I-94 East - West Corridor

PRELIMINARY ENGINEERING

&

OPERATIONAL REVIEW

INTERSTATE ACCESS JUSTIFICATION REPORT

70th Street to 16th Street

Project ID 1060-27-00

Milwaukee County

November 6, 2015

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SUMMARY

The Wisconsin Department of Transportation is currently conducting a corridor study on Interstate 94 (I-94) East-West. The I-94 East-West Corridor study area is located in central Milwaukee County between downtown Milwaukee (Marquette Interchange) and the Zoo Interchange (currently under construction from WIS 100 to 70th Street). The project limits are 70th Street on the west and 16th Street on the east, approximately 3.5 miles of I-94 in Milwaukee County. The project includes one existing High Level Service Interchange[1] (WIS 175/WIS 341/Miller Park Way) and five existing service interchanges (70th Street/68th Street, Hawley Road, Mitchell Boulevard, 35th Street, and 25th Street/26th Street/28th Street/St. Paul Avenue.) Traffic from around the region, state, and nation passes through this corridor, and there are many major institutions and tourist attractions that are close in proximity including the Veterans Administration (VA) complex, Miller Park (Milwaukee Brewers baseball stadium), Miller Coors Brewery, and the Menomonee Valley, which is home to many industrial properties and Potawatomi Hotel and Casino. **Exhibits 1-1, 1-2** and **2-1** through **2-3** show a map of the project location and aerial photography of the project corridor. This study has identified the current needs within the corridor as well as needs to address future traffic projections.

As part of the National Environmental Policy Act (NEPA), a preferred alternative for the I-94 East-West Corridor Project was identified in February of 2015 (see **Appendix H** - Preferred Alternative Identification Tech Memo).This report contains the proposed interchange modifications within the study area except the Hawley Road Interchange, which is to be reconfigured to a partial interchange and is addressed in a separate report that has already been submitted to FHWA. The separate report for the Hawley Road Interchange that focuses on the special circumstances that justify the construction of a partial interchange has been submitted to FHWA Headquarters for approval. The Hawley Road Interchange is proposed to be reconstructed as a partial interchange to provide the needed access to and from the west while avoiding the sensitive areas to the east.

Policy Points: FHWA has eight policy points for proposals for changes in access to the Interstate Highway System. This report has been prepared in accordance with U.S. Department of Transportation, Federal Highway Administration, Interstate System Access Informational Guide, and Wisconsin Department of Transportation Facility Development Manual Procedure 7-45-1. Each of the eight policy points for the proposed I-94 East-West Corridor have been met as shown in the table below:

[1] The current Stadium Interchange was designed and built to function as a system interchange in anticipation of planned freeway development. However, since the current US 41 (now WIS 175) was never fully developed as a freeway and the route does not function as a freeway for an appreciable distance north and south of the interchange, the interchange is not technically classified as a system interchange by FHWA. Throughout the FEIS document, the existing Stadium Interchange is generally referred to as a system interchange. FHWA's classification of the type of interchange, as it pertains to the existing interchange, has no bearing on the proposed design of the updated interchange. The proposed Stadium Interchange design, as part of the preferred alternative, is referred to as a "hybrid" interchange throughout the FEIS. This term can also be synonymous with a high-level service interchange. Because previous project documentation, including the Draft EIS, referred to the current Stadium Interchange as a system interchange, and the proposed design as a "hybrid" interchange and since the terminology has no bearing on the proposed design as part of the preferred alternative, the terminology has been retained in the Final EIS.

Policy Points	
Policy Point 1 Existing Network's Ability to Accommodate Traffic	This project is not adding a new interchange to this corridor and the existing local street system is fully developed within a very dense urban area. This project will reconstruct and reconfigure the existing I-94 mainline and its' interchanges to better accommodate the network's ability to serve existing and future traffic needs. The modifications to the local street system are generally located within the areas of the existing interchanges where there is a need to physically and operationally match with the existing street networks. **68th /70th Street Interchange** This existing interchange is a split diamond from 70th Street to 68th Street. Frontage roads consisting of W. O'Connor Street on the north side and W. Kearney Street on the south side provide the connections between the east and west ramp intersections. This interchange will be reconstructed to a split diamond in a similar configuration to the existing interchange. Various alternatives, including consolidating the split diamond interchange configuration into a single diamond interchange were analyzed, however due to environmental impacts and community and public opposition were dropped in favor of the split diamond configuration. The existing interchange operates at LOS D except for the westbound exit ramp which operates at LOS E in both the AM and PM peak periods. **Hawley Road Interchange** This existing interchange has a diagonal ramp like a typical diamond interchange in the southwest quadrant of the interchange, a half loop ramp in the southeast quadrant for the eastbound I-94 connections and partial cloverleaf ramps in the northwest quadrant for the westbound I-94 connections. This interchange is proposed to be reconstructed as a partial (half diamond) with ramps to and from the west only to balance between project needs and environmental impacts and costs. Information regarding the Hawley Road interchange is included in this IAJR only to the level needed to document its presence within the corridor, its impact to operations and safety within the corridor, and its relevance to the entire project. The details of the proposed design and the justification for reconstructing the interchange to a partial are discussed in a separate Interstate Access Justification Report as indicated on the previous page. **Mitchell Boulevard Interchange** This existing diamond interchange has three left side ramps (eastbound exit, eastbound entrance and westbound entrance) in the median between the eastbound and westbound I-94 roadways. The westbound exit ramp is a right side diagonal ramp. This interchange is proposed to be removed and replaced with right-side diamond type ramps embedded in the Stadium Interchange, approximately one-half mile to the east. I-94 operates at LOS E in the AM and LOS D in the PM peak within this interchange in both directions. These existing weaving segments east of the interchange operate at LOS E in both directions in the AM peak and eastbound in the PM peak. The westbound operates at LOS D in the PM peak. The weaving segments to the west operate at LOS F in both

directions in the AM peak and in the eastbound direction in the PM peak. The westbound weaving segment operates at LOS E in the PM peak.

Stadium Interchange

This existing interchange is a three level High Level Service Interchange with directional ramps serving all turning movements. Each direction has both right and left side exit and entrance ramps. This interchange is proposed to be reconstructed as a service type interchange that will have free flow exit ramps from I-94 and traffic signal controlled intersections for the entrance ramps to I-94, with all ramps located on the right side. Service ramps to and from local streets (44th and 46th Streets) will be embedded. These embedded ramps along with modifications to the local street system will replace the movements being removed from the Mitchell Boulevard Interchange to maintain access similar to the existing. The weave sections on both sides of this interchange operate at LOS E in the AM and PM peak, except for the westbound in the PM peak which operates at LOS D west of the interchange.

35th Street Interchange

This is a diamond interchange with diagonal ramps on the south side and slip ramps connecting directly to Park Hill Avenue on the north side. This interchange is proposed to be reconstructed to a standard diamond with ramps braided with those of the adjacent interchanges. The westbound ramps will be reconfigured to connect directly to 35th Street instead of Park Hill Avenue. Park Hill Avenue is currently one way going westbound from 32nd Street to 37th Street to accommodate the 35th Street westbound exit and entrance ramps. With the new ramp configurations, Park Hill Avenue will be cul-de-sacced west of 35th Street, and terminated at an alley just east of 35th Street. The weave sections on the west side of this interchange operate at LOS E in the AM and PM peak. The westbound weave east of 35th Street operates at LOS E in the AM and LOS D in the PM peak. The eastbound entrance ramp operates at LOS D in both AM and PM peaks.

25th/26th/28th Street Interchange

There are existing ramps at 25th, 26th, and 28th Streets. The westbound exit ramp and the eastbound entrance ramp are at 25th Street. The eastbound exit ramp connects to 26th Street at St. Paul Avenue. The westbound entrance ramp is at 28th Street and St. Paul Avenue. This interchange is proposed to be reconstructed maintaining a similar configuration to the existing ramps with improvements proposed to St. Paul Avenue to provide improved traffic operations and way finding between ramps.

The adjoining local street network provides access between local communities and the I-94 EW freeway corridor. Major east-west arterials within the study area include Greenfield Avenue, National Avenue, Bluemound Road, and Wisconsin Avenue, all of which parallel the I-94 corridor and intersect the I-94 service interchange cross streets. Currently, these parallel roadways operate at or near capacity, as drivers actively avoid the congested I-94 EW freeway corridor. The westbound weave west of 28th Street operates at LOS E in the AM and LOS D in the PM peak. The eastbound exit to St. Paul Avenue at 26th Street operates at LOS

	E in both AM and PM peaks. **Conclusion** These interchanges require improvement to safely and efficiently accommodate the network's ability to move the traffic that is projected to use this corridor and its connecting State and Local Arterials and Collector networks in the design year of 2040. The reconfiguration of the interchanges will provide for safer and more efficient operations for through traffic and for traffic accessing the freeway at the interchanges in this area. Improved ramp spacing along I-94 will provide an improved level of service and safety on the freeway. Improvements to the local system alone will not alleviate the need to reconfigure the interchanges. Elimination or consolidation of existing interchanges was considered early in the NEPA process, but it was determined that other than the Mitchell Boulevard Interchange, the interchanges needed to be retained to the maximum extent possible due to the potential for impacts to the communities served by the interchanges. The need for the project is discussed further in the **NEED** section.
Policy Point 2 Transportation System Management	This project is not adding any new interchanges to this corridor. The project is reconstructing the existing interchanges with modifications to improve the safety and operations in the corridor and its connections to the State and Local Arterial and Collector Street network. Although numerous Transportation System Management (TSM) applications are proposed to be incorporated as part of this project, TSM applications alone cannot resolve the need to modify the interchanges. Transportation System Management features will be included in the design of the preferred alternative for the corridor project. These include Ramp Metering, Ramp Gates, Closed Circuit Cameras, Variable Message Signs, and Traffic Detectors under this preferred alternative. Existing TSM applications currently include various ramp metering, changeable message signs providing driver information, closed circuit cameras, traffic detectors, ramp gates, and encouraging the use of transit systems which will be enhanced further under the preferred alternative. **Conclusion** Transportation System Management measures have been investigated. These measures are incorporated into the proposed design alternative; however, these measures alone cannot provide an acceptable level of service in the design year or eliminate the need to modify the existing interchanges as proposed.
Policy Point 3 Safety Impacts and Operational Analysis	This proposed project will not add any access points to the interstate; it will reconstruct and reconfigure the existing access points to operate more safely and efficiently. The proposed design will address the current safety issues with revisions to the corridor to improve roadway geometrics, freeway operations, ramp capacity and ramp/mainline merges/diverges. Traffic analysis (HCM and Paramics) and safety analysis (ISATe) that have been completed as part of the corridor study show that the proposed design will substantially improve existing conditions.

68th / 70th Street Interchange

This interchange is proposed to be reconstructed as a split diamond in the same configuration as the existing interchange. The frontage roads of W. O'Connor Street on the north side and W. Kearney Street on the south side will continue to provide the connections between the east and west ramp intersections. The proposed 68th/70th Street Interchange configuration is shown on **Exhibit 6-1.**

Entrance and exit ramps will be longer than the existing ramps to provide more room for traffic entering and exiting the freeway, improving safety and traffic operations. 64th Street will continue to pass under I-94. An auxiliary lane will be added between the 68th/70th Street Interchange and Hawley Road Interchange ramps. In addition, the intersections within the 68th/70th Street Interchange will be improved with better lane configurations and longer turn lanes to improve safety and operations.

Hawley Road Interchange

This interchange is proposed to be reconstructed as a half diamond with ramps to and from the west only in order to improve freeway operations and reduce environmental impacts through the very tight cemetery section. The modified interchange will provide adequate acceleration and deceleration distances for merging and diverging to the mainline. Also, it will provide acceptable levels of service through the cemetery section with the elimination of vehicle weaving. Auxiliary lanes will be included on the mainline between the Hawley Road ramps and the 68th Street ramps. The proposed Hawley Road Interchange configuration is shown on **Exhibit 6-2**. Due to the reconfiguration of the Hawley Road Interchange from a full direction interchange to a partial direction interchange, this interchange is addressed in a separate report which has already been submitted to FHWA.

Stadium Interchange

The Stadium Interchange is proposed to be reconstructed to a service type interchange with free flow ramps for the movements exiting I-94 and traffic signal controlled intersections at the entrance ramp terminals. It will be a four level interchange, including the embedded interchange to 44th and 46th Streets that replace the access that currently exists at Mitchell Boulevard. With the embedded interchange within the Stadium Interchange, sufficient distances can be provided for the merging and diverging maneuvers between each of the Stadium and relocated local service ramps and the partial interchange ramps at Hawley Road. The modified configuration also replaces the left side ramps with right side ramps, eliminating the two-sided weave maneuvers that exist between the existing Hawley Road, Mitchell Boulevard and Stadium Interchange ramps. The proposed Stadium Interchange configuration with the embedded local street connections is shown on **Exhibit 6-3**.

As part of the reconstructed Stadium Interchange, there will be no access from northbound Miller Park Way to the Wisconsin Avenue interchange on WIS 175. Those exiting I-94 to STH 341 will continue to be able to exit at Wisconsin Avenue. Additionally, those entering STH 341 southbound from Wisconsin Avenue will

	continue to be able to access I-94 in both directions and travel south along WIS 175/Miller Park Way. The Stadium Interchange ramps will be braided with the 35th Street ramps to the east. Therefore, there will be no access from WIS 175 or Miller Park Way to the 35th Street interchange. Traffic on WIS 175/Miller Park Way will access 35th Street from Wisconsin Avenue north of I-94 or National Avenue south of I-94. Access to the 35th Street interchange will continue to be provided for motorists on I-94. **35th Street Interchange** This interchange is proposed to be reconstructed as a diamond interchange. The ramps will be braided with the ramps of the adjacent interchanges on each side to eliminate the weaving that occurs under the current configuration. Other alternatives, including elimination of this interchange, were analyzed, however due to community and public opposition to closing it and environmental justice considerations, the design as proposed was chosen. The proposed 35th Street Interchange configuration is shown on **Exhibit 6-4**. **25th/26th/28th Street Interchange** This interchange is proposed to be reconstructed in the same configuration as existing, however improvements will be incorporated on St. Paul Avenue, the local street that connects the ramps, to improve the operations, safety and way finding between these separated ramp locations. The ramps to and from the west will be braided with the 35th Street Interchange to eliminate short weaves between interchanges. The proposed 25th, 26th, 28th Street Interchange configuration is shown on **Exhibit 6-5**. **Conclusion** The proposed improvement has been developed to improve the safety and efficiency of the traffic operations associated with the preferred alternative within this corridor. There are no additional access points being added to the interstate as part of this improvement. There are local street improvements adjacent to the interchanges where necessary to accommodate the projected design year traffic and to improve operations and safety at these interchanges.
Policy Point 4 Local Road Access	The interchanges will be full access interchanges connecting to public roads, except for the Hawley Road interchange which is proposed to be a partial (half) interchange serving traffic to and from the west. The existing interchange at Hawley Road is a full interchange. When the freeway is reconstructed with additional lanes, it is not feasible to provide the ramps to and from the east without impacting graves. The Hawley Road interchange area to the west abuts a highly dense residential area. Shifting the interchange further west will create significant residential and community impacts. The complete removal of access at this location would impact the residents and businesses in the area, however local street improvements are proposed to mitigate the partial loss of access. The EIS and a separate Hawley Road Interchange interstate access report which has already been submitted for the project define the need for the partial interchange.

	The land surrounding I-94 is fully developed. Removal of interchanges would require widening local streets and intersections adjacent to the interchanges. This widening would impact the business and residential properties along those streets, leading to unacceptable impacts. The local officials and residents were strongly opposed to the removal of any existing interchanges within this corridor. The interchanges within this corridor are proposed to be modified and in the case of Mitchell Boulevard, to be relocated, to provide safer and more efficient operations between the tightly spaced interchanges along this urban freeway corridor. **Conclusion** The proposed interchanges, except the Hawley Road Interchange, will be full access connecting to public roads, providing for all traffic movements. The embedded interchange within the Stadium Interchange will provide a balanced design between addressing long-term mobility needs and safety concerns while minimizing impacts to existing development and environmental resources to the maximum extent practical.
Policy Point 5 Regional Transportation Plans	The proposed I-94 E-W project is included in the current Southeast Wisconsin Regional Planning Commission (SEWRPC) Long-Range Transportation Plan (2035 Regional Land Use and Transportation Plan). The Preliminary Engineering phase of this project is in the TIP. The Modernization Alternatives proposed conform to SEWRPC's 2035 regional transportation plan. The 2035 regional transportation plan includes reconfiguration of the Stadium Interchange, a half interchange at Hawley Road under the At-grade alternative and relocated full direction embedded interchange within the Stadium Interchange to replace the Mitchell Boulevard access. **Conclusion** The project is consistent with local and regional land use plans and as such, also conforms with fiscal constraint and air quality requirements. The next phase(s) of the project will be included in the SEWRPC TIP prior to signing of the ROD. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016.
Policy Point 6 Multiple Interchange Additions	No additional interchanges are proposed to be added as part of this project and none are proposed to be added in the future. With the tight interchange spacing, it is not feasible to add any additional interchanges in this corridor. The regional plan does not include any additional interchanges within this corridor. The design team actually looked at trying to reduce the number of interchanges in the corridor, but other than relocating or modifying the design to improve existing access points, were not able to eliminate any interchanges due to unacceptable operations, local opposition and environmental justice considerations.

	Conclusion This area is fully developed with closely spaced interchanges. No additional interchanges are proposed to be added as part of this project and none are proposed to be added in the future.
Policy Point 7 Appropriate Coordination	The I-94 East-West Project team has demonstrated appropriate coordination through its significant public involvement and outreach. The development of the I-94 East-West preferred alternative has included substantial public outreach. This has included coordination with those impacted by the modifications of the existing interchanges. Through this coordination, this project and all of its alternatives have been developed in an orderly and coordinated manner to serve the public. **Conclusion** No new interchanges are proposed in this corridor. New development is not a driving force for the project or for any of the interchange designs since the surrounding area is fully developed. The project team has had extensive coordination with local officials and stakeholders along the project in the development of this study.
Policy Point 8 Environmental Planning	The I-94 East-West Corridor Study Draft EIS was approved and signed by FHWA and WisDOT on November 4, 2014. A Notice of Availability for the Draft EIS appeared in the Federal Register on November 14, 2014, beginning the 60-day comment period that was extended to end on January 27, 2015.Public Hearings for the project were held on December 3rd and 4th, 2014. The preferred alternative was announced on February 17, 2015. Following the end of the public comment period, FHWA and WisDOT are preparing a Final EIS, slated for approval in December 2015. An engineering and operational acceptance is being sought through this report and a separate report for the partial Hawley Road Interchange prior to approval of the FEIS, with a Record of Decision anticipated in the spring of 2016. Final IAJR approval will be requested after the ROD has been approved. **Conclusion** The design of the proposed interchange modifications have been developed to improve the traffic operations on the I-94 mainline as well as the entering and exiting traffic movements to and from the interchanges. The development of the proposed modifications has taken place as part of the NEPA process. The proposed interchange modifications and local street/intersection improvements to mitigate the change in access are covered under the EIS.

Methodology

The Highway Capacity Manual (HCM) method analysis was conducted using Highway Capacity Software (HCS2010) for the existing and proposed freeway and ramp terminal alternatives along the corridor. The Highway Capacity Manual (HCM) method analysis was conducted for the traffic signal and stop sign controlled crossroad ramp terminals using Synchro version 8.The results of these analyses were used to screen alternatives as it relates to freeway operations and to come to the conclusion that capacity

expansion from 6 to 8 lanes was needed throughout the corridor. This need for capacity expansion throughout the corridor influences the interchange modifications needed.

Microsimulation analysis was conducted using Paramics. Microsimulation provides a stochastic analysis of traffic operations with a systems approach that considers the operations of the adjacent components. The existing Paramics models of the I-94 EW corridor were used to provide feedback on system-wide traffic operations and establish the base for future Paramics model development. The future Paramics models of the study area were used to evaluate alternatives in a more comprehensive manner in terms of design refinements, but were not used to screen alternatives. The study team worked with the SEWRPC to develop the traffic projections to be used in the traffic analyses that the design is based on. See **Appendix I**, Paramics Calibration Memo for information on how Paramics was used on this project study.

A safety analysis was conducted for the existing and proposed freeway mainline and ramp alternatives using the Highway Safety Manual (HSM) methods with the Enhanced Interchange Safety Analysis Tool (ISATe). Using this spreadsheet tool, a comparison was made between the predicted frequency and severity of crashes for each alternative considered. With the input of the geometric and operations data, the algorithms and equations in the spreadsheet compute the predicted average crash frequencies. ISATe incorporates geometric and operational features of the interstate facility and the ramps including the basic number of through lanes, roadway alignment and cross section data, ramp access data with entrances, exits and weaving data; and the projected average annual daily traffic data.

Alternatives

The corridor was broken into two segments for the study. On the west segment, the alternatives considered a double deck alternative with four lanes plus auxiliary lanes in each direction and the at-grade alternative with four lanes in each direction. On the east segment the alternatives considered realigning the freeway to flatten the reverse curvature and maintaining the alignment similar to the existing with widened shoulders in spot locations to improve the sight distance. As part of each of these overall corridor alternatives, different interchange design alternatives were also considered. For more information on the alternatives for the freeway and the interchanges refer to the **ALTERNATIVES** section of this report. These alternatives were presented at the local officials, public informational meetings and a public hearing. Input from these meetings, the hearing, engineering analyses and consideration of the impacts to the surrounding businesses, organizations and residents were used to identify the preferred alternative for this area of I-94.

Overall Conclusion

This project is not adding a new interchange to this corridor and the existing local street system is fully developed within a very dense urban area. This project will reconstruct and reconfigure the existing I-94 mainline and its' interchanges to better accommodate the network's ability to serve existing and future traffic needs. The preferred alternative and proposed interchange designs meet the eight policy points for access to the interstate. The 8-Lane At-grade alternative with a partial (half diamond) interchange at Hawley Road (access to and from the west) was identified as the preferred alternative for the west segment of the I-94 East-West Corridor project. The On-alignment alternative was selected as the preferred alternative for the east segment of the I-94 East-West Corridor project. This preferred alternative will provide a balance of improved operations with an acceptable level of impacts and cost. The interchange configurations for each of the interchanges of the preferred alternative are shown in **Table 1**.

The adjoining local street network is located in a dense, urbanized area where roadways have been expanded to the greatest extent possible. Capacity expansion of the arterial roadways parallel to the I-94 corridor would result in extensive residential and commercial impacts that the local communities do not support. Therefore, the expansion of the I-94 EW freeway corridor, including improvements to the existing service interchange connections, was left as the only acceptable alternative when considering the operations and safety of the network as a whole.

Table 1

LOCATION	EXISTING INTERCHANGES	PROPOSED INTERCHANGES
68th – 70th Street	Split Diamond with slip ramps to and from local roads on west side and regular type diamond ramps connecting to 68th Street on the east side (**Exhibit 2-1**)	Split Diamond with slip ramps connecting to the frontage roads on west side and standard diamond ramps with auxiliary lanes on the east side (**Exhibit 6-1**)
Hawley Road	Parclo WB/Diamond EB Connections (**Exhibit 2-1**)	Partial (half) Diamond ramps to and from the west only (**Exhibit 6-2**)
Mitchell Boulevard	Modified Diamond – 3 left side ramps (EB Exit & Entrance and WB Entrance) & one right side ramp (WB Exit) (**Exhibits 2-1** and **2-2**)	Removed and replaced with the embedded split diamond type interchange within the Stadium Interchange
Embedded Split Diamond Type Interchange within Stadium Interchange	Does not currently exist	Ramps at 44th Street to/from the west and a new local road (46th Street) with ramps to/from the east (**Exhibit 6-3**)
Stadium Interchange – WIS 175/WIS 341	High Level Service Interchange (A 3 level with combination right side/left side ramps) (**Exhibit 2-2**)	Service Type interchange with free-flow exits and signal controlled intersection entrances along WIS 175/WIS 341 (**Exhibit 6-3**)
35th Street	Diamond Interchange (**Exhibit 2-2**)	Diamond Interchange with braided ramps (**Exhibit 6-4**)
25th Street/St. Paul Avenue(26th & 28th Streets)	Half-diamonds to 25th Street east side and to St. Paul Avenue at 26th and 28th Streets west side (**Exhibit 2-3**)	Half-diamonds to 25th Street east side and St. Paul Avenue at 26th and 28th Streets west side with braided ramps (**Exhibit 6-5**)

In addition to the crossing routes that have interchanges with I-94 the following routes cross the interstate as grade separated: 64th Street, Zablocki Drive, Yount Drive, 44th Street, 32nd Street, 27th Street, St. Paul Avenue, and 16th Street. Information on these routes is shown in **Table 2**.

Table 2

Cross Street	Over/Under I-94	Existing ADT	Functional Class	No. of Lanes
64th Street	Under	2000	Local	2
Zablocki Drive	Over	NA	Private	2
Yount Drive	Under	3100	Local	2
44th Street	Under	4500	Local	2
32nd Street	Under	3400	Collector	2
27th Street	Over	12700	Arterial	4
St. Paul Avenue	Over	12300	Arterial	4
16th Street	Over	9400	Arterial	4

Chapter 1: Full Corridor

INTRODUCTION

The Wisconsin Department of Transportation is currently conducting a corridor study on Interstate 94 (I-94) East-West. The I-94 East-West Corridor study area is located in central Milwaukee County between downtown Milwaukee (Marquette Interchange) and the Zoo Interchange (project immediately west of this project, currently under construction from WIS 100 to 70th Street). This study has identified the current needs within the corridor as well as needs to address future traffic projections for the design year 2040. This report contains the required information to justify the interchange modifications proposed throughout the study corridor. A separate Interstate Access Justification Report covers the Hawley Road Interchange access modification located within the corridor which has already been submitted.

Project Location

The I-94 East-West Corridor study area includes 3.5 miles of the Interstate 94 (I-94) freeway from 70th Street (west terminus) to 16th Street (east terminus). A location map is shown on **Exhibit 1-1**. This corridor is within the limits of the City of Milwaukee. The City of West Allis, City of Wauwatosa, and Village of West Milwaukee are located nearby with State and local streets intersecting I-94 at its interchanges providing access between I-94 and these communities. The aerial photography mapping of existing I-94 mainline and its interchanges within the project's area of influence are shown in **Exhibits 2-1, 2-2** and **2-3**.

Factors Used to Define the Area of Influence

Interchange Spacing

The west area of influence terminus is the 84th Street Interchange located approximately 4850' to the west of the 70th/68th interchange. The east area of influence terminus is at the 13th Street eastbound exit ramp located approximately 4500'to the east of the 25th Street interchange. The 84th Street Interchange was included in the Zoo Interchange Project. The 13thStreet Interchange was included in the Marquette Interchange Reconstruction Project completed in 2008. Existing and future year traffic analysis of I-94 EW corridor operations included the effect of these adjacent interchanges on inbound and outbound operations at the study limits.

Existing Signal/Stop Sign Locations

The areas of influence for each of the interchanges include the intersections connecting the ramps to the crossroads. Also included is the 27th Street and St. Paul Avenue intersection that is between the ramp intersections. The area of influence for the project is shown on **Exhibits 2-1** through **2-3**. The 70th/68th split diamond interchange is signal controlled on all ramp terminals. The Hawley Road Interchange has a signal controlled intersection for the westbound ramp terminal, a stop sign controlled intersection for the eastbound exit ramp terminal, and a free flow right turn and a median left turn lane at the eastbound entrance ramp terminal. The Mitchell Boulevard Interchange is stop controlled for all ramp terminal intersection movements. The 35th Street Interchange is signal controlled for all ramp terminal intersection movements. The 25th Street/St. Paul Avenue and the26th Street/St. Paul Avenue

ramp terminal intersections are all signal controlled and the 28th Street westbound entrance ramp terminal is a free flow right turn with a median left turn lane.

Anticipated Land Use Changes

The proposed improvements to the interchanges along this corridor are to serve the surrounding area that is fully developed. There is no new development driving this improvement project. The project will require the acquisition of 73 acres of non-highway land. The right-of-way acquired would be from residential, commercial, institutional, and utility land uses. Most of the right-of-way acquired would be strips of land adjacent to the existing right-of-way in the Stadium Interchange and to the east. There will be no broad land use changes as a result of this project. Some land currently used as highway right-of-way may potentially no longer be needed as highway right-of-way. WisDOT may declare the land excess right-of-way, and it could be converted to a different land use. The future of this land depends on a WisDOT declaration of the land as excess right-of-way as well as the City of Milwaukee's zoning and land development process which permits and/or restricts the type of use.

Background

I-94 project corridor (70th Street to 16th Street)

The I-94 East-West Freeway is one of the busiest routes in southeast Wisconsin. It serves as a vital link to downtown Milwaukee and the western suburbs, and is part of a major east-west Interstate route serving national, regional, and local traffic for trips within and through the study area. The study area includes five service interchanges on I-94 (68th & 70th Street, Hawley Road, Mitchell Boulevard, 35th Street, and 25th/26th/28th Street) and one existing High Level Service Interchange at the junction with WIS 175/WIS 341(Miller Park Way). The WIS 175/341 (previously US 41) route was originally slated to be part of a larger freeway system that was never fully constructed. This segment of I-94 was originally constructed in 1963 and has since had three resurfacing projects completed in the mid-1970s, the late 1990s, and again in 2011-2012. This segment of roadway is at the end of its useful life cycle with the last rehabilitation project completed in 2012. The last rehabilitation project is estimated to only hold up until around year 2020. The Hawley Road Interchange is proposed to be reconstructed to a partial interchange and is covered in a separate report.

In 1966, the SEWRPC completed a regional transportation system plan for the year 1990. The original transportation plan recommended several new freeway links, many of which were never constructed.

In 1991, WisDOT began analyzing long-term improvements to the following three I-94 interchanges in Milwaukee County: the Zoo Interchange, the Stadium Interchange, and the Marquette Interchange. By 1995, the three interchange studies merged into one study, the I-94 East-West study, which evaluated 10 highway and transit alternatives, including light rail transit and bus options, in the I-94 East-West Corridor.

WisDOT, in collaboration with FHWA and the Federal Transit Administration (FTA), completed a Draft Environmental Impact Statement (Draft EIS)/Major Investment Study (MIS) for the original I-94 East-West Corridor study in October 1996. The Draft EIS/MIS project termini were Interstate 794 (I-794) to the east and the I-94/Wisconsin State Highway 16 (WIS 16) Interchange in Waukesha County to the west. WisDOT developed a draft Locally Preferred Alternative (LPA) that included all the transportation components of the Draft EIS/MIS.

With the development of the draft LPA, the MIS process was completed for the I-94 East-West Corridor in Milwaukee and Waukesha counties. On June 26, 2000, FHWA published a *Federal Register* notice terminating the environmental process at the Draft EIS/MIS phase and announced that WisDOT, FTA, and FHWA would not complete a corridor-wide Final EIS and Record of Decision (ROD). In addition, FHWA indicated that it was unlikely that the various components of the LPA would proceed on the same schedule, but the information from the Draft EIS/MIS could lead to the initiation of environmental analysis for individual components of the LPA. WisDOT and FHWA have since advanced two elements of the previous LPA: the Marquette Interchange (reconstruction completed in 2008) and the Zoo Interchange (construction began in 2013). The other elements of the LPA have not been implemented.

In 2003, SEWRPC completed a regional freeway system planning study, *A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin*, at the request of WisDOT. The study:

- Identified segments of the freeway system that would require reconstruction within the next 30 years and recommended how to rebuild various freeway segments
- Discussed whether the freeway segments should be rebuilt in kind, with minor redesign, with substantial redesign, or with additional traffic lanes
- Recommended reconstructing I-94 with eight travel lanes (four in each direction), new pavement with full shoulders, new bridges with additional vertical clearance, improved entrance ramps for better operations, and improved vertical alignment (fewer dips and rises in the road) to accommodate safer stopping sight distances
- Recommended reconstructing the Stadium Interchange as a service interchange

In 2006, SEWRPC completed its most recent regional transportation system plan, *A Regional Transportation System Plan for Southeastern Wisconsin: 2035—SEWRPC Planning Report No. 49* (SEWRPC 2006a). The plan was reviewed and updated in 2010 and 2014. The plan:

- Recognizes that 127 miles of freeway widening proposed in the plan, and in particular the 19 miles of widening in the City of Milwaukee (including I-94 between the Zoo and Marquette interchanges), will undergo preliminary engineering and environmental documentation by WisDOT
- Acknowledges during the environmental documentation process, alternatives will be considered, including rebuild-as-is, various options of rebuilding to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes
- Acknowledges that only at the conclusion of preliminary engineering would WisDOT and FHWA determine how the freeway would be reconstructed

In fall 2011, Wisconsin's Transportation Projects Commission approved the I-94 corridor for study. FHWA published a Notice of Intent to prepare an EIS for the I-94 East-West Corridor in the *Federal Register* on May 18, 2012.

