization Project. The TDM also projected a growth rate of 0.16% per year (compounded annually) from 2010 to 2040, which is expected after the completion of the I-94 Modernization Project. The traffic projections account for growth due to long term traffic pattern changes plus the socio-economic growth in the I-94 impact area. The I-94 corridor will also see an increase in traffic due to diverted demand that is currently using adjacent facilities. The SECMOG TDM model estimates that I-94 mainline traffic volumes are projected to increase by 23% to 27% depending on when I-94 modernization project is completed (i.e. if project was completed in 2010 traffic shift would have been 23%, if project is completed in 2040 traffic shift is expected to be 27%). Table 1 below summarizes the projected traffic increases for the I-94 corridor. The total traffic increase is based on the average of the annual growth rate and the traffic shift due to the diverted demand since the final completion date of the I-94 Modernization Project is unknown.

Table 1: I-94 Projected Traffic Volume Increases

	Annual Growth Rate (2010 – 2040)	Traffic Shift due to Diverted Demand	Total Traffic Increase (2010 – 2040)
I-94 Modernization Project	0.07% - 0.16% Per Year	23% to 27%	29%

The projected traffic volume increases from SEMCOG's TDM were developed in 2010, during a time of recession. Recent economic changes in Detroit's Midtown area and surrounding communities are not reflected in these projections.

Based on the review of SEMCOG's TDM, the corridor analysis provides the expected traffic growth along the I-94 study corridor. The growth determined from the corridor analysis is limited to the mainline freeway lanes as the level of detail within the TDM does not provide accurate traffic volume projections for surface streets and ramps. Given the limitations of the SEMCOG TDM, separate forecasting methodologies will be used for the I-94 freeway and surface streets / ramps.

Traffic Volume Forecasting Methodology:

<u>I-94 Freeway Traffic Volume Forecasting Methodology</u>

1. Growth rates from SEMCOG's Corridor Analysis (shown in Table 1) will be used to forecast 2040 build I-94 mainline traffic volumes.

<u>I-94 Service Drive and Ramp Traffic Volume Forecasting Methodology</u>

Given the limitations of the TDM to accurately project traffic volumes for the surface streets and ramps, several methods were analyzed for forecasting traffic on the I-94 Service Drives and I-94 Ramps which included:

- Comparing 2010 and 2040 SEMCOG TDM's to evaluate growth based on population, socioeconomic data, and vehicle miles travel within the I-94 study area.
- Reviewing existing traffic volumes within the I-94 study area where continuous service drives exist to estimate volumes for proposed continuous service drives.

- Reviewing existing traffic travel patterns within the I-94 study area to estimate directional distribution percent's for future.
- Reviewing the recently constructed I-96 project in Livonia.
- Minimum safety standards for a service drive would require two lanes for emergency access.
- Best traffic planning and engineering practices

It was suggested that a subarea micro-simulation model could be used. While a subarea micro-simulation model would be the best way to forecast traffic volumes for the surface streets and ramps it would also require an extensive amount of data that is not available. A subarea micro-simulation model would require the collection of additional traffic volumes for all significant alternate routes in the Detroit area surrounding the I-94 corridor. The limits of a subarea model could extend as far as the borders of the map shown previously in Figure 1. In addition to the data collection there would also be a large effort to calibrate the model before it could be used.

With the inherent schedule delays that a subarea micro-simulation model would create it was agreed on May 1, 2015 with MDOT and SEMCOG that triangulating the methods analyzed above would be an acceptable approach to forecast traffic for the I-94 Service Drives and I-94 Ramps in place of a subarea micro-simulation model.

Therefore, based on discussions with MDOT and SEMCOG on May 1, 2015 the proposed methodology for forecasting traffic for the I-94 Service Drives and I-94 Ramps is outlined below. Both MDOT and SEMCOG were in agreement on this approach:

1. A total of 1,000 thru vehicles per hour (VPH) will be applied to the I-94 Service Drives during the AM and PM peak hours. The 1,000 thru vehicles is based on existing peak hour traffic volumes counted at the Chene St and Mt. Elliott St intersections with the I-94 eastbound and westbound service drives. Chene St and Mt. Elliott St were used to develop the thru VPH based on the existing continuous service drives at these locations.

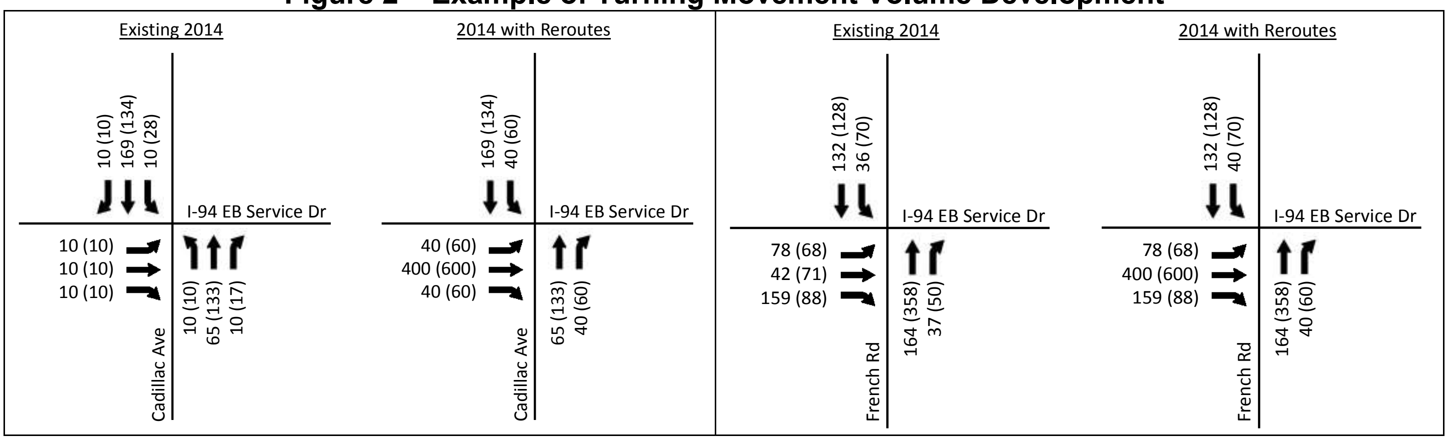
2. Projected directional distributions were developed, as shown in Table 2, based on an evaluation of existing traffic volumes and anticipated travel pattern impacts from the proposed continuous service drives. The directional distributions will be applied to the 1,000 thru VPH to assign peak hour thru volumes on the eastbound and westbound I-94 Service Drives.

Table 2: I-94 Service Drive Projected Directional Distributions

Location	Direction Distribution	
	AM Peak Hour	PM Peak Hour
West of M-10		
WB I-94 Service Drive	40%	60%
EB I-94 Service Drive	60%	40%
Between M-10 and M-1 (Woodward Ave)		
WB I-94 Service Drive	45%	55%
EB I-94 Service Drive	55%	45%
East of M-1 (Woodward Ave)		
WB I-94 Service Drive	60%	40%
EB I-94 Service Drive	40%	60%

3. To develop peak hour turning movement volumes at the study area intersections, 10% of the service drive thru traffic volume will be used. The peak hour turning movement percentage was developed based on review of existing turning movement counts at low volume intersections on the I-94 corridor and the Trumbull Ave Bridge evaluation. Additionally, the I-96 reconstruction project (Newburg Rd to Melvin St) in Livonia was reviewed to confirm the proposed methodology for the I-94 corridor. A review of the I-96 project found that when distributing turning volumes to adjacent signals it was assumed that 10% turned left and 10% turned right which matches the proposed methodology for the I-94 corridor. This methodology will only be used if the existing turning movements are lower than 10% of the service drive thru volume otherwise the existing volume will be used. Two examples of the I-94 Eastbound Service Drive, east of M-1 (Woodward Ave), are shown in Figure 2.

Figure 2 – Example of Turning Movement Volume Development



In addition to the forecasting methods described above, a minimum annual growth rate of 0.16% per year (compounded annually) will be used to forecast I-94 Service Drives, local roads, and I-94 Ramps for the AM and PM peak periods. The minimum annual growth rate of 0.16% matches the highest annual growth that is anticipated for the I-94 Freeway. All adjustments will be made to the existing (2014) traffic volumes to account for the proposed roadway modifications before applying the 0.16% annual growth rate to develop projected 2040 build traffic volumes.

TECHNICAL MEMORANDUM

Existing (2014) Paramics Assessment and Model Calibration for I-94

NO. MDOT – TM 8

May 21, 2015

MDOT JN: 122114

Control Section: 82024

Author: Eric Youngblom
Jordan Williams

Reviewer: Rob Beuthling, PE
Jason Kessler, PE

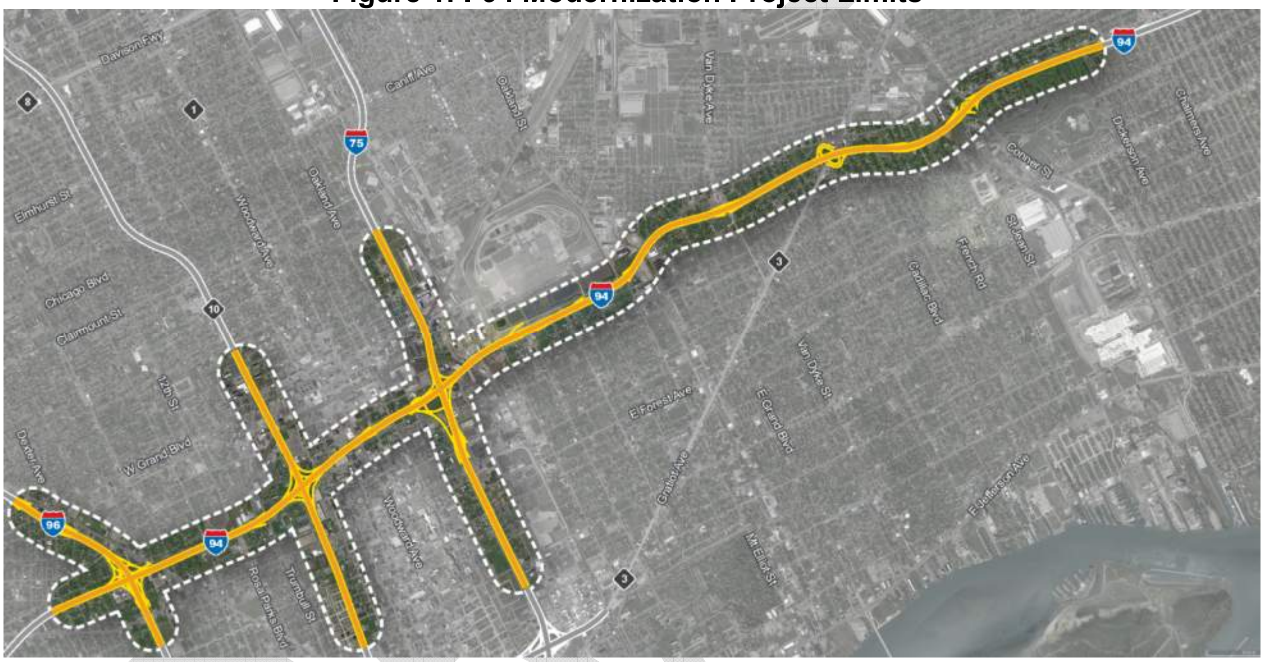
Background:

This technical memorandum has been prepared as part of the I-94 Modernization Project Owners Representative Work Task #1, Subtask 2.2 Traffic. The purpose of this report is to document the calibration and validation of the Existing (2014) Paramics model for the study area corridor. Details in this report include review of the MOTSIM (*Maintenance of Traffic Simulation*) model received from MDOT on October 23, 2014, development of base year volumes, development of target speed profiles, Paramics inputs, validation results, and observations for the Existing AM and PM conditions.

1. Introduction

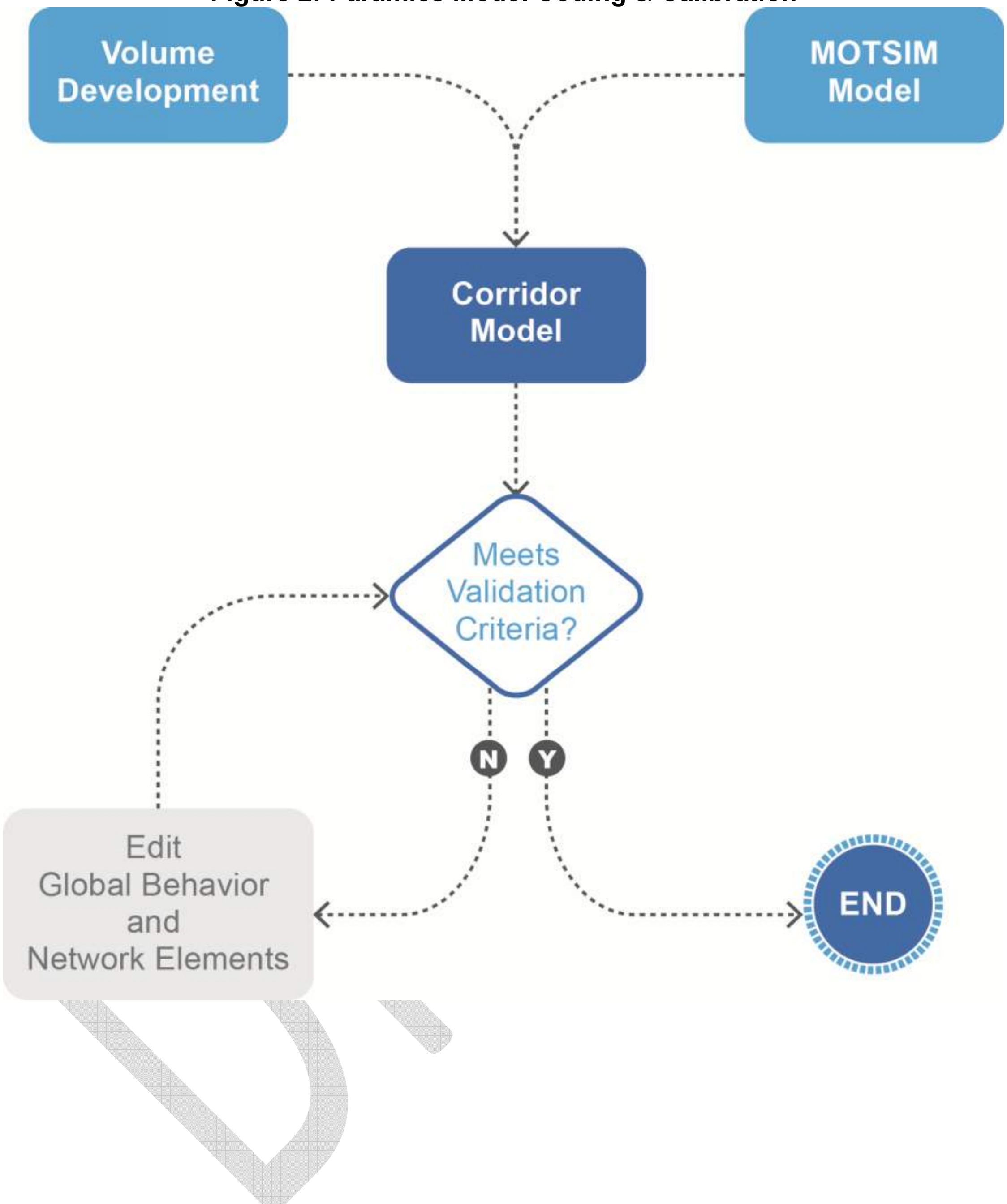
The limits of the I-94 Modernization Project are located in the City of Detroit between I-96 and Conner Ave, which is approximately seven miles in length, as shown in Figure 1 below. I-94 is currently striped as a six (6) lane urban freeway that carries three (3) lanes of westbound traffic and three (3) lanes of eastbound traffic. Within these seven miles of urban freeway there are over 50 ramp entrances/exits along the I-94 corridor including three (3) system to system interchanges at I-96, M-10, and I-75.

Figure 1: I-94 Modernization Project Limits



This report documents the calibration and validation of the Existing (2014) Paramics models for the study area corridor. Details in this report include review of the MOTSIM (*Maintenance of Traffic Simulation*) model received from MDOT, development of base year volumes, development of target speed profiles, Paramics inputs, validation results, and observations for the Existing AM and PM conditions. The calibration process is summarized in the Figure 2 below. The process uses the Existing Paramics model from MDOT and applies updated volumes to develop the corridor model. The model was then modified to match the observed volumes and observed speeds through network and variable manipulation. The calibration approach follows FHWA guidelines outlined in the *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software.*

Figure 2: Paramics Model Coding & Calibration



2. Paramics Model Inputs

2.1. Model Scoping

The model extents were established to assess the mainline operational needs within the Project's study area. Service interchanges and portions of the service drive system are included in the model to get proper platooning at the entrance ramps. To evaluate vehicle operations on the Interstate facility, the model uses an all-or-nothing traffic assignment. This traffic assignment provides the model a static volume set and is not meant to evaluate real time routing decisions that allow vehicles to use the service drive or other alternative routes.

Based on a FHWA guidelines, the hours of simulation for the AM and PM peak periods were established to capture the full period of congestion for each peak. These hours were determined from Nokia's *HERE* travel time data. Based on HERE travel time data the AM and PM peak periods are defined as 6-10 AM and 2-7 PM. Figure 3 and Figure 4 shown below represents speeds in 5 minute increments along the Y-axis, and geographic locations along the I-94 corridor on the X-axis.

Figure 3: AM HERE Speeds for Tuesday – Thursday in October – November 2014

Eastbound

Time	Between Grand and 24th St	At Linwood	At 14th St	At Rosa Park	At Trumbull	East of M-10	At John R	East of I-75	At Chene	At Mount Elliot	At Burns	Between Gratiot and Cadillac	Between French and Conner	East of Conner	At Chalmers
6 AM to 7 AM	59	58	61	58	60	59	54	55	58	58	61	59	59	61	63
	56	51	55	57	60	58	57	54	57	59	60	60	61	60	60
	60	57	62	62	62	58	52	54	57	58	58	58	59	57	60
	60	55	54	54	57	56	54	49	61	63	62	63	62	55	60
	59	53	52	56	56	55	50	51	58	60	58	59	62	60	60
	59	56	53	54	61	57	51	52	60	59	59	57	59	52	61
	59	57	51	55	59	56	51	50	55	61	59	60	60	57	61
	62	59	54	56	61	58	53	53	57	59	57	60	60	59	61
	59	49	46	47	53	55	50	49	57	60	60	60	57	61	61
	56	53	48	49	52	53	49	50	54	55	57	56	57	58	59
	57	49	45	48	52	53	49	48	56	61	59	61	58	60	62
	55	50	43	48	51	52	50	49	55	58	58	60	61	58	61
7 AM to 8 AM	54	51	49	48	52	54	51	51	55	57	58	58	59	59	60
	55	49	42	46	51	53	47	49	55	58	58	59	60	59	59
	54	47	39	43	48	51	46	49	57	57	57	59	60	59	60
	51	40	32	40	47	50	49	51	58	61	58	62	62	61	60
	46	30	31	39	50	50	47	49	58	60	59	61	63	60	63
	36	28	30	37	45	52	47	49	60	56	57	60	61	55	61
	38	22	27	40	49	53	45	51	57	58	58	59	61	60	60
	32	25	30	38	46	51	48	51	58	56	56	58	58	62	59
	34	24	31	38	46	52	47	51	59	60	57	59	64	61	61
	30	21	24	37	45	53	46	51	58	61	59	59	60	56	58
	26	21	27	35	46	51	42	51	57	59	59	60	57	56	61
	27	21	25	39	46	52	47	52	57	60	60	60	60	60	61
8 AM to 9 AM	28	20	28	37	44	51	49	51	56	59	57	59	61	60	59
	32	23	29	37	44	51	48	53	55	61	61	61	60	60	60
	28	23	29	39	47	51	47	49	58	58	56	61	60	60	60
	28	20	27	37	47	52	45	51	59	59	57	57	60	59	60
	31	23	29	35	44	49	44	52	58	58	59	61	61	53	64
	30	23	27	38	47	53	49	51	55	57	57	59	60	59	62
	29	22	25	34	45	52	46	51	56	59	59	61	61	62	64
	30	22	29	37	47	51	46	51	55	57	57	60	58	59	61
	32	26	31	41	47	52	44	50	59	60	59	60	61	56	62
	29	24	30	39	47	47	44	49	60	61	58	62	60	55	63
	36	26	29	41	48	51	47	53	60	59	58	59	59	60	61
	36	24	29	38	45	51	45	49	57	60	59	63	62	62	59
9 AM to 10 AM	40	23	30	40	49	52	46	49	54	59	57	56	60	56	60
	43	25	29	39	47	52	45	50	56	61	59	61	60	61	60
	44	29	33	41	49	52	46	49	55	57	56	60	61	60	62
	48	32	33	38	48	49	45	52	57	56	56	59	60	61	62
	50	36	34	43	46	51	45	48	56	58	57	58	61	58	62
	54	38	35	44	51	51	47	49	55	57	54	60	60	56	61
	55	47	39	45	50	53	46	51	57	58	59	60	61	59	59
	56	49	38	47	51	53	48	51	55	59	54	59	63	61	62
	56	47	47	51	55	54	48	52	56	58	57	58	59	56	56
	56	52	46	49	54	54	47	50	55	59	60	58	61	59	61
	54	51	47	52	55	55	48	52	56	59	59	59	60	60	62
	57	53	48	52	55	55	45	52	56	61	60	58	58	58	60

Westbound

Time	Between Grand and 24th St	At Linwood	At 14th St	At Rosa Park	At Trumbull	East of M-10	At John R	East of I-75	At Chene	At Mount Elliot	At Burns	Between Gratiot and Cadillac	Between French and Conner	East of Conner	At Chalmers
6 AM to 7 AM	65	62	64	62	65	60	55	57	61	62	62	60	62	64	65
	62	63	67	62	59	59	57	59	58	62	60	61	65	61	61
	63	63	62	57	60	57	55	55	57	60	60	60	61	63	63
	58	62	60	62	61	59	56	58	59	60	56	58	57	57	58
	63	64	63	62	62	58	55	55	54	55	53	56	57	55	49
	58	59	57	60	61	57	52	55	53	52	53	54	53	53	52
	62	63	68	62	63	57	54	55	51	53	52	52	53	51	50
	63	61	59	59	62	56	51	52	52	48	51	48	51	49	43
	60	58	54	56	57	56	50	51	52	50	46	45	49	45	37
	62	58	63	58	59	54	49	50	49	50	41	43	45	48	42
	58	58	57	56	54	55	50	52	49	49	45	46	44	44	43
	61	58	56	59	56	56	52	55	51	49	49	48	51	48	41
7 AM to 8 AM	62	58	63	57	60	56	52	54	51	48	47	48	51	46	44
	60	60	58	59	58	54	50	53	49	47	46	46	48	47	43
	60	59	57	56	55	53	49	52	48	47	43	45	43	44	40
	59	57	57	56	54	56	50	50	47	45	41	35	37	41	40
	63	59	59	57	59	53	49	51	46	42	40	37	37	41	35
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	57	57	59	52	53	52	43	48	46	40	40	35	34	34	32
	59	60	60	56	55	53	44	50	45	40	33	27	31	33	30
	59	59	59	56	59	54	47	47	43	38	37	34	32	27	31
	59	58	57	57	59	55	49	47	41	43	38	33	31	28	22
	62	58	59	57	62	55	49	49	45	41	34	31	28	27	26
	61	58	61	61	60	56	50	52	46	38	34	33	30	27	31
8 AM to 9 AM	57	59	54	55	59	54	51	52	45	40	36	31	29	30	28
	56	57	58	56	56	54	50	49	45	40	40	24	34	30	30
	60	57	55	56	59	53	51	49	42	39	39	35	30	29	29
	59	58	54	55	55	53	49	50	43	39	35	37	39	36	24
	60	59	57	57	58	55	51	51	43	40	33	32	29	35	33
	58	55	60	56	57	54	49	49	41	39	36	35	36	31	25
	57	57	59	52	57	54	45	47	40	40	39	33	29	33	25
	58	57	55	56	56	51	49	50	42	38	38	35	29	34	32
	59	57	61	59	57	53	47	47	41	36	33	33	37	35	32
	61	57	58	56	53	51	46	45	41	39	38	36	38	37	36
	60	55	57	52	57	53	47	47	42	41	41	40	38	40	36
	59	58	55	57	57	55	48	49	44	41	42	42	41	41	42
9 AM to 10 AM	61	58	59	58	59	54	47	49	45	42	44	40	43	46	45
	61	56	61	54	58	55	51	49	43	45	45	44	46	49	47
	60	59	58	56	55	52	48	47	43	42	45	40	45	49	49
	59	59	60	56	54	53	48	49	46	47	45	47	46	46	50
	61	56	58	54	58	50	49	50	48	47	46	51	48	51	52
	60	58	57	57	58	53	47	49	47	49	51	50	51	53	54
	61	57	57	55	59	53	47	50	47	51	54	54	54	51	50
	58	59	60	59	59	55	48	48	51	51	50	53	49	52	59
	58	58	60	57	57	54	48	50	51	52	54	54	53	55	56
	57	57	59	57	58	56	50	51	53	52	54	56	51	52	53
	59	57	55	58	58	55	49	51	51	52	53	52	49	52	56
	55	57	57	57	60	57	51	53	54	54	54	53	54	57	57

Eastbound →

← Westbound

Figure 4: PM HERE Speeds for Tuesday – Thursday in October – November 2014

Eastbound →

Time	Between Grand and 24th St	At Linwood	At 14th St	At Rosa Park	At Trumbull	East of M-10	At John R	East of I-75	At Chene	At Mount Elliot	At Burns	Between Gratiot and Cadillac	Between French and Conner	East of Conner	At Chalmers
2 PM to 3 PM	56	53	51	53	54	49	43	51	56	57	56	62	60	59	61
	57	52	46	54	57	52	43	51	56	55	57	60	62	59	63
	58	53	49	50	52	48	39	51	54	54	56	62	62	61	62
	59	53	49	50	53	50	40	50	52	53	54	58	60	58	62
	56	51	48	49	53	46	38	50	53	57	54	58	58	57	60
	57	50	49	50	51	45	38	52	54	56	58	61	60	57	62
	54	49	46	48	50	41	36	48	53	58	56	59	62	60	62
	54	49	42	44	49	41	34	49	53	55	56	58	59	58	62
	53	42	36	42	50	39	34	47	51	54	54	55	56	54	60
	52	39	33	42	44	35	32	48	51	53	54	57	58	57	59
	48	37	33	42	47	32	29	46	52	56	57	60	57	60	61
	52	39	36	42	44	34	30	47	52	57	57	60	59	56	61
3 PM to 4 PM	51	39	34	40	46	29	28	47	50	56	55	59	58	60	61
	54	41	36	39	42	28	27	43	49	52	55	57	58	56	62
	53	39	32	36	37	23	27	46	50	53	54	57	55	55	60
	49	33	27	33	36	21	25	43	44	53	50	51	54	53	60
	43	24	24	30	33	21	28	46	42	48	47	54	56	55	57
	40	22	23	30	34	23	29	43	42	48	49	54	55	52	56
	36	19	24	31	39	22	28	42	41	50	51	52	51	50	56
	34	22	20	29	34	20	24	38	39	47	48	51	49	48	53
	29	20	20	27	32	19	23	36	40	47	44	43	42	45	52
	29	15	19	26	30	18	26	33	36	41	43	43	42	43	52
	26	19	20	28	32	22	26	33	35	41	40	41	41	44	54
	27	16	21	28	31	22	27	34	27	35	36	38	41	44	53
4 PM to 5 PM	31	15	20	29	30	21	25	29	28	39	38	39	38	42	51
	39	26	22	28	35	22	25	31	29	37	38	41	40	42	52
	39	28	24	32	34	21	23	24	24	36	37	39	37	40	53
	42	30	27	28	28	17	20	23	21	32	39	38	38	38	50
	40	32	19	28	27	18	22	24	24	34	37	34	36	35	47
	44	28	21	27	28	18	23	24	24	31	35	35	33	32	49
	37	26	26	29	33	18	21	24	25	30	32	35	34	36	50
	39	30	22	23	24	19	21	22	21	29	26	31	36	37	47
	42	30	26	34	30	22	22	24	22	27	37	33	30	35	44
	41	32	26	29	30	19	21	16	19	32	33	34	35	33	44
	42	34	28	27	26	16	19	20	23	28	27	28	32	36	36
	43	31	28	29	29	19	23	24	26	29	28	30	29	33	38
5 PM to 6 PM	46	32	24	28	34	21	22	21	20	31	30	23	29	37	42
	50	30	33	28	33	22	20	20	21	24	27	32	31	37	45
	44	34	27	28	27	17	20	17	17	27	29	30	34	34	43
	43	30	29	32	35	15	18	17	19	26	27	28	31	37	47
	42	33	26	24	24	14	19	21	19	23	28	29	35	40	46
	41	27	17	20	23	13	16	18	19	22	27	27	34	37	44
	44	29	22	22	26	17	19	18	19	25	29	26	28	34	43
	42	27	19	22	21	14	19	20	24	25	26	24	27	32	44
	38	25	22	23	25	18	21	21	23	26	27	27	28	36	47
	42	30	21	27	25	15	19	23	22	25	26	32	32	37	49
	41	29	20	26	25	16	20	20	23	28	31	31	35	35	49
	41	28	25	29	29	22	19	20	22	33	33	36	34	39	50
6 PM to 7 PM	46	32	28	30	32	26	22	24	25	35	36	35	33	40	51
	47	35	32	35	45	28	27	29	28	36	32	34	40	39	51
	52	34	39	39	49	32	30	33	29	33	37	41	43	40	50
	50	36	37	37	43	30	31	29	28	38	42	44	44	42	51
	49	44	36	40	43	34	31	31	31	40	39	44	41	45	52
	53	40	38	37	38	33	34	38	30	42	37	41	45	41	48
	54	46	39	41	48	36	31	40	32	37	40	47	41	40	51
	58	49	49	50	53	48	43	44	49	53	45	52	53	52	52
	58	52	51	53	55	50	41	48	44	50	51	57	53	50	56
	54	53	48	51	53	48	47	50	50	52	49	53	52	51	58
	56	53	50	50	51	51	48	49	53	54	52	56	58	56	58
	59	58	56	53	56	55	43	51	54	54	54	57	57	60	60

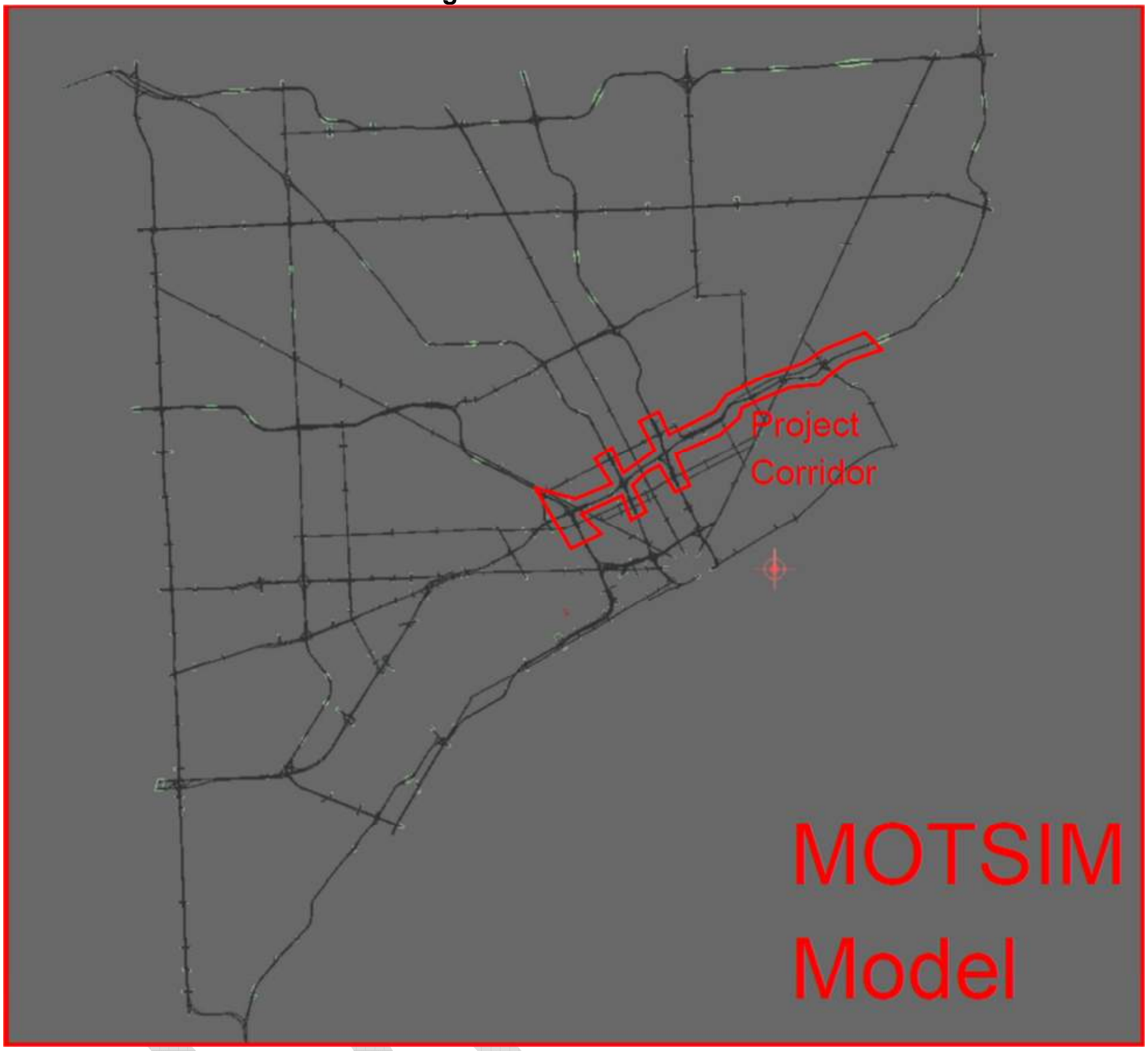
Westbound ←

Time	Between Grand and 24th St	At Linwood	At 14th St	At Rosa Park	At Trumbull	East of M-10	At John R	East of I-75	At Chene	At Mount Elliot	At Burns	Between Gratiot and Cadillac	Between French and Conner	East of Conner	At Chalmers
2 PM to 3 PM	59	55	57	55	54	54	48	51	54	53	54	58	59	56	57
	62	56	54	52	55	53	49	54	56	54	53	56	54	55	45
	60	54	54	53	54	51	49	52	54	51	54	59	58	54	54
	60	55	51	50	52	51	48	50	53	53	52	56	57	53	54
	59	53	53	47	51	48	45	50	50	53	55	57	54	56	62
	57	53	52	50	53	46	43	49	51	51	55	55	59	57	57
	57	55	53	50	51	48	45	43	50	53	53	58	58	56	55
	61	54	51	47	46	49	41	44	45	53	55	58	56	57	59
	56	50	48	42	42	45	35	44	45	48	54	57	58	58	60
	59	55	52	43	42	45	41	46	45	47	57	58	59	56	61
	54	54	45	43	43	42	43	47	46	50	56	60	57	60	59
	61	56	53	44	42	46	47	49	46	47	55	57	57	59	60
3 PM to 4 PM	57	53	51	43	38	43	45	50	48	51	56	58	57	59	61
	59	54	51	40	33	41	45	50	52	52	56	56	59	59	61
	57	51	44	37	30	36	41	50	47	50	54	59	57	60	57
	60	52	48	36	32	36	38	45	51	52	53	54	57	59	61
	59	52	48	37	28	33	36	47	48	52	54	54	57	57	58
	59	54	49	37	31	34	38	47	51	52	53	55	56	55	59
	59	50	45	36	30	32	39	43	52	51	51	52	54	56	54
	57	53	48	34	27	32	39	45	54	53	52	50	53	55	59
	56	51	48	35	26	30	37	46	48	54	53	53	57	56	55
	58	50	47	36	23	28	36	47	48	54	53	54	53	56	57
	52	50	45	34	27	33	33	46	48	52	55	54	53	56	54
	56	50	48	35	29	29	34	48	53	53	54	55	55	59	57
4 PM to 5 PM	56	51	45	38	26	32	36	47	56	55	56	53	54	55	55
	55	53	45	36	22	27	32	47	51	53	53	52	52	55	53
	57	50	45	37	24	27	31	42	51	54	52	57	57	59	60
	56	53	48	36	22	26	28	40	52	55	54	58	60	59	62
	56	50	44	33	23	24	27	43	52	54	57	58	58	58	59
	55	52	49	32	25	23	27	43	52	57	57	58	59	60	63
	53	52	47	34	22	22	28	43	53	57	56	59	57	60	63
	52	49	45	35	24	25	30	46	52	55	56	56	57	57	59
	56	52	50	35	22	25	29	42	46	52	54	54	56	56	59
	54	52	46	35	19	21	26	38	49	54	54	57	63	60	60
	53	51	40	33	19	21	21	32	52	53	54	53	51	59	58
	48	48	45	31	20	22	24	35	53	55	56	54	56	58	60
5 PM to 6 PM	52	49	44	36	22	22	26	41	53	54	55	54	55	59	60
	52	46	42	33	21	23	24	46	56	53	53	55	57	60	60
	50	48	46	32	22	22	24	43	52	53	53	53	58	58	60
	52	48	45	30	21	21	26	42	53	55	55	52	58	58	61
	53	50	47	33	22	22	22	41	54	53	55	58	58	58	58
	53	52	45	34	22	23	24	44	52	54	55	57	56	55	58
	55	50	47	32	18	22	27	44	54	55	53	57	55	53	60
	53	50	46	29	21	21	29	45	51	52	52	54	51	57	54
	55	48	46	32	21	22	33	46	52	54	53	53	56	57	61
	56	53	48	30	17	20	36	47	54	56	55	55	56	54	55
	57	51	44	34	24	23	38	49	55	52	53	54	56	53	58
	55	47	48	32	22	23	37	51	55	55	55	59	56	53	55
6 PM to 7 PM	54	48	42	34	22	23	40	51	53	53	56	56	54	57	57
	57	52	46	37	25	28	43	50	53	58	58	58	59	56	53
	58	54	50	39	27	31	42	52	55	56	55	57	57	55	55
	54	51	40	35	25	28	41	50	51	56	56	58	60	57	56
	57	51	43	32	24	32	41	49	50	55	55	59	60	56	50
	56	53	45	33	34	33	41	50	56	57	56	57	57	54	54
	57	52	47	40	33	39	44	50	52	56	54	55	58	56	54
	56	54	50	44	41	45	49	56	58	58	58	55	57	56	55
	58	50	51	49	47	49	54	55	55	57	58	57	55	57	55
	56	56	55	50	51	45	46	54	54	59	58	61	58	54	58
	59	53	51	48	48	49	46	51	55	57	57	57	60	56	56
	57	57	52	55	53	53	49	52	55	56	55	57	56	55	55

2.2. MOTSIM Model

The MOTSIM model (See Figure 5 below) is a microsimulation model of the greater Detroit Metro region completed in Quadstone's Paramics software. Model elements, such as geometry, origin-destination patterns, and global settings were reviewed for incorporation into the project corridor model. The network geometry in the I-94 project corridor reflected the existing roadway condition and was extracted to start building the project corridor model. Modifications were made to update the Paramics elements from the MOTSIM model to represent best modeling practices for the corridor.

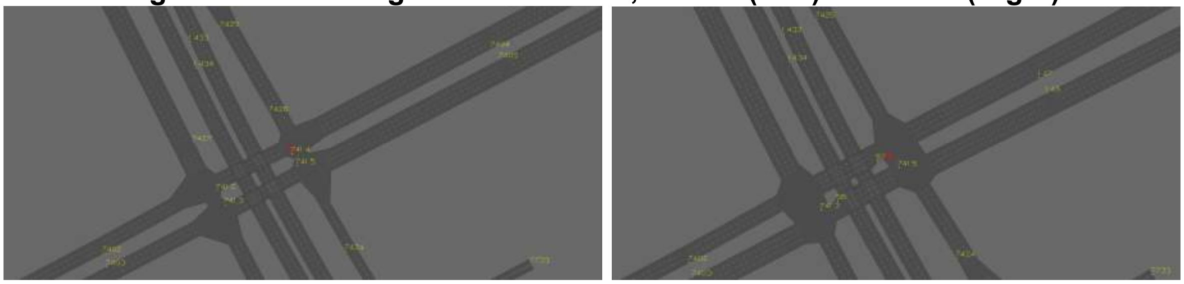
Figure 5: MOTSIM Model



The modification to the MOTSIM network includes:

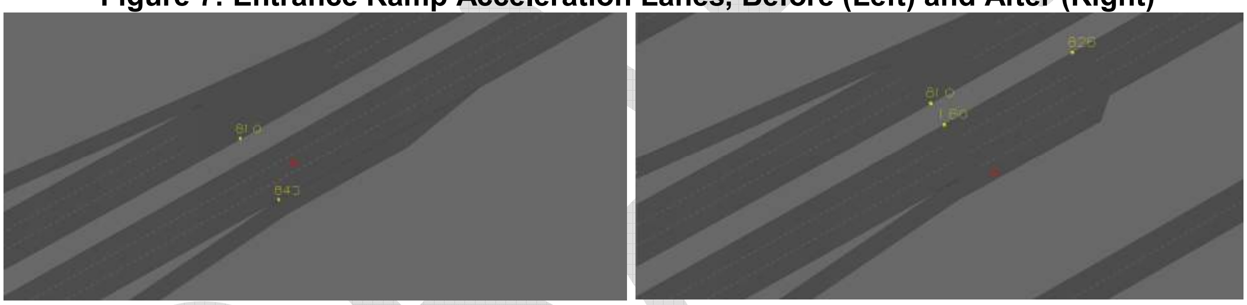
- I-94 model speed limits updated from 60 to 65 mph to the posted speed limit of 55 mph.
    - HERE speed data also confirmed that the typical free flow speed is closer to 55 mph than the 60-65 mph range.
- Link specific headway and reaction factors were removed for the calibration of the study area specific model. Some link-specific headway factors were later applied as required.
- Network coding for interchange terminals with a median was changed from two separate links to one link with two directions and offsets to allow for more accurate signal coding.

Figure 6: Interchanges with Medians, Before (Left) and After (Right)



- The service drive system along I-94 was added to the model network.
- Global headway and reaction times were adjusted to match study area corridor operations.
- Entrance ramp acceleration lanes were measured and recoded as short-length lane additions in lieu of the Paramics ramp function.
    - o Using the Paramics ramp function, vehicles become unreasonably stalled on entrance ramps. Short-length lane additions simulate more realistic behavior, with mainlines yielding to the ramps as the ramp traffic enters the mainline.

Figure 7: Entrance Ramp Acceleration Lanes, Before (Left) and After (Right)



- Lane utilization rules were established for sections of the corridor that have evidence of heavy left lane utilization. This occurs at mainline sections with poor sight distances and at sections with heavy ramp movements.
    - o The image in Figure 8 below shows I-94 traffic near the I-75 Interchange at 5:15 PM. Both directions of travel show vehicles congregating in the two left lanes with the right lane used predominately for entering and exiting vehicles.

Figure 8: Avoidance of Right Lanes During Peak Hours, Looking East over Beaubien St

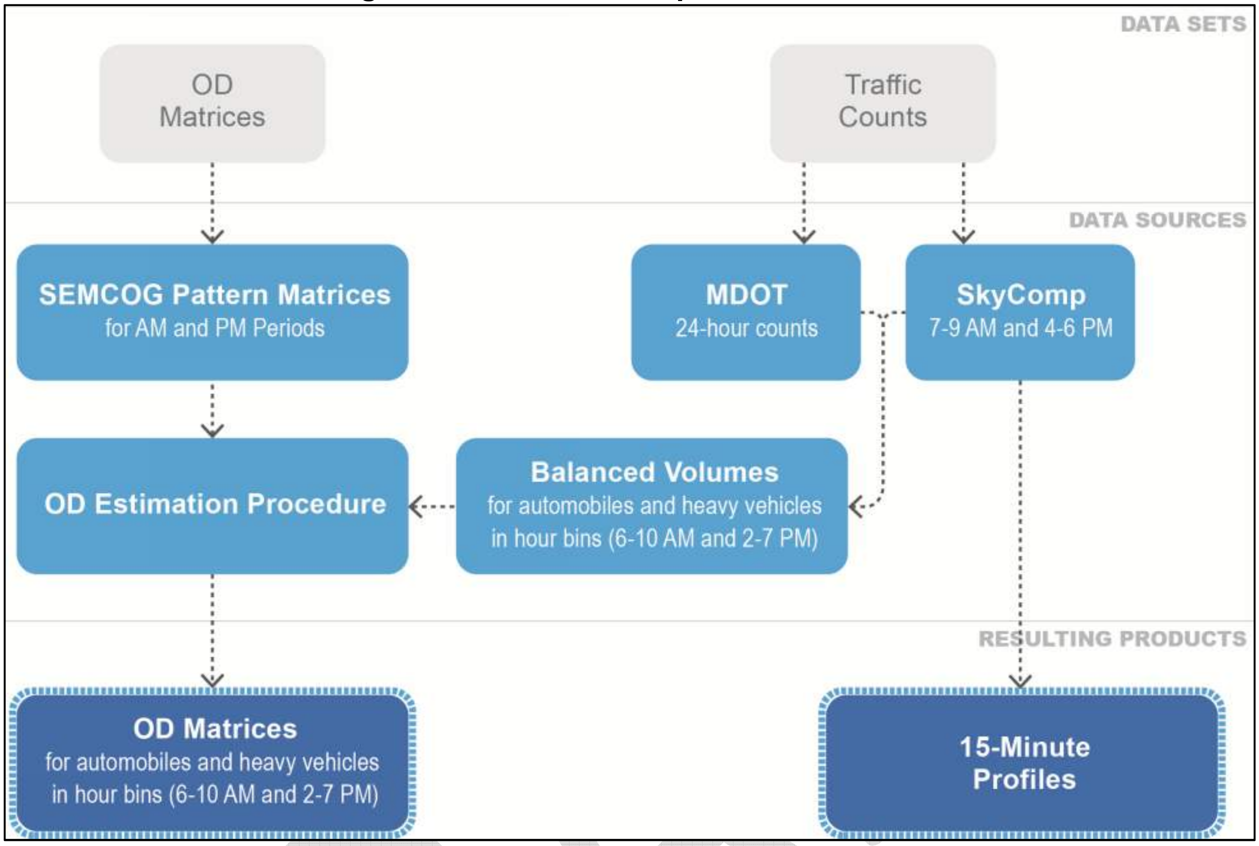
2.3. Volume Development

Traffic volumes were collected from two sources:

1. Time lapse aerial photography to capture mainline, ramp, and intersection turning movement counts during AM and PM peak hours
2. MDOT Classification mainline counts taken over 24 hour periods

The methodology for using both sources of count data with origin-destination matrices provided by the Southeast Michigan Council of Governments (SEMCOG) is shown in Figure 9 below and explained in the following sections: *Traffic Counts, Origin-Destination Matrices,* and *Profiles.*

Figure 9: Volume Development Procedure



Traffic Counts

Traffic counts were collected for mainline, ramps, and intersection movements in the I-94 corridor by Skycomp for the AM Peak 7 AM to 9 AM on Wednesday, November 5, 2014, and the PM peak 4 PM to 6 PM on Wednesday, October 8, 2014. The Skycomp counts were balanced for each direction along the mainline, ramp, and intersection for each hour. The counts from Skycomp were supplemented by MDOT 24 hour vehicle classification counts at 4 mainline locations in each direction along I-94: the Brush Street overpass, Dickerson Street overpass, Central Street overpass, and Trumbull Street overpass. Each screenline was counted in both eastbound and westbound directions for 24-hours, with vehicles classified by passenger car, single unit trucks, and combination trucks. Counts were totaled for each hour in each direction across the corridor, and plotted as a function of time of day. This data was then used to estimate a volume before and after the Skycomp count times. The general formula for estimating the volume for hours before and after the Skycomp count hours is shown below:

$$Volume_{i-1} = Volume_i x \frac{\sum(MDOT\ Mainline\ Counts)_{i-1}}{\sum(MDOT\ Mainline\ Counts)_i}$$

$$Volume_{i+1} = Volume_i x \frac{\sum(MDOT\ Mainline\ Counts)_{i+1}}{\sum(MDOT\ Mainline\ Counts)_i}$$

During the calibration process the estimated volume were further adjusted to better match observed speeds.

Origin-Destination Matrices

The SEMCOG Travel Demand Model was utilized to create a pattern origin-destination (OD) matrix for the study area corridor model. OD matrices were exported for the AM and PM peak periods.

The Existing 2014 Paramics OD matrices for automobiles and trucks were developed through OD estimation using the SEMCOG pattern OD matrices and balanced Skycomp counts. The OD estimation process utilizes Microsoft Excel and Paramics Analyzer files to correlate OD pairs to individual turning movements on ramps, mainlines, and intersections. This estimation methodology relies entirely on the static all-or-nothing traffic assignment (with no perturbation) within the Paramics model. To reproduce realistic field conditions within Paramics, the model utilizes traffic counts collected as targets and varies the pattern OD matrix from SEMCOG. Because the SEMCOG pattern OD is not an observed OD pattern, the pattern is used to initialize values and adjusted to match observed traffic counts.

Profiles

Paramics allows for unique volume distribution within each hour matrix. The Paramics input file that controls the hourly distribution is called *profile.* The existing I-94 model uses profiles that divide the hour into 15 minute demand sets. To better replicate the influxes of demand within any given hour; profiles were developed for ten sections in the model, as shown below in Figure 10. Each freeway mainline origin (west I-94, east I-94, north I-96, south I-96, north I-75, south I-75, north M-10, and south M-10) were defined as sections. Additionally, cross street origins west of I-75 and east of I-75 were defined as separate sections. The Skycomp data was used to develop the profiles for 2 hours in each peak period, 7-9am and 4-6pm. Profiles for the 10 sections are shown in Figure 11 below for the AM and in Figure 12 below for the PM. The hours before and after Skycomp counts (6-7am, 9-10am, 2-3pm, 3-4pm, and 6-7pm) used a uniform profile. A uniform profile was used because only mainline screenline counts were available, (no ramps), and these screenlines showed predominantly uniform profiles.