In 2005, US 41 from Milwaukee to Green Bay was identified by the federal government for inclusion in the US Interstate Highway System. Planning for the Interstate conversion began in 2007, with a long-term planning study. In fall of 2012, AASHTO approved the I-41 route number designation conditional upon subsequent approval by FHWA. FHWA approved the Formal Conversion Request Package and I-41 was added to the Interstate Highway System on April 7, 2015. Designating the highway as an Interstate is expected to bring economic growth, increase the safety of the road, create a corridor identity and

bring broader benefits to the state of Wisconsin. Installation of about 3,000 new signs began this summer with signing expected to be completed by November 2015.

The new I-41 route runs concurrently with US 41 for the entire route. I-41 begins at the I-94/US 41 interchange located about one mile south of the Wisconsin/Illinois border. It follows I-94 north to the Mitchell Interchange, and then I-894 and US 45 around Milwaukee and then joins US 41 north to Green Bay where it ends at the I-43 Interchange.

Existing US 41 in the Milwaukee area was re-routed to follow I-41 along I-894 and US 45. US 41 along Lisbon Avenue and Appleton Avenue from I-94 at the Stadium Interchange northwesterly to the interchange with US 45 was re-numbered WIS 175.

Purpose

The purpose of the project is to address the deteriorated condition of I-94, obsolete roadway and bridge design, existing and future traffic demand, and high crash rates. The I-94 East-West Corridor project would accomplish the following:

- Maintain a key link in the local, state, and national transportation network.
- Address the obsolete design of I-94 to improve safety and decrease crashes.
- Replace deteriorating pavement.
- Accommodate existing and future traffic volumes at an acceptable level of service.

The project would neither require nor preclude other future transportation improvements identified in the regional transportation plan. The project would provide a safer and more efficient transportation system in the I-94 East-West Corridor while minimizing impacts to the natural, cultural, and built environment to the extent feasible and practicable.

METHODOLOGY

WisDOT and FHWA developed and evaluated a wide range of alternatives for this project. The alternatives that were retained for detailed study (Double Deck and 8 lanes at grade with no, half and full Hawley Road Interchanges on the west segment of the project and the off alignment and on alignment alternatives on the east segment of the project) would improve I-94 over the existing condition. All of the alternatives would address the deteriorated condition of I-94, obsolete roadway and bridge design, existing and future traffic demand, and high crash rates. The alternatives were analyzed to determine future traffic operations within the area of influence, which was defined based on interchange spacing, signal/stop sign locations, and lane use (see “Factors Used to Define Area of Influence”) for additional detail). Future traffic analysis included the consideration of inbound and outbound operations between the 84th Street and 68th/70th Street service interchanges (west study limit) and the 28th/26th/25th Streets service interchange and Marquette Interchange (east study limit).

Identification of a preferred alternative was based on resource agency input, local government input, public input, cost, impacts to the human/natural environment, and input from the public, state and federal resource agencies, cooperating and participating agencies, and local officials. Identification of a preferred alternative was also performed in accordance with the Clean Water Act’s Section 404 (b) (1), Sections 106 and 110 of the National Historic Preservation Act as amended, and the U.S. DOT’s Section 4(f) law. Consultation under Section 106 and Section 110 has been ongoing and will be completed before the Record of Decision is approved.

Freeway Analysis

The Highway Capacity Manual (HCM) method analysis was conducted using Highway Capacity Software (HCS2010) for the existing and proposed freeway and ramp terminals along the corridor. The threshold values for the density for each of the Levels of Service from A to F are given in **Table 1**.

Table 1

Level of Service	Freeway Density	Ramp Density	Weaving Density Freeway	Weaving Density CD Road
A	≤ 11	0 – 10	0 – 10	0 – 12
B	> 11 - 18	>10 – 20	>10 – 20	>12 – 24
C	>18 – 26	>20 - 28	>20 - 28	>24 - 32
D	>26 - 35	>28 - 35	>28 - 35	>32 - 36
E	>35 - 45	>35	>35	>36
F	>45 or V/C >1	Exceeds Capacity	Exceeds Capacity	Exceeds Capacity

Paramics was used to analyze the existing and future operations of the I-94 corridor as a whole. It was used for the areas with the complex weaving segments, in the Stadium Interchange in both AM and PM peak periods. Paramics uses micro-simulation to provide a stochastic analysis of traffic operations with a systems approach that considers the operations of the adjacent components. FHWA conducted a peer review of the Paramics models developed for this project and the calibration to verify the operational conclusions associated with these analyses. The memo that describes the calibration and the FHWA review is included in **Appendix I**.

ISATe was used to analyze the magnitude of crashes for comparison between the existing configuration and alternative configurations studied since the model has not been calibrated for Wisconsin freeways. Using this spreadsheet tool, a comparison was made between the predicted frequency and severity of crashes for each alternative considered. With the input of the geometric and operations data, the algorithms and equations in the spreadsheet compute the predicted average crash frequencies. ISATe incorporates geometric and operational features of the interstate facility and the ramps including the basic number of through lanes, roadway alignment and cross section data, ramp access data with entrances, exits and weaving data; and the projected average annual daily traffic data.

Intersection Analysis

The Highway Capacity Manual (HCM) method analysis was conducted for the traffic signal and stop sign controlled crossroad ramp terminals using Synchro version 8. The thresholds for the seconds of delay for each of the levels of service from A to F are given in **Table 2**.

Table 2

Level of Service	Signalized Delay (sec.)	Unsignalized Delay (sec.)
A	≤ 10	0 – 10
B	> 10 – 20	>10 – 15
C	>20 – 35	>15 - 25
D	>35 – 55	>25 - 35
E	>55 – 80	>35 - 50
F	>80	>50

After evaluating project purpose and need, cost, impacts to the human/natural environment, and public and agency comments received throughout the NEPA process and in direct response to the DEIS, WisDOT has identified the At-grade alternative with the half interchange at Hawley Road in the west segment and the on alignment alternative in the east segment as the preferred alternative.

EXISTING CONDITIONS – FULL CORRIDOR

The aerial photography mapping of the existing corridor is shown in **Exhibits 2-1, 2-2** and **2-3**.

This segment of I-94 was completed in 1963. Over the years, the concrete pavement has become worn and cracked. WisDOT resurfaced I-94 in the mid-1970s, late 1990s, and again in 2011–2012, which temporarily returned smooth riding surfaces to the roadway, but did not address the cracks in the concrete or the voids in the gravel base under the pavement. In addition to the physical condition, there are other substandard design elements, such as inadequate ramp spacing, that need to be addressed. Perhaps the most notable functional deficiencies are related to the closely spaced service interchanges and the combination of left- and right-hand entrance and exit ramps, which are contrary to driver expectations and result in major safety and operational problems, such as traffic weaving and congestion. The condition of the bridges in the study area has deteriorated over the years due to age, greater volumes and heavier than expected traffic, road salt, freeze thaw cycles, and water entering cracks in the bridges. At some locations, bridge clearances (the vertical distance from the pavement to the lowest portion of the bridge above the roadway) are below current accepted vertical clearance standards.

Demographics

Population in Milwaukee County and the Village of West Milwaukee grew slightly between 2000 and 2010, while the cities of Milwaukee, Wauwatosa, and West Allis, as well as the study area declined up to 2.6 percent over the same period. According to 2010 census data: the City of Milwaukee has a population of 594,744; Milwaukee County has a population of 947,735; the City of Wauwatosa has a population of 46,421; and the City of West Allis has a population of 60,411.

In 2010, minorities accounted for 47.4 percent of the population within the study area, while the minority population for all of Milwaukee County was 39.4 percent and 55.2 percent for the City of Milwaukee. However, between 2000 and 2010, the minority population in Milwaukee County grew annually by approximately 1.4 percent, while the minority population within the study area only grew 0.5 percent annually during the same timeframe. Within study area communities, minority populations

have experienced different levels of annual growth from 1.0 percent in the City of Milwaukee to 13.3 percent in the City of West Allis.

In Milwaukee County, African Americans are the largest minority population, accounting for 26.8 percent of the population. Hispanics or Latinos, accounting for 13.3 percent, are the second largest minority population in Milwaukee County. Within the study area, however, the populations are switched. Hispanics or Latinos are the largest minority population, accounting for 26.9 percent, and African Americans are the second largest minority population, accounting for 24.6 percent of the population.

Based on U.S. Census Bureau data from the 2007−2011 ACS 5-Year Estimates, the percentage of persons living in poverty is greater in the study area (31.0 percent) than it is in Milwaukee County (19.3 percent), City of Milwaukee (26.2 percent), West Allis (11.8 percent), Wauwatosa (4.9 percent), and West Milwaukee (16.7 percent).

Milwaukee County is expected to add 24,600 jobs between 2010 and 2040, a 4.3 percent increase. Milwaukee County is expected to continue to be an employment hub for southeast Wisconsin, and employment is expected to remain steady. In 2010, about 94,000 people were employed within the I-94 East-West Corridor study area.

Traffic analysis zones for base year from selected travel demand forecasting model were provided by SEWRPC and are included in **Exhibit 10**.

Existing Roadway Network

The aerial photography of the corridor is shown on **Exhibits 2-1, 2-2** and **2-3**.

I-94 is the major east- west roadway in the corridor. I-94 is part of the National System of Interstate and Defense Highways, is part of the National Highway System and is a designated federal and state "long truck route," allowing longer commercial vehicles to use the freeway. I-94 is also a designated "backbone" route in WisDOT's Connections 2030 Long-Range Multimodal Transportation Plan. Backbone routes are high level multilane (or planned multilane) divided highways that provide connections between major statewide regions and economic centers and tie them to the national transportation network.

A parallel arterial route, US 18 (Bluemound Road) is located to the north of I-94. The portion of US 18 on Bluemound Road carries average daily traffic volumes varying from 7,500 to 15,900 vehicles per day. US 18 has a very dense spacing of access points that affect the through traffic operations. There are intersections with every cross street with a block spacing in the range of 300 to 400 feet for most of this area. There are many closely spaced residential and commercial driveways also.

A second, parallel east-west arterial route, WIS 59 (Greenfield Avenue/National Avenue) is located to the south of I-94. Greenfield Avenue is designated as WIS 59 from the west end of the study area up to the intersection with National Avenue. At the intersection of Greenfield Avenue and National Avenue, WIS 59 switches to National Avenue through the east end of the study area. On average, WIS 59 carries average daily traffic volumes varying from 12,400 to 14,300 vehicles per day. WIS 59 has many closely spaced access points similar to US 18, including eight signalized intersections between 70th Street and WIS 175.

The major north-south roadway in the corridor is WIS 341/WIS 175, which crosses I-94 in the center of the study area and forms the Stadium Interchange. WIS 341, also known as Miller Park Way, is located south of I-94 and carries average daily traffic volumes varying from 59,100 to 64,700 vehicles per day

between I-94 and Greenfield Avenue. WIS 341 is an at-grade signalized corridor between Greenfield Avenue and National Avenue, which turns into a grade-separated roadway north of National Avenue. WIS 175 is a grade-separated roadway north of I-94 up to Lisbon Avenue (approximately 2 miles north of the Stadium Interchange), at which point it becomes an at-grade roadway. On average, WIS 175 serves between 63,600 and 67,800 vehicles per day between the Stadium Interchange and north of Wells Street.

Another north-south roadway, WIS 57 (27th Street) is located on the east segment of the study area and provides access to the 25th, 26th, 28th Streets Interchange. The portion of WIS 57 on 27th Street carries an average daily traffic volume of 18,000 vehicles per day between St Paul Avenue and Clybourn Street. WIS 57 has many adjacent business driveways, which can affect through traffic operations. There are signalized intersections at major cross streets, including St. Paul Avenue, Clybourn Street, Michigan Street, and Wisconsin Avenue.

Other north-south roadways within the I-94 EW study area include 35th Street, Hawley Road, 68th Street, and 70th Street, all of which form service interchanges within the I-94 EW corridor. In addition, the surrounding local street network provides access between the local communities and the east-west and north-south roadways.

Alternative Travel Modes

Alternate travel modes are shown on **Exhibit 2-4**.

The Milwaukee County Transit System (MCTS) is the largest local transit operator in Wisconsin. MCTS provides transit services for all of Milwaukee County and paratransit services (Transit Plus) for the elderly, persons with disabilities, and people with conditions that prevent them from using MCTS buses. Freeway Flyer express service is available along the I-94 corridor. Freeway Flyer routes operate during weekday morning and evening rush hours, providing service between park and ride lots and downtown Milwaukee. Service is also provided to special events such as Summerfest, other lakefront festivals, and the Wisconsin State Fair.

There are no park and ride lots in the I-94 East-West Corridor; however, a park-and-ride lot is located just west of the study area, within the E-W area of influence, at 76th Street and I-94. Several MCTS Freeway Flyer routes use I-94, and several other MCTS routes operate on local streets in the I-94 corridor project area. MCTS routes cross I-94 on 70th Street, 68th Street, Hawley Road, 35th Street, and 27th Street. Several routes also run parallel to I-94. In January 2015 MCTS introduced the Gold Line Metro Express Route which travels along Wisconsin Avenue parallel to I-94. The Metro Express routes are limited stop services which operate at high frequency intervals.

The Washington County Commuter Express provides 8 weekday trips from West Bend to downtown Milwaukee and 10 trips from downtown Milwaukee to West Bend on I-94 through the study area.

Coach USA operates the following commuter bus routes that use I 94:

- 20 trips each weekday from Waukesha County to downtown Milwaukee and 22 trips each weekday from Milwaukee to Waukesha County via I-94. The routes operate between 5:00 AM and 8:00 PM.
- The Airport Express route provides 10 daily round trips on I-94 from Waukesha to downtown Milwaukee, General Mitchell International Airport, Chicago O'Hare International Airport, and Chicago Midway Airport.

- The University of Wisconsin–Whitewater route provides service between Whitewater and downtown Milwaukee via I-94, while school is in session (September through May). There are two trips from Whitewater to Milwaukee on Friday afternoons and two trips from Milwaukee to Whitewater on Sunday afternoon/evening. The route uses the 76th Street park and ride lot and the 68th/70th Street interchange.

The Megabus offers service to destinations throughout the Midwest. Two to three daily round trips between Minneapolis and Milwaukee use I 94.

Greyhound Bus Lines uses I-94 for the following routes:

- Two to four daily round trips between Green Bay and Milwaukee on US 45 and I-94.
- Five to seven daily trips from Milwaukee to Minneapolis and five to seven daily trips from Minneapolis to Milwaukee on I-94.

Lamers Bus Lines provides a daily route with one round trip running between Milwaukee and Wausau with stops in the Fox Valley area. This route uses I-94 within the study area. One daily route between Milwaukee and Madison also uses I-94 within the study area.

Badger Bus operates eight daily round trips between Madison and Milwaukee on I-94, with a stop in downtown Milwaukee.

A bus rapid transit (BRT) transit study is being undertaken by Milwaukee County to explore the development of BRT along a corridor paralleling I-94 between downtown Milwaukee and the Milwaukee Regional Medical Center. WisDOT has committed to financially participate in the planning process of this BRT study.

General Mitchell International Airport which serves national and international flights is located approximately 12 miles from this project. It is served by the WIS119 (Airport Spur) interchange.

The Port of Milwaukee which is about seven miles from this project serves the Lake Express High Speed Ferry and freight vessels on the Great Lakes / St. Lawrence System.

The Oak Leaf Trail, Hank Aaron State Trail, and on-street routes serve bicyclists and pedestrians. These facilities are shown on **Exhibit 2-4**.

The Southeastern Wisconsin Regional Planning Commission independently concluded in its regional plan that doubling transit revenue service miles in the region would not eliminate the need to add capacity on I-94. If doubling of transit service revenue miles as recommended in the regional transportation plan is not implemented, then personal vehicle travel demand may be higher than estimated in the plan. TDM, as a stand-alone alternative, will not address the project's purpose and need, including the need to modify the interchanges.

Interchanges

Table 3 shows the locations and configurations of the existing interchanges. A location map is shown on **Exhibit 1-1**. The aerial photography of the corridor with each of the interchanges identified is shown on **Exhibits 2-1, 2-2** and **2-3**.

Table 3

LOCATION	INTERCHANGE Configuration/Geometry	Features not meeting Design Standards
68th – 70th Street Split Diamond	Split Diamond with local road slip ramp connections on west side EB Exit - diamond slip ramp with taper exit terminal connection to the Kearney Frontage Road prior to the 70th St intersection EB Entrance – diamond ramp with taper entrance to I-94 WB Exit – diamond ramp with taper exit terminal from I-94 WB Entrance – Diamond slip ramp with taper entrance to I-94 and connection to O'Connor Street east of 70th Street	Acceleration lanes/taper on entrances Stopping Sight Distance Vertical Clearance
Hawley Road Parclo WB and Diamond/ half loop EB	Parclo WB/Diamond EB WB Exit – 25 mph loop ramp with parallel exit terminal WB Entrance – S-curve ramp outside of loop ramp with taper entrance terminal EB Exit – diagonal ramp with taper exit terminal EB Entrance – curved ramp with taper entrance terminal	Acceleration taper on entrances Deceleration lane to loop ramp Stopping Sight Distance Vertical Clearance
Mitchell Boulevard	Modified Diamond – 3 left side ramps (EB exit, EB entrance, WB entrance) & one right side ramp (WB exit)	Left side ramps Stopping Sight Distance Vertical Clearance
Stadium Interchange – WIS 175/WIS 341	Directional Interchange (3 level with 4 left side and 4 right side exit to entrance ramps)	Left side ramps Ramp Design Speeds vary between 25 and 40 mph Vertical Clearance
35th Street	Diamond Interchange	Vertical Clearance
25th Street/St. Paul Avenue(26th & 28th Streets)	Half-diamonds not directly connected with a common frontage road	Vertical Clearance

The configuration of the freeway and interchanges located within the existing influence area are functionally deficient in many areas.

- Horizontal Curves—Several curves on I-94 have a radius and superelevation that result in speed ratings less than the recommended freeway design speed.
- Vertical Alignment Grades—One study area location has greater than maximum vertical grade.
- Stopping Sight Distance—There are several locations where the existing speed ratings are less than the minimum recommended design speed based on stopping sight distance.
- Decision Sight Distance—There are eight locations that do not meet minimum standards for decision sight distance.
- Cross Section—The inside shoulder width along I-94 does not meet standards. Shoulder widths on all service interchange ramps and three ramps in the Stadium Interchange do not meet standards.
- Vertical Clearance—There are 16 bridges in the study area with substandard vertical clearance.
- Ramp Spacing—There are 12 locations in the study area where minimum ramp spacing is not provided, causing unsafe weaving movements.
- Left-hand Entrances and Exits—There are 10 locations where left-hand ramps combined with closely spaced service interchanges create unsafe situations.
- Ramp Taper Rates—There are 18 locations where the ramp taper rates do not allow for adequate merging distance.
- Acceleration and Deceleration Lanes—There are 10 entrance and exit ramps that have inadequate acceleration and deceleration lengths.

Existing Data

Analyses of the operations for the existing conditions were conducted using balanced year 2009 AM and PM Peak Hour traffic volumes and existing geometrics. Year 2009 was selected as the base for existing year traffic analysis because it was the most recent year without significant freeway construction going on in the area that impacted the traffic volumes on the I-94 corridor and its interchanges. Existing traffic volumes were collected from Automatic Traffic Recorders (ATRs), coverage counts and intersection turning counts. These volumes are within 0.2% of the K200 volumes on I-94. As such, K200 design hour volumes and LOS D threshold was agreed to between WisDOT and FHWA because of the highly developed urban area and unique large traffic generators in the area. Use of these traffic volumes was documented in the memorandum *DHV & LOS for I-94 East-West Stadium Interchange Study* and approved by FHWA on September 20, 2012, found in **Appendix C**.

For use with the HCS 2010 analysis, the peak hour factor used for the existing analysis was 0.96. Level terrain was assumed throughout the study area. The I-94 mainline operating speed utilized for existing analysis was 55 mph. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Table A-1** in **Appendix A. Tables A-2** and **A-3** include the input information for ramp and weaving segment analyses.

Paramics microsimulation analysis of the existing conditions included the AM peak period (6:30-9:00AM) and PM peak period (2:00-6:30PM). As part of the existing Paramics model development, an aerial origin-destination survey was conducted for the AM and PM peak hours for use in the development of hourly, calibrated trip pairs within the existing Paramics models. Additionally, in order to calibrate the models to existing (2009) conditions, hourly traffic volumes and 15-minute speeds at select locations

were used as the measures of effectiveness (MOEs) by which to calibrate the existing Paramics models to WisDOT standards.

As part of the calibration effort, 2009 hourly target volumes were developed for the corridor for all freeway mainlines, high level service ramps, and service ramps. This volume data set was developed based on a combination of corridor detector data and the balanced 2009 AM and PM peak hour traffic volumes previously mentioned. Additionally, average 2009, 15-minute speed data was collected for the corridor at 18 locations (nine per direction of I-94). This speed data was collected based on corridor detector data as well.

Specific details related to the volume and speed data collection and development effort is included in the "Existing Conditions – Calibration Memo", found in **Appendix I**. In addition, this memo includes the target volume and speed data used for calibration.

Crash data was obtained from the University of Wisconsin Traffic Operations and Safety Laboratory for the period from 2005 through 2009. More recent crash data is not included due to changes in I-94 EW corridor traffic volumes from the Zoo Interchange emergency bridge repair (2010), I-94 EW Resurfacing Project (2011-2012), and I-94 WB Restriping Project (2013). The statewide average total crash rate for Large Urban Freeways is 85 crashes per hundred million vehicle miles traveled (100MVMT).

Existing Safety Conditions

Within the I-94 EW Study corridor (I-94 and WIS 175/WIS 341 mainlines and service ramps, in addition to the Stadium Interchange) over 2,600 crashes occurred between 2005 and 2009, which is an average of more than 1.4 crashes per day. The average total crash rate on the I-94 mainline from 70th Street to 16th Street from 2005 to 2009 is 238.9 crashes /100M VMT (does not include crashes which occurred within the Stadium Interchange). This is about 181% greater than the statewide average total crash rate. The average total crash rate on the WIS 175/WIS 341 mainline from Canal Street to Wells Street is 167.6 crashes/100M VMT (does not included crashes which occurred within the Stadium Interchange), which is approximately 97% greater than the statewide average total crash rate. The breakdown of study area crashes (includes all mainline, service ramp, and system ramps) by type and severity is shown in **Table 4**.

Table 4

Crash Type	Number of Crashes (2005-2009)	Percent of Total Crashes			Total
		Property Damage	Injury	Fatal	
Angle	51	1.2%	0.7%	0.0%	1.9%
Rear-End	1595	41.1%	19.3%	0.0%	60.5%
Sideswipe	386	11.9%	2.7%	<0.1%	14.6%
Single Vehicle	588	15.9%	6.3%	<0.1%	22.3%
Other	17	0.4%	0.3%	0.0%	0.6%
Total	2637	70.6%	29.3%	0.1%	100.0%

For more detail on the crashes within the corridor, see the Crash Analysis Technical Memorandum, which is included as **Appendix D**.

The existing corridor was also analyzed using the ISATe tool to predict the frequency and severity of crashes to compare among the alternatives and to the existing crash data collected. The results of the ITATe safety analyses were considered along with traffic operations, costs and impacts of the alternatives. The preferred alternative has predicted crash reductions ranging from 15% to 28% compared to the no-build alternative. The technical memorandum that summarized these analyses is included as **Appendix E**.

Road Safety Audit

A planning stage Road Safety Audit (RSA) was conducted for this project in May of 2013. The alternatives have been revised and new alternatives have been developed since the RSA was conducted so some specific changes recommended no longer apply. The points made have been considered in the new alternatives that have been developed. This RSA report has eight main issues:

1. Proposed Single Point Interchange Design
   The single point interchange option that was evaluated in the Stadium Interchange would violate driver expectancy and create a situation that may lead to wrong way maneuvers. This option was removed from consideration for various reasons.
2. Close interchange spacing along IH-94
   Maintaining all existing interchanges would result in six interchanges within the 3.5 mile corridor. Maintaining all of these interchanges with the tight weave areas will lead to more crashes as traffic volumes increase. The current design replaces the Mitchell Boulevard interchange with an embedded interchange in the Stadium Interchange. Also braiding the ramps eliminates the weave issues between 35th Street and 27th Street and from the Stadium Interchange to 35th Street. Elimination of the ramps on the east side of Hawley Road also improves traffic weaving.
3. Tight loop ramps
   Tight loop ramps that were evaluated under some alternatives at service interchanges may increase the risk of run off the road crashes. Also the loop ramps at the 44th Street Interchange may increase the risk of wrong-way maneuvers. The proposed design replaces the loop ramps analyzed under other alternatives at 44th Street with diagonal ramps. The tight loop at Hawley Road is eliminated under the At-grade alternative.
4. Double-deck Section
   Under the Double deck Alternative, geometrics could have compounded lighting issues. During the morning or evening peak periods when the sun is lower in the sky drivers may be overcome by the lighting change when exiting the double deck section. Lighting would have been provided in the lower section to mitigate this issue. *Merging in the double deck section could have increased the risk of sideswipe crashes.* The entrance ramp from Hawley Road would have extended past the double deck section and then merged onto the freeway. *Icing on the upper level of the double decked section could have lead to an increase in crash frequency iduring winter months.* The upper level would have required salting like all other bridge decks that are susceptible to icing. The Double deck alternative was eliminated for various reasons.
5. Ramps
   Issues were sited at 25th Street, 44th Street, and under the modified turbine and single point alternatives. The ramps with these features have been removed from consideration in the preferred design that is moving forward. *Close proximity between the signalized ramp termini*

and the adjacent signalized intersections could lead to an increase in queuing, left-turn and angle crashes. Intersection spacing will be increased where feasible. Interconnected traffic signals will be included in the design to help prevent excessive queuing.

6. Limited Stopping Sight Distance on High Level Service Ramps
   When ramps are placed on structures they may encounter limited stopping sight distance. This increases the risk of rear-end crashes on these ramps. Curves are being flattened to the fullest extent feasible, barrier heights will be selected and lighting provided to maximize sight.
7. Weaving
   Weaving on Collector-Distributor Roads and weaving on the freeway. Ramps have been modified to increase the weaving distance to the maximum extent feasible. Braided ramps are also provided to eliminate the weaving maneuvers on the I-94 Mainline.
8. Grades
   The interaction of the horizontal and vertical alignments poses a potential human factors issue related to misinterpreting the severity of curvature when a horizontal curve is on a crest vertical curve or at the bottom of a long downgrade. Flatter curves and roadway lighting are included in the proposed design to provide increased sight distance to the fullest extent feasible.

NEED

A combination of the following factors demonstrates the need for the transportation improvements in the I-94 East-West Corridor:

- **System linkage and route importance**
- **High crash rates (Safety)**
- **Existing freeway conditions and deficiencies**
- **Existing and future traffic volumes**

System linkage and route importance

I-94 is a major east-west freeway link across the northern United States, is part of the National System of Interstate and Defense Highways, and is part of the National Highway System. It is also a federal and state "long truck route" and a backbone route in WisDOT's Connections 2030 Long-Range Multimodal Transportation Plan. I-94 is a critical link in Milwaukee County's freeway system. In addition to serving long distance travelers and regional and national freight movement, the study-area freeway system is an important commuter route for many of the employees who work in Milwaukee County.

Safety

From 2005 to 2009, there were 2,637 crashes (not including deer/other animal crashes) on the freeway and its interchange entrance/exit ramps, or roughly 1.4 crashes per day. Crash rates in the I-94 East-West Corridor are on average at least 2 to 3 times higher than the statewide average for similar roadways, and several sections are more than 4 times higher than the statewide average. In the study area freeway system, the most common types of crashes are rear-end, single-vehicle run-off-the-road, and sideswipe. Major contributors to these types of crashes are congestion and sub-standard ramp geometry and spacing.

Existing Freeway Conditions and Deficiencies

Since WisDOT constructed the I-94 corridor in the early 1960s, the original concrete pavement has worn and cracked. The condition of the bridges has deteriorated over the years due to age, heavier than expected traffic, road salt, freeze-thaw cycles, and water entering cracks in the bridges. The decision sight distance is substandard at several areas on I-94. The shoulder widths on I-94 are substandard, ranging from 2-12 feet. The minimum spacing requirements between interchanges are not met and the ramp spacing in some areas are below the minimum spacing. The left-hand entrance ramps from Mitchell Boulevard to westbound I-94 are approximately 0.3 mile from the right-hand exit ramp to Hawley Road. The entrance and exit ramps have substandard ramp taper rates and inadequate acceleration/deceleration lengths. Additionally, many of the horizontal and vertical alignments are substandard within the area of influence.

Existing and future traffic volumes

This segment of I-94 carries between 143,000 and 160,500 vehicles on an average weekday. Currently, during the heaviest traffic periods, level of service on I-94 ranges between level of service C and level of service F. By 2040 (the project's design year), traffic volumes on I-94 are expected to rise to approximately 160,000 to 186,000 vehicles per day, which represents an 11 to 16 percent traffic increase over the current conditions. By 2040, I-94 would generally operate at level of service D to F during the morning and evening peak periods. The increased volumes and reduced levels of service will very likely increase the number of crashes in the future.

ALTERNATIVES

There were over 100 alternatives developed and evaluated for the I-94 East-West Corridor study project. The build alternatives were based on the SEWRPC's Regional Transportation Plan and various forms of public and agency involvement and with thorough consideration of adjacent development, socioeconomic factors, and environmental constraints and included:

- No-build alternative
- Region-wide public transit and TDM elements
- Region-wide TSM elements
- Build alternatives

For design and presentation to the public the project was broken into east and west segments. The west segment included the area from 70th Street at the west end to Yount Drive. The east segment begins at Yount Drive and includes the Stadium Interchange and I-94 extended from it to the east limit at 16th Street. The No-build and build alternatives studied are described with respect to these segments.

No-build Alternative

A no-build alternative was considered and used for comparative purposes. The no-build would consist of maintaining the existing six-lane freeway and all of the interchanges as they are. The left side ramps in the Mitchell Boulevard and Stadium Interchanges would remain. The weave sections between 35th Street and 28th Street and between Hawley Road and Mitchell Boulevard would not be improved. The No-build alternative would not include any safety improvements, capacity improvements, or pavement replacement. Only maintenance and minor improvements would be performed.

The no-build alternative would not meet the purpose and need of the project. The no-build would result in poor levels of service for the traveling public and crash rates would be expected to increase as the level of congestion increases. While the No-build alternative did not meet the purpose and need for

the project, it did serve as a baseline for a comparison of impacts related to the build alternatives. See **Exhibits 4-1** through **4-3** for the no-build traffic operations.

Transportation Demand Management

The SEWRPC traffic forecasts used for this project reflect predicted growth patterns, numbers and types of trips made, routes taken, travel times, and other factors such as transit use. In its recommendations for providing additional highway capacity, the regional transportation plan recommended and incorporated the following:

An intermediate growth scenario for the region and community land use planning that promotes compact development/redevelopment in areas that can use existing or expanded municipal sewer and water, and where higher-density development can be served by transit, bicycle, and pedestrian facilities.

A 100 percent increase in public transit in terms of revenue-transit vehicle miles was modeled. The increase in public transit includes the development of rapid and express transit systems and substantial expansion of local bus systems where development density is sufficient to generate ridership. Even with a 100% increase in public transit use, several segments of the six-lane I-94 roadway would still operate at LOS of E to F. Congestion related crashes would continue to exist.

A Transportation Demand Management Alternative, on its own, will not alleviate the need to modify the interchanges as part of meeting the purpose and need of this project.

Transportation System Management

The design team has considered the use of ITS, both under the no-build and with other roadway improvements consisting of:

Ramp metering - The ramp metering scheme included in the design of this facility is consistent with the metering criteria in the *Wisconsin Statewide Freeway Ramp Metering and Control Guidebook*.

Ramp gates will be included in the project consistent with WisDOT policy. These ramp gates allow emergency responders to quickly close ramps in the event of an incident on the freeway.

Permanent closed circuit cameras will be used at various locations along the corridor to assist WisDOT in the operations of the system. When an incident occurs they will allow the operators at the Statewide Traffic operations Center to observe the actual traffic operations allowing for quicker clearing of incidents and displaying of messages on dynamic signs and via media traffic condition reports. Cameras will be installed to allow operators to see all of the interchanges.

Variable message boards will be used at various locations along the corridor to assist WisDOT in providing information to the driving public about traffic conditions. The variable message signs (VMS) can advise drivers of other routes to take in the event of incidents to help them avoid long delays

Traffic detectors will be included to collect travel speed and traffic volume information to aid operators and law enforcement officials in maintaining the operation of the system with respect to message signs, media reports and ramp metering systems.

The 2003 regional freeway system plan studied high-occupancy vehicle (HOV) and high-occupancy toll (HOT) lanes but did not recommend them in the regional freeway reconstruction plan for several reasons. The Draft EIS/MIS prepared for the 1996 I-94 East-West study considered HOV lanes and they received little to no support. Further, implementing barrier-separated HOV and HOT lanes would require significant additional right-of-way and would substantially increase freeway system reconstruction costs

compared to adding regular freeway lanes (see Appendix G of SEWRPC's 2035 regional transportation plan). The SEWRPC's build traffic forecasts include TSM strategies as part of the base-line assumptions. The managed lanes alternative was eliminated from consideration because of the relatively short corridor limits with many freeway access points and the traffic characteristics of managed lanes that add weaving movements.

Although TSM elements will be included with as part of the proposed improvements, a Transportation System Management Alternative, on its own, will not alleviate the need to modify the interchanges as part of meeting the purpose and need of this project.

Build Alternatives

Many alternatives were considered. There were many alternatives that were eliminated early in the process due to fatal flaws. There were also many alternatives that were looked at that were able to address all or some of the purpose and need criteria but were eliminated due to excessive impacts or unacceptable safety or operations:

- 6-lane At-grade Alternative on mainline
- Braided ramps on the west leg
- 70th Street Tight Diamond interchange in place of existing Split Diamond Interchange
- Split Diamond Interchange at 68th/70th Streets with CD Roads
- Stadium Full System Interchange (Right side fly-over ramps for all movements)
- Stadium Turbine Interchange (Two level ramp crossings using larger circular ramp radii)
- Stadium Single Point Diamond (At-grade intersection of STH 175/STH 341 and ramp turning movements)
- Stadium Single Point with CD Roads (Stadium Single Point with C-D roads along I 94)
- Stadium Modified Echelon with CD Roads to Mitchell Boulevard (Grade separated intersections of STH 175/341 and ramp turning movements)
- Split Diamond at 27th/35th Streets (Frontage road connections between 35th Street and 27th Street)
- Eliminate 35th Street Interchange and/or Hawley Road Interchange

A key decision made during this study was whether to improve the level of service on I-94 by adding a fourth through-lane in each direction or reconstructing it as a 6-lane freeway. WisDOT and FHWA decided to eliminate the 6-lane Modernization alternatives from consideration because they would not meet the project's purpose and need related to providing level of service D or better traffic operations in the 2040 design year.

The following alternatives, which were interchangeable, were analyzed for detailed study for the I-94 East-West Corridor. For example, both the On-alignment and Off-alignment alternatives in the east segment were compatible with the Double Deck alternative in the west segment. The same holds true for the At-grade alternative.

West segment (70th Street to Yount Drive)

- Add a fourth lane in each direction with either no Hawley Road interchange or a half interchange at Hawley Road (entrance/exit ramps to and from the west) and narrow lanes and shoulders through cemetery area (called the At-grade alternative)

- Add a fourth lane in each direction with Hawley Road interchange and Double Deck the EB and WB roadways (all up or partially down) through the cemetery area (called the Double Deck alternative)

East segment (Yount Drive to 16th Street)

- Add a fourth lane in each direction, modified single-point interchange at the Stadium Interchange with the I-94 mainline nearly on-alignment east of 32nd Street (called the On-alignment alternative)
- Add a fourth lane in each direction, modified single-point interchange at the Stadium Interchange with the I-94 mainline off-alignment segment east of 32nd Street (called the Off-alignment alternative)

In the west segment (70th Street to Yount Drive, just west of the Stadium Interchange), the At-grade alternative and the Double Deck alternative were both analyzed. Both would have 8 lanes (4 in each direction). The Double Deck alternative would include full interchanges at 68th/70th Streets and Hawley Road. The At-grade alternative would include a full interchange at 68th/70th Streets and either no interchange at Hawley Road or a half interchange at Hawley Road. The half interchange would have an entrance ramp to westbound I-94 and an exit ramp from eastbound I-94 to Hawley Road. There would be no westbound exit ramp or eastbound entrance ramp as part of the half interchange at Hawley Road option.

In the east segment (Yount Drive to 16th Street), the On-alignment alternative and the Off-alignment alternative were both analyzed. Both would have 8 lanes (4 in each direction), and both would have interchanges at the Stadium Interchange, 35th Street, at or near 27th Street, and a new embedded interchange within the Stadium Interchange replacing the removed Mitchell Boulevard access.

West Segment Build Alternatives

The west segment of the study area is I-94 from 70th Street to Yount Drive, just west of the Stadium Interchange. This segment includes the existing 68th/70th Street, Hawley Road, and Mitchell Boulevard service interchanges. All alternatives were developed to avoid direct impacts to the cemeteries (Beth Hamedrosh Hagodel Cemetery, Spring Hill Cemetery, and Wood National Cemetery) adjacent to I-94 in this segment.

At-grade Alternative (Preferred Alternative)

The At-grade alternative would reconstruct I-94 to 8 travel lanes (4 in each direction) at essentially the same elevation as the existing freeway. To avoid encroachment on the cemeteries, the reconstructed freeway mainline would have less than 12-foot driving lanes and narrow shoulders in the approximate 2,000-foot segment between the adjacent cemeteries (Hawley Road to Zablocki Drive). Lane widths would be as narrow as 11 feet for a short distance. The lanes would transition from 12 feet to 11 feet for several hundred feet east and west of the 11-foot-lane segment. The shoulder widths would vary in this segment as the available right-of-way varies (with the shoulders being as narrow as 2 feet). East and west of the cemeteries, the freeway would have standard 12-foot lanes and full shoulders. Dynamic traffic management tools to warn drivers of closed lanes in the narrow segment, advance warning signs alerting drivers to the narrow lanes and narrow shoulders, and other tools like reflectors on the center median barrier wall and the outside barrier wall would likely be implemented to make the narrow lane/narrow shoulder segment operate as safe as possible.

The 68th/70th Street interchange would be reconstructed in its current configuration (a split diamond interchange). Entrance and exit ramps would be longer than the existing ramps to provide more room for traffic entering and exiting the freeway, improving safety and traffic operations. 64th Street would

continue to pass under I-94. The 68th/70th Street and 64th Street grade separation structures over I-94 would be similar to existing with increased vertical clearance and widening to provide for eight travel lanes and full shoulder widths meeting standards.

The At-grade alternative had the options for either no interchange at Hawley Road or a half interchange at Hawley Road. The half interchange would have an entrance ramp to westbound I-94 and an exit ramp from eastbound I-94 to Hawley Road. There would be no westbound exit ramp or eastbound entrance ramp as part of the half interchange at Hawley Road option. The reason that a full interchange cannot be provided under this alternative is because any ramps east of Hawley Road would impact the cemeteries and result in the relocation of graves and right-of-way purchase from the cemeteries. The alternative considered to shift the interchange to the west had extensive impacts to the surrounding properties and the local street network.

The half interchange option at Hawley Road was included because of the constraint posed by the cemeteries east of Hawley Road combined with extensive public and local government input stating the removal of the entire Hawley Road interchange would have a socioeconomic impact on businesses and residents that currently use the Hawley Road interchange. The VA Campus would also be impacted by reduced access to and from its site, of which most traffic coming to or leaving the campus from the western direction use the Hawley Road interchange. The Hawley Road grade separation structure would be constructed east of the existing structure with increased vertical clearance. The partial interchange at Hawley Road with ramps to and from the west would address the VA's concern regarding access.

Zablocki Drive would remain at its present location, and its bridge over I-94 would be replaced and raised, requiring reconstruction of short segments of Zablocki Drive on each side of the new bridge (about 340-feet north of I-94 and 210-feet south of I-94).

The freeway entrance and exit ramps at the Mitchell Boulevard Interchange would be removed. Having entrance and exit ramps in the narrow cemetery area creates congestion and there is no space to physically locate the ramps without impacting the cemeteries or having very short and unsafe merge distances on the interstate. The Mitchell Boulevard Interchange would be replaced by a new local road interchange embedded within the Stadium Interchange. This is discussed in more detail, in the **East Segment Build Alternatives** section.

There would be one business displacement and four residential displacements under the No Hawley Road interchange option and two business and five residential displacements under the option with the half interchange at Hawley Road. The At-grade alternative would cost about $115 million (2014 dollars) to construct with no Hawley interchange and about $125 million (2014 dollars) with the half interchange at Hawley Road.

Double Deck Alternative (All Up or Partial Down)

The Double Deck alternative would reconstruct I-94 to 8 travel lanes (4 in each direction). A Double Deck (the freeway lanes would be stacked with one set of freeway lanes elevated over the other) would be constructed in the area between the cemeteries to avoid direct impacts to the cemeteries. The transition back to side-by-side freeway lanes would occur at about 64th Street, just west of the Hawley Road interchange on the west and Yount Drive, just west of the Stadium Interchange on the east.

All I-94 lanes would be 12-feet-wide under this alternative. The shoulder widths would vary slightly in this segment as there is not enough available right-of-way near the cemeteries to provide full shoulder width. The shoulder widths would be 12-feet for the eastbound traffic on the upper deck and 10-feet for the westbound traffic on the lower deck. East and west of the cemeteries, the freeway would have

standard 12-foot lanes and full shoulders in both directions. The 10-foot shoulder widths would be a balance between the safety needs of the project and limited impacts to the cemeteries.

This alternative would reconstruct the 68th/70th Street and Hawley Road as full interchanges with collector-distributor (C-D) roads added connecting the interchanges (see inset for information on C-D roads). The C-D roads would eliminate weaving on I-94 between 68th Street and Hawley Road, improving safety and traffic operations on I-94, while still providing direct access to and from I-94. The 68th/70th Street and Hawley Road interchanges would be reconstructed with a configuration similar to that of the existing interchanges. Existing structures at these interchanges would be replaced with higher vertical clearance and additional widths to accommodate the additional lane of traffic in each direction, wider shoulders and C-D roadways.

All four ramps at the Hawley Road Interchange would remain with the Double Deck alternative. Ramps at the Mitchell Boulevard interchange would be removed and replaced by a new interchange imbedded within the Stadium Interchange. Zablocki Drive would be shifted east, where it would be parallel to Mitchell Boulevard, but separate from it. Zablocki Drive would continue to provide a connection between the Zablocki Medical Center and Bluemound Road (and between the north and south sides of Wood National Cemetery). Zablocki Drive and Mitchell Boulevard would pass under I-94 as opposed to crossing over I-94 as it does today.

The Double Deck alternative would have two design options, “all up” or “partially down.” Under the all up option the top level of the freeway (eastbound roadway) would be about 30 feet above the existing freeway elevation. The bottom level (westbound roadway) would be at about the same elevation as the existing freeway. Under the partially down option the top level of the freeway (eastbound roadway) would be about 22 to 24 feet above the existing freeway. The bottom level (westbound roadway) would be about 6 to 8 feet below the existing freeway elevation.

Under both options, the construction footprint would generally be the same. Eastbound I-94 would transition to the top level, while westbound I-94 would be on the bottom level. For westbound traffic (on the lower level), there would be 4 freeway lanes and 1 auxiliary lane. The westbound auxiliary lane would serve vehicles entering and exiting I-94 between the Stadium Interchange and the Hawley Road and 68th/70th Street interchanges C-D Roadway. The eastbound Hawley Road entrance ramp would also be located on the lower level running parallel to, but counter-directional to the westbound traffic with the EB Exit Ramp to the Stadium Interchange braided over it. For eastbound traffic (upper level), there would be 4 freeway lanes and 1 auxiliary lane. The eastbound auxiliary lane would serve vehicles entering and exiting I-94 between the 68th/70th Streets, Hawley Road interchanges C-D Roadway and the Stadium Interchange.

There would be 2 business displacements and 10 residential displacements under the Double Deck alternative. The all up option would cost $295 million to construct, while the partially down option would cost $320 to $345 million to construct.

East Segment Build Alternatives

The east segment of the study area is from Yount Drive, just west of the Stadium Interchange, to 16th Street. This segment includes the existing 35th Street and 25th, 26th, 28th Street service interchanges and the Stadium Interchange. The alternatives analyzed in this segment all include a new embedded interchange, connecting to 44th and 46th Streets, under the Stadium Interchange to replace the interchange removed from Mitchell Boulevard.

On-alignment Alternative (Preferred Alternative)

Under the On-alignment alternative, the Stadium Interchange would be reconstructed as a Two Intersection Left Turn Interchange. The highest point of the new Stadium Interchange would be about 25 feet higher than the existing interchange. All of the exit ramps between I-94 and WIS 175/Miller Park Way would be free-flow ramps (no traffic signals).

I-94 through the Stadium Interchange would operate at levels of service C to D, and WIS 175/Miller Park Way would operate at level of service C or better in the design year (2040). Perhaps the biggest change in the way the interchange would operate is that there would be a traffic signal on WIS 175/Miller Park Way that would control crossing movements between the through traffic on WIS 175/Miller Park Way and the left turns onto I-94 from WIS 175/Miller Park Way.

Underneath the Stadium Interchange, new entrance and exit ramps to 44th Street and a new local road (46th Street) would be constructed. The ramps would replace the interchange that would be removed from Mitchell Boulevard having the left side ramps and substandard spacing.

East of the Stadium Interchange, the 35th Street Interchange would be reconstructed. Braided ramps between the Stadium Interchange and the 35th Street Interchange would allow the two closely spaced interchanges to operate safer and more independently of each other. The difference between the On-alignment and Off-alignment alternatives is that east of 32nd Street, the freeway would remain close to its current alignment and be widened to the south. The centerline of reconstructed I-94 would move about 50 feet south of the existing freeway centerline. The entrance and exit ramps in the 27th Street area would remain where they are today at 25th, 26th, and 28th Streets; and St. Paul Avenue because there would not be enough room to consolidate them at 27th Street. This alternative would improve sight distance compared to the existing freeway by widening the shoulders beyond the standard 12 feet (where possible), but not to the extent of the Off-alignment alternative, which would straighten the freeway. The sight distance would meet American Association of State Highway and Transportation (AASHTO) minimum criterion. As noted previously, the improved sight distance under the Off-alignment alternative would result in about 1 percent fewer crashes than under the On-alignment alternative.

The intersection of 27th Street and St. Paul Avenue would need more extensive reconstruction under this alternative than the Off-alignment alternative. This is because most of the exiting freeway traffic destined for 27th Street would first need to go to St. Paul Avenue at 25th or 26th Street, and then turn onto 27th Street at its intersection with St. Paul Avenue. Similarly, most of the traffic entering the freeway at 25th and 28th Streets would also need to use the 27th Street/St. Paul Avenue intersection. This would require improvements such as left-and right-turn lanes at the 27th Street/St. Paul Avenue intersection. This alternative has two options, one option with braided ramps on both sides of I-94 between the 35th Street and 25th/26th/28th Street interchanges and the other with braided ramps on the north side of I-94 and a double auxiliary lane without braided ramps on the south side of I-94 between the same interchanges.

This alternative would result in eight commercial displacements. Two additional vacant commercial buildings/parcels would also be acquired. This alternative would cost about $710 million (2014 dollars) to construct.

Off-alignment Alternative

The Off-alignment alternative would have essentially the same Stadium Interchange as the On-alignment alternative described in the preceding section.

The 35th Street Interchange would also remain in place under this alternative and in a very similar configuration as the On-alignment alternative. Braided ramps would also be provided between the 35th

and 27th Street interchanges. The 27th Street area interchange would be reconstructed so that all ramps directly connect to 27th Street, which is also State Highway 57 (WIS 57). Currently, the ramps at this interchange connect to 25th, 26th, 28th Streets, and St. Paul Avenue, all local roads.

East of 32nd Street, I-94 would be reconstructed about 400 feet south of its current alignment. I-94 would rejoin its existing alignment near 18th Street. Benefits of re-aligning I-94 to the south include the following:

- Elimination of the horizontal and vertical curves (i.e. downhill with a curve at the bottom) on I-94 near 25th Street that limit sight distance for eastbound I-94 drivers as they approach the Marquette Interchange. This would help to decrease the crash frequency on this segment of I-94 by 29 percent compared to the Replace-in-Kind alternative, and 1 percent compared to the On-alignment alternative.
- Allow enough space to build entrance and exit ramps directly to 27th Street. This would provide a more direct connection between I-94 and 27th Street, a major north-south arterial and state highway.

This alternative would result in six commercial displacements. This alternative would cost about $785 million (2014 dollars) to construct.

Preferred Alternative

The Preferred alternative is the At-grade alternative with a partial access at Hawley Road on the west and the On-alignment alternative on the east. The *I-94 East-West Corridor Preferred Alternative Identification Technical Memorandum* in **Appendix H** provides supporting documentation that established the basis for the recommendation of the preferred alternative.

ALTERNATIVES ANALYSIS

Conformance with Transportation Plans

The information in this section applies to all of the alternatives studied.

A Regional Transportation System Plan for Southeastern Wisconsin: 2035—SEWRPC Planning Report No. 49 (SEWRPC 2006a)

SEWRPC's regional transportation plan is based on population, household, employment growth, and other data from the regional land use plan. The transportation system plan forecasts traffic growth and transportation demand in the region. It also analyzes the ability of existing transportation facilities to address forecasted traffic demand and meet air-quality conformity requirements. SEWRPC's regional traffic model has been in place for more than 40 years and determines future traffic demand. SEWRPC updates the model regularly to reflect changing trends. A transportation project must be listed in the regional transportation plan before it can be constructed. However, inclusion in the plan does not mean the project will ultimately be constructed.

The 2035 regional transportation system plan recognizes that the 127 miles of freeway widening proposed in the plan, and in particular the 19 miles of widening in the City of Milwaukee (including I-94 between the Zoo and Marquette interchanges), will undergo preliminary engineering and environmental documentation by WisDOT. The plan acknowledges that during preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuilding to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. The plan further acknowledges that only at the conclusion of

preliminary engineering and environmental analysis would WisDOT and FHWA determine how the freeway would be reconstructed.

The 2035 regional transportation system plan incorporates the findings of SEWRPC's 2003 *A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin* (SEWRPC 2003). The 2003 regional

freeway system plan includes the following traffic operations information for the I-94 East-West Corridor:

- The study area does not serve substantial through-vehicle travel. SEWRPC defines through-vehicle travel as travel with neither end of the vehicle trip located within the county within which the freeway segment is located (Milwaukee County). SEWRPC's 2020 traffic projections show the I-94 East-West Corridor as carrying modest volumes of through traffic.
- The segment of I-94 serves substantial inter-county traffic. SEWRPC defines inter-county traffic as travel with one end of the vehicle trip located within the county within which the freeway segment is located.
- The segment of I-94 potentially needs additional freeway traffic lanes.
- The 2035 regional transportation plan included a full interchange at Hawley Road and did not reflect the relocation of the access provided by the existing Mitchell Boulevard interchange to a new location within the Stadium Interchange. On September 16, 2015, the SEWRPC Commission amended the 2035 regional transportation plan as follows:
    - Convert from full to half interchange at Hawley Road.
    - Remove existing interchange at Mitchell Boulevard.
    - Provide service ramps to non-arterial roadways at the Stadium Interchange.

<u>2015–2018 Transportation Improvement Program for Southeastern Wisconsin (November 2014) (SEWRPC 2014)</u>

SEWRPC is the federally designated metropolitan planning organization that ensures air quality conformity in the seven-county southeastern Wisconsin region. In accordance with the 1990 Clean Air Act Amendments, proposed highway improvements must be included in an approved Transportation Improvement Program (TIP) and the adopted regional transportation system plan to be in conformance with the State Implementation Plan (SIP) for air quality.

The next phase of the I-94 East-West Corridor project is not included in the 2015-2018 TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the project's ROD. The ROD is currently scheduled for spring 2016. Preliminary engineering for the I-94 East-West Corridor was included in the 2013–2016 TIP as Project Number 18: "Preliminary Engineering for Reconstruction of I-94 from 70th Street to 25th Street in the City of Milwaukee." In October 2013, SEWRPC amended the TIP to reflect the updated eastern limit of the project at 16th Street, rather than 25th Street.

In September 2015, FHWA and the FTA determined the SEWRPC 2035 *Regional Transportation Plan*[1] to be in conformance with the transportation planning requirements of Titles 23 and 49 United States Code (USC), the Clean Air Act Amendments, and related regulation. FHWA and FTA also approved the

[1] As amended in September 2015 to account for proposed changes in access at the current I-94 interchanges at Hawley Road and Mitchell Boulevard as part of the recommended alternative for the I -94 East-West Corridor and updated by SEWRPC Memorandum Report Number 215, *Review and Update of the Year 2035 Regional Transportation Plan* in 2014, and *Year 2015–2018 Transportation Improvement Program.*

regional emissions analysis prepared for the 2035 regional transportation plan, which the 2015–2018 TIP serves to implement. See Appendix C of the 2015–2018 TIP for more information on conformity.

Coordination

Wisconsin Department of Transportation (WisDOT) offered opportunities for citizens, Native American tribes, local governments, and state and federal review agencies to review and comment on the Draft Environmental Impact Statement (EIS). In addition, study team members attended numerous meetings initiated by local officials and citizens. The public involvement process was open to all residents and population groups in the study area and did not exclude any persons due to income, race, national origin, sex, age, religion, or handicap.

Public input was divided on the At-grade and Double Deck alternatives. In general, those who live near the freeway and have commented on the project support the At-grade alternative. Residents and businesses that use the Hawley Road interchange have expressed concern about the additional time and indirection that would be caused by completely or partially removing the Hawley Road interchange under the At-grade alternative. The next closest interchange would be the 68th Street/70th Street interchange, about 8 blocks west of Hawley Road. In general, those who do not live near the freeway supported the Double Deck alternative because it would reduce traffic congestion and increase safety.

Public Involvement Meetings (PIM) and State Fair

Five public involvement meetings were held during identification and evaluation of project purpose and need factors, development and refinement of the alternatives, and evaluation of impacts. In addition to the public involvement meetings, the study team participated in several neighborhood meetings, Community Advisory Committee and Technical Advisory Committee meetings, Agency Coordination meetings, and several other meetings to discuss the project and gain public feedback. Section 5 of the Draft EIS provides a detailed account of the project's public and agency coordination.

Support for improvements included addressing safety and traffic flow concerns, modernizing the freeway, adding travel lanes, and incorporating transit. Concerns included access changes, specifically at Hawley Road, property acquisition, adding travel lanes, creating more noise in adjacent neighborhoods, changing views from properties adjacent to I-94, affecting the cemeteries, adding more traffic to the local street network, and cost.

Public comments received from the public meeting attendees were most often from people living and working along the I-94 East-West corridor. General themes of the comments from the PIM's are listed below.

- The majority of the adjacent neighbors who provided comment opposed the Double Deck alternative. There was strong opposition due to altered views in the neighborhoods, the National Historic Landmark, the cemeteries, and opposition due to the Double Deck alternative resulting in fewer views of the Hunger Task Force billboard.
- The At-grade alternative is preferred by many locals because it does not modify the view or raise the freeway. The lesser order of magnitude of the freeway expansion is also frequently mentioned by those in favor of at-grade.
- Many residents and businesses were opposed to limiting access at Hawley Road. Most did not state a preference for either alternative but voiced strong opposition to changing access at Hawley Road.
- PIM comments from drivers with a daily commute generally preferred the Double Deck alternative for reasons pertaining to safety and congestion.

The I-94 East-West project team staffed a project information booth at the 2013 and 2014 Wisconsin State Fair. The booth included project related exhibits and provided the public with an opportunity to interact with the project team and address any comments or questions. Public comments received from the State Fair were primarily from individuals who drive the corridor but do not live adjacent to the freeway. The comments were overwhelmingly in favor of the Double Deck alternative, primarily due to the greater capacity. Those that supported the At-grade alternative typically mentioned cost considerations.

Few comments were received regarding the east segment alternatives. For those who commented on specific design concepts, there was a preference for the alternative which consolidates the freeway ramps at 27th Street, along with concern over cost of the Off-alignment alternative and the improvements associated with that alternative not being justified given the cost differential between the Off-alignment and On-alignment alternatives.

Public Hearing and Comment Period

Public Hearings for the project were conducted on December 3 and 4, 2014. The public, local officials, and government agencies were encouraged to provide comments regarding the project. The comment period was open until January 27, 2015.

During the comment period, WisDOT received numerous comments from cooperating and participating government agencies, local officials, interest groups, and the public. Comments varied and there was support for all alternatives. The most commonly heard comments included the following:

- Many of the public comments were against the alternatives presented for the cemetery area of the corridor. Many supported alternatives that were not presented at the hearing, namely the replace-in-kind or the 6-lane Modernization Alternatives, which were eliminated from consideration early in the study for not meeting purpose and need. See Section 2.5 for detailed information as to why these alternatives were eliminated from consideration.
- Opposition to the Double Deck alternative was another commonly voiced opinion. Those preferring that the Double Deck option be dropped from consideration opposed it for various reasons, with cost being the most common reason. Cultural resource groups were against the Double Deck alternative due to the groups' general agreement that the alternative would have an adverse impact on the historic properties, specifically the Soldiers' Home NHL and Historic District.
- Supporters of the Double Deck alternative cited the need to reconstruct the interstate to handle future traffic demand and the increased safety over the At-grade alternative.
- Maintain existing interchanges
- Support of a transit-focused alternative
- Supporters of the Hunger Task Force were against the Double Deck alternative but desired full access at the Hawley Road interchange.
- Those with connections to the Beth Hamedrosh Hagodel Cemetery supported WisDOT for developing alternatives that did not impact the cemetery land or any graves

<u>City of West Allis</u>

The City of West Allis is concerned about the elimination of access to the City, specifically at the Hawley Road and 68th/70th Street interchanges. In June 2013 the City of West Allis adopted a resolution opposing construction of alternatives that do not include access to both 70th/68th Street and Hawley Road. The city also feels that eliminating access at the Hawley Road interchange would hinder economic development opportunities within the City, increase traffic on local City roads, and pose economic justice implications to minority residents attempting to reach employment elsewhere.

At the Public Hearing, the City of West Allis voiced support for the Double Deck alternative because it was the only alternative that maintained full access at Hawley Road. On December 9, 2014 the City of West Allis passed a resolution in support of the Double Deck alternative if the At-grade alternative cannot accommodate full access at the Hawley Road interchange. Coordination with the City resulted in the currently proposed design of the Washington Street extension in order to mitigate the loss of access at Hawley Road.

Village of West Milwaukee

On January 5, 2015 the Village of West Milwaukee passed a resolution supporting the Double Deck alternative if the At-grade alternative cannot accommodate full access at the Hawley Road interchange. In addition, the Village opposed any alternative that creates additional traffic on Village roads and does not provide adequate future capacity on I-94.

City of Milwaukee

The City of Milwaukee opposes freeway lane expansion and any double-decking of lanes where the top level or deck is elevated. The City is concerned about substantial changes in existing local access, impacts of new or revised access points, residential impacts, and right-of-way acquisition with the loss of tax base. The City of Milwaukee also supports a consideration of mass transit traffic mitigation options, and retaining the 35th Street interchange. At the Public Hearing the Mayor of Milwaukee provided public testimony in support of the At-grade alternative.

City of Wauwatosa

In October 2015 the City of Wauwatosa passed a resolution opposing expansion of the I-94 East-West Corridor.

Section 106 Consulting Parties

WisDOT met with Section 106 consulting parties since July 2013 to discuss the project's impact on historic properties adjacent to I-94. The Section 106 consulting parties were concerned with the visual and noise impacts under both the At-grade and Double Deck alternatives, and most oppose the Double Deck alternative and support the At-grade alternative. The group concurred that the Double Deck alternative would have an Adverse Effect on Calvary Cemetery and the Soldiers' Home NHL and Historic district and a potential Adverse Effect on Story Hill Residential District 2 and 3. Most consulting parties agree that the At-grade alternative can be designed so that it has No Adverse Effect on any historic properties.

East Segment Stakeholders

Menomonee Valley Partners and other east segment stakeholders are concerned with the Off-alignment alternative's long, skewed crossing of St. Paul Avenue, creating a tunnel effect and therefore making the area less desirable for development. Other east segment stakeholders like how all the ramps to and from I-94 connect to the 27th Street interchange under the Off-alignment alternative. Menomonee Valley Partners, Avenues West, and other east segment stakeholders have not expressed support or opposition to either of the alternatives on the east segment.

Milwaukee Brewers

The designs of the interchanges are based on the typical AM and PM peak hours. Although the LOS has not been determined during the Brewer game arrival or departure consideration has been given to special events at Miller Park. The description and results of the analysis of the ingress and egress is included in **Appendix J**. The design team has been coordinating with the Miller Park Stadium District to ensure that event traffic can be accommodated with reasonable delay. Their goal is to accommodate the departure from the parking lots within 45 minutes after the Brewers' games. The current traffic

control plan for Brewer games at Miller Park includes police directing traffic in and out of the parking areas at game times.

The design has been refined to minimize the impact to the Miller Park facility. Access to the parking areas has been coordinated with the representatives of the Brewers and the Stadium District. The interchange layout improves mainline operations and provides comparable but safer access to Miller Park from what exists today, while minimizing the loss of parking spaces in the adjacent parking lots.

Chapter 2:
68th / 70th STREET INTERCHANGE

EXISTING CONDITIONS

The aerial photography of the existing corridor is shown in **Exhibits 2-1**, **2-2** and**2-3**.

Existing Land Use

Existing land use in the I-94 East-West Corridor generally consists of high density urban development, including commercial, residential, institutional, industrial, parks, transportation, and utilities.

Land use immediately surrounding the 68th/70th Street Interchange is generally single family residential, with some commercial, institutional, and utility uses present. On the north side of I-94 between 70th Street and 69th Street is the Girl Scouts of Southeast Wisconsin and a Wisconsin Electric (WE) Energies substation between 69th and 68th Streets. Between 68th Street and Hawley Road, a utility corridor consisting of overhead electrical transmission lines and towers is adjacent to I-94. North of the utility corridor is a high-density, single-family residential neighborhood, interspersed with some multifamily residential units, some commercial businesses, a school, and park. Bluemound Road (roughly 0.4 mile north of I-94) is generally a commercial corridor between 66th Street and Hawley Road.

The land use on the south side of I-94 between 70th Street and the Hawley Road interchange is mainly single family residential with some multifamily units along with a school, commercial, and recreational uses. The Hank Aaron State Trail (HAST) is roughly 0.4 mile south of I 94.

The area surrounding the 70th Street/Greenfield Avenue intersection generally consists of commercial land uses, including a bank and a retail/office complex. There is a high density residential senior living facility (apartments) in the southwest quadrant of the intersection. The National Avenue/Greenfield Avenue intersection also consists mainly of commercial/retail uses. A church is located on the west end of the intersection. The Miller Park Way/National Avenue intersection is surrounded by a variety of land uses. The VA Campus, including the Soldiers' Home NHL and Historic District, is located in the northwest quadrant, while a large industrial facility, Joy Global, is located in the northeast quadrant. South of National Avenue is a dense commercial/retail corridor.

Operational Performance

<u>Existing Freeway Analysis – HCS 2010</u>

Analyses of the freeway operations for the existing conditions were conducted using balanced year 2009 AM and PM peak hour traffic volumes and existing geometrics. The peak hour factor used for the existing analysis was 0.96. Level terrain and a posted mainline speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-1. Tables A-2** and **A-3** have the input information for ramp and weaving segment analyses.

The existing I-94 mainline operates at LOS E on either side of the 68th/70th Street Interchange. Within the interchange it operates at LOS D. The westbound exit ramp operates at LOS E in the AM and PM peak periods. The other three ramps operate at LOS D in both the AM and PM peak periods. The density

values and LOS for each of the mainline freeway segments is shown in **Appendix A** in **Table A-4**. **Tables A-5** and **A-6** have the density values and LOS for each of the ramp terminals and weaving segments analyzed.