Figure 10: Volume Distribution Profile Zones

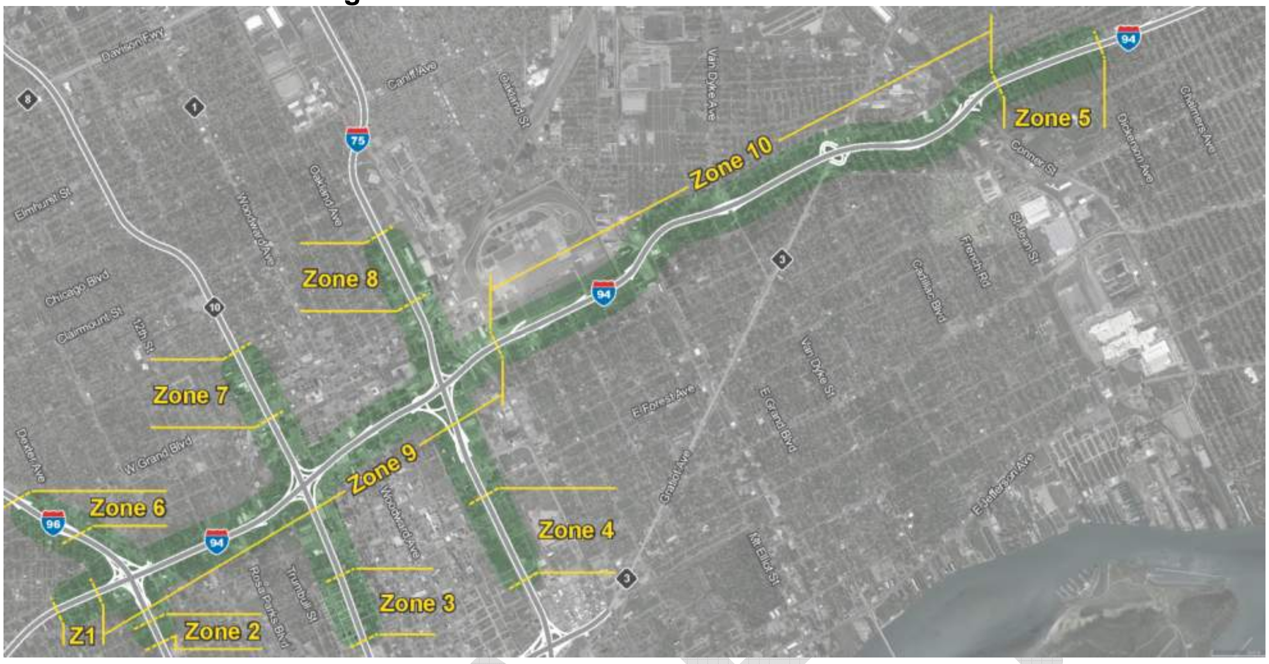


Figure 11: AM Peak - 15 Minute Volume Profiles

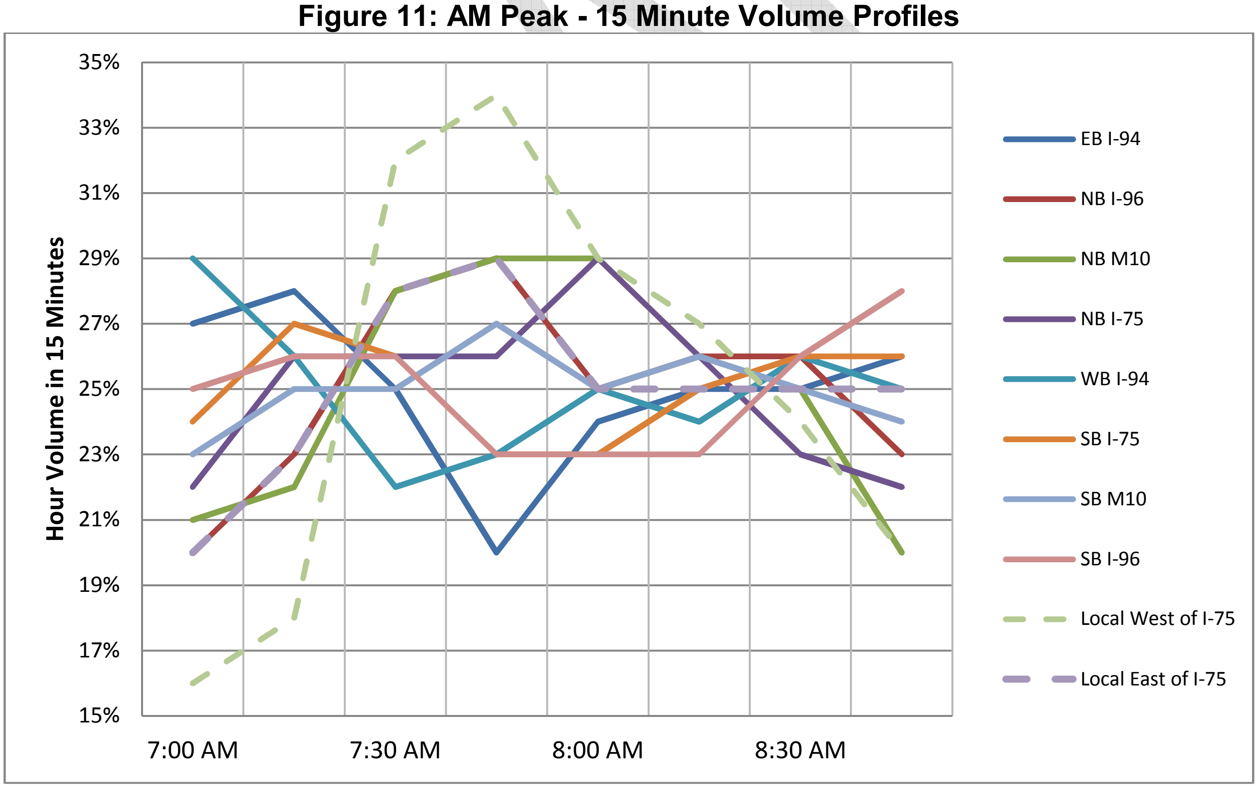
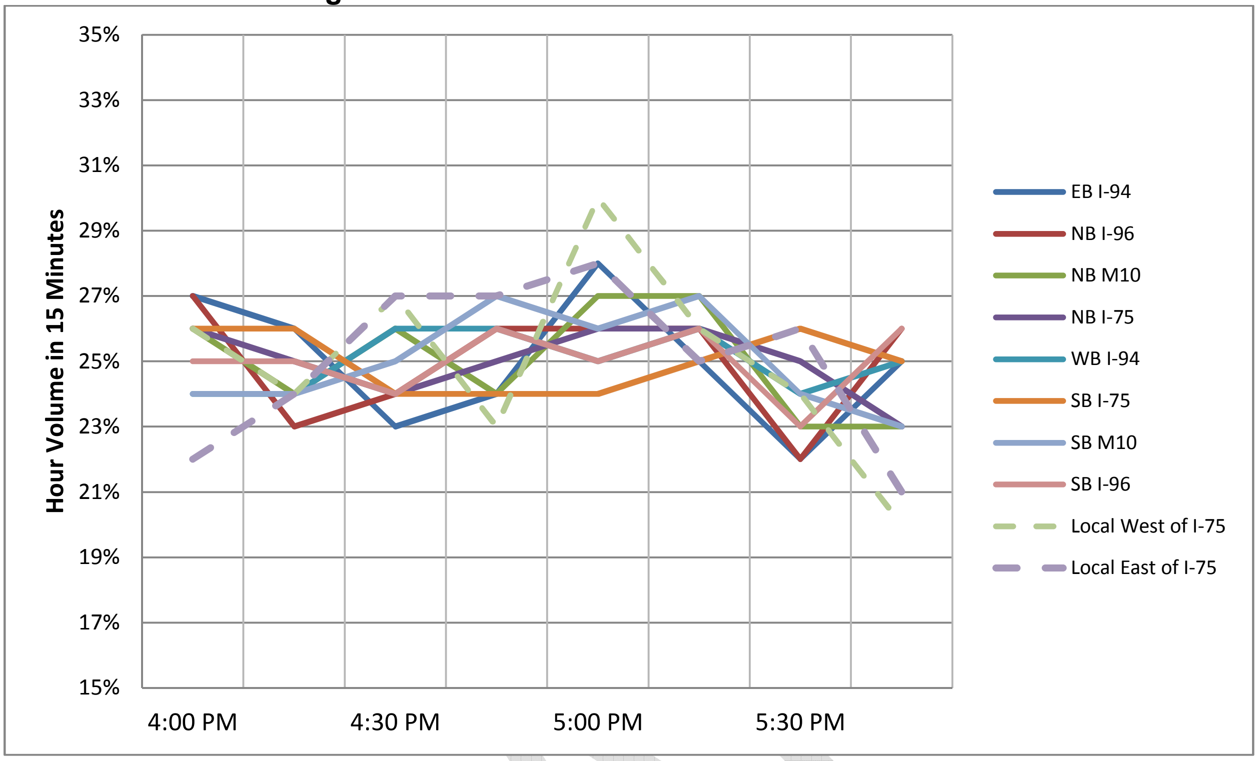


Figure 12: PM Peak - 15 Minute Volume Profiles



2.4. Speed Data

The model speed data was validated against speed data summarized from the Nokia *HERE* speed database. The HERE data was summarized and averaged over weekdays from October and November of 2014. The HERE data was also summarized for the specific days the traffic counts were taken. It was determined that both sets of data, the two-month average and day-of-count specific, had unique benefits in validation, so both were used in the validation process. The day-of-count specific speed data had the advantage that volumes used in the simulation were directly responsible for the travel time information from that day-of-count date. The concern using the day-of-count travel times exclusively was that it was unknown how many vehicles were used to calculate speed for each time-location bin and could potentially be skewed by a singular outlier vehicle moving at a non-representative speed. This concern is addressed using the two-month average speed data; two months of counts having two months of traffic from which to draw speed calculations. The concern with this data is that the traffic volumes were not simultaneously counted over the same two months; therefore volumes from the date of the count may be high or low compared to the monthly average, yielding a different anticipated speed from the model. In the validation process, speed measurement locations were identified and matched to links from the Paramics model. The model-output link speeds were compared side-by-side to both sets of HERE speed data, and used to provide a multi-dimensional idea of what speeds should be expected. By in large, the day-of-count speeds and the two-month average speeds followed similar trends, with day-of-count speeds matching or trending slightly slower than the two-month average speeds. The speed profiles for the corridor are summarized in Appendix A. Results comparing modeled speeds to observed speeds are discussed in the Validation Results section.

2.5. Traffic Control

Traffic control in the Paramics model is set up using fixed traffic control timing plans that are designed to closely mimic real life traffic control design. Signal timings were provided by MDOT via Synchro files, and incorporated into the Paramics model. By in large these pre-timed signals performed successfully within Paramics, but a select few timing plans required minor adjustment to process demands successfully. Cycle length and sequence remained constant in this process.

3. Calibration

The purpose of the Paramics calibration procedure is to align modeled volumes and speeds with observed data. When modeled results and observed results are within best practice criteria thresholds, the model is considered validated. Some of the calibration elements have been discussed in earlier sections, such as simulation time, route assignment, demand matrices, and link speeds. Other parameters such as speed memory and time steps were set to Paramics defaults and known best practices. Two global parameters were tested extensively within Paramics: mean target headway and mean driver reaction time. Mean target headway is the average time it takes for the front of a following vehicle to pass the same point as the front of the vehicle preceding it, while the mean reaction time is the time required for a following vehicle to respond to the vehicle preceding to accelerate or decelerate. The value of these factors does not necessarily represent field headway and reaction times, but are rather model inputs to achieve operations that represent field conditions. Through the calibration procedure the headway and driver reaction time were adjusted from 0.5s to 1.0s. After multiple iterations, the results indicated that maintaining a headway of 0.75s and increasing the reaction time from 0.75s to 0.85s was most appropriate for achieving model validation. A summary of the global parameters for the MOTSIM model and the I-94 corridor model are listed in Table 1.

Table 1: Paramics Model Parameters

Parameter	MOTSIM Model		I-94 Project Model	
	AM Period	PM Period	AM Period	PM Period
Paramics Version	5.20		6.9.3	
Duration of simulation	4 hours	5 hours	4 hours	5 hours
Simulation Time	5:00 AM – 9:00 AM	2:00 PM – 7:00 PM	6:00 AM – 10:00 AM	2:00 PM – 7:00 PM
Critical Analysis Hours	N/A		7:00 AM – 9:00 AM	4:00 PM – 6:00 PM
Number of Time steps per second	4		5	
Speed Memory	5		5	
Route Assignment type	All or nothing, w/ perturbation		All or nothing, No perturbation	
Demand Matrix Structure	Matrix 1 = Passenger Cars Matrix 2 = Heavy Vehicles		Matrix 1 = Passenger Cars Matrix 2 = Heavy Vehicles	
Mean Target Headway	0.75 seconds		0.75 seconds	
Mean Driver Reaction Time	0.75 seconds		0.85 seconds	
Link Speeds	Speed Limit plus 5-10 mph		Speed Limit	
Curve Speed Factor	1		1	
Vehicles	Provided with MOTSIM Model (6 types)		Expanded (16 types)	

Number of Simulation Runs

The calibration procedure used the average of seven simulation runs to access the impacts of variable and network changes. The metrics summarized in the Validation results is based on 25 runs. The 25 runs correlates to the 25 days of speed data used for the 2-month average target. At some locations, there is significant variation in speeds because of the volatility of congestion based on the shock wave effect of downstream queues. The modeled speed data showed similar trends to the HERE speed data summarized in Appendix B, where bottleneck location had low speed variation between runs and location upstream of bottlenecks had large speed variation between runs. Compiling results using the average of 25 runs provides more confidence in the average model results.

4. Validation Results

The validation results discussed below show how well the model represents field verified volumes and speeds. The methodology for validation of speeds and volume follow the *FHWA Traffic Analysis Toolbox Volume III.*

The link by link validation data is summarized in Appendix A

Existing Volume Validation

Volume validation is summarized for freeway mainlines and ramps. The volume validation uses the GEH static to compare modeled volumes to observed volumes.

The GEH statistic compares the modeled Paramics volume to the actual balanced observed count volumes for each time period. According to best practices, if the GEH statistic is below 5 for 85% or more of the links, then the modeled volumes are considered an acceptable representation of the observed volumes. The GEH statistic is defined as:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Where: M = Paramics Modeled Volume
C = Balanced Observed Volume

The GEH statistic was used to compare the modeled volume and observed volumes in hour increments for two hour periods in both the AM (7-9 AM) and PM (4-6 PM) peak periods. Below is a summary of the GEH statistics for the mainline links. A full link-by-link comparison of the GEH is in Appendix A. The GEH summary in Table 2 indicates that the existing AM and PM models closely match the balanced 2014 volume sets.

Table 2: The Percent of Freeway links in 2014 Existing Model with GEH < 5.0

AM Model		PM Model	
7-8 AM	8-9 AM	4-5 PM	5-6 PM
92 %	99 %	100 %	99 %

Existing Speed Validation

Speed validation in this section is summarized for I-94 freeway links. Additional speed validation results on a link-by-link basis for I-94, I-96, I-75, and M-10 are shown in Appendix A.

The best practice for speed validation is to maximize the number of segments that are within 10 mph of the observed speed range.

The modeled speeds were validated against the *HERE* speed database for the Tuesday-Thursday average of October and November 2014, and against the speed data on the day of the count (AM peak: November 5, PM peak: October 8). The Paramics model captures the increase and decrease of congestion over the model periods. For each model there are 2 critical hours that are summarized in the tables below. The tables show the percentages of mainlines that is in each speed category and then the summary of how each category validates to the speed category. The percentage of links is based on link length.

The calculations summarized in the tables are determined using the following definitions.

$Speed_{Day}$ – Observed Speed the day of the count

$Speed_{2Month}$ – Observed average speed for Tuesday-Thursday in October and November 2014

$Speed_{Mod}$ – The Average Modeled speed

$$Observed\ Speed\ = \frac{Speed_{Day}+Speed_{2Month}}{2}$$

Within 10 mph: $if\ Speed_{Mod} > minimum(Speed_{Day}, Speed_{2Month}) - 10$
$and\ Speed_{Mod} < maximum(Speed_{Day}, Speed_{2Month}) + 10$

Slower by 10 mph: $if\ Speed_{Mod} < minimum(Speed_{Day}, Speed_{2Month}) - 10$

Faster by 10 mph: $if\ Speed_{Mod} > maximum(Speed_{Day}, Speed_{2Month}) + 10$

Table 3: Eastbound Speed Validation for AM Peak – EB I-94

	7- 8 AM				8-9 AM			
Observed Speed (mph)	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph
> 50	59%	91%	9%	0%	59%	91%	9%	0%
40 – 50	24%	60%	0%	40%	24%	49%	0%	51%
30 - 40	7%	100%	0%	0%	7%	87%	13%	0%
20 - 30	10%	100%	0%	0%	3%	100%	0%	0%
< 20	0%	0%	0%	0%	7%	100%	0%	0%
Total		**85.35%**	**5.01%**	**9.64%**		**81.67%**	**5.91%**	**12.42%**

Table 4: Westbound Speed Validation for AM Peak – WB I-94

	7- 8 AM				8-9 AM			
Observed Speed (mph)	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph
> 50	58%	87%	13%	0%	50%	100%	0%	0%
40 – 50	27%	100%	0%	0%	27%	100%	0%	0%
30 - 40	15%	100%	0%	0%	15%	100%	0%	0%
20 - 30	0%	0%	0%	0%	8%	100%	0%	0%
< 20	0%	0%	0%	0%	0%	0%	0%	0%
Total		**92.29%**	**7.71%**	**0.00%**		**100.00%**	**0.00%**	**0.00%**

Table 5: Eastbound Speed Validation for PM Peak – EB I-94

	4 - 5 PM				5 - 6 PM			
Observed Speed (mph)	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph
> 50	0%	0%	0%	0%	0%	0%	0%	0%
40 – 50	0%	0%	0%	0%	0%	0%	0%	0%
30 - 40	34%	79%	0%	21%	7%	100%	0%	0%
20 - 30	31%	89%	11%	0%	41%	63%	0%	37%
< 20	34%	88%	0%	12%	52%	100%	0%	0%
Total		**85.18%**	**3.50%**	**11.33%**		**84.53%**	**0.00%**	**15.47%**

Table 6: Westbound Speed Validation for PM Peak – WB I-94

	4 - 5 PM				5 - 6 PM			
Observed Speed (mph)	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph	% of total Directional Links	% within 10 mph	% slower by > 10 mph	% faster by > 10 mph
> 50	31%	100%	0%	0%	31%	100%	0%	0%
40 – 50	15%	100%	0%	0%	15%	100%	0%	0%
30 - 40	4%	100%	0%	0%	4%	0%	0%	100%
20 - 30	50%	72%	0%	28%	50%	98%	0%	2%
< 20	0%	0%	0%	0%	0%	0%	0%	0%
Total		**85.86%**	**0.00%**	**14.14%**		**95.04%**	**0.00%**	**4.96%**

The tables above show that the modeled speed matches 80% to 100% of the links on I-94 during the critical analysis hours. This indicates that the existing model acceptably replicates real world conditions.

5. Operational Observations

The model validation process discussed in the previous sections shows that the existing models are a fair representation of existing conditions and therefore can be used to assess existing operations.

AM Peak Period Observations

Eastbound I-94

In the morning peak hours, eastbound congestion focuses most heavily at the entrance ramp merges from Northbound and Southbound I-96 to Eastbound I-94. Some ramp backups occur, although the backups remain predominantly upstream along I-94 eastbound ahead of the merges as highlighted by the slow speeds in Figure 13. From the M-10 interchange on westward, congestion opens up with speeds increasing once again, as shown in Figure 14. The Paramics image in Figure 18 below in *AM Model Observations* highlights the eastbound merge section along I-94 from I-96.

Westbound I-94

Westbound congestion in the morning peak hours is much more distributed than that experienced in the eastbound direction. Congestion remains focused along I-94 upstream of the diverge to I-75, shown in Figure 15 with congestion clearing up after this diverge (Figure 16). The cause of the congestion is from a high frequency of entrance and exit ramps along I-94 upstream of I-75, with congestion following a shockwave pattern up and down this corridor for a majority of the 7am-9am peak hours. See Figure 19 in *AM Model Observations* below, highlighting the westbound corridor in question.

Figure 13: Eastbound Congestion at I-96

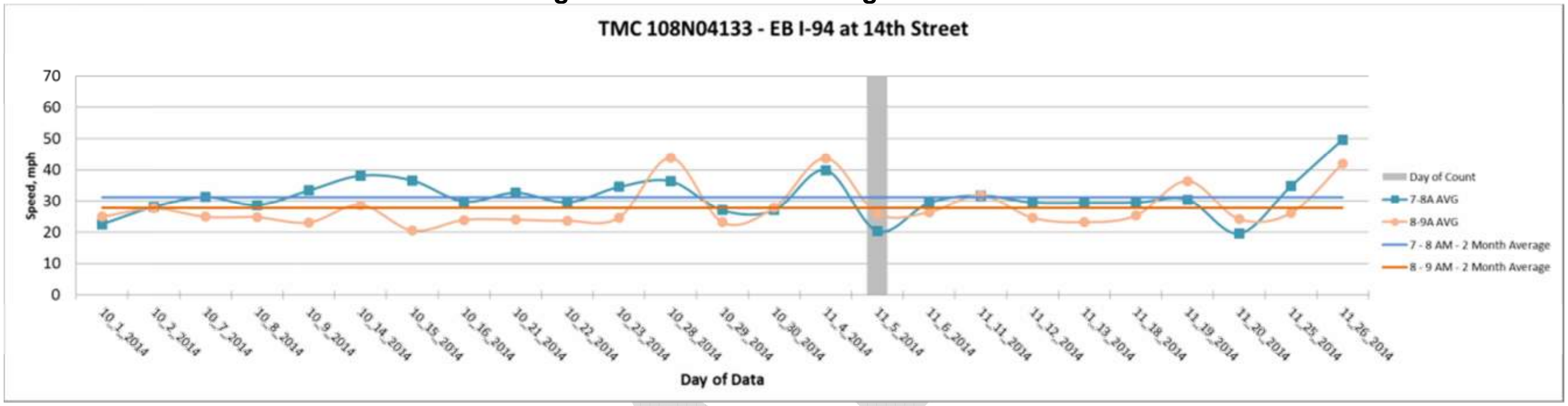


Figure 14: Congestion Clears at M-10

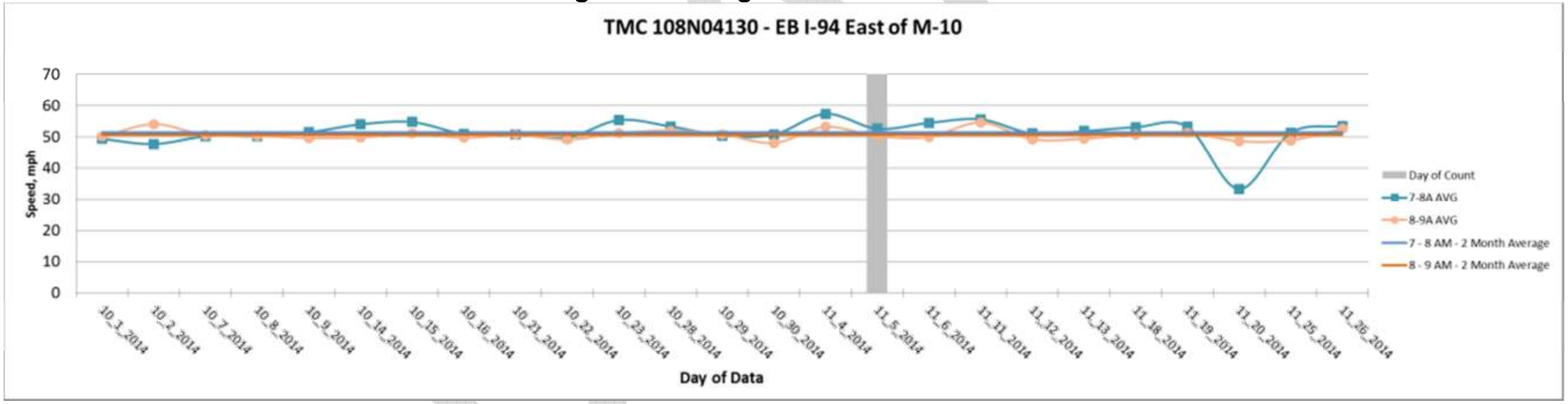


Figure 15: Westbound I-94 Congestion Upstream of Diverge to I-75

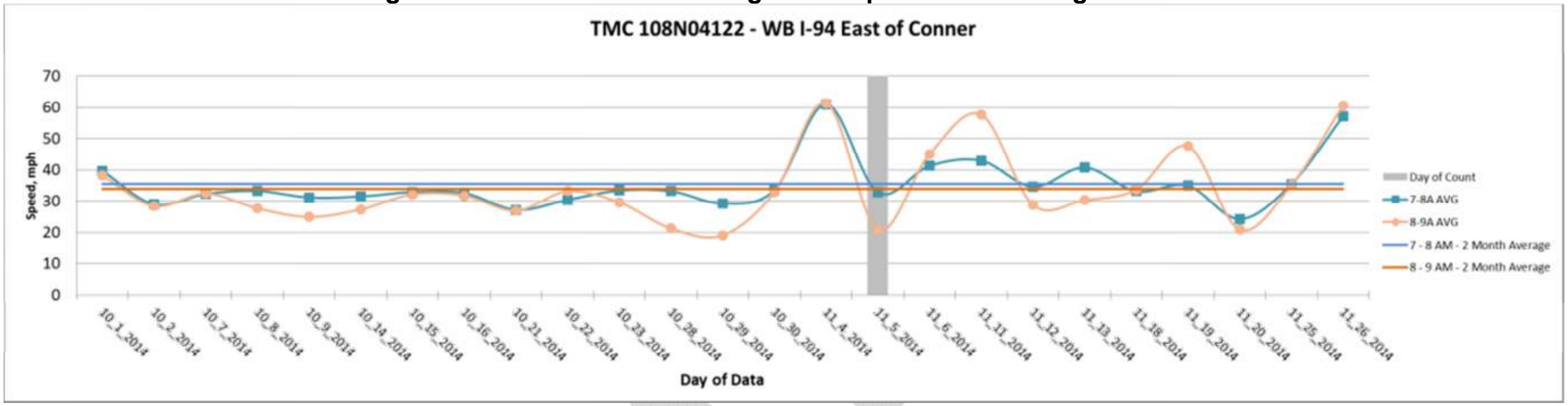
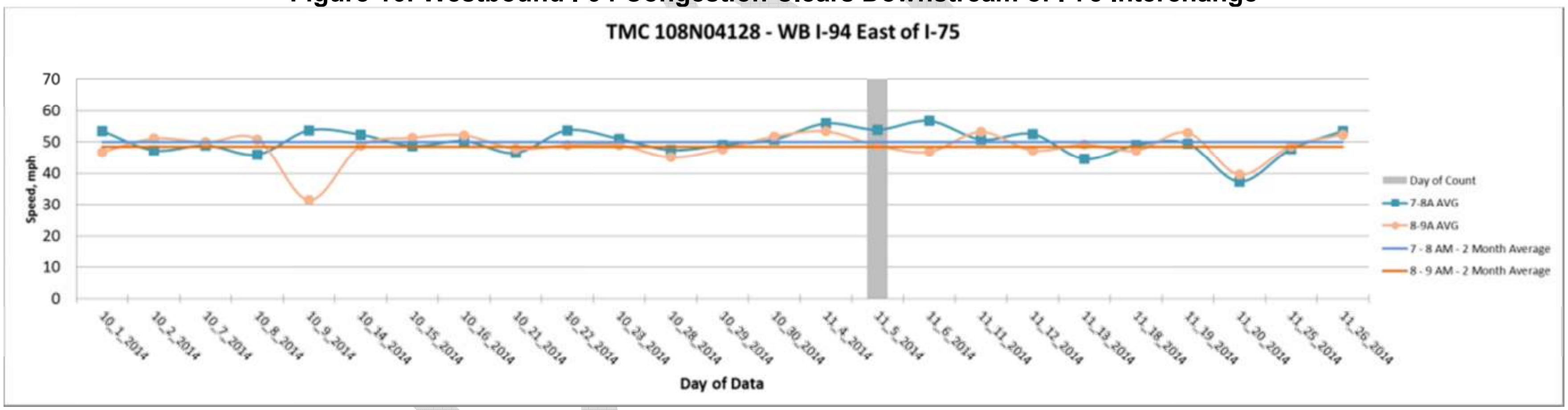


Figure 16: Westbound I-94 Congestion Clears Downstream of I-75 Interchange



AM Model Observations

Figure 17: AM Congestion Zones

Figure 18: Eastbound Congestion on I-94 from Merging I-96 Traffic

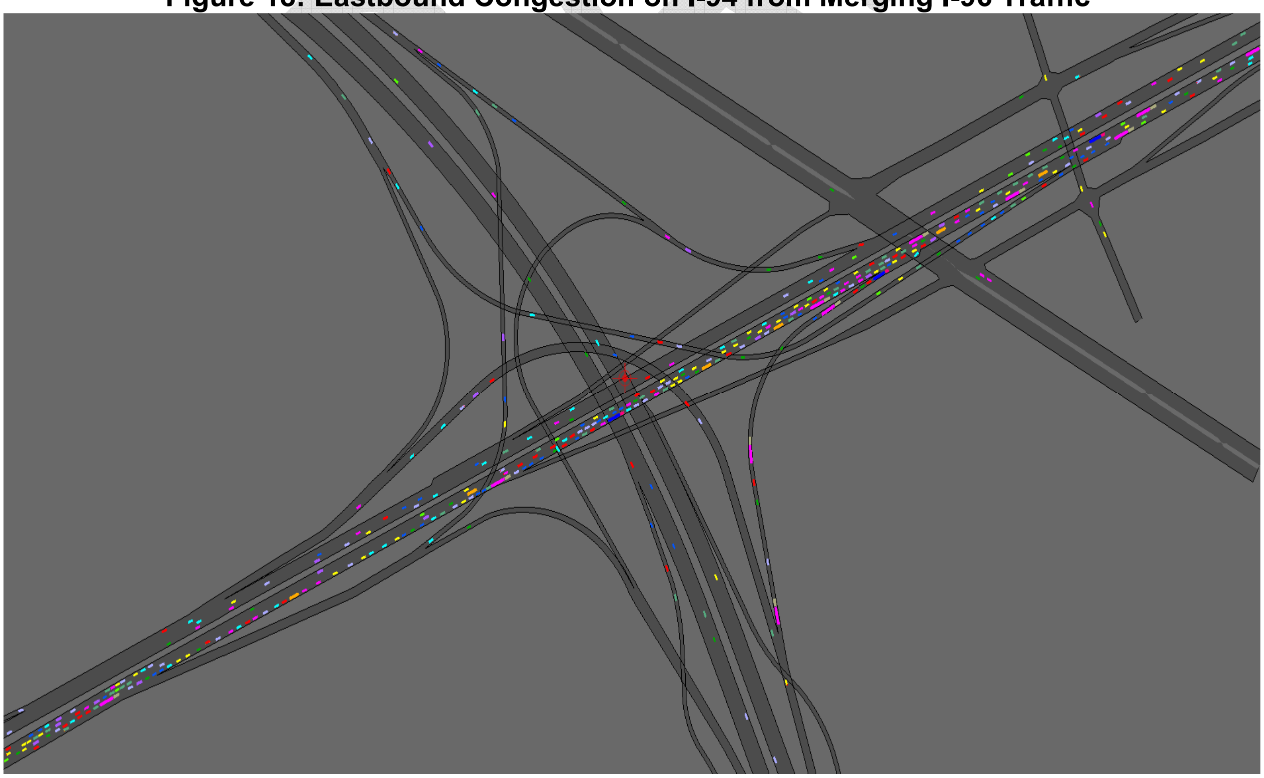
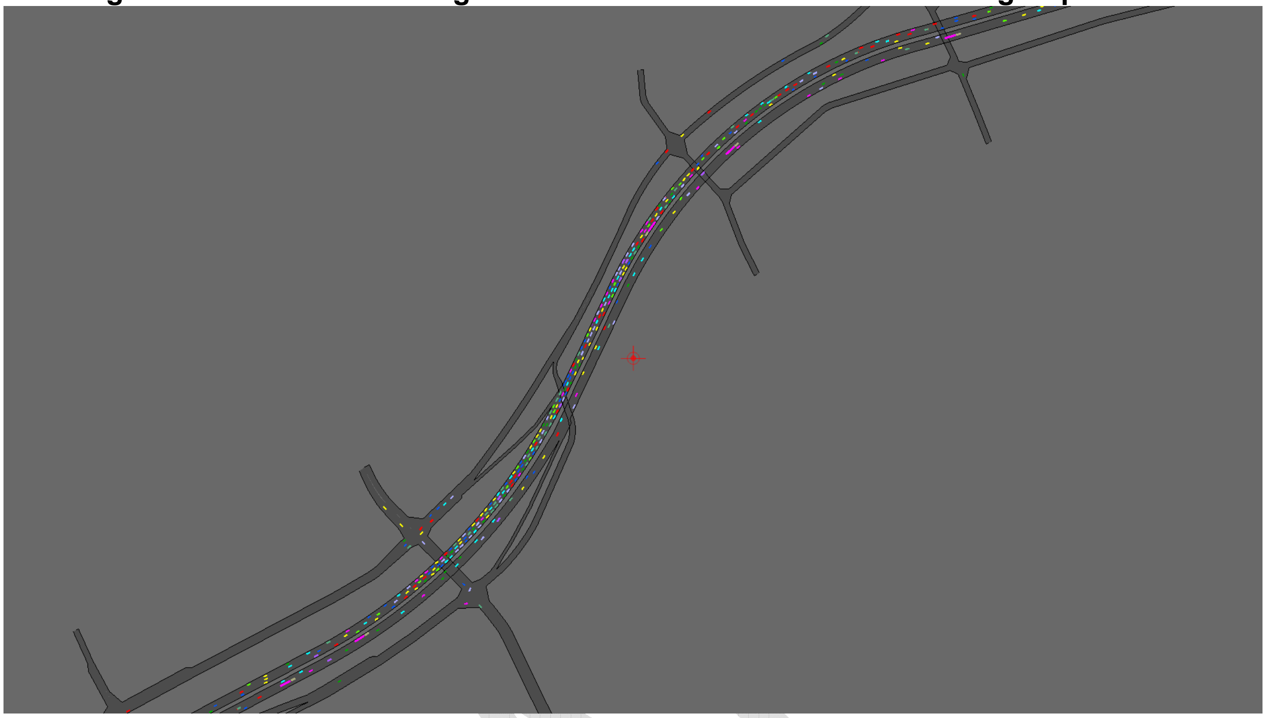


Figure 19: Westbound Congestion Shockwave from I-94/I-75 Diverge Upstream



PM Peak Period Observations

Eastbound

The *HERE* speed data indicated that there is consistent congestion in the Eastbound direction from I-75 to Conner (Figure 20). This congestion creates queues and impacts operations upstream to I-96 (Figure 21). The speed data and model results show shockwave effect for facilities upstream of I-75, creating varying degrees of congestion between model runs and observed data. This modeled eastbound congestion is captured in Figure 25, Figure 26, and Figure 28.

Westbound I-94

The data and model results show westbound I-94 is congested between Trumbull and I-75. The major bottleneck for this direction occurs at Trumbull (Figure 22) and M-10 entrance ramps with queues extending upstream towards I-75 (Figure 23).

Figure 20: Eastbound I-94 Congestion at I-75

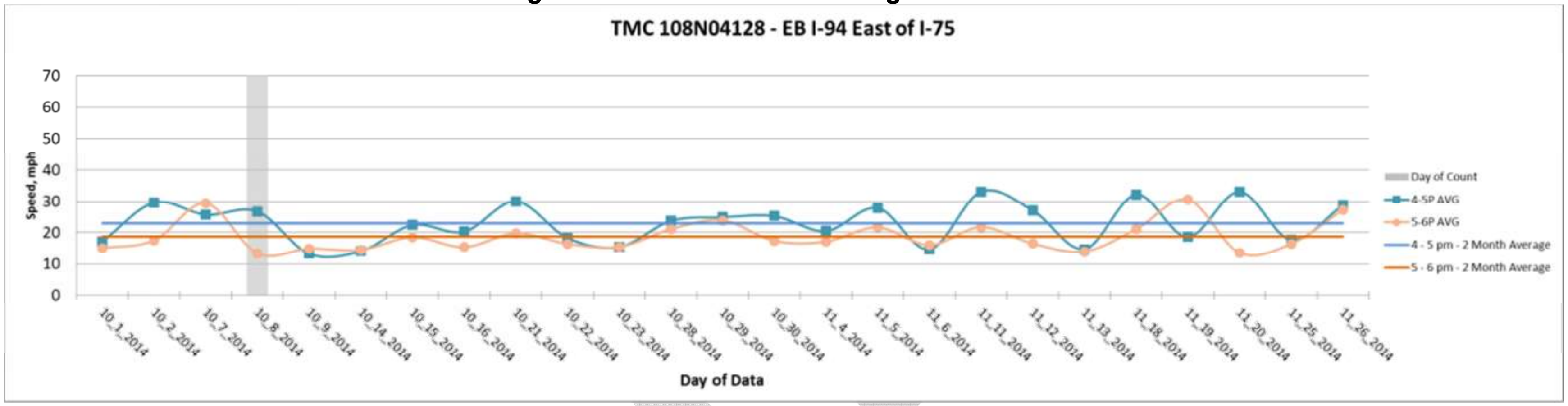


Figure 21: Eastbound I-94 Congestion near I-96 Impacted from downstream Queues

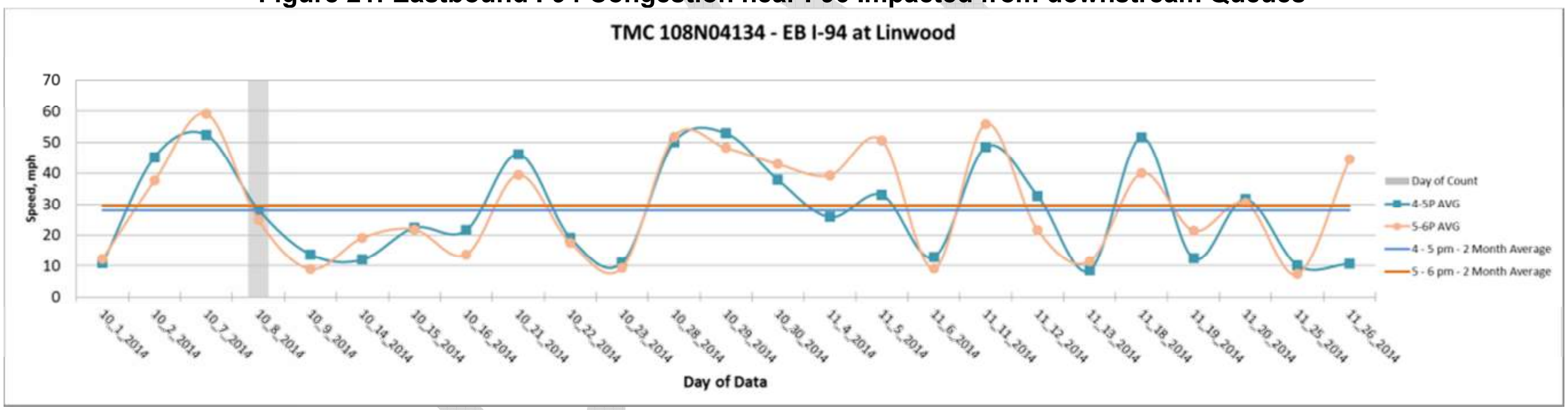


Figure 22: Westbound I-94 Congestion at Trumbull

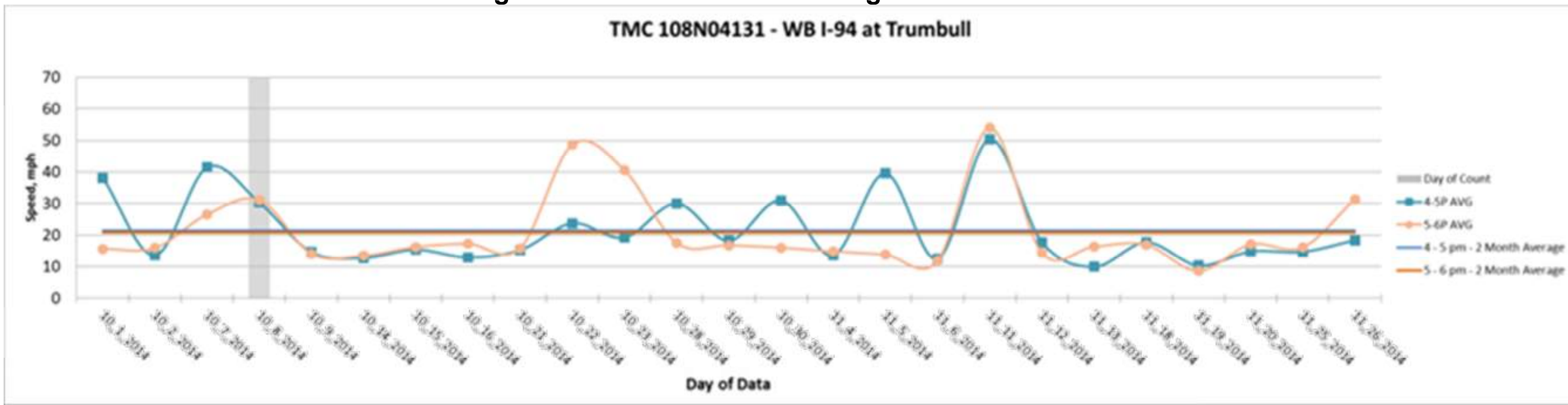
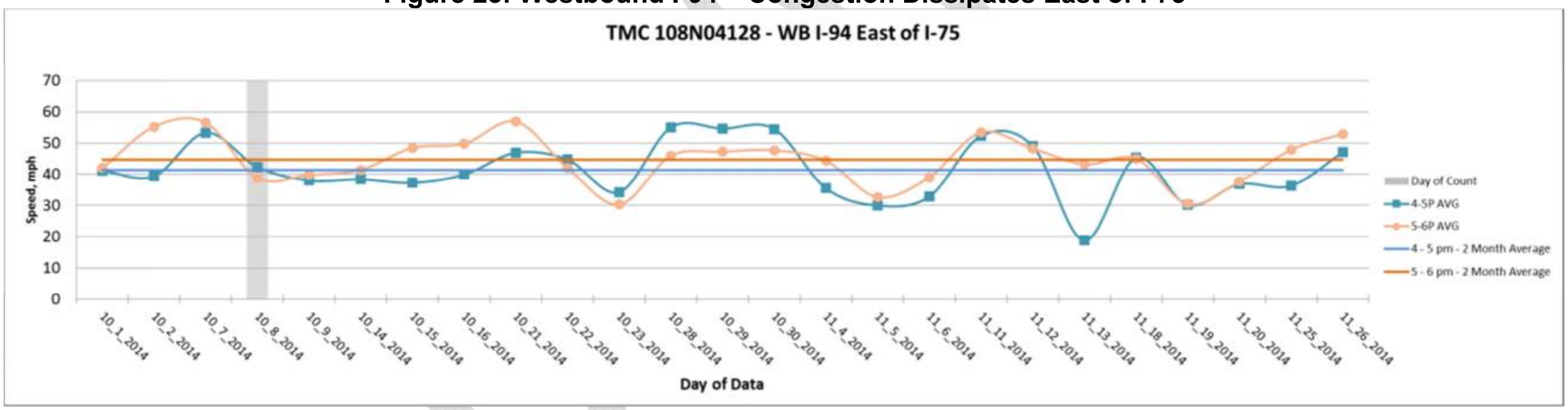


Figure 23: Westbound I-94 – Congestion Dissipates East of I-75



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PM Model Observations

The images below are screen captures from the PM Existing Paramics Model, which shows congestion levels at different times of the day. This congestion is consistent with the speed profiles shown above.

The figure below shows queues forming in the EB and WB directions around M-10 and I-75. The westbound queues are from Trumbull towards I-75 and the EB is from I-75 through the M-10 Interchange.

Figure 24: PM Congestion Zones

Figure 25: PM Existing at 3:30 PM – WB and EB Congestion

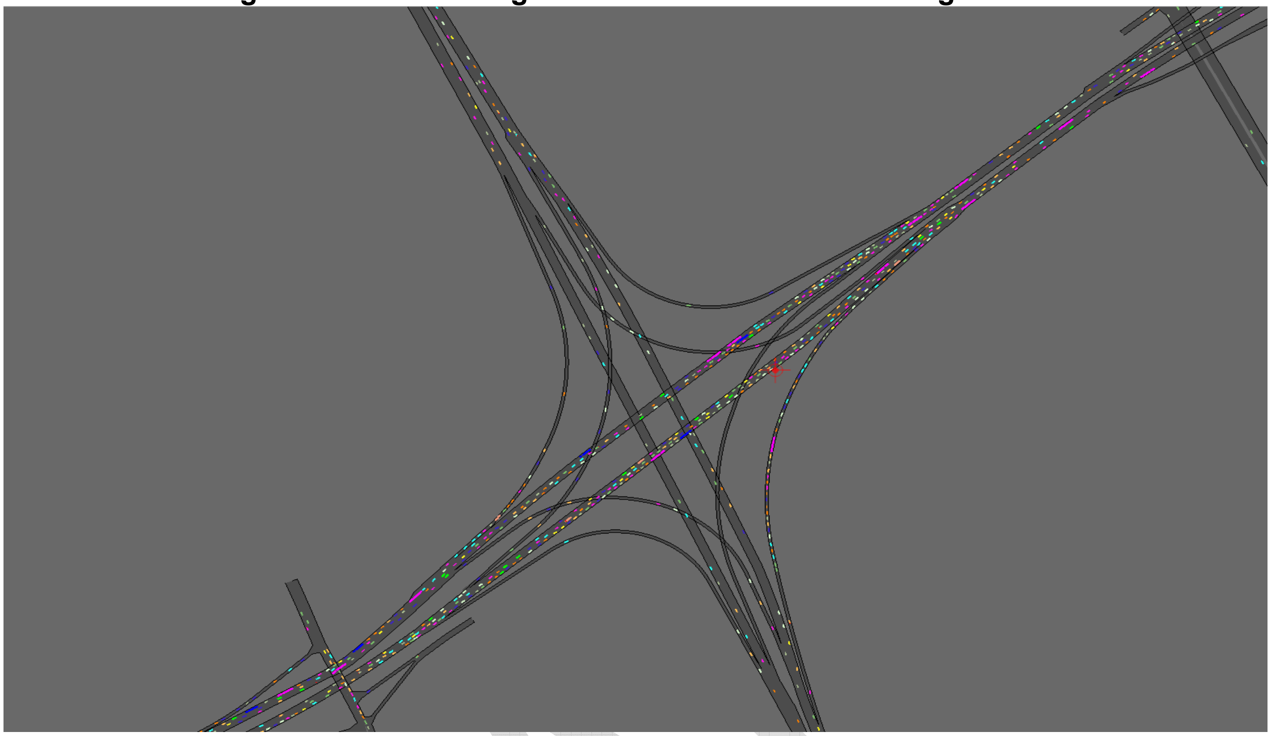
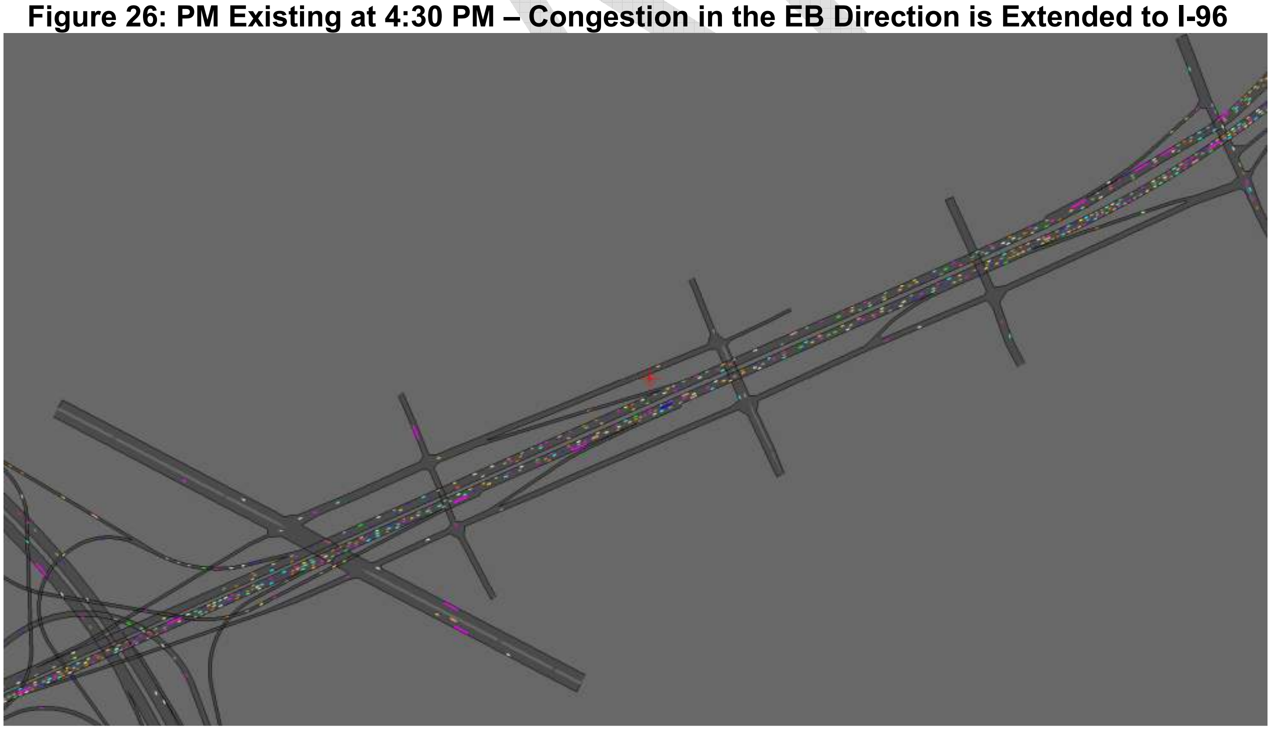
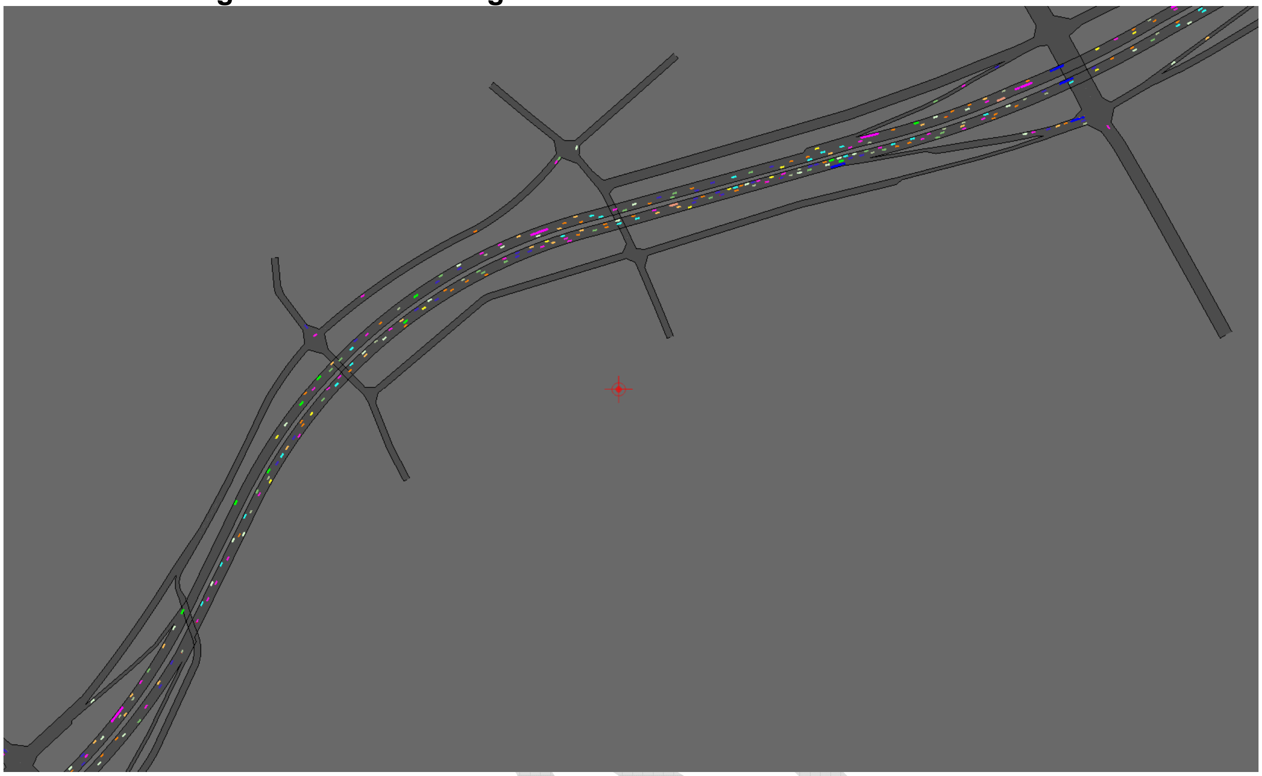


Figure 26: PM Existing at 4:30 PM – Congestion in the EB Direction is Extended to I-96



The figure below show Eastbound I-94 traffic east of I-75 traveling near 30 mph, but no queues are forming in this section. Westbound I-94 is at free flow speeds.

Figure 27: PM Existing at 4:30 PM – Eastbound I-94 East of I-75



The figure below shows heavy congestion persisting for the EB and WB I-94 west of I-75.