The existing traffic volumes and levels of service for the freeway and ramps are shown on schematic diagrams of the facility. These are included as **Exhibit 3-1.**

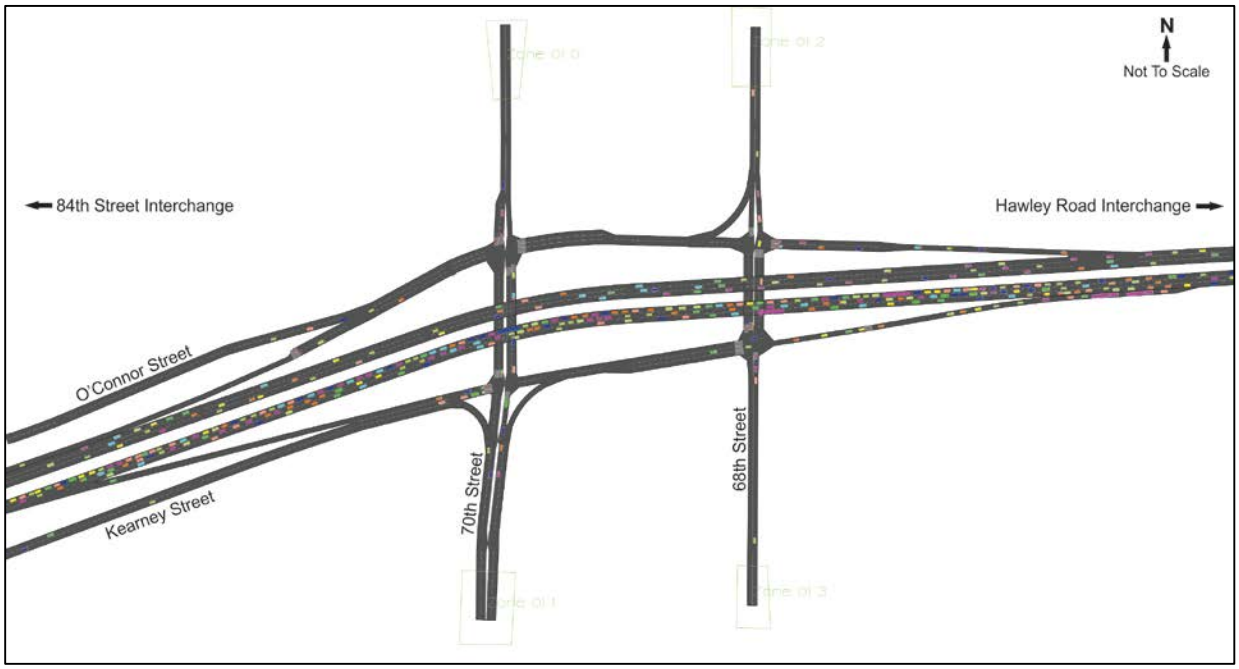
Existing Freeway Analysis – Paramics

Existing AM and PM peak hour LOS is not reported based on Paramics model outputs, as there is no direct correlation between the inherent assumptions included in the Highway Capacity Manual methodology and Paramics microsimulation modeling. Therefore, visual observations of the model and resulting speeds are primarily utilized to convey model operations.

The existing AM peak period Paramics model shows slow speeds and associated congestion throughout the duration of the AM peak hour (7-8 AM) in the 68th/70th Street Interchange area, which is consistent with the HCS 2010 analysis results. Slower speeds develop along I-94 EB near the 68th Street entrance ramp due to the short taper length and heavy EB entrance ramp demand. The resulting mainline congestion reflects upstream and affects approach operations past the west end of the project study limits. Operations and speeds on I-94 WB through the 68th/70th Street Interchange are consistent. As such, AM peak hour speeds along I-94 EB average 26 mph between 70th and 68th Streets. Downstream operations approaching the Zoo Interchange and 84th Street area effect I-94 WB operations approaching 76th Street, but are limited in scope to the I-94 WB mainline west of 70th Street. I-94 WB corridor speeds during the AM peak hour average 49 mph between 68th and 70th Streets.

Figure 1 shows a screen capture from the existing AM peak period Paramics model in the 68th/70th Street Interchange area, which represents operations at approximately 7:30 AM. **Tables A-19** and **A-20** in **Appendix A** includes the existing AM peak period Paramics model speeds for roadway sections located within the 68th/70th Street area of influence.

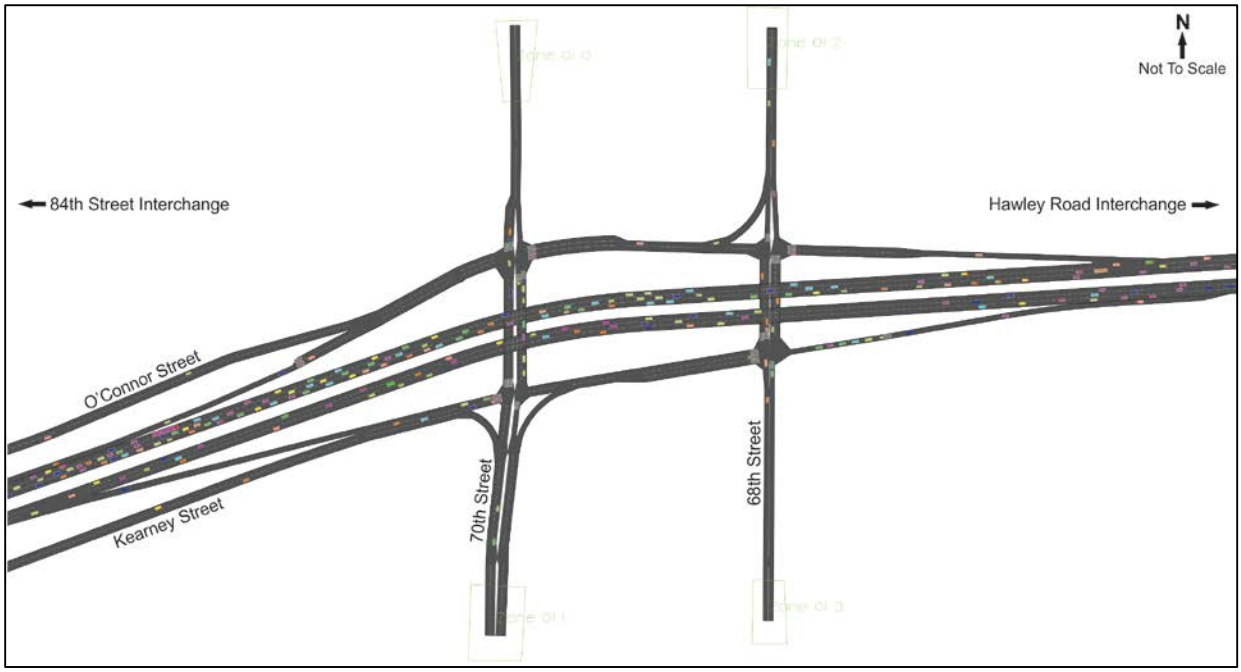
Figure 1



The existing PM peak period Paramics model shows increasingly slower speeds and resulting congestion along I-94 WB throughout the duration of the PM peak hour (4:30-5:30 PM) and extending into the hour after (5:30-6:30 PM) within the 68th/70th Street Interchange area of influence. Slow speeds develop along I-94 WB west of 70th Street due to downstream operations approaching the Zoo Interchange. The operational issues in the Zoo area forms congestion that develops upstream through the 68th/70th Street Interchange. This congestion is compounded by PM demand from the 70th Street WB entrance ramp, which results in slower speeds approaching the 70th Street entrance ramp (average 47 mph). PM peak period demand east of the 68th/70th Street Interchange is effectively metered by operational issues between the Mitchell Boulevard and Stadium Interchanges. Operations and speeds along I-94 EB through the 68th/70th Street Interchange are consistent in the 50-55mph range, as the PM peak period demands are lower than during the AM peak hour.

Figure 2 shows a screen capture from the existing PM peak period Paramics model in the 68th/70th Street Interchange area, which represents operations at approximately 5 PM. **Tables A-21** and **A-22** in **Appendix A** includes the existing PM peak period Paramics model speeds for roadway sections located within the 68th/70th Street area of influence.

Figure 2



Intersection Analysis

Existing peak hour operations of the service interchange ramp terminals were analyzed using Synchro. The intersection peak hour factors and turning movement truck percentages were calculated for each ramp terminal based on existing count data collected for the AM and PM peak hours.

In general, the existing ramp terminals operate between LOS A and LOS D overall during the existing peak hours. 68th/70th Street Interchange turning movements mostly operate between L OS A and LOS D, with one movement at LOS E. Turning movements at the Hawley Road Interchange operate between LOS A and LOS C, expect for one turning movement.

The results of the intersection analyses are shown in the tables in **Appendix B**. More detail is provided in the discussion for **Policy Point 1**.

84th Street Interchange

The 84th Street Interchange is located outside of the I-94 East-West Study limits, west of the 68th/70th Street Interchange. The existing 84th Street Interchange is a signalized tight diamond, which connects to frontage roads at each ramp terminal. The north (W. O'Connor Street) and south (W. Kearney Street) frontage roads connect the 84th Street Interchange to the 68th/70th Street Interchange to the east. The eastbound entrance and westbound exit ramps connect with these frontage roads.

Existing 84th Street Interchange ramp terminal operations were analyzed as part of the Zoo Interchange IAJR since it will be reconstructed as part of that project.

68th /70th Street Interchange

The existing interchange is a split diamond from 68th Street to 70th Street. As noted previously, frontage roads consisting of W. O'Connor Street on the north side and W. Kearney Street on the south side provide a connection between 84th, 70th, and 68th Streets. The ramps to and from the west (eastbound exit and westbound entrance) connect directly with these frontage roads.

A summary of the Levels of Service from the Synchro analysis for all of the movements are in **Appendix B** in **Table B-1** with queue lengths summarized in **Table B-2.** The EB thru movement at the 68th St eastbound entrance ramp terminal in the PM peak period operates at LOS E. This EB approach will have some delays that exceed one minute and queues may fluctuate from cycle to cycle. The 95th percentile queues do not back up to the 70th Street ramp intersection. These queues are on the frontage road and do not impact mainline operations or safety. All other turning movements operate at LOS D or better during both existing peak hours.

Hawley Road Interchange

The existing interchange has a diagonal exit ramp and curved entrance ramp on the south side for the eastbound I-94 connection and partial cloverleaf ramps on the north side for the westbound I-94 connections, with the westbound exit ramp being a loop. The eastbound ramp terminals are unsignalized and the westbound ramp terminal intersection on Hawley road is traffic signal controlled.

A summary of the Levels of Service from the Synchro analysis for all of the movements are in **Table B-3** with queue lengths summarized in **Table B-4**. The Hawley Road EB exit ramp operates at LOS F in the PM peak period, which is a stop controlled intersection with significant cross-street through traffic. The analysis does not take into account gaps created at the signalized intersection of the WB ramp terminal. The queues do not impact the I-94 mainline operations and safety. All other turning movements operate at LOS C or better during both existing peak hours.

Existing Safety Conditions

The average total crash rate on I-94 within the 68th/70th Street Interchange from 2005 to 2009 is 219.5 crashes /100M VMT on the eastbound mainline and 246.9 crashes/100M VMT on the westbound mainline, which is approximately two (eastbound) to three (westbound) times greater than the statewide average total crash rate. The breakdown of freeway mainline crashes by severity is shown in **Table 1**.

Table 1

Segment	Number of Crashes			Total
	Property Damage	Injury	Fatal	
I-94 EB 70th St Exit to 68th St Entr	89	39	0	128
I-94 EB 68th St Entr to Hawley Rd Exit	30	15	0	45
I-94 WB Hawley Rd to 68th St Exit	26	12	0	38
I-94 WB 68th St Exit to 70th St Entr	100	44	0	144
I-94 EB Exit Ramp to 70th St	0	0	0	0
I-94 EB Entrance Ramp from 68th St	5	3	0	8
I-94 WB Exit Ramp to 68th St	3	5	0	8
I-94 WB Entrance Ramp from 70th St	5	3	0	1

The average total crash rate on service ramps within the I-94 E-W Study area is 0.5 crashes/1MEV from 2005 to 2009. The total crash rate on the 68th/70th Street Interchange ramps is 0.4 crashes/1MEV for the same period. For more detail on the crashes within the corridor, see the Crash Analysis Technical Memorandum, which is included as **Appendix D**.

Existing Environmental Constraints

The 68th/70th Street Interchange is surrounded by highly dense residential areas to the north and south of I-94. The Girl Scouts of Southeastern Wisconsin headquarters and the Girl Scouts' Milwaukee Service and Resource Center is located in the northeast quadrant of 70th and W. O'Connor Street. An electrical substation is to the east of the Girl Scouts, and a utility corridor consisting of overhead electrical transmission lines and towers continues from the substation to Hawley Road. Reconfiguring the ramps to a tight diamond interchange at 70th Street would create significant residential and community impacts. 70th Street is the arterial that serves the traffic south of I-94. It is mostly a residential street north of I-94. 68th Street is the arterial that serves the traffic north of I-94, but it ends about three blocks south of I-94. The alternative with the diamond at 70th Street would require those drivers on 68th Street to use cross streets that are mostly residential streets to get to 70th Street to access I-94. Alternatives to consolidate these two routes would have unacceptable impacts to the residential area.

ALTERNATIVES

Alternatives that were studied and eliminated due to impacts or unacceptable operations for the 68th/70th Street Interchange included:

- Braided ramps on the west leg eastbound entrance and westbound exit ramps at 68th Street with the Hawley Road Ramps
- 70th Street Tight Diamond Interchange with the relocation of the east side ramps of 68th Street to the east side of 70th Street
- Split Diamond Interchange at 68th/70th Streets with CD Roads
- Split Diamond Interchange configuration similar to existing

70th Street Tight Diamond Interchange

The tight diamond interchange at 70th Street was considered to increase the spacing between the 68th Street and Hawley Road ramps. 70th Street serves the major traffic travelling south from I-94, and 68th Street serves the major traffic travelling north from I-94. The traffic using this type of interchange configuration would have to provide for heavy volume turning movements to move between 68th and 70th Streets. This alternative was dismissed based on public input and impacts resulting from the intersection and roadway alterations needed to divert traffic along 70th Street, Stevenson Street and 68th Street, including relocations and possible historic property impacts.

Preferred Alternative – Split Diamond Interchange

The 68th/70th Street Interchange is proposed to be reconstructed in its current configuration (a split diamond interchange). Entrance and exit ramps are proposed to be longer than the existing ramps to provide more room for traffic entering and exiting the freeway to accelerate/decelerate and to queue, improving safety and traffic operations. 64th Street will continue to pass under I-94. The 68th/70th Street and 64th Street grade separation structures over I-94 will be similar to existing with increased vertical clearance and widening to provide for eight travel lanes and full shoulder widths meeting standards.

FUTURE YEAR TRAFFIC

Year 2040 traffic forecasts were used to analyze the traffic operations of the alternatives considered for implementation. Average weekday traffic and peak hour forecasts were provided by SEWRPC. K30 volumes do not represent the peak hour traffic volumes in this corridor because of the special traffic generators in the area (Miller Park, State Fair Park, Summerfest and other festivals held in the area). K200 volumes were found to closely approximate the typical AM and PM peak hours, so these were used for the design hourly volumes in the analyses as concurred with by WisDOT and FHWA. The basis for the design year traffic projections used for this project and the approval on September 20, 2012 by FHWA are documented in the memo on DHV and LOS in **Appendix C**.

No-Build Conditions

The No-Build HCS 2010 analyses were conducted using the projected design year (2040) AM and PM peak hour No-Build traffic volumes and the existing geometric conditions. The peak hour factor used for the no-build analysis was 0.97. Level terrain and a mainline free flow speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-7**. **Tables A-8** and **A-9** have the input information for ramp and weaving segment analyses.

The 2040 no-build analysis shows level of service on I-94 within the range from LOS E to LOS F. I-94 mainline would operate at LOS E or F in the area of the 70th / 68th Street Interchange in the design year if no improvements were made to this facility. I-94 eastbound, both AM and PM, and westbound in the PM peak will operate at LOS E between the 70th Street and 68th Street ramps. This segment will operate at LOS F westbound in the AM peak. I-94 eastbound on either side of this interchange will operate at LOS F in the PM and LOS E in the AM peak. I-94 westbound on either side of this interchange will operate at LOS E in the PM and LOS F in the AM peak. The eastbound exit ramp will operate at LOS D in the AM and PM peak. The eastbound entrance ramp will operate at LOS D in the AM and LOS F in the PM peak. The westbound exit ramp will operate at LOS F in the AM and LOS E in the PM peak. The westbound entrance ramp will operate at LOS F in the AM and LOS D in the PM peak.

The LOS for the freeway segments are shown in **Table A-10**. The weaving and ramp segments are shown in **Tables A-11** and **A-12**.

While the No-Build alternative would include continued maintenance of the I-94 corridor facility, it would not address the purpose and need of the project. As traffic volumes increase, an increase in congestion and crashes can be expected if there is no improvement to the facility.

The No-Build alternative is not considered a reasonable course of action, but is retained as a basis for comparison to the Build Alternative.

The No-Build traffic volumes and levels of service for the freeway and ramps are shown on schematic diagrams in **Exhibit 4-1.**

ALTERNATIVES ANALYSIS

Compliance with Policies and Engineering Standards

The design for the I-94 East/West Corridor Project is intended to meet or exceed current interstate standards where feasible. However, it is acknowledged that there will be exceptions to standards in some locations to minimize impacts to the surrounding development and environmental/cultural resources. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review and approval by WisDOT and FHWA. Exceptions to standards for the preferred alternative are in this section. For more detail on these and exceptions for other alternatives see the Exceptions to Standards memo in **Appendix F.** The 68th/70th Street Interchange proposed design will have no 13 controlling criteria exception to standards. However, the weave between the westbound Hawley Road Entrance Ramp and the westbound 68th Street exit ramp will be 910', where 1000' is the recommended minimum per NCHRP 687 analysis equivalent crash comparison between an entrance-exit 1000' spacing with an auxiliary lane and a 1600' spacing without an auxiliary lane.

Environmental Impacts

This project is in a developed urban area with no natural areas. There are few environmental impacts. There will be no business and three residential displacements under the 68th/70th Street Split Diamond Interchange reconstruction.

Safety

The corridor was analyzed with the ISATe tool to predict the frequency and severity of crashes on the alternatives considered. The ISATe model predicts a reduction of 15% in total crashes, 8% in the fatal and injury crashes and 18% in property damage only crashes for the preferred alternative compared to the replace in kind alternative. The technical memorandum that summarized this analysis is included as **Appendix E**.

The safety performance for the two alternatives is very similar. With as small as these crash numbers are the difference is about one crash per year. The local streets are not included in this model.

The crashes in the Replace-in-Kind alternative are approximately 75% multiple vehicle and 25% single vehicle crashes. For the proposed split diamond the crashes are approximately 72% multiple vehicle and 28% single vehicle crashes.

Safety Improvements in the Proposed Design

The proposed design will address the existing safety issues with the following revisions to the corridor:

- Provide auxiliary lanes between the Hawley Road and 68th Street interchange ramps
- Increase the I-94 mainline and 68th/70th Streets capacities to help reduce the number of crashes due to congested conditions on the freeway and its ramps.
- Increase acceleration and deceleration distances at the entrance and exit ramps to provide safer and more efficient merging and diverging operations.
- Provide less congested conditions that should help emergency responders arrive more quickly when a crash does occur.

The proposed design for the 68th/70th Street Interchange is shown on **Exhibit 5-1**. The spacing of the access points is improved from the existing condition and the distances are shown on this exhibit. The design of the 68th/70th Street Interchange is shown on **Exhibit 6-1**. The signing plan for the proposed design is shown on **Exhibit 8-1**. **Table 2** shows the proposed spacing of the ramp terminals along I-94 within the corridor along with the standard required spacing for each ramp configuration.

Table 2 Proposed Ramp Spacing

Route	From	To	Proposed	Required	Auxiliary Lane*
I-94 EB	68th Street Entrance	Hawley Street Exit	1048’	1600'	Yes
I-94 EB	Hawley Road Exit	Stadium Exit	3470’	1000'	No
I-94 WB	Stadium Entrance	Hawley Road Entrance	3465’	1000'	No
I-94 WB	Hawley Road Entrance	68th Street Exit	910'	1600'	Yes

* AASHTO recommends the inclusion of an auxiliary lane when ramp spacing s 1500’ or less.

Operational Performance

Freeway Analysis – HCS 2010

The preferred alternative was analyzed in HCS using the projected design year (2040) AM and PM peak hour traffic volumes and the proposed design geometrics. The peak hour factor used for the build alternative analysis was 0.97. Level terrain and a mainline operating speed of 55 mph was used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes input for each freeway segment are shown in **Appendix A** in **Table A-13**. The input information for the ramp and weaving segments are in **Tables A-14** and **A-15**.

The proposed design for the 68th/70th Street Interchange is shown on **Exhibit 5-1**. **Exhibit 6-1** shows the proposed interchange. The projected 2040 AM and PM peak traffic volumes and the level of service from the HCS analyses are shown on **Exhibit 7-1**.

The I-94 freeway segments within the 68th/70th Street Interchange will operate at LOS D in both directions in the AM and PM peak periods for the preferred alternative. Between the 68th/70th Street and 84th Street Interchanges, which is the transition between the I-94 E-W Study limit and the Zoo Interchange reconstruction project limit, the I-94 eastbound mainline is expected to operate at LOS D during the future AM peak hour and LOS E during the future PM peak hour. The I-94 westbound

mainline between the 84th Street and 68th/70th Street Interchanges is expected to operate at LOS D during the design year peak hours.

The I-94 eastbound mainline during the future PM peak hour is expected to operate at the border of the LOS D/E threshold based on the HCM 2010 weave density (35 passenger cars per mile per lane). As such, a variance of a few hundred vehicles in the future PM peak hour would shift the I-94 eastbound mainline result from an LOS E to an LOS D. It is not uncommon to have that degree of variance in day-to-day peak hour volumes. In addition, it is not expected that future PM peak hour operations on the I-94 EB mainline in this area would significantly affect upstream operations.

Freeway Analysis – Paramics

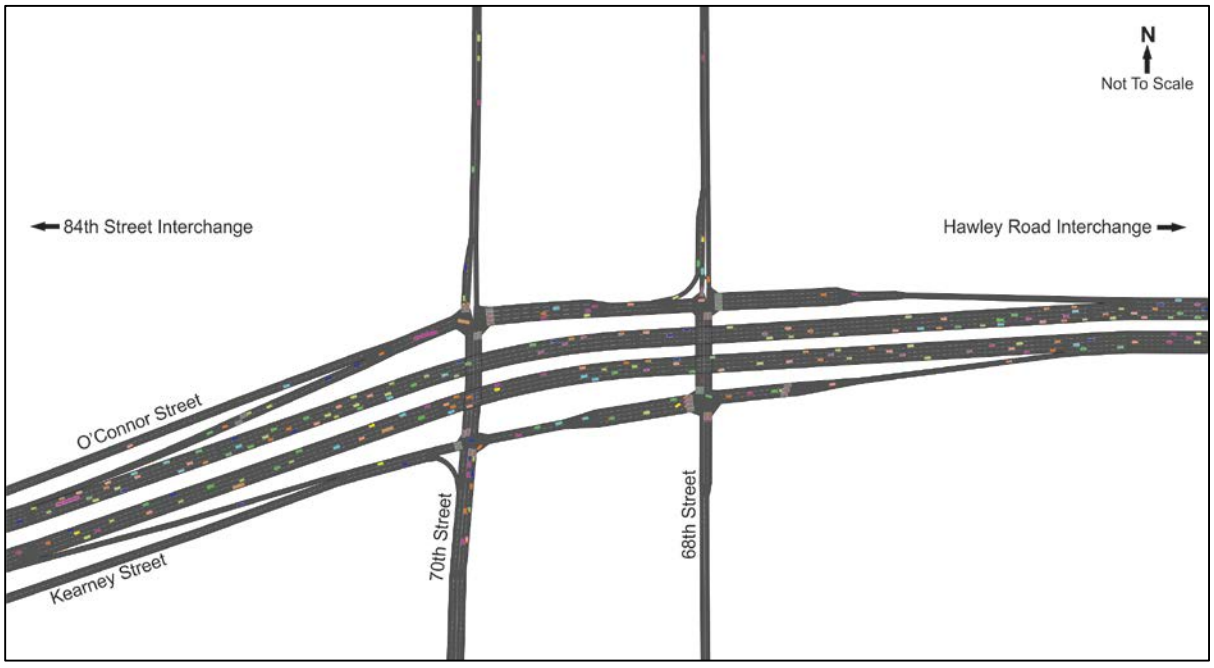
The preferred alternative was also analyzed using Paramics microsimulation during the design year (2040) peak periods. It should be noted that the future peak period Paramics models assume that the Zoo Interchange has been reconstructed by the I-94 E-W Study design year.

Overall, the future peak period Paramics models of the preferred alternative indicated acceptable operations in the 68th/70th Street Interchange influence area associated with the design year traffic forecast. As previously indicated, LOS is not reported based on Paramics model outputs and as such, visual observations of the model and resulting speeds are used to convey operations.

In general, the future AM peak period Paramics model demonstrated consistent speeds and stable operations throughout the AM peak hour along I-94 at the 68th/70th Street Interchange. The additional lane in each direction of I-94 in this area, along with the rebuilt Zoo Interchange, helps improve operations in comparison to the existing AM peak period. All roadway sections included within the area of influence operated at or slightly greater than the posted speed limit (55 mph).

Figure 3 shows a screen capture from the future AM peak period Paramics model in the 68th/70th Street Interchange area, which represents operations at approximately 7:30 AM. **Tables A-23** and **A-24** in **Appendix A** includes the future AM peak period Paramics model speeds for roadway sections located within the 68th/70th Street area of influence.

Figure 3

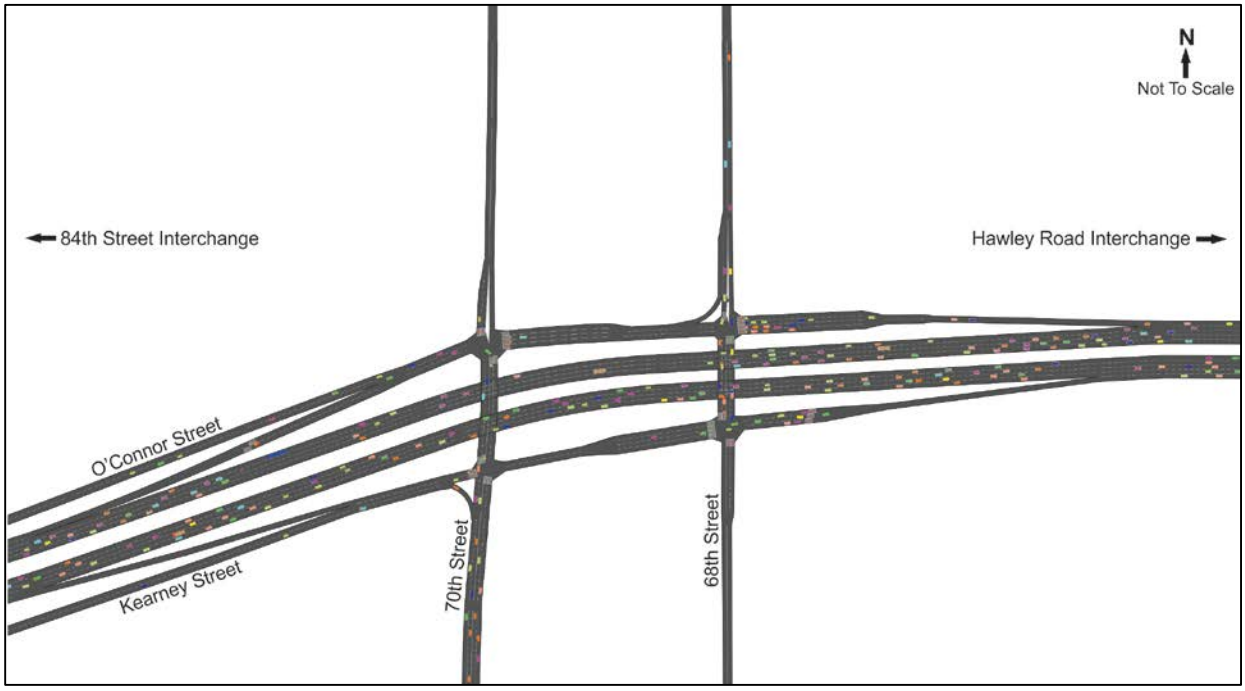


The future PM peak period Paramics model also demonstrated consistent speeds and stable operations throughout the PM peak hour along I-94 through the 68th/70th Street Interchange. The additional freeway capacity, in addition to operational improvements downstream approaching the Zoo Interchange, generally improves operations along I-94 WB in comparison to existing PM peak period conditions. All roadway sections along I-94 WB near the 68th/70th Street Interchange operate consistently and slightly faster than the posted speed limit.

Future PM peak operations along I-94 EB are also improved in comparison to the existing PM peak period. Speeds are slightly slower than expected between the 70th Street EB exit ramp and the 68th Street EB entrance ramp (53 mph on average), but are still consistent (i.e. stable flow) and not at unacceptable levels. This can be attributed to a combination of drivers maneuvering in preparation for downstream exits at the Hawley Road and the Stadium Interchanges, and some minor turbulence associated with the auxiliary lane weave between 68th Street and Hawley Road. However, I-94 EB operations are still acceptable overall and improved in comparison to existing PM peak period conditions.

Figure 4 shows a screen capture from the future PM peak period Paramics model in the 68th/70th Street Interchange area, which represents operations at approximately 5PM. **Tables A-25** and **A-26** in **Appendix A** includes the future PM peak period Paramics model speeds for roadway sections located within the 68th/70th Street area of influence.

Figure 4



Intersection Analysis

Design year peak hour operations of the 68th/70th Street service interchange ramp terminals were analyzed using Synchro. The analysis included the 68th/70th Street signalized ramp terminals, in addition to the nearest signalized intersections on 68th Street and 70th Street, which allowed for the identification of potential local street impacts due to ramp terminal operations. The peak hour factor used for the future AM and PM peak hour analysis was 0.87 and 0.97, respectively. Existing peak hour truck percentages at the ramp terminals were assumed to remain unchanged in the design year peak hours.

In general, the signalized ramp terminals are expected to operate between LOS A and LOS D overall during the future peak hours. 84th Street Interchange turning movements will operate between LOS A and LOS D during the future peak hours. Turning movements at the 68th/70th Street Interchange are expected to mainly operate between LOS A and LOS D, with one movement at LOS E. The movement anticipated to operate at LOS E, the westbound thru during the PM peak hour at the intersection of 70th Street and O'Connor Street, is not expected to impact upstream operations, as the resulting 50th and 95th percentile queues are each less than 50 feet. Since the 68th/70th Street ramp terminals overall operated at, or better than, LOS D during the future peak hours, the proposed design of the ramp terminal intersections was deemed acceptable by the I-94 EW design team.

The results of the future design year AM and PM peak hour intersection analyses are shown in the tables included in **Appendix B.**

84th Street Interchange

The 84th Street Interchange will be reconstructed (as part of the Zoo Interchange project) as a tight diamond interchange, which is the current configuration of the interchange and will retain the frontage road connections to 70th and 68th Streets. Advanced left turn lanes will be provided for the northbound and southbound approaches to help facilitate future turning demand. Future operations of the 84th Street Interchange was analyzed as part of the Zoo Interchange IAJR.

68th/70th Street Interchange

As part of the preferred alternative, the 68th/70th Street Interchange will be rebuilt as a split diamond, which is the same as the existing configuration. The north (O'Connor Street) and south (Kearney Street) frontage roads that connect the service ramps from the west at 70th Street and from the east at 68th Street would be retained. 70th Street would remain as a four-lane facility and 68th Street as a two-lane facility. All four ramp terminals would remain signalized with intersection improvements at each to facilitate future demand.

The 68th/70th Street Interchange is expected to operate between LOS A and LOS D overall during the future peak hours. Turning movements will mainly operate at LOS D or better, with the exception of the westbound thru movement at the intersection of 70th Street and O'Connor Street which will operate at LOS E.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-10** and **B-11**.

Hawley Road Interchange

Under the preferred alternative, the Hawley Road Interchange will be reconstructed as a half diamond, with access to and from the west only. The proposed lane configurations for the north (I-94 WB entrance ramp) and south (I-94 EB exit ramp) ramp terminals are similar to the existing conditions. Hawley Road would remain as a four-lane facility with a single NBL turn lane at the signalized north ramp terminal. The EB approach at the signalized south ramp terminal would provide exclusive left and right turn movements.

The Hawley Road Interchange is expected to operate between LOS A and B overall during the future peak hours. Turning movements will operate at LOS D or better at both ramp terminals during the design year peak hours. It should be noted that the analysis assumes the installation of a traffic signal for the south ramp terminal, as the north ramp terminal is currently signalized. However, a traffic signal warrant analysis has not yet been formally completed.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-12** and **B-13**.