Figure 28: PM Existing at 5:30 PM

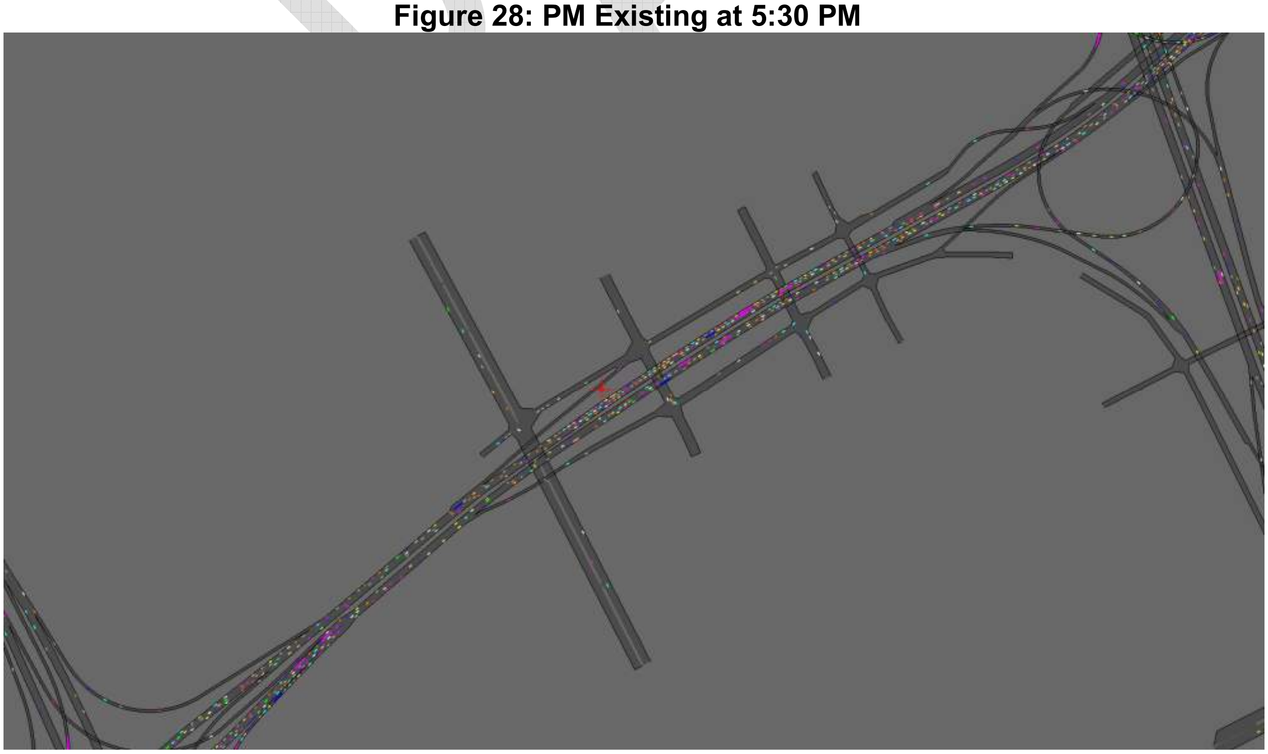
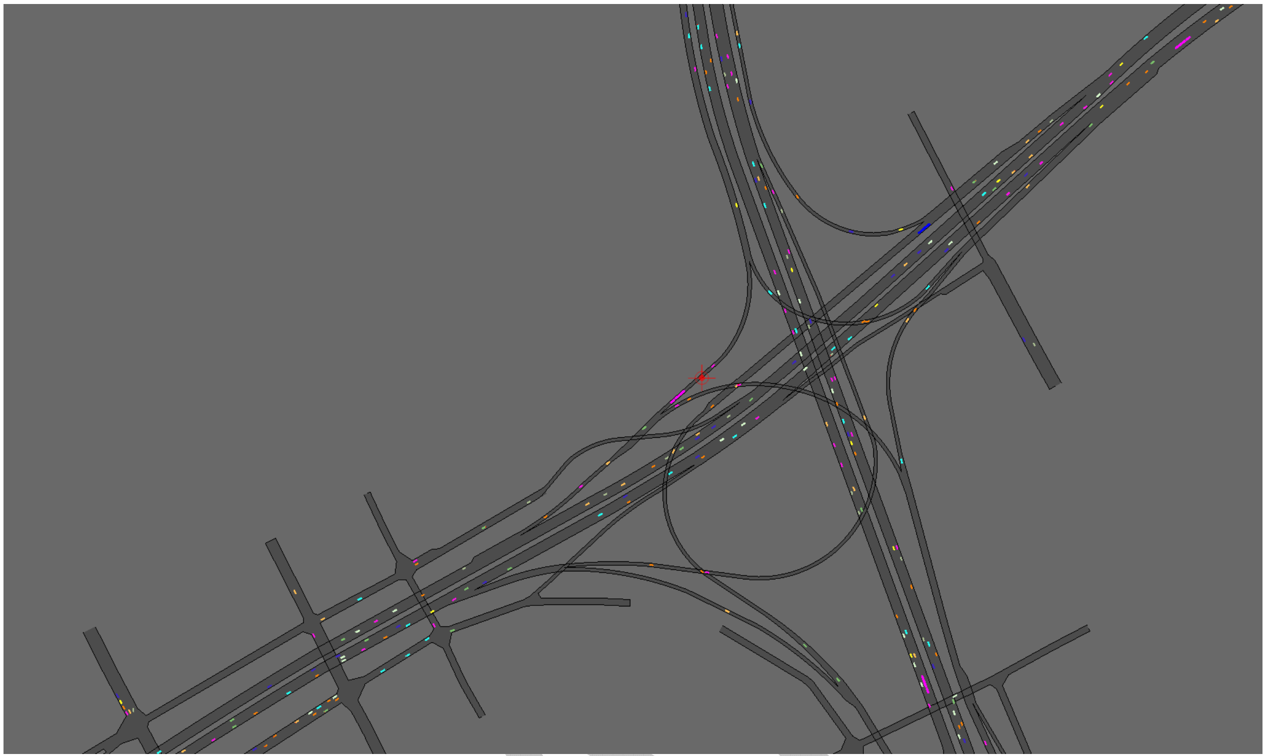


Figure 29: PM Existing at 6:45 – I-94 Congestion is Cleared in Both Directions.



Appendix A: Validation Sheets

AM Period - Existing Validation

EB I-94

			AM67				AM78											AM89											AM910			
Link	Facility	Type	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
1014:1012	EB I-94 West of I-96	Mainline	4266	52.91			4370	374	4744	4575	2.48	48	F	24.64			3760	360	4120	4236	1.79	43	E	25.77			3808	48.71		
1018:1019	EB I-94 to SB I-96	Ramp	233				250	21	271	255	0.99	-	-				140	16	156	163	0.55	-	-				150			
1027:1008	EB I-94 to NB I-96	Ramp	680				750	30	780	756	0.87	-	-				610	33	643	662	0.74	-	-				585			
1012:1010		Mainline	3332	56.93	44.50	53.75	3370	323	3693	3524	2.81	59	F	20.91	17.08	31.17	3010	311	3321	3431	1.89	59	F	20.41	16.83	22.08	3093	45.52	48.36	40.25
1022:1023	EB I-94 Exit to Grand River	Ramp	164				170	10	180	170	0.76	-	-				160	10	170	178	0.61	-	-				159			
1010:159		Mainline	3149	52.53	44.50	53.75	3200	313	3513	3287	3.88	94	F	12.24	17.08	31.17	2850	301	3151	3273	2.15	98	F	11.66	16.83	22.08	2987	32.45	48.36	40.25
983:982	NB I-96 to EB I-94	Ramp	457				470	73	543	525	0.78	-	-				340	121	461	467	0.28	-	-				425			
187:158		Mainline	3585	29.88			3670	386	4056	3784	4.34	102	F	13.03			3190	422	3612	3751	2.29	104	F	12.78			3439	25.02		
978:979	SB I-96 to EB I-94	Ramp	938				1070	33	1103	1097	0.18	-	-				930	40	970	968	0.06	-	-				904			
186:966		Mainline	4498	38.48	39.13	52.00	4740	419	5159	4869	4.10	61	F	27.79	20.40	31.67	4120	462	4582	4718	1.99	63	F	26.44	25.82	27.67	4362	35.82	42.36	38.17
972:971	EB I-94 Entrance from Linwood	Ramp	114				210	10	220	136	6.30	-	-				290	19	309	194	7.25	-	-				179			
966:965		Mainline	4607	36.53	48.10	53.50	4950	429	5379	5004	5.20	47	F	27.44	28.82	39.50	4410	481	4891	4911	0.29	50	F	26.08	36.42	37.17	4544	34.13	48.09	45.00
965:960		Mainline	4577	40.52	48.10	53.50	4950	429	5379	5000	5.26	48	F	35.94	28.82	39.50	4410	481	4891	4912	0.30	49	F	34.85	36.42	37.17	4554	39.91	48.09	45.00
962:963	EB I-94 Entrance from 14th St	Ramp	56				60	10	70	62	0.98	-	-				100	11	111	109	0.19	-	-				94			
960:959		Mainline	4625	53.09			5010	439	5449	5063	5.32	25	C	51.88			4510	492	5002	5020	0.25	26	C	50.82			4649	52.02		
975:976	EB I-94 Exit to Trumbull	Ramp	528				700	10	710	591	4.67	-	-				670	10	680	585	3.78	-	-				539			
959:952		Mainline	4086	56.90	52.00	56.67	4310	429	4739	4472	3.93	28	D	56.64	39.43	47.25	3840	482	4322	4434	1.69	28	D	56.18	42.45	45.25	4112	56.22	56.00	50.75
952:951		Mainline	4074	57.88	52.00	56.67	4310	429	4739	4472	3.93	27	D	57.83	39.43	47.25	3840	482	4322	4435	1.71	27	D	57.81	42.45	45.25	4113	57.61	56.00	50.75
949:950	EB I-94 Exit to SB Hwy 10	Ramp	629				730	10	740	703	1.38	-	-				730	10	740	758	0.66	-	-				707			
951:943		Mainline	3439	56.77	55.67	55.75	3580	419	3999	3768	3.71	23	C	56.77	50.60	51.33	3110	472	3582	3677	1.58	23	C	56.92	50.83	50.58	3406	56.61	55.17	52.83
943:944	EB I-94 Exit to NB Hwy 10	Ramp	517				590	33	623	573	2.04	-	-				490	29	519	556	1.60	-	-				481			
943:919		Mainline	2913	58.84	55.67	55.75	2990	386	3376	3195	3.16	19	C	58.92	50.60	51.33	2620	443	3063	3122	1.06	19	C	59.09	50.83	50.58	2925	58.79	55.17	52.83
919:918		Mainline	2904	57.88	55.67	55.75	2990	386	3376	3194	3.18	20	C	57.34	50.60	51.33	2620	443	3063	3122	1.06	20	C	57.01	50.83	50.58	2926	56.65	55.17	52.83
918:912		Mainline	2898	57.76	55.67	55.75	2990	386	3376	3188	3.28	23	C	49.46	50.60	51.33	2620	443	3063	3125	1.11	25	C	45.68	50.83	50.58	2927	49.61	55.17	52.83
916:915	EB I-94 Entrance from NB Hwy 10	Ramp	425				490	16	506	512	0.27	-	-				490	37	527	534	0.30	-	-				475			
937:936	EB I-94 Entrance from SB Hwy 10	Ramp	617				700	13	713	695	0.68	-	-				640	11	651	610	1.63	-	-				615			
912:180		Mainline	3934	51.42			4180	415	4595	4390	3.06	25	C	36.08			3750	491	4241	4272	0.48	28	D	32.73			4019	40.61		
180:910		Mainline	3922	45.24			4180	415	4595	4383	3.16	41	E	37.09			3750	491	4241	4275	0.52	44	E	34.77			4023	38.69		
926:927	EB I-94 Exit to John R	Ramp	245				280	23	303	293	0.58	-	-				270	24	294	292	0.12	-	-				271			
910:909		Mainline	3665	50.51	49.91	51.42	3900	392	4292	4086	3.18	32	D	45.20	47.09	46.42	3480	467	3947	3985	0.60	33	D	42.85	45.83	45.75	3755	45.08	48.92	46.33
909:906		Mainline	3650	51.42	49.91	51.42	3900	392	4292	4086	3.18	29	D	49.59	47.09	46.42	3480	467	3947	3986	0.62	29	D	48.49	45.83	45.75	3756	49.39	48.92	46.33
906:904		Mainline	3642	50.43	49.91	51.42	3900	392	4292	4086	3.18	28	D	50.12	47.09	46.42	3480	467	3947	3986	0.62	29	D	49.54	45.83	45.75	3757	49.55	48.92	46.33
299:314	EB I-94 Exit to SB I-75	Ramp	450				520	25	545	519	1.13	-	-				590	22	612	602	0.41	-	-				585			
300:301	EB I-94 Exit to NB I-75	Ramp	816				870	181	1051	992	1.85	-	-				780	181	961	983	0.71	-	-				936			
904:903		Mainline	2358	58.64	49.91	51.42	2510	186	2696	2576	2.34	15	B	58.99	47.09	46.42	2110	264	2374	2400	0.53	14	B	59.21	45.83	45.75	2237	59.07	48.92	46.33
903:890		Mainline	2355	62.12	49.91	51.42	2510	186	2696	2576	2.34	14	B	62.60	47.09	46.42	2110	264	2374	2400	0.53	13	B	62.81	45.83	45.75	2237	62.69	48.92	46.33
901:900	EB I-94 Entrance from Beaubien	Ramp	140				150	10	160	158	0.16	-	-				210	10	220	215	0.34	-	-				198			
890:889		Mainline	2491	53.97	51.11	50.75	2660	196	2856	2733	2.33	13	B	54.09	52.45	50.08	2320	274	2594	2617	0.45	13	B	54.03	51.83	50.58	2435	54.05	51.17	50.33
892:893	EB I-94 Exit to Russel	Ramp	220				260	13	273	255	1.11	-	-				210	29	239	238	0.06	-	-				222			
889:881		Mainline	2267	56.25	51.11	50.75	2400	183	2583	2477	2.11	15	B	56.30	52.45	50.08	2110	245	2355	2380	0.51	15	B	56.35	51.83	50.58	2212	56.36	51.17	50.33
881:878		Mainline	2259	56.22	51.11	50.75	2400	183	2583	2474	2.17	15	B	55.67	52.45	50.08	2110	245	2355	2383	0.58	15	B	56.35	51.83	50.58	2214	57.02	51.17	50.33
281:282	EB I-94 Entrance from SB I-75	Ramp	668				740	58	798	714	3.06	-	-				540	55	595	575	0.83	-	-				556			
285:286	EB I-94 Entrance from NB I-75	Ramp	417				460	26	486	484	0.09	-	-				460	25	485	491	0.27	-	-				427			
878:183		Mainline	3336	56.88			3600	267	3867	3672	3.18	14	B	56.22			3110	325	3435	3450	0.26	13	B	56.93			3196	57.77		
183:876		Mainline	3330	57.10			3600	267	3867	3672	3.18	17	B	56.41			3110	325	3435	3452	0.29	16	B	57.26			3195	58.07		
887:888	EB I-94 Exit to Chene	Ramp	93				110	10	120	112	0.74	-	-				130	11	141	135	0.51	-	-				134			
876:875		Mainline	3230	58.90			3490	257	3747	3559	3.11	21	C	58.73			2980	314	3294	3319	0.43	20	C	58.97			3060	59.32		
875:872		Mainline	3221	58.27			3490	257	3747	3557	3.14	21	C	58.23			2980	314	3294	3322	0.49	20	C	58.33			3060	58.50		
872:869		Mainline	3204	57.96			3490	257	3747	3556	3.16	21	C	57.82			2980	314	3294	3324	0.52	20	C	57.98			3063	58.19		
871:870	EB I-94 Entrance from Chene St	Ramp	68				60	26	86	85	0.11	-	-				70	10	80	76	0.45	-	-				68			
869:860		Mainline	3260	57.19	58.60	58.75	3550	283	3833	3637	3.21	17	B	56.39	57.73	58.17	3050	324	3374	3405	0.53	16	B	57.06	61.83	58.83	3131	57.69	57.78	58.67
863:864	EB I-94 Exit to Elliot	Ramp	207				240	24	264	254	0.62	-	-				180	33	213	218	0.34	-	-				194			
860:859		Mainline	3039	50.81	58.60	58.75	3310	259	3569	3383	3.15	24	C	48.59	57.73	58.17	2870	291	3161	3193	0.57	22	C	50.71	61.83	58.83	2935	53.11	57.78	58.67
859:192		Mainline	3023	55.57	58.60	58.75	3310	259	3569	3381	3.19	21	C	55.32	57.73	58.17	2870	291	3161	3199	0.67	20	C	55.45	61.83	58.83	2934	55.98	57.78	58.67
856:855	EB I-94 Entrance from Elliot	Ramp	96				100	10	110	108	0.19	-	-				130	10	140	141	0.08	-	-				132			
836:834		Mainline	3110	57.36			3410	269	3679	3489	3.17	21	C	56.77			3000	301	3301	3342	0.71	21	C	56.76			3066	57.61		
834:832		Mainline	3092	54.90			3410	269	3679	3486	3.22	23	C	53.47			3000	301	3301	3347	0.80	22	C	54.18			3065	56.13		
832:829		Mainline	3080	45.68			3410	269	3679	3479	3.34	28	D	43.21			3000	301	3301	3355	0.94	26	C	45.18			3065	50.99		
848:849	EB I-94 Exit to Van Dyke	Ramp	206				240	23	263	246	1.07	-	-				270	31	301	293	0.46	-	-				272			
829:827		Mainline	2856	41.01	58.00	58.67	3170	246	3416	3229	3.24	28	D	40.53	59.20	57.75	2730	270	3000	3068	1.23	26	C	41.30	59.33	57.92	2795	43.37	58.00	57.33
827:160		Mainline	2848	52.87	58.00	58.67	3170	246	3416	3228	3.26	21	C	53.28	59.20	57.75	2730	270	3000	3069	1.25	20	C	52.98	59.33	57.92	2795	51.82	58.00	57.33
841:842	EB I-94 Entrance from Van Dyke	Ramp	110				110	30	140	139	0.08	-	-				80	13	93	92	0.10	-	-				79			
160:826		Mainline	2957	56.63			3280	276	3556	3367	3.21	15	B	56.74			2810	283	3093	3162	1.23	15	B	56.76			2874	55.83		
826:809		Mainline	2936	59.81			3280	276	3556	3367	3.21	20	C	59.83			2810	283	3093	3164	1.27	19	C	59.68			2874	59.29		
809:807		Mainline	2931	56.98			3280	276	3556	3366	3.23	21	C	56.93			2810	283	3093	3166	1.30	20	C	56.37			2873	55.98		
818:819	EB I-94 Exit to Gratiot	Ramp	179				220	14	234	221	0.86	-	-				310	19	329	316	0.72	-	-				299			
807:806		Mainline	2738	53.91	57.83	59.17	3060	262	3322	3143	3.15	20	C	54.13	55.64	59.33	2500	264	2764	2855	1.72	18	C	54.87	60.27	60.00	2573	54.22	60.33	58.75
823:824	EB I-94 Entrance from Gratiot	Ramp	149				160	10	170	165	0.39	-	-				180	10	190	192	0.14	-	-				171			
803:800		Mainline	2878	65.87			3220	272	3492	3306	3.19	17	B	65.72			2680	274	2954	3050	1.75	16	B	65.82			2745	65.69		
6209:6210	EB I-94 Exit to French	Ramp	186				230	10	240	219	1.39	-	-				200	10	210	211	0.07	-	-				190			
800:6208		Mainline	2687	53.30	59.86	59.00	2990	262	3252	3088	2.91	20	C	53.03	62.25	60.00	2480	264	2744	2840	1.82	19	C	53.67	61.00	60.08	2554	53.21	60.80	60.25
6208:6214		Mainline	2668	53.31	59.86	59.00	2990	262	3252	3086	2.95	20	C	53.15	62.25	60.00	2480	264	2744	2846	1.93	18	C	54.02	61.00	60.08	2555	53.64	60.80	60.25
6250:6251	EB I-94 Entrance from French	Ramp	83				90	10	100	102	0.20	-	-				70	10	80	80	0.00	-	-				68			
6215:6220		Mainline	2739	59.81			3080	272	3352	3188	2.87	19	C	59.43			2550	274	2824	2929	1.96	18	B	58.49			2623	58.42		
6221:6222	EB I-94 Exit to Conner	Ramp	354				420	43	463	425	1.80	-	-				490	51	541	514	1.18	-	-				499			
6220:6229		Mainline	2377	54.79	57.63	57.75	2660	229	2889	2762	2.39	18	B	54.68	58.11	58.83	2060	223	2283	2416	2.74	15	B	55.05	61.20	58.83	2125	54.90	54.44	58.58
6229:6232		Mainline	2374	55.98	57.63	57.75	2660	229	2889	2761	2.41	17	B	55.92	58.11	58.83	2060	223	2283	2417	2.76	15	B	56.60	61.20	58.83	2125	56.53	54.44	58.58
6249:6248	EB I-94 Entrance from Conner	Ramp	150				160	11	171	172	0.08	-	-				190	16	206	205	0.07	-	-				187			
6234:6238		Mainline	2498	58.56			2820	240	3060	2927	2.43	17	B	58.49			2250	239	2489	2634	2.86	16	B	58.40			2308	58.33		
6238:6239	EB I-94 East of Conner	Mainline	2479	57.34			2820	240	3060	2925	2.47	18	B	57.00			2250	239	2489	2637	2.92	16	B	57.12			2312	57.30		

AM Period - Existing Validation

WB I-94

Link	Facility	Type	AM67 Model Output Volume	AM67 Simulation Speed (mph)	AM67 Avg Hour Speed, Date of Count	AM67 2mo. Avg Hour Speed	AM78 Auto Volume Lookup	AM78 Truck volume Lookup	AM78 Total Volume Lookup	AM78 Model Output Volume	AM78 GEH (Target v. Model)	AM78 Density pc/mi/ln	AM78 LOS	AM78 Simulation Speed (mph)	AM78 Avg Hour Speed, Date of Count	AM78 2mo. Avg Hour Speed	AM89 Auto Volume Lookup	AM89 Truck volume Lookup	AM89 Total Volume Lookup	AM89 Model Output Volume	AM89 GEH (Target v. Model)	AM89 Density pc/mi/ln	AM89 LOS	AM89 Simulation Speed (mph)	AM89 Avg Hour Speed, Date of Count	AM89 2mo. Avg Hour Speed	AM910 Model Output Volume	AM910 Simulation Speed (mph)	AM910 Avg Hour Speed, Date of Count	AM910 2mo. Avg Hour Speed
6237:6233	WB I-94 East of Conner	Mainline	4586	54.03			4910	265	5175	5105	0.98	37	E	47.06			3970	290	4260	4146	1.76	32	D	44.63			3864	54.55		
6233:6230		Mainline	4578	54.99			4910	265	5175	5102	1.02	40	E	43.14			3970	290	4260	4151	1.68	35	E	40.86			3864	55.22		
6246:6247	WB I-94 Exit to Conner	Ramp	224				200	73	273	270	0.18	-	-				270	47	317	311	0.34	-	-				291			
6230:6228		Mainline	4343	52.24	45.82	53.17	4710	192	4902	4819	1.19	44	E	37.19	26.92	36.08	3700	243	3943	3852	1.46	36	E	36.49	21.33	34.25	3575	53.45	37.00	51.08
6228:161		Mainline	4329	48.82	45.82	53.17	4710	192	4902	4797	1.51	53	F	30.57	26.92	36.08	3700	243	3943	3878	1.04	39	E	33.80	21.33	34.25	3575	54.43	37.00	51.08
6224:161	WB I-94 Entrance fromNB Conner	Ramp	270				300	11	311	300	0.63	-	-				250	7	257	259	0.12	-	-				230			
6218:6217	WB I-94 Entrance from SB Conner	Ramp	229				250	10	260	258	0.12	-	-				380	8	388	389	0.05	-	-				345			
206:801		Mainline	4781	55.45			5260	213	5473	5322	2.06	40	E	45.17			4330	258	4588	4566	0.33	38	E	41.74			4152	56.91		
6213:6212	WB I-94 Entrance from French	Ramp	109				120	12	132	127	0.44	-	-				120	9	129	128	0.09	-	-				117			
802:804		Mainline	4857	52.28			5380	225	5605	5431	2.34	45	F	40.72			4450	267	4717	4717	0.00	43	E	37.83			4272	53.60		
811:812	WB I-94 Exit to Gratiot	Ramp	237				260	28	288	274	0.84	-	-				310	34	344	343	0.05	-	-				311			
815:816	WB I-94 Entrance from Gratiot	Ramp	555				630	10	640	625	0.60	-	-				570	17	587	592	0.21	-	-				525			
808:810		Mainline	5109	55.96			5750	207	5957	5698	3.39	45	F	42.63			4710	250	4960	5060	1.41	45	E	38.79			4493	57.12		
837:838	WB I-94 Exit to Van Dyke	Ramp	78				80	28	108	104	0.39	-	-				90	33	123	124	0.09	-	-				116			
810:828		Mainline	5016	51.65	48.18	52.33	5670	179	5849	5575	3.63	52	F	36.25	34.45	39.33	4620	217	4837	4956	1.70	51	F	33.14	32.67	37.50	4379	52.17	54.36	49.58
828:830		Mainline	5004	52.43	48.18	52.33	5670	179	5849	5561	3.81	54	F	34.74	34.45	39.33	4620	217	4837	4971	1.91	53	F	32.08	32.67	37.50	4382	53.31	54.36	49.58
845:846	WB I-94 Entrance from Van Dayke	Ramp	401				460	28	488	458	1.38	-	-				470	28	498	473	1.13	-	-				440			
831:833		Mainline	5334	52.38			6130	207	6337	5971	4.67	53	F	38.27			5090	245	5335	5495	2.17	52	F	35.78			4831	54.06		
833:835		Mainline	5323	53.12			6130	207	6337	5962	4.78	54	F	37.52			5090	245	5335	5505	2.31	53	F	35.15			4832	55.97		
851:852	WB I-94 Exit to Elliot	Ramp	164				190	10	200	181	1.38	-	-				160	19	179	191	0.88	-	-				160			
835:858		Mainline	5120	44.15	55.00	54.17	5940	197	6137	5758	4.91	60	F	32.64	39.60	42.75	4930	226	5156	5343	2.58	60	F	30.50	36.50	39.33	4682	51.05	55.64	48.67
858:861		Mainline	5080	44.30	55.00	54.17	5940	197	6137	5739	5.16	50	F	38.86	39.60	42.75	4930	226	5156	5364	2.87	50	F	36.31	36.50	39.33	4694	48.69	55.64	48.67
866:867	WB I-94 Entrance from Elliot	Ramp	348				370	30	400	392	0.40	-	-				580	50	630	613	0.68	-	-				584			
873:874		Mainline	5367	55.02			6310	227	6537	6125	5.18	41	E	50.55			5510	276	5786	5988	2.63	42	E	48.50			5282	55.33		
882:883	WB I-94 Entrance from Chene	Ramp	167				180	13	193	193	0.00	-	-				210	18	228	231	0.20	-	-				210			
874:877		Mainline	5507	52.39			6490	240	6730	6318	5.10	32	D	50.46			5720	294	6014	6218	2.61	33	D	48.20			5499	53.05		
289:290	WB I-94 Exit to NB I-75	Ramp	405				490	22	512	480	1.44	-	-				350	29	379	430	2.54	-	-				352			
293:294	WB I-94 Exit to SB I-75	Ramp	994				1220	53	1273	1199	2.10	-	-				1140	70	1210	1280	1.98	-	-				1128			
877:880		Mainline	4074	47.09	56.00	54.50	4780	165	4945	4632	4.52	34	D	46.31	51.36	50.08	4230	195	4425	4515	1.35	34	D	44.71	47.75	48.75	4022	47.16	55.20	49.67
880:891		Mainline	4066	55.49	56.00	54.50	4780	165	4945	4630	4.55	29	D	53.35	51.36	50.08	4230	195	4425	4519	1.41	30	D	52.08	47.75	48.75	4022	54.39	55.20	49.67
896:897	WB I-94 Exit to Beaubien	Ramp	572				700	10	710	664	1.76	-	-				700	11	711	748	1.37	-	-				638			
891:902		Mainline	3485	55.39	55.27	53.00	4080	155	4235	3962	4.26	26	D	51.12	47.40	47.92	3530	184	3714	3775	1.00	26	C	50.48	48.73	48.58	3384	54.72	52.70	48.58
902:188		Mainline	3480	55.28	55.27	53.00	4080	155	4235	3961	4.28	27	D	49.37	47.40	47.92	3530	184	3714	3776	1.01	26	D	48.79	48.73	48.58	3384	55.17	52.70	48.58
276:277	WB I-94 Entrance from NB I-75	Ramp	389				420	37	457	454	0.14	-	-				390	32	422	419	0.15	-	-				387			
278:279	WB I-94 Entrance from SB I-75	Ramp	813				900	75	975	881	3.09	-	-				760	72	832	788	1.55	-	-				775			
188:189		Mainline	4675	54.01	55.27	53.00	5400	267	5667	5293	5.05	29	D	47.10	47.40	47.92	4680	288	4968	4985	0.24	27	D	46.76	48.73	48.58	4547	54.11	52.70	48.58
189:905		Mainline	4663	52.52	55.27	53.00	5400	267	5667	5287	5.13	40	E	45.69	47.40	47.92	4680	288	4968	4992	0.34	37	E	46.08	48.73	48.58	4547	53.31	52.70	48.58
905:908		Mainline	4642	51.10	55.27	53.00	5400	267	5667	5273	5.33	42	E	42.37	47.40	47.92	4680	288	4968	5012	0.62	39	E	43.88	48.73	48.58	4546	52.91	52.70	48.58
928:929	WB I-94 Entrance from John R	Ramp	252				270	20	290	283	0.41	-	-				270	20	290	290	0.00	-	-				257			
911:26		Mainline	4860	46.43	60.67	57.00	5670	287	5957	5534	5.58	44	E	42.72	58.55	54.25	4950	308	5258	5332	1.02	42	E	43.78	57.00	53.33	4798	48.31	54.91	53.92
26:913		Mainline	4857	58.26	60.67	57.00	5670	287	5957	5535	5.57	33	D	57.43	58.55	54.25	4950	308	5258	5331	1.00	32	D	57.75	57.00	53.33	4798	58.58	54.91	53.92
920:921	WB I-94 Exit to NB Hwy 10	Ramp	842				1070	18	1088	1004	2.60	-	-				910	20	930	1017	2.79	-	-				851			
913:30		Mainline	4011	51.78	60.67	57.00	4600	269	4869	4530	4.95	30	D	51.93	58.55	54.25	4040	288	4328	4315	0.20	29	D	52.02	57.00	53.33	3948	51.44	54.91	53.92
932:933	WB I-94 Exit to SB Hwy 10	Ramp	701				870	28	898	836	2.11	-	-				840	28	868	912	1.47	-	-				796			
30:923		Mainline	3298	55.81	60.67	57.00	3730	241	3971	3695	4.46	23	C	55.79	58.55	54.25	3200	260	3460	3402	0.99	21	C	56.65	57.00	53.33	3151	55.66	54.91	53.92
923:924		Mainline	3287	51.65	60.67	57.00	3730	241	3971	3694	4.47	25	C	50.75	58.55	54.25	3200	260	3460	3406	0.92	22	C	52.78	57.00	53.33	3151	53.01	54.91	53.92
924:185		Mainline	3274	50.75	60.67	57.00	3730	241	3971	3694	4.47	26	C	49.58	58.55	54.25	3200	260	3460	3410	0.85	23	C	52.29	57.00	53.33	3150	54.39	54.91	53.92
941:942	WB I-94 Entrance from SB Hwy 10	Ramp	567				630	35	665	659	0.23	-	-				430	41	471	474	0.14	-	-				450			
947:948	WB I-94 Entrance from NB Hwy 10	Ramp	313				350	10	360	361	0.05	-	-				310	11	321	324	0.17	-	-				293			
954:3607		Mainline	4142	51.38	64.50	59.92	4710	286	4996	4713	4.06	24	C	51.06	63.90	57.67	3940	312	4252	4212	0.61	21	C	52.51	59.09	56.75	3892	53.50	57.67	57.75
3607:955		Mainline	4141	52.90	64.50	59.92	4710	286	4996	4713	4.06	23	C	52.96	63.90	57.67	3940	312	4252	4213	0.60	20	C	54.19	59.09	56.75	3892	54.84	57.67	57.75
957:958	WB I-94 Entrance from Trumbull	Ramp	213				230	10	240	233	0.46	-	-				290	9	299	301	0.12	-	-				265			
961:964		Mainline	4310	56.83	63.44	59.58	4940	296	5236	4939	4.16	30	D	55.89	68.00	56.83	4230	321	4551	4528	0.34	28	D	56.28	58.89	55.58	4155	57.22	57.20	56.50
967:968	WB I-94 Exit to Linwood	Ramp	151				180	11	191	180	0.81	-	-				160	11	171	169	0.15	-	-				154			
964:974		Mainline	4146	50.16	62.88	60.83	4760	285	5045	4758	4.10	34	D	47.89	69.00	59.17	4070	310	4380	4365	0.23	31	D	48.87	61.50	56.92	3998	50.34	60.57	58.42
974:994		Mainline	4127	50.60	62.88	60.83	4760	285	5045	4754	4.16	33	D	49.34	69.00	59.17	4070	310	4380	4372	0.12	31	D	48.80	61.50	56.92	3999	50.39	60.57	58.42
1001:1002	WB I-94 Exit to SB I-96	Ramp	74				80	18	98	96	0.20	-	-				80	13	93	95	0.21	-	-				85			
1001:1004	WB I-94 Exit to NB I-96	Ramp	939				1170	58	1228	1142	2.50	-	-				1090	53	1143	1199	1.64	-	-				1039			
994:995		Mainline	3090	57.61	63.50	60.75	3510	209	3719	3515	3.39	21	C	57.90	66.17	58.42	2900	244	3144	3083	1.09	18	C	58.07	56.00	57.17	2875	57.51	58.33	57.58
999:998	WB I-94 Entrance from Linwood	Ramp	48				50	10	60	61	0.13	-	-				50	9	59	61	0.26	-	-				56			
162:1011		Mainline	3128	57.58	63.50	60.75	3560	219	3779	3573	3.40	21	C	57.80	66.17	58.42	2950	253	3203	3149	0.96	19	C	58.17	56.00	57.17	2933	57.62	58.33	57.58
990:991	WB I-94 Entrance from SB I-96	Ramp	142				150	10	160	161	0.08	-	-				150	20	170	174	0.30	-	-				163			
1020:1021	WB I-94 Entrance from NB I-96	Ramp	526				540	79	619	604	0.61	-	-				460	101	561	568	0.29	-	-				509			
1011:1013	WB I-94 West of I-96	Mainline	3784	56.16			4250	308	4558	4335	3.34	20	C	55.97			3560	374	3934	3895	0.62	18	C	56.26			3603	56.07		

AM Period - Existing Validation

Section	Link	Facility	Type	AM67 Model Output Volume	AM67 Simulation Speed (mph)	AM67 Avg Hour Speed, Date of Count	AM67 2mo. Avg Hour Speed	AM78 Auto Volume Lookup	AM78 Truck volume Lookup	AM78 Total Volume Lookup	AM78 Model Output Volume	AM78 GEH (Target v. Model)	AM78 Density pc/mi/ln	AM78 LOS	AM78 Simulation Speed (mph)	AM78 Avg Hour Speed, Date of Count	AM78 2mo. Avg Hour Speed	AM89 Auto Volume Lookup	AM89 Truck volume Lookup	AM89 Total Volume Lookup	AM89 Model Output Volume	AM89 GEH (Target v. Model)	AM89 Density pc/mi/ln	AM89 LOS	AM89 Simulation Speed (mph)	AM89 Avg Hour Speed, Date of Count	AM89 2mo. Avg Hour Speed	AM910 Model Output Volume	AM910 Simulation Speed (mph)	AM910 Avg Hour Speed, Date of Count	AM910 2mo. Avg Hour Speed
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	2482	73.26			2640	210	2850	2842	0.15	10	A	72.78			2640	210	2850	2836	0.26	10	A	72.70			2632	72.88		
	1614:1615		Mainline	2479	68.55			2640	210	2850	2840	0.19	11	A	68.34			2640	210	2850	2836	0.26	11	A	68.26			2633	68.45		
	1615:1618	SB I-96 Exit to Grand	Ramp	266				290	20	310	309	0.06	-	-				290	20	310	309	0.06	-	-				282			
	1615:1599		Mainline	2209	54.26	63.22	62.25	2350	190	2540	2530	0.20	12	B	54.12	54.20	58.67	2350	190	2540	2528	0.24	12	B	54.14	41.58	58.33	2350	54.17	65.17	62.50
	1599:1597		Mainline	2199	58.96	63.22	62.25	2350	190	2540	2528	0.24	11	B	58.73	54.20	58.67	2350	190	2540	2525	0.30	11	B	58.75	41.58	58.33	2353	58.86	65.17	62.50
	1597:1595		Mainline	2195	59.23	63.22	62.25	2350	190	2540	2528	0.24	11	B	59.05	54.20	58.67	2350	190	2540	2523	0.34	11	B	59.07	41.58	58.33	2355	59.15	65.17	62.50
	1595:1593		Mainline	2193	60.46	63.22	62.25	2350	190	2540	2527	0.26	11	A	60.30	54.20	58.67	2350	190	2540	2524	0.32	11	A	60.31	41.58	58.33	2355	60.40	65.17	62.50
	1607:1593	SB I-96 Entrance from Grand	Ramp	263				280	20	300	304	0.23	-	-				280	20	300	305	0.29	-	-				273			
	1593:1591		Mainline	2452	58.61			2630	210	2840	2831	0.17	10	A	58.03			2630	210	2840	2828	0.23	10	A	58.21			2627	58.68		
	1591:1589		Mainline	2447	60.01			2630	210	2840	2831	0.17	10	A	59.14			2630	210	2840	2828	0.23	10	A	59.60			2628	60.22		
	990:991	WB I-94 Entrance from SB I-96	Ramp	142				150	10	160	161	0.08	-	-				150	20	170	174	0.30	-	-				163			
	978:979	SB I-96 to EB I-94	Ramp	938				1070	33	1103	1097	0.18	-	-				930	40	970	968	0.06	-	-				904			
	1589:1577		Mainline	1346	57.98	58.75	60.08	1410	167	1577	1574	0.08	7	A	57.64	48.60	50.00	1550	150	1700	1686	0.34	8	A	57.58	38.60	46.92	1565	57.73	59.00	58.17
	1577:1574		Mainline	1339	60.15	58.75	60.08	1410	167	1577	1575	0.05	7	A	59.90	48.60	50.00	1550	150	1700	1684	0.39	7	A	59.75	38.60	46.92	1566	59.93	59.00	58.17
	1583:1584	SB I-96 Exit to Warren	Ramp	187				200	20	220	219	0.07	-	-				200	20	220	223	0.20	-	-				201			
	1574:1573		Mainline	1149	56.37	58.75	60.08	1210	147	1357	1356	0.03	6	A	56.20	48.60	50.00	1350	130	1480	1461	0.50	7	A	56.10	38.60	46.92	1365	56.12	59.00	58.17
	1573:1554		Mainline	1145	61.23	58.75	60.08	1210	147	1357	1356	0.03	6	A	60.97	48.60	50.00	1350	130	1480	1460	0.52	6	A	60.86	38.60	46.92	1366	60.99	59.00	58.17
	1018:1019	EB I-94 to SB I-96	Ramp	233				250	21	271	255	0.99	-	-				140	16	156	163	0.55	-	-				150			
	1001:1002	WB I-94 Exit to SB I-96	Ramp	74				80	18	98	96	0.20	-	-				80	13	93	95	0.21	-	-				85			
	1558:1559	SB I-96 Entrance from Warren	Ramp	248				260	20	280	278	0.12	-	-				260	20	280	280	0.00	-	-				247			
	163:1552	SB I-96 South of Entrance from Warren	Mainline	1684	59.15			1800	206	2006	1982	0.54	7	A	58.96			1830	179	2009	1999	0.22	7	A	59.08			1851	59.18		
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	1993	53.99			2110	175	2285	2263	0.46	9	A	53.79			2110	250	2360	2357	0.06	9	A	53.84			2157	53.90		
	1568:1569	NB I-96 Exit to Warren	Ramp	297				320	30	350	341	0.48	-	-				320	30	350	351	0.05	-	-				322			
	1553:1555		Mainline	1690	57.61			1790	145	1935	1919	0.36	7	A	57.33			1790	220	2010	2009	0.02	7	A	57.71			1835	57.82		
	983:982	NB I-96 to EB I-94	Ramp	457				470	73	543	525	0.78	-	-				340	121	461	467	0.28	-	-				425			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	526				540	79	619	604	0.61	-	-				460	101	561	568	0.29	-	-				509			
	1555:1572		Mainline	694	60.58	57.00	56.08	780	-7	773	779	0.22	3	A	60.51	57.25	56.33	990	-2	988	985	0.10	4	A	60.36	43.20	51.42	901	60.34	58.44	58.33
	1580:1579	NB I-96 Entrance from Warren	Ramp	58				60	10	70	72	0.24	-	-				60	10	70	69	0.12	-	-				60			
	1575:1576		Mainline	747	60.17	57.00	56.08	840	3	843	849	0.21	4	A	60.14	57.25	56.33	1050	8	1058	1054	0.12	4	A	60.00	43.20	51.42	963	60.03	58.44	58.33
	1576:1588		Mainline	745	63.61	57.00	56.08	840	3	843	849	0.21	3	A	63.52	57.25	56.33	1050	8	1058	1054	0.12	4	A	63.32	43.20	51.42	962	63.29	58.44	58.33
	1001:1004	WB I-94 Exit to NB I-96	Ramp	939				1170	58	1228	1142	2.50	-	-				1090	53	1143	1199	1.64	-	-				1039			
	1027:1008	EB I-94 to NB I-96	Ramp	680				750	30	780	756	0.87	-	-				610	33	643	662	0.74	-	-				585			
	1588:1590		Mainline	2348	50.59			2760	91	2851	2746	1.98	11	B	49.60			2750	94	2844	2918	1.38	12	B	49.90			2586	50.88		
	1590:1592		Mainline	2344	54.97	66.00	60.42	2760	91	2851	2746	1.98	10	A	54.50	63.14	59.50	2750	94	2844	2918	1.38	11	A	54.50	58.67	57.92	2586	55.14	61.63	60.42
	1602:1603	NB I-96 Exit to Grand	Ramp	189				210	20	230	222	0.53	-	-				210	20	230	237	0.46	-	-				211			
	1592:1594		Mainline	2150	58.56	66.00	60.42	2550	71	2621	2524	1.91	11	B	58.03	63.14	59.50	2540	74	2614	2681	1.30	12	B	58.17	58.67	57.92	2374	58.55	61.63	60.42
	1594:1596		Mainline	2144	56.26	66.00	60.42	2550	71	2621	2523	1.93	11	B	56.02	63.14	59.50	2540	74	2614	2682	1.32	12	B	56.13	58.67	57.92	2376	56.45	61.63	60.42
	1596:1598		Mainline	2133	55.62	66.00	60.42	2550	71	2621	2522	1.95	12	B	55.32	63.14	59.50	2540	74	2614	2683	1.34	12	B	55.48	58.67	57.92	2375	55.88	61.63	60.42
	1610:1611	NB I-96 Entrance from Grand	Ramp	146				150	10	160	159	0.08	-	-				150	10	160	158	0.16	-	-				150			
	1613:50	NB I-96 north of Entrance from Grand	Mainline	2260	55.52			2700	81	2781	2679	1.95	12	B	55.30			2690	84	2774	2844	1.32	13	B	55.41			2523	55.76		
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	4887	56.81	59.33	62.25	5400	162	5562	5514	0.65	26	C	54.09	64.00	61.83	5630	179	5809	5569	3.18	45	F	31.39	61.90	59.83	5456	37.84	60.57	61.08
	60:1405		Mainline	4879	57.25	59.33	62.25	5400	162	5562	5511	0.69	26	C	54.04	64.00	61.83	5630	179	5809	5565	3.24	45	F	31.10	61.90	59.83	5460	37.49	60.57	61.08
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	413				400	88	488	475	0.59	-	-				390	79	469	448	0.98	-	-				443			
	1405:1434		Mainline	4450	54.11	57.75	60.50	5000	74	5074	5027	0.66	33	D	50.65	59.33	59.33	5240	100	5340	5110	3.18	56	F	30.52	60.50	58.17	5023	36.30	61.56	58.83
	1434:1407		Mainline	4437	49.65	57.75	60.50	5000	74	5074	5024	0.70	36	E	47.45	59.33	59.33	5240	100	5340	5098	3.35	60	F	28.77	60.50	58.17	5031	33.79	61.56	58.83
	1407:1422		Mainline	4428	56.89	57.75	60.50	5000	74	5074	5019	0.77	32	D	53.04	59.33	59.33	5240	100	5340	5092	3.43	61	F	28.02	60.50	58.17	5037	34.71	61.56	58.83
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	442				500	18	518	491	1.20	-	-				560	10	570	579	0.38	-	-				509			
	1422:939		Mainline	4856	56.32			5500	92	5592	5498	1.26	27	D	50.94			5800	110	5910	5662	3.26	53	F	26.88			5559	32.99		
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	567				630	35	665	659	0.23	-	-				430	41	471	474	0.14	-	-				450			
	939:940		Mainline	4283	55.99			4870	57	4927	4837	1.29	34	D	47.78			5370	69	5439	5186	3.47	76	F	22.91			5113	29.10		
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	617				700	13	713	695	0.68	-	-				640	11	651	610	1.63	-	-				615			
	940:1431		Mainline	3653	53.37	59.00	57.75	4170	44	4214	4130	1.30	32	D	43.63	57.80	55.42	4730	58	4788	4572	3.16	66	F	23.29	56.00	51.75	4508	28.58	56.36	53.00
	1431:1435		Mainline	3639	52.52	59.00	57.75	4170	44	4214	4114	1.55	31	D	44.12	57.80	55.42	4730	58	4788	4571	3.17	53	F	29.04	56.00	51.75	4513	33.36	56.36	53.00
	1435:1441		Mainline	3631	57.09	59.00	57.75	4170	44	4214	4104	1.71	31	D	44.54	57.80	55.42	4730	58	4788	4564	3.28	62	F	24.74	56.00	51.75	4523	31.40	56.36	53.00
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	629				730	10	740	703	1.38	-	-				730	10	740	758	0.66	-	-				707			
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	701				870	28	898	836	2.11	-	-				840	28	868	912	1.47	-	-				796			
	1441:1442		Mainline	4951	50.38			5770	82	5852	5637	2.84	29	D	39.44			6300	96	6396	6226	2.14	50	F	25.03			6035	29.48		
	1442:1443		Mainline	4943	41.09			5770	82	5852	5621	3.05	45	E	31.65			6300	96	6396	6231	2.08	70	F	22.44			6040	24.90		
	1471:1472	SB Hwy 10 Exit to Forest	Ramp	1032				1200	10	1210	1157	1.54	-	-				1240	10	1250	1198	1.49	-	-				1195			
	1443:1445		Mainline	3885	57.66	59.60	60.67	4570	72	4642	4457	2.74	26	C	57.74	62.67	53.83	5060	86	5146	5022	1.74	29	D	58.20	55.25	52.83	4855	57.95	52.83	53.42
	1465:1466	SB Hwy 10 Entrance from Forest	Ramp	136				140	10	150	147	0.25	-	-				200	10	210	213	0.21	-	-				193			
	1447:54		Mainline	3996	56.67			4710	82	4792	4603	2.76	27	D	56.98			5260	96	5356	5238	1.62	30	D	57.87			5041	57.56		
	54:58	SB Hwy 10 South of Entrance from Forest	Mainline	3989	56.45			4710	82	4792	4602	2.77	27	D	56.77			5260	96	5356	5239	1.61	31	D	57.64			5039	57.40		