Policy Points	
Policy Point 1 Existing Network's Ability to Accommodate Traffic	*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 necessary 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.* This project is not adding a new interchange to this corridor location. This project will reconstruct and reconfigure the existing interchange to match a reconstructed 4-lane freeway section in each direction improving the safety and efficiency of I-94 within the corridor. The existing conditions on the corridor are shown on **Exhibits 2-1, 2-2** and **2-3.** The existing HCS analysis input values and the resulting LOS values are shown in **Appendix A** on **Tables A-1** through **A-3** and **A-4** through **A-6** respectively. The summary of the traffic volumes and level of service for the existing conditions is shown on **Exhibits 3-1** through **3-3**. The No Build traffic projections and level of service are shown on **Exhibits 4-1** through **4-3**. The levels of service and queue length information for the intersection analyses are shown in **Appendix B**. The local road network adjacent to the 68th/70th Street Interchange serves a variety of land uses, ranging from commercial to residential, in a dense urban area. 68th Street provides freeway access north of I-94 and 70th Street provides freeway access south of I-94. Parallel east-west arterial roadways, including Greenfield Avenue, National Avenue, and Bluemound Road, currently operate at or near capacity during the AM and PM peak periods. **68th /70th Street Interchange** This interchange is a split diamond from 70th Street to 68th Street. The frontage roads of W. O'Connor Street on the north side and W. Kearney Street on the south side provide the connections between the east and west ramp intersections. The ramps to and from the west are slip ramps connecting directly to the frontage roads, while the ramps to and from the east are diagonal ramps. The existing I-94 mainline operates at LOS E on either side of this interchange and LOS D within the interchange where the volume is lower minus the ramp traffic. The westbound exit ramp operates at LOS E, while the other three ramps operate at LOS D. The no build analyses show that the westbound mainline and ramps will drop to LOS F in the AM peak. For the proposed interchange design, all four of the intersections have traffic signal control. The ramps to and from the west are slip ramps that connect directly to the frontage roads about 350 feet west of 70th Street.

The intersection of the eastbound ramps with 68th Street operates at LOS D in the PM peak and LOS C in the AM peak. The eastbound through movement operates at LOS E in the PM and LOS D in the AM peak, but is not expected to impact I-94 mainline operations as the resulting queue lengths are short and will not impact the upstream ramp terminal. The other three intersections operate at LOS C or better for all movements. The LOS and queue lengths are shown in **Appendix B** on **Tables B-1** and **B-2**.

This interchange will be reconstructed as a split diamond in a similar configuration as the existing interchange.

Adjacent Interchanges

84th Street Interchange

The existing 84th Street Interchange is a tight diamond with frontage road connections at the north and south ramp terminals. These frontage roads connect 84th Street to 70th and 68th Streets.

The I-94 mainline between 84th Street and 70th Street operates at LOS E during the AM and PM peak hours. The no build analysis indicates that the I-94 EB mainline between 84th Street and 70th Street would continue to operate at LOS E and the I-94 WB mainline would degrade to LOS F during the AM peak hour. Under the no build analysis for the PM peak hour, the I-94 EB mainline is expected to degrade to LOS F with the I-94 WB mainline continuing to operate at LOS E.

This interchange will be reconstructed and remain in a tight diamond configuration with frontage road connections as part of the Zoo Interchange project.

Hawley Road Interchange

The existing interchange has a diagonal exit ramp like a typical diamond interchange in the southwest quadrant and a partial loop entrance ramp in the southeast quadrant with a free-flow right turn and a median left turn lane for the eastbound I-94 connections. On the north side of the interchange the ramps are in a typical partial cloverleaf configuration for the westbound I-94 connections with the westbound exit being a loop ramp. Information regarding the Hawley Road Interchange is included in this IAJR only to the level needed to document its presence within the corridor, its impact to operations and safety within the corridor, and its relevance to the entire project. The details of the proposed design and the justification for reconstructing the interchange to a partial are discussed in a separate Interstate Access Justification Report.

The existing mainline west of the interchange operates at LOS E. The mainline within the interchange operates at LOS D in the westbound and eastbound directions in the PM peak and LOS E in the eastbound AM peak. The ramps to and from the west operate at LOS E for both directions and time periods. The existing weaving segment east of the interchange is a two-sided weave to the left side ramps at Mitchell Boulevard that operate at LOS F in the westbound direction for both AM and PM peaks and also in the in the eastbound direction in the AM peak and operates at LOS E in the eastbound direction in the PM peak period.

	The no build analyses show that with the traffic volumes projected for the design year, the LOS will drop to LOS E within the interchange for both directions and time periods. The westbound entrance and the mainline west of the interchange will operate at LOS F in the AM peak and LOS E in the PM peak. The eastbound mainline and exit ramp will operate at LOS E in the AM peak and F in the PM peak. The two-sided weave segments east of the interchange will operate at LOS F in both directions for the AM and PM peak periods The existing eastbound ramp terminal intersections are unsignalized. The westbound ramp terminal intersection on Hawley road is traffic signal controlled. The left turn movement on the eastbound exit ramp operates at LOS F, while the other movements are at LOS B or C. The traffic signal controlled intersection at the westbound ramps operates well with all movements at LOS A or B. The intersection LOS and queue lengths are shown in **Appendix B** in **Tables B-3** and **B-4.** This interchange is proposed to be reconstructed as a partial interchange (half diamond) with ramps to and from the west because it is not feasible to construct ramps to and from the east without impacting graves in the cemeteries along the freeway. ***Safety Analyses*** The average total crash rate on I-94 within the 68th/70th Street Interchange from 2005 to 2009 is 219.5 crashes /100M VMT on the eastbound mainline and 246.9 crashes/100M VMT on the westbound mainline, which is approximately two (eastbound) to three (westbound) times greater than the statewide average total crash rate. For more detailed crash information, see the Crash Analysis Technical Memorandum in **Appendix D**. **Conclusion** The 68th/70th Street Interchange in conjunction with the I-94 mainline require improvements to safely and efficiently accommodate the network's ability to move the traffic that is projected to be using this corridor in the design year of 2040.The reconstruction of the interchanges as discussed above will provide for proper connection to the proposed 4-Lane freeway section in both directions and safer and more efficient operations for through traffic and for traffic accessing the freeway in this area. The widening of the freeway consisting of added mainline travel and auxiliary lanes is needed to accommodate the projected traffic volumes at an acceptable LOS and safety. Improved ramp spacing along I-94 will provide an improved level of service and safety on the freeway. Improvements to the local system alone will not alleviate the need to reconfigure this interchange. Elimination or reconfiguration of this interchange was considered early in the NEPA process, but it was determined that this interchange needed to be retained due to the potential for impacts to the community it serves. The need for the project is discussed further under the **NEED** section of this report.
Policy Point 2 Transportation System	*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*

Management	*improvements to the Interstate without the proposed changes in access.* This project is not adding any new interchanges to this corridor. The project is reconstructing the existing roadway with an additional lane of traffic in each direction and interchanges with modifications to improve the safety and operations in the corridor. Existing ITS features are currently in place along this segment of I-94. Additional ITS and TSM improvements were studied (including a doubling of transit), however the mainline and interchange improvements as proposed are still needed. To provide an acceptable LOS and improve safety, Transportation System Management features are proposed to be included in the design of the preferred alternative. These include Ramp Metering, Ramp Gates, Closed Circuit Cameras, Variable Message Signs, and Traffic Detectors. These features alone being added to the existing facility were analyzed. They did not meet the purpose and need of the project. The SEWRPC's build traffic forecasts include TSM strategies as part of the base-line assumptions, including a doubling of transit use. Existing TSM applications currently in use that will be carried forward in the proposed design consist of ramp metering, providing driver information on changeable message signs, closed circuit cameras, traffic detectors, ramp gates, and encouraging the use of transit. The existing eastbound entrance ramp has ramp meters that were installed under a previous project. The 70th Street WB ramp did not originally have a ramp meter, but had one added under the Zoo Interchange project which is currently under construction immediately to the west of this project. Geometric improvement only alternatives without increased lanes were also analyzed and found not to adequately meet the project purpose and need. All of the proposed alternatives would not preclude the implementation of more transit use, but in fact would provide for improved operations for existing transit use and future transit growth. **Conclusion** Transportation System Management measures have been investigated. These measures are incorporated into the proposed design alternative. However, these measures alone will not provide an acceptable level of service in the design year or eliminate the need to modify the existing interchange as proposed with the preferred alternative. The design of the preferred alternative does not preclude the future implementation of additional TSM measures.
Policy Point 3 ***Safety Impacts and Operational Analysis***	*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, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access. The crossroads and the local street*

network, to at least the first major intersection on either side of the proposed change in access, shall 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. Requests for a proposed change in access must 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. Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative.

The existing facility was constructed in 1963 and does not conform to current design standards. This proposed project will not add any additional access points to the interstate, but will reconstruct and reconfigure the existing access points to operate more safely and efficiently.

The proposed design will address the current safety issues with revisions to the corridor to improve roadway geometrics, roadway capacity, ramp capacity, and ramp/mainline merges/diverges. Traffic analyses (HCM and Paramics) and safety analyses (ISATe) show the proposed design will substantially improve existing conditions.

The proposed improvements to I-94 include reconstruction to the roadway cross section by providing four mainline travel lanes in each direction, including reconstruction with added improvements to the 68th/70th Street Interchange and auxiliary lanes between the 68th Street and Hawley Road ramps. Alternatives providing geometric and operational improvements without added mainline traffic lanes were studied and found to not adequately meet the project's purpose and need.

The preferred alternative is shown on **Exhibit 5-1** and **Exhibit 6-1**. The projected design year traffic volumes and levels of service are shown on **Exhibit 7-1**. **Appendix A** has **Table A-13** of HCS analysis input data and **Table A-16** showing the level of service along with the density values for this segment of the freeway and the 68th/70th Street ramps. **Appendix B** has the tables with the intersection analyses results.

68th / 70th Street Interchange

This interchange is proposed to be reconstructed as a split diamond in a similar configuration to the existing interchange. The frontage roads of W. O'Connor Street on the north side and W. Kearney Street on the south side will continue to provide the connection between the east and west ramp intersections. The ramps to and from the west are slip ramps connecting directly to the frontage roads. The ramps to and from the east are diagonal ramps connecting directly to 68th Street. The construction of the ramps to and from the west will be included in the Zoo Interchange project that is currently being constructed immediately to the west of this project. The intersection of 70th Street and the eastbound exit ramp will have a northbound "look ahead" lane added to increase the storage for vehicles passing through the intersection to the left turn lane at the 68th Street westbound entrance ramp intersection. The westbound exit ramp will have one through lane

and a right turn lane added at the 68th Street intersection.

The proposed interchange along with the intersection lane configuration improvements are shown on **Exhibit 6-1**.

Other alternatives were studied for the reconstruction of this interchange, including creating a single diamond interchange by combining the 68th and 70th Street corridors but were found to have considerable impacts to the environment and surrounding community as this would require expansion of the local roads and intersections to provide the needed roadway capacity. 70th street is continuous and serves the area to the south, while 68th Street serves the area to the north.

The I-94 mainline will operate at LOS D through this area in both directions for both the AM and PM peak periods. The eastbound weave segment east of the interchange where the ramps connect to the mainline will also operate at LOS D. Between the 68th/70th Street and 84th Street Interchanges, which is the transition between the I-94 E-W Study limit and Zoo Interchange reconstruction project limit, the I-94 eastbound mainline is expected to operate at LOS D during the AM peak hour and LOS E during the PM peak hour. The I-94 westbound mainline between the 84th Street and 68th/70th Street Interchanges is expected to operate at LOS D during both peak hours.

The I-94 EB mainline during the PM peak hour (LOS E) is expected to operate at LOS D/E threshold based on the HCM 2010 weave density, where a variance of a few hundred vehicles would shift the result to a LOS D. It is not uncommon to have that degree of variance in day-to-day peak hour volumes and eastbound operations in this area are expected to have minimal impact on upstream operations even when operating just into the LOS E range.

All four of the ramp intersections with 68th and 70th Streets will be traffic signal controlled. All movements will operate at LOS D or better except the eastbound through movement at 68th Street and its eastbound ramp which will operate at LOS E in the PM peak. The intersection LOS and queue lengths are shown in **Appendix B** on **Tables B-10** and **B-11**.

Adjacent Interchanges

84th Street Interchange

The 84th Street Interchange will be reconstructed in a tight diamond configuration with frontage road connections (similar to what currently exists) with additional turn lanes to facilitate future demand. This interchange is not located within the I-94 East-West Study limits and will be rebuilt as part of the Zoo Interchange project.

Hawley Road Interchange

This interchange is proposed to be constructed as a partial (half diamond) interchange with ramps to and from the west. The ramps to and from the east cannot be constructed with adequate acceleration and deceleration lengths and auxiliary lanes connecting to the proposed I-94 cross section without impacting the cemeteries on both sides of the freeway. **Appendix F** has the explanation with

	more detailed information about why the partial interchange is justified including how the environmental process impacted its selection. Local street improvements to mitigate the change in access at the Hawley Road Interchange will be included in the I-94 E-W Corridor Project. The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-2**. The I-94 mainline will operate at LOS D through this area in both directions for both the AM and PM peak periods. The weave segment west of the interchange where the ramps connect to the mainline will also operate at LOS D. The ramp intersections with Hawley Road will be traffic signal controlled. The intersection LOS and queue lengths are shown in **Appendix B** on **Tables B-12** and **B-13.** **Safety** The I-94 freeway mainline and ramp segments were analyzed using HSM methods using the ISATe tool. This analysis showed that the preferred alternative will provide a reduction in crashes of approximately 20% over the no-build alternative. Some features in the preferred alternative that will enhance the safety performance are increased mainline capacity, added auxiliary lanes between Hawley Road and 68th Street, improvements to traffic signals at the crossroad ramp terminals. **Signing** The proposed modifications to the 68th/70th Street and Hawley Road interchanges will allow better placement of informational signing to help unfamiliar drivers. The proposed guide signing plan is shown on **Exhibits 8-1** through **8-3**. Trail blazing signs will be provided to direct drivers to the access at adjacent interchanges. Signing will be provided to direct drivers along the frontage roads to re-enter the freeway in the same direction. **Conclusion** The proposed improvement has been developed to improve the safety and efficiency of the traffic operations within the corridor. There are no additional access points being added to the interstate as part of this improvement. The added auxiliary lanes will help the weaving between the Hawley Road and 68th/70th Street interchanges. There are proposed local street improvements adjacent to the interchanges and between the interchanges where necessary to accommodate the projected design year traffic. The improvements between the interchanges will help drivers that currently use the Hawley Road interchange, but will have to use the adjacent 68th/70th Street Interchange in the future.
Policy Point 4 ***Local Road Access***	*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 vehicles, HOV's, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards.* The 68th/70th Street Interchange is proposed to be full access interchange that

	connects to public streets. The land surrounding the I-94 and the 68th/70th Street Interchange is fully developed. A tight diamond interchange at 70th Street, one of the alternatives analyzed, would require widening of local streets and intersections between the interchanges to accommodate the needed change in traffic patterns. This widening would impact the business and residential properties along those streets, leading to unacceptable impacts. **Conclusion** The split diamond interchange at 68th/70th will provide a balance between addressing long-term mobility needs and safety concerns while minimizing impacts to existing development and environmental resources to the maximum extent practical.
Policy Point 5 Regional Transportation Plans	*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.* The proposed I-94 E-W project is included in the current SEWRPC Long-Range Transportation Plan (2035 Regional Land Use and Transportation Plan). The Preliminary Engineering phase of this project is in the TIP. The 2035 regional transportation system plan proposed modernization and limited expansion of the southeastern Wisconsin freeway system. A doubling of transit use was analyzed prior to analyzing capacity expansion as called for in the SEWRPC Plan. The 2035 regional transportation plan included a full interchange at Hawley Road and did not reflect the relocation of the access provided by the existing Mitchell Boulevard interchange to a new location within the Stadium Interchange. On September 16, 2015, the SEWRPC Commission amended the 2035 regional transportation plan as follows: • Convert from full to half interchange at Hawley Road. • Remove existing interchange at Mitchell Boulevard. • Provide service ramps to non-arterial roadways at the Stadium Interchange. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016. The 68th/70th Street Interchange alternative conforms to SEWRPC's 2035 regional

	transportation plan. **Conclusion** The project, which includes the modification of the 68th/70th Street Interchange, is consistent with local and regional land use plans and as such, also conforms with fiscal constraint and air quality requirements. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016. Funding for the next phase of the project will be included in the TIP prior to the signing of the ROD.
Policy Point 6 Multiple Interchange Additions	*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 proposed and desired access within the context of a longer-range system or network plan.* The 68th/70th Street Interchange is not a new access point. No additional interchanges are proposed to be added as part of this project and none are proposed for the future. The spacing of interchanges along this corridor is less than one mile. With the tight interchange spacing, it is not feasible to add any additional interchanges in this corridor. The regional plan does not include any additional interchanges within this corridor. The design team looked at trying to reduce the number of interchanges in the corridor, but other than relocating or modifying the design to improve on existing access points, were not able to eliminate any interchanges. The 68th/70th Street Interchange is proposed to be modified to provide safer and more efficient operations as well as accommodating the additional mainline lanes that are proposed for this project. **Conclusion** This area is fully developed with closely spaced interchanges. No additional interchanges are proposed to be added as part of this project and none are proposed for the future.
Policy Point 7 Appropriate Coordination	*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. 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.* The I-94 East-West Project team has demonstrated appropriate coordination between the development and related transportation system improvements through its significant public involvement and outreach efforts with the City of

	Milwaukee, City of Wauwatosa, City of West Allis, Village of West Milwaukee, Milwaukee County, local business groups, individual businesses, community leaders, and residents of the area. The City of Wauwatosa strongly opposes loss of direct ramp access to 68th Street, and noted the potential for significant off-system real estate impacts along Stevenson Street and other streets within the City of Milwaukee if the 68th Street connection to I-94 were removed or significantly modified . The project team has had several meetings with the stakeholders in the area of the cemeteries and the historic properties that are impacted by the change in access at the 68th/70th Street and Hawley Road Interchanges. Also, meetings were held with the local officials to agree on improvements to the local streets to mitigate the proposed change in access at Hawley Road. Through this coordination, this project and all of its alternatives have and will continue to be developed in an orderly and coordinated manner to serve the public. **Conclusion** The area along the I-94 E-W corridor is fully developed; as such, no new interchanges are proposed within the area of influence for the 68th/70th Street interchange.. The project team has had extensive coordination with local officials and stakeholders throughout the project's area of influence. The proposed 68th/70th Street Interchange provides a balance between providing for the needs expressed by the stakeholders and reducing the impacts to the surrounding properties.
Policy Point 8 Environmental Planning	*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.* The I-94 East-West Corridor Study Draft EIS was approved and signed by FHWA and WisDOT on November 4, 2014. A Notice of Availability for the Draft EIS appeared in the Federal Register on November 14, 2014, beginning the 60-day comment period that was slated to end on January 13, 2015. A two week extension of the comment period was requested and granted with the comment period for the I-94 East-West Corridor Study Draft EIS ending on January 27, 2015. Public Hearings for the project were held on December 3rd and 4th. The preferred alternative was announced on February 17, 2015. Following the end of the public comment period, FHWA and WisDOT are preparing a Final EIS, slated for approval in December 2015. This engineering and operational acceptance is being sought prior to approval of the FEIS. A Record of Decision is anticipated in the spring of 2016. Coordination meetings were held between the design team, WisDOT and FHWA (Division and Headquarters) prior to the selection of the preferred alternative and Draft Environmental Impact Statement. The engineering and operational review and approval schedule has been coordinated with FHWA and will be completed prior to review and approval of the Final EIS.

Conclusion

The design of the 68th/70th Street Interchange has been developed to improve the traffic operations of the I-94 mainline as well as the entering and exiting traffic movements at the interchange. The development of the proposed interchange has taken place as part of the NEPA process. The 68th/70th Street Interchange modifications and the local street/intersection improvements to mitigate the change in access are covered in the EIS.

Chapter 3:
STADIUM INTERCHANGE

EXISTING CONDITIONS

The aerial photography of the existing corridor is shown in **Exhibits 2-1** through **2-3.**

Existing Land Use

Existing land use in the I-94 East-West Corridor generally consists of high density urban development, including commercial, residential, institutional, industrial, parks, transportation, and utilities.

The land use around the Stadium Interchange area is dominated by Miller Park to the south with a combination of residential, commercial, and industrial land uses north of I-94. Land uses east of the Stadium Interchange are divided by I-94. The area north of I-94 is generally residential and commercial, while the area south of I-94 is part of the Menomonee Valley industrial park. Between Mitchell Boulevard and Yount Drive, the electrical transmission line corridor crosses from the north side to the south side of I-94, and continues east on the south side of the interchange.

The southwest quadrant of the Stadium Interchange consists of Miller Park and its parking lots. A youth baseball field (Helfaer Field) is located in the Miller Park parking lot.

The northwest quadrant of the Stadium Interchange east of Yount Drive includes a parking lot for Miller Park located between WIS 175, I-94, Yount Drive, and the Story Apartments. The Story Apartments are adjacent to WIS 175 at the intersection of Story Parkway and Bluemound Road. The Bluemound Road area consists of a combination of commercial uses and single-family residences.

The northeast quadrant of the Stadium Interchange consists of a variety of land uses between I-94 and Wisconsin Avenue. A pocket of 18 residences is located along 45th Street just east of WIS 175, and the Valley Park neighborhood is located between the Menomonee River and 35th Street. The Menomonee River and the Canadian Pacific rail line traverse this quadrant of the interchange. Commercial uses are located along Wisconsin Avenue east of WIS 175. A large semi-truck trailer parking area owned by MillerCoors is located south of Wisconsin Avenue between the Menomonee River and Canadian Pacific rail line, and a Miller Park parking lot is located between 44th Street and WIS 175/WIS 341.

The southeast quadrant of the Stadium Interchange consists of industrial, utility, recreational, and transportation land uses. The utility land use consists of the electrical transmission line corridor on the south side of I-94 and the Park Hill electrical substation. Industrial land uses are located east of Selig Drive in the west end of the Menomonee Valley. Recreational land use consists of green spaces along the Menomonee River, the Hank Aaron State Trail, and a park along Canal Street. The largest Miller Park parking lot is within this quadrant.

Operational Performance

Existing Freeway Analysis – HCS 2010

Analyses of the freeway operations for the existing conditions were conducted using balanced year 2009 AM and PM peak hour traffic volumes and existing geometrics. The peak hour factor used for the existing analysis was 0.96. Level terrain and a posted mainline speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-1. Tables A-2** and **A-3** have the input information for ramp and weaving segment analyses.

There are weaving segments on I-94 on both sides of the Stadium Interchange. They all operate at LOS E except the westbound segment west of the Stadium Interchange which operates at LOS D in the PM peak period. WIS 341 south of the Stadium Interchange has weaving segments in both directions that operate at LOS B in both the AM and PM peak periods. WIS 175 north of the Stadium Interchange has weaving segments in both directions that operate at LOS C in the northbound direction and LOS B in the southbound direction in both the AM and PM peak periods. The northbound and southbound mainline operates at LOS B in both the AM and PM peak periods. The I-94 mainline operates at LOS D eastbound in both the AM and PM peaks and westbound in the PM peak. The westbound AM peak operates at LOS C.

The density values and LOS for each of the mainline freeway segments is shown in **Table A-4**. **Tables A-5** and **A-6** have the density values and LOS for each of the ramp terminals and weaving segments analyzed.

The existing traffic volumes and levels of service for the freeway and ramps are shown on schematic diagrams of the facility. These are included as **Exhibit 3-2.** The Hawley Road, Mitchell Boulevard, and 35th Street service interchanges are discussed in this section, and subsequent sections which detail future operations, as they impact existing and future operations of the Stadium Interchange due to their close proximity.

Existing Freeway Analysis – Paramics

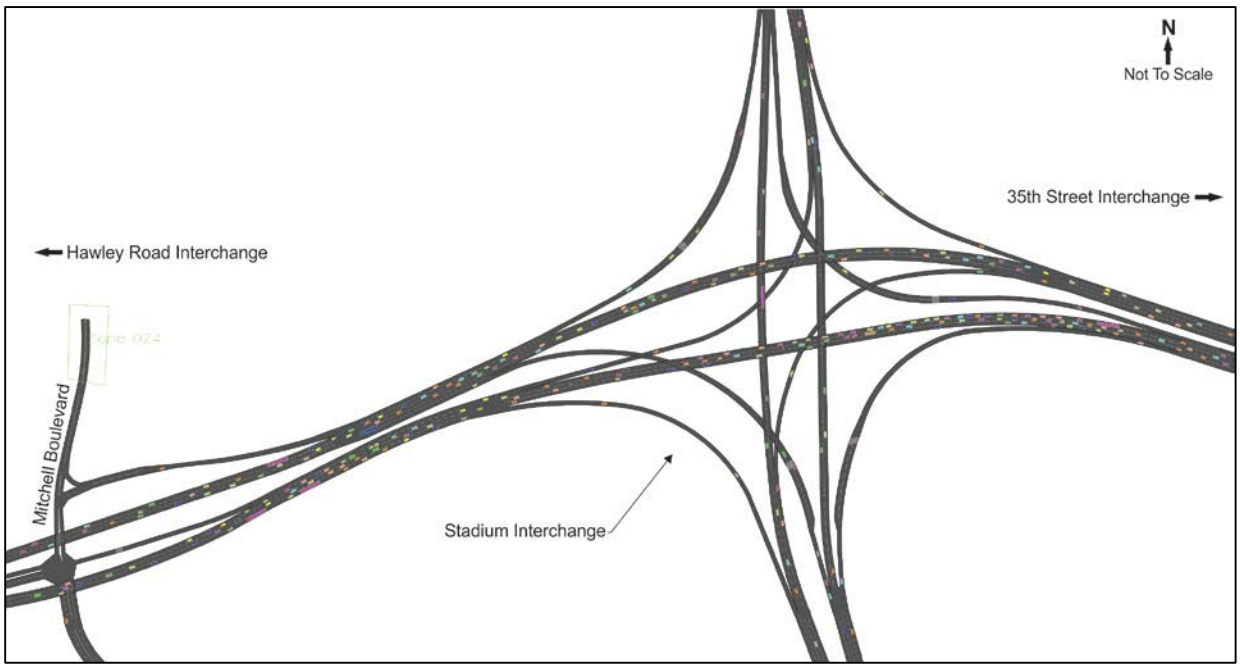
Existing AM and PM peak hour LOS is not reported based on Paramics model outputs, as there is no direct correlation between the inherent assumptions included in the Highway Capacity Manual methodology and Paramics microsimulation modeling. Therefore, visual observations of the model and resulting speeds are primarily utilized to convey model operations.

The existing AM peak period Paramics model shows slow speeds and congestion throughout the duration of the AM peak hour (7-8AM) between the Mitchell Boulevard and Stadium interchanges, which is consistent with HCS 2010 analysis of the existing conditions. Congestion and slow speeds along I-94 EB develop due to the combination of left and right side exit and entrance ramps at both interchanges, which creates turbulence that affects all travel lanes. In addition, the short distances, weaving, and heavy mainline demands between Mitchell Boulevard, the Stadium Interchange, and 35th Street increases this level of turbulence and results in average hourly speeds of approximately 36 mph.

Similarly, operations along I-94 WB are affected by a combination of the existing geometry, interchange spacing, and demands between 35th Street and Mitchell Boulevard, which results in slow speeds and congestion. AM peak hour hourly speeds along I-94 WB average approximately 37 mph.

Figure 1 shows a screen capture from the existing AM peak period Paramics model between Mitchell Boulevard and the Stadium Interchanges, which represents operations at approximately 7:30AM. **Tables A-19** and **A-20** in **Appendix A** includes the existing AM peak period Paramics model speeds for roadway sections between the Mitchell Boulevard and Stadium Interchanges area of influence.

Figure 1

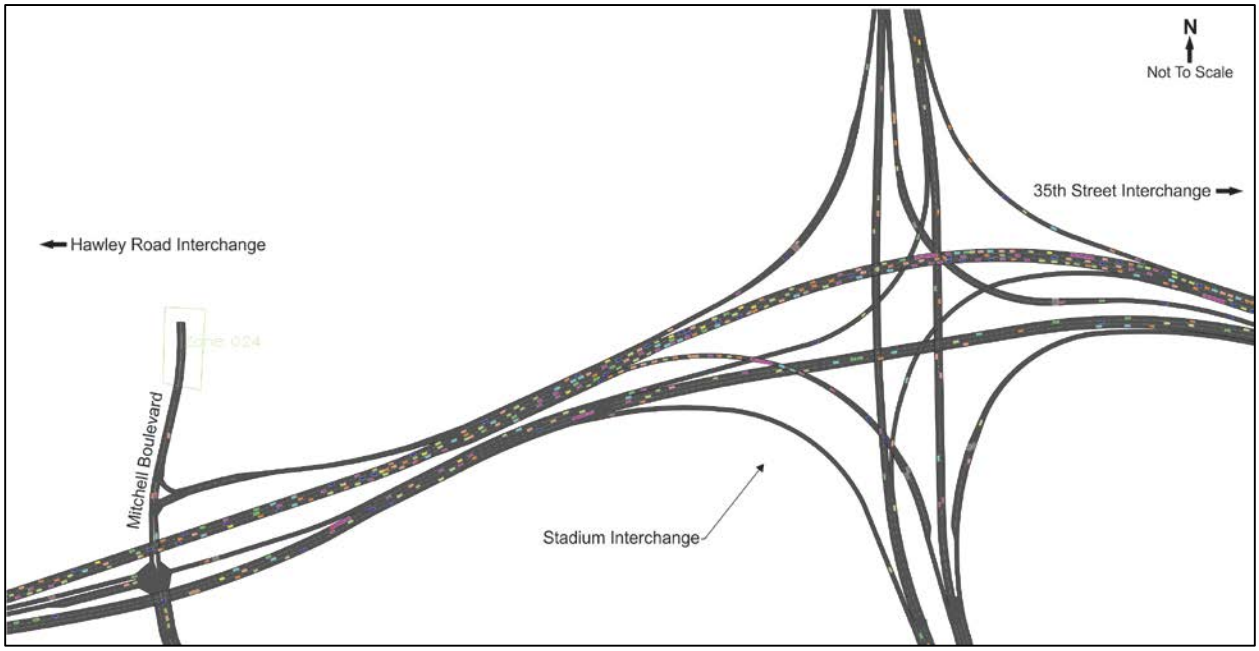


The existing PM peak period Paramics model shows significantly slower speeds and increased congestion along I-94 WB throughout the duration of the PM peak hour (4:30-5:30PM) and extending into the hour after (5:30-6:30PM) between 35th Street and Mitchell Boulevard, including the Stadium Interchange. As noted previously, the existing geometry, short interchange/ramp spacing, and heavy demands are all contributing factors to the resulting heavy congestion. As a result, average PM peak hour speeds along I-94 WB in this area range between 13 mph and 46 mph, with a corridor average of 26 mph.

Operations along I-94 EB between Mitchell Boulevard and 35th Street are slightly better during the PM peak hour in comparison to the AM peak hour, mainly due to the slightly lower demand. Sporadic congestion and slightly slower speeds are still present, but is mainly limited to the area between Mitchell Boulevard and the Stadium Interchange during the greatest 15-minute period of the PM peak hour (4:45-5PM). The average I-94 EB corridor speed during the PM peak hour is 49 mph.

Figure 2 shows a screen capture from the existing PM peak period Paramics model between Mitchell Boulevard and the Stadium Interchanges, which represents operations at approximately 5PM. **Tables A-21** and **A-22** in **Appendix A** includes the existing PM peak period Paramics model speeds for roadway sections between the Mitchell Boulevard and Stadium Interchanges area of influence.

Figure 2



Intersection Analysis

Existing peak hour operations of the service interchange ramp terminals were analyzed using Synchro. The intersection peak hour factors and turning movement truck percentages were calculated for each ramp terminal based on existing count data collected for the AM and PM peak hours.

In general, the existing ramp terminals operate between LOS A and LOS E overall during the existing peak hours. Turning movements at the Hawley Road Interchange operate between LOS A and LOS C, expect for one turning movement. Similarly, turning movements at the Mitchell Boulevard Interchange operate between LOS A and LOS B, except for I-94 EB exit ramp movements during the PM peak hour. 35th Street Interchange turning movements mainly operate at LOS D or better outside of one turning movement.

The results of the intersection analyses are shown in the tables in **Appendix B**. More detail is provided in the discussion for **Policy Point 1**.

Hawley Road Interchange

The existing interchange has a diagonal exit ramp and curved entrance ramp on the south side for the eastbound I-94 connections and partial cloverleaf ramps on the north side for the westbound I-94 connections, with the westbound exit ramp being a loop. The eastbound ramp terminals are unsignalized and the westbound ramp terminal intersection on Hawley Road is traffic signal controlled.

A summary of the Levels of Service from the Synchro analysis for all of the movements are in **Table B-3** with queue lengths summarized in **Table B-4.** The Hawley Road eastbound exit ramp operates at LOS F in the PM peak period. This is a stop controlled intersection with significant cross-street through traffic. The analysis does not take into account gaps created at the signalized intersection of the westbound ramp terminal. The queues do not impact the I-94 mainline operations and safety. All other turning movements operate at LOS C or better during both existing peak hours.

Mitchell Boulevard Interchange

The existing interchange is a diamond with three left side ramps (EB Exit, EB Entrance, and WB Entrance) located within the median. The westbound exit ramp is a right side diagonal ramp like a typical diamond. The intersections of the ramps with Mitchell Boulevard are all stop sign controlled.

A summary of the Levels of Service from the Synchro analysis for all of the movements are in **Table B-5.** The Mitchell Boulevard eastbound exit ramps operate at LOS E in the PM peak period. The volumes are relatively low and the operations do not impact the mainline operations or safety. All other turning movements operate at LOS B or better during both existing peak hours.

35th Street Interchange

The existing interchange is a diamond. The westbound ramps are slip ramps that connect to Park Hill Avenue. The eastbound ramps connect directly to 35th Street. The intersections are traffic signal controlled.

In general, the 35th Street Interchange north ramp terminal (I-94 WB ramps) operates at LOS E during the existing AM peak hour and at LOS D during the existing PM peak hour. Outside of the northbound left turn movement, which operates at LOS F during both peak hours, the remaining turning movements operate at LOS D or better. The south ramp terminal (I-94 EB ramps) and corresponding turning movements operate at LOS D or better during both existing peak hours.

A summary of the Levels of Service from the Synchro analysis for all of the movements are shown in **Table B-6** with queue lengths summarized in **Table B-7**.

Existing Safety Conditions

The average total crash rate on I-94 from the Stadium Interchange ramps to the 35th Street ramps is 275.3 crashes /100M VMT. This is about 224% greater than the statewide average total crash rate of 85 crashes/100M VMT. The average total crash rate on WIS 175/WIS 341 from Canal Street to Wells Street is 167.6 crashes/100M VMT, which is approximately 97% greater than the statewide average total crash rate. The breakdown of crashes by severity is shown in **Table 1** for the years 2005 to 2009.

Table 1

Segment	Number of Crashes			Total
	Property Damage	Injury	Fatal	
I-94 EB to WIS 175 NB (W-N)	31	18	0	49
I-94 EB (W-E)	24	5	0	29
I-94 EB to WIS 341 SB (W-S)	6	3	0	9
I-94 WB to WIS 175 NB (E-N)	3	1	0	4
I-94 WB (E-W)	27	11	0	38
I-94 WB to WIS 341 SB (E-S)	10	4	0	14
WIS 341 NB to I-94 WB (S-W)	4	3	0	7
WIS 341 NB to WIS 175 NB (S-N)	5	4	0	9
WIS 341 NB to I-94 EB (S-E)	7	3	0	10
WIS 175 SB to I-94 WB (N-W)	11	1	0	12
WIS 175 SB to WIS 341 SB (N-S)	3	3	0	6
WIS 175 SB to I-94 EB (N-E)	10	4	0	14

The average total crash rate on the ramps within the Stadium Interchange is 0.8 crashes per one million entering vehicles (crashes/1MEV) from year 2005 to 2009. The I-94 eastbound to WIS 175 northbound ramp has the highest crash rate of the stadium interchange movements. 49 crashes were reported during this period, which equates to a crash rate of 3.3 crashes/1MEV. Other ramps that have a crash rate higher than the average are the I-94 westbound to WIS 341 southbound with a rate of 1.0 crash/1MEV, WIS 175 southbound to I-94 eastbound with a rate of 0.9 crashes/1MEV and WIS 341 northbound to I-94 eastbound. The three ramps with the highest crash rates have left side movements which will be replaced with right side movements under the preferred alternative. For more detail on the crashes within the corridor, see the Crash Analysis Technical Memorandum, which is included as **Appendix D**.

Existing Environmental Constraints

The Northwestern Branch, National Home for Disabled Volunteer Soldiers National Historic Landmark and Historic District (Soldiers' Home NHL and Historic District) is located adjacent to both sides of I-94 west of Miller Park. The Soldiers' Home was established in 1865 to care for Civil War veterans. West of the Soldiers' Home NHL and Historic District are two cemeteries adjacent to both sides of I-94. At the outset of the project it was determined that no graves would be moved as part of this project. 40 graves were relocated as part of the original I-94 construction in 1963. Hundreds of more graves would need to be relocated in order to provide for a full to partially full roadway section meeting standards on existing grade. Due to the close proximity of the cemeteries to Mitchell Boulevard, a full diamond interchange could not be reconstructed at this location without relocating graves.

East of the Stadium Interchange is a crossing of the Menomonee River. This is not a new crossing as I-94 already crosses the river.

The Story Hill Neighborhood is located directly north of Miller Park and south of Wisconsin Avenue. Story Hill was developed in the 1920's. The houses in the neighborhood consist of ornate early 20th-century houses, predominantly made of brick. The Story Hill Nos. 2 & 3 Residential Historic Districts are found directly south of the original Story Hill Subdivision, which was platted on the 9th of May 1911 and determined eligible for the National Register on the 18th of April 2013. The subject district is framed by W. Bluemound Road on the north, N. Story Parkway on the east and south, and Mitchell Boulevard Park on the west.

ALTERNATIVES

Many alternatives were considered. There were alternatives that were looked at and eliminated because they had fatal flaws. The following are some of the alternatives that were looked at and eliminated due to impacts or unacceptable operations:

- Stadium Full System Interchange (4 level interchange with 50 mph free flow fly over ramps)
- Stadium Turbine Interchange (Several level full system interchange with 40 mph free flow ramps)
- Stadium Single Point Diamond Interchange (3 level interchange with a single point intersection between the ramps and WIS 175/341 controlled by traffic signals)
- Stadium Single Point Interchange with CD Roads (3 level interchange with left handed entrance and exit ramps going through a single point intersection controlled by signals; WIS 175/341 is free flow)
- Stadium Modified Echelon Interchange with CD Roads to Mitchell Boulevard (3 level interchange with free flow left hand entrance/exit ramps to/from WIS 175/341.)

Zablocki Drive will remain at its present location, and its bridge over I-94 is proposed to be replaced and raised, requiring reconstruction of short segments of Zablocki Drive on each side of the new bridge (about 340-feet north of I-94 and 210-feet south of I-94).

The freeway entrance and exit ramps at the Mitchell Boulevard Interchange are proposed to be removed. Having entrance and exit ramps in the narrow cemetery area creates congestion and there is no space to physically locate the ramps without impacting the cemeteries or having very short and unsafe merge and diverge distances on the interstate. The Mitchell Boulevard interchange access will be replaced by a new local road interchange embedded within the Stadium Interchange.

Preferred Alternative

The Preferred alternative is the At-grade alternative with a Half Hawley Road Interchange on the west and the On-alignment alternative on the east. The *I-94 East-West Corridor Preferred Alternative Identification Technical Memorandum* in **Appendix H** provides supporting documentation that established the basis for the recommendation of the preferred alternative.

Under the On-alignment alternative, the Stadium Interchange is proposed to be reconstructed to a service type interchange. The highest point of the new Stadium Interchange is to be about 25 feet higher than the existing interchange. The exit ramps are to be free-flow and the entrance ramps are to be controlled by traffic signals. All of the exit ramps from I-94 to WIS 175/Miller Park Way are to be free-flow ramps (no signals).

WisDOT decided to update the Stadium Interchange with signals on WIS 175/Miller Park Way for two reasons:

- WIS 175/Miller Park Way does not carry as much traffic as a typical 6-lane freeway. WIS 175/Miller Park Way was constructed as a freeway because it was intended to connect to a larger freeway network that was never completed.[1] As a result, the amount of traffic entering and exiting WIS 175/Miller Park Way at the Stadium Interchange does not require entirely free-flow movements like those that a system-type interchange provides.
- The cost of reconstructing this interchange as a full system interchange is higher than it would be if reconstructed as a service interchange (the footprint of a system-type interchange would increase to accommodate modern design standards, increasing impacts to adjacent neighborhoods and parking adjacent to Miller Park).

The existing speed on Miller Park Way drops down to 35 MPH at the signalized intersection about a half a mile south. The existing speed limit to the north is 50 MPH, but is proposed to be changed to 45 MPH. WIS 175 ends less than two miles north of the Stadium Interchange at the signalized intersection with Lisbon Avenue.

Given that WIS 341/Miller Park Way to WIS 175 traffic is higher than on most urban streets (like 68th and 70th Streets, or Hawley Road for example), but still less than on other urban freeways like I-94 or I-894, WisDOT decided on an interchange with both free-flow and signal-controlled ramps, but a lower speed design (free-flow ramps design speed of 35-45mph). Northbound WIS 341/Miller Park Way will be at a signal controlled intersection with the ramp from southbound WIS 175 to eastbound I-94 and southbound WIS 175 will be at a signal controlled intersection with northbound WIS 341/Miller Park Way to westbound I-94. The reconstructed interchange would have a smaller footprint than the existing interchange.

The ramps exiting I-94 in the Stadium Interchange are free-flow. The ramps from eastbound I-94 to southbound WIS 341/Miller Park Way and from westbound I-94 to northbound WIS 175 are free-flow ramps with a design speed of 35-45MPH. The ramps from eastbound I-94 to northbound WIS 175 and from westbound I-94 to southbound WIS 341/Miller Park Way are proposed to be free flow with either a tangent section separating two 35MPH design speed curves or single 45 mph design speed curves.

I-94 through the Stadium Interchange would operate at level of service D or better. WIS 175/Miller Park Way would generally operate at level of service C or better in the design year (2040) during the morning and afternoon peak hours. Perhaps the biggest change in the way the interchange would operate is that there would be a traffic signal on WIS 175/Miller Park Way that would control the through-traffic and left turns onto I-94 from WIS 175/Miller Park Way.

Underneath the Stadium Interchange, new entrance and exit ramps to 44th Street and a new local street (tentatively referred to as 46th Street) are proposed to be constructed (**Exhibit 5-2**). The ramps will replace the access that would be removed from Mitchell Boulevard. This interchange will connect to the existing Miller Park ring road and a new frontage road north of I-94. The new north frontage road will pass over Yount Drive and connect to Mitchell Boulevard near the existing westbound I-94 exit ramp at

[1] US 41 in the study area has been re-designated as a state highway (WIS 175) due to the conversion of US 41 to I-41 and the rerouting of I-41/US 41 along I-894 and US 45. The US 41 Interstate Conversion Project converted US 41 to an interstate highway from the Mitchell Interchange in Milwaukee to Green Bay via I-894, US 45, and US 41. This involves no improvements of the existing US 41 route in the I-94 East-West Corridor (other than additional signing) and does not change the forecasted traffic volume on the roadways. Project signing has been completed during the 2015 construction season. For more information on the US 41 Interstate Conversion Project, see the project's website at: http://www.dot.wisconsin.gov/projects/neregion/41/.

Mitchell Boulevard. For drivers on westbound I-94 these connections would provide access similar to existing Miller Park parking, the VA campus, and the Story Hill neighborhood.

As part of the reconstructed Stadium Interchange, there will be no access from northbound Miller Park Way to the Wisconsin Avenue Interchange on WIS 175. Those exiting I-94 to WIS 175 will continue to be able to exit at Wisconsin Avenue. Additionally, those entering WIS 175 southbound from Wisconsin Avenue will continue to be able to access I-94 in both directions and travel south along WIS 175/Miller Park Way. Braided ramps are proposed between the Stadium Interchange and the 35th Street Interchange to eliminate the tight weaves, therefore there will be no access from WIS 175 or Miller Park Way to the 35th Street Interchange. Traffic on WIS 175/Miller Park Way will be able to access 35th Street from Wisconsin Avenue north of I-94 or National Avenue south of I-94. Access to the 35th Street Interchange will continue to be provided for motorists on I-94.

FUTURE YEAR TRAFFIC

Year 2040 traffic forecasts were used to analyze the traffic operations of the alternatives considered for implementation. Average weekday traffic and peak hour forecasts were provided by SEWRPC. K30 volumes do not represent the peak hour traffic volumes in this corridor because of the special traffic generators in the area (Miller Park, State Fair Park, Summerfest and other festivals held in the area). K200 volumes were found to closely approximate the typical AM and PM peak hours, so these were used for the design hourly volumes in the analyses as concurred with by WisDOT and FHWA. The basis for the design year traffic projections used for this project and the approval on September 20, 2012 by FHWA are documented in the memo on DHV and LOS in **Appendix C**.

As discussed previously, the Hawley Road, Mitchell Boulevard, and 35th Street service interchanges are discussed in this section as they impact future operations of the Stadium Interchange due to their close proximity.

No-Build Conditions

The No-Build analyses were conducted using the projected design year (2040) AM and PM peak hour traffic volumes and the existing geometric conditions. The peak hour factor used for the no-build analysis was 0.97. Level terrain and a mainline free flow speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-7**. **Tables A-8** and **A-9** have the input information for ramp and weaving segment analyses.

The 2040 no-build analysis shows levels of service along I-94 ranging from LOS C to LOS F. I-94 mainline would operate at LOS E or F on most segments in the design year if no improvement is made to this facility. The LOS for the freeway segments are shown in **Table A-10**. The weaving and ramp segments are shown in **Tables A-11** and **A-12**.

While the No-Build alternative would include continued maintenance of the I-94 corridor facility, it would not address the purpose and need of the project. As traffic volumes increase, an increase in congestion and crashes can be expected if there is no improvement to the facility.

The No-Build alternative is not considered a reasonable course of action, but is retained as a basis for comparison to the Build Alternative.

The No-Build traffic volumes and levels of service for the freeway and ramps are shown on schematic diagrams in **Exhibits 4-1, 4-2** and **4-3**.

ALTERNATIVES ANALYSIS

Compliance with Policies and Engineering Standards

The design for the I-94 East-West Corridor Project is intended to meet or exceed current interstate standards where feasible. However, it is acknowledged that there will be exceptions to standards in some locations to minimize impacts to the surrounding development and environmental/cultural resources. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review and approval by WisDOT and FHWA. The anticipated exceptions to standards for the preferred alternative are in this section. For more detail on these and exceptions for other alternatives see the Exceptions to Standards memo in **Appendix F**.

The following are areas where exceptions are anticipated to be necessary to avoid excessive impacts:

I-94 Between the Hawley Road Interchange and Zablocki Drive (just east of Hawley Road)

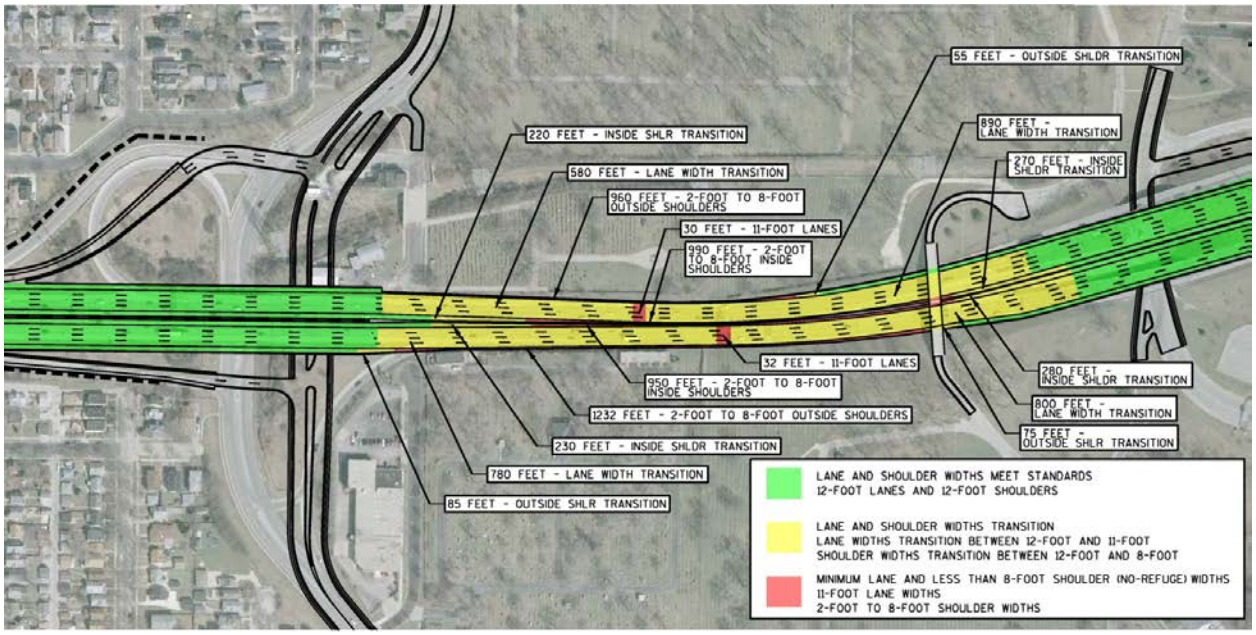
At its narrowest point, roughly 110 feet would be available for the construction footprint of I-94 between the cemeteries. Lane widths would be as narrow as 11 feet for a short distance (**Figure 3**). For the At-grade alternative with a half interchange at Hawley Road, eastbound and westbound traffic would travel in 11-foot lanes for roughly 30 feet in each direction. The lanes would transition from 12 feet to 11 feet for several hundred feet east and west of the 11-foot-lane segment. For eastbound traffic the adjacent transitions from 12- to 11-foot lanes would be roughly 780 feet to the west and 800 feet to the east of the short section of 11-foot lanes. For westbound traffic, the transition from 12 to 11-foot lanes would be roughly 580 feet to the west of the short section of 11-foot lanes and 890 feet to the east.

The shoulder widths would vary in this segment as the available right-of-way varies (the shoulders would be as narrow as 2 feet). For eastbound traffic, the outside shoulder would transition from 12-foot to 8-foot for 85 feet and then would consist of a shoulder width of between 2- and 8-foot for the next 1,230 feet. The outside shoulder width would transition from 8-foot to 12-foot over the next 75 feet. The eastbound inside shoulder would transition from 12- to 8-foot for 230 feet and then would consist of a shoulder width between 2- and 8-foot for the next 950 feet. The inside shoulder width would transition from 8-foot to 12-foot over the next 280 feet.

For westbound traffic, the outside shoulder would transition from 12-foot to 8-foot for 55 feet and then would consist of a shoulder width of between 2- and 8-foot for the next 960 feet before transitioning immediately back to 12-feet. The westbound inside shoulder would transition from 12- to 8-foot for 270 feet and then would consist of a shoulder width between 2- and 8-foot for the next 990 feet. The inside shoulder width would transition from 8-foot to 12-foot over the next 220 feet.

To summarize, for eastbound traffic, there would be less than 12-foot lanes for about 1,600 feet, less than 12-foot inside shoulder for 1,460 feet, and less than 12-foot outside shoulder for 1,390 feet. For westbound traffic, there would be less than 12-foot lanes for about 1,500 feet, less than 12-foot inside shoulder for 1,480 feet, and less than 12-foot outside shoulder for 1,010 feet. **Figure 3** provides a visual summary of the distances described in this section.

Figure 3



The East Segment On-Alignment Alternative has shoulder segments wider than 12’ proposed in spot locations to provide the needed sight distance.

Stopping Sight Distance (SSD)

Roadway barrier as a SSD sight obstruction along the inside (left) shoulder of the horizontal curves on I-94 EB from 850’ east of Hawley Road to 1250’ east of Hawley Road and along the outside (right) shoulder of the horizontal curves on I-94 WB from Zablocki Drive to about 600’ west of Zablocki Drive.

Environmental Impacts

This project is in a developed urban area with no natural areas. There are few environmental impacts.

The reconstructed Stadium Interchange would result in several new bridges built over the Menomonee River primary environmental corridor. The bridges would span both the Menomonee River and associated primary environmental corridor.

Alternatives were designed to stay within existing right-of-way as much as possible to minimize the impact on surrounding environmental corridors. There are no feasible Stadium Interchange options that could completely avoid impact to the linear primary environmental corridor. Alternatives were designed to minimize impacts to the primary environmental corridor in this location by clear spanning it.

In the east segment the On-alignment alternative (preferred alternative) would acquire 47 acres of new right-of-way. About half of the new right-of-way required is located near the Stadium Interchange. About 13 acres would be required from the Miller Park property while 17 acres of We Energies or ATC property would be acquired. East of the Stadium Interchange, as a result of staying close to the existing

alignment, the On-alignment alternative would require less new right-of-way than the Off-alignment alternative in this area.

Safety

The corridor was analyzed with the ISATe tool to predict the frequency and severity of crashes on the alternatives considered. The ISATe tool predicted that the preferred alternative will have a reduction in total crashes of 20%, Fatal and injury crashes of 18% and property damage only crashes of 22% over the replace in kind alternative. The Replace-in-kind has 80% multiple vehicle and 20% single vehicle crashes predicted. The preferred alternative has 73% multiple vehicle and 27% single vehicle crashes predicted. The technical memorandum that summarizes this analysis is included as **Appendix E**.

Safety Improvements in the Proposed Design

The proposed design will address the existing safety issues with the following revisions to the corridor:

- Removing the left side ramps. All ramps in the proposed improvement project will be on the right side conforming to driver expectations. This will eliminate the two-sided weave maneuvers.
- Single exits at the Stadium Interchange.
- Alignment improvements, flatter horizontal curves and vertical curves with better sight distance
- Providing an embedded service interchange within the Stadium Interchange rather than having the close spacing between the existing Stadium Interchange and the Mitchell Boulevard Interchange.
- The increased capacity is expected to reduce the number of crashes due to congested conditions on the freeway.
- Increased acceleration and deceleration distances at the entrance and exit ramps will provide safer and more efficient merging and diverging operations.
- With less congested conditions emergency responders will arrive more quickly when a crash does occur.

The proposed design for the preferred alternative of the interchange is shown on **Exhibit 5-2**. The spacing of the access points is improved from the existing condition and the distances are shown on these exhibits. The design of the interchange is shown on **Exhibit 6-3**. The signing plan for the proposed design is shown on **Exhibits 8-1** through **8-3**. **Table 2** shows the proposed spacing of the ramp terminals along I-94 within the corridor along with the standard spacing for each ramp configuration.

Table 2 Proposed Ramp Spacing

Route	From	To	Proposed	Required	Auxiliary Lane*
I-94 EB	Hawley Road Exit	Stadium Exit	3470’	1000'	No
I-94 EB	Stadium Exit	44th Street Exit	1295’	1000'	No
I-94 EB	44th Street Exit	35th Street Exit	1200'	1000'	No
I-94 EB	35th Street Exit	Stadium Entrance	1950'	500'	No
I-94 EB	Stadium Entrance	26th Street Exit	2285'	1000'	No
I-94 WB	28th Street Entrance	Stadium Exit	1280'	2000'	Yes

Table 2 Proposed Ramp Spacing (Continued)

Route	From	To	Proposed	Required	Auxiliary Lane*
I-94 WB	Stadium Exit	35th Street Entrance	1590’	500'	No
I-94 WB	35th Street Entrance	44th Street Entrance	1490'	1000'	No
I-94 WB	44th Street Entrance	Stadium Entrance	1280'	1000'	No
I-94 WB	Stadium Entrance	Hawley Road Entrance	3465’	1000'	No
Ramp EB	Stadium Exit	WS/WN Ramp Exit	1191'	800'	No
Ramp WB	Stadium Exit	46th Street Exit	1470'	800'	No
Ramp WB	46th Street Exit	ES/EN Ramp Exit	620’	800’	No

* AASHTO recommends the inclusion of an auxiliary lane when ramp spacing s 1500’ or less.

Operational Performance

Freeway Analysis – HCS 2010

The preferred alternative was analyzed in HCS using the projected design year (2040) AM and PM peak hour traffic volumes and the proposed design geometrics. The peak hour factor used for the build alternative analysis was 0.97. Level terrain and a mainline operating speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes input for each freeway segment are shown in **Appendix A** in **Table A-13**. The input information for the ramp and weaving segments are in **Tables A-14** and **A-15**.

The proposed design for the preferred alternative is shown on **Exhibit 5-2**. **Exhibit 6-3** shows each proposed interchange in the Stadium Interchange area of influence. The projected 2040 AM and PM peak traffic volumes and the level of service from the HCS analyses are shown on **Exhibit 7-2**. The level of service is from LOS C to LOS D on I-94 freeway segments for this alternative. The narrow section will operate at LOS D. WIS 175 will operate at LOS B.

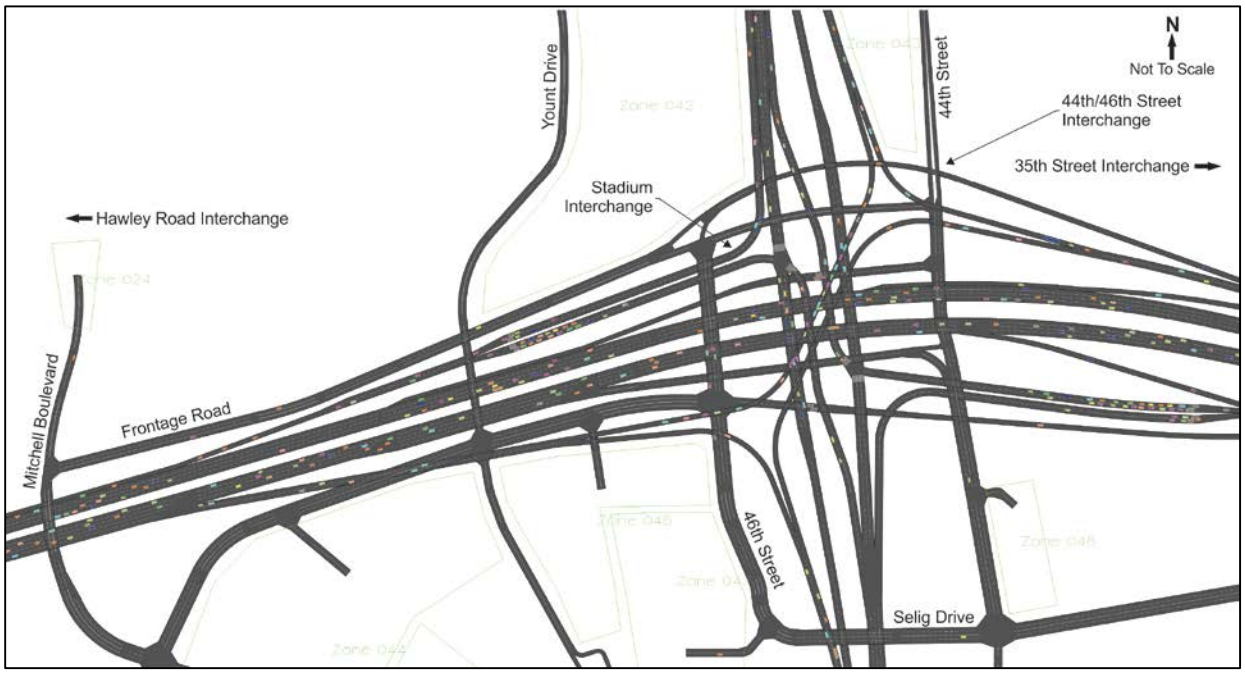
Freeway Analysis - Paramics

Overall, the future peak period Paramics models of the preferred alternative indicated acceptable operations in the Stadium Interchange influence area, including the embedded 44th/46th Street Interchange, associated with the design year traffic forecast. As previously indicated, LOS is not reported based on Paramics model outputs and as such, visual observations of the model and resulting speeds are used to convey operations.

In general, the future AM peak period Paramics model demonstrated consistent speeds and stable operations throughout the AM peak hour along I-94 through the Stadium Interchange. Improved geometrics (i.e. right side exit ramps), ramp spacing, and the additional lane in each direction of I-94 help improve operations in comparison to the existing AM peak period. I-94 EB through the cemetery section (between Hawley Road and Mitchell Boulevard) operated slightly under the posted speed limit (55 mph), but there was no residual or upstream impacts of the slightly slower speeds. The 44th/46th Street Interchange has little to no impact on mainline operations as the future AM peak period demand is low relative to the rest of the corridor. The remaining roadway sections along both directions of I-94 included within the area of influence operated at or slightly greater than the posted speed limit.

Figure 4 shows a screen capture from the future AM peak period Paramics model in the Stadium Interchange area, which represents operations at approximately 7:30AM. **Table A-23** and **A-24** in **Appendix A** includes the future AM peak period Paramics model speeds for roadway sections located within the Stadium Interchange area of influence.

Figure 4

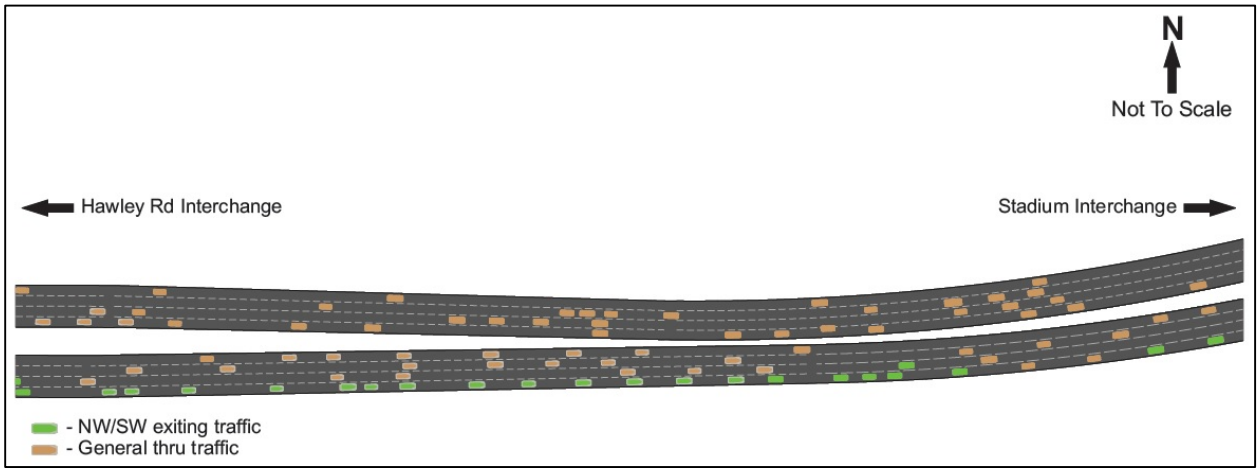


The future PM peak period Paramics model also demonstrated consistent speeds and stable operations throughout the PM peak hour between Mitchell Boulevard and the Stadium Interchange. There was one segment in the PM peak hour that indicated slightly lower speeds than expected, but not to unacceptable levels. The following section summarizes the cause of the reduced speeds observed in the model.

The preferred alternative segment between Hawley Road and the Stadium Interchange features two items that contribute to reduced speeds; 1) a four lane eastbound cross-section with sub-standard lane widths and shoulders, and 2) all traffic exiting the I-94 corridor to head north on WIS 175 (W-N ramp) or south on WIS 341 (W-S ramp) need to be in the right-most general purpose lane upstream of the Stadium Interchange.

The design year PM peak hour forecast indicates that roughly 30% of the I-94 EB approach demand will exit the I-94 EB mainline via the W-N or W-S ramps at the Stadium Interchange. The result is a heavy utilization of the right-most lane by a combination of exiting and I-94 EB thru traffic. **Figure 5** shows an example of the right-lane utilization from the PM peak period Paramics model.

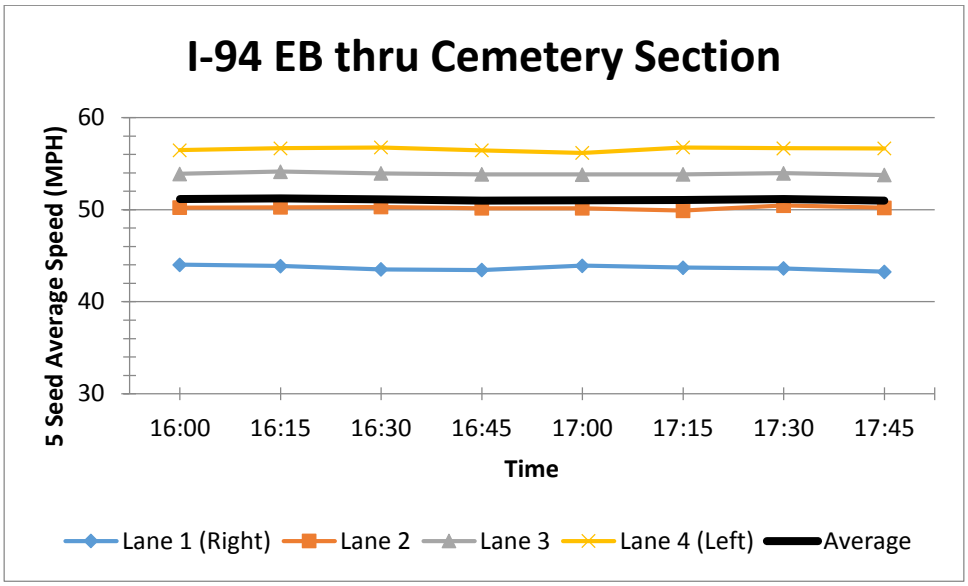
Figure 5



As a result of the heavy right lane utilization, I-94 EB mainline overall speeds between Hawley Road and the Stadium Interchange are impacted due to the friction effect of right lane operations on the median and left lanes. This results in some sporadic congestion that is localized to the cemetery section.

Despite the operational effect of the right lane utilization, the other general purpose lanes and overall segment speeds through the cemetery section are consistent throughout the PM peak period, as indicated in **Figure 6**. The consistency in speeds at this location is an indication of stable flow and reliable operations overall.