AM Period - Existing Validation

Section	Link	Facility	Type	AM67 Model Output Volume	AM67 Simulation Speed (mph)	AM67 Avg Hour Speed, Date of Count	AM67 2mo. Avg Hour Speed	AM78 Auto Volume Lookup	AM78 Truck volume Lookup	AM78 Total Volume Lookup	AM78 Model Output Volume	AM78 GEH (Target v. Model)	AM78 Density pc/mi/ln	AM78 LOS	AM78 Simulation Speed (mph)	AM78 Avg Hour Speed, Date of Count	AM78 2mo. Avg Hour Speed	AM89 Auto Volume Lookup	AM89 Truck volume Lookup	AM89 Total Volume Lookup	AM89 Model Output Volume	AM89 GEH (Target v. Model)	AM89 Density pc/mi/ln	AM89 LOS	AM89 Simulation Speed (mph)	AM89 Avg Hour Speed, Date of Count	AM89 2mo. Avg Hour Speed	AM910 Model Output Volume	AM910 Simulation Speed (mph)	AM910 Avg Hour Speed, Date of Count	AM910 2mo. Avg Hour Speed
NB Hwy 10	55:1448	NB Hwy 10 South of Exit to Forest	Mainline	2523	57.97			2800	65	2865	2872	0.13	17	B	57.47			2860	88	2948	2970	0.40	18	B	57.06			2667	57.53		
NB Hwy 10	1448:1444		Mainline	2516	56.21			2800	65	2865	2871	0.11	17	B	55.68			2860	88	2948	2973	0.46	18	C	54.92			2666	55.61		
NB Hwy 10	1461:1462	NB Hwy 10 Exit to Forest	Ramp	344				370	19	389	390	0.05	-	-				550	12	562	564	0.08	-	-				513			
NB Hwy 10	1444:1446		Mainline	2168	59.45		53.17	2430	46	2476	2482	0.12	14	B	58.98	60.40	54.50	2310	76	2386	2409	0.47	14	B	59.08	53.55	54.58	2153	59.48	59.33	52.17
NB Hwy 10	1446:1440		Mainline	2160	61.55		53.17	2430	46	2476	2479	0.06	14	B	61.30	60.40	54.50	2310	76	2386	2413	0.55	13	B	61.49	53.55	54.58	2153	61.68	59.33	52.17
NB Hwy 10	1469:1470	NB Hwy 10 Entrance from Forest	Ramp	564				630	10	640	637	0.12	-	-				820	15	835	842	0.24	-	-				755			
NB Hwy 10	1440:1439		Mainline	2716	54.80			3060	56	3116	3113	0.05	14	B	54.30			3130	91	3221	3257	0.63	15	B	54.15			2909	54.58		
NB Hwy 10	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	425				490	16	506	502	0.27	-	-				490	37	527	534	0.30	-	-				475			
NB Hwy 10	1439:1438		Mainline	2285	58.08		53.33	2570	40	2610	2599	0.22	15	B	57.78	54.80	54.25	2640	54	2694	2725	0.60	16	B	57.36	56.36	53.92	2434	57.93	54.25	52.75
NB Hwy 10	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	313				350	10	360	361	0.05	-	-				310	11	321	324	0.17	-	-				293			
NB Hwy 10	1438:1437		Mainline	1966	57.43		53.33	2220	30	2250	2238	0.25	13	B	57.10	54.80	54.25	2330	43	2373	2401	0.57	14	B	57.03	56.36	53.92	2143	57.22	54.25	52.75
NB Hwy 10	1437:1436		Mainline	1962	57.24		53.33	2220	30	2250	2238	0.25	13	B	56.91	54.80	54.25	2330	43	2373	2402	0.59	14	B	56.75	56.36	53.92	2144	57.03	54.25	52.75
NB Hwy 10	1436:1432		Mainline	1959	57.71		53.33	2220	30	2250	2237	0.27	13	B	57.31	54.80	54.25	2330	43	2373	2403	0.61	14	B	57.23	56.36	53.92	2143	57.49	54.25	52.75
NB Hwy 10	1432:1430		Mainline	1953	59.59		53.33	2220	30	2250	2236	0.30	13	B	59.10	54.80	54.25	2330	43	2373	2405	0.65	14	B	58.96	56.36	53.92	2143	59.30	54.25	52.75
NB Hwy 10	920:921	WB I-94 Exit to NB Hwy 10	Ramp	842				1070	18	1088	1004	2.60	-	-				910	20	930	1017	2.79	-	-				851			
NB Hwy 10	1430:938		Mainline	2788	50.61		53.33	3290	48	3338	3239	1.73	16	B	50.09	54.80	54.25	3240	63	3303	3424	2.09	17	B	49.93	56.36	53.92	2994	50.62	54.25	52.75
NB Hwy 10	943:944	EB I-94 Exit to NB Hwy 10	Ramp	517				590	33	623	573	2.04	-	-				490	29	519	556	1.60	-	-				481			
NB Hwy 10	182:1423		Mainline	3291	53.62			3880	81	3961	3805	2.50	18	C	52.02			3730	92	3822	3986	2.62	20	C	51.69			3476	53.86		
NB Hwy 10	1424:1425	NB Hwy 10 Exit to Milwaukee	Ramp	955				1150	10	1160	1106	1.60	-	-				970	12	982	1053	2.23	-	-				895			
NB Hwy 10	1423:1408		Mainline	2330	61.14		56.08	2730	71	2801	2696	2.00	15	B	60.82	56.71	56.83	2760	80	2840	2936	1.79	16	B	60.34	49.89	54.08	2581	60.86	55.70	55.42
NB Hwy 10	1408:1433		Mainline	2323	54.51		56.08	2730	71	2801	2694	2.04	17	B	54.25	56.71	56.83	2760	80	2840	2937	1.80	18	C	54.04	49.89	54.08	2582	54.25	55.70	55.42
NB Hwy 10	1433:1406		Mainline	2316	64.37		56.08	2730	71	2801	2694	2.04	14	B	64.00	56.71	56.83	2760	80	2840	2937	1.80	16	B	63.69	49.89	54.08	2583	64.07	55.70	55.42
NB Hwy 10	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	192				200	20	220	218	0.14	-	-				200	20	220	217	0.20	-	-				196			
NB Hwy 10	1406:61		Mainline	2502	52.58	68.00	54.17	2930	91	3021	2911	2.02	14	B	52.31	50.00	60.75	2960	100	3060	3155	1.70	15	B	52.13	62.17	59.25	2779	52.38	60.60	60.58
NB Hwy 10	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	2500	60.25	68.00	54.17	2930	91	3021	2911	2.02	12	B	59.95	50.00	60.75	2960	100	3060	3155	1.70	13	B	59.79	62.17	59.25	2779	60.09	60.60	60.58
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	6229	27.19			6890	311	7201	6449	9.10	52	F	25.14			6740	316	7056	6530	6.38	52	F	25.56			6531	26.23		
SB I-75	238:239	SB I-75 Exit to Clay	Ramp	259				250	59	309	272	2.17	-	-				250	44	294	269	1.49	-	-				279			
SB I-75	236:242		Mainline	5924	30.83	61.67	61.58	6640	252	6892	6177	8.85	56	F	27.86	50.67	50.17	6490	272	6762	6259	6.23	56	F	28.43	35.25	40.17	6254	28.73	47.08	49.67
SB I-75	242:244		Mainline	5885	31.01	61.67	61.58	6640	252	6892	6168	8.96	57	F	27.68	50.67	50.17	6490	272	6762	6264	6.17	58	F	27.66	35.25	40.17	6249	27.88	47.08	49.67
SB I-75	253:2851	SB I-75 Entrance from Clay	Ramp	456				500	14	514	497	0.76	-	-				560	11	571	551	0.84	-	-				506			
SB I-75	247:249		Mainline	6307	37.62			7140	266	7406	6663	8.86	46	F	37.01			7050	283	7333	6811	6.21	47	F	37.03			6762	37.23		
SB I-75	278:279	WB I-94 Entrance from SB I-75	Ramp	813				900	75	975	881	3.09	-	-				760	72	832	788	1.55	-	-				775			
SB I-75	281:282	EB I-94 Entrance from SB I-75	Ramp	668				740	58	798	714	3.06	-	-				540	55	595	556	0.83	-	-				556			
SB I-75	249:261		Mainline	4806	44.49	60.50	59.08	5500	133	5633	5066	7.75	38	E	45.03	45.45	49.42	5750	156	5906	5452	6.02	42	E	43.97	41.70	45.33	5431	43.65	44.83	49.42
SB I-75	261:262		Mainline	4797	55.74	60.50	59.08	5500	133	5633	5067	7.74	30	D	56.47	45.45	49.42	5750	156	5906	5451	6.04	34	D	54.51	41.70	45.33	5431	54.28	44.83	49.42
SB I-75	262:265		Mainline	4790	53.36	60.50	59.08	5500	133	5633	5067	7.74	32	D	54.17	45.45	49.42	5750	156	5906	5450	6.05	35	E	52.27	41.70	45.33	5431	51.58	44.83	49.42
SB I-75	265:266		Mainline	4769	52.38	60.50	59.08	5500	133	5633	5068	7.72	32	D	52.66	45.45	49.42	5750	156	5906	5449	6.07	36	E	51.81	41.70	45.33	5431	52.01	44.83	49.42
SB I-75	266:268		Mainline	4748	49.20	60.50	59.08	5500	133	5633	5067	7.74	35	D	49.45	45.45	49.42	5750	156	5906	5447	6.09	37	E	49.56	41.70	45.33	5434	49.52	44.83	49.42
SB I-75	311:312	SB I-75 Exit to Warren	Ramp	993				1160	15	1175	1060	3.44	-	-				1060	12	1072	1010	1.92	-	-				995			
SB I-75	268:269		Mainline	3747	67.51	57.78	58.92	4340	118	4458	4007	6.93	20	C	67.83	62.25	53.92	4690	144	4834	4436	5.85	22	C	67.53	55.56	53.17	4440	67.50	52.90	54.42
SB I-75	269:270		Mainline	3737	58.85	57.78	58.92	4340	118	4458	4006	6.95	23	C	59.12	62.25	53.92	4690	144	4834	4435	5.86	26	C	58.75	55.56	53.17	4440	58.73	52.90	54.42
SB I-75	299:314	EB I-94 Exit to SB I-75	Ramp	450				520	25	545	519	1.13	-	-				590	22	612	602	0.41	-	-				585			
SB I-75	293:294	WB I-94 Exit to SB I-75	Ramp	994				1220	53	1273	1199	2.10	-	-				1140	70	1210	1280	1.98	-	-				1128			
SB I-75	270:320		Mainline	5156	53.11	57.78	58.92	6080	196	6276	5722	7.15	28	D	52.76	62.25	53.92	6420	236	6656	6313	4.26	31	D	51.89	55.56	53.17	6155	52.57	52.90	54.42
SB I-75	320:321		Mainline	5148	61.28	57.78	58.92	6080	196	6276	5721	7.17	24	C	61.27	62.25	53.92	6420	236	6656	6312	4.27	26	D	61.04	55.56	53.17	6156	61.16	52.90	54.42
SB I-75	322:323	SB I-75 Entrance from Warren	Ramp	186				190	20	210	208	0.14	-	-				190	10	200	199	0.07	-	-				180			
SB I-75	321:69		Mainline	5313	57.22			6270	216	6486	5927	7.10	21	C	57.15			6610	246	6856	6510	4.23	23	C	56.99			6336	57.06		
SB I-75	69:70	SB I-75 South of Entrance from Warren	Mainline	5302	58.36			6270	216	6486	5928	7.08	21	C	58.30			6610	246	6856	6508	4.26	23	C	58.07			6339	58.17		
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	3925	61.13			4330	138	4468	4479	0.16	15	B	60.05			4170	147	4317	4322	0.08	15	B	60.13			3902	61.15		
NB I-75	339:340	NB I-75 Exit to Warren	Ramp	92				90	21	111	111	0.00	-	-				90	23	113	115	0.19	-	-				100			
NB I-75	324:319		Mainline	3813	55.21	57.14	58.42	4240	117	4357	4367	0.15	21	C	52.79	59.90	57.75	4080	124	4204	4212	0.12	20	C	53.29	60.73	58.67	3800	55.32	51.82	56.00
NB I-75	319:317		Mainline	3808	56.55	57.14	58.42	4240	117	4357	4365	0.12	20	C	55.49	59.90	57.75	4080	124	4204	4213	0.14	19	C	56.00	60.73	58.67	3800	56.51	51.82	56.00
NB I-75	276:277	WB I-94 Entrance from NB I-75	Ramp	389				420	37	457	454	0.14	-	-				390	32	422	419	0.15	-	-				387			
NB I-75	285:286	EB I-94 Entrance from NB I-75	Ramp	417				460	26	486	484	0.09	-	-				460	25	485	491	0.27	-	-				427			
NB I-75	315:263	NB I-75 to I-94 Ramp Entrance from NB Fronta	Ramp	140				150	8	158	157	0.08	-	-				140	7	147	146	0.08	-	-				132			
NB I-75	317:271		Mainline	3128	57.27	57.14	58.42	3510	62	3572	3582	0.17	21	C	56.90	59.90	57.75	3370	74	3444	3456	0.20	20	C	57.19	60.73	58.67	3118	57.28	51.82	56.00
NB I-75	306:305	NB I-75 Entrance from Warren	Ramp	347				380	19	399	398	0.05	-	-				370	11	381	383	0.10	-	-				345			
NB I-75	267:264		Mainline	3433	59.44	53.90	57.17	3890	81	3971	3973	0.03	23	C	59.34	60.75	56.42	3740	85	3825	3850	0.40	22	C	59.45	60.75	57.83	3465	59.53	59.64	56.92
NB I-75	300:301	EB I-94 Exit to NB I-75	Ramp	816				870	181	1051	992	1.85	-	-				780	181	961	983	0.71	-	-				936			
NB I-75	264:250		Mainline	4232	52.52	53.90	57.17	4760	262	5022	4960	0.88	24	C	52.01	60.75	56.42	4520	266	4786	4839	0.76	24	C	52.10	60.75	57.83	4400	52.50	59.64	56.92
NB I-75	289:290	WB I-94 Exit to NB I-75	Ramp	405				490	22	512	480	1.44	-	-				350	29	379	430	2.54	-	-				352			
NB I-75	248:245		Mainline	4613	53.36			5250	284	5534	5439	1.28	27	D	51.76			4870	295	5165	5271	1.47	26	C	52.54			4753	53.70		
NB I-75	255:256	NB I-75 Exit to Clay	Ramp	953				1150	10	1160	1145	0.44	-	-				970	12	982	1010	0.89	-	-				908			
NB I-75	245:243		Mainline	3641	58.00	59.60	58.92	4100	274	4374	4296	1.18	19	C	57.93	58.80	58.58	3900	283	4183	4260	1.19	19	C	57.88	61.27	60.92	3843	57.77	58.40	59.67
NB I-75	243:237		Mainline	3632	58.65	59.60	58.92	4100	274	4374	4294	1.22	19	C	58.55	58.80	58.58	3900	283	4183	4262	1.22	19	C	58.46	61.27	60.92	3842	58.41	58.40	59.67
NB I-75	240:241	NB I-75 Entrance from Clay	Ramp	110				120	10	130	131	0.09	-	-				120	10	130	127	0.26	-	-				120			
NB I-75	237:74	NB I-75 north of Entrance from Clay	Mainline	3734	57.33			4220	284	4504	4421	1.24	16	B	57.23			4020	293	4313	4392	1.20	16	B	57.17			3962	57.16		

GEH Stats for I-94	
Max	6.30
Average	2.51
# Under 5	133
# Over 5	12
% Under 5	92%

AM78

GEH Stats for I-94	
Max	7.25
Average	0.99
# Under 5	144
# Over 5	1
% Under 5	99%

AM89

PM Period - Existing Validation

EB I-94

Link	Facility	Type	PM1415 Model Output Volume	PM1415 Simulation Speed (mph)	PM1415 Avg Hour Speed, Date of Count	PM1415 2mo. Avg Hour Speed	PM1516 Model Output Volume	PM1516 Simulation Speed (mph)	PM1516 Avg Hour Speed, Date of Count	PM1516 2mo. Avg Hour Speed
1014:1012	EB I-94 West of I-96	Mainline	4355	50.97			4572	48.80		
1018:1019	EB I-94 to SB I-96	Ramp	246				258			
1027:1008	EB I-94 to NB I-96	Ramp	801				825			
1012:1010		Mainline	3283	57.00	43.30	47.33	3482	52.27	28.58	25.42
1022:1023	EB I-94 Exit to Grand River	Ramp	200				217			
1010:159		Mainline	3069	56.03	43.30	47.33	3246	47.80	28.58	25.42
983:982	NB I-96 to EB I-94	Ramp	306				318			
187:158		Mainline	3364	45.28			3553	35.25		
978:979	SB I-96 to EB I-94	Ramp	711				798			
186:966		Mainline	4058	46.85	37.82	42.75	4342	39.47	27.09	24.25
972:971	EB I-94 Entrance from Linwood	Ramp	120				132			
966:965		Mainline	4174	45.55	41.09	47.42	4472	37.58	33.45	30.67
965:960		Mainline	4152	48.59	41.09	47.42	4459	40.53	33.45	30.67
962:963	EB I-94 Entrance from 14th St	Ramp	73				76			
960:959		Mainline	4218	56.25			4530	47.38		
975:976	EB I-94 Exit to Trumbull	Ramp	355				382			
959:952		Mainline	3854	57.64	49.30	50.58	4142	44.73	33.70	34.75
952:951		Mainline	3843	57.93	49.30	50.58	4125	41.44	33.70	34.75
949:950	EB I-94 Exit to SB Hwy 10	Ramp	318				351			
951:943		Mainline	3519	55.44	44.33	43.33	3766	36.41	18.92	21.50
943:944	EB I-94 Exit to NB Hwy 10	Ramp	539				585			
943:919		Mainline	2969	55.60	44.33	43.33	3155	32.54	18.92	21.50
919:918		Mainline	2955	50.66	44.33	43.33	3120	25.37	18.92	21.50
918:912		Mainline	2941	37.23	44.33	43.33	3096	17.87	18.92	21.50
916:915	EB I-94 Entrance from NB Hwy 10	Ramp	704				734			
937:936	EB I-94 Entrance from SB Hwy 10	Ramp	537				563			
912:180		Mainline	4172	26.84			4380	16.39		
180:910		Mainline	4154	33.86			4372	26.83		
926:927	EB I-94 Exit to John R	Ramp	482				502			
910:909		Mainline	3658	48.64	37.64	36.25	3859	36.97	28.33	25.92
909:906		Mainline	3641	47.96	37.64	36.25	3847	33.11	28.33	25.92
906:904		Mainline	3631	46.70	37.64	36.25	3834	25.64	28.33	25.92
299:314	EB I-94 Exit to SB I-75	Ramp	142				154			
300:301	EB I-94 Exit to NB I-75	Ramp	771				811			
904:903		Mainline	2695	49.26	37.64	36.25	2844	17.29	28.33	25.92
903:890		Mainline	2688	45.31	37.64	36.25	2830	13.78	28.33	25.92
901:900	EB I-94 Entrance from Beaubien	Ramp	462				481			
890:889		Mainline	3139	33.39	52.00	48.92	3297	12.40	47.55	40.00
892:893	EB I-94 Exit to Russel	Ramp	108				118			
889:881		Mainline	3017	29.70	52.00	48.92	3165	12.88	47.55	40.00
881:878		Mainline	2992	28.37	52.00	48.92	3155	18.27	47.55	40.00
281:282	EB I-94 Entrance from SB I-75	Ramp	1251				1364			
285:286	EB I-94 Entrance from NB I-75	Ramp	571				590			
878:183		Mainline	4795	41.09			5106	33.56		
183:876		Mainline	4784	50.54			5107	48.20		
887:888	EB I-94 Exit to Chene	Ramp	552				600			
876:875		Mainline	4219	56.97			4509	54.47		
875:872		Mainline	4202	52.73			4511	44.70		
872:869		Mainline	4155	39.20			4517	29.76		
871:870	EB I-94 Entrance from Chene St	Ramp	450				466			
869:860		Mainline	4567	27.60	59.80	55.33	4975	23.44	51.83	47.75
863:864	EB I-94 Exit to Elliot	Ramp	169				177			
860:859		Mainline	4362	26.69	59.80	55.33	4797	25.19	51.83	47.75
859:192		Mainline	4337	50.16	59.80	55.33	4795	46.05	51.83	47.75
856:855	EB I-94 Entrance from Elliot	Ramp	285				311			
836:834		Mainline	4607	47.20			5102	42.49		
834:832		Mainline	4567	40.91			5104	36.92		
832:829		Mainline	4536	30.46			5103	27.52		
848:849	EB I-94 Exit to Van Dyke	Ramp	233				251			
829:827		Mainline	4272	36.83	56.82	55.58	4852	36.05	49.27	47.75
827:160		Mainline	4260	53.14	56.82	55.58	4851	53.11	49.27	47.75
841:842	EB I-94 Entrance from Van Dyke	Ramp	142				146			
160:826		Mainline	4400	56.44			4997	56.67		
826:809		Mainline	4371	59.31			4995	57.49		
809:807		Mainline	4360	48.66			4992	39.62		
818:819	EB I-94 Exit to Gratiot	Ramp	224				260			
807:806		Mainline	4104	42.96	60.82	59.17	4725	36.33	53.20	50.17
823:824	EB I-94 Entrance from Gratiot	Ramp	729				787			
803:800		Mainline	4818	57.14			5506	52.84		
6209:6210	EB I-94 Exit to French	Ramp	149				163			
800:6208		Mainline	4657	40.45	57.90	59.33	5342	35.26	51.00	50.50
6208:6214		Mainline	4619	45.95	57.90	59.33	5337	43.25	51.00	50.50
6250:6251	EB I-94 Entrance from French	Ramp	156				159			
6215:6220		Mainline	4754	57.22			5495	52.98		
6221:6222	EB I-94 Exit to Conner	Ramp	234				282			
6220:6229		Mainline	4501	41.64	55.36	57.75	5211	35.59	44.33	50.83
6229:6232		Mainline	4489	43.12	55.36	57.75	5211	38.45	44.33	50.83
6249:6248	EB I-94 Entrance from Conner	Ramp	442				454			
6234:6238		Mainline	4879	56.98			5663	56.99		
6238:6239	EB I-94 East of Conner	Mainline	4845	53.02			5657	52.17		

Link	PM1617 Auto Volume Lookup	PM1617 Truck volume Lookup	PM1617 Total Volume Lookup	PM1617 Model Output Volume	PM1617 GEH (Target v. Model)	PM1617 Density pc/mi/ln	PM1617 LOS	PM1617 Simulation Speed (mph)	PM1617 Avg Hour Speed, Date of Count	PM1617 2mo. Avg Hour Speed
1014:1012	4250	243	4493	4353	2.11	30	D	37.48		
1018:1019	230	26	256	249	0.44	-	-			
1027:1008	730	92	822	797	0.88	-	-			
1012:1010	3290	125	3415	3303	1.93	30	D	37.94	26.82	28.25
1022:1023	200	10	210	201	0.63	-	-			
1010:159	3090	115	3205	3090	2.05	32	D	32.75	26.82	28.25
983:982	250	60	310	310	0.00	-	-			
187:158	3340	175	3515	3393	2.08	46	F	25.19		
978:979	780	21	801	791	0.35	-	-			
186:966	4120	196	4316	4176	2.15	46	F	30.65	13.78	23.58
972:971	150	10	160	124	3.02	-	-			
966:965	4270	206	4476	4298	2.69	39	E	28.50	23.44	28.17
965:960	4270	206	4476	4289	2.82	47	F	31.40	23.44	28.17
962:963	70	10	80	74	0.68	-	-			
960:959	4340	216	4556	4362	2.91	30	D	36.67		
975:976	420	10	430	382	2.38	-	-			
959:952	3920	206	4126	3974	2.39	43	E	31.35	24.78	29.17
952:951	3920	206	4126	3963	2.56	52	F	25.82	24.78	29.17
949:950	360	7	367	353	0.74	-	-			
951:943	3560	199	3759	3609	2.47	60	F	20.53	16.64	18.17
943:944	590	16	606	575	1.28	-	-			
943:919	2970	183	3153	3032	2.18	65	F	16.06	16.64	18.17
919:918	2970	183	3153	3030	2.21	77	F	13.47	16.64	18.17
918:912	2970	183	3153	3028	2.25	92	F	11.33	16.64	18.17
916:915	760	12	772	721	1.87	-	-			
937:936	580	26	606	564	1.74	-	-			
912:180	4310	221	4531	4310	3.32	69	F	12.89		
180:910	4310	221	4531	4311	3.31	61	F	24.14		
926:927	490	41	531	500	1.37	-	-			
910:909	3820	180	4000	3815	2.96	39	E	33.01	18.73	21.00
909:906	3820	180	4000	3818	2.91	44	E	29.89	18.73	21.00
906:904	3820	180	4000	3822	2.85	57	F	22.69	18.73	21.00
299:314	150	10	160	153	0.56	-	-			
300:301	810	58	868	831	1.27	-	-			
904:903	2860	112	2972	2846	2.34	66	F	14.74	18.73	21.00
903:890	2860	112	2972	2849	2.28	84	F	11.57	18.73	21.00
901:900	490	10	500	491	0.40	-	-			
890:889	3350	122	3472	3342	2.23	79	F	10.80	22.89	23.25
892:893	120	10	130	120	0.89	-	-			
889:881	3230	112	3342	3226	2.02	94	F	11.64	22.89	23.25
881:878	3230	112	3342	3226	2.02	60	F	18.21	22.89	23.25
281:282	1290	56	1346	1290	1.54	-	-			
285:286	590	18	608	605	0.12	-	-			
878:183	5110	186	5296	5121	2.42	29	D	36.25		
183:876	5110	186	5296	5122	2.41	26	D	49.53		
887:888	640	10	650	630	0.79	-	-			
876:875	4470	176	4646	4491	2.29	28	D	54.62		
875:872	4470	176	4646	4491	2.29	34	D	44.92		
872:869	4470	176	4646	4492	2.28	51	F	30.03		
871:870	460	10	470	470	0.00	-	-			
869:860	4930	186	5116	4970	2.06	54	F	23.29	30.60	31.83
863:864	170	19	189	181	0.59	-	-			
860:859	4760	167	4927	4791	1.95	65	F	25.07	30.60	31.83
859:192	4760	167	4927	4792	1.94	35	E	46.25	30.60	31.83
856:855	290	10	300	298	0.12	-	-			
836:834	5050	177	5227	5095	1.84	40	E	42.73		
834:832	5050	177	5227	5092	1.88	46	F	37.24		
832:829	5050	177	5227	5092	1.88	63	F	27.40		
848:849	230	29	259	254	0.31	-	-			
829:827	4820	148	4968	4839	1.84	46	F	35.74	27.64	33.42
827:160	4820	148	4968	4838	1.86	31	D	52.89	27.64	33.42
841:842	140	8	148	147	0.08	-	-			
160:826	4960	156	5116	4985	1.84	23	C	56.17		
826:809	4960	156	5116	4984	1.86	29	D	57.75		
809:807	4960	156	5116	4982	1.89	42	E	40.25		
818:819	260	13	273	264	0.55	-	-			
807:806	4700	143	4843	4714	1.87	44	E	36.61	36.10	34.67
823:824	770	15	785	776	0.32	-	-			
803:800	5470	158	5628	5487	1.89	34	D	53.83		
6209:6210	160	12	172	167	0.38	-	-			
800:6208	5310	146	5456	5319	1.87	48	F	37.11	31.82	34.67
6208:6214	5310	146	5456	5316	1.91	41	E	43.41	31.82	34.67
6250:6251	150	9	159	157	0.16	-	-			
6215:6220	5460	155	5615	5471	1.93	36	E	51.76		
6221:6222	260	24	284	277	0.42	-	-			
6220:6229	5200	131	5331	5192	1.92	50	F	34.78	37.09	36.17
6229:6232	5200	131	5331	5192	1.92	46	F	37.89	37.09	36.17
6249:6248	450	16	466	462	0.19	-	-			
6234:6238	5650	147	5797	5651	1.93	33	D	57.05		
6238:6239	5650	147	5797	5652	1.92	37	E	52.14		

Link	PM1718 Auto Volume Lookup	PM1718 Truck volume Lookup	PM1718 Total Volume Lookup	PM1718 Model Output Volume	PM1718 GEH (Target v. Model)	PM1718 Density pc/mi/ln	PM1718 LOS	PM1718 Simulation Speed (mph)	PM1718 Avg Hour Speed, Date of Count	PM1718 2mo. Avg Hour Speed	PM1819 Model Output Volume	PM1819 Simulation Speed (mph)	PM1819 Avg Hour Speed, Date of Count	PM1819 2mo. Avg Hour Speed
1014:1012	4260	236	4496	4416	1.20	39	E	29.36			3577	42.23		
1018:1019	280	19	299	277	1.30	-	-				237			
1027:1008	1050	95	1145	1070	2.25	-	-				859			
1012:1010	2930	122	3052	3057	0.09	32	D	32.62	24.42	29.42	2512	44.64	41.33	43.50
1022:1023	280	10	290	265	1.50	-	-				231			
1010:159	2650	112	2762	2782	0.38	36	E	25.94	24.42	29.42	2326	38.07	41.33	43.50
983:982	180	47	227	227	0.00	-	-				158			
187:158	2830	159	2989	3008	0.35	45	E	23.04			2509	36.44		
978:979	720	1	721	713	0.30	-	-				494			
186:966	3550	160	3710	3720	0.16	46	F	27.57	14.00	23.33	3030	42.47	45.86	40.92
972:971	150	1	151	121	2.57	-	-				82			
966:965	3700	161	3861	3842	0.31	38	E	25.60	17.70	25.42	3117	40.89	43.00	43.08
965:960	3700	161	3861	3844	0.27	47	F	27.72	17.70	25.42	3147	43.47	43.00	43.08
962:963	70	1	71	68	0.36	-	-				42			
960:959	3770	162	3932	3912	0.32	32	D	31.62			3198	47.56		
975:976	440	10	450	395	2.68	-	-				333			
959:952	3330	152	3482	3516	0.57	44	E	27.46	12.88	26.58	2881	43.92	30.67	46.92
952:951	3330	152	3482	3522	0.68	50	F	23.91	12.88	26.58	2907	40.69	30.67	46.92
949:950	330	6	336	324	0.66	-	-				263			
951:943	3000	146	3146	3200	0.96	54	F	20.40	10.08	15.92	2654	36.83	36.50	38.75
943:944	560	21	581	550	1.30	-	-				470			
943:919	2440	125	2565	2653	1.72	51	F	17.69	10.08	15.92	2215	33.26	36.50	38.75
919:918	2440	125	2565	2655	1.76	58	F	15.72	10.08	15.92	2258	29.69	36.50	38.75
918:912	2440	125	2565	2662	1.90	68	F	13.38	10.08	15.92	2287	28.67	36.50	38.75
916:915	710	8	718	645	2.80	-	-				633			
937:936	640	11	651	608	1.71	-	-				414			
912:180	3790	144	3934	3918	0.26	58	F	13.75			3353	30.23		
180:910	3790	144	3934	3922	0.19	60	F	22.22			3366	36.87		
926:927	490	18	508	465	1.95	-	-				427			
910:909	3300	126	3426	3456	0.51	44	E	26.69	16.42	18.50	2951	43.64	29.80	35.75
909:906	3300	126	3426	3448	0.38	53	F	22.01	16.42	18.50	2977	39.23	29.80	35.75
906:904	3300	126	3426	3442	0.27	67	F	17.39	16.42	18.50	2997	33.66	29.80	35.75
299:314	150	10	160	150	0.80	-	-				144			
300:301	640	47	687	671	0.61	-	-				607			
904:903	2510	69	2579	2615	0.71	69	F	12.88	16.42	18.50	2282	30.24	29.80	35.75
903:890	2510	69	2579	2617	0.75	81	F	10.91	16.42	18.50	2298	29.69	29.80	35.75
901:900	440	9	449	449	0.00	-	-				293			
890:889	2950	78	3028	3069	0.74	75	F	10.34	13.33	18.75	2607	26.20	33.25	38.83
892:893	140	10	150	136	1.17	-	-				106			
889:881	2810	68	2878	2936	1.08	91	F	10.85	13.33	18.75	2519	26.05	33.25	38.83
881:878	2810	68	2878	2938	1.11	61	F	16.25	13.33	18.75	2546	31.24	33.25	38.83
281:282	1300	42	1342	1119	6.36	-	-				1122			
285:286	700	12	712	733	0.78	-	-				487			
878:183	4810	122	4932	4783	2.14	31	D	31.62			4171	45.15		
183:876	4810	122	4932	4782	2.15	24	C	50.09			4174	53.70		
887:888	730	10	740	693	1.76	-	-				626			
876:875	4080	112	4192	4091	1.57	24	C	58.81			3551	58.69		
875:872	4080	112	4192	4095	1.51	24	C	56.60			3555	58.26		
872:869	4080	112	4192	4113	1.23	27	D	50.70			3562	57.67		
871:870	420	10	430	430	0.00	-	-				284			
869:860	4500	122	4622	4562	0.89	29	D	40.53	21.18	25.17	3855	53.28	32.67	43.00
863:864	190	15	205	199	0.42	-	-				159			
860:859	4310	107	4417	4372	0.68	47	F	31.60	21.18	25.17	3707	40.27	32.67	43.00
859:192	4310	107	4417	4378	0.59	30	D	49.33	21.18	25.17	3711	53.52	32.67	43.00
856:855	350	10	360	363	0.16	-	-				239			
836:834	4660	117	4777	4743	0.49	34	D	47.08			3953	53.60		
834:832	4660	117	4777	4752	0.36	39	E	41.38			3965	47.16		
832:829	4660	117	4777	4761	0.23	51	F	31.69			3974	36.62		
848:849	180	15	195	195	0.00	-	-				149			
829:827	4480	102	4582	4570	0.18	41	E	37.36	25.42	27.67	3831	39.52	46.25	42.17
827:160	4480	102	4582	4573	0.13	30	D	52.15	25.42	27.67	3832	54.16	46.25	42.17
841:842	120	17	137	142	0.42	-	-				91			
160:826	4600	119	4719	4715	0.06	22	C	55.30			3924	57.69		
826:809	4600	119	4719	4718	0.01	31	D	51.69			3931	59.99		
809:807	4600	119	4719	4725	0.09	49	F	32.80			3934	55.25		
818:819	240	12	252	252	0.00	-	-				169			
807:806	4360	107	4467	4489	0.33	47	F	31.91	23.64	28.33	3774	49.62	46.29	46.50
823:824	940	13	953	953	0.00	-	-				645			
803:800	5300	120	5420	5450	0.41	37	E	50.01			4427	60.05		
6209:6210	100	9	109	106	0.29	-	-				88			
800:6208	5200	111	5311	5347	0.49	54	F	33.38	27.17	31.08	4343	41.42	50.57	46.08
6208:6214	5200	111	5311	5360	0.67	43	E	41.52	27.17	31.08	4349	47.30	50.57	46.08
6250:6251	160	11	171	171	0.00	-	-				112			
6215:6220	5360	122	5482	5536	0.73	36	E	51.97			4464	59.74		
6221:6222	290	19	309	278	1.81	-	-				258			
6220:6229	5070	103	5173	5266	1.29	49	F	36.03	34.00	35.67	4209	50.40	47.22	45.08
6229:6232	5070	103	5173	5269	1.33	45	E	39.43	34.00	35.67	4211	51.22	47.22	45.08
6249:6248	360	14	374	377	0.15	-	-				256			
6234:6238	5430	117	5547	5651	1.39	33	D	56.86			4483	57.49		
6238:6239	5430	117	5547	5657	1.47	37	E	51.73			4492	54.81		

PM Period - Existing Validation

WB I-94

			PM1415				PM1516				PM1617										PM1718										PM1819			
Link	Facility	Type	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
6237:6233	WB I-94 East of Conner	Mainline	3209	54.91			3407	54.80			3140	239	3379	3553	2.96	22	C	54.73			3440	181	3621	3834	3.49	24	C	54.31			2505	55.90		
6233:6230		Mainline	3204	55.40			3407	55.25			3140	239	3379	3553	2.96	22	C	55.28			3440	181	3621	3833	3.47	24	C	54.45			2507	56.22		
6246:6247	WB I-94 Exit to Conner	Ramp	307				326				320	14	334	330	0.22	-	-				440	13	453	448	0.24	-	-				307			
6230:6228		Mainline	2890	53.91	57.55	56.42	3078	53.86	60.30	57.25	2820	225	3045	3222	3.16	21	C	53.81	59.33	58.00	3000	168	3168	3386	3.81	22	C	53.83	60.88	56.25	2203	54.72	55.78	56.00
6228:161		Mainline	2879	55.48	57.55	56.42	3081	55.27	60.30	57.25	2820	225	3045	3217	3.07	20	C	55.13	59.33	58.00	3000	168	3168	3388	3.84	21	C	55.06	60.88	56.25	2206	56.76	55.78	56.00
6225:6224	WB I-94 Entrance fromNB Conner	Ramp	439				453				460	7	467	465	0.09	-	-				420	2	422	431	0.44	-	-				280			
6218:6217	WB I-94 Entrance from SB Conner	Ramp	137				143				130	10	140	137	0.25	-	-				150	3	153	153	0.00	-	-				105			
206:801		Mainline	3423	57.84			3675	57.70			3410	242	3652	3815	2.67	23	C	57.33			3570	173	3743	3979	3.80	24	C	57.38			2601	59.03		
6213:6212	WB I-94 Entrance from French	Ramp	291				302				300	10	310	310	0.00	-	-				180	5	185	192	0.51	-	-				124			
802:804		Mainline	3689	54.94			3975	54.76			3710	252	3962	4122	2.52	26	D	54.43			3750	178	3928	4177	3.91	26	D	54.77			2731	56.82		
811:812	WB I-94 Exit to Gratiot	Ramp	164				184				170	10	180	182	0.15	-	-				170	10	180	183	0.22	-	-				126			
815:816	WB I-94 Entrance from Gratiot	Ramp	416				440				420	20	440	435	0.24	-	-				360	3	363	368	0.26	-	-				247			
808:810		Mainline	3893	57.10			4225	56.96			3960	262	4222	4371	2.27	26	D	57.12			3940	171	4111	4370	3.98	26	D	56.97			2870	58.16		
837:838	WB I-94 Exit to Van Dyke	Ramp	173				178				160	18	178	184	0.45	-	-				170	10	180	184	0.30	-	-				124			
810:828		Mainline	3709	52.41	57.09	54.42	4045	52.22	62.00	53.67	3800	244	4044	4187	2.23	27	D	52.34	58.27	54.92	3770	161	3931	4187	4.02	27	D	52.09	59.50	53.92	2751	53.42	62.43	56.58
828:830		Mainline	3701	54.34	57.09	54.42	4044	54.04	62.00	53.67	3800	244	4044	4188	2.24	27	D	54.12	58.27	54.92	3770	161	3931	4186	4.00	27	D	53.64	59.50	53.92	2755	55.66	62.43	56.58
845:846	WB I-94 Entrance from Van Dayke	Ramp	293				302				300	26	326	297	1.64	-	-				290	3	293	284	0.53	-	-				190			
831:833		Mainline	3944	54.46			4350	54.22			4100	270	4370	4481	1.67	28	D	54.26			4060	164	4224	4477	3.84	29	D	53.22			2954	55.64		
833:835		Mainline	3937	56.78			4350	56.59			4100	270	4370	4478	1.62	27	D	56.44			4060	164	4224	4480	3.88	28	D	54.81			2957	58.11		
851:852	WB I-94 Exit to Elliot	Ramp	212				233				220	11	231	225	0.40	-	-				180	10	190	195	0.36	-	-				129			
835:858		Mainline	3703	52.70	56.73	51.08	4117	52.58	57.91	52.17	3880	259	4139	4245	1.64	28	D	52.02	58.67	54.50	3880	154	4034	4291	3.98	29	D	50.07	58.25	53.83	2838	54.00	58.90	56.58
858:861		Mainline	3677	51.08	56.73	51.08	4117	50.31	57.91	52.17	3880	259	4139	4237	1.51	30	D	48.60	58.67	54.50	3880	154	4034	4302	4.15	31	D	47.19	58.25	53.83	2847	54.85	58.90	56.58
866:867	WB I-94 Entrance from Elliot	Ramp	330				343				330	17	347	340	0.38	-	-				250	4	254	252	0.13	-	-				165			
873:874		Mainline	3968	58.13			4455	58.13			4210	276	4486	4575	1.32	28	D	57.20			4130	158	4288	4558	4.06	28	D	54.90			3027	58.75		
882:883	WB I-94 Entrance from Chene	Ramp	361				372				370	10	380	380	0.00	-	-				190	5	195	198	0.21	-	-				135			
874:877		Mainline	4306	56.35			4831	56.23			4580	286	4866	4947	1.16	23	C	54.68			4320	163	4483	4765	4.15	23	C	51.91			3168	58.44		
289:290	WB I-94 Exit to NB I-75	Ramp	741				841				820	29	849	829	0.69	-	-				660	19	679	712	1.25	-	-				466			
293:294	WB I-94 Exit to SB I-75	Ramp	720				839				750	77	827	818	0.31	-	-				730	40	770	775	0.18	-	-				547			
877:880		Mainline	2816	53.88	52.83	48.25	3151	53.98	51.33	47.00	3010	180	3190	3292	1.79	22	C	50.34	40.58	41.50	2930	104	3034	3289	4.54	25	C	44.96	40.13	44.92	2164	55.53	51.30	51.50
880:891		Mainline	2812	56.84	52.83	48.25	3150	56.15	51.33	47.00	3010	180	3190	3288	1.72	22	C	50.78	40.58	41.50	2930	104	3034	3291	4.57	27	D	41.81	40.13	44.92	2169	56.69	51.30	51.50
896:897	WB I-94 Exit to Beaubien	Ramp	361				411				410	10	420	399	1.04	-	-				380	10	390	394	0.20	-	-				272			
891:902		Mainline	2444	56.13	48.92	44.50	2738	54.20	49.11	38.42	2600	170	2770	2882	2.11	21	C	46.72	20.83	28.25	2550	94	2644	2902	4.90	29	D	34.27	21.82	28.83	1903	54.35	42.70	44.25
902:188		Mainline	2441	56.82	48.92	44.50	2737	53.69	49.11	38.42	2600	170	2770	2878	2.03	22	C	44.15	20.83	28.25	2550	94	2644	2905	4.96	33	D	29.73	21.82	28.83	1906	54.05	42.70	44.25
276:277	WB I-94 Entrance from NB I-75	Ramp	288				311				300	8	308	324	0.90	-	-				310	6	316	333	0.94	-	-				227			
278:279	WB I-94 Entrance from SB I-75	Ramp	545				554				520	40	560	546	0.60	-	-				620	46	666	547	4.83	-	-				590			
188:189		Mainline	3268	56.58	48.92	44.50	3601	52.52	49.11	38.42	3420	218	3638	3739	1.66	23	C	41.33	20.83	28.25	3480	146	3626	3786	2.63	39	E	24.97	21.82	28.83	2731	52.89	42.70	44.25
189:905		Mainline	3261	56.03	48.92	44.50	3597	50.88	49.11	38.42	3420	218	3638	3730	1.52	33	D	39.25	20.83	28.25	3480	146	3626	3793	2.74	54	F	23.95	21.82	28.83	2739	52.38	42.70	44.25
905:908		Mainline	3246	55.16	48.92	44.50	3593	47.13	49.11	38.42	3420	218	3638	3707	1.14	38	E	33.55	20.83	28.25	3480	146	3626	3811	3.03	64	F	20.24	21.82	28.83	2756	49.74	42.70	44.25
928:929	WB I-94 Entrance from John R	Ramp	513				526				500	33	533	540	0.30	-	-				560	37	597	590	0.29	-	-				398			
911:26		Mainline	3729	47.97	52.42	48.17	4109	39.72	41.18	33.92	3920	251	4171	4215	0.68	46	F	31.79	33.60	24.58	4040	183	4223	4426	3.09	54	F	27.88	19.60	22.00	3183	48.76	34.60	37.00
26:913		Mainline	3726	57.05	52.42	48.17	4109	45.71	41.18	33.92	3920	251	4171	4213	0.65	41	E	35.38	33.60	24.58	4040	183	4223	4428	3.12	47	F	32.38	19.60	22.00	3185	56.19	34.60	37.00
920:921	WB I-94 Exit to NB Hwy 10	Ramp	739				851				840	28	868	829	1.34	-	-				790	15	805	836	1.08	-	-				572			
913:30		Mainline	2983	46.29	52.42	48.17	3258	34.11	41.18	33.92	3080	223	3303	3382	1.37	49	F	23.92	33.60	24.58	3250	168	3418	3594	2.97	56	F	21.85	19.60	22.00	2614	45.79	34.60	37.00
932:933	WB I-94 Exit to SB Hwy 10	Ramp	463				520				480	42	522	510	0.53	-	-				540	32	572	571	0.04	-	-				413			
30:923		Mainline	2502	40.12	52.42	48.17	2730	26.08	41.18	33.92	2600	181	2781	2858	1.45	62	F	15.97	33.60	24.58	2710	136	2846	3039	3.56	70	F	14.91	19.60	22.00	2217	45.45	34.60	37.00
923:924		Mainline	2485	31.36	52.42	48.17	2724	20.91	41.18	33.92	2600	181	2781	2850	1.30	67	F	14.70	33.60	24.58	2710	136	2846	3052	3.79	68	F	15.35	19.60	22.00	2231	42.27	34.60	37.00
924:185		Mainline	2461	27.86	52.42	48.17	2719	19.13	41.18	33.92	2600	181	2781	2846	1.23	66	F	14.91	33.60	24.58	2710	136	2846	3062	3.97	63	F	16.67	19.60	22.00	2249	42.35	34.60	37.00
941:942	WB I-94 Entrance from SB Hwy 10	Ramp	849				914				860	45	905	912	0.23	-	-				810	42	852	864	0.41	-	-				591			
947:948	WB I-94 Entrance from NB Hwy 10	Ramp	790				832				840	10	850	817	1.14	-	-				660	6	666	614	2.06	-	-				551			
954:3607		Mainline	4072	27.58	53.30	48.75	4457	20.70	32.13	29.50	4300	236	4536	4576	0.59	60	F	19.57	33.30	22.33	4180	184	4364	4554	2.85	55	F	20.96	27.13	21.08	3403	44.97	29.67	34.42
3607:955		Mainline	4069	25.62	53.30	48.75	4457	19.29	32.13	29.50	4300	236	4536	4575	0.58	64	F	18.27	33.30	22.33	4180	184	4364	4556	2.87	60	F	19.33	27.13	21.08	3405	45.22	29.67	34.42
957:958	WB I-94 Entrance from Trumbull	Ramp	920				955				1010	10	1020	962	1.84	-	-				820	10	830	887	1.95	-	-				658			
961:964		Mainline	4900	48.00	49.36	48.00	5406	46.55	39.75	36.67	5310	246	5556	5540	0.21	40	E	47.45	43.20	34.58	5000	194	5194	5462	3.67	40	E	46.82	29.70	32.25	4103	56.64	38.83	40.00
967:968	WB I-94 Exit to Linwood	Ramp	153				169				110	18	128	168	3.29	-	-				90	11	101	145	3.97	-	-				124			
964:974		Mainline	4728	38.39	60.63	51.92	5237	36.74	48.50	47.67	5200	228	5428	5373	0.75	49	F	37.40	50.20	45.75	4910	183	5093	5316	3.09	49	F	36.94	47.50	45.67	3988	47.51	48.75	46.67
974:994		Mainline	4706	44.87	60.63	51.92	5237	44.18	48.50	47.67	5200	228	5428	5373	0.75	41	E	44.58	50.20	45.75	4910	183	5093	5315	3.08	41	E	44.48	47.50	45.67	3995	48.83	48.75	46.67
1001:1002	WB I-94 Exit to SB I-96	Ramp	579				663				650	19	669	678	0.35	-	-				630	21	651	664	0.51	-	-				533			
1001:1004	WB I-94 Exit to NB I-96	Ramp	786				869				810	84	894	853	1.39	-	-				780	69	849	863	0.48	-	-				594			
994:995		Mainline	3316	58.94	58.58	54.17	3703	59.16	52.00	51.67	3740	125	3865	3842	0.37	22	C	59.15	52.27	51.08	3500	93	3593	3788	3.21	22	C	59.22	53.63	49.33	2877	57.95	54.38	52.17
999:998	WB I-94 Entrance from Linwood	Ramp	137				146				130	10	140	140	0.00	-	-				150	10	160	157	0.24	-	-				109			
162:1011		Mainline	3441	58.91	58.58	54.17	3850	58.93	52.00	51.67	3870	135	4005	3980	0.40	23	C	58.66	52.27	51.08	3650	103	3753	3946	3.11	23	C	59.07	53.63	49.33	2991	58.29	54.38	52.17
990:991	WB I-94 Entrance from SB I-96	Ramp	206				226				210	12	222	226	0.27	-	-				270	10	280	281	0.06	-	-				193			
1020:1021	WB I-94 Entrance from NB I-96	Ramp	731				777				680	83	763	764	0.04	-	-				680	76	756	752	0.15	-	-				511			
1011:1013	WB I-94 West of I-96	Mainline	4362	54.88			4853	54.74			4760	230	4990	4969	0.30	23	C	54.94			4600	189	4789	4980	2.73	23	C	55.30			3702	56.15		

PM Period - Existing Validation

	Link	Facility	Type	PM1415				PM1516				PM1617										PM1718										PM1819			
				Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
SB I-96	49:1614	SB I-96 North of Exit to Grand	Mainline	3380	71.87			3543	71.85			3270	262	3532	3526	0.10	13	B	71.96			3270	262	3532	3520	0.20	13	B	71.89			2418	73.31		
	1614:1615		Mainline	3374	67.99			3543	67.75			3270	262	3532	3526	0.10	13	B	67.93			3270	262	3532	3519	0.22	13	B	67.81			2420	68.70		
	1615:1618	SB I-96 Exit to Grand	Ramp	299				328				290	23	313	314	0.06	-	-				290	23	313	316	0.17	-	-				213			
	1615:1599		Mainline	3070	53.80	68.60	62.67	3215	53.78	66.22	63.92	2980	239	3219	3213	0.11	16	B	53.78	68.33	64.33	2980	239	3219	3201	0.32	15	B	53.72	63.00	62.17	2210	54.26	67.00	62.33
	1599:1597		Mainline	3055	58.26	68.60	62.67	3215	58.17	66.22	63.92	2980	239	3219	3213	0.11	14	B	58.19	68.33	64.33	2980	239	3219	3202	0.30	14	B	58.17	63.00	62.17	2215	58.93	67.00	62.33
	1597:1595		Mainline	3048	58.78	68.60	62.67	3214	58.77	66.22	63.92	2980	239	3219	3214	0.09	14	B	58.75	68.33	64.33	2980	239	3219	3202	0.30	14	B	58.70	63.00	62.17	2217	59.20	67.00	62.33
	1595:1593		Mainline	3045	59.99	68.60	62.67	3214	59.84	66.22	63.92	2980	239	3219	3214	0.09	14	B	59.84	68.33	64.33	2980	239	3219	3202	0.30	14	B	59.84	63.00	62.17	2217	60.43	67.00	62.33
	1607:1593	SB I-96 Entrance from Grand	Ramp	494				497				460	37	497	493	0.18	-	-				460	37	497	504	0.31	-	-				337			
	1593:1591		Mainline	3532	57.70			3712	57.44			3440	276	3716	3708	0.13	13	B	57.52			3440	276	3716	3706	0.16	13	B	57.60			2557	58.92		
	1591:1589		Mainline	3526	59.85			3714	59.56			3440	276	3716	3707	0.15	13	B	59.60			3440	276	3716	3706	0.16	13	B	59.86			2559	61.55		
	990:991	WB I-94 Entrance from SB I-96	Ramp	206				226				210	12	222	226	0.27	-	-				270	10	280	281	0.06	-	-				193			
	978:979	SB I-96 to EB I-94	Ramp	711				798				780	21	801	791	0.35	-	-				720	1	721	713	0.30	-	-				494			
	1589:1577		Mainline	2589	56.93	61.57	60.25	2691	56.86	62.38	58.33	2450	243	2693	2688	0.10	12	B	56.90	65.63	60.00	2450	265	2715	2713	0.04	13	B	56.89	56.71	56.67	1879	57.43	63.00	57.67
	1577:1574		Mainline	2576	58.98	61.57	60.25	2690	58.97	62.38	58.33	2450	243	2693	2688	0.10	12	B	58.98	65.63	60.00	2450	265	2715	2713	0.04	12	B	58.89	56.71	56.67	1882	59.56	63.00	57.67
	1583:1584	SB I-96 Exit to Warren	Ramp	210				230				210	17	227	227	0.00	-	-				210	17	227	226	0.07	-	-				152			
	1574:1573		Mainline	2360	54.98	61.57	60.25	2462	54.93	62.38	58.33	2240	226	2466	2461	0.10	12	B	55.02	65.63	60.00	2240	248	2488	2488	0.00	12	B	54.94	56.71	56.67	1731	55.44	63.00	57.67
	1573:1554		Mainline	2354	59.74	61.57	60.25	2462	59.68	62.38	58.33	2240	226	2466	2460	0.12	11	A	59.77	65.63	60.00	2240	248	2488	2488	0.00	11	A	59.66	56.71	56.67	1733	60.32	63.00	57.67
	1018:1019	EB I-94 to SB I-96	Ramp	246				258				230	26	256	249	0.44	-	-				280	19	299	277	1.30	-	-				237			
	1001:1002	WB I-94 Exit to SB I-96	Ramp	579				663				650	19	669	678	0.35	-	-				630	21	651	664	0.51	-	-				533			
	1558:1559	SB I-96 Entrance from Warren	Ramp	559				576				530	43	573	570	0.13	-	-				530	43	573	566	0.29	-	-				379			
	163:1552	SB I-96 South of Entrance from Warren	Mainline	3699	58.01			3957	57.67			3250	314	3564	3960	6.46	14	B	57.82			3280	331	3611	3998	6.27	15	B	57.70			2888	58.46		
NB I-96	1548:1553	NB I-96 South of Exit to Warren	Mainline	3618	53.28			3791	53.24			3500	279	3779	3786	0.11	15	B	53.28			3500	280	3780	3791	0.18	15	B	53.26			2573	53.92		
	1568:1569	NB I-96 Exit to Warren	Ramp	477				499				460	37	497	499	0.09	-	-				460	37	497	502	0.22	-	-				335			
	1553:1555		Mainline	3127	57.21			3293	57.21			3040	242	3282	3287	0.09	12	B	57.29			3040	243	3283	3289	0.10	12	B	57.44			2242	58.29		
	983:982	NB I-96 to EB I-94	Ramp	306				318				250	60	310	310	0.00	-	-				180	47	227	227	0.00	-	-				158			
	1020:1021	WB I-94 Entrance from NB I-96	Ramp	731				777				680	83	763	764	0.04	-	-				680	76	756	752	0.15	-	-				511			
	1555:1572		Mainline	2073	59.30	60.00	58.58	2197	59.27	50.43	58.67	2110	99	2209	2212	0.06	10	A	59.22	61.60	59.75	2180	120	2300	2312	0.25	10	A	59.09	60.00	57.58	1578	59.53	63.50	56.83
	1580:1579	NB I-96 Entrance from Warren	Ramp	580				588				540	46	586	576	0.41	-	-				540	43	583	577	0.25	-	-				392			
	1575:1576		Mainline	2635	58.96	60.00	58.58	2784	58.89	50.43	58.67	2650	145	2795	2787	0.15	12	B	58.88	61.60	59.75	2720	163	2883	2891	0.15	13	B	58.83	60.00	57.58	1974	59.34	63.50	56.83
	1576:1588		Mainline	2631	62.09	60.00	58.58	2785	62.02	50.43	58.67	2650	145	2795	2787	0.15	12	B	61.97	61.60	59.75	2720	163	2883	2891	0.15	12	B	61.53	60.00	57.58	1976	62.51	63.50	56.83
	1001:1004	WB I-94 Exit to NB I-96	Ramp	786				869				1210	84	1294	853	13.46	-	-				1180	69	1249	863	11.88	-	-				594			
	1027:1008	EB I-94 to NB I-96	Ramp	801				825				730	92	822	797	0.88	-	-				1050	95	1145	1070	2.25	-	-				859			
	1588:1590		Mainline	4196	47.40			4480	47.42			4590	321	4911	4441	6.87	19	C	48.28			4950	327	5277	4815	6.50	23	C	43.46			3441	50.03		
	1590:1592		Mainline	4190	50.69	61.57	60.17	4479	50.76	62.33	60.83	4590	321	4911	4442	6.86	18	B	51.63	59.67	60.17	4950	327	5277	4814	6.52	20	C	48.51	70.25	59.25	3443	53.30	65.50	58.50
	1602:1603	NB I-96 Exit to Grand	Ramp	531				562				520	42	562	557	0.21	-	-				520	42	562	567	0.21	-	-				390			
	1592:1594		Mainline	3653	56.86	61.57	60.17	3918	56.94	62.33	60.83	4070	279	4349	3885	7.23	18	B	57.29	59.67	60.17	4430	285	4715	4247	6.99	19	C	56.21	70.25	59.25	3054	57.90	65.50	58.50
	1594:1596		Mainline	3643	56.45	61.57	60.17	3919	56.31	62.33	60.83	4070	279	4349	3885	7.23	18	B	56.45	59.67	60.17	4430	285	4715	4245	7.02	20	C	56.06	70.25	59.25	3057	56.59	65.50	58.50
	1596:1598		Mainline	3626	56.04	61.57	60.17	3917	55.89	62.33	60.83	4070	279	4349	3887	7.20	18	B	56.07	59.67	60.17	4430	285	4715	4242	7.07	20	C	55.63	70.25	59.25	3062	56.10	65.50	58.50
	1610:1611	NB I-96 Entrance from Grand	Ramp	473				473				440	35	475	468	0.32	-	-				440	35	475	467	0.37	-	-				325			
	1613:50	NB I-96 north of Entrance from Grand	Mainline	4068	57.03			4389	56.91			4510	314	4824	4360	6.85	20	C	57.03			4870	320	5190	4705	6.90	21	C	56.75			3395	56.73		
SB Hwy 10	63:60	SB Hwy 10 North of Exit to Grand	Mainline	3686	57.54	62.25	61.42	3892	57.46	64.30	61.92	3700	185	3885	3887	0.03	17	B	57.46	55.14	61.58	3680	144	3824	3839	0.24	17	B	57.40	66.20	61.83	2601	58.65	64.67	61.42
	60:1405		Mainline	3681	57.86	62.25	61.42	3890	57.74	64.30	61.92	3700	185	3885	3889	0.06	17	B	57.81	55.14	61.58	3680	144	3824	3839	0.24	17	B	57.90	66.20	61.83	2602	58.98	64.67	61.42
	1416:1417	SB Hwy 10 Exit to Grand	Ramp	607				635				530	87	617	618	0.04	-	-				550	71	621	621	0.00	-	-				426			
	1405:1434		Mainline	3063	55.19	61.25	56.92	3254	54.53	59.80	58.25	3170	98	3268	3269	0.02	20	C	54.70	57.14	55.83	3130	73	3203	3220	0.30	20	C	55.28	62.17	57.08	2178	57.16	62.86	58.17
	1434:1407		Mainline	3055	50.27	61.25	56.92	3253	49.60	59.80	58.25	3170	98	3268	3268	0.00	22	C	49.86	57.14	55.83	3130	73	3203	3221	0.32	22	C	50.21	62.17	57.08	2182	51.41	62.86	58.17
	1407:1422		Mainline	3048	57.21	61.25	56.92	3251	55.89	59.80	58.25	3170	98	3268	3269	0.02	20	C	56.55	57.14	55.83	3130	73	3203	3223	0.35	19	C	57.26	62.17	57.08	2184	58.10	62.86	58.17
	1428:1429	SB Hwy 10 Entrance from Milwaukee	Ramp	811				807				1030	10	1040	807	7.67	-	-				1000	10	1010	769	8.08	-	-				562			
	1422:939		Mainline	3847	55.78			4056	53.61			4200	108	4308	4076	3.58	19	C	54.64			4130	83	4213	3995	3.40	18	C	55.91			2748	57.41		
	941:942	WB I-94 Entrance from SB Hwy 10	Ramp	849				914				860	45	905	912	0.23	-	-				810	42	852	864	0.41	-	-				591			
	939:940		Mainline	2991	56.28			3138	55.71			3340	63	3403	3166	4.14	19	C	55.95			3320	41	3361	3135	3.97	19	C	56.52			2159	57.75		
	937:936	EB I-94 Entrance from SB Hwy 10	Ramp	537				563				580	26	606	564	1.74	-	-				640	11	651	608	1.71	-	-				414			
	940:1431		Mainline	2446	56.13	57.33	51.75	2574	56.06	60.10	51.00	2760	37	2797	2602	3.75	16	B	56.02	54.29	45.92	2680	30	2710	2528	3.56	15	B	56.13	47.38	45.75	1748	57.33	59.00	52.67
	1431:1435		Mainline	2435	55.12	57.33	51.75	2575	55.17	60.10	51.00	2760	37	2797	2603	3.73	16	B	54.99	54.29	45.92	2680	30	2710	2529	3.54	15	B	54.86	47.38	45.75	1749	56.40	59.00	52.67
	1435:1441		Mainline	2431	60.66	57.33	51.75	2575	60.70	60.10	51.00	2760	37	2797	2602	3.75	14	B	60.60	54.29	45.92	2680	30	2710	2530	3.52	14	B	59.87	47.38	45.75	1750	62.21	59.00	52.67
	949:950	EB I-94 Exit to SB Hwy 10	Ramp	318				351				360	7	367	353	0.74	-	-				330	6	336	324	0.66	-	-				263			
	932:933	WB I-94 Exit to SB Hwy 10	Ramp	463				520				480	42	522	510	0.53	-	-				540	32	572	571	0.04	-	-				413			
	1441:1442		Mainline	3205	55.44			3447	55.43			3600	86	3686	3465	3.70	13	B	55.32			3550	68	3618	3425	3.25	13	B	54.25			2427	56.86		
	1442:1443		Mainline	3200	45.39			3447	45.30			3600	86	3686	3464	3.71	19	C	45.23			3550	68	3618	3426	3.24	20	C	44.21			2429	46.65		
	1471:1472	SB Hwy 10 Exit to Forest	Ramp	662				720				780	10	790	735	1.99	-	-				870	10	880	811	2.37	-	-				575			
	1443:1445		Mainline	2524	57.84	57.50	55.67	2725	58.00	63.44	57.17	2820	76	2896	2729	3.15	16	B	57.91	60.00	56.92	2680	58	2738	2618	2.32	15	B	58.37	61.33	55.00	1856	59.03	61.38	56.58
	1465:1466	SB Hwy 10 Entrance from Forest	Ramp	299				305				310	10	320	323	0.17	-	-				340	10	350	339	0.59	-	-				231			
	1447:54		Mainline	2807	57.51			3029	57.61			3130	86	3216	3053	2.91	18	B	57.57			3020	68	3088	2957	2.38	17	B	57.96			2092	58.38		
	54:58	SB Hwy 10 South of Entrance from Forest	Mainline	2802	57.35			3030	57.44			3130	86	3216	3052	2.93	18	B	57.41			3020	68	3088	2957	2.38	17	B	57.81			2095	58.20		