Figure 6

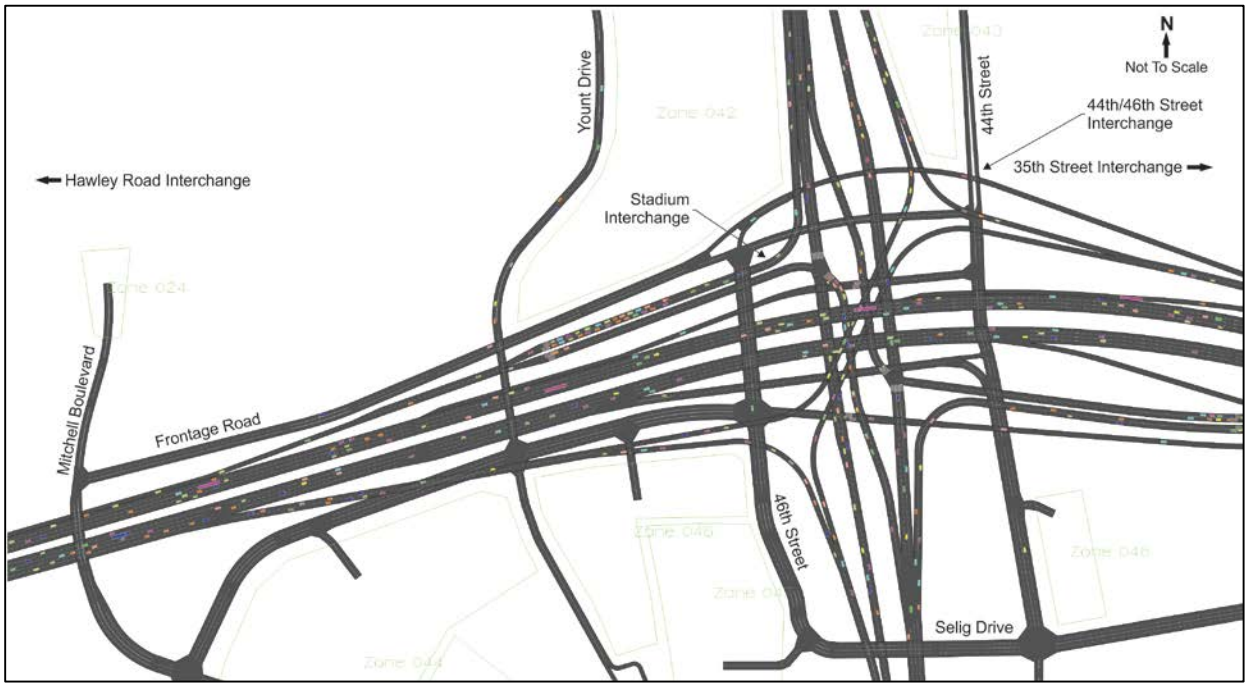


Similar to the future AM peak period, the 44th/46th Street Interchange has little to no impact on I-94 mainline operations during the future PM peak period due to the relatively low demand.

Figure 7 shows a screen capture from the future PM peak period Paramics model in the Stadium Interchange area, which represents operations at approximately 5PM. **Table A-25** and **A-26** in **Appendix**

A includes the future PM peak period Paramics model speeds for roadway sections location within the Stadium Interchange area of influence.

Figure 7



The designs of the interchanges are based on the typical AM and PM peak hours. Although the design is not based on the projected volume during a period of Brewer game arrival or departure, consideration has been given to special events at Miller Park. The description and results of the analysis of the ingress and egress scenarios are included in **Appendix J**. The design team has been coordinating with the Miller Park Stadium District to ensure that event traffic can be accommodated with reasonable delay. Their goal is to accommodate the departure from the parking lots within 45 minutes after the Brewers' game ends. The current traffic control plan for Brewer games at Miller Park includes police directing traffic in and out of the parking areas at game times.

The design has been refined to minimize the impact to the Miller Park facility. Access to the parking areas has been coordinated with the representatives of the Brewers and the Stadium District. The interchange layout improves mainline operations and provides comparable but safer access to Miller Park from what exists today, while minimizing the loss of parking spaces in the adjacent parking lots.

Intersection Analysis

Design year peak hour operations of the service interchange ramp terminals were analyzed using Synchro. The analysis of the Stadium Interchange ramp terminals was limited to the signalized intersections themselves as there are no adjacent signalized intersections located within one half mile. The peak hour factor used for the future AM and PM peak hour analysis was 0.87 and 0.97, respectively. Existing peak hour truck percentages at the ramp terminals were assumed to remain unchanged in the design year peak hours.

In general, the signalized ramp terminals are expected to operate between LOS B and LOS D overall during the future peak hours. Turning movements at the Hawley Road Interchange are expected to operate between LOS A and LOS D. The signalized turning movements within the Stadium Interchange are expected to operate between LOS B and LOS C. Turning movements at the 35th Street Interchange will operate between LOS A and LOS D during the future peak hours. Since the Stadium Interchange ramp terminals generally operated at, or better than, LOS D during the future peak hours, the proposed design of the ramp terminal intersections was deemed acceptable by the I-94 E-W design team.

The results of the future design year AM and PM peak hour intersection analyses are shown in the tables included in **Appendix B.**

Hawley Road Interchange

Under the preferred alternative, the Hawley Road Interchange will be reconstructed as a half diamond, with access to and from the west. The proposed lane configurations for the north (I-94 WB entrance ramp) and south (I-94 EB exit ramp) ramp terminals are similar to the existing conditions. Hawley Road would remain as a four-lane facility with a single NBL turn lane at the signalized north ramp terminal. The eastbound approach at the signalized south ramp terminal would provide exclusive left and right turn movements.

The Hawley Road Interchange is expected to operate between LOS A and B overall during the future peak hours. Turning movements will operate at LOS D or better at both ramp terminals during the design year peak hours. It should be noted that the analysis assumes the installation of a traffic signal for the south ramp terminal, as the north ramp terminal is currently signalized. However, a traffic signal warrant analysis has not yet been formally completed.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-12** and **B-13**.

Mitchell Boulevard Interchange

As noted previously, the existing Mitchell Boulevard Interchange access would be removed and replaced with an embedded, split diamond service interchange at 44th and 46th Streets, located beneath the Stadium Interchange. Access to and from Mitchell Boulevard would be retained in the future by the inclusion of a frontage road on the north side of I-94, in addition to existing access located along Selig Drive located south of I-94.

Each of the four ramp terminals would operate as a stop controlled intersection. Turning movements are expected to operate at LOS A during the future peak hours due to the relatively low demand.

A summary of the future peak hour traffic volumes, levels of service, and delay from the Synchro analysis are included in **Table B-14**.

Stadium Interchange

As part of the preferred alternative, the Stadium Interchange would be reconstructed to a service type interchange with free flow ramps for movements exiting I-94 and traffic signal controlled intersections for the entrance ramp terminals. The NBL (S-W) and SBL (N-E) movements would have two turn lanes crossing three thru lanes in each direction. The NBR (S-E) and SBR (N-W) movements would be free-flow through the signalized intersections. Both the Stadium Interchange eastbound and westbound entrance ramps would be metered before entering the I-94 freeway corridor.

The Stadium Interchange signalized intersections are expected to operate at LOS C overall during the future peak hours. The conflicting left turn and thru movements are expected to operate between LOS B and LOS C. As noted previously, the right turn movements are free-flow and therefore have no signal delay (LOS A).

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-15** and **B-16**.

35th Street Interchange

Under the preferred alternative, the 35th Street Interchange would remain a diamond service interchange. The existing westbound exit and entrance ramp connections to and from the north local access road (Park Hill Avenue) would be removed. The future service ramps in both directions would be braided with the Stadium Interchange (west) and St Paul Avenue/25th Street Interchange (east). 35th Street would remain a four-lane facility with single left turn lanes to access the entrance ramps.

The 35th Street Interchange was assumed to operate under TTI (Texas Transportation Institute) phasing with optimal signal timings due to the close spacing of the north and south ramp terminals, which minimizes internal queue lengths. The north ramp terminal (I-94 EB ramps) is expected to operate at LOS B overall during the future AM and PM peak hours. The south ramp terminal (I-94 WB ramps) is expected to operate at LOS C overall during the future peak hours. No turning movements are expected to operate worse than LOS D at either ramp terminal.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-17** and **B-18**.

Policy Points	
Policy Point 1 Existing Network's Ability to Accommodate Traffic	*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 necessary 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.* The Stadium Interchange is not a new interchange and this project is not adding a new interchange to this corridor. This project will reconstruct and reconfigure the existing interchanges to improve the safety and efficiency of I-94, while minimizing impacts to the surrounding environment. Modifications to the ramps and the ramp terminal intersections are described in **Policy Point 3**. Proposed local road changes are discussed in **Policy Point 4.** The existing conditions for the Stadium Interchange are shown on **Exhibit 2-2.** The local streets in the network that serve the traffic in the area of this interchange are currently operating close to or at capacity during the AM and PM peak periods. These roadways include Greenfield Avenue, National Avenue, and Bluemound Road.

The existing HCS analysis input values and the resulting LOS values are shown in **Appendix A** on **Tables A-1** through **A-3** and **A-4** through **A-6** respectively. The summary of the traffic volumes and level of service for the existing conditions is shown on **Exhibits 3-2**. The No Build traffic projections and level of service are shown on **Exhibits 4-1** through **4-3**. The levels of service and queue length information for the intersection analyses are shown in **Appendix B**.

Stadium Interchange

This existing interchange is a three level High Level Service Interchange with directional ramps serving all turning movements. Each direction has a combination of right and left side ramps.

The existing mainline operates at LOS D within the interchange in the east bound direction for both AM and PM peaks. The westbound operates at LOS D in the AM and LOS C in the PM peak. There are weaving segments on I-94 on either side of the interchange. The weaving segments on the east side operate at LOS E in both directions for AM and PM peaks. The weaving segments on the west side operate at LOS E for the eastbound direction for both the AM and PM peaks, while the westbound direction operates at LOS E in the AM and LOS D in the PM peak.

The no build analyses show that the mainline will operate at LOS D in the design year in both directions for both the AM and PM peak periods, however the weaving segments on both sides of this interchange will operate at LOS E in both directions for both AM and PM peak periods.

This interchange is proposed to be reconstructed to a service interchange that will have free flow exit ramps from I-94 and traffic signal controlled intersections for the entrance ramps.

Mitchell Boulevard Interchange

This is an existing diamond interchange that has three left side ramps in the median between the eastbound and westbound I-94 roadways, for the eastbound exit and entrance ramps, and the westbound entrance ramp. The westbound exit ramp is a normal right side diagonal ramp.

I-94 mainline between the ramps operates at LOS E in the AM peak and LOS D in the PM peak. This interchange is spaced very close to the adjacent interchanges with weaving segments on both sides. The weave to the west operates at LOS F eastbound in both the AM and PM peaks as well as westbound in the AM peak. The westbound PM peak operates at LOS E. The weave to the east operates at LOS E in the eastbound direction for AM and PM and LOS E in the AM and LOS D in the PM peaks for the westbound direction.

The no build analyses show that with the traffic volumes projected for the design year, the mainline within the interchange will operate at LOS F in the PM peak and LOS E in the AM peak in the eastbound direction. The westbound direction in this segment will operate at LOS E in both AM and PM peaks. The weave segment to the west will fall to LOS F in both directions for both the AM and PM peak periods. The weave segment to the east will operate at LOS E in both directions for both

the AM and PM peak periods.

The exit ramps are stop sign controlled. Traffic volumes are very low at this interchange, except during events at Miller Park Stadium (home of the Milwaukee Brewers major league baseball team). The stop sign controlled movements operate at LOS A or B. The stop controlled intersection LOS values are shown in **Appendix B** in **Table B-5.**

This interchange is proposed to be removed and replaced with diamond ramps embedded within the Stadium Interchange, a ½ mile to the east.

Adjacent Interchanges

Hawley Road Interchange

The existing interchange has a diagonal exit ramp like a typical diamond interchange in the southwest quadrant and a partial loop entrance ramp in the southeast quadrant with a free-flow right turn and a median left turn lane for the eastbound I-94 connections. On the north side of the interchange the ramps are in a typical partial cloverleaf configuration for the westbound I-94 connections with the westbound exit being a loop ramp. Information regarding the Hawley Road Interchange is included in this IAJR only to the level needed to document its presence within the corridor, its impact to operations and safety within the corridor, and its relevance to the entire project. The details of the proposed design and the justification for reconstructing the interchange to a partial are discussed in a separate Interstate Access Justification Report.

The existing mainline west of the interchange operates at LOS E. The mainline within the interchange operates at LOS D in the westbound and eastbound directions in the PM peak and LOS E in the eastbound AM peak. The ramps to and from the west operate at LOS E for both directions and time periods. The existing weaving segment east of the interchange is a two-sided weave to the left side ramps at Mitchell Boulevard that operate at LOS F in the westbound direction for both AM and PM peaks and also in the in the eastbound direction in the AM peak. It operates at LOS E in the eastbound direction in the PM peak period.

The no build analyses show that with the traffic volumes projected for the design year, the LOS will drop to LOS E within the interchange for both directions and time periods. The westbound entrance and the mainline west of the interchange will operate at LOS F in the AM peak and LOS E in the PM peak. The eastbound mainline and exit ramp will operate at LOS E in the AM peak and LOS F in the PM peak. The two-sided weave segments east of the interchange will operate at LOS F in both directions for the AM and PM peak periods.

The existing eastbound ramp terminal intersections are unsignalized. The westbound ramp terminal intersection on Hawley Road is traffic signal controlled. The left turn movement on the eastbound exit ramp operates at LOS F while the other movements are at LOS B or C. The traffic signal controlled intersection at the westbound ramps operates well with all movements at LOS A or B. The intersection LOS and queue lengths are shown in **Appendix B** in **Tables B-3** and

B-4.

This interchange is proposed to be reconstructed as a partial interchange (half diamond) with ramps to and from the west because it is not feasible to construct ramps to and from the east without impacting graves in the cemeteries along the freeway.

35th Street Interchange

This existing interchange is a diamond interchange with diagonal ramps on the south side connecting directly to 35th Street and slip ramps on the north side connecting to Park Hill Avenue on the north side. Both intersections are traffic signal controlled.

The mainline operates at LOS D in the westbound direction for both AM and PM peaks and in the eastbound for the PM peak. It operates at LOS E in the AM peak in the eastbound direction.

The no build analyses show that in the design year, the mainline eastbound will operate at LOS E within the interchange. The westbound will operate at LOS D in the AM and LOS E in the PM peak. The weave segment west of the interchange will operate at LOS E in both directions for both the AM and PM peak periods. The freeway east of this interchange is a basic freeway segment eastbound and a weave segment westbound which will operate at LOS E in both directions for both the AM and PM peak periods.

Both intersections are traffic signal controlled. The eastbound ramp intersection operates at LOS B in the AM and LOS C in the PM peak. The westbound ramp intersection operates at LOS E in the AM and LOS D in the PM peak. The movements all operate at LOS D or better except the northbound left turn movement which operates at LOS F. The intersection LOS and queue lengths are shown in **Appendix B** on **Tables B-6** and **B-7**.

This interchange will be reconstructed to a standard diamond with the ramps braided with those of the adjacent interchanges. Park Hill Avenue will be reconstructed to have a cul-de-sac on the west side of 35th Street and terminate at the alley east of 35th Street.

Safety Analyses

The average total crash rate on I-94 from the Stadium Interchange to the 35th Street Interchange from 2005 to 2009 is 275.3 crashes /100M VMT, which is about 224% greater than the statewide average total crash rate. The average total crash rate on WIS 175/WIS 341 from Canal Street to Wells Street is 167.6 crashes/100M VMT, which is approximately 97% greater than the statewide average total crash rate. Some of the features of the existing facility that lead to safety issues are the short multilane weaving segments between the Hawley Road Interchange right-side ramps and the left-side Mitchell Boulevard Interchange ramps, the closely spaced ramps without auxiliary lanes, the short acceleration and deceleration distances at entrance and exit ramps, and limited sight distance. For more detailed crash information, see the Crash Analysis Technical

	Memorandum in **Appendix D**. **<u>Conclusion</u>** The Stadium Interchange in conjunction with the I-94 mainline require improvements to safely and efficiently accommodate the network's ability to move the traffic that is projected to be using this corridor in the design year of 2040. The reconstruction of the Stadium Interchange with the embedded interchange as discussed above will provide for the safer and more efficient operation for through traffic and those accessing the freeway in this area. The widening of the freeway consisting of added mainline travel and auxiliary lanes is needed to accommodate the projected traffic volumes at an acceptable LOS and safety. The embedded interchange ramps that replace the existing ramps at Mitchell Boulevard will improve ramp spacing along I-94 providing an improved level of service and safety. The need for the project and the interchange modifications are discussed further under the **NEED** section of this report.
<u>Policy Point 2</u> ***Transportation System Management***	*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 changes in access.* The Stadium Interchange is not a new interchange in this area. This project is proposing to remove ramps at Mitchell Boulevard and replace them with an embedded interchange within the Stadium Interchange. Although numerous Transportation System Management (TSM) applications are proposed to be incorporated as part of this project, TSM alone cannot resolve the need to modify the interchanges as proposed. Existing ITS features are currently in place along this segment of I-94. Improved ITS and TMP improvements were studied (including a doubling of transit), however mainline and interchange improvements as proposed are still needed. To provide an acceptable LOS, Transportation System Management features are proposed to be included in the design of the preferred alternative. These include Ramp Metering, Ramp Gates, Closed Circuit Cameras, Variable Message Signs, and Traffic Detectors. These features alone being added to the existing facility will not meet the purpose and need of the project or eliminate the need to modify the existing interchanges as proposed with the preferred alternative. The SEWRPC's build traffic forecasts include TSM strategies as part of the base-line assumptions, including a doubling of transit use. Existing TSM applications currently in use that will be carried forward in the proposed design consist of ramp metering, providing driver information on changeable message signs, closed circuit cameras, traffic detectors, ramp gates, and encouraging the use of transit. The existing ramps have ramp meters that were installed under previous projects: Hawley Road eastbound and westbound, Mitchell Boulevard eastbound and westbound, Stadium N-E, S-E, N-W and S-W, and 35th Street. Wrong way driver detection has been installed on the eastbound exit ramp to Mitchell Boulevard

	consisting of wrong way signs with flashing LEDs to get the attention and warn drivers that start to go on to the ramp in the wrong direction. Geometric improvement only alternatives without increased lanes were also analyzed and found not to adequately meet the project purpose and need. All of the proposed alternatives would not preclude the implementation of more transit use, but in fact would provide for improved operations for existing transit use and future transit growth. **Conclusion** Transportation System Management measures have been investigated. These measures are incorporated into the proposed design alternatives. However, these measures alone were studied and will not provide an acceptable level of service in the design year or eliminate the need to modify the existing interchanges as proposed with the preferred alternative. The design of the preferred alternative does not preclude the future implementation of additional TSM measures.
Policy Point 3 ***Safety Impacts and Operational Analysis***	*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, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access. The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall 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. Requests for a proposed change in access must 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. Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative.* The existing facility was constructed in 1963 and does not conform to current design standards. This proposed project will not add any additional access points to the interstate, it will reconstruct and reconfigure the existing access points to operate more safely and efficiently. The proposed design will address the current safety issues with revisions to the corridor to improve roadway geometrics, roadway capacity, ramp capacity, and ramp/mainline merge and diverge characteristics. Traffic analyses (HCM and Paramics) and safety analyses (ISATe) show the proposed design will substantially improve existing conditions.

The improvements to I-94 in the preferred alternative include reconstruction of the proposed roadway cross section by providing four mainline travel lanes in each direction, including reconstruction with added improvements to the interchanges and auxiliary lanes where needed between interchanges. Alternatives providing geometric and operational improvements without added mainline traffic lanes were studied and found to not adequately meet the project's purpose and need.

The preferred alternative for the Stadium Interchange area of influence is shown on **Exhibit 5-2**. The individual interchanges are shown on **Exhibits 6-2** through **6-3**. The projected design year traffic volumes and levels of service are shown on **Exhibits 7-1** through **7-2**. **Appendix A** has **Tables A-13** through **A-15** of HCS analysis input data and **Tables A-16** through **A-18** show the level of service along with the density values for each segment of the freeway and ramps. **Appendix B** has the tables of the intersection analyses results.

Stadium Interchange

The Stadium Interchange is proposed to be reconstructed to a service type interchange with free flow ramps for the movements exiting I-94 and traffic signal controlled intersections at the entrance ramp terminals. This will be a four level interchange, including the embedded interchange to 44th and 46th Streets which is the relocation of the Mitchell Boulevard Interchange access. The top level will consist of the ramps that exit I-94 and enter WIS 175/341 north and south. The second level will be the WIS 175/WIS 341 mainline roadway with the ramp intersections that provide the entrance to I-94 east and west. The third level down is the I-94 mainline. The bottom level consists of the 44th and 46th Street ramp connections. The embedded interchange has diagonal ramps connecting I-94 to and from the west to 44th Street. 46th Street has ramps that combine with the Stadium Interchange ramps to and from the east.

The Mitchell Boulevard Interchange is proposed to be relocated to provide safer and more efficient operations between the existing tightly spaced Hawley Road and Mitchell Boulevard interchanges. The freeway entrance and exit ramps at the Mitchell Boulevard Interchange will be removed. Having entrance and exit ramps in the narrow cemetery area contributes to congestion and there is no space to physically locate the ramps without impacting the cemeteries or having very short and unsafe merge distances on the interstate. With the embedded interchange within the Stadium Interchange, sufficient distances can be provided for the merging and diverging maneuvers between each of the stadium and relocated local service ramps and the partial interchange ramps at Hawley Road.

The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-3**.

The segment of I-94 west of the Stadium Interchange will operate at LOS D in both directions for both the AM and PM peak periods. The segment to the east will operate at LOS C.

The I-94 entrance ramps will have traffic signal controlled ramp terminal intersections with WIS 175/WIS 341 consisting of two-phase signal control. All

movements in these intersections will operate at LOS C or better. The traffic volume, LOS and delay values as well as the queue lengths for these intersections are shown in **Appendix B** in **Tables B-15** and **B-16.**

The embedded interchange replaces the access that currently exists at the Mitchell Boulevard Interchange. There is very low demand for this access other than when events occur at Miller Park. The unsignalized intersection analyses shows that during the normal AM and PM peak periods these intersections will operate at LOS A. The traffic volumes, levels of service and delay values are shown in **Table B-14** in **Appendix B.**

Adjacent Interchanges

Hawley Road Interchange

This interchange is proposed to be constructed as a partial (half diamond) interchange with ramps to and from the west. The ramps to and from the east cannot be constructed with adequate acceleration and deceleration lengths and auxiliary lanes connecting to the proposed I-94 cross section without impacting the cemeteries on both sides of the freeway. **Appendix F** has the explanation with more detailed information about why the partial interchange is justified including how the environmental process impacted its selection. Local street improvements to mitigate the change in access at the Hawley Road Interchange will be included in the I-94 E-W Corridor Project.

The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-2**. The local street improvements to mitigate the change in access at Hawley Road are shown on **Exhibits 9-1** through **9-5.**

The I-94 mainline will operate at LOS D through this area in both directions for both the AM and PM peak periods. The weave segment west of the interchange where the ramps connect to the mainline will also operate at LOS D.

The ramp intersections with Hawley Road will be traffic signal controlled. The intersection traffic volumes, LOS and queue lengths are shown in **Appendix B** on **Tables B-12** and **B-13.**

35th Street Interchange

This interchange will be reconstructed as a diamond interchange. The ramps will be braided with the ramps of the adjacent interchanges to eliminate the weaving that occurs under the current configuration. All four ramps will be diagonal ramps. Park Hill Avenue will be terminated with a cul-de-sac west of 35th Street and into an alley intersection east of 35th Street eliminating the slip ramp connections that currently exist.

The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-4**.

The I-94 eastbound mainline will operate at LOS C through the area of this interchange. The I-94 westbound will operate at LOS C west of the interchange and in the AM peak east of the interchange. I-94 will operate at LOS D in the PM

	peak east of the interchange. The ramps will all operate at LOS C. The ramp terminal intersections will be traffic signal controlled. All movements will operate at LOS D or better in the AM and PM peak periods. The levels of service and delay values are shown in **Table B-17** and the queue lengths are shown in **Table B-18** in **Appendix B**. **Safety** The I-94 freeway mainline and ramp segments were analyzed using HSM methods using the ISATe tool. This analysis showed that the preferred alternative will provide a reduction in crashes of approximately 20% over the no-build alternative. Some features in the preferred alternative that will enhance the safety performance are increased mainline capacity, increased spacing between ramps on I-94, addition of traffic signal improvements at crossroad ramp terminals, and removal of the left-side ramps. **Conclusion** The Stadium Interchange modifications have been developed in conjunction with the I-94 mainline preferred alternative to improve the safety and efficiency of the traffic operations within the area of influence. There are no additional access points being added to the interstate as part of this improvement. The reconfiguration of the Hawley Road Interchange and embedded interchange will eliminate the weaving movements between it and the Stadium Interchange. There are proposed local street improvements adjacent to the interchanges and between the interchanges where necessary to accommodate the projected design year traffic. The improvements between the interchanges will help drivers that currently use the interchange, but will have to use one of the adjacent interchanges in the future.
Policy Point 4 ***Local Road Access***	*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 vehicles, HOV's, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards.* This interchange will be a full access interchange, that connects to a state highway (WIS 175/341) and to local public streets. Underneath the Stadium Interchange, new entrance and exit ramps to 44th Street and a new local street (tentatively referred to as 46th Street) is proposed to be constructed (**Exhibit 5-2**). The ramps replace the interchange that is proposed to be removed from Mitchell Boulevard. This interchange will connect to the existing Miller Park ring road and a new frontage road north of I-94. The new north frontage road will pass over Yount Drive and connect to Mitchell Boulevard near the existing westbound I-94 exit ramp at Mitchell Boulevard. For drivers on westbound I-94 these connections would provide access similar to existing Miller Park parking, the VA campus, and the Story Hill neighborhood. The frontage road came about through continued coordination with the Milwaukee Brewers. The Brewers believe the frontage road will improve traffic operations for loading and

	unloading their parking lots. Along with helping the Brewers, the northern frontage road will also improve access for the VA campus and local residents. There will be no access from northbound Miller Park Way to the Wisconsin Avenue Interchange on WIS 175. However, those exiting I-94 to WIS 175 will continue to be able to exit at Wisconsin Avenue. Additionally, those entering WIS 175 southbound from Wisconsin Avenue will continue to be able to access I-94 in both directions and travel south along WIS 175/Miller Park Way. Braided ramps between the Stadium Interchange and the 35th Street Interchange will allow the two closely spaced interchanges to operate safely. Therefore, there will be no access from WIS 175 or Miller Park Way to the 35th Street Interchange. Traffic on WIS 175/Miller Park Way will be able to access 35th Street from Wisconsin Avenue north of I-94 or National Avenue south of I-94. Access to the 35th Street Interchange will continue to be provided for motorists on I-94. Traffic signal upgrades are proposed to be made to optimize the signal phasing and improve the operations of the intersections. The design for the I-94 East-West Corridor Project is intended to meet or exceed current interstate standards where feasible. However, it is acknowledged that there will be exceptions to standards in some locations needed to minimize impacts to the surrounding development and environmental/cultural resources. The exceptions to standards that are anticipated are summarized in the Compliance with Policies and Engineering Standards of this document. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review and approval by WisDOT and FHWA. For more detail on the exceptions to standards, including the exceptions that were identified for other alternatives, see the 13 Controlling Criteria Exceptions to Standards Memorandum on Remaining Alternatives Prior to Preferred Alternative Selection in **Appendix F.** **<u>Conclusion</u>** The Stadium Interchange with the embedded interchange will provide a balance between addressing long-term mobility needs and safety concerns while minimizing impacts to the existing development and environmental resources to the maximum extent practical. Due to the 35th Street Interchange close proximity east of the Stadium Interchange, the 35th Street Interchange is proposed to be reconstructed with braided ramps between 35th Street and the Stadium Interchanges. Motorists will no longer be able to access to/from the 35th Street Interchange from/to the WIS 375/Miller Park Way. Traffic on WIS 175/Miller Park Way will be able to access 35th Street from Wisconsin Avenue north of I-94 or National Avenue south of I-94. Proposed signing will direct drivers to the appropriate interstate access points.
<u>Policy Point 5</u> Regional Transportation Plans	*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. The proposed I-94 E-W project is included in the current SEWRPC Long-Range Transportation Plan (2035 Regional Land Use and Transportation Plan). The Preliminary Engineering phase of this project is in the TIP. The 2035 regional transportation system plan proposed modernization and limited expansion of the southeastern Wisconsin freeway system. A doubling of transit use was analyzed prior to analyzing capacity expansion as called for in the SEWRPC Plan. The 2035 regional transportation plan included a full interchange at Hawley Road and did not reflect the relocation of the access provided by the existing Mitchell Boulevard interchange to a new location within the Stadium Interchange. On September 16, 2015, the SEWRPC Commission amended the 2035 regional transportation plan as follows: • Convert from full to half interchange at Hawley Road. • Remove existing interchange at Mitchell Boulevard. • Provide service ramps to non-arterial roadways at the Stadium Interchange. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016. The Stadium Interchange conforms to SEWRPC's 2035 regional transportation plan. **Conclusion** The project is consistent with local and regional land use plans and as such, also conforms with fiscal constraint and air quality requirements. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016.
Policy Point 6 Multiple Interchange Additions	*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 proposed and desired access within the context of a longer-range system or network plan.* The Stadium Interchange is not a new access point. The removed Mitchell Boulevard ramps are being replaced with the embedded interchange within the Stadium Interchange. No additional interchanges are proposed to be added as

	part of this project and none are proposed for the future. The spacing of interchanges along this corridor is less than one mile. With the tight interchange spacing, it is not feasible to add any additional interchanges within this corridor. The Mitchell Boulevard Interchange will be replaced with an embedded interchange and two of the proposed ramps are combined with the Stadium Interchange ramps to reduce the number of access points entering the freeway. The regional plan does not include any additional interchanges within this influence area. The design team looked at trying to reduce the number of interchanges in the corridor, but other than relocating or modifying the design to improve on existing access points, were not able to eliminate any interchanges due to needed traffic operations, local opposition and environmental justice considerations. The interchanges within this influence area are proposed to be modified to provide safer and more efficient operations as well as accommodating the additional mainline lanes that are included with this project. **Conclusion** This area is fully developed with closely spaced interchanges. No additional interchanges are proposed to be added as part of this project and none are proposed to be added in the future. New development is not a driving force for the design of this interchange since the surrounding area is fully developed.
Policy Point 7 ***Appropriate Coordination***	*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. 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.* The I-94 East-West Project team has demonstrated appropriate coordination between the development and related transportation system improvements through its significant public involvement and outreach efforts with the City of Milwaukee, City of Wauwatosa, City of West Allis, Village of West Milwaukee, Milwaukee County, local business groups, individual businesses, community leaders, and residents in the area. For the design of the Stadium Interchange, the project team has had several coordination meetings with area stakeholders including the Stadium District and the Milwaukee Brewers, Menomonee Valley Partners, Hunger Task Force, and cultural resource groups. Through this coordination, this project and all of its alternatives have and will continue to be developed in an orderly and coordinated manner to serve the public. The design team also had extensive coordination with the United States Department of Veterans' Affairs (VA), who expressed particular concern about the possibility of the Hawley Road Interchange closing. The VA noted that many of its

	6,000 employees, as well as some of the one million patients per year, use the Hawley Road Interchange to access its campus. All of the ambulance providers that access the VA Medical Center by freeway use the Hawley Road Interchange. The VA has stated that closing the Mitchell Boulevard Interchange would not be as big of an issue as closing the Hawley Road Interchange. The half interchange at Hawley Road, with ramps to and from the west, would address the VA's concern regarding access. **Conclusion** No new interchanges are proposed in this corridor. New development is not a driving force for this interchange design since the surrounding area is fully developed. The project team has had extensive coordination with local officials and stakeholders throughout the project's area of influence**.** The proposed Stadium Interchange modifications provide a balance between providing for the needs expressed by the stakeholders and reducing the impacts to the surrounding properties.
Policy Point 8 Environmental Planning	*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.* The I-94 East-West Corridor Study Draft EIS was approved and signed by FHWA and WisDOT on November 4, 2014. A Notice of Availability for the Draft EIS appeared in the Federal Register on November 14, 2014, beginning the 60-day comment period that was slated to end on January 13, 2015. A two week extension of the comment period was requested and granted with the comment period for the I-94 East-West Corridor Study Draft EIS ending on January 27, 2015. Public Hearings for the project were held on December 3rd and 4th. The preferred alternative was announced on February 17, 2015. Following the end of the public comment period, FHWA and WisDOT are preparing a Final EIS, slated for approval in December 2015. This engineering and operational acceptance is being sought prior to approval of the FEIS. A Record of Decision is anticipated in the spring of 2016. Coordination meetings were held between the design team, WisDOT and FHWA (Division and Headquarters) prior to the selection of the preferred alternative and Draft Environmental Impact Statement. The engineering and operational review and approval schedule has been coordinated with FHWA and will be completed prior to review and approval of the Final EIS. **Conclusion** The design of the Stadium Interchange modifications have been developed to improve the traffic operations of the I-94 mainline as well as the entering and exiting traffic movements. The development of the proposed modifications has taken place as part of the NEPA process. All of the interchange modifications and the local street/intersection improvements to mitigate the change in access are covered in the EIS.