PM Period - Existing Validation

				PM1415				PM1516				PM1617										PM1718										PM1819			
	Link	Facility	Type	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Auto Volume Lookup	Truck volume Lookup	Total Volume Lookup	Model Output Volume	GEH (Target v. Model)	Density pc/mi/ln	LOS	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed	Model Output Volume	Simulation Speed (mph)	Avg Hour Speed, Date of Count	2mo. Avg Hour Speed
NB Hwy 10	55:1448	NB Hwy 10 South of Exit to Forest	Mainline	4075	56.58			4292	55.37			4300	64	4364	4249	1.75	38	E	37.32			4270	22	4292	3856	6.83	56	F	22.89			3418	35.67		
	1448:1444		Mainline	4064	55.05			4290	53.03			4300	64	4364	4233	2.00	41	E	34.52			4270	22	4292	3848	6.96	59	F	21.64			3447	33.85		
	1461:1462	NB Hwy 10 Exit to Forest	Ramp	237				245				220	20	240	227	0.85	-	-				240	10	250	225	1.62	-	-				199			
	1444:1446		Mainline	3821	57.67	55.50	53.92	4045	54.14	59.00	54.67	4080	44	4124	3997	1.99	40	E	33.72	47.00	51.42	4030	12	4042	3621	6.80	57	F	21.21	58.75	47.17	3261	33.46	54.00	53.67
	1446:1440		Mainline	3806	60.32	55.50	53.92	4036	54.57	59.00	54.67	4080	44	4124	3967	2.47	42	E	31.46	47.00	51.42	4030	12	4042	3608	7.02	57	F	20.97	58.75	47.17	3314	33.29	54.00	53.67
	1469:1470	NB Hwy 10 Entrance from Forest	Ramp	1315				1351				1420	1	1421	1153	7.47	-	-				1140	10	1150	873	8.71	-	-				1016			
	1440:1439		Mainline	5107	48.98			5377	43.28			5500	45	5545	5095	6.17	49	F	26.25			5170	22	5192	4483	10.19	57	F	19.75			4359	33.03		
	916:915	EB I-94 Entrance from NB Hwy 10	Ramp	704				734				760	12	772	721	1.87	-	-				710	8	718	645	2.80	-	-				633			
	1439:1438		Mainline	4392	53.26	56.57	52.92	4621	51.78	52.00	50.50	4740	33	4773	4361	6.10	31	D	47.12	44.91	46.25	4460	14	4474	3839	9.85	28	D	45.87	49.00	38.83	3764	50.82	54.50	50.00
	947:948	WB I-94 Entrance from NB Hwy 10	Ramp	790				832				840	10	850	817	1.14	-	-				660	6	666	614	2.06	-	-				551			
	1438:1437		Mainline	3591	55.49	56.57	52.92	3788	55.27	52.00	50.50	3900	23	3923	3548	6.14	22	C	54.98	44.91	46.25	3800	8	3808	3226	9.81	20	C	54.40	49.00	38.83	3211	54.72	54.50	50.00
	1437:1436		Mainline	3584	55.61	56.57	52.92	3789	55.29	52.00	50.50	3900	23	3923	3549	6.12	22	C	54.46	44.91	46.25	3800	8	3808	3226	9.81	20	C	53.70	49.00	38.83	3211	53.95	54.50	50.00
	1436:1432		Mainline	3578	55.56	56.57	52.92	3789	54.57	52.00	50.50	3900	23	3923	3550	6.10	23	C	51.80	44.91	46.25	3800	8	3808	3224	9.85	21	C	50.99	49.00	38.83	3211	52.26	54.50	50.00
	1432:1430		Mainline	3567	55.20	56.57	52.92	3788	52.19	52.00	50.50	3900	23	3923	3554	6.04	25	C	47.67	44.91	46.25	3800	8	3808	3220	9.92	23	C	47.47	49.00	38.83	3214	50.48	54.50	50.00
	920:921	WB I-94 Exit to NB Hwy 10	Ramp	739				851				840	28	868	829	1.34	-	-				790	15	805	836	1.08	-	-				572			
	1430:938		Mainline	4299	43.11	56.57	52.92	4638	38.90	52.00	50.50	4740	51	4791	4384	6.01	31	D	35.08	44.91	46.25	4590	23	4613	4056	8.46	28	D	36.09	49.00	38.83	3789	39.86	54.50	50.00
	943:944	EB I-94 Exit to NB Hwy 10	Ramp	539				585				590	16	606	575	1.28	-	-				560	21	581	550	1.30	-	-				470			
	182:1423		Mainline	4817	45.29			5215	42.66			5330	67	5397	4968	5.96	30	D	42.12			5150	44	5194	4604	8.43	26	D	44.04			4264	47.49		
	1424:1425	NB Hwy 10 Exit to Milwaukee	Ramp	439				467				470	10	480	453	1.25	-	-				550	10	560	488	3.15	-	-				459			
	1423:1408		Mainline	4367	58.76	57.89	56.25	4748	58.64	59.22	53.67	4860	57	4917	4517	5.82	26	C	59.37	43.33	45.33	4600	34	4634	4117	7.82	23	C	60.06	33.80	31.58	3807	59.90	58.25	52.58
	1408:1433		Mainline	4353	53.30	57.89	56.25	4747	53.32	59.22	53.67	4860	57	4917	4518	5.81	28	D	53.73	43.33	45.33	4600	34	4634	4118	7.80	26	C	54.02	33.80	31.58	3807	53.82	58.25	52.58
	1433:1406		Mainline	4342	62.14	57.89	56.25	4747	62.18	59.22	53.67	4860	57	4917	4518	5.81	24	C	62.84	43.33	45.33	4600	34	4634	4120	7.77	22	C	63.27	33.80	31.58	3807	63.07	58.25	52.58
	1419:1420	NB Hwy 10 Entrance from Grand	Ramp	809				848				790	63	853	840	0.45	-	-				790	63	853	845	0.27	-	-				575			
	1406:61		Mainline	5140	50.73	61.00	58.08	5595	50.83	60.86	52.75	5650	120	5770	5359	5.51	26	D	51.26	43.67	41.00	5390	97	5487	4966	7.21	24	C	51.40	39.00	31.25	4383	51.51	60.60	54.58
	61:67	NB Hwy 10 north of Entrance from Grand	Mainline	5136	58.25	61.00	58.08	5595	58.18	60.86	52.75	5650	120	5770	5360	5.50	23	C	58.76	43.67	41.00	5390	97	5487	4966	7.21	21	C	58.83	39.00	31.25	4382	58.93	60.60	54.58
SB I-75	73:236	SB I-75 North of Exit to Clay	Mainline	5110	39.61			5279	26.62			5000	315	5315	5270	0.62	37	E	29.29			5060	249	5309	4428	12.63	68	F	13.42			4512	34.84		
	238:239	SB I-75 Exit to Clay	Ramp	476				493				460	33	493	488	0.23	-	-				400	26	426	362	3.22	-	-				362			
	236:242		Mainline	4600	33.08	60.58	56.92	4779	24.48	63.42	53.33	4540	282	4822	4775	0.68	47	F	26.42	46.90	46.42	4660	223	4883	4065	12.23	74	F	14.06	38.00	49.67	4181	35.67	63.82	59.25
	242:244		Mainline	4557	24.02	60.58	56.92	4779	21.35	63.42	53.33	4540	282	4822	4768	0.78	56	F	21.78	46.90	46.42	4660	223	4883	4065	12.23	78	F	13.36	38.00	49.67	4216	34.89	63.82	59.25
	253:2851	SB I-75 Entrance from Clay	Ramp	895				926				980	10	990	912	2.53	-	-				930	10	940	785	5.28	-	-				610			
	247:249		Mainline	5416	35.84			5701	34.73			5520	292	5812	5681	1.73	42	E	34.29			5590	233	5823	4850	13.32	52	F	23.89			4847	39.90		
	278:279	WB I-94 Entrance from SB I-75	Ramp	545				554				520	40	560	546	0.60	-	-				620	46	666	547	4.83	-	-				590			
	281:282	EB I-94 Entrance from SB I-75	Ramp	1251				1364				1290	56	1346	1290	1.54	-	-				1300	42	1342	1119	6.36	-	-				1122			
	249:261		Mainline	3596	47.32	54.82	54.08	3777	47.24	61.27	50.50	3710	196	3906	3836	1.13	28	D	47.06	38.89	43.08	3670	145	3815	3179	10.75	24	C	45.78	41.83	47.67	3163	45.66	59.27	55.58
	261:262		Mainline	3589	58.42	54.82	54.08	3777	58.70	61.27	50.50	3710	196	3906	3836	1.13	22	C	58.53	38.89	43.08	3670	145	3815	3178	10.77	18	C	59.31	41.83	47.67	3165	57.76	59.27	55.58
	262:265		Mainline	3584	57.92	54.82	54.08	3778	58.42	61.27	50.50	3710	196	3906	3836	1.13	23	C	58.11	38.89	43.08	3670	145	3815	3177	10.79	18	C	59.57	41.83	47.67	3167	57.34	59.27	55.58
	265:266		Mainline	3570	56.76	54.82	54.08	3778	57.27	61.27	50.50	3710	196	3906	3837	1.11	23	C	56.92	38.89	43.08	3670	145	3815	3174	10.84	18	C	58.39	41.83	47.67	3174	56.11	59.27	55.58
	266:268		Mainline	3555	51.48	54.82	54.08	3777	51.91	61.27	50.50	3710	196	3906	3840	1.06	25	C	51.63	38.89	43.08	3670	145	3815	3172	10.88	20	C	53.01	41.83	47.67	3180	50.95	59.27	55.58
	311:312	SB I-75 Exit to Warren	Ramp	506				544				550	10	560	555	0.21	-	-				540	10	550	460	4.00	-	-				473			
	268:269		Mainline	3044	67.44	57.60	56.25	3233	67.96	62.20	56.50	3160	186	3346	3284	1.08	17	B	67.68	56.33	48.50	3130	135	3265	2711	10.13	13	B	69.01	59.60	52.25	2710	66.94	62.80	57.50
	269:270		Mainline	3036	58.67	57.60	56.25	3231	59.10	62.20	56.50	3160	186	3346	3284	1.08	19	C	58.91	56.33	48.50	3130	135	3265	2712	10.12	15	B	60.13	59.60	52.25	2713	58.30	62.80	57.50
	299:314	EB I-94 Exit to SB I-75	Ramp	142				154				150	10	160	153	0.56	-	-				150	10	160	150	0.80	-	-				144			
	293:294	WB I-94 Exit to SB I-75	Ramp	720				839				750	77	827	818	0.31	-	-				730	40	770	775	0.18	-	-				547			
	270:320		Mainline	3881	54.31	57.60	56.25	4224	54.37	62.20	56.50	4060	273	4333	4255	1.19	20	C	54.37	56.33	48.50	4010	185	4195	3638	8.90	17	B	54.99	59.60	52.25	3409	54.37	62.80	57.50
	320:321		Mainline	3875	61.80	57.60	56.25	4224	61.88	62.20	56.50	4060	273	4333	4254	1.21	18	B	61.79	56.33	48.50	4010	185	4195	3637	8.92	15	B	62.37	59.60	52.25	3412	61.74	62.80	57.50
	322:323	SB I-75 Entrance from Warren	Ramp	355				357				340	28	368	369	0.05	-	-				340	27	367	363	0.21	-	-				248			
	321:69		Mainline	4213	57.39			4581	57.52			4400	301	4701	4625	1.11	17	B	57.43			4350	212	4562	3999	8.61	14	B	57.84			3665	57.49		
	69:70	SB I-75 South of Entrance from Warren	Mainline	4206	58.59			4581	58.71			4400	301	4701	4624	1.13	16	B	58.61			4350	212	4562	4000	8.59	14	B	59.08			3667	58.75		
NB I-75	68:324	NB I-75 South of Exit to Warren	Mainline	4890	59.30			5146	58.48			5020	185	5205	5219	0.19	18	C	57.99			5050	23	5073	5100	0.38	18	B	57.87			3441	61.59		
	339:340	NB I-75 Exit to Warren	Ramp	353				362				250	93	343	339	0.22	-	-				210	1	211	214	0.21	-	-				142			
	324:319		Mainline	4512	51.59	57.17	57.33	4783	50.81	61.36	52.83	4770	92	4862	4879	0.24	25	C	49.95	58.42	43.33	4840	22	4862	4890	0.40	25	C	49.92	45.45	38.08	3307	56.58	56.89	55.00
	319:317		Mainline	4504	55.53	57.17	57.33	4784	55.35	61.36	52.83	4770	92	4862	4879	0.24	22	C	55.23	58.42	43.33	4840	22	4862	4891	0.42	22	C	55.14	45.45	38.08	3309	57.56	56.89	55.00
	276:277	WB I-94 Entrance from NB I-75	Ramp	288				311				300	8	308	324	0.90	-	-				310	6	316	333	0.94	-	-				227			
	285:286	EB I-94 Entrance from NB I-75	Ramp	571				590				590	18	608	605	0.12	-	-				700	12	712	733	0.78	-	-				487			
	315:263	NB I-75 to I-94 Ramp Entrance from NB Front	Ramp	341				356				370	1	371	363	0.42	-	-				400	31	431	441	0.48	-	-				286			
	317:271		Mainline	3976	56.86	57.17	57.33	4233	56.69	61.36	52.83	4250	67	4317	4317	0.00	26	C	56.70	58.42	43.33	4230	35	4265	4268	0.05	25	C	56.50	45.45	38.08	2882	57.76	56.89	55.00
	306:305	NB I-75 Entrance from Warren	Ramp	913				960				980	1	981	965	0.51	-	-				850	12	862	880	0.61	-	-				578			
	267:264		Mainline	4839	60.59	56.09	57.00	5189	60.63	59.82	55.33	5230	68	5298	5282	0.22	29	D	60.46	55.45	44.58	5080	47	5127	5156	0.40	28	D	60.59	44.11	42.42	3471	60.83	60.14	54.50
	300:301	EB I-94 Exit to NB I-75	Ramp	771				811				810	58	868	831	1.27	-	-				640	47	687	671	0.61	-	-				607			
	264:250		Mainline	5588	53.31	56.09	57.00	6002	53.29	59.82	55.33	6040	126	6166	6111	0.70	29	D	53.04	55.45	44.58	5720	94	5814	5831	0.22	27	D	53.66	44.11	42.42	4081	54.03	60.14	54.50
	289:290	WB I-94 Exit to NB I-75	Ramp	741				841				820	29	849	829	0.69	-	-				660	19	679	712	1.25	-	-				466			
	248:245		Mainline	6296	54.62			6847	54.47			6860	155	7015	6934	0.97	32	D	54.39			6380	113	6493	6551	0.72	30	D	54.88			4553	56.35		
	255:256	NB I-75 Exit to Clay	Ramp	434				467				470	10	480	469	0.50	-	-				550	10	560	549	0.47	-	-				386			
	245:243		Mainline	5834	57.50	59.45	60.58	6380	57.46	63.45	57.75	6390	145	6535	6465	0.87	28	D	57.47	56.90	47.50	5830	103	5933	6009	0.98	26	D	57.75	53.78	48.08	4173	57.80	60.17	57.33
	243:237		Mainline	5818	58.08	59.45	60.58	6379	58.02	63.45	57.75	6390	145	6535	6462	0.91	28	D	58.04	56.90	47.50	5830	103	5933	6014	1.05	26	C	58.36	53.78	48.08	4176	58.50	60.17	57.33
	240:241	NB I-75 Entrance from Clay	Ramp	506				513				480	38	518	517	0.04	-	-				480	38	518	531	0.57	-	-				349			
	237:74	NB I-75 north of Entrance from Clay	Mainline	6306	56.44			6894	56.40			6870	183	7053	6978	0.90	25	C	56.40			6310	141	6451	6548	1.20	23	C	56.58			4527	56.97		

GEH Stats for I-94	
Max	3.32
Average	1.43
# Under 5	145
# Over 5	0
% Under 5	100%

PM1617

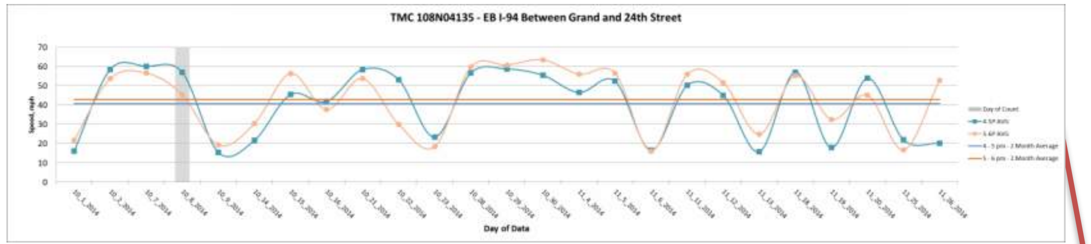
GEH Stats for I-94	
Max	6.36
Average	1.56
# Under 5	144
# Over 5	1
% Under 5	99%

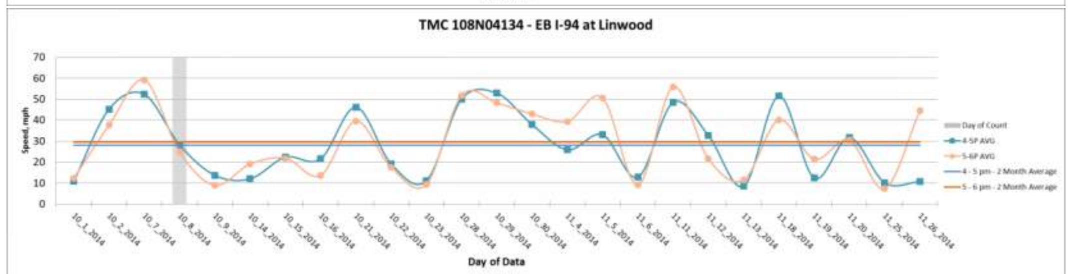
PM1718

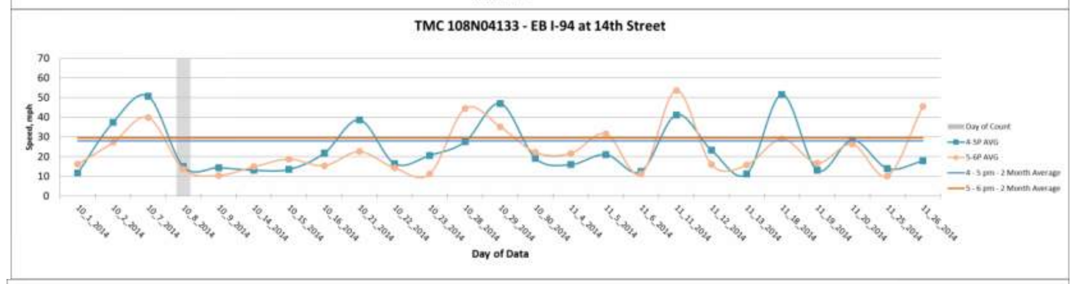
Appendix B: *HERE* Day to Day Speed Profiles

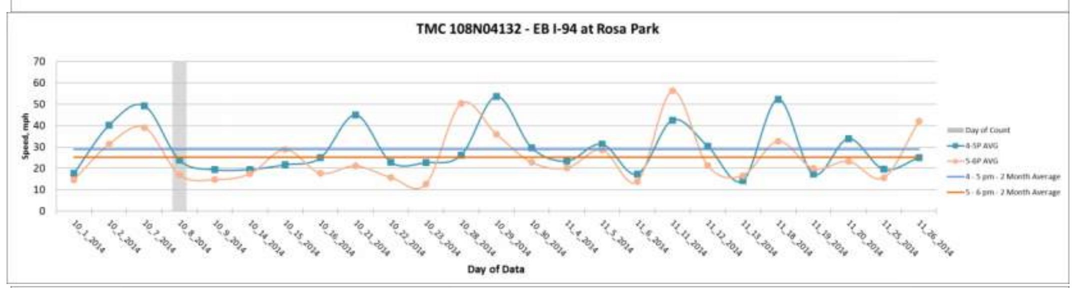
Eastbound I-94 – PM Peak

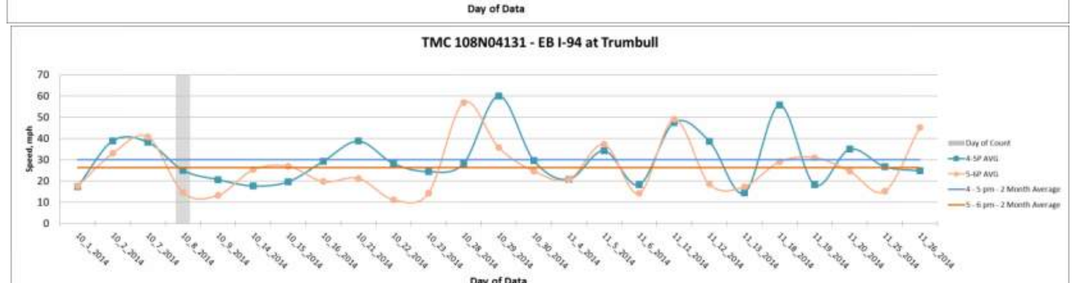
Speeds Reported by the *HERE* Database for Tuesday – Thursday during October and November 2014

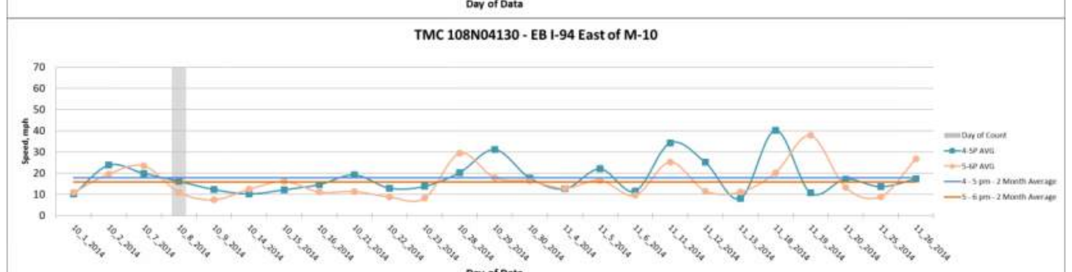


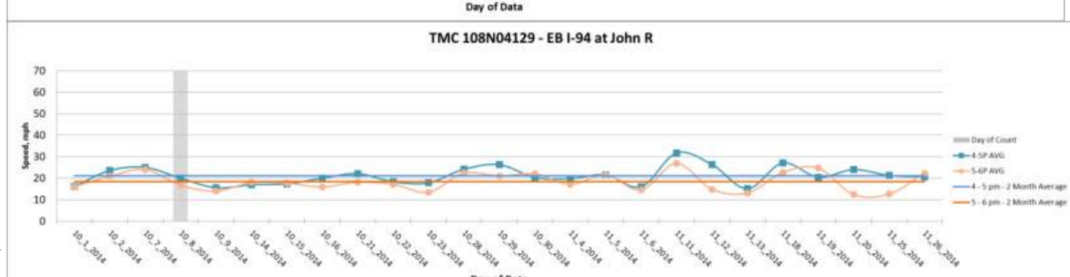


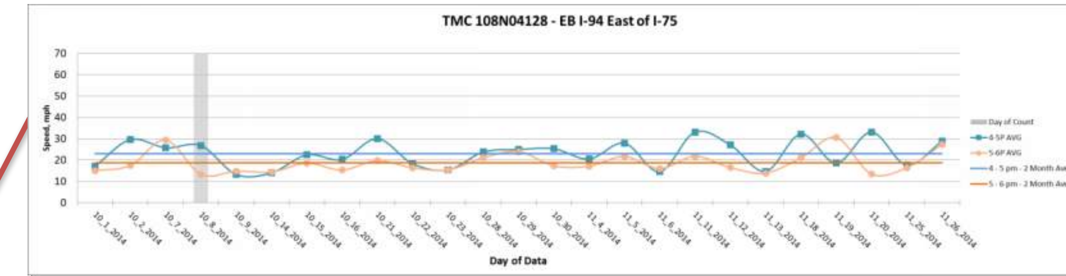


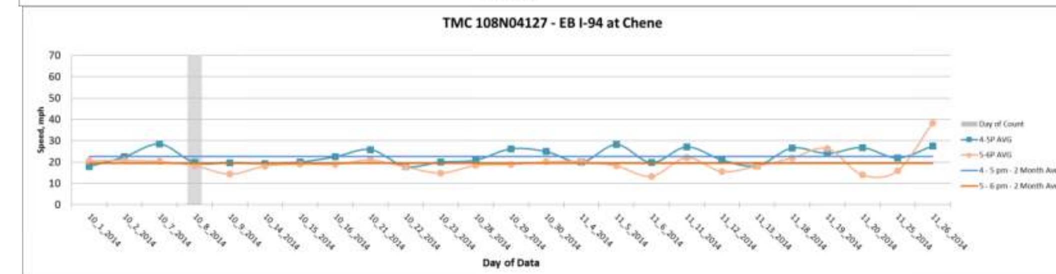


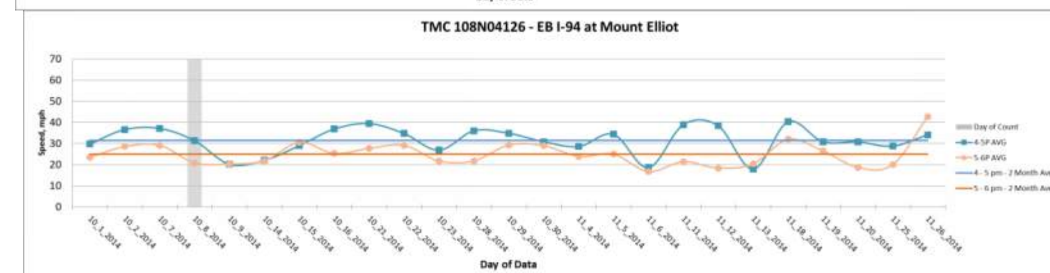


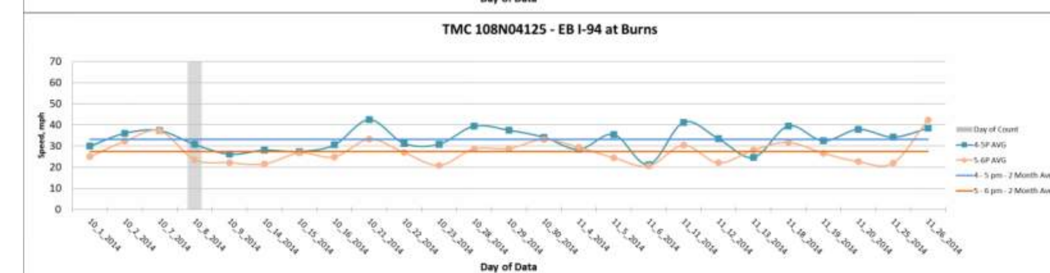


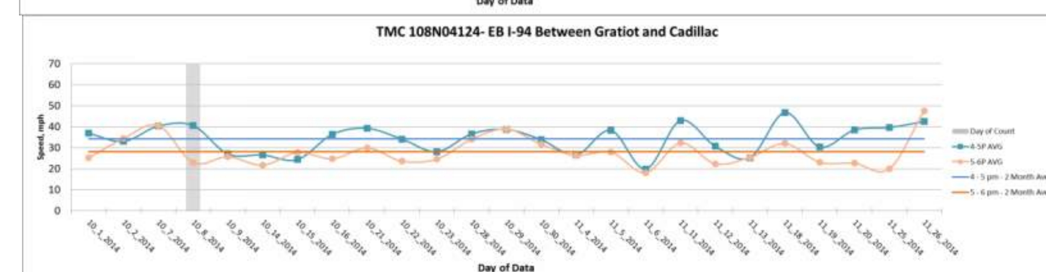


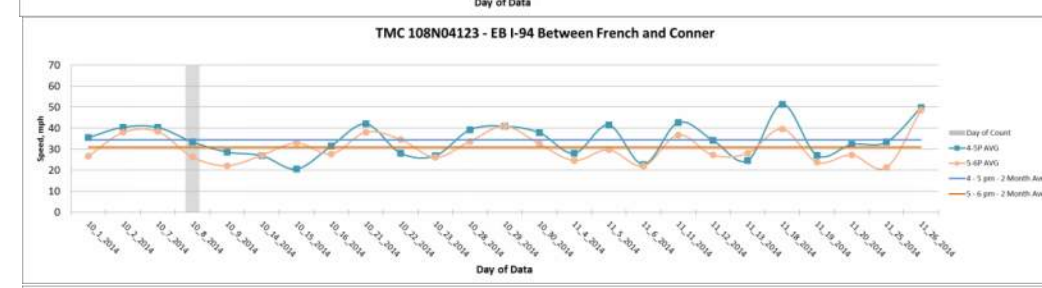


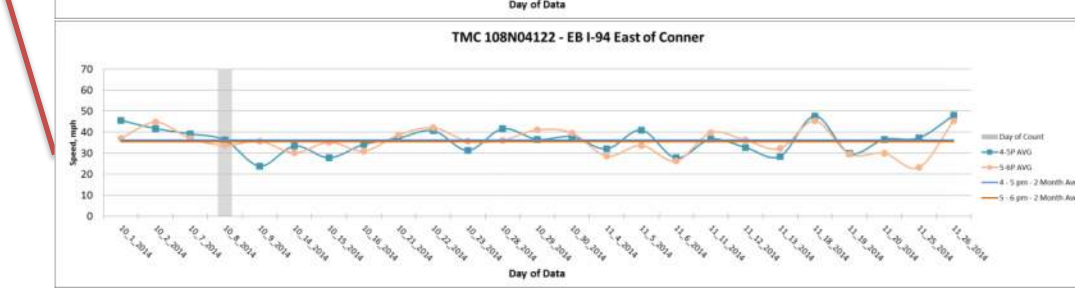






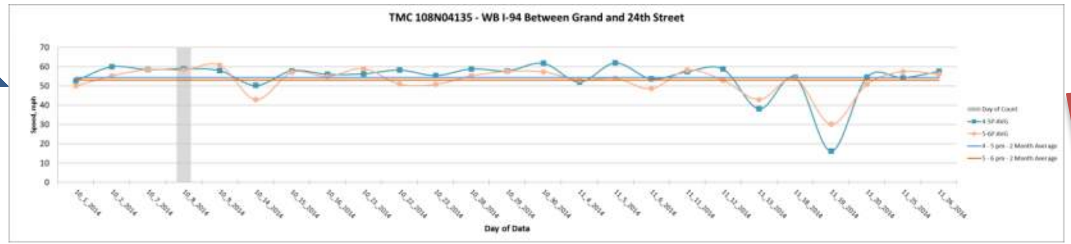


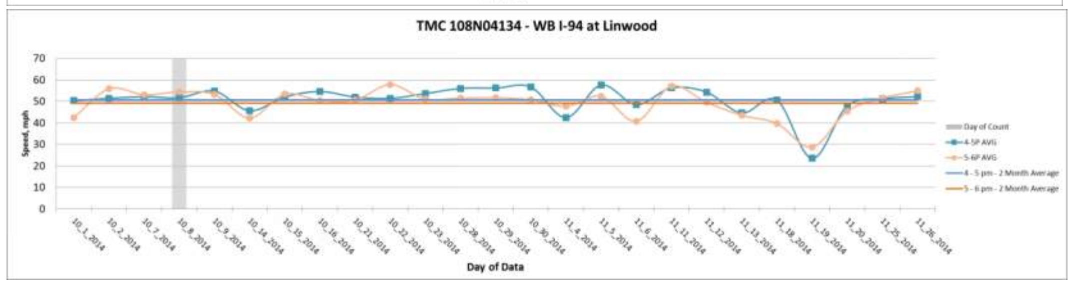


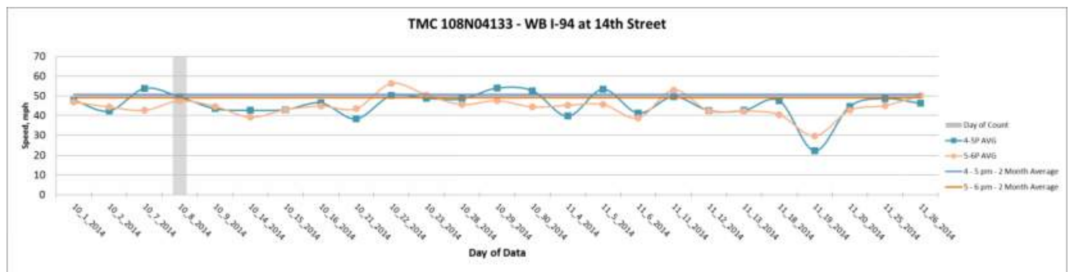


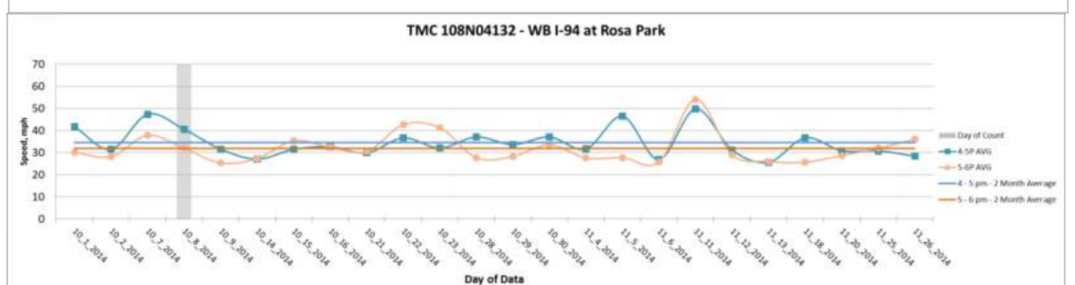
Westbound I-94 – PM Peak

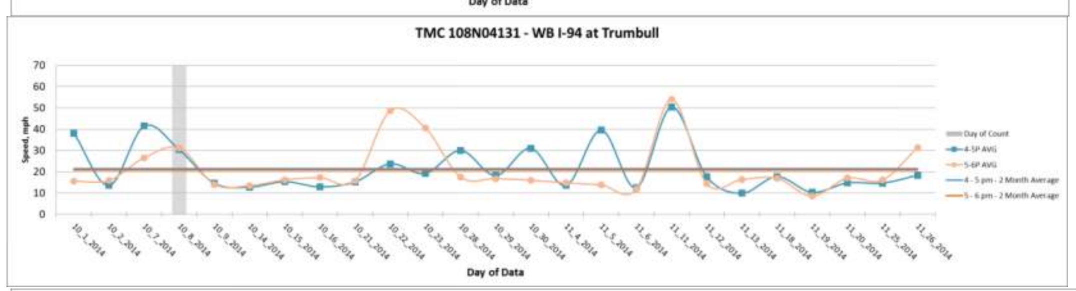
Speeds Reported by the *HERE* Database for Tuesday – Thursday during October and November 2014

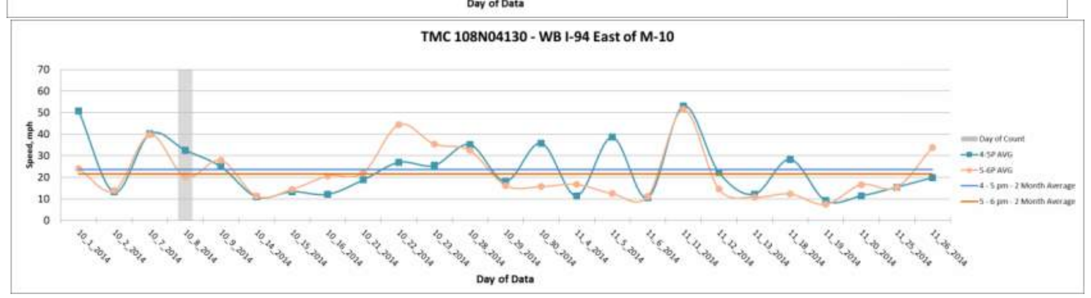


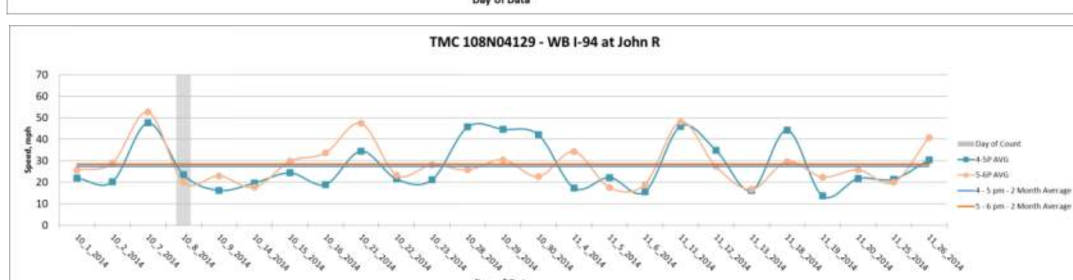


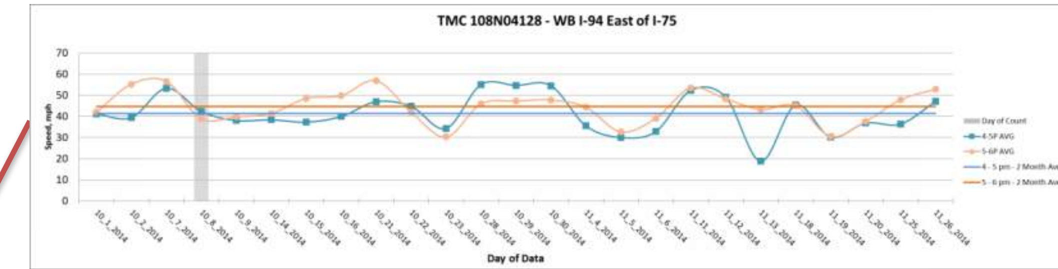


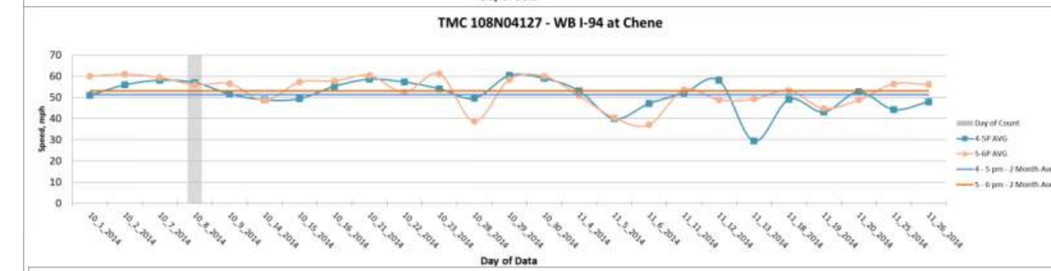


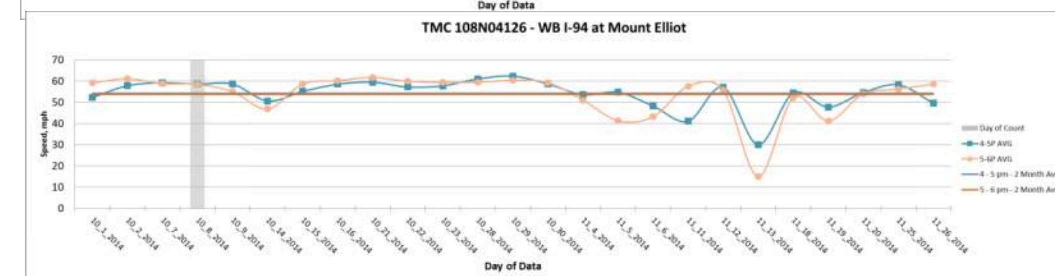


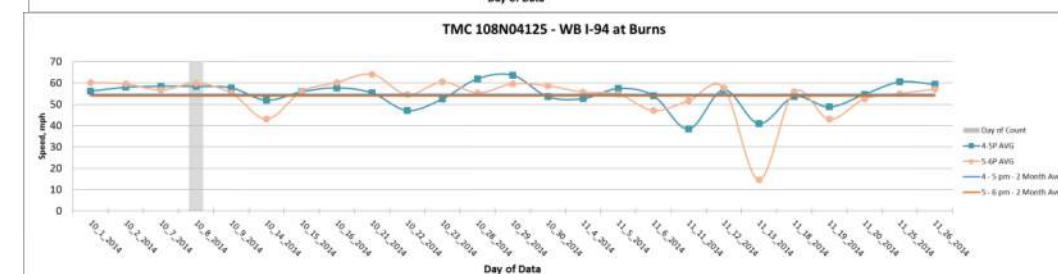


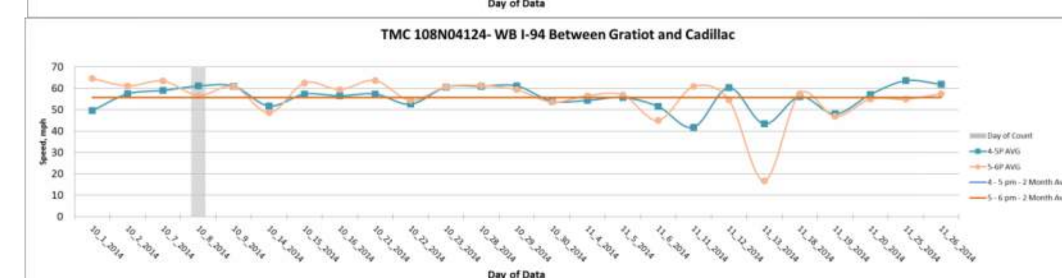


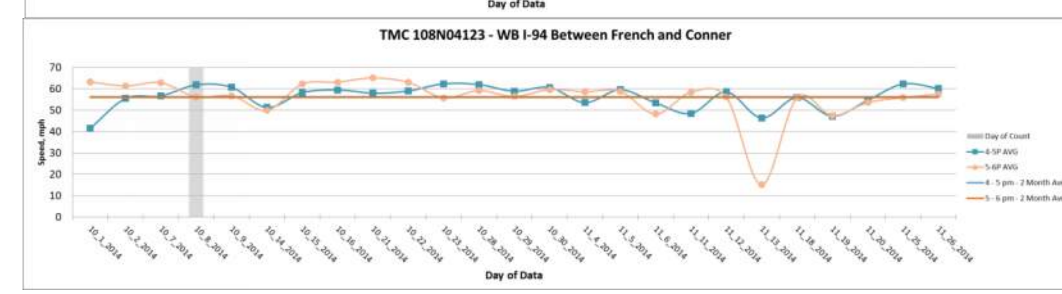


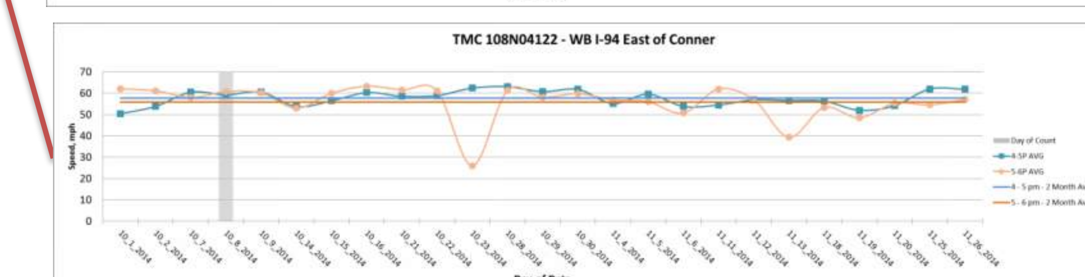






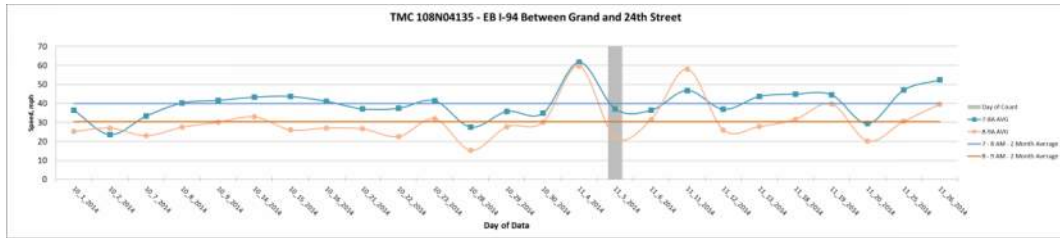


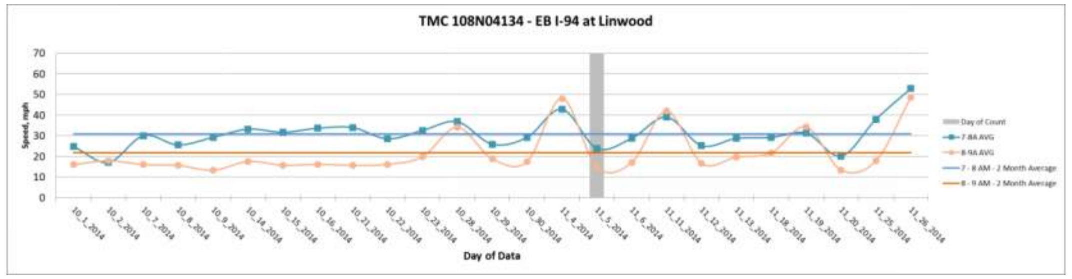


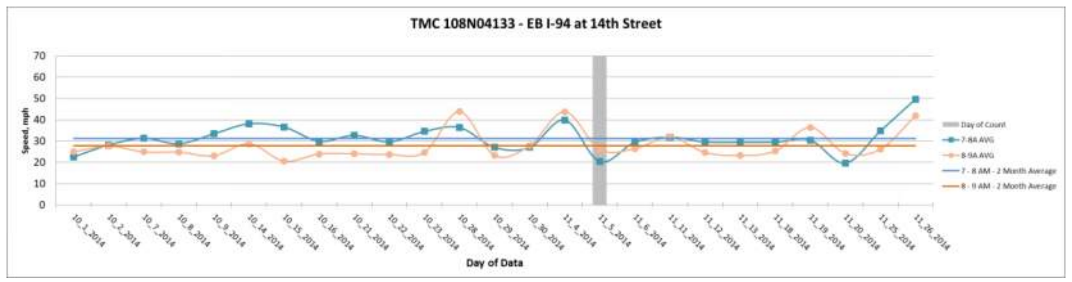


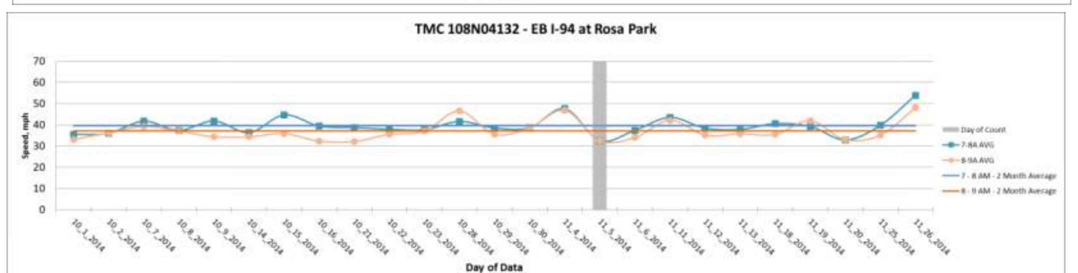
Eastbound I-94 – AM Peak

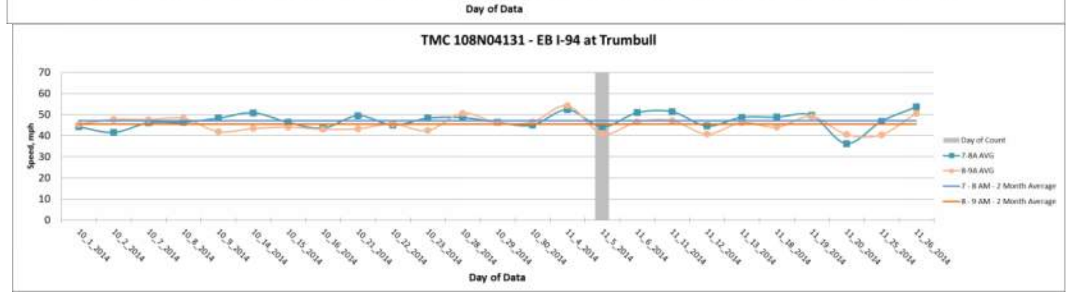
Speeds Reported by the *HERE* Database for Tuesday – Thursday during October and November 2014

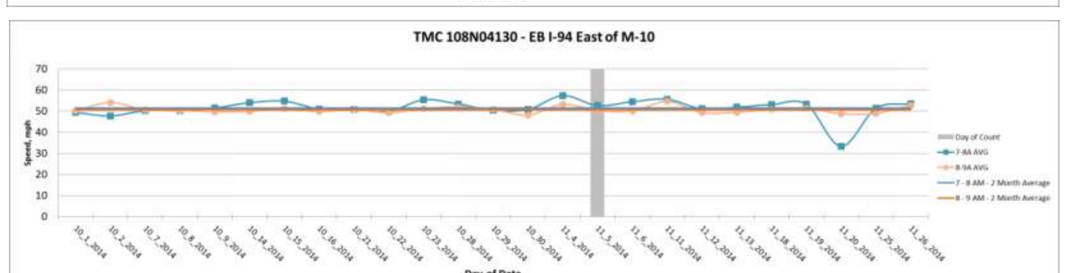


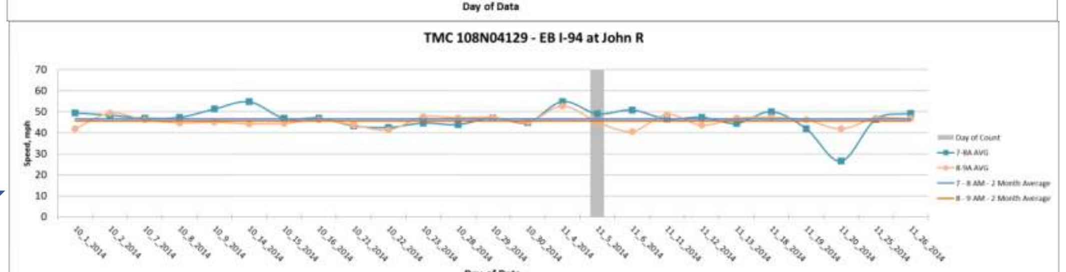


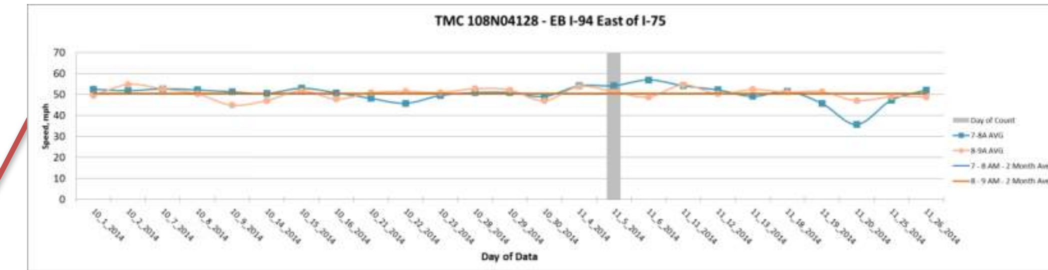


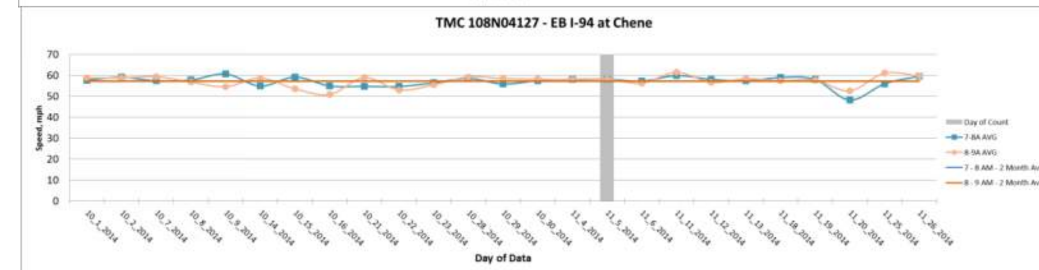


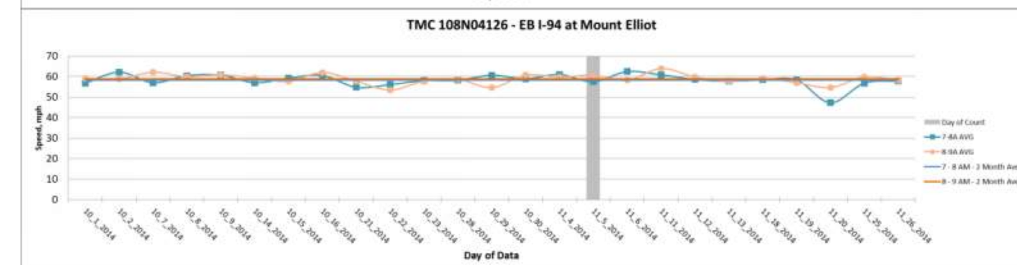


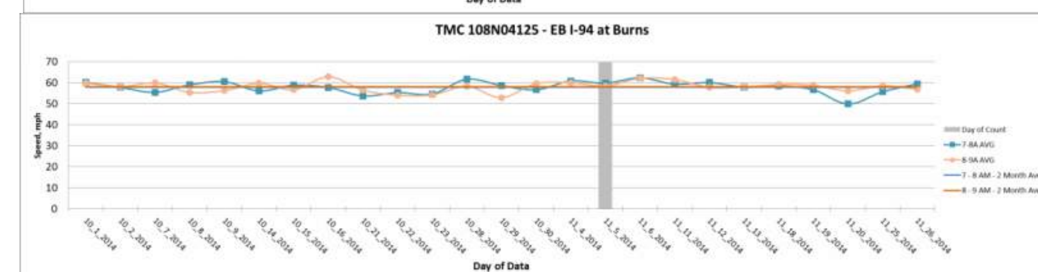


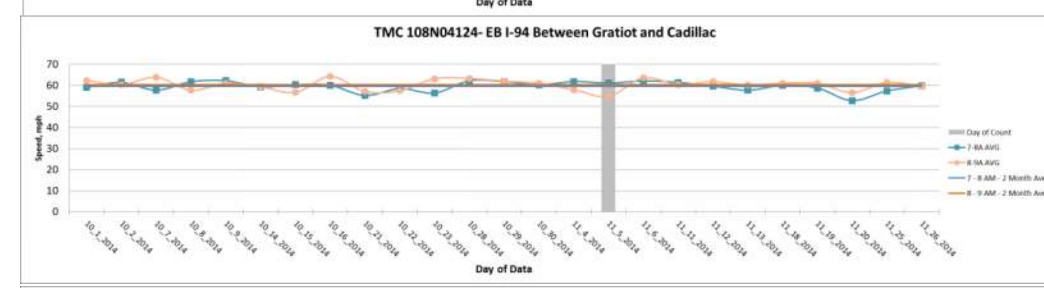


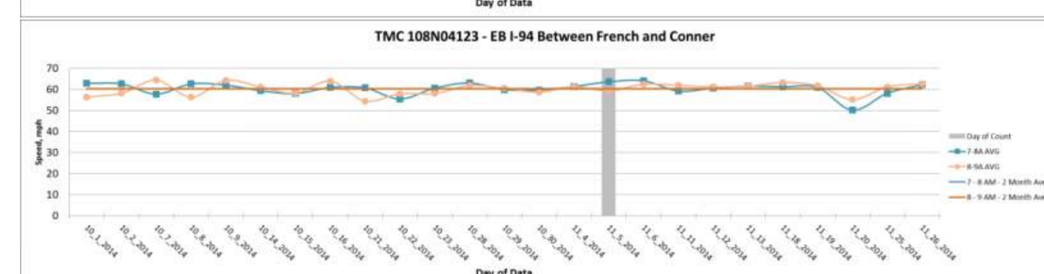


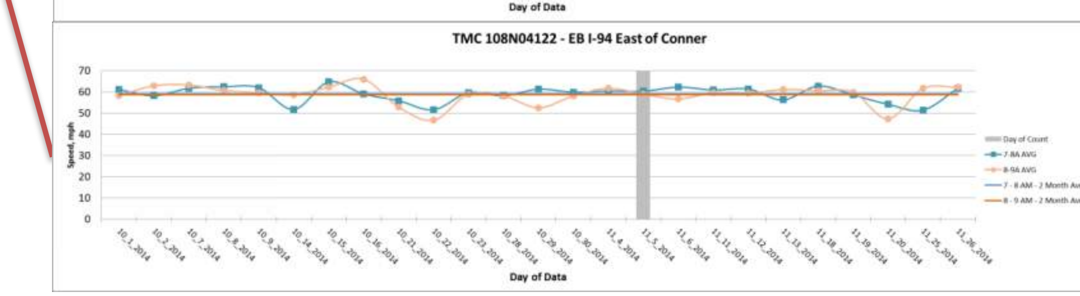






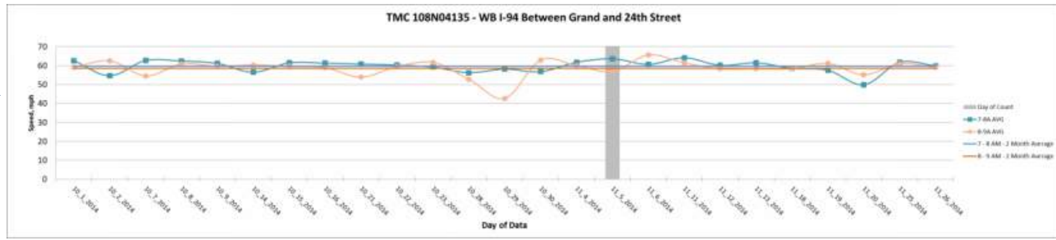


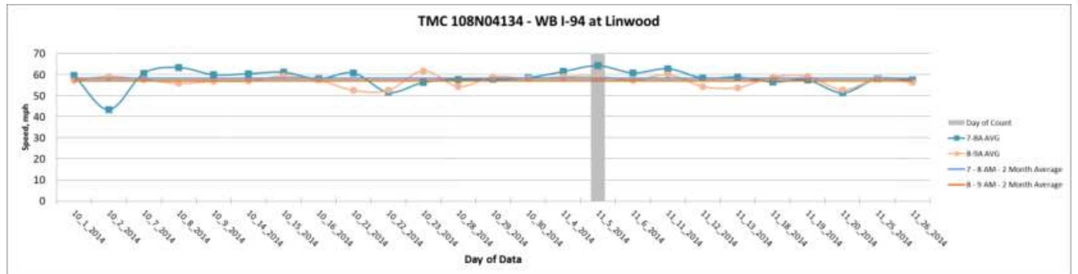


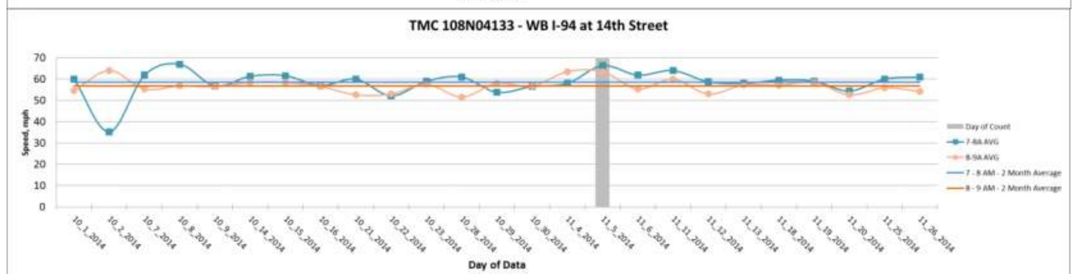


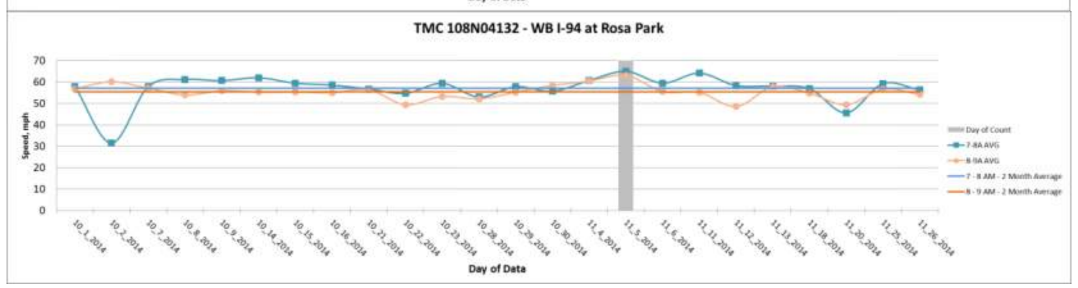
Westbound I-94 – AM Peak

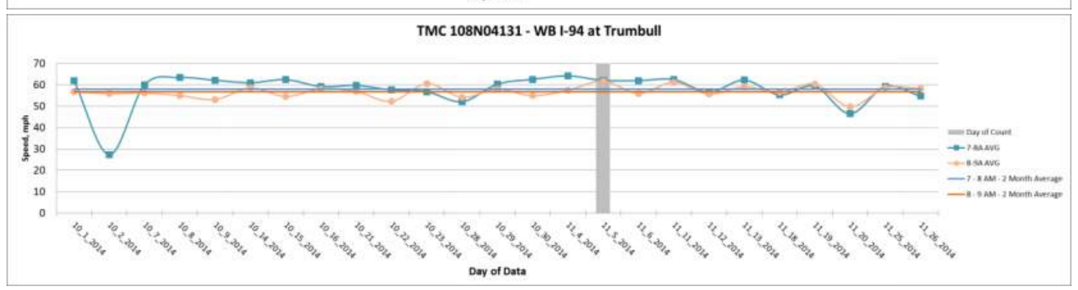
Speeds Reported by the *HERE* Database for Tuesday – Thursday during October and November 2014

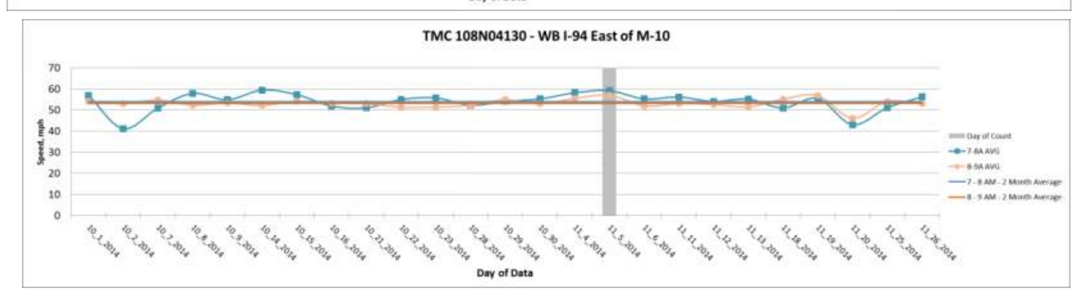


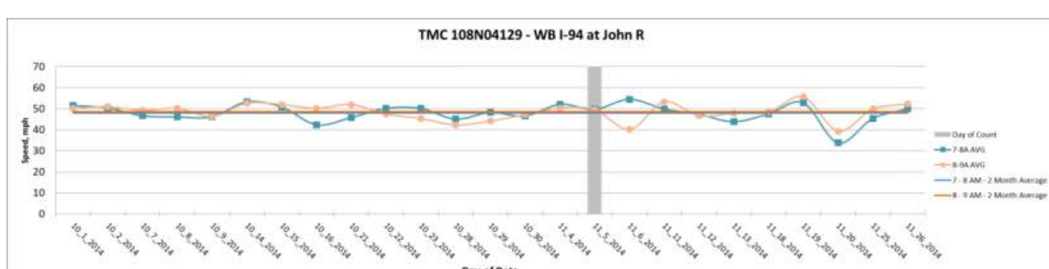


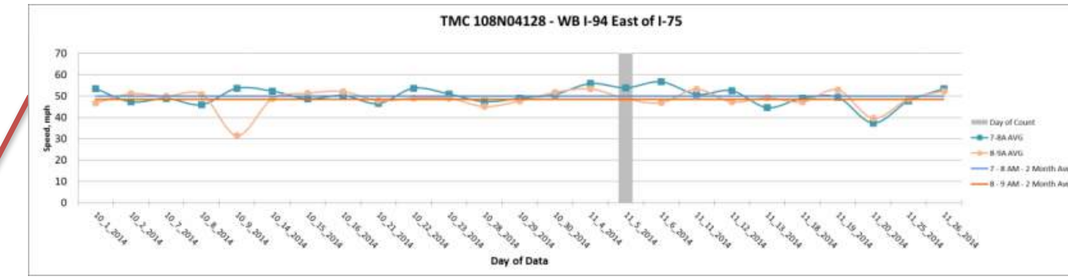


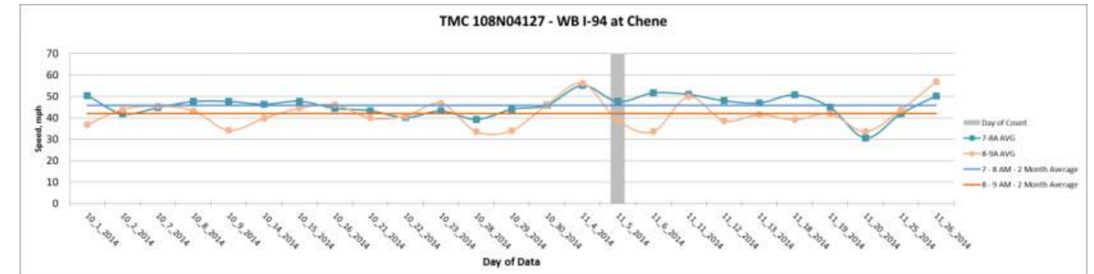


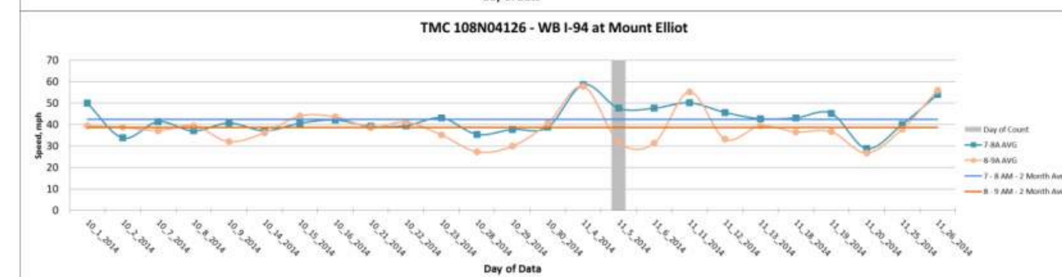


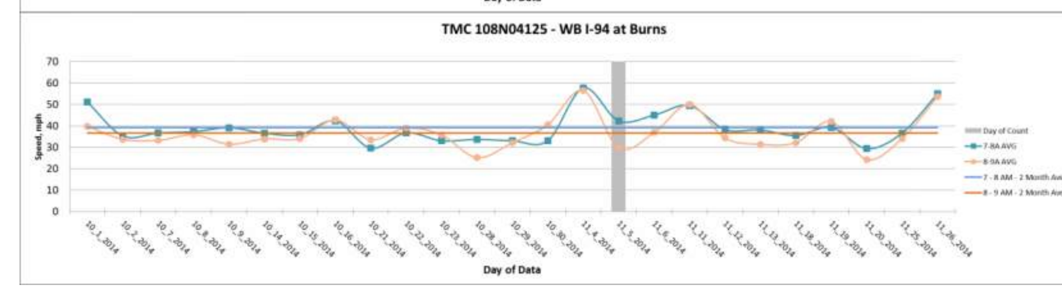


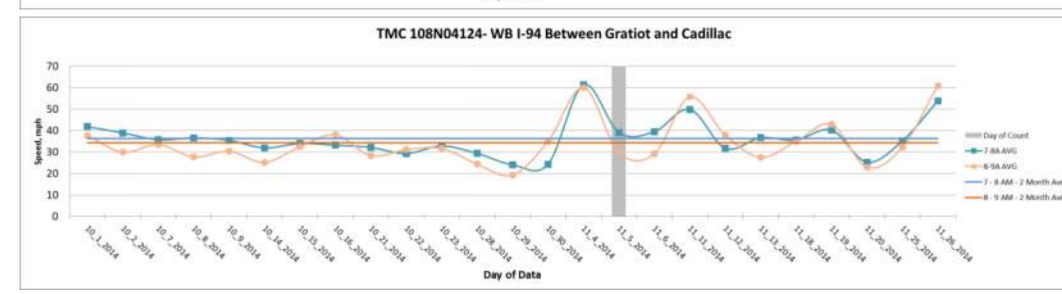


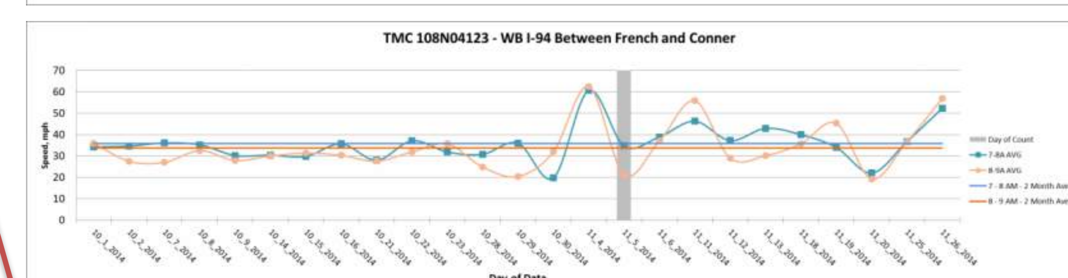


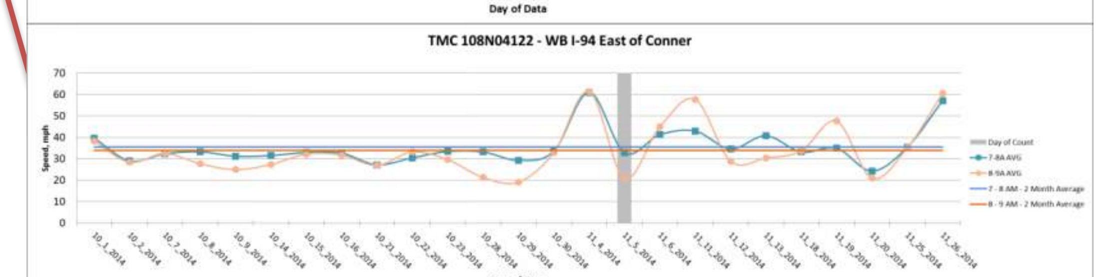












STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

GLORIA J. J
DIRECTOR

January 4, 2006

RECEIVED
FEDERAL HIGHWAY ADMIN.
JAN 06 2006
MICHIGAN DIVISION
LANSING, MICHIGAN

Mr. Thomas J. Fudaly
Engineering & Operations Manager
Federal Highway Administration
315 W. Allegan St., Room 211
Lansing, MI 48933

Dear Mr. Fudaly:

Request for Approval of Additional Special Route Designations
for Vertical Clearance in Highly Urbanized Areas

The Michigan Department of Transportation (MDOT) is requesting approval of additional routes to be included with the current Special Routes Designation in our Bridge and Road Design Manuals. By approving this plan, these additional routes would now require 14'-6" vertical clearance as compared to the AASHTO required 16'-0". MDOT, as part of the plan, is also designating a system of routes that remain as the 16'-0" network.

We have coordinated with you and your staff over the past several years to arrive at a plan to provide a roadway network that preserves sufficient 16'-0" routes for the national defense system and for the movement of commercial goods. This proposal satisfies both the need for such a system while allowing other routes in the urban areas relief to a more appropriate standard of 14'-6". A significant portion of MDOT's roadway system was built when the vertical clearance standard was 14'-0". In the absence of approval of these special route designations, MDOT would suffer a significantly greater hardship to meet current standards than our counterparts across the country. We estimate approval of the additional routes will save the State of Michigan almost $270 million. These funds can be used to address the other significant bridge needs across the state and help improve the overall bridge system condition.

Enclosed for your approval is a listing of the additional structures we are requesting approval to be added to the Special Route Designation. Also enclosed are maps that show the vertical clearance designations for Michigan's urban areas. MDOT has added a field to our corporate database that indicates the required vertical clearance for each structure. Enclosed is a spreadsheet that contains the information for bridges in the urban areas.

MURRAY D. VAN WAGONER BUILDING • P.O. BOX 30050 • LANSING, MICHIGAN 48909
www.michigan.gov • (517) 373-2090

0 (01/03)

We have also included an updated version of our "Operating Instructions for Scoping of Road and Bridge Projects to meet the current AASHTO Vertical Clearance Standards". This document was originally created in 1998 as a joint cooperative effort with FHWA. This provides MDOT staff with the process for scoping projects that have substandard vertical clearance and provides them instructions on how to analyze the best/most cost effective method to achieve the required standard. This document was developed with the understanding that the best alternative may include an incremental approach to improve the vertical clearance over a series of projects.

Our proposal has been developed cooperatively with your office. MDOT believes it provides us with a methodology to cost effectively meet your concerns with improving vertical clearance on our roadway system. When approved, we will make appropriate changes to our Bridge and Road Design Manuals as well as include the changes into our Scoping Manual that is currently being updated. Please contact me at 373-0030 if you have any questions pertaining to this request.

Sincerely,

Mark A. Van Port Fleet
Engineer of Design

Enclosures
cc: J. Polasek
T. Frake
S. Beck
S. Mortel
D. Wresinski
A. Irwin

NEWLY EXEMPT BRIDGES (PROPOSED)					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S04					
S05	50011	CLINTON R RD	M-53	14.83	14.5
S09	50023	U TRN W/MOUND RD	M-59	14.17	14.5
S08	63043	M-150	M-59	15.58	14.5
S06	63043	AUBURN RD	M-59	14.57	14.5
S03-1	63043	CROOKS RD	M-59	14.83	14.5
S01-2	63043	SQUIRREL RD NB	M-59	14.47	14.5
S01-1	63043	I-75 SB	M-59	15.42	14.5
S01	63043	I-75 NB	M-59	15.58	14.5
X01	63043	OPDYKE RD	M-59	14.57	14.5
X03-4	63043	GTW RR	M-59	14.57	14.5
X03-3	63041	GTWRR(WEST TRACK)	M-59	14.90	14.5
S02	63041	GTWRR(EAST TRACK)	M-59	14.93	14.5
S46	63031	M-10 NB	US-24	14.50	14.5
X01	0	I-696 EB	WOODWARD	15.06	14.5
S02-2	63052	GTW RR	US-24	13.75	14.5
S02-1	81081	US-23 SB	US-23 BR	14.40	14.5
P01	81081	US-23 NB	US-23 BR	14.40	14.5
X01	81072	N UNIV PED WALK	FOREST AVE US23 BR	15.65	17 PED 23 RR
X01	81101	AA RR	I-94 BL	14.50	14.5
S01	81073	AA RR	US-23 BR	14.57	14.5
S07	81101	I-94	I-94 BL	14.17	14.5
S05	81073	M-14	US-23 BR HURON RIVER DR	14.40	14.5
S04	81105	NEWPORT RD	M-14	15.32	14.5
S03	81105	MILLER RD	M-14	14.67	14.5
S03	81105	DEXTER RD	M-14	15.65	14.5
S04	81063	OLD M-17 EB	US-12 WB	14.67	14.5
S05	81063	WIARD RD NB (UP/L)	US-12	14.07	14.5
S01	81063	FORD EX DR NB(UPL)	US-12	13.85	14.5
X01	82011	ECORSE RD WB	US-12EB	14.17	14.5
S10-3	82011	CONRAIL	US-12	14.67	14.5
S25	77031	I-94 EB	M-25	14.67	14.5
S03	77091	I-94/I-69 (E & WB)	PINE GROVE AVE.(M-25)	14.93	14.5
X01	25072	I-69	M-54 (DORT HWY)	15.06	14.5
X02	25072	GTW RR	M-54	13.98	14.5
X03	25072	CSX RR	M-54	14.01	14.5
X02	61151	MI SHORE	I-96 BS	14.99	14.5
X04	61151	CSX RR	I-96 BS	14.67	14.5
S01	61151	CSX RR	I-96 BS	15.16	14.5
S02	61151	BROADWAY AVE	I-96 BS	14.57	14.5
X01	61151	AIRPORT RD	I-96 BS	15.91	14.5
S03	3032	CSX RR	US-31	14.30	14.5
S03	3051	US-31 SB	US-31 BR (58 TH STREET)	14.99	14.5
S01	3034	I-196 WB	US-31NB	15.58	14.5

NEWLY EXEMPT BRIDGES (PROPOSED)					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S02	70013	US-31	I-196 BL	14.83	14.5
S02	11081	EUCLID AVE	I-94 BL (MAIN STREET)	14.50	14.5
S01-3	11081	EUCLID AVE	I-94 BL (MAIN STREET)	14.50	14.5
S01-4	11031	I-94 EB	US-31 & M-139	15.91	14.5
S08	11031	I-94 WB	US-31 & M-139	14.93	14.5
X01	70062	I-96 EB	M-11 WB	14.40	14.5
X02	41063	CONRAIL	M-11	14.01	14.5
S01-4	41063	CSX RR	M-11	12.99	14.5
P01	41063	I-96WB	M-11	14.76	14.5
X01	39052	PEDESTRIAN	M-331 (S WESTNEDGE AVE)	15.81	17
P02	33042	CONRAIL	M-43	14.40	14.5
S14	33042	PED OVER @ CLEMENS	M-43	14.99	14.5
S15	19021	I-69 SB	GRAND RIVER AVE (I-96BL)	14.99	14.5
S04-2	19021	I-69 NB	GRAND RIVER AVE (I-96BL)	14.99	14.5
S12	0	US-127 SB	I-94BL	14.34	14.5
S12	38083	I-94	I-94BL SB	14.34	14.5
S07	50011	M-53 SB	VAN DYKE RD & M-53 RMP	16.25	14.5
S06	50022	M-59 EB	M-53	16.24	14.5
S01	50022	M-59	M-53	16.24	14.5
X01	50023	UTICA RD	M-59	16.24	14.5
S02	50023	CONRAIL	M-59	16.01	14.5
S09	50023	MERRILL RD	M-59	16.24	14.5
S07	50023	U TRN E/MOUND RD	M-59	16.24	14.5
S03	50023	NB MOUND RD	M-59	16.24	14.5
S07	50023	XOVER W/MOUND RD	M-59	16.24	14.5
S03-1	63043	LIVERNOIS RD	M-59	16.50	14.5
S01	63043	SQUIRREL RD SB	M-59	20.41	14.5
S02	81105	WAGNER RD	M-14	16.67	14.5
S01-3	3032	US-31 BR (58 TH)	US-31 NB	16.24	14.5
P01	41063	I-96EB	M-11	16.57	14.5
P03	41062	PED X-OVER@IVANRES	M-11	19.00	17
R01	41062	PED X-OVER M-11	M-11(28TH STREET)	16.99	17
S01	41062	M-11	CSX RR & M-21BR	20.67	23
S02-3	3032	60 TH STREET	US-31	16.24	14.5
S02-4	23152	I-96 EB	M-43	16.14	14.5
P01	23152	I-96 WB	M-43	16.01	14.5
P02	33042	PED OVER @ FAIRVIE	M-43	16.01	14.5
P01	33043	HARRISON ST	I-69 BR	16.01	14.5
S04-1	33043	PED @HITCH POST RD	I-69 BR	16.01	14.5
	0	US-127 NB	I-94BL	16.93	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S02	13033	M-96 (COLUMBIA)	I-194		14.5
S03	23081	CANAL RD	I-496 RAMP	14.83	14.5
S04	23081	CANAL RD	I-496	15.35	14.5
S05	23081	CREYTS RD NB	I-496	15.16	14.5
S06	23081	SNOW RD	I-496	14.99	14.5
S14	23081	CREYTS ROAD SB	I-496	14.57	14.5
P01	25132	AVON ST WALKOVER	I-475	16.73	17
P02	25132	GEORGE ST. PED. X	I-475	16.73	17
P03	25132	HARVARD ST WALKOVR	I-475	15.65	17
P06	25132	LINDSAY BLVD PEDX	I-475	15.16	17
R02	25132	GTW RR SERV RD	I-475	14.83	14.5 Rd 23.0 RR
S02	25132	HILL RD	I-475	16.14	14.5
S04	25132	BRISTOL RD(OLDM121	I-475	14.83	14.5
S05	25132	HEMPHILL RD	I-475	15.49	14.5
S09	25132	12TH ST RELOC	I-475	15.32	14.5
S10	25132	I-69 EB	I-475 & I-475 RAMPS	15.75	14.5
S10	25132	I-69 WB	I-475 & I-475 RAMPS	15.75	14.5
S15	25132	FIFTH ST.	I-475 & RAMPS C&D	15.22	14.5
S16	25132	COURT ST - WB	I-475	14.50	14.5
S17	25132	THIRD ST	I-475	14.99	14.5
S18	25132	SECOND ST	I-475	15.22	14.5
S19	25132	KEARSLEY ST	I-475	15.32	14.5
S20	25132	E BD LONGWAY BLVD	I-475	14.83	14.5
S21	25132	W BD LONGWAY BLVD	I-475	14.83	14.5
S29	25132	CARPENTER ROAD	I-475	14.50	14.5
S30	25132	SELBY STREET	I-475	14.90	14.5
S31	25132	COLDWATER ROAD	I-475	14.99	14.5
S36	25132	TERRY STREET	I-475	14.57	14.5
S39	25132	JENNINGS RD	I-475	14.50	14.5
S40	25132	LEFT TURN LANE NO1	I-475	14.99	14.5
S41	25132	LEFT TURN LANE NO2	I-475	14.57	14.5
S46	25132	I-475 RAMP B	I-475	14.73	14.5
S49	25132	CORNELL AVE	I-475	14.83	14.5
S51	25132	RUSSELL AVE	I-475	14.83	14.5
S52	25132	14TH ST	I-475	17.98	14.5
X02	25132	GTW RR	I-475	14.83	14.5
S02	33044	CLARE ST	I-496	18.31	14.5
S05	33044	M-99(MLK AVE NB)	I-496	15.06	14.5
S06	33044	RAMP H	I-496 EB	14.57	14.5
S07	33044	RAMP E	I-496 WB	14.99	14.5
S08	33044	PINE ST	I-496	18.57	14.5
S09	33044	WALNUT ST	I-496	17.81	14.5
S10	33044	CAPITOL AVE	I-496	15.98	14.5
S11	33044	WASHINGTON AVE	I-496	17.32	14.5
S12	33044	GRAND AVE	I-496	15.75	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S13	33044	EVERETT ST	I-496	14.90	14.5
S14	33044	SB M-99 (BIRCH)	I-496	14.90	14.5
S15	33044	ST JOSEPH-MAIN ST	I-496	14.50	14.5
S16	33044	HUNGERFORD ST	I-496	14.44	14.5
S17	33044	I-496 WB	I-496 RAMP TO US-127	14.76	14.5
X01	33044	CONRAIL	I-496	15.42	14.5
B01	33045	I-496 EB	RED CEDAR R & RAMP V	15.06	14.5
B02	33045	I-496 WB	RED CEDAR R & RAMP V	15.75	14.5
R13	33045	CLEMENS ST	I-496 & CSX RR	23.92	23
S15	33045	DUNCKEL DRIVE	I-496	14.57	14.5
S02	39051	BARNEY RD (H AVE)	US-131 BR	14.83	14.5
B01	41027	I-196 WB FR US-131	I-196 EB	14.67	14.5
B01	41027	I-196 WB TO US131	I-196 EB	14.67	14.5
S02	41027	US-131 NB	I-196 EB, M-21	17.32	14.5
S03	41027	US-131 SB	I-196 EB, M-21	14.90	14.5
S04	41027	US-131 SB	I-196 WB TO I-196,131 NB	15.65	14.5
S07	41027	SCRIBNER	I-196 EB	14.67	14.5
S16	41027	COIT AVE	I-196 & M-21	18.67	14.5
S18	41027	COLLEGE AVE	I-196	18.67	14.5
S19	41027	EASTERN AVE	I-196 & M-21	15.58	14.5
S20	41027	DIAMOND AVE	I-196 & M-21	15.91	14.5
S21	41027	FULLER AVE	I-196 & M-21	15.42	14.5
S24	41027	MARYLAND AVE	I-196 & M-21	15.06	14.5
S03	41131	76TH ST	US-131	14.24	14.5
S04	41131	68TH ST	US-131	16.40	14.5
S05	41131	54TH ST	US-131	15.06	14.5
S06	41131	44TH ST	US-131	13.98	14.5
S07	41131	36TH ST	US-131	14.01	14.5
S08	41131	32ND ST	US-131	15.98	14.5
S09	41131	M-11	US-131	13.98	14.5
S10	41131	BURTON ST	US-131	14.83	14.5
S11	41131	HALL ST	US-131 & CENTURY AVE	19.32	14.5
S01	50111	9 MI RD SB TURN RD	I-94	15.06	14.5
S02	50111	9 MI RD	I-94	14.90	14.5
S03	50111	9 MI RD NB TURN RD	I-94	14.73	14.5
S04	50111	STEPHENS DR	I-94	15.06	14.5
S05	50111	10 MI RD S INT	I-94	15.16	14.5
S06	50111	10 MI RD	I-94	14.50	14.5
S07	50111	10 MI RD N INT	I-94	15.06	14.5
S08	50111	FRAZHO RD	I-94	14.73	14.5
S12	63022	M-102 EB	FARMINGTON RD	14.73	14.5
S12	63022	M-102 WB	FARMINGTON RD	14.73	14.5
S14	63022	M-102 WB	GRAND RIVER E.B. CONN	14.57	14.5
S01	63051	M-1 OVER 8 MI RD	M-102 8 MI RD & RAMPS	14.30	14.5
S01	63051	M-1 NB RAMP	M-102 8 MILE RD	14.30	14.5
S01	63051	M-1 SB RAMP	M-102 8 MILE RD	14.30	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S01	63081	J L HUDSON DR	M-10	15.49	14.5
S02	63081	M-39 (RAMP H)	M-10 NB (RAMP G)	14.73	14.5
S03	63081	M-10 (RAMP B)	M-10 RAMP	14.73	14.5
S05	63081	M-39 NB	M-10	15.06	14.5
S07	63081	9 MI RD	M-10 RAMP	14.99	14.5
S08	63081	9 MI RD	M-10	14.99	14.5
S09	63081	M-39 SB	M-10 RAMP C	14.34	14.5
S10	63081	MOUNT VERNON ST	M-10	14.83	14.5
S11	63081	EVERGREEN RD.(NB)	M-10	14.99	14.5
S11	63081	EVERGREEN RD (SB)	M-10	14.99	14.5
S12	63081	10 MI RD	M-10	15.22	14.5
S13	63081	10.5 MI RD	M-10	15.32	14.5
S14	63081	LAHSER RD	M-10	14.24	14.5
S15	63081	NORTHLAND DR EB	M-10	14.99	14.5
S15	63081	NORTHLAND DR WB	M-10	14.99	14.5
S16	63081	LEFT TURN STRUCT	M-10	14.83	14.5
S04	63103	SHEVLIN DBL U TURN	I-75	15.42	14.5
S05	63103	I-696	I-75 & 4 RAMPS	15.98	14.5
X01	63151	GTW RR	US-24BL	13.65	14.5
S06	63172	I-75 NB	M-24 & I-75 BL	14.24	14.5
S06	63172	I-75 SB	M-24 & I-75 BL	14.24	14.5
S07	63172	M-24 CONN EB	I-75	16.08	14.5
S07	63172	M-24 CONN WB	I-75	16.08	14.5
S37	63174	M-59 WB RMP/ I-75S	I-75 RMP(A2,A7,A14)		14.5
S03	63192	I-96, RAMP J	M-5 NB	18.70	14.5
P01	73101	@21ST ST WALKOVER	I-675	14.99	17
P02	73101	ELEVENTH ST WALKOV	I-675	16.14	17
S03	73101	OUTER DR	I-675	14.57	14.5
S04	73101	VETREANS MEM PKWY	I-675	14.57	14.5
S04	73101	VETREANS MEM PKWY	I-675	14.57	14.5
S05	73101	14TH ST	I-675	16.50	14.5
S15	73101	TITTABAWASSEE RD	I-675	14.40	14.5
S16	73101	MICHIGAN RD	I-675	14.99	14.5
S19	73101	MCCARTY RD	I-675	14.40	14.5
S24	73101	I-675 RAMP TO I-75	I-675 & I-75	17.49	14.5
X01	73101	CSX RR	I-675	14.67	14.5
S03	82021	I-94 WB	HANNAN RD	14.50	14.5
S06	82021	I-94 EB	HANNAN RD	14.50	14.5
S02	82022	I-94 EB	WAYNE RD	14.99	14.5
S03	82022	I-94 WB	WAYNE RD	14.99	14.5
S04	82022	I-94 EB	MERRIMAN RD	14.50	14.5
S04	82022	I-94 WB	MERRIMAN RD	14.50	14.5
S05	82022	I-94 EB	MIDDLEBELT RD	15.42	14.5
S06	82022	I-94 WB	MIDDLEBELT RD	14.92	14.5
S07	82022	I-94 EB	INKSTER RD	15.65	14.5
S08	82022	I-94 WB	INKSTER RD	15.00	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S09	82022	I-94 EB	ECORSE RD	15.22	14.5
S10	82022	I-94 WB	ECORSE RD	14.99	14.5
S17	82022	I-94 EB	PELHAM RD	15.49	14.5
S18	82022	I-94 WB	PELHAM RD	14.30	14.5
S23	82022	I-94 EB	OUTER DR	14.50	14.5
S24	82022	I-94 WB	OUTER DR	15.22	14.5
S25	82022	I-94 EB	OAKWOOD BLVD	14.40	14.5
S26	82022	I-94 WB	OAKWOOD BLVD	14.07	14.5
S27	82022	I-94	GREENFIELD RD	14.73	14.5
S29	82022	SCHAEFER HWY	I-94	16.90	14.5
S30	82022	ROTUNDA DRIVE	I-94	14.57	14.5
S31	82022	MILLER RD	I-94	15.22	14.5
S32	82022	RAMP FROM US-12EB	I-94	14.67	14.5
S33	82022	US-12 (MICHIGAN AV	I-94 RAMP	13.75	14.5
S34	82022	US-12 (MICHIGAN AV	I-94	14.99	14.5
S35	82022	RAMP TO US-12	I-94	14.24	14.5
S36	82022	M-153, WYOMING AVE	I-94	14.67	14.5
S37	82022	OZGA RD	I-94	15.16	14.5
S39	82022	I-94EB RAMP	GREENFIELD RD	14.67	14.5
S40	82022	I-94 E.B.RMP	PELHAM RD	15.16	14.5
S42	82022	I-94 EB RMP	PELHAM RMP	16.24	14.5
S43	82022	M-39 SB RAMP L	I-94	16.24	14.5
S43	82022	M-39 SB RAMP K	I-94	16.24	14.5
S52	82022	RAMP H TO SB MERRI	N BD MERRIMAN ROAD	0.00	14.5
S55	82022	VAN BORN	I-94 EB RAMP	16.24	14.5
S56	82022	VINING RD	I-94 INTERCHANGE	14.73	14.5
X03	82022	CONRAIL	I-94	13.98	14.5
X04	82022	CONRAIL	I-94	13.98	14.5
X05	82022	CONRAIL(ABN DT RR)	I-94	13.75	14.5
X06	82022	CONRAIL(ABN C&O RR	I-94	18.50	14.5
X07	82022	CSX RR	I-94	19.00	14.5
X99	82022	GTW RR	I94 ACCESS RD-GATE 10	13.98	14.5
P01	82023	TRENTON AVE WALKOV	I-94	13.98	17
P02	82023	LUMLEY AVE WALKOVE	I-94	13.65	17
P03	82023	TARNOW AVE WALKOVE	I-94	14.07	17
P04	82023	ROOSEVELT AVE WALK	I-94	14.30	17
P05	82023	BROOKLYN AV WALKOV	I-94	14.50	17
S01	82023	WEIR RD	I-94	14.24	14.5
S02	82023	ADDISON RD	I-94	14.17	14.5
S03	82023	LONYO AVE	I-94	14.99	14.5
S04	82023	CENTRAL AVE	I-94	14.24	14.5
S05	82023	CECIL AVE	I-94	14.17	14.5
S06	82023	MARTIN AVE	I-94	13.91	14.5
S07	82023	LIVERNOIS AVE	I-94	14.50	14.5
S09	82023	JUNCTION ST	I-94	14.30	14.5
S10	82023	30TH ST	I-94	14.07	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S11	82023	WARREN AVE	I-94	13.65	14.5
S12	82023	SCOTTEN AVE	I-94	14.50	14.5
S13	82023	SB W GRAND BLVD	I-94	14.17	14.5
S14	82023	NB W GRAND BLVD	I-94	14.07	14.5
S15	82023	24TH ST	I-94	14.50	14.5
S17	82023	GRAND RIVER AVE	I-94	14.67	14.5
S18	82023	LINWOOD AVE	I-94	14.24	14.5
S19	82023	14TH ST	I-94	14.30	14.5
S20	82023	12TH ST	I-94	14.17	14.5
S21	82023	TRUMBULL AVE	I-94	14.24	14.5
S22	82023	M-10 SB	I-94 RAMP	23.65	14.5
S23	82023	I-94 EB	I-94 RAMP TO M-10	14.30	14.5
S24	82023	M-10 SB	I-94	14.24	14.5
S25	82023	I-94EB RAMP TO M10	M-10SB &I-94WB	14.30	14.5
S26	82023	I-94WB RAMP TO M10	M-10NB &I-94EB	14.24	14.5
S27	82023	M-10 NB	I-94	14.07	14.5
S28	82023	I-94 WB	I-94 RAMP FROM M-10	14.17	14.5
S29	82023	M-10 NB	I-94 RAMP FROM M-10	23.65	14.5
S30	82023	THIRD ST	I-94	14.67	14.5
X01	82023	CSX RR	I-94	14.08	14.5
X02	82023	CONRAIL	I-94	14.50	14.5
X02	82023	GTW & CONRAIL	I-94	14.50	14.5
P04	82024	HELEN AVE WALKOVER	I-94	14.24	17
P05	82024	PED X-OVER@TOWNS	I-94	14.24	17
P06	82024	SEMINOLE AVE WALK	I-94	16.31	17
P07	82024	ROHNS AVE WALKOVER	I-94	14.14	17
S01	82024	SECOND BLVD	I-94	14.99	14.5
S02	82024	CASS AVE	I-94	16.08	14.5
S03	82024	M-1 WOODWARD AVE	I-94	14.30	14.5
S04	82024	JOHN R ST	I-94	14.30	14.5
S05	82024	BRUSH ST	I-94	14.57	14.5
S06	82024	BEAUBIEN ST	I-94	15.58	14.5
S08	82024	CHENE ST	I-94	14.30	14.5
S09	82024	WB E GRAND BLVD	I-94	14.50	14.5
S09	82024	EB E GRAND BLVD	I-94	14.50	14.5
S10	82024	MT ELLIOT ST	I-94	14.30	14.5
S11	82024	CONCORD AVE	I-94	15.06	14.5
S12	82024	FRONTENAC AVE	I-94	13.98	14.5
S13	82024	M-53(VANDYKE ST)	I-94	14.17	14.5
S14	82024	BURNS AVE	I-94	14.44	14.5
S15	82024	MCCLELLAN AVE	I-94	14.50	14.5
S16	82024	HARPER AVE	I-94	15.16	14.5
S18	82024	LUCKY PLACE	I-94	16.24	14.5
S19	82024	SAGINAW ST U-TRN	I-94	16.24	14.5
X02	82024	CONRAIL	I-94	14.07	14.5
P02	82025	SPRINGFIELD AVE WA	I-94	16.50	17

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
P03	82025	MALCOLM AVE WALKOV	I-94	15.25	17
P04	82025	COPLIN AVE WALKOVE	I-94	15.81	17
P05	82025	NEWPORT AVE WALKOV	I-94	15.06	17
P06	82025	PHILIP AVE WALKOVE	I-94	15.42	17
P07	82025	LAKEPOINTE AV WALK	I-94	15.49	17
P08	82025	CHATSWORTH RD WALK	I-94	14.40	17
P09	82025	BEDFORD RD WALKOVE	I-94	15.03	17
P12	82025	BISHOP AVE WALKOVE	I-94	14.30	17
P13	82025	KENOSHA AVE WALKOV	I-94	14.24	17
P14	82025	WOODLAND AV WALKOV	I-94	13.98	17
P15	82025	WOODMONT WALKOVER	I-94	14.30	17
P16	82025	KENMORE AVE WALKOV	I-94	14.30	17
P17	82025	BEAUFAIT AV WALKOV	I-94	14.07	17
S01	82025	M-3 (GRATIOT)	I-94	14.07	14.5
S02	82025	CADILLAC AVE	I-94	14.30	14.5
S03	82025	FRENCH ROAD	I-94	14.30	14.5
S04	82025	SB CONNER AVE	I-94	14.83	14.5
S05	82025	NB CONNER AVE	I-94	14.50	14.5
S06	82025	BARRETT AVE	I-94	14.83	14.5
S07	82025	DICKERSON AVE	I-94	14.30	14.5
S08	82025	CHALMERS AVE	I-94	14.24	14.5
S09	82025	OUTER DRIVE NB	I-94	14.57	14.5
S09	82025	OUTER DRIVE SB	I-94	14.57	14.5
S10	82025	NOTTINGHAM RD	I-94	14.40	14.5
S11	82025	HARPER AVE	I-94	14.67	14.5
S12	82025	WHITTIER RD	I-94	14.50	14.5
S13	82025	CADIEUX AVE	I-94	14.57	14.5
S14	82025	MORANG AVE	I-94	14.57	14.5
S15	82025	HARPER AVE	I-94	14.57	14.5
S16	82025	MOROSS RD NB	I-94	14.57	14.5
S16	82025	MOROSS RD SB	I-94	14.57	14.5
S17	82025	WOODSIDE AVE	I-94	14.24	14.5
S18	82025	ALLARD AVE	I-94	14.57	14.5
S19	82025	LOCHMORE AVE	I-94	14.57	14.5
S20	82025	M-102 EB	I-94	14.40	14.5
S20	82025	M-102 WB	I-94	14.40	14.5
S21	82025	HARPER AVE.	I-94	14.30	14.5
S22	82025	8 MI RD	I-94	15.06	14.5
X01	82025	CR RR	I-94	14.73	14.5
X01	82025	CR RR SPUR BR(ABN)	I-94	14.73	14.5
S02	82041	ECORSE RD	US-24	15.16	14.5
X01	82051	GTW RR	US-24	15.49	14.5
X02	82052	NS RR	US-24	14.99	14.5
X03	82052	CONRAIL	US-24	14.67	14.5
P01	82053	FRISBEE ST WALKOVE	US-24	15.75	17
X01	82053	CSX RR	US-24	13.67	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
X01	82053	CSX RR	US-24 SB	13.67	14.5
X01	82061	CSX RR	US-12	14.50	14.5
S01	82062	US-12 EB	US-24	14.30	14.5
S01	82062	US-12 WB	US-24	14.30	14.5
S03	82062	GREENFIELD RD	US-12	14.40	14.5
S04	82062	SCOTTEN AVE	US-12	13.98	14.5
X01	82062	CSX RR	US-12	14.67	14.5
X01	82062	GTW RR	US-12	14.67	14.5
X02	82062	CONRAIL	US-12	13.75	14.5
X03	82062	CONRAIL	US-12	13.98	14.5
X07	82071	CONRAIL	I-75 RAMP C& NB OLD 25	15.08	14.5
X01	82073	CONRAIL & C&O RRS	M-85 (FORT ST)	14.33	14.5
X02	82073	NORFOLK & WEST RR	M-85 (FORT ST)	13.81	14.5
X03	82073	CONRAIL	M-85 (FORT ST)	13.81	14.5
P01	82081	PED X-OVER	M-153	15.00	17
S02	82081	MILLER RD	M-153	13.65	14.5
S03	82081	GREENFIELD RD	M-153	14.73	14.5
S06	82081	EVERGREEN RD NB	M-153	14.83	14.5
S06	82081	EVERGREEN RD SB	M-153	14.83	14.5
X01	82081	CSX RR	M-153	14.83	14.5
X02	82081	CR RR	M-153	13.00	14.5
S04	82103	WOODWARD AVE UTURN	M-8, DAVISON FWY	14.50	14.5
S11	82103	HAMILTON AVENUE	M-8, DAVISON FWY	14.50	14.5
S12	82103	THIRD AVENUE	M-8, DAVISON FWY	14.50	14.5
S13	82103	SECOND AVENUE	M-8, DAVISON FWY	14.50	14.5
P01	82104	CHAREST AVE WALKOV	M-8	14.40	17
S02	82104	JOHN R STREET	M-8, DAVISON FWY	14.50	14.5
S04	82104	SB OAKLAND AVENUE	M-8, DAVISON FWY	14.90	14.5
S05	82104	PROP M14 WB RAMP	S SERVICE RD	14.99	14.5
S06	82104	N SERVICE RD	PROP M-14 WB RAMP	14.57	14.5
S07	82104	JOSEPH CAMPAU	M-8	15.49	14.5
S08	82104	GODDARD AVENUE	M-8	14.67	14.5
S09	82104	NB OAKLAND AVENUE	M-8, DAVISON FWY	14.90	14.5
P02	82111	PORTER ST WALKOVER	M-10	14.07	17
P03	82111	ELIZABETH ST WALK	M-10	18.08	17
P04	82111	SPRUCE ST WALKOVER	M-10	14.40	17
P05	82111	SELDEN AVE WALKOVE	M-10	14.07	17
P06	82111	CANFIELD AV WALKOV	M-10	14.24	17
P07	82111	MERRICK AVE WALKOV	M-10	14.17	17
P08	82111	JOE L WALKWAY	M-10 LODGE FWY	14.83	17
S01	82111	MONROE AVE	I-375	14.30	14.5
S02	82111	LAFAYETTE AVE	I-375	14.24	14.5
S03	82111	LARNED ST	I-375	14.24	14.5
S04	82111	JEFFERSON AVE	I-375	15.65	14.5
S04	82111	JEFFERSON AVE(EB)	I-375	15.65	14.5
S04	82111	JEFFERSON AV(WB)	I-375	15.65	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S05	82111	HASTINGS	I-375	14.57	14.5
S06	82111	WASHINGTON ST	M-10	15.06	14.5
S10	82111	LARNED ST RAMP	M-10 NB	14.24	14.5
S11	82111	M-85 (FORT ST,)	M-10	13.98	14.5
S12	82111	LAFAYETTE BLVD	M-10	14.44	14.5
S13	82111	HOWARD ST	M-10	13.98	14.5
S14	82111	US-12	M-10 NB	14.11	14.5
S14	82111	US-12	M-10 SB	14.11	14.5
S14	82111	BAGLEY AV RAMPS	M-10	14.11	14.5
S16	82111	GRAND RIVER AVE	M-10	14.17	14.5
S17	82111	M L KING (STIMSON)	M-10	14.17	14.5
S18	82111	FOREST AVE	M-10	14.07	14.5
S19	82111	WARREN AV	M-10	13.94	14.5
S22	82111	JEFFERSON EB/NB375	I-375 SB	#N/A	14.5
S23	82111	WOODBRIDGE ST	I-375	#N/A	14.5
X01	82111	W C C C RR (ABN)	M-10	14.17	14.5
X01	82111	RR PARK'GDECK(ABN)	M-10	14.17	14.5
X01	82111	RR PEDESTRIAN WALK	M-10	14.17	14.5
Z01	82111	COBO HALL	M-10	#N/A	14.5
P01	82112	HOLDEN AVE WALKOVE	M-10	13.91	17
P02	82112	PINGREE AV WALKOVE	M-10	14.30	17
P03	82112	GLADSTONE AVE WALK	M-10	14.17	17
P04	82112	MONTEREY AV WALKOV	M-10	14.50	17
P05	82112	HIGHLAND AV WALKOV	M-10	14.07	17
P08	82112	FORD AVE WALKOVER	M-10	14.30	17
P09	82112	LOG CABIN AV WALKO	M-10	14.24	17
P10	82112	BAYLIS AVE WALKOVE	M-10	14.30	17
P11	82112	ALDEN AVE WALKOVER	M-10	14.30	17
P12	82112	MUIRLAND AV WALKOV	M-10	14.50	17
P14	82112	TULLER AVE WALKOVE	M-10	14.24	17
P15	82112	NORTHLAWN AV WALKO	M-10	17.98	17
P16	82112	WISCONSIN AVE WALK	M-10	14.73	17
P17	82112	MARGARETA AVE WALK	M-10	13.98	17
S01	82112	MILWAUKEE AVE	M-10	14.24	14.5
S02	82112	W GRAND BOULEVARD	M-10	14.24	14.5
S03	82112	PALLISTER AVENUE	M-10	14.24	14.5
S04	82112	SEWARD AVENUE	M-10	14.24	14.5
S05	82112	EUCLID AVENUE	M-10	14.30	14.5
S06	82112	CLAIRMOUNT AVENUE	M-10	14.17	14.5
S07	82112	HAMILTON AVENUE	M-10	14.30	14.5
S08	82112	CHICAGO BLVD	M-10	14.17	14.5
S09	82112	CALVERT AVE	M-10	14.07	14.5
S10	82112	WEBB AVE	M-10	14.40	14.5
S11	82112	GLENDALE AVE	M-10	14.34	14.5
S12	82112	EB DAVISON M-8	M-10SB	15.49	14.5
S13	82112	M-10 NB	DAVISON (M-8)	14.50	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S14	82112	M-10 RAMP	EB DAVISON (M-8)	14.50	14.5
S15	82112	WB DAVISON (M-8)	M-10SB	15.65	14.5
S16	82112	NB TO WB DAVISON	M-10 SB	19.00	14.5
S17	82112	OAKMAN BLVD	M-10	14.24	14.5
S18	82112	ROSA PARKS BLVD.	M-10	15.06	14.5
S19	82112	LINWOOD AVE	M-10 JOHN LODGE (EXPWY	14.57	14.5
S20	82112	DEXTER-BELDEN AVE.	M-10 JOHN LODGE(EXPWY)	14.24	14.5
S21	82112	LIVERNOIS AVE	M-10	14.17	14.5
S22	82112	GREENLAWN AVE	M-10	14.50	14.5
S23	82112	WYOMING AVE	M-10	14.40	14.5
S24	82112	PURITAN AVE	M-10	13.98	14.5
S25	82112	MYERS RD	M-10	14.50	14.5
S25	82112	MYERS RD TURNAROUN	M-10	14.50	14.5
S26	82112	MCNICHOLS RD	M-10	14.83	14.5
S27	82112	OUTER DRIVE EB	M-10	14.99	14.5
S27	82112	OUTER DRIVE WB	M-10	14.99	14.5
S28	82112	SCHAFFER	M-10	15.06	14.5
S28	82112	SCHAEFER SE TURN	M-10	15.06	14.5
S28	82112	SCHAEFER NW TURN	M-10	15.06	14.5
S29	82112	7 MI RD	M-10	14.99	14.5
S30	82112	VASSAR DRIVE	M-10	15.16	14.5
S31	82112	PEMBROKE AVE	M-10	14.50	14.5
S32	82112	GREENFIELD RD	M-10	15.22	14.5
S32	82112	GREENFIELD RD TURN	M-10	15.22	14.5
S33	82112	NEWJERSEY TRN(M10)	M-10	18.31	14.5
S34	82112	M-102 RAMP	M-10 RAMP	17.06	14.5
S34	82112	M-102 WB SERV RD	M-10	17.06	14.5
S34	82112	M-102 EB SERV RD	M-10	17.06	14.5
S34	82112	M-102	M-10 & RAMPS	17.06	14.5
S35	82112	GREENFIELD RD LT T	M-10	14.30	14.5
S36	82112	LIVERNOIS AVE	M-10	14.17	14.5
X01	82112	CONRAIL	M-10	14.50	14.5
X01	82112	GTW RR	M-10	14.50	14.5
X02	82112	CONRAIL	M-10	13.75	14.5
P02	82121	PED @ JORDAN COLL	GRAND RIVER (M-5)	15.65	17
X01	82121	CONRAIL	GRAND RIVER AVE	13.98	14.5
X01	82121	GTW RR	GRAND RIVER AVE	13.98	14.5
P01	82122	BENTLER PED X-OVER	I-96	15.49	17
P02	82122	STOUT AVE PED X-OV	I-96	16.17	17
P03	82122	MINOCK PED X-OVER	I-96	16.33	17
R01	82122	EVERGREEN RD	I-96 & CSX RR	16.50	14.5 RD 23 RR
S01	82122	SCHOOLCRAFT RD	I-96	14.40	14.5
S02	82122	NEWBURGH RD	I-96	15.42	14.5
S03	82122	LEVAN RD	I-96	15.75	14.5
S04	82122	YALE AVE	I-96	14.83	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S05	82122	STARK RD	I-96	15.16	14.5
S06	82122	FARMINGTON RD	I-96	14.83	14.5
S07	82122	BROOKFIELD AVE	I-96	15.32	14.5
S08	82122	BERWICK RD LFT TRN	I-96	14.73	14.5
S09	82122	MERRIMAN RD	I-96	15.98	14.5
S10	82122	WARNER COURT	I-96	14.73	14.5
S11	82122	MIDDLEBELT RD	I-96	15.81	14.5
S12	82122	RACE TRACK ENT.	I-96	14.99	14.5
S13	82122	CARDWELL RD	I-96	14.57	14.5
S14	82122	INKSTER RD	I-96	14.57	14.5
S15	82122	BREAKFAST U-TRN LN	I-96	14.50	14.5
S16	82122	BEECH DALY RD	I-96	16.31	14.5
S17	82122	GARFIELD ST U-TRN	I-96	14.90	14.5
S18	82122	FENTON ST	I-96	14.40	14.5
S19	82122	US-24 TELEGRAPH RD	I-96	14.57	14.5
S19	82122	NB SERV RD	I-96	14.57	14.5
S19	82122	SB SERV RD	I-96	14.57	14.5
S20	82122	VIRGIL ST	I-96	14.57	14.5
S21	82122	OUTER DRIVE	I-96	14.83	14.5
S22	82122	BURT RD	I-96	14.73	14.5
S23	82122	SCHOOLCRAFT X-OVER	I-96	14.40	14.5
S24	82122	GLENDALE AVE	I-96	15.32	14.5
S25	82122	INDUSTRIAL AVE	I-96	14.50	14.5
S26	82122	BERWYN STREET	I-96	14.99	14.5
S27	82122	MERRIMAN ROAD LT T	I-96	14.83	14.5
S28	82122	MERRIMAN ROAD LT T	I-96	14.99	14.5
S29	82122	MELVIN	I-96	14.67	14.5
S30	82122	LFT TRN W MIDLBELT	I-96	14.90	14.5
S31	82122	LFT TRN E MIDLBELT	I-96	14.73	14.5
S32	82122	LFT TRN W INKSTER	I-96	14.73	14.5
S33	82122	LFT TRN E INKSTER	I-96	14.57	14.5
S34	82122	LFT TRN W BEECH DL	I-96	14.99	14.5
S35	82122	LFT TRN E BEECH DL	I-96	14.99	14.5
S36	82122	LFT TRN W OF LEVAN	I-96	14.83	14.5
S37	82122	LFT TRN E OF LEVAN	I-96	14.90	14.5
S38	82122	FARMINGTON LFT TRN	I-96	14.90	14.5
S39	82122	FARMINGTON LFT TRN	I-96	14.99	14.5
S40	82122	WAYNE RD	I-96	14.73	14.5
S41	82122	NEWBURGH DBL U-TRN	I-96	15.91	14.5
S42	82122	NEWBURGH E LFT TRN	I-96	14.99	14.5
X02	82122	CSX RR	I-96	14.50	14.5
X03	82122	CSX RR	I-96	14.58	14.5
P01	82123	SORENTO PED X-OVER	I-96	17.98	17
P02	82123	MENDOTA PED X-OVER	I-96	15.98	17
P03	82123	CHERRYLAWN PED X-O	I-96	17.98	17
P04	82123	CLARENDON AV WALKO	I-96	15.98	17

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
P05	82123	IVANHOE AVE WALKOV	I-96	14.73	17
P06	82123	ROOSEVELT WALKOVER	I-96	15.58	17
P07	82123	MANSFIELD PED X-OV	I-96 & C&O RR	16.17	17
R02	82123	TURN RDWY 3RD LEVL	CSX RR & I-96 RDWYS	14.50	14.5 RD 23 RR
R03	82123	TURN RDWY 4TH.LEVL	CSX RR & 3RD LEVEL T RD	14.50	14.5 Rd 23.0 RR
R05	82123	GREENFIELD RD	I-96 & CSX RR	14.83	14.5 RD 23 RR
S01	82123	TURN RDWY EB TO SB	WB&U-TURN SERVICE ROA	19.98	14.5
S02	82123	WB TO SB TURN RDWY	3RD LEVEL TURN.RDWY	14.50	14.5
S03	82123	TURN.RDWY 3RD LEVL	I-96 ROADWAYS	14.50	14.5
S04	82123	U-TRN SERV RD	M-39(SOUTHFIELD EXPR)	14.83	14.5
S05	82123	I-96 EB COLLECTOR	M-39(SOUTHFILD EXPR)	15.49	14.5
S06	82123	I-96 EB MAIN RDWY	M-39(SOUTHFIELD EXPR)	16.50	14.5
S07	82123	I-96 WB COLLECTOR	M-39 (SOUTHFIELD EXPR)	21.23	14.5
S08	82123	I-96 RAMP NB TO EB	M-39 RAMP & E SERVICE RD	14.50	14.5
S09	82123	I-96 WB MAIN RDWY	M-39 (SOUTHFIELD EXPR)	17.49	14.5
S10	82123	I-96 RAMP	E B SERVICE RD	14.83	14.5
S11	82123	I-96 RAMP	W B SERVICE RD	13.92	14.5
S12	82123	HUBBELL AVE	I-96 (JEFFRIES FRWY)	14.67	14.5
S13	82123	FULLERTON AVE	I-96 (JEFFRIES FRWY)	15.58	14.5
S14	82123	SCHAEFER RD	I-96 (JEFFRIES FRWY)	15.22	14.5
S15	82123	GR RIV LT TRN(M-5)	I-96 (JEFFRIES FRWY)	15.98	14.5
S16	82123	GRAND RIVER AVE	I-96 (JEFFRIES FRWY)	15.75	14.5
S17	82123	MEYERS RD	I-96 (JEFFRIES FRWY)	14.67	14.5
S18	82123	WYOMING AVE	I-96 (JEFFRIES FRWY)	15.42	14.5
S19	82123	I-96 (JEFFRIES)	M-8	14.99	14.5
S21	82123	I-96 WB COLLECTOR	M-8	15.49	14.5
S22	82123	I-96 W DAV TO E.JE	M-8	15.91	14.5
S23	82123	WB DAV TO EB JEFFR	I-96 JEFFRIES FREEWAY	15.58	14.5
S24	82123	FULLERTON AVE	I-96 (JEFFRIES FRWY)	15.49	14.5
S25	82123	OAKMAN BLVD EB	I-96 (JEFFRIES FRWY)	16.14	14.5
S25	82123	OAKMAN BLVD WB	I-96 (JEFFRIES FRWY)	16.14	14.5
S26	82123	ELMHURST AVE	I-96	15.65	14.5
S27	82123	U-TURN N OF G RIV	I-96	15.65	14.5
S28	82123	GRAND RIVER AVE	I-96	14.99	14.5
S29	82123	WEST CHICAGO AVE	I-96	13.98	14.5
S30	82123	LIVERNOIS AVE	I-96	14.57	14.5
S31	82123	LIVERNOIS LEFT TUR	I-96	14.17	14.5
S32	82123	UNDERWOOD AVE	I-96	14.99	14.5
S33	82123	JOY RD	I-96	14.83	14.5
S34	82123	MAPLEWOOD AVE	I-96	14.57	14.5
S35	82123	PACIFIC AVE	I-96	14.73	14.5
S36	82123	W GD BLVD & TIREMA	I-96	15.16	14.5
S37	82123	W GD BLVD&TIREMAN	I-96	15.16	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S38	82123	MC GRAW AVE	I-96	14.40	14.5
S39	82123	I-96	RAMP FROM I-94	14.67	14.5
S40	82123	I-96	RAMP TO I-94	14.73	14.5
S41	82123	I-96EB TO I94EB RA	I-96	15.42	14.5
S42	82123	I96WB TO I94WB RAM	I-96 & RAMP	14.67	14.5
S43	82123	GD RIV ENT TO I94W	RAMP TO I-94	14.17	14.5
S44	82123	I94EB RAMP TO I96W	I-94	16.40	14.5
S45	82123	I94WB RAMP TO I96E	I-94	15.58	14.5
S46	82123	I-96	I-94	15.65	14.5
S47	82123	GRD RIV AVE EXIT R	I-96 RAMP	14.73	14.5
S48	82123	WARREN AV EXIT RMP	I-96 RAMP	15.22	14.5
S49	82123	WARREN AV ENT RAMP	I-96 RAMP	14.57	14.5
S50	82123	SCOTTEN AVE	I-96	14.40	14.5
S51	82123	EB DAVISON (M-8)	I-96 WYOMING EXIT RAMP	14.83	14.5
X06	82123	CSX RR	I-96 (JEFFRIES FRWY)	14.50	14.5
X07	82123	CONRAIL	I-96 (JEFFRIES FRWY)	15.83	14.5
X08	82123	CONRAIL SPUR	I-96 (JEFFRIES FRWY)	16.17	14.5
X09	82123	CONRAIL (ABN)	I-96 (JEFFRIES FRWY)	15.75	14.5
X10	82123	CONRAIL (ABN)	I-96 (JEFFRIES FRWY)	14.90	14.5
P01	82124	SELDEN AV WALKOVER	I-96	14.83	17
S01	82124	WARREN AVE	I-96	14.30	14.5
S02	82124	BUCHANAN ST	I-96	14.57	14.5
S03	82124	MYRTLE ST	I-96	14.40	14.5
X01	82124	GTW RR	I-96 (JEFFRIES)	14.24	14.5
X03	82124	CONRAIL	I-96(JEFFRIES)	15.65	14.5
S01	82131	WOODARD AVE, M-1	M-8, DAVISON FWY	14.50	14.5
X01	82131	GTW RR	M-1	13.98	14.5
X01	82131	CONRAIL	M-1	13.98	14.5
X02	82131	CR RR	M-1	13.81	14.5
S01	82141	M-102 EB	US-24	14.67	14.5
S01	82141	M-102 WB	US-24	14.67	14.5
X01	82143	GTW RR	M-102	14.40	14.5
B03	82191	I-75 NB	CR RR,GODDARD RD,SXTN	14.50	14.5
B03	82191	I-75 SB	SEXTON-KILFOIL DR,CR RR	14.50	14.5
S01	82191	I-75	NORTH HURON RIVER DR	14.30	14.5
S02	82191	WOODRUFF RD	I-75	14.07	14.5
S03	82191	M-85 SB	I-75 NB	14.30	14.5
S04	82191	GIBRALTAR RD	I-75	16.08	14.5
S05	82191	VREELAND RD	I-75	14.17	14.5
S06	82191	I-75 NB	VAN HORN RD	26.31	14.5
S06	82191	I-75 SB	VAN HORN RD	26.31	14.5
S07	82191	WEST RD	I-75	14.67	14.5
S08	82191	KING RD	I-75	14.07	14.5
S09	82191	I-75 CONN NB	I-75	14.99	14.5
S10	82191	I-75 CONN SB	I-75	14.24	14.5
S11	82191	SIBLEY RD	I-75	14.57	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S12	82191	PENNSYLVANIA RD	I-75	14.83	14.5
S13	82191	I-75 SB	US-24 CONN	14.67	14.5
S14	82191	I-75 NB	EUREKA RD	14.99	14.5
S16	82191	I-75 NB	ALLEN RD	14.50	14.5
S16	82191	I-75 SB	ALLEN RD	14.50	14.5
S17	82191	I-75 NB	NORTH LINE RD	14.83	14.5
S17	82191	I-75 SB	NORTH LINE RD	14.83	14.5
S19	82191	LONDON MOORE RD	I-75	14.90	14.5
S21	82191	I-75 NB	TOLEDO-DIX HWY & RAMP (	14.67	14.5
S21	82191	I-75 SB	TOLEDO-DIX HWY & RAMP (	14.67	14.5
S22	82191	CAMPAIGN RD	I-75	15.32	14.5
S23	82191	I-75 NB	M-39	14.67	14.5
S23	82191	I-75 SB	M-39	14.67	14.5
S24	82191	I-75 RAMP C NB	TOLEDO DIX HWY RAMP D	14.73	14.5
S25	82191	I-75 RAMP D SB	TOLEDO DIX HWY & RAMP (	14.83	14.5
P01	82192	SAWYER AVE WALKOVE	M-39	14.73	17
P03	82192	CATHEDRAL AV WALKO	M-39	14.07	17
P06	82192	GLENDALE PED BR	M-39	14.40	17
S02	82192	OUTER DRIVE S EB	M-39	14.17	14.5
S02	82192	OUTER DRIVE S WB	M-39	14.17	14.5
S03	82192	FERN AVE	M-39	14.17	14.5
S04	82192	OAKWOOD BLVD	M-39	14.50	14.5
S05	82192	ROTUNDA DRIVE	M-39	14.57	14.5
S06	82192	VILLAGE RD	M-39	14.00	14.5
S08	82192	HUBBARD AV EB	M-39	14.67	14.5
S08	82192	HUBBARD AV WB	M-39	14.67	14.5
S09	82192	PAUL AVE	M-39	13.81	14.5
S10	82192	WARREN AVE	M-39	14.30	14.5
S11	82192	TIREMAN AVE	M-39	14.17	14.5
S12	82192	JOY RD	M-39	14.42	14.5
S13	82192	FITZPATRICK AVE	M-39	14.50	14.5
S14	82192	W CHICAGO AVE	M-39	14.30	14.5
S15	82192	PLYMOUTH ROAD	M-39 (SOUTHFIELD)	14.40	14.5
S16	82192	WB FULLERTON AVE	M-39	14.50	14.5
S17	82192	SCHOOLCRAFT AVE	M-39	14.40	14.5
X01	82192	CONRAIL	M-39	14.30	14.5
X02	82192	CSX RR	M-39	14.67	14.5
X03	82192	CSX RR	M-39	14.50	14.5
X05	82192	GTW RR	M-39	14.67	14.5
X06	82192	CONRAIL	M-39	13.98	14.5
X06	82192	CONRAIL	M-39	13.98	14.5
P02	82193	TOURNIER AV CROSSO	M-39	15.16	17
P03	82193	VASSAR AVE WALKOVE	M-39	15.32	17
S01	82193	LYNDON AVE	M-39	14.73	14.5
S02	82193	M-5(GRAND RIVER)	M-39 (SOUTHFIELD EXP)	14.67	14.5
S03	82193	FENKELL AVE	M-39	14.67	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S04	82193	PURITAN AVE	M-39	14.83	14.5
S05	82193	6 MI RD	M-39	14.57	14.5
S06	82193	OUTER DRIVE	M-39	14.73	14.5
S07	82193	CURTIS AVE	M-39	14.73	14.5
S08	82193	7 MI RD	M-39	14.67	14.5
S09	82193	PEMBROKE AVE	M-39	13.65	14.5
S10	82193	M-102 LEFT TURN RA	M-39	14.73	14.5
S11	82193	M-102 EB	M-39	15.06	14.5
S11	82193	M-102 WB	M-39	15.06	14.5
P01	82194	SOLVAY AVE WALKOVE	I-75	16.14	17
P02	82194	BEARD AVE WALKOVER	I-75	16.08	17
P03	82194	CASGRAIN AV WALKOV	I-75	16.14	17
P04	82194	CALVARY ST WALKOVE	I-75	15.91	17
P05	82194	FERDINAND AVE WALK	I-75	16.31	17
P06	82194	HUBBARD ST WALKOVE	I-75	14.90	17
P07	82194	17TH ST WALKOVER	I-75	15.32	17
P08	82194	GILROY ST WALKOVER	I-75	15.06	17
S01	82194	CICOTTE AVE	I-75	14.99	14.5
S02	82194	I-75 NB	OUTER DRIVE	14.67	14.5
S02	82194	I-75 SB	OUTER DRIVE	14.67	14.5
S05	82194	I-75	M-85 (FORT ST)	14.83	14.5
S07	82194	SPRINGWELL AVE	I-75	15.58	14.5
S08	82194	GREEN AVE	I-75	16.73	14.5
S09	82194	WATERMAN AVE	I-75	14.50	14.5
S10	82194	LIVERNOIS AVE	I-75	14.90	14.5
S11	82194	JUNCTION AVE	I-75	14.67	14.5
S12	82194	CLARK AVE	I-75	15.16	14.5
S13	82194	W GRAND BLVD SB	I-75	14.50	14.5
S14	82194	LAFAYETTE BLVD	I-75	13.98	14.5
S15	82194	PORTER ST	I-75	13.98	14.5
S16	82194	PORTER ST NB RAMPS	I-75	14.24	14.5
S16	82194	PORTER ST SB RAMPS	I-75	14.24	14.5
S17	82194	VERNOR AVE	I-75	14.30	14.5
S18	82194	I-75 SB	I-96WB	14.83	14.5
S19	82194	US-12	I-75 NB	14.50	14.5
S20	82194	US-12	I-75 SB	14.30	14.5
S21	82194	DRAGOON AVE	I-75	15.49	14.5
S22	82194	I-75 RAMP WB TO SB	RAMP TO WB I-96	14.57	14.5
S23	82194	W GRAND BLVD NB	I-75	14.50	14.5
S24	82194	US-12	I-96	14.57	14.5
S25	82194	US-12 EB CONN	I-75 NB	14.73	14.5
S26	82194	RMP I-96E TO I-75N	I-75 SB	14.73	14.5
S27	82194	US-12 EB CONN	I-96 NB	14.57	14.5
S28	82194	TRUCK TOLLS TO AMB	I-75/1-96	#N/A	14.5
X01	82194	CONRAIL	I-75	13.98	14.5
X02	82194	CPR - CONRAIL	W BD SERV RD& I-75/I-96	#N/A	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
P01	82195	MARKET ST WALKOVER	M-3 CONN TO I-75	14.67	17
P02	82195	COCHRAN AV WALKOVE	I-75	14.30	17
S01	82195	14TH ST	I-75	15.16	14.5
S02	82195	12TH ST	I-75	15.49	14.5
S03	82195	ROSA PARKS ENT RMP	I-75 S COLLECTOR-DIST RD	14.99	14.5
S04	82195	ROSA PARKS EXT RMP	I-75 N COLLECTOR-DIST RD	15.49	14.5
S05	82195	TRUMBULL AVE	I-75	14.57	14.5
S06	82195	M-10 SB TO EB RAMP	I-75 & RAMP TO SB	13.98	14.5
S08	82195	I-75 E-N RAMP	M-10	14.57	14.5
S09	82195	M-10S TO I-75E RMP	M-10	18.31	14.5
S11	82195	I-75 NB	M-10	16.50	14.5
S11	82195	I-75 SB	M-10	16.50	14.5
S12	82195	M-10N TO I-75S RMP	M-10	20.31	14.5
S13	82195	I-75 W S RAMP	M-10	15.42	14.5
S15	82195	M-10 N-W RAMP	I-75 & EXIT RAMPS	14.27	14.5
S17	82195	I-75 SB ENT RMP	I-75 NB ENT RAMP	15.06	14.5
S18	82195	THIRD AVE	I-75	15.06	14.5
S19	82195	GRAND RIV AVE(M-5)	I-75	14.83	14.5
S20	82195	SECOND BLVD	I-75	14.90	14.5
S23	82195	CASS AVE	I-75	15.32	14.5
S24	82195	CLIFFORD ST	I-75	14.50	14.5
S25	82195	M-1 WOODWARD AV	I-75	14.57	14.5
S26	82195	JOHN R	I-75	15.58	14.5
S27	82195	BRUSH ST	I-75	14.83	14.5
P02	82251	DIVISION AVE WALKO	I-75	14.99	17
P03	82251	LELAND ST WALKOVER	I-75	14.30	17
S01	82251	M-3 (GRATIOT AVE)	I-375	14.50	14.5
S02	82251	MADISON AVE RAMPS	I-375	14.50	14.5
S03	82251	I-75 E N TURN RD	I-375	15.16	14.5
S04	82251	I-75 S E TURN RD	I-375	15.22	14.5
S05	82251	BRUSH ST ENT RAMP	I-75 EB -375 SB TRN RDY	14.14	14.5
S07	82251	I-75 NB	I-75 S.TO EB.RAMP	14.99	14.5
S07	82251	I-75 SB	I-75 S.TO EB.RAMP	14.99	14.5
S07	82251	BRUSH ST ENTR RMP	I-75 SB.TO EB. RAMP	14.99	14.5
S08	82251	M-3 CONN	I-75 & I-375	14.27	14.5
S08	82251	M-3 CONN	I-75 & I-375	14.27	14.5
S09	82251	M-3 EB CONN	I-375 & I-75 RAMP	15.16	14.5
S09	82251	M-3 WB CONN	I-375 & I-75 RAMP	15.16	14.5
S11	82251	I-375 N W TURN RD	I-75 & RAMP	15.81	14.5
S12	82251	M-3 TO I-375 S RMP	I-75	15.91	14.5
S13	82251	WILKINS ST & RAMP	I-75	14.57	14.5
S14	82251	MACK AVE	I-75	14.30	14.5
S15	82251	CANFIELD AVE	I-75	14.90	14.5
S16	82251	WARREN AVE	I-75	14.57	14.5
S17	82251	WARREN ENT TO I-75	I-75 NB TO E&W TUR.RDWY	14.83	14.5
S18	82251	I-75 SB EXIT RAMP	I-75 E&W TO SB.TUR.RDWY	14.24	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S19	82251	FERRY AVE	I-75 W TO S.TURN.RDWY	14.99	14.5
S20	82251	FERRY AVE	I-75 & TURN.RDWY	14.57	14.5
S21	82251	I-94 EB ENT RAMP	I-75 RAMP TO I-94	14.30	14.5
S22	82251	I-94 W-S RAMP	I-94EB TO I-75NB RAMP	15.81	14.5
S23	82251	I-94EB-I-75NB RAMP	I-75	18.14	14.5
S24	82251	I-94 W-S RAMP	I-94	16.31	14.5
S25	82251	I-75N-I94W RAMP	I-75 & RAMP	29.99	14.5
S26	82251	I-75N-I94E RAMP	RUSSELL ST CONN	21.06	14.5
S27	82251	I-94	I-75	14.50	14.5
S28	82251	I-75 S-W RAMP	NORTH SERVICE RD	14.73	14.5
S29	82251	I-94 W-S RAMP	I-75 & RAMP	14.50	14.5
S30	82251	I-75S-I94E RAMP	I-94	19.98	14.5
S30	82251	I-75 S-E RAMP	I-75 SB	19.98	14.5
P03	82252	GREENDALE AVE WALK	I-75	15.33	17
P05	82252	LANTZ AVE WALKOVER	I-75	15.65	17
P09	82252	PHILADELPHIA AV WA	I-75	15.65	17
R11	82252	DAVISON TO I-75 RP	GTWRR,I-75&DAVISON(M-8)	15.98	14.5 Rd 23.0 RR
S01	82252	PIQUETTE	I-75	14.40	14.5
S02	82252	MILWAUKEE AVE	I-75	18.73	14.5
S03	82252	E GRAND BLVD	I-75	14.50	14.5
S04	82252	CLAY AVE	I-75	14.57	14.5
S05	82252	HOLBROOK AVE	I-75	15.58	14.5
S06	82252	7 MI RD NB LEFT TU	I-75	14.00	14.5
S07	82252	7 MI RD	I-75	15.32	14.5
S08	82252	7MI RD SB LEFT TUR	I-75	15.42	14.5
S09	82252	STATE FAIR AVE	I-75	15.42	14.5
S10	82252	M-102 (8 MI RD)	I-75	15.06	14.5
S10	82252	M-102 EB SERV RD	I-75	15.06	14.5
S10	82252	M-102 WB SERV RD	I-75	15.06	14.5
S11	82252	DEQUINDRE AVE	I-75	16.40	14.5
S12	82252	CANIFF AVE & TURN	I-75	15.32	14.5
S13	82252	COMMER AVE	I-75	14.90	14.5
S14	82252	CARPENTER AVE	I-75	15.06	14.5
S23	82252	NEVADA AVE	I-75	14.90	14.5
S24	82252	OAKLAND AVE	I-75	14.57	14.5
S25	82252	I-75N RMP WINCHEST	I-75	14.67	14.5
S26	82252	DEQUINDRE U-TURN	I-75	17.06	14.5
S27	82252	MEADE ST	I-75	14.99	14.5
S28	82252	I-75	RAMP TO DAVISON(M-8)	14.50	14.5
S29	82252	DEQUINDRE	I-75 RAMP TO DAVISON	14.83	14.5
S30	82252	DAVISON S SERV RD	I-75 RAMP C	15.65	14.5
S31	82252	I-75 & RAMPS C&D	DAVISON & SERV.RDS.	14.73	14.5
S33	82252	DAVISON RAMP(M-8)	I-75	21.82	14.5
S34	82252	DEQUINDRE AVE	DAVISON (M-8)	14.73	14.5
S36	82252	I-75	RAMP D TO DAVISON(M-8)	14.40	14.5

Previously Exempted Highly Urbanized Routes					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
X03	82252	CR RR	I-75	16.08	14.5
X04	82252	NS RR	I-75	17.42	14.5
X05	82252	CONRAIL & GTW RR	I-75	16.99	14.5
X06	82252	GTW RR	I-75	15.22	14.5
X13	82252	GTW RR	DAVISON (M-8)	14.73	14.5
X14	82252	GTW RR	I-75 RAMP	14.73	14.5
X14	82252	GTW RR	I-75 RAMP	14.73	14.5
S03	82271	US-24-I-75 CONN SB	US-24NB	14.67	14.5

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
		Muskegon			
S03	61012	US-31 SB	M-120	14.40	16
S04	61012	US-31 NB	M-120	14.40	16
S01	61075	MARQUETTE RD	US-31	14.63	16
S02-5	61075	NB RAMP TO WB BR	US-31 SB&US-31 BR EB(TOP	14.90	16
S01	61072	SHETTLER RD	US-31	15.58	16
S02	61072	BROADWAY ST	US-31	15.94	16
S03	61072	SHERMAN RD	US-31	15.98	16
X01	61072	MI SHORE RR	US-31	14.86	16
S03	61152	US-31	I-96	14.63	16
S01	61074	PONTALUNA	US-31	14.70	16
S03	61074	HILE RD	US-31	15.42	16
S01	61151	BROADWAY AVE	I-96 BS	14.57	16
X03	61151	MI SHORE	I-96 BS	14.99	16
X02	61151	CSX RR	I-96 BS	14.67	16
S02	61074	STERNBERG RD	US-31	16.80	16
S08	61152	FRUITPORT RD	I-96	16.63	16
S05	61152	STERNBERG RD	I-96	16.24	16
		Holland			
S01	70013	US-31	I-196 BL	14.83	16
S01	3034	I-196 WB	US-31NB	15.58	16
S02	3035	60 TH STREET	I-196	16.50	16
S04	3035	58 TH STREET	I-196	16.08	16
S06	3035	M-40	I-196	16.08	16
S07	3035	146 TH AVE	I-196	16.08	16
S05	3035	56 TH STREET	I-196	15.91	16
S01	70024	ADAMS RD	I-196	15.72	16
S04	0	I-196 EB	I-196 BL(BYRON ROAD)	15.09	16
S15	0	I-196 WB	I-196BL (BYRON RD)	14.67	16
S03	70024	88TH AVE.	I-196	16.37	16
		Benton Harbor			
S14	11015	LIVINGSTON ROAD	I-94	16.77	16
R06	11015	MI & IN ELEC ROAD	I-94	24.84	23
X06-7	11015	MI & IN ELEC CO RR	I-94	24.80	16
R06	11015	MI & IN ELEC ROAD	I-94	24.84	23
S15	11015	JOHN BEERS ROAD	I-94	16.40	16
S17-3	11012	I-94 EB	I-94 BL (LAKESHORE DR)	14.50	16
S17-4	11012	I-94 WB	I-94 BL (LAKESHORE DR)	14.50	16
S18	11015	GLENLORD ROAD	I-94	17.09	16
S19	11015	CLEVELAND AVE	I-94	16.93	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S20	11015	WASHINGTON AVE	I-94	16.57	16
S22	11015	M-63	I-94	17.09	16
S01-3	11031	I-94 EB	US-31 & M-139	15.91	16
S01-4	11031	I-94 WB	US-31 & M-139	14.93	16
S02	11016	NICKERSON AVE	I-94	16.44	16
S04	11016	NAPIER ROAD	I-94	16.24	16
S05	11016	EMPIRE ROAD	I-94	15.03	16
S06	11016	BRITAIN RD	I-94	14.96	16
S07	11016	HIGHLAND ROAD	I-94	17.09	16
S09	11016	TERRITORIAL ROAD	I-94	17.19	16
S10	11016	BENTON CENTER ROAD	I-94	16.44	16
S08	11017	I-94 BL EB (MAIN)	I-94	17.03	16
		Niles			
S01-3	11051	US-12 EB	M-51	13.91	16
S01-4	11051	US-12 WB	M-51	13.91	16
S01	11057	BUCHANAN ROAD	US-31	17.42	16
		Kalamazoo			
S01	39013	CENTRE AVE (Q AVE)	US-131	14.63	16
S03	39013	MILHAM RD (O AVE)	US-131	17.03	16
S07-3	39014	I-94 EB & CD RAMP	US-131 SB	14.67	16
S08-3	39013	I-94 EB & CD RAMP	US-131 NB	14.67	16
S07-4	39013	I-94 WB	US-131 SB	14.67	16
S08-4	39013	I-94 WB	US-131 NB	14.76	16
S01	39014	PARKVIEW (M AVE)	US-131	16.40	16
S03	39014	I-94 BL (STADIUM)	US-131	14.70	16
S05	39014	MICHIGAN AVE	US-131	16.24	16
S06	39014	M-43 (MAIN STREET)	US-131	14.93	16
S07	39014	H AVE	US-131	14.99	16
S01	39024	4 TH STREET	I-94	15.91	16
S02	39024	6 TH STREET	I-94	17.32	16
S03	39024	9 TH STREET	I-94	16.67	16
S09	39024	OAKLAND DRIVE	I-94	15.58	16
S02	39022	LOVERS LANE	I-94	14.24	16
S11	39022	KILGORE ROAD	I-94	17.32	16
S04	39022	SPRINKLE ROAD	I-94	15.91	16
S05	39022	MILLER RD (L AVE)	I-94	14.76	16
S10	39022	CORK STREET	I-94	17.16	16
S06	39022	I-94 BL EB	I-94	16.08	16
X01	39082	NORFOLK SOUTHERN	M-43 (E MICH AVE)	14.24	16
S01	39042	SPRINKLE ROAD	M-96 (KING HIGHWAY)	16.24	16
		Battle Creek			

Bridges on 16ft Routes in Highly Urban Areas				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S08	13062	I-194	I-94 BL (DICKMAN ROAD)	26.57	16
S01	0	M-96 (COLUMBIA)	RAYMOND RD	15.16	16
S02	13081	RENTON ROAD	I-94	18.67	16
S01	13081	I-94 BL (MLK)	I-94	16.50	16
S03	13081	HELMER ROAD	I-94	16.50	16
S04	13081	CAPITAL AVE	I-94	15.42	16
S06-2	13081	I-194 & M-66 SB	I-94	15.49	16
S06-1	13081	I-194 & M-66 NB	I-94	17.32	16
S02-3	13017	I-94 EB	BEADLE LAKE ROAD	15.58	16
X01	13082	NORFOLK SOUTHERN	I-94	15.75	16
S04	13082	F DRIVE NORTH	I-94	19.98	16
S05	13082	I-94 BL (MICHIGAN)	I-94	18.57	16
S06	13082	M-311(11 MILE RD)	I-94	17.49	16
		Jackson			
S02	38131	M-50 NB	US-127	14.34	16
S04	38131	VAN HORN RD	US-127	14.76	16
S05	38131	HENRY RD	US-127	15.16	16
S04	38101	BLACKMAN RD	I-94	14.57	16
S02-4	38101	M-60 WB	I-94	14.67	16
S02-3	38101	M-60 EB	I-94	14.76	16
S05	38101	AIRPORT RD	I-94	14.40	16
S06	38131	I-94	US-127 & M-50	14.17	16
S07	38101	LANSING RD	I-94	14.07	16
S08-1	38101	M-106 NB	I-94	14.01	16
S09	38101	ELM RD	I-94	14.30	16
S10	38101	DETTMAN RD	I-94	14.67	16
S05-2	38101	US-127 SB	I-94	14.30	16
S05-1	38101	US-127 NB	I-94	14.90	16
S11	38101	HAWKINS RD	I-94	14.37	16
S12	38083	I-94	I-94BL SB	14.34	16
S01	38103	SARGENT RD	I-94	16.99	16
S04-2	0	US-127 SB	I-94BL	14.34	16
S04-1	0	US-127 NB	I-94BL	16.93	16
S02	38111	E SOUTH ST	US-127	16.50	16
S03	38111	PAGE RD	US-127	16.17	16
R01-1	0	US-127 NB	CONRAIL & M-50	14.76	16 RD 23 RR
R01-2	0	US-127 SB	CONRAIL & M-50	16.24	16 RD 23 RR
S01	38111	M-50	US-127	15.58	16
R01-4	38102	M-60 WB	CONRAIL & I-94 BL	23.82	16 RD 23 RR
R01-3	38102	M-60 EB	CONRAIL & I-94 BL	23.33	16 RD 23 RR

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
		Grand Rapids			
S01	41133	INDIAN LAKE RD	US-131 SB	16.50	16
S02	41133	INDIAN LAKE RD	US-131 NB	16.50	16
S03	41133	M-46	US-131	16.47	16
S06	41132	POST RD	US-131	14.80	16
S09	41132	12 MI RD	US-131	15.12	16
S13	41132	14 MI RD (M-57)	US-131	15.09	16
S05	41132	PINE ISLAND DRIVE	US-131	16.27	16
S08	41132	10 MI RD	US-131	16.34	16
S07	70063	16TH AVE	I-96	14.57	16
S08	70062	I-96 EB	M-11 WB	14.40	16
S01	41026	FRUIT RIDGE RD	I-96	16.50	16
S02	41026	WALKER AVE	I-96	16.40	16
S04	41026	M-37	I-96EB,M-37	16.24	16
S06	41026	WB I-296 CONN	I-96EB & M-37	16.63	16
R03	41132	I-296 CONN TO WB96	CSX & CR RR &US-131 SB	17.16	16 Rd 23 RR
S07-3	41132	I-96 EB	US-131	16.24	16
S07-4	41132	I-96 WB	US-131	18.24	16
S03	41025	CHENEY AVE	I-96	16.17	16
S04	41025	M-44 CONN	I-96	17.26	16
S05	41025	DEAN LAKE AVE.	I-96	15.35	16
S07	41025	KNAPP STREET	I-96	16.40	16
S10	41025	M-44 (EAST BELT LI	I-96	16.34	16
S09	41025	I-96 EB	I-196 WB & M-21	16.34	16
S08	41025	LEONARD ST	I-96	16.70	16
P01	41051	CALVIN COLLEGE PED	M-37 (E BELT LINE AVE)	17.59	17
S01	41031	32ND ST	M-37	28.31	16
X01	41031	CSX RR	M-37	16.01	16
S30	0	60TH STREET	M-6	16.99	16
S28	41031	M-6 WB	M-37	17.85	16
S27	41031	M-6 EB	M-37	18.24	16
S25	41064	EAST PARIS AVE	M-6	16.50	16
S26	41064	PATTERSON AVENUE	M-6	17.42	16
S11	41025	M-21 WB	I-96 EB RAMP	14.40	16
S16	41025	BURTON STREET	I-96	16.17	16
S15	41025	FOREST HILL AVENUE	I-96	16.24	16
S14	41025	CASCADE RD	I-96	16.17	16
S13	41025	M-21 EB	I-96 & M-21	17.13	16
S12	41025	M-21 WB	I-96 & M-21	17.32	16
S01-4	41063	I-96WB	M-11	14.76	16
S01-3	41063	I-96EB	M-11	16.57	16
S02	41024	KRAFT AVE.	I-96	16.40	16
S03	41024	THORNAPPLE R DR	I-96	16.17	16
S35	41025	M-6 EB TO I-96 WB	I-96	17.85	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
B03	41024	M-6, RAMP A	I-96 & THORNAPPLE RIVER	16.77	16
B03	41024	M-6, RAMP A	I-96 & THORNAPPLE RIVER	16.77	16
S04	41024	WHITNEYVILLE AVE.	I-96	14.83	16
S36	41064	M-6 EB TO I-96 WB	I-96 WB TO M-6 WB RAMP D	16.50	16
S17	41131	M-6 EB	US-131	16.40	16
S15	41131	M-6 WB C-D	US-131	16.40	16
S14	41031	M-6 EB C-D	US-131	16.40	16
S16	41031	M-6 WB	US-131	16.40	16
S01	41064	KENOWA AVE	M-6	16.40	16
S02	41064	WILSON AVE	M-6 , RAMP G	16.40	16
S03	41064	IVANREST AVE	M-6	16.83	16
S04	41064	BYRON CENTER AVE	M-6, RAMPS E & G	17.42	16
S05	41064	BURLINGAME AVE	M-6	16.57	16
B03	70025	8TH AVE	M-6, RUSH CREEK	12.66	16
S02	41043	M-6 EB, RAMP D	M-6 WB , RAMP C	17.42	16
S03	41043	I-196 WB TO M-6 EB	I-196 EB	19.65	16
S01	41034	M-6 WB, RAMP C	I-196 EB	18.33	16
S13	70024	8TH AVE	I-196	16.14	16
S20	41029	KENOWA AVE	I-196	16.67	16
S22	41029	44TH ST	I-196	16.54	16
R01	0	I-196 EB M-21	CSX RR & I-196 RMP	16.77	16 RD 23 RR
S03	41061	I-196 WB	M-11	14.83	16
S04	41061	I-196 EB	M-11	15.49	16
S05	41029	I-196WB RAMP TOM11	I-196EB	16.34	16
S06	41029	RMP B M-21BR I-196	I-196 EB	16.04	16
S10	41029	RAMP OVER WB I-196	I-196 WB	18.50	16
S11	41029	M-45 LAKE MICH DR	I-196 WB	17.81	16
S07	41842	I-196 RAMP A M-21	M-21BR (CHICAGO DR)	15.91	16
S13	41081	I-196 EB	M-45EB RAMP TO I-196WB	29.43	16
S12	41081	I-196 EB	M-45	15.49	16
		Lansing			
S06	19042	WEBSTER RD	I-69	16.70	16
S11	19042	UPTON RD	I-69	16.70	16
S09	19041	I-69BR EB RAMP D	I-69	16.40	16
S10	19041	I-69BR WB RAMP C	I-69	16.40	16
S07	19042	NICHOLS RD	I-69	16.37	16
S07	19042	NICHOLS RD	I-69	16.37	16
S08	19042	CENTER RD	I-69	16.67	16
S06	19042	WEBSTER RD	I-69	16.70	16
S03	19042	I-69 EB C-D	US-127	17.78	16
S01	19033	CLARK ROAD	US-127	16.40	16
S08	19043	CLARK RD	I-69	16.40	16
S11	19043	LOWELL RD	I-69	16.50	16
S10	19043	AIRPORT ROAD	I-69	16.67	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S02	19043	CLARK RD	I-69 & US-127	17.26	16
S07	19043	DEWITT RD	I-69	16.57	16
S05	19043	US-127 BR	I-69	16.77	16
S05	19043	US-127 BR	I-69	16.77	16
S17	19043	FRANCIS ROAD	EB & WB TURNING RD	16.34	16
S12	19021	I-69 SB	EB TURNING ROADWAY	16.40	16
S13	19021	I-69 NB	EB TURNING ROADWAY	16.57	16
S19	19022	EB TURNING RDWY	I-96	16.77	16
S16	19022	I-69 SB	I-96	16.34	16
S06-4	19022	I-96 WB	I-96BL	19.00	16
S06-3	19022	I-96 EB	I-96BL	14.99	16
S14	19021	I-69 SB	GRAND RIVER AVE (I-96BL)	14.99	16
S15	19021	I-69 NB	GRAND RIVER AVE (I-96BL)	14.99	16
S13	23152	EATON HWY	I-69 EB & I-96 WB	16.47	16
S14	23152	EATON HWY	I-69 WB & 96 EB	16.47	16
S02-3	23152	I-96 EB	M-43	16.14	16
S02-4	23152	I-96 WB	M-43	16.01	16
S01	23152	WILLOW HWY	I-96	16.67	16
S02	23152	I-496 WB	I-96	16.24	16
S05	23152	MT HOPE HWY	I-96 & I-496 RAMP	16.27	16
S05	23152	MT HOPE HWY	I-96 & I-496 RAMP	16.27	16
S16	23152	MILLET ROAD	I-69 NB	16.57	16
S06	23152	MILLETT RD	I-96	16.70	16
S14	23152	I-69 NB	I-96	16.40	16
S15	23152	I-69 SB	I-96	16.67	16
S09	23152	I-96 WB	LANSING RD	17.42	16
S13	23063	DAVIS HWY	I-69	16.67	16
S01	23151	CREYTS RD	I-96 EB	15.58	16
S02	23151	CREYTS RD	I-96 WB	15.98	16
S03	23151	WAVERLY RD	I-96	16.24	16
S01-4	33011	I-96 WB	M-99	15.16	16
S01-3	33011	I-96 EB	M-99	16.93	16
S04-3	33081	I-96 EB	I-96BL RAMPS	14.67	16
S04-4	33081	I-96 WB	I-96BL RAMPS	14.99	16
S01	33084	AURELIUS RD	I-96	16.24	16
		Metro Detroit Area			
S04	58171	NEWPORT RD	I-275	16.67	16
S01	82291	WILL CARLETON RD	I-275	16.67	16
S03	82291	SOUTH HURON	I-275	16.50	16
S02	82291	WILLOW RD	I-275	16.14	16
S04	82291	HURON R. DRIVE	I-275	16.40	16
S05	82291	SIBLEY RD	I-275	16.57	16
S06	82291	PENNSYLVANIA RD	I-275	16.50	16
S07	82291	EUREKA RD	I-275	16.57	16
X02	82291	NS RR	I-275	16.01	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S18	82291	I-275 TO I-94 RAMP	I-275	16.57	16
S11	82291	I-94 EB	I-275	18.67	16
S14-4	82291	I-94 WB	I-275	16.50	16
S14-8	82291	I-94 WB COLLECTOR	I-275	16.50	16
S11	82291	I-94 EB	I-275	18.67	16
S14-4	82291	I-94 WB	I-275	16.50	16
S14-8	82291	I-94 WB COLLECTOR	I-275	16.50	16
S11	82291	I-94 EB	I-275	18.67	16
X04	82291	NS RR	I-275 EXIT RAMP F	16.24	16
S02	82292	TYLER RD.	I-275	16.83	16
S03	82292	ECORSE RD.	I-275	16.50	16
S06	82292	PALMER RD	I-275	16.50	16
S01	82292	HANNAN RD.	I-275	16.99	16
S05	0	I-275 SB	MICHIGAN AVE(US-12)	16.90	16
S11	0	I-275 NB	MICHIGAN AVE(US-12)	16.73	16
S09	0	I-275 SB	RELOC M-14	16.40	16
S10-1	0	I-275 NB	RELOC M-14	16.24	16
S10-5	0	I-275 NB COLLECTOR	RELOC M-14	17.65	16
S10-5	0	I-275 NB COLLECTOR	RELOC M-14	17.65	16
S08	0	I-275 SB	M-153 (FORD RD)	16.93	16
S15	0	I-275 NB	M-153 (FORD RD)	18.41	16
S01	82293	WARREN RD	I-275	18.57	16
S02	82293	JOY RD	I-275	16.67	16
S03	82293	ANN ARBOR RD	I-275	16.67	16
S04	82293	ANN ARBOR TRAIL	I-275	16.90	16
S06	82293	PLYMOUTH RD	I-275	16.14	16
S11	82293	SB TO EB I-96	I-275 NB	17.22	16
S12	82125	FIVE MI RD	I-96	17.06	16
S05	82125	SIX MILE RD	I-96	16.50	16
S03	82125	SEVEN MILE RD	I-96	15.98	16
S10	63191	TEN MILE RD	I-96	17.42	16
S09	63191	GRAND RIVER AVE	I-275, I-96	16.93	16
S10	63191	TEN MILE RD	I-96	17.42	16
S09	63191	GRAND RIVER AVE	I-275, I-96	16.93	16
S14	50062	BARKMAN AVE	I-696	17.16	16
S02	50062	GROVELAND AVE	I-696	17.55	16
S03-2	50062	SB GRATIOT AVE M-3	I-696	17.09	16
S03-1	50062	NB GRATIOT AVE M-3	I-696	17.06	16
S28	50062	M-97 GROESBECK HWY	I-696	17.91	16
S29	50062	HAYES RD	I-696	17.32	16
S13	50062	BELANGER AVE	I-696	17.16	16
P01	50062	GRANDMONT PED X-OV	I-696 & SERVICE RDS	14.99	17
S18	50061	VAN DYKE AVE (M53)	I-696	19.42	16
S19	50061	LFT TRN LANE	I-696	16.93	16
S41	50061	ARSENAL AVE	I-696	16.73	16
S42	50061	CAMPBELL RD	I-696	16.99	16
S21	50061	LFT TRN LANE	I-696	17.16	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S22	50061	HOOVER RD	I-696	18.34	16
S23	50061	LFT TRN LANE	I-696	17.49	16
S30	50061	WAGNER DR	I-696	16.83	16
S31	50061	FAIRFIELD AVE	I-696	16.83	16
S43	50061	SCHOENHERR LFT TRN	I-696	16.90	16
S25	50061	SCHOENHERR RD	I-696	16.77	16
S26	50061	BUNERT RD	I-696	16.83	16
X02	50061	GTW RR	I-696	16.01	16
X01	50061	CONRAIL	I-696	16.01	16
S17	50061	U-TRN & LFT TRN	I-696	16.83	16
S14	50061	SHERWOOD AVE.	I-696 &RAMPS B,C,H,&F	16.34	16
S08	50061	RAMP G AT MOUND RD	I-696	26.15	16
S33-5	50061	N.BD.SERVICE RD.	I-696	16.24	16
S33-1	50061	N.BD.MOUND RD.	I-696	16.24	16
S33-6	50061	S.BD.SERVICE RD.	I-696	16.24	16
S33-2	50061	S.BD.MOUND RD.	I-696	16.24	16
S05	50061	EB 11 MILE RD	I-696	16.40	16
S03	50061	RYAN ST	I-696	16.57	16
S04	50061	MEREDITH DR	I-696	16.17	16
S44	50061	U TURN @ ELCAPITAN	I-696	17.09	16
S01	50061	U TURN @ AUGUSTINE	I-696	16.40	16
S02	50061	EB 11 MI RMP I-696	I-696	16.67	16
S16	50061	EB 11 MILE RD	I-696	15.16	16
S06	50061	RAMP G AT MOUND RD	I-696	15.81	16
P01	50061	THOMAS ST PED X-OV	I-696	14.99	17
S10	63103	JOHN R RD	I-696	16.67	16
S11	63103	U-TURN @ BATTELLE	I-696	17.06	16
S12	63103	COUZENS ST	I-696	16.73	16
S13	63103	10 MI RD CONNECTOR	I-696	16.83	16
S14	63103	DEQUINDRE LFT TRN	I-696	16.50	16
S15	63103	DEQUINDRE AVE	I-696	16.31	16
S14	63102	US-24 N TO M-10 W	I-696	21.00	16
S03	63102	LASHER ROAD	I-696	16.57	16
S32	63102	LOIS LN	I-696	16.50	16
S04	63102	11 MILE ROAD	I-696	16.67	16
S33	63102	SERV.RD U-TURN	I-696	16.31	16
S34	63102	CENTRAL PARK BLVD	I-696	16.73	16
S35	63102	MEADOWLARK U EAST	I-696	17.16	16
S05	63102	EVERGREEN ROAD	I-696	19.59	16
S36	63102	RED RIVER AVE U-T	I-696	17.32	16
S06	63102	SANTA BARBARA	I-696	16.50	16
S38	63102	SANTA BARBARA U EA	I-696	16.50	16
S07	63102	SOUTHFIELD U TURN	I-696	17.75	16
S08	63102	SOUTHFIELD RD	I-696	20.31	16
S09	63102	SOUTHFIELD U TURN	I-696	16.57	16
S39	63102	LATHRUP ROAD	I-696	16.83	16
S11	63102	LINCOLN DRIVE	I-696	17.06	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S12	63102	U-TURN W.OF GRNFLD	I-696	16.90	16
S13	63102	GREENFIELD ROAD	I-696	16.67	16
S14	63102	U-TURN E.OF GRNFLD	I-696	16.40	16
S10	63102	E B 11 MILE SER RO	I-696	16.57	16
P01	63102	MEADOWOOD	I-696	16.50	16
Z02	63102	PLAZA	I-696	16.57	16
Z01	63102	PLAZA	I-696	17.42	16
Z03	63102	PLAZA	I-696	16.73	16
S16	63102	10 MILE ROAD W-SER	I-696	16.24	16
S17	63102	COOLIDGE ROAD U T	I-696	16.24	16
S18	63102	COOLIDGE ROAD	I-696	16.24	16
S19	63102	COOLIDGE ROAD U TU	I-696	16.24	16
S20	63102	SCOTIA ROAD	I-696	16.24	16
S40	63102	MANISTEE U-TURN	I-696	16.24	16
S41	63102	ROANOKE U-TURN	I-696	16.24	16
S42	63102	MAPLEFIELD U-TURN	I-696	16.24	16
S23	63102	WOODWARD U TURN W	I-696	16.67	16
S25	63102	SB WOODWARD SERV	I-696	17.55	16
S27	63102	NB WOODWARD SERV	I-696	18.67	16
S28	63102	MAIN STREET	I-696	16.99	16
X01	63102	GTW RR	I-696	17.81	16
S29	63102	MOHAWK AVENUE	I-696	16.24	16
S29-8	63102	MOHAWK AVENUE(UTN)	I-696	16.24	16
S31	63102	CAMPBELL AVE	I-696	16.24	16
S12	63101	RAMP P TO M-10	I-696	17.65	16
S13	63101	US-24,TELEGRAPH RD	I-696	16.57	16
S07	63101	ORCHARD LAKE RD	I-696	16.77	16
P02	63101	E OF ORCHARD LAKE	I-696	16.24	16
S08	63101	MIDDLEBELT RD	I-696	16.31	16
S10	63101	FRANKLIN RD	I-696	16.14	16
S11	63101	SB N WESTERN HWY	I-696	16.14	16
S02	63101	HAGGERTY RD	I-696	16.24	16
S05-4	63101	I-96 WB	I-696	16.50	16
S06	63101	TRN RDWY C (I-696)	I-96 & M-275	16.24	16
S05-4	63101	I-96 WB	I-696	16.50	16
S05-1	63101	I-275 NB	I-696	17.16	16
S03	63101	HALSTEAD RD	I-696	16.24	16
S03	63101	HALSTEAD RD	I-696	16.24	16
S06	63101	FARMINGTON RD	I-696	16.34	16
S01	63101	M-5 (OLD M-102)	I-696 EB	16.99	16
S02	63022	M-5	I-96/I-696	16.93	16
S01	63191	MEADOWBROOK RD	I-96	16.57	16
S07	63022	NOVI RD	I-96	16.83	16
S03	63022	SOUTH HILL RD	I-96	16.08	16
S04	63022	OLD PLANK RD	I-96	16.50	16
S05	63022	WIXOM RD	I-96	14.76	16
S06	63022	BECK RD	I-96	14.90	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S07	47064	PLEASANT VALLEY RD	I-96	15.06	16
S08	47064	KENSINGTON RD	I-96	15.12	16
S05	47013	GRAND RIVER AVE	US-23 SB	15.29	16
S03	47013	I-96 EB	US-23SB	14.67	16
S12	47065	SPENCER RD	I-96	17.49	16
S11	47065	FLINT RD	I-96	16.99	16
S08	47065	I-96 BL (ON RMP)	I-96 WB	16.40	16
S09	47065	DORR RD	I-96	16.27	16
S06	47065	PINCKNEY RD	I-96	16.50	16
S07	47065	CHILSON RD	I-96	16.50	16
S02	47065	M-59/I-96BL	I-96	16.40	16
S04	47065	M-155 (MASON RD)	I-96	16.67	16
S16-8	82291	I-94 WB COLLECTOR	I-275 SB TO I-94 EB RAMP	16.40	16
P01	82021	QUIRK ROAD WALKOVE	I-94	20.67	17
S01	82021	BELLEVILLE RD	I-94	16.93	16
S02	82021	HAGGERTY RD	I-94	16.99	16
P01	82021	QUIRK ROAD WALKOVE	I-94	20.67	17
S01	82021	BELLEVILLE RD	I-94	16.93	16
S02	82021	HAGGERTY RD	I-94	16.99	16
S01	81041	US-12 EB	I-94	17.16	16
S03	81041	RAWSONVILLE RD	I-94	16.67	16
S01	81063	US-12 BR,WHITTAKER	I-94	16.40	16
S02	81063	GROVE ST	I-94	16.40	16
P01	81063	GEORGINA DR WALKOV	I-94	17.39	17
S06	81063	HARRIS RD	I-94	17.55	16
S12	81062	US-12	I-94	16.24	16
S09	81062	CARPENTER RD	I-94	16.34	16
S08-1	81062	US-23 NB	I-94	17.59	16
S08-2	81062	US-23 SB RAMP	I-94	16.73	16
S13	81062	ELLSWORTH RD.	I-94	16.24	16
P02	81062	PLAINVIEW CT PED B	I-94	16.90	17
P01	81062	PED&BIKE@STONE SCH	I-94	16.90	17
S04	81062	SALINE RD	I-94	16.90	16
S05	81062	102STATE RD	I-94	17.26	16
S07	81062	PLATT RD	I-94	14.50	16
S06	81062	STONE SCHOOL RD	I-94	14.17	16
S03	81062	SCIO CHURCH RD	I-94	14.40	16
S02	81062	LIBERTY RD	I-94	14.24	16
S01	81101	I-94	I-94 BL	14.17	16
S13	81104	JACKSON AV WB,94BR	I-94 RAMP	14.67	16
S08	81104	PARKER RD	I-94	19.19	16
S09	81104	BAKER RD	I-94	16.37	16
S10	81104	ZEEB RD	I-94	16.99	16
S11	81104	M-14 EB	I-94 WB	17.81	16
S12	81104	WAGNER RD	I-94	16.73	16
S04	47013	LEE RD	US-23	14.73	16
X03	47013	CSX RR	US-23	15.26	16

Bridges on 16ft Routes in Highly Urban Areas				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S05	47013	GRAND RIVER AVE	US-23 SB	15.29	16
S03	47013	I-96 EB	US-23SB	14.67	16
S04	47013	I-96 WB	US-23SB	14.90	16
S06	47013	GRAND RIVER AVE	US-23 NB	15.16	16
S05	47013	I-96 EB	US-23NB	14.67	16
S02	47041	US-23	M-36	14.30	16
S05	81075	WARREN RD	US-23	14.67	16
S08	81075	6 MI RD	US-23	15.06	16
S10	81075	8 MI RD	US-23	14.17	16
S09-1	81103	23 BR N TO US-23 N	US-23 SB(RAMP C)	15.09	16
S02	81103	PONTIAC TRAIL	US-23 WB, M-14 WB	14.67	16
S01	81103	PONTIAC TRAIL	US-23 EB, M-14 EB	14.67	16
S04	81103	NIXON RD	US-23, M-14	16.63	16
S04	81074	GEDDES RD	US-23	14.60	16
S05	81074	EARHART RD	US-23	15.09	16
S06	81074	PLYMOUTH-ANNARBOR	US-23	14.96	16
S07	81074	ELLSWORTH RD	US-23	15.72	16
S02-2	81081	US-23 SB	US-23 BR	14.40	16
S07	81103	DIXBORO RD	M-14	15.42	16
S08	81103	VORHIES RD	M-14	16.93	16
S12-3	81103	M-153 CONN.RAMP C	M-14	16.99	16
S12-4	81103	M-153 CONN.RAMP B	M-14	16.57	16
S02	82102	NAPIER ROAD	M-14	17.22	16
S03	82102	N. TERRITORIAL RD	M-14	16.31	16
S04	82102	RIDGE ROAD	M-14	16.57	16
S05	82102	BECK ROAD	M-14	16.99	16
S10	82102	ROBINWOOD DR.	M-14	16.40	16
S11	82102	SCHOOLCRAFT CONN.	M-14	16.99	16
S01	82102	HAGGERTY ROAD	M-14	16.73	16
S09	0	I-275 SB	RELOC M-14	16.40	16
S06	81076	US-12	US-23	14.80	16
S02	33035	MASON-HOWELL RD	US-127	14.99	16
S10	33035	M-36 EB	US-127	15.72	16
S01	33035	M-36 WB	US-127	15.72	16
S04	33035	HOLT RD	US-127	16.04	16
S02	33032	COLUMBIA RD	US-127	14.86	16
S03	33032	SITTS RD	US-127	14.80	16
S01	33032	KIPP RD	US-127	15.09	16
S03	63192	I-96, RAMP J	M-5 NB	18.67	16
S01	63052	ORCHARD LAKE RD	US-24	14.30	16
P01	63041	PED O PASS	HURON M-59	15.49	17
X02	63041	C&O RR	M-59 WB	14.01	16
P02	63041	PED O PASS	HURON M-59	16.14	17
S08-3	63112	I-75 CONN EB	M-24	14.67	16
S08-4	63112	I-75 CONN WB	M-24	14.67	16
S06	63174	DALLAS DBL U TURN	I-75	15.98	16
S30	63174	10.5 MI ROAD	I-75	16.73	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S31	63174	11 MI RD	I-75	15.98	16
S01	63174	GARDENIA RD	I-75	15.98	16
S02	63174	NB SERV RD	I-75	16.99	16
P01	63174	12 MI RD WALKOVER	I-75	16.99	17
S06-2	63632	I-75 SB	M-150 (ROCHESTER RD.)	14.50	16
S06-1	63632	I-75 NB	M-150 (ROCHESTER RD)	15.06	16
S10	63174	WATTLES RD	I-75	15.32	16
P07	63174	WATTLES RD PED	I-75	17.22	16
S13	63174	N.B. CROOKS RD.	I-75	16.50	16
S12	63174	RAMP CONNTO CHRYSL	I-75	16.40	16
S17	63174	I-696 TURN RDWY AF	I-696&RAMPS FROM I-75 SB	16.40	16
S18	63174	I-696 RAMP EB	I-75 & RAMPS TO I-75 NB	16.24	16
S19	63174	SOUTH BLVD	I-75	16.40	16
S20-2	63042	I-75 SB	OLD M-59 (AUBURN RD)	14.57	16
S20-1	63042	I-75 NB	OLD M-59 (AUBURN RD)	14.73	16
S01-2	63043	I-75 SB	M-59	15.42	16
S01-1	63043	I-75 NB	M-59	15.58	16
S02-4	63172	FEATHERSTONE RD	I-75	16.40	16
S02-3	63172	FEATHERSTONE RD	I-75	17.06	16
S18	63172	I-75 RAMP B	I-75 RAMP B & I-75	16.83	16
S03-4	63172	UNIVERSITY DR (WB)	I-75	328.05	16
S03-3	63172	UNIVERSITY DR (EB)	I-75	16.50	16
S05	63172	WALTON BLVD	I-75	16.40	16
S06-2	63112	I-75 SB	M-24 & I-75 BL	16.73	16
S06-1	63112	I-75 NB	M-24 & I-75 BL	16.73	16
S09	63172	GIDDINGS RD	I-75	19.55	16
S07-3	63172	M-24 CONN EB	I-75	16.60	16
S07-4	63172	M-24 CONN WB	I-75	16.60	16
S17	63172	M-15	I-75	16.24	16
S14	63172	SASHABAW RD	I-75	16.31	16
S13	63172	WALDON RD	I-75	16.40	16
S11	63172	N.BD. BALDWIN RD.	I-75	16.57	16
S02	63173	M-24	I-75 SB	16.08	16
S01	63173	HOLCOMB RD	I-75	16.08	16
S03	63054	I-75 NB	M-24	16.83	16
S04	63173	DAVISBURG RD	I-75	16.73	16
S05	63173	RATTALEE LAKE RD	I-75	16.90	16
S01	63173	HOLCOMB RD	I-75	16.08	16
S03	25131	HOLLY RD	I-75	16.50	16
S02	25131	BALDWIN RD	I-75	16.50	16
S10	25131	HILL RD	I-75	16.99	16
S09	25131	FENTON RD	I-75	16.67	16
S07	25131	GRAND BLANC RD	I-75	16.40	16
S01	25131	I-475 SB	I-75 NB	16.01	16
S12	25131	M-54 (DORT HWY)	I-75 S B	16.04	16
S11	25031	MILLER RD	I-75	14.47	16
S08	25031	MAPLE RD	I-75	14.73	16

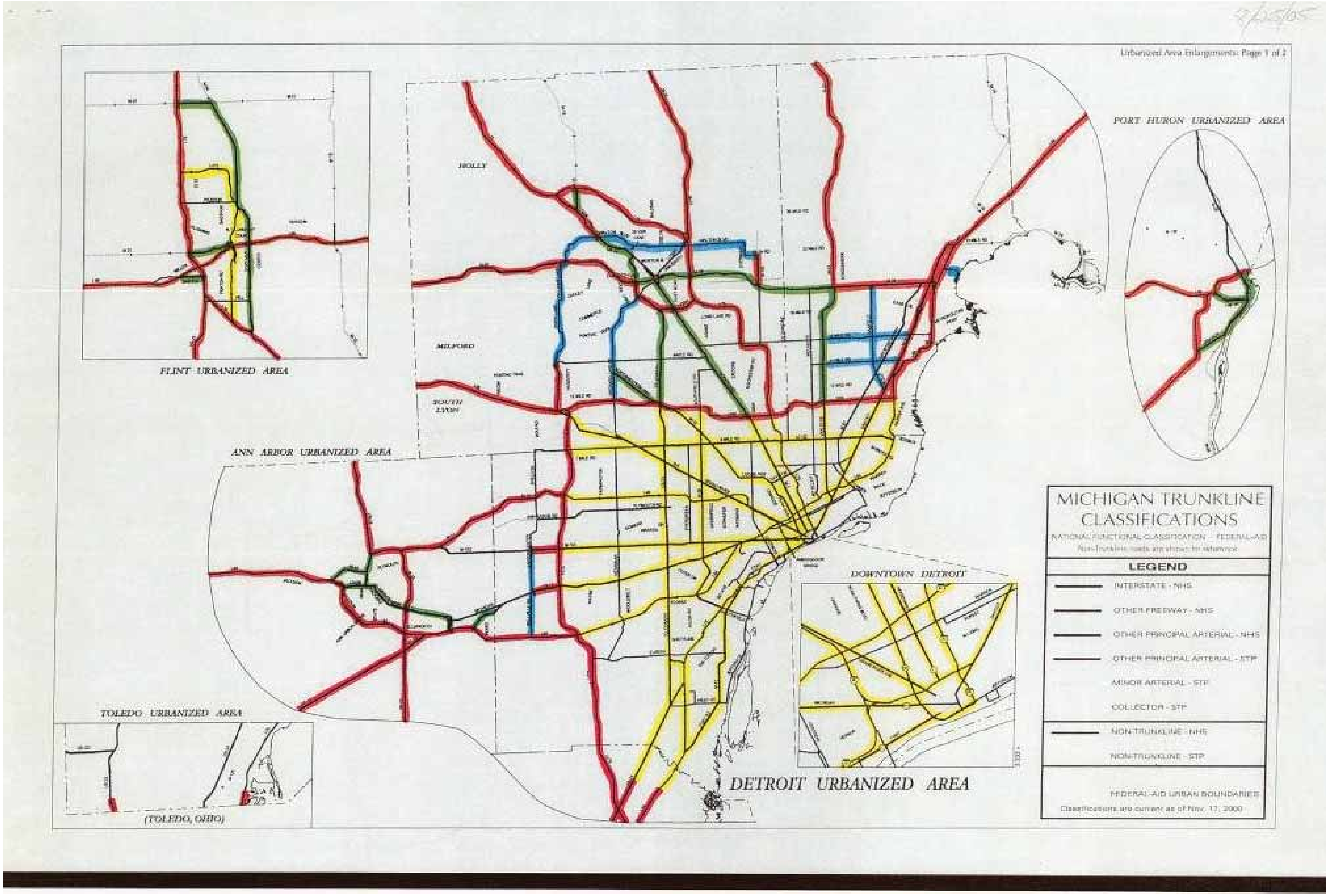
Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
X02	25031	GTW RR	I-75	14.01	16
S13	25032	DODGE RD	I-75	16.08	16
S12-8	25032	I-69 RAMP F	I-75	16.34	16
S12-4	25032	I-69 WB	I-75	16.31	16
S12-3	25032	I-69 EB	I-75	16.50	16
S12-7	25032	I-69 RAMP E	I-75	16.40	16
P01	25032	HOGARTH ST WALKOER	I-75	16.08	17
S01	25032	ARLENE DRIVE	I-75	16.21	16
X01	25032	GTW RR	I-75	14.83	16
S02	25032	M 21	I-75	14.17	16
S04	25032	BEECHER RD	I-75	17.81	16
S07	25032	PASADENA AVE	I-75	14.80	16
S08	25032	PIERSON RD	I-75	17.32	16
S09	25032	CARPENTER RD	I-75	14.37	16
S10	25032	COLDWATER RD	I-75	14.07	16
S44	25031	I-475 RAMP B	I-75 NB & SB	18.24	16
S11	25032	STANLEY RD	I-75	16.08	16
S12	25032	MT MORRIS RD	I-75	16.08	16
S13	25032	DODGE RD	I-75	16.08	16
S14	25032	WILSON RD	I-75	16.40	16
S15	25032	M-57 (VIENNA RD)	I-75	16.24	16
S16	25032	FARRAND RD	I-75	14.67	16
S02	73111	KING RD	I-75	16.40	16
S01	73111	BAKER RD	I-75	16.08	16
S03	73111	HESS RD	I-75	17.06	16
S04	73111	M-46	I-75	16.08	16
S24	73111	I-675 RAMP TO I-75	I-675 & I-75	17.49	16
S02	73111	I-675 WB	I-75	16.08	16
S07	73111	WADSWORTH RD	I-75	16.08	16
S25	73111	I-675 SB RAMP/I-75	I-75	17.16	16
S08	73111	M-81,WASHINGTON ST	I-75	16.24	16
S18	73111	I-675 NB OVER I-75	I-75	16.83	16
S05	73111	JANES RD	I-75	15.98	16
S03	73112	CRANE RD	I-75	16.34	16
S02	73112	KOCHVILLE RD	I-75	16.24	16
S01	9034	AMELITH RD	I-75	16.50	16
S02-2	9034	M-84	I-75 SB	16.40	16
S02-1	9034	M-84	I-75 NB	16.24	16
S03	9034	HOTCHKISS RD	I-75	16.50	16
S04	9034	SALZBURG RD	I-75	16.31	16
S05-3	9034	US-10 EB	I-75	16.57	16
S05-4	9034	US-10 WB	I-75	16.57	16
S04	9035	WILDER RD	I-75	16.86	16
S02	9035	N UNION RD	I-75	16.50	16
S03	9033	I-75 SB	M-13 CONN	14.99	16
S01	25042	M-13	I-69	16.31	16
S02	25042	DUFFIELD RD	I-69	15.42	16

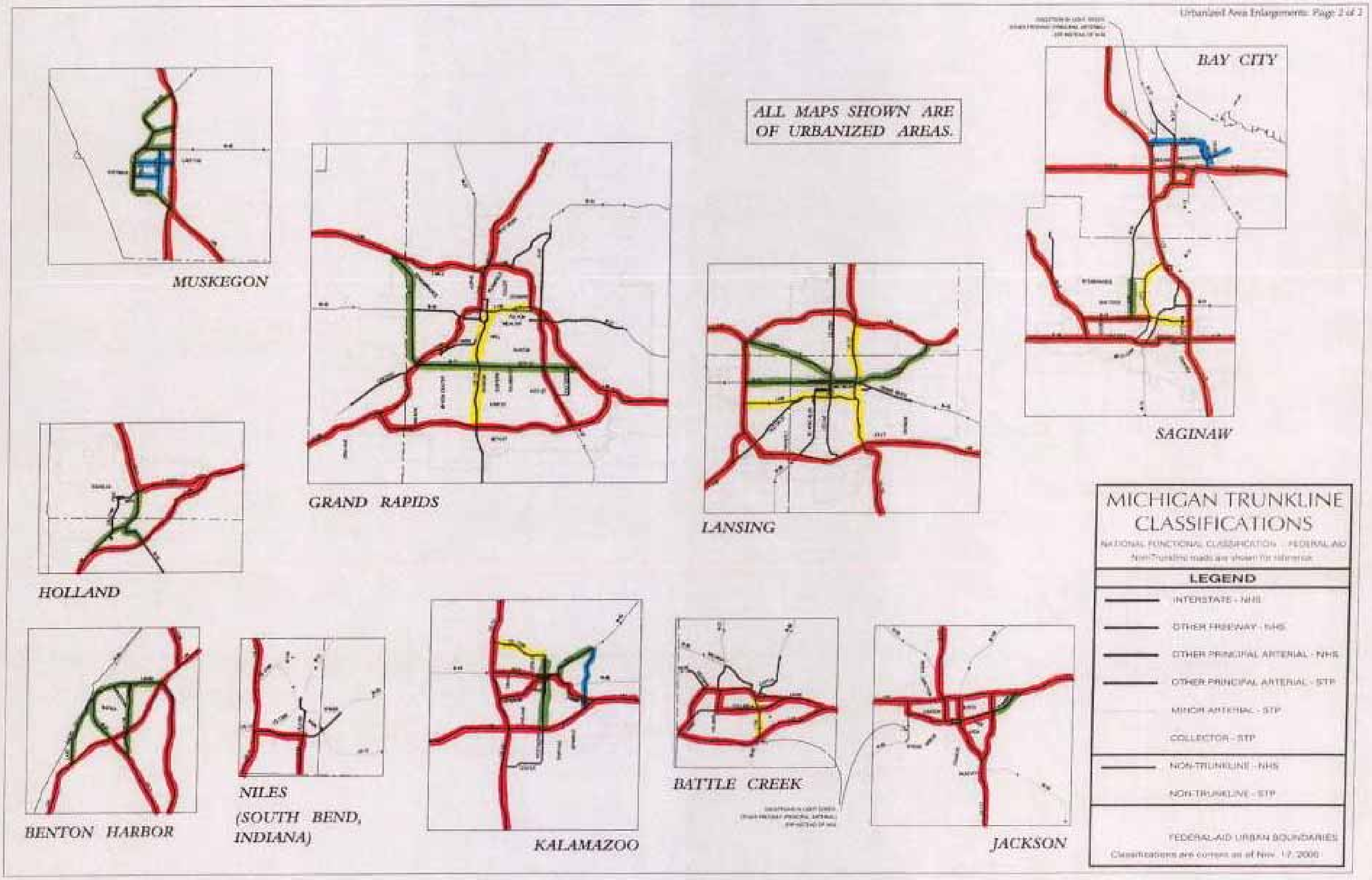
Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
S03	25042	NICHOLS RD	I-69	14.57	16
S04	25042	SEYMOUR RD	I-69	14.40	16
S05	25042	MORRISH RD	I-69	14.67	16
S10	25042	I-75 RAMP B	I-69	15.65	16
S11	25042	I-75 RAMP C	I-69	16.14	16
P01	25085	PED X-OVER@PARK DR	I-69	16.57	17
S03	25085	CHURCH ST	I-69	16.57	16
S04	25085	BEACH ST (OLDM-56)	I-69	16.67	16
S02	25085	GRAND TRAVERSE ST	I-69	15.42	16
S05	25085	SAGINAW ST	I-69	15.06	16
S01	25084	LAPEER RD	I-69	17.16	16
S03	25072	I-69	M-54 (DORT HWY)	15.06	16
S07	25084	BELSAY RD	I-69	15.49	16
P02	25084	PED @ ADAMS AVE	I-69	15.58	17
S09	25084	LAPEER RD	I-69	15.52	16
S12	25091	I-69 WB	M-15	15.16	16
S11	25084	OAK RD	I-69	16.67	16
S05	25031	TORREY RD	US-23	14.40	16
S06	25031	GRAND BLANC RD	US-23	14.57	16
S11	25031	MILLER RD	I-75	14.47	16
R01-2	25031	US-23 SB	GTW RR &US-23BR	14.07	16
R01-1	25031	US-23 NB	GTW RR &US-23BR	14.17	16
S02	25031	LAHRING RD	US-23	14.34	16
S03	25031	THOMPSON RD	US-23	14.60	16
S07	25031	HILL RD	US-23	16.24	16
S01	25033	US-23 BR	US-23	17.09	16
S04	47014	CROUSE RD	US-23	14.96	16
S08	47014	WHITE LAKE RD	US-23	15.85	16
S03-2	47082	US-23 SB	M-59	14.34	16
S03-1	47082	US-23 NB	M-59	14.34	16
S01	47014	SPENCER RD	US-23	14.83	16
S04	47013	LEE RD	US-23	14.73	16
S24	77111	I-94/I-69 (WB)	EB I-94/I-69 ON RAMP	14.53	16
S04	77023	MICHIGAN RD	I-69	13.85	16
S05	77023	MICHIGAN RD	I-69WB	14.57	16
S01	77023	WADHAMS RD	I-69	14.93	16
S02	77023	ALLEN RD	I-69	14.70	16
S03	77023	RANGE RD	I-69	14.67	16
S23	77111	RAMP D I94EBTO M21	I-69 EB	15.09	16
S07	50022	M-59 EB	M-53	16.24	16
S06	50022	M-59	M-53	16.24	16
S08	50013	21 MI RD	M-53	14.57	16
S09	50013	22 MI RD	M-53	14.57	16
S01	50013	23 MI RD	M-53	14.57	16
S03	50013	26 MI RD	M-53	14.57	16
S03	50015	28 MILE RD	M-53	0.00	16
S11	50015	33 MILE RD	M-53	328.05	16

Bridges on 16ft Routes in Highly Urban Areas					
				Underclearance in Ft.	
Structure Number	Control Section	Structure Carry Traffic On	Structure over	Existing	Required
P01	73062	COUNTRY CLUB WALKO	M-46	14.50	17
X01	73062	CSX RR	M-46	14.01	16
S11	9101	THREE MILE RD	US-10	16.14	16
S21	77111	WATER ST	I-94	15.65	16
S17	77111	I-69 WB	I-94	17.26	16
S20	77111	SB I-94 RAMP TO	I-94	16.73	16
S16	77111	MICHIGAN RD	I-94	15.42	16
S01	77111	MEISNER RD	I-94	16.34	16
S11	77111	SMITH CREEK RD	I-94	16.40	16
S12	77111	RAVENSWOOD RD	I-94	16.34	16
S13	77111	RANGE RD	I-94	17.09	16
S15	77111	I-69 EB	I-94	17.65	16
S10-4	77031	I-94 WB	M-25	14.34	16
S10-3	77031	I-94 EB	M-25	14.67	16
S01	50112	M-3 & M-29	I-94	16.24	16
S02	50112	M-19 NEW HAVEN RD	I-94	16.24	16
S03	50112	26 MI RD	I-94	16.40	16
S04	50112	CO LINE RD	I-94	16.34	16
S32	50111	M-59 (EB)	I-94	16.40	16
S33	50111	M-59 (WB)	I-94	16.77	16
S30	50111	21 MI RD	I-94	16.17	16
S31	50111	COTTON RD	I-94	16.34	16

LEGEND TO UNDERCLEARANCE MAPS

Yellow	Already exempted trunkline NHS routes (14'-6")
Green	Additional exempted trunkline NHS routes
Red	Trunkline NHS 16' routes
Blue	Local NHS 16' routes


Urbanized Area Enlargements: Page 1 of 2
FLINT URBANIZED AREA
PORT HURON URBANIZED AREA
HOLLY
MILFORD
SOUTH LYON
ANN ARBOR URBANIZED AREA
TOLEDO URBANIZED AREA
(TOLEDO, OHIO)
DOWNTOWN DETROIT
DETROIT URBANIZED AREA
MICHIGAN TRUNKLINE CLASSIFICATIONS
LEGEND
INTERSTATE - NHS
OTHER FREEWAY - NHS
OTHER PRINCIPAL ARTERIAL - NHS
OTHER PRINCIPAL ARTERIAL - STP
MINOR ARTERIAL - STP
COLLECTOR - STP
NON-TRUNKLINE - NHS
NON-TRUNKLINE - STP
FEDERAL-AID URBAN BOUNDARIES
Classifications are current as of Nov. 17, 2000


Urbanized Area Enlargements: Page 2 of 2
ALL MAPS SHOWN ARE OF URBANIZED AREAS.
MUSKEGON
GRAND RAPIDS
LANSING
BAY CITY
SAGINAW
HOLLAND
BENTON HARBOR
NILES (SOUTH BEND, INDIANA)
KALAMAZOO
BATTLE CREEK
JACKSON
MICHIGAN TRUNKLINE CLASSIFICATIONS
LEGEND
INTERSTATE - NHS
OTHER FREEWAY - NHS
OTHER PRINCIPAL ARTERIAL - NHS
OTHER PRINCIPAL ARTERIAL - STP
MINOR ARTERIAL - STP
COLLECTOR - STP
NON-TRUNKLINE - NHS
NON-TRUNKLINE - STP
FEDERAL-AID URBAN BOUNDARIES

The Michigan Department of Transportation
Operating Instructions for Scoping of Road and Bridge Projects to meet the current AASHTO Vertical Clearance Standards

Michigan has many structures over its roadway systems that do not meet the current American Association of State Highway and Transportation Officials (AASHTO) standards for vertical clearance. This is primarily due to a significant portion of our highway system being constructed prior to 1960 when the AASHTO standard for vertical clearance was 14'-0". The standard was revised in 1960 to 16'-0" for freeway and arterial roadways. MDOT's current design guidelines call for 16'-0" clearance on all NHS trunkline routes with the exception of the highly urbanized areas. The following procedure outlines the steps to follow when scoping road or bridge projects when the project limits include a structure that does not meet the current AASHTO vertical clearance requirement. Some areas have been designated as highly urbanized with an alternate route and have a vertical clearance requirement of 14'-6". These areas have been specifically identified and are provided along with the vertical clearance requirement table. Unless routes have been specifically identified they are not to be considered highly urbanized and must follow the listed vertical clearance requirement.

If the recommended alternative to meet vertical clearance results in capacity improvements, the project must be coordinated with the Project Planning Division of the Bureau of Transportation Planning. This assures that proper department prioritization of capacity improvements are maintained. Recommended alternatives to meet vertical clearance that increase the estimated project cost (to rehabilitate in kind) by $3 Million Dollars or more must be coordinated with Statewide Planning Division of the Bureau of Transportation Planning to determine if alternate funding sources are available. A review is needed to determine whether a design exception should be pursued.

New Construction

Definition: New structures over the **Interstate Freeway, Non Interstate Freeway and Arterials on the NHS** shall be designed to meet the current AASHTO vertical clearance requirement of 16'-0" (16'-3" is desired to provide for future overlay of the road).

New structures over **Collectors and Local Roads and Non-NHS Trunklines** shall be designed to meet the current AASHTO vertical clearance requirement of 14'-6" (14'-9" is desired to provide for future overlay of the road).

Bridge 4R Projects - Freeways & Arterials

Definition: Bridge projects whose scope of work include deck replacement, superstructure replacement, widening with the addition of a through lane, or full structure replacement.

Structures programmed for 4R work must be designed to meet the current AASHTO vertical clearance requirement of 16'-0" (16'-3" is desired for future overlay of the road). Scoping of projects must include a determination of the most effective means of obtaining the vertical clearance standard. A cost/benefit analysis to determine how best to achieve the standard, either in full or with incremental progress by obtaining part of the vertical clearance with the current project and the remainder with a future project must be completed. The analysis should include the alternatives of obtaining vertical clearance with the bridge project, a road project, or some combination of road and bridge work to meet the clearance requirements. In many cases it may not be possible to achieve the complete vertical clearance with the proposed bridge project. If the most efficient plan for meeting the vertical clearance requirement is incremental progress, a design exception is required. The design exception should be submitted as soon as possible, preferably prior to the submittal of the call for projects. This assures that the project with exception is approved prior to beginning design, minimizing the potential for redesign of the project.

The following is the minimum required information to be included in the vertical clearance analysis. This information will also be needed if a design exception is submitted.

1. Preliminary Grades for the bridge and approaches, the route under the structure, and ramps if appropriate.
2. Location of existing structure foundations related to the proposed grade changes
3. Evaluation of impacts on existing drainage.
4. Evaluation of any other deficient geometric feature.
5. Determination of ROW Needs
6. Impacts on Environment
7. Cost Estimates for alternatives to meet vertical clearance
8. Proposed time frame when the remainder of vertical clearance will be achieved (Ballpark figure)
9. Accident analysis where appropriate
10. Soils (cut and fill information) and Ground Water Information
11. Impact on Local Businesses and Residences
12. User costs, constructability, maintaining traffic scheme and maintenance cost should also be considered.

Road 4R Projects - Freeways

Definition: Road projects whose scope of work include complete removal and replacement of pavement , major alignment improvements, adding lanes for through traffic, new roads, or projects with intermittent grade lifts that leave less than 50% of the existing pavement in service.

Road 4R projects on the Freeway system must be designed to meet the current AASHTO vertical clearance requirement of 16'-0" (16'-3" is desired for future overlay of the road). Scoping of projects must include a determination of the most effective means of obtaining the vertical clearance standard. A cost/benefit analysis to determine how best to achieve the standard, either in full or with incremental progress by obtaining part of the vertical clearance with the current project and the remainder with a future project must be completed. The analysis should include the alternatives of obtaining vertical clearance with the bridge project, a road project, or some combination of road and bridge work to meet the clearance requirements. In many cases it may not be possible to achieve the complete vertical clearance with the proposed road project. If the most efficient plan for meeting the vertical clearance requirement is incremental progress, a design exception is required. The design exception should be submitted as soon as possible, preferably prior to the submittal of the call for projects. This assures that the project with exception is approved prior to beginning design minimizing the potential for redesign of the project.

The minimum analysis requirements will be the same as identified for Bridge 4R projects and must also be included with a design exception request.

Road 4R Projects - Arterials

Definition: Road projects whose scope of work include complete removal and replacement of pavement, major alignment improvements, adding lanes for through traffic, new roads, or projects with intermittent grade lifts that leave less than 50% of the existing pavement in service.

When doing **4R road work on the Arterial system**, where no work is scheduled for the bridges, the bridges are considered existing structures and can be retained if they meet the 14'-6" vertical clearance standard, therefore no design exception is required (Reference AASHTO standards, 2001 green book Chapter VII, Vertical Clearance, pg. 451). The existing vertical clearance must be retained (the existing vertical clearance must not be reduced). Although not required, an evaluation should be performed to determine how best to achieve the standard, either in full or with incremental progress. Obtaining incremental progress toward the vertical clearance requirement with the road 4R project could prevent other more costly construction with the next major bridge rehabilitation or replacement project.

Road 4R and Bridge 4R work on Collectors and Local Routes

Maintain existing vertical clearance and a minimum of 14'-6". (14'-9"is desired on 4R projects if possible)

Road or Bridge 3R Work- Freeways

Definition: Projects whose scope of work include resurfacing, milling or profiling; lane and or shoulder widening (no increase in the number of through lanes); roadway base correction; minor alignment improvements; roadside safety improvements; intersection and railroad crossing upgrades; pavement joint repair; crush and shape and resurfacing; rubblize and resurface; passing relief lanes; intermittent grade lifts that leave more than 50% of the existing pavement in service; signing, pavement marking and traffic signals; passing relief lanes; bridge deck overlay and /or minor widening (no increase in number of through lanes).

When doing **Road or Bridge 3R work over the Freeway System** structures must be designed to meet the current AASHTO vertical clearance requirement of 16'-0" (16'-3" is desired for future overlay of the road). A design exception is required if the proposed vertical clearance requirement is not met. The format for the design exception does not need to include the detailed evaluation but should include the basis for the request and a review of the accident history and high load hits for the structures in the immediate vicinity of the structure.

Road or Bridge 3R work- Arterials

Definition: Projects whose scope of work include resurfacing, milling or profiling; lane and or shoulder widening (no increase in the number of through lanes); roadway base correction; minor alignment improvements; roadside safety improvements; intersection and railroad crossing upgrades; pavement joint repair; crush and shape and resurfacing; rubblize and resurface; passing relief lanes; intermittent grade lifts that leave more than 50% of the existing pavement in service; signing, pavement marking and traffic signals; passing relief lanes; bridge deck overlay and /or minor widening (no increase in number of through lanes).

When doing **Road 3R work on the Arterial System** the bridges are considered existing structures and can be retained if they meet the 14'-0" vertical clearance standard, therefore no design exception is required (Reference AASHTO standards,2001 green book Chapter VII, Vertical Clearance, pg. 451). The existing vertical clearance must be retained. Although not required, an evaluation should be performed to determine how best to achieve the standard, either in full or with incremental progress. Obtaining incremental progress toward the vertical clearance requirement with the road 3R project could prevent other more costly construction with the next major bridge rehabilitation or replacement project. A design exception is required to maintain the vertical clearance below 16'-3". The likelihood of obtaining design exceptions for reducing vertical clearance is extremely remote.

When doing **Bridge 3R work on the Arterial System** the structures are considered existing and the existing vertical clearance may be retained. No design exception is required.

Road 3R and Bridge 3R work on Collectors and Local routes

Maintain existing vertical clearance and a minimum of 14'-0".

Road and Bridge Preventative Maintenance

Definition: Projects whose scope of work includes but not limited to Road Work consisting of Thin Bituminous overlays, pavement grinding, Concrete Joint Repair, Slurry Seal-Shoulders only, Seal Coat-Shoulders only and Bridge Work consisting of painting (full, spot, zone), pin and hanger replacement, slope paving repair, joint replacement and repair, drainage system repair, scour countermeasures, concrete crack sealing, concrete patching and repair (high quality patching), approach pavement relief joint installation, and polymer overlays. See 14.01.01 of the Road Design Manual complete listing.

Maintain existing vertical clearance. No design exception required.

TABLE 1

VERTICAL CLEARANCE REQUIREMENT TABLE

	NHS & Non NHS	National Highway System(NHS)				Non NHS	
Route Classification Under the Structure	All Construction	New Construction	Road 4R Construction	Bridge 4R Construction	3R Construction	All New & 4R Const.	All 3R Const.
	Desired	Min	Min	Min	Min	Min	Min
Freeways	16'-3"	16'-0" *	16'-0" *	16'-0" *	16'-0" *	14'-6" *	14'-6" *
Arterials (Local & Trunkline)	16'-3"	16'-0" *	Maintain Existing 14'-6" Min*	16'-0" *	14'-0" *	14'-6" *	14'-0" *
Collectors, Local Roads & Special Routes(1)	14'-9"	14'-6" *	Maintain Existing 14'-6" Min*	Maintain Existing 14'-6" Min*	14'-0" *	14'-6" *	14'-0" *

3R = Rehabilitation, Restoration, Resurfacing **4R = Reconstruction**

* Minimum Vertical Clearance must be maintained over complete usable shoulder width.

(1) Special Routes are in Highly Urbanized Areas where an alternate route of 16'-0" is available or has been designated. The listing of exempted structures is contained in Exhibit A.

Design exceptions are required if the minimum vertical clearance is not met. See the design exception matrix included in this document.

Design Exception Requirements

Vertical Clearance

Design Exceptions are needed where proposed vertical clearance does not meet the minimum clearance requirements provided in Table 1

Type of Project	Design Exception Required	Coordination with MTMCTEA Required	MDOT approval required by Engineer of Design or Engineer of Bridge Design	FHWA Approval Required
New and 4R reconstruction work on Interstate greater than $1,000,000	Yes	Yes	Yes	Yes
New and 4R reconstruction work on Interstate less than $1,000,000	Yes	Yes	Yes	No
New and 4R reconstruction work on Non Interstate Freeways greater than $5,000,000	Yes	No	Yes	Yes
New and 4R reconstruction work on Non Interstate Freeways less than $5,000,000	Yes	No	Yes	No
New and 4R reconstruction work on NHS Routes other than Freeways greater than $5,000,000	Yes	No	Yes	Yes
New and 4R reconstruction work on NHS Routes other than Freeways less than $5,000,000	Yes	No	Yes	No
New and 4R Reconstruction on Non-NHS Routes	Yes	No	Yes	No
3R Work on Interstate System	Yes	Yes	Yes	Negotiated per Project
3R Work on Non Interstate Freeways	Yes	No	Yes	Negotiated per Project
3R Road Work on Non-Freeway Arterial Routes	Yes	No	Yes	Negotiated per Project
3R Bridge Work on Non-Freeway Arterial Routes	Yes	No	Yes	Negotiated per Project
3R Work on Other Non-Freeway Routes	Yes	No	Yes	Negotiated per Project
Preventative Maintenance Work	No	No	No	No

MTMCTEA- Military Traffic Management Command Transportation Engineering Agency

Vertical Clearance Table References

	Item	Reference
1.	Vertical clearance for grade separations and interchanges above the travelway and shoulders should be 1'-0" greater that the legal height and allowance should be made for future resurfacing.	AASHTO "A Policy on Geometric Design of Highways and Streets 2001" Page 767.
	Vehicle Ht. in MI 13'6" +1'0" Min. Vert. Cl. 14'6"	Michigan Vehicle Code 257.719; "Section 719,(1) A vehicle unloaded or with load shall not exceed a height of 13 feet 6 inches."
2	Interstate Freeways all work types	AASHTO "A policy on Design Standards-Interstate System January 2005" Page 5.
3.	Freeway New Construction, Road 4R and Bridge 4	AASHTO "A Policy on Geometric Design of Highways and Streets 2001" Page 510-511.
4.	Arterials New Construction all work types.	AASHTO "A Policy on Geometric Design of Highways and Streets 2001" Pages 451 and 476.
5.	Collectors and other Local Roads all work types.	AASHTO "A Policy on Geometric Design of Highways and Streets 2001" Pages 389,403,418,431, and 440.
6.	[1]Special Routes - (Highly Urbanized Areas)	AASHTO "A policy on Design Standards-Interstate System January 2005" Page 5. AASHTO "A Policy on Geometric Design of Highways and Streets 2001" Page 451,476, and 510-511.
7.	14'-0" allowance for 3R work.	AASHTO "A Policy on Geometric Design of Highways and Streets 2001" Foreword Page xliii. "This publication is not intended as a policy for resurfacing, restoration, or rehabilitation (R.R.R.) Projects." and "When designing 3R projects the designer should refer to TRB Special Report 214, Designing Safer Roads: Practices for Resurfacing, Restoration, and Rehabilitation and related publications for guidance" No reference has been found in the TRB report pertaining to vertical clearance. Additionally, AASHTO "A Policy on Geometric Design of Highways and Streets 2001" Pages 451 and 476 states "Existing structures that provide clearance of 14'-0", if allowed by local statute, may be retained". This infers that for 3R work the standards used at the time of original construction may be used, thus the 1.0 ft above legal height would not necessarily apply. Logic indicates we are not substantially altering the structure of the road or bridge therefore it is not appropriate to address vertical clearance with these projects.

U.S. Department
of Transportation
**Federal Highway
Administration**

Michigan Division

315 West Allegan Street, Room 201
Lansing, Michigan 48933

January 27, 2006

Ms. Gloria J. Jeff, Director
Michigan Department of Transportation (B450)
Lansing, Michigan

Dear Ms. Jeff:

Mr. Van Port Fleet's January 4, 2006, request for additional special route designations for bridge vertical clearance in highly developed urbanized areas is approved. This proposal should allow more efficient scoping of projects, since the required vertical clearance will be known and should allow MDOT's limited resources to be focused on the most important routes. I am pleased that MDOT and FHWA were able to work through the many difficult issues and develop a proposal that is acceptable to both agencies.

Sincerely,

Original signed by:

James J. Steele
Division Administrator

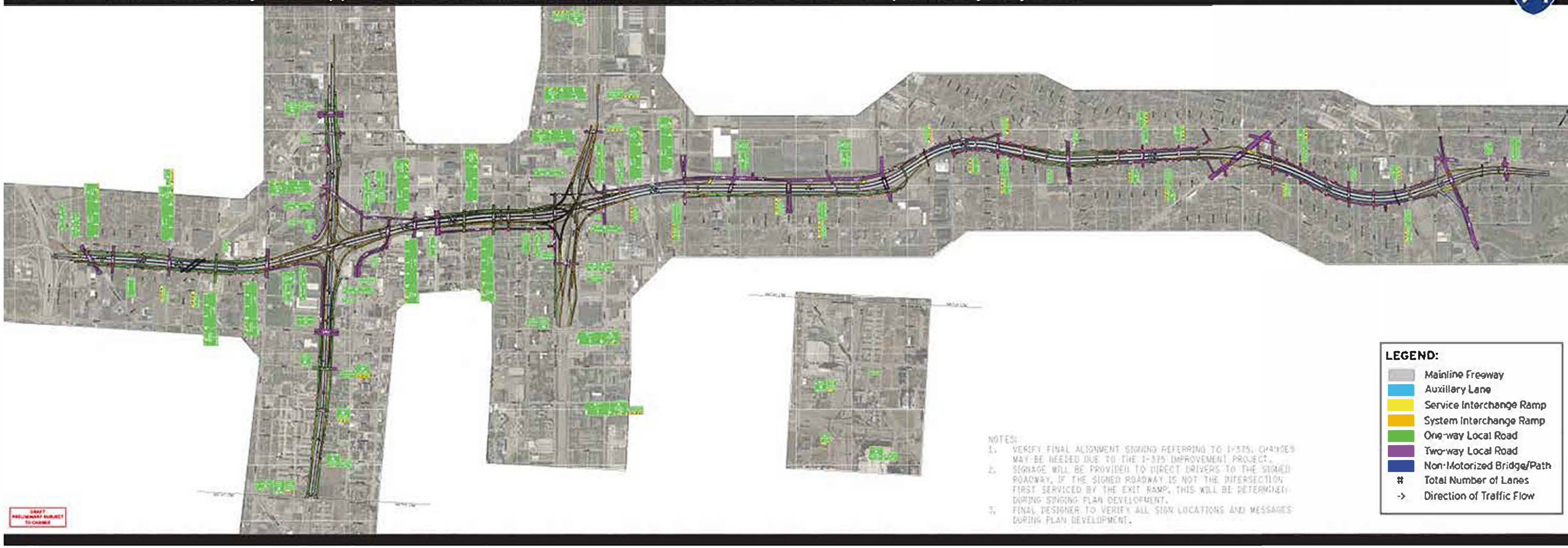
cc: J. Polasek, MDOT Highway Development (B340)
R. Van Port Fleet, MDOT Engineer of Design (B220)
(Document No. 91575)

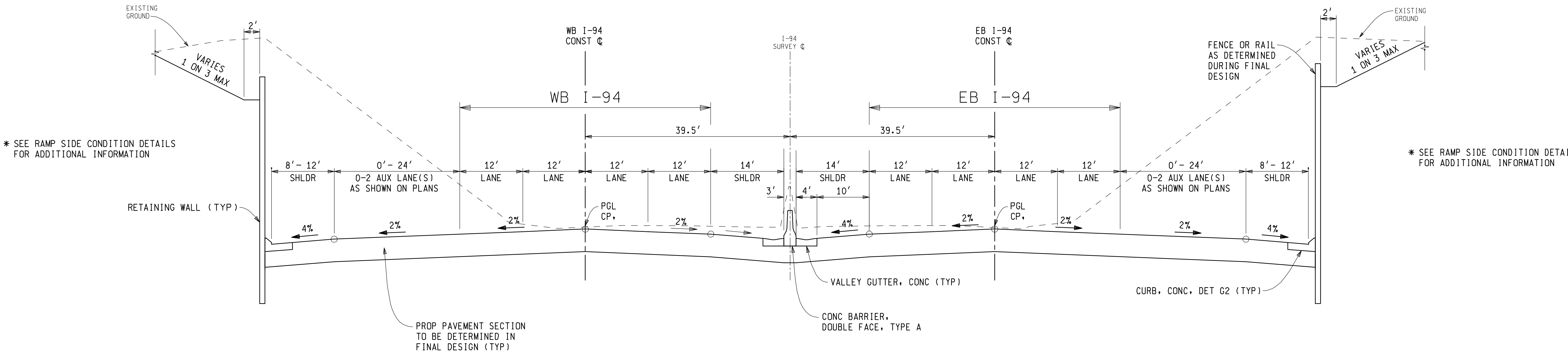
Celebrating 50 Years 1956 50th 2006 Eisenhower Interstate System

BUCKLE UP AMERICA

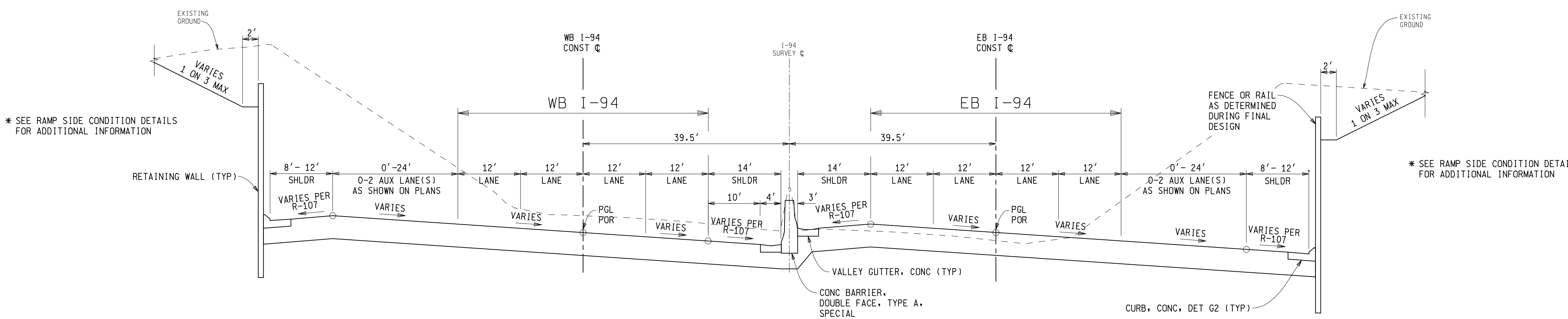
APPENDIX D

I-94 Modernization Project - Approved Selected Alternative with Modifications Conceptual Signing Plan





I-94 MAINLINE NORMAL SECTION WITH AUXILIARY LANE(S)



I-94 MAINLINE SUPERELEVATED SECTION WITH AUXILIARY LANE(S) (RT SHOWN)

PROPOSED TYPICAL SECTIONS

0 3 5 10
10 SCALE
(VERTICAL SCALE VARIES)

CH2MHILL | HNTB | MDOT Michigan Department of Transportation

I-94 MAINLINE

DATE	CONT. SEC.	JOB NO.	DESIGN UNIT	SHEET NO. R.O.W	CONST.
01/22/10	82023/82024/82025	32587	STEPANSKI		6

DATE: 6/8/2010 7:06:27 AM
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