Chapter 4:
35th STREET INTERCHANGE

EXISTING CONDITIONS

The aerial photography of the existing corridor is shown in **Exhibits 2-1** through **2-3**.

Existing Land Use

Existing land use in the I-94 East-West Corridor generally consists of high density urban development, including commercial, residential, institutional, industrial, parks, transportation, and utilities.

Land uses in the east segment (Yount Drive to 16th Street) maintain an urban character. The Stadium Interchange area is dominated by Miller Park to the south with a combination of residential, commercial, and industrial land uses north of I-94. Land uses east of the Stadium Interchange are divided by I-94. The area north of I-94 is generally residential and commercial, while the area south of I-94 is part of the Menomonee Valley industrial park.

North of I-94, the Merrill Park neighborhood is located between 35th Street and 27th Street. The neighborhood consists of single-family, two-family, and multifamily housing. The three main commercial corridors in this segment are Wisconsin Avenue, 35th Street, and 27th Street. Between 25th Street and 16th Street, there is a mix of land uses that serve the Marquette University campus. Institutional uses include Marquette University High School, St. Rose and St. Leo Catholic School, and three churches.

Directly south of I-94 from 35th Street to 27th Street is a utility corridor consisting of overhead electrical transmission lines and towers. Along Greves Street, 27th Street, and St. Paul Avenue is a cluster of commercial and industrial properties, while east of 25th Street to 16th Street, Badger Truck Center is adjacent to I-94 along with additional commercial uses. South of these land uses is the Menomonee Valley, which is home to many industrial properties and Potawatomi Hotel and Casino.

Operational Performance

<u>Existing Freeway Analysis – HCS 2010</u>

Analyses of the freeway operations for the existing conditions were conducted using balanced year 2009 AM and PM peak hour traffic volumes and existing geometrics. The peak hour factor used for the existing analysis was 0.96. Level terrain and a posted mainline speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-1**. **Tables A-2** and **A-3** have the input information for ramp and weaving segment analyses.

I-94 within the 35th Street Interchange operates at LOS D in the westbound direction in both the AM and PM peak and in the PM peak eastbound. Eastbound operates at LOS E in the AM peak.

The density values and LOS for each of the mainline freeway segments is shown in **Table A-4**. **Tables A-5** and **A-6** have the density values and LOS for each of the ramp terminals and weaving segments analyzed.

The existing traffic volumes and levels of service for the freeway and ramps are shown on a schematic diagram of the facility. These are included as **Exhibit 3-3**.

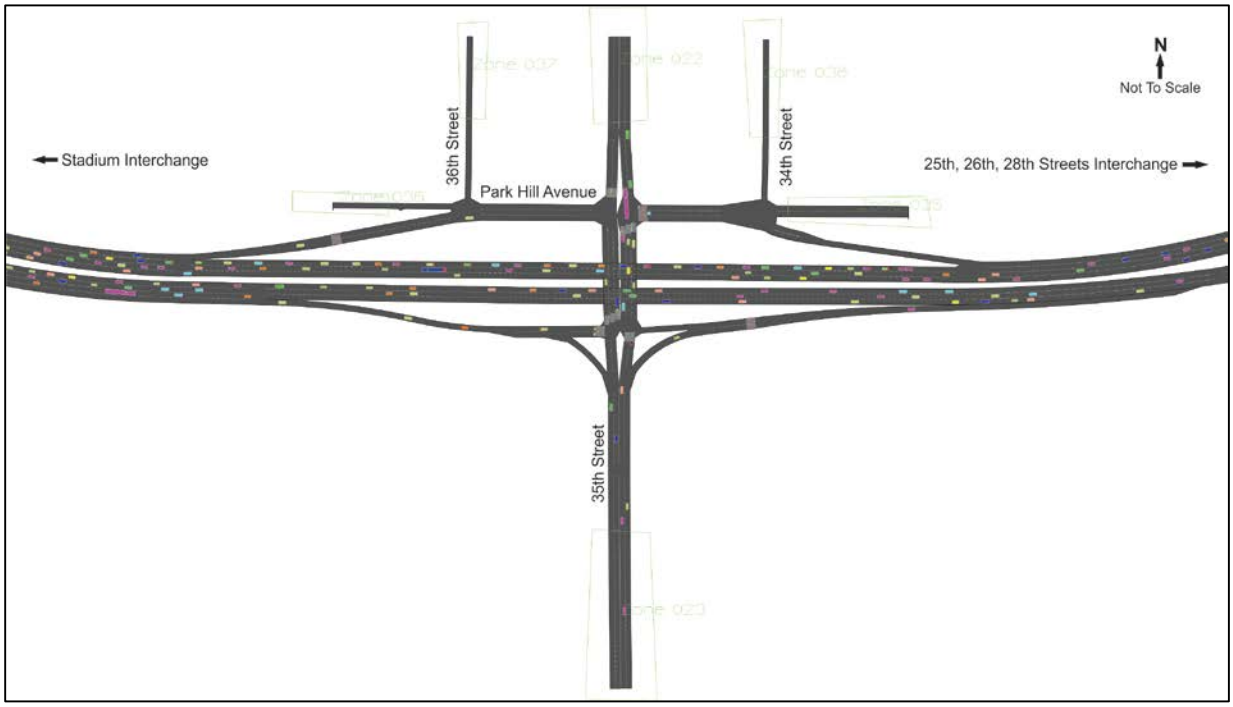
Existing Freeway Analysis – Paramics

Existing AM and PM peak hour LOS is not reported based on Paramics model outputs, as there is no direct correlation between the inherent assumptions included in the Highway Capacity Manual methodology and Paramics microsimulation modeling. Therefore, visual observations of the model and resulting speeds are primarily utilized to convey model operations.

The existing AM peak period Paramics model shows slower speeds and congestion throughout the duration of the AM peak hour (7-8AM) along I-94 within the35th Street Interchange influence area, which is consistent with HCS 2010 analysis of the existing conditions. Congestion and slow speeds along I-94 EB and WB between 35th Street and the Stadium Interchange develops due to the combination of left and right side exit and entrance ramps, short ramp spacing, and weaving turbulence. Speeds on I-94 average 39 mph and 44 mph over the AM peak hour along the eastbound and westbound roadways, respectively. Average speeds through and east of 35th Street along I-94 in both directions are greater in comparison (48-49 mph).

Figure 1 shows a screen capture from the existing AM peak period Paramics model at the 35th Street Interchange, which represents operations at approximately 7:30AM. **Tables A-19 and A-20** in **Appendix A** includes the existing AM peak period Paramics model speeds for roadway sections within the 35th Street Interchange area of influence.

Figure 1

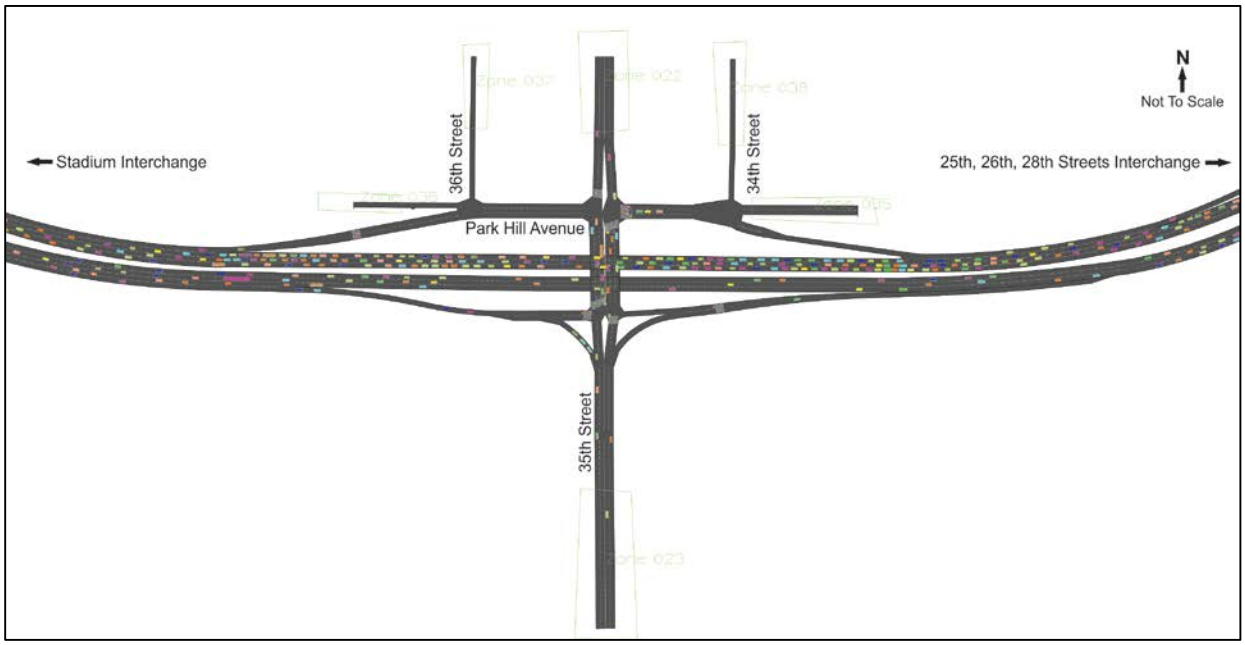


The existing PM peak period Paramics model shows that operations along I-94 EB at the 35th Street Interchange are slightly better during the PM peak hour in comparison to the AM peak hour, mainly due to slightly less demand. Sporadic congestion and slightly slower speeds are still present between the Stadium Interchange and 35th Street due to merging and weaving operations, but the average I-94 EB corridor speed during the PM peak hour is 50 mph.

PM peak period model operations along I-94 WB indicates significantly slower speeds and increased congestion along I-94 WB throughout the duration of the PM peak hour (4:30-5:30PM) and extending into the hour after (5:30-6:30PM). Slow average PM peak hour speeds east and west of the 35th Street Interchange, 29 mph and 22 mph respectively, is indicative of the resulting congestion that stems from heavy PM peak hour demands and weaving operations in these areas. In addition, I-94 WB operations through 35th Street are impacted by downstream operations west of the Stadium Interchange, which results in significant upstream congestion. Speeds are slightly faster between the 35th Street WB exit and entrance ramps as the upstream weave essentially meters the demand and limits throughput.

Figure 2 shows a screen capture from the existing PM peak period Paramics model at the 35th Street Interchange, which represents operations at approximately 5PM. **Tables A-21 and A-22** in **Appendix A** includes the existing PM peak period Paramics model speeds for roadway sections within the 35th Street Interchange area of influence.

Figure 2



Intersection Analysis

Existing peak hour operations of the service interchange ramp terminals were analyzed using Synchro. The intersection peak hour factors and turning movement truck percentages were calculated for each ramp terminal based on existing count data collected for the AM and PM peak hours.

In general, the existing ramp terminals operate between LOS B and LOS F overall during the existing peak hours. Turning movements at the 35th Street Interchange mainly operate at LOS D or better outside

of one turning movement. Turning movements at the 25th, 26th, and 28th Street Interchange mostly operate between LOS B and LOS D, with a couple at LOS E or LOS F.

The results of the intersection analyses are shown in the tables in **Appendix B**. More detail is provided in the discussion for **Policy Point 1**.

35th Street Interchange

The existing interchange is a diamond. The westbound ramps are slip ramps that connect to Park Hill Avenue. The eastbound ramps connect directly to 35th Street. The intersections are traffic signal controlled.

In general, the 35th Street Interchange north ramp terminal (I-94 WB ramps) operates at LOS E during the existing AM peak hour and at LOS D during the existing PM peak hour. Outside of the northbound left turn movement, which operates at LOS F during both peak hours, the remaining turning movements operate at LOS D or better. The south ramp terminal (I-94 EB ramps) and corresponding turning movements operate at LOS D or better during both existing peak hours.

A summary of the levels of service from the Synchro analysis for all of the movements are in **Table B-6** with queue lengths summarized in **Table B-7**.

25th/26th/28th Street Interchange

The existing interchange is split between 25th, 26th, and 28th Street, where the ramps to and from the east are located at 25th Street, the I-94 EB exit ramp is located at 26th Street, and the I-94 WB entrance ramp is located at 28th Street. Each of these roadways are directly connected via St. Paul Avenue. The EB exit, EB entrance, and WB exit ramp terminals are signalized. The intersection of 28th Street and St. Paul Avenue is stop controlled for the north and west approaches, which allows the primary approach (east) to operate free-flow.

The signalized intersections along St. Paul Avenue between 27th Street and 25th Street, which includes the ramp terminals at 25th and 26th Streets, operate between LOS B and LOS C during the existing AM peak hour. All movements operate at LOS D or better, except for the southbound left turn movement at the intersection of 27th Street and St. Paul Avenue. The 25th and 26th Street ramp terminals operate between LOS B and LOS C during the existing PM peak hour, with all turning movements at LOS C or better. The intersection of 27th Street and St. Paul Avenue operates at LOS F overall during the PM peak hour, predominately due to the southbound thru movement which operates at LOS F.

A summary of the levels of service from the Synchro analysis is included in **Table B-8** with queue lengths summarized in **Table B-9.**

Existing Safety Conditions

The average total crash rate on I-94 from within the 35th Street Interchange from 2005 to 2009 is 315.6 crashes /100M VMT for eastbound and 225.4 crashes /100M VMT for westbound. This is more than two and a half (westbound) to three and a half (eastbound) times greater than the statewide average total crash rate. The breakdown of freeway mainline crashes by severity is shown in **Table 1**.

Table 1

Segment	Number of Crashes			Total
	Property Damage	Injury	Fatal	
I-94 EB Stadium Ramps to 35th St Exit	84	31	0	115
I-94 EB 35th St Exit to 35th Entrance	105	35	0	140
I-94 EB 35th Entrance to 26th St Exit	50	21	0	71
I-94 WB 27th St Entrance to 35th St Exit	17	4	0	21
I-94 WB 35th St Exit to 35th St Entrance	77	23	0	100
I-94 WB 35th St Entrance to Stadium	87	28	0	115
I-94 EB Exit Ramp to 35th St.	4	2	0	6
I-94 EB Entrance Ramp from 35th St.	2	1	0	3
I-94 WB Exit Ramp to 35th St.	1	1	0	2
I-94 WB Entrance Ramp from 35th St.	2	1	0	3

The average total crash rate on service ramps within the I-94 East-West Stadium Interchange study area is 0.5 crashes/1MEV from 2005 to 2009. The total crash rate on the service ramps within the 35th Street Interchange is 0.4 crashes/1MEV. For more detail on the crashes within the corridor, see the Crash Analysis Technical Memorandum, which is included as **Appendix D**.

Existing Environmental Constraints

East of the Stadium Interchange is a crossing of the Menomonee River. This is not a new crossing as I-94 already crosses the river. The 35th Street Interchange abuts a highly dense residential area to the north and a utility corridor with an electrical substation at 30th Street to the south.

According to 2010 Census data, the four Census tracts in this area have between 29 and 61 percent of residents living in poverty, and the minority population percentage of those tracts combined is 83 percent.

ALTERNATIVES

Build Alternatives

Many alternatives were considered. There were alternatives that were looked at that had fatal flaws. The following are some of the alternatives that were looked at and eliminated due to impacts or unacceptable operations:

- CD Road between 35th/27th Streets
- Eliminate 35th Street Interchange with I-94

East Segment Build Alternatives

The east segment of the study area is from Yount Drive, just west of the Stadium Interchange, to 16th Street. This segment includes the existing 35th Street and 25th/26th/28th Street service interchanges and the Stadium Interchange.

No Interchange at 35th

This alternative would reconstruct I 94 while eliminating the 35th Street Interchange. Removing the 35th Street Interchange would provide drivers with enough distance to safely merge between the Stadium Interchange and the 25th/26th/28th Street Interchange without braiding the ramps. This alternative was eliminated from further consideration because of impacts to the local street network from traffic diverted from 35th Street and strong opposition from the City of Milwaukee and local stakeholders.

Preferred Alternative

The 35th Street Interchange is proposed to be reconstructed as a diamond interchange. Braided ramps between the Stadium Interchange and the 35th Street Interchange would allow the two closely spaced interchanges to operate safely. Braided ramps are also proposed between the 35th and 25th/26th/28th Street interchanges. The *I-94 East-West Corridor Preferred Alternative Identification Technical Memorandum* in **Appendix H** provides supporting documentation that established the basis for the recommendation of the preferred alternative.

As part of the reconstructed interchange, motorists entering the freeway westbound from 35th will not have access to WIS175/WIS341 due to the braided ramps. Traffic will be able to access WIS175/WIS341 from Wisconsin Avenue north of I-94 or National Avenue south of I-94.

FUTURE YEAR TRAFFIC

Year 2040 traffic forecasts were used to analyze the traffic operations of the alternatives considered for implementation. Average weekday traffic and peak hour forecasts were provided by SEWRPC. K30 volumes do not represent the peak hour traffic volumes in this corridor because of the special traffic generators in the area (Miller Park, State Fair Park, Summerfest and other festivals held in the area). K200 volumes were found to closely approximate the typical AM and PM peak hours, so these were used for the design hourly volumes in the analyses as concurred with by WisDOT and FHWA. The basis for the design year traffic projections used for this project and the approval on September 20, 2012 by FHWA are documented in the memo on DHV and LOS in **Appendix C**.

No-Build Conditions – HCS 2010 Analysis

The No-Build HCS 2010 analyses were conducted using the projected design year (2040) AM and PM peak hour traffic volumes and the existing geometric conditions. The peak hour factor used for the no-build analysis was 0.97. Level terrain and a mainline free flow speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-7**. **Tables A-8** and **A-9** have the input information for ramp and weaving segment analyses.

The 2040 no-build analysis shows levels of service along I-94 ranging from LOS C to LOS F. I-94 mainline would operate at LOS E or F on most segments in the design year if no improvement is made to this facility. The LOS for the freeway segments are shown in **Table A-10**. The weaving and ramp segments are shown in **Tables A-11** and **A-12**.

While the No-Build alternative would include continued maintenance of the I-94 corridor facility, it would not address the purpose and need of the project. As traffic volumes increase, an increase in congestion and crashes can be expected if there is no improvement to the facility.

The No-Build alternative is not considered a reasonable course of action, but is retained as a basis for comparison to the Build Alternative.

The No-Build traffic volumes and levels of service for the freeway and ramps are shown on a schematic diagram in **Exhibit 4-3**.

ALTERNATIVES ANALYSIS

Compliance with Policies and Engineering Standards

The design for the I-94 East-West Corridor Project is intended to meet or exceed current interstate standards where feasible. However, it is acknowledged that there will be exceptions to standards in some locations to minimize impacts to the surrounding development and environmental/cultural resources. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review and approval by WisDOT and FHWA later in the design process. The anticipated exceptions to standards for the preferred alternative are in this section. For more detail on these and exceptions for other alternatives see the Exceptions to Standards memo in **Appendix F**.

The following are areas where exceptions are anticipated to be necessary to avoid excessive impacts:

The East Segment On-Alignment Alternative has shoulders wider than 12' proposed in spot locations to provide the needed sight distance.

Stopping Sight Distance (SSD)

Bridge and retaining wall parapets as SSD sight obstructions along the inside (left) shoulder of the horizontal curve on the eastbound exit ramp to 26th Street, just south of St. Paul Ave.

Concrete barrier creates a SSD sight obstruction along the outside (right) shoulder of the horizontal curve on the westbound entrance ramp from 28th Street, just east of the I-94/ramp gore.

Environmental Impacts

This project is in a developed urban area with no natural areas. There are few environmental impacts in the east segment of the I-94 corridor.

Ten commercial properties would be acquired as part of the On-alignment alternative, including some properties located south of I-94. The properties are a mix of vacant and active businesses. Additionally, three residences along 35th Street would be displaced.

Marquette University High School is located on 35th Street, just north of I-94. Over 100 people having a connection to Marquette University High School submitted comments requesting that the 35th Street Interchange with I-94 remain open. Property owners and representatives from community organizations expressed concern about property acquisition and impacts to the community if access is changed or views of adjacent properties are altered.

Safety

The corridor was analyzed with the ISATe tool to predict the frequency and severity of crashes on the alternatives considered. The 35th Street Interchange is within the segment that was analyzed to compare the east leg alternatives. The limits of this segment are from just west of 32nd Street to 16th Street. The ISATe tool predicted that the preferred alternative will have a reduction of 28% in total crashes, 20% in fatal and injury crashes and 30% in property damage only crashes over the replace in kind alternative.

The ISATe tool predicted approximately 74% of the crashes as multiple vehicle crashes and 26% of the crashes as single vehicle for the existing alignment. The distribution is approximately 62% multiple vehicle and 38% single vehicle for the on alignment and 60% multiple vehicle and 40% single vehicle for the off alignment. The technical memorandum that summarized this analysis is included as **Appendix E**.

Safety Improvements in the Proposed Design

The proposed design will address the existing safety issues with the following revisions to the corridor:

- Alignment improvements, flatter horizontal curves and vertical curves with better sight distance.
- Braided ramps at the 35th Street Interchange, eliminating the weaving movements.
- Increase the I-94 mainline and 35th Street capacity as a measure to reduce the number of crashes due to congested conditions on the freeway and at 35th Street.
- Increase acceleration and deceleration distances at the entrance and exit ramps to provide safer and more efficient merging and diverging operations.
- Less congested conditions will help emergency responders arrive more quickly when a crash does occur.

The proposed design for the preferred alternative is shown on **Exhibits 5-2** through **5-3**. The spacing of the access points is improved from the existing condition and the distances are shown on these exhibits. The design of each interchange is shown on **Exhibits 6-3** through **6-5**. The signing plan for the proposed design is shown on **Exhibits 8-1** through **8-3**. **Table 2** shows the proposed spacing of the ramp terminals along I-94 within the corridor along with the standard spacing for each ramp configuration.

Table 2 Proposed Ramp Spacing

Route	From	To	Proposed	Required	Auxiliary Lane*
I-94 EB	44th Street Exit	35th Street Exit	1200'	1000'	No
I-94 EB	35th Street Exit	Stadium Entrance	1950'	500'	No
I-94 EB	Stadium Entrance	26th Street Exit	2285'	1000'	No
I-94 EB	26th Street Exit	35th Street Entrance	1700'	1600'	Yes
I-94 EB	35th Street Entrance	25th Street Entrance	1651’	500'	No
I-94 WB	25th Street Exit	35th Street Exit	2175'	1000'	No
I-94 WB	35th Street Exit	28th Street Entrance	2150'	500'	No
I-94 WB	28th Street Entrance	Stadium Exit	1280'	2000'	Yes
I-94 WB	Stadium Exit	35th Street Entrance	1590’	500'	No
I-94 WB	35th Street Entrance	44th Street Entrance	1490'	1000'	No

* AASHTO recommends the inclusion of an auxiliary lane when ramp spacing s 1500’ or less.

Operational Performance

The preferred alternative HCS 2010 analyses were conducted using the projected design year (2040) AM and PM peak hour traffic volumes and the proposed design geometrics. The peak hour factor used for the build alternative analysis was 0.97. Level terrain and a mainline operating speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes input for each freeway segment are shown in **Appendix A** in **Table A-13**. The input information for the ramp and weaving segments are in **Tables A-14** and **A-15**.

The proposed design for the preferred alternative is shown on **Exhibits 5-2** through **5-3**. **Exhibits 6-3** through **6-5** show each proposed interchange. The projected 2040 AM and PM peak traffic volumes and the level of service from the HCS analyses are shown on **Exhibits 7-1** through **7-3**.

Freeway Analysis – HCS 2010

The preferred alternative was analyzed in HCS. Traffic volumes, percent of heavy vehicles and number of lanes input for each segment are shown in **Tables 11A** through **11C**. The density values and LOS are shown in **Table A-16** for freeway segments**, Table A-17** for weaving segments, and **Table A-18** for ramp segments.

The I-94 EB and WB mainlines are expected to mainly operate at LOS C through the 35th Street Interchange influence area during the future AM peak hour. The I-94 EB mainline approaching the 35th Street EB entrance ramp is expected to operate at LOS D during the future AM peak hour. Similarly, the I-94 EB and WB mainlines are expected to mostly operate at LOS C within the 35th Street Interchange influence area during the future PM peak hour. The I-94 EB mainline approaching the 35th Street EB entrance ramp, in addition to the I-94 WB mainline between the 35th Street WB exit ramp and 28th Street WB entrance ramp, are expected to operate at LOS D during the future PM peak hour.

Freeway Analysis – Paramics

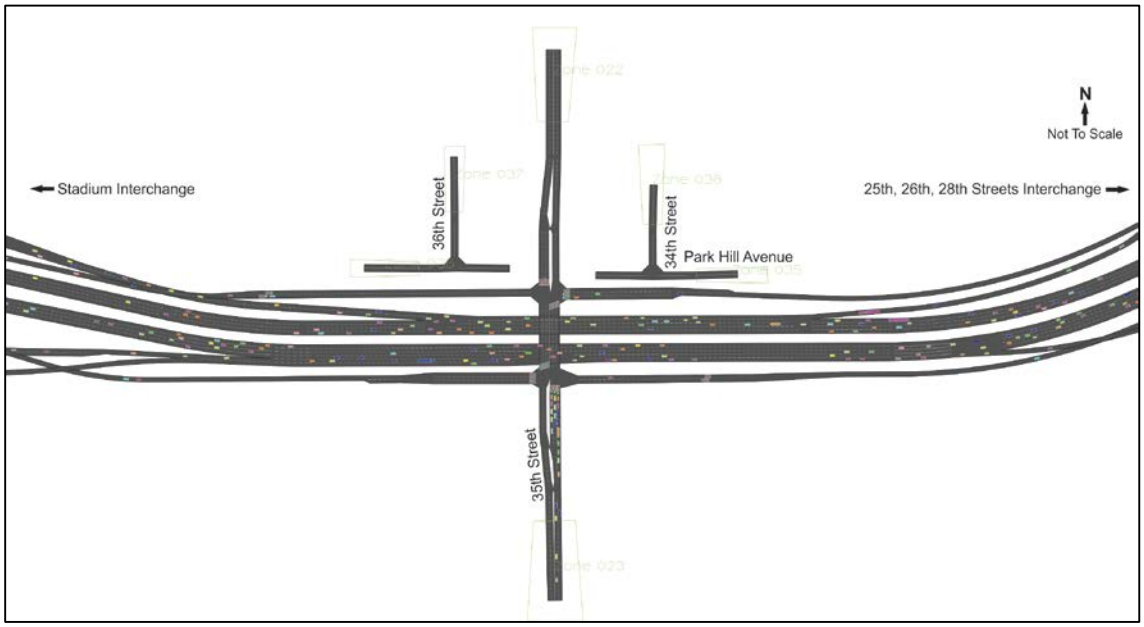
The preferred alternative was also analyzed using Paramics microsimulation during the design year (2040) peak periods.

Overall, the future peak period Paramics models of the preferred alternative indicated acceptable operations within the 35th Street Interchange influence area associated with the design year traffic forecast. As previously indicated, LOS is not reported based on Paramics model outputs and as such, visual observations of the model and resulting speeds are used to convey operations.

In general, the future AM peak period Paramics model demonstrated consistent speeds and stable operations throughout the AM peak hour along I-94 through the 35th Street Interchange. Improved geometrics (i.e. braided ramps), ramp spacing, and the additional lane in each direction of I-94 help improve operations in comparison to the existing AM peak period. All roadway sections along both directions of I-94 included within the area of influence operated at or slightly greater than the posted speed limit, which indicates reliable operations.

Figure 3 shows a screen capture from the future AM peak period Paramics model in the 35th Street Interchange area, which represents operations at approximately 7:30AM. **Tables A-23** and **A-24** in **Appendix A** includes the future AM peak period Paramics model speeds for roadway sections located within the 35th Street Interchange area of influence.

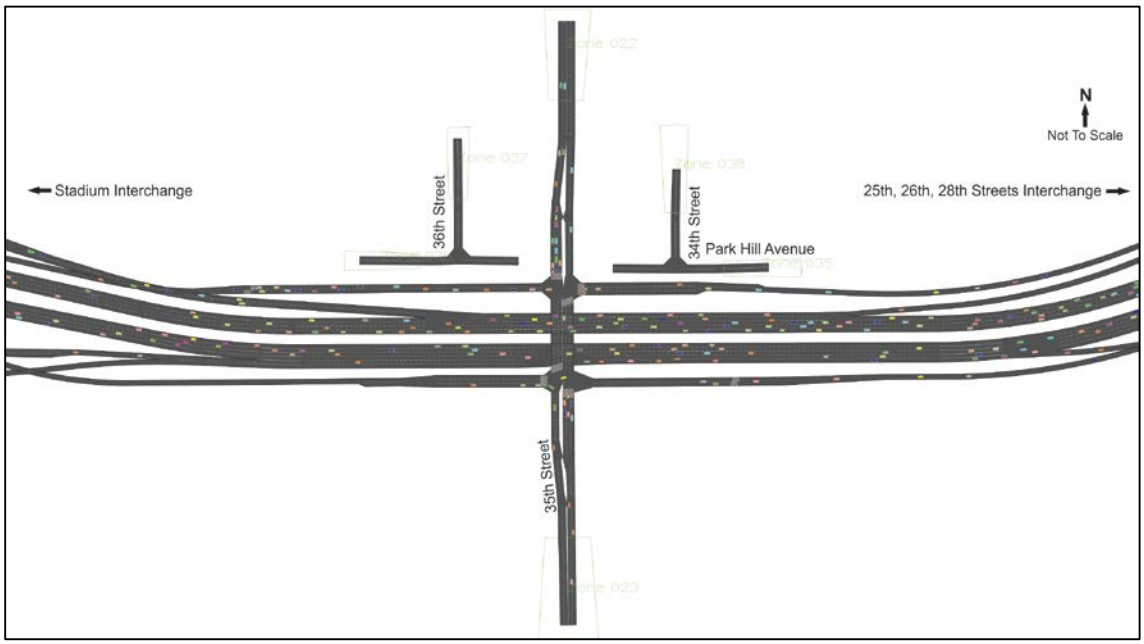
Figure 3



Similar to the future AM peak hour, the future PM peak period Paramics model also demonstrated consistent speeds and stable operations throughout the PM peak hour within the 35th Street Interchange influence area, due to the improved geometrics and additional capacity associated with the preferred alternative. Both directions of I-94 operated at or slightly faster than the posted speed limit.

Figure 4 shows a screen capture from the future PM peak period Paramics model in the 35th Street Interchange area, which represents operations at approximately 5PM. **Tables A-25** and **A-26** in **Appendix A** shows the future PM peak period Paramics model speeds for roadway sections located within the 35th Street Interchange area of influence.

Figure 4



Intersection Analysis

Design year peak hour operations of the service interchange ramp terminals were analyzed using Synchro. The analysis included the 35th Street signalized ramp terminals, in addition to the nearest signalized intersection north of the interchange on 35th Street, which allowed for the identification of potential local street impacts due to ramp terminal operations. There are no signalized intersections south of the interchange on 35th Street within one half mile. The peak hour factor used for the future AM and PM peak hour analysis was 0.87 and 0.97, respectively. Existing peak hour truck percentages at the ramp terminals were assumed to remain unchanged in the design year peak hours.

In general, the signalized ramp terminals are expected to operate between LOS B and LOS D overall during the future peak hours. The signalized turning movements within the Stadium Interchange are expected to operate between LOS B and LOS C. Turning movements at the 35th Street Interchange will operate between LOS A and LOS D during the future peak hours. Turning movements along St. Paul Avenue will mainly operate between LOS B and LOS D at the 25th, 26th, and 28th Street Interchange during the future peak hours. Since the 35th Street ramp terminals generally operated at, or better than, LOS D during the future peak hours, the proposed design of the ramp terminal intersections was deemed acceptable by the I-94 EW design team.

The results of the future design year AM and PM peak hour intersection analyses are shown in the tables included in **Appendix B.**

Mitchell Boulevard Interchange

The existing Mitchell Boulevard Interchange would be removed and replaced with an embedded, split diamond service interchange at 44th and 46th Streets, located beneath the Stadium Interchange. Access to and from Mitchell Boulevard would be retained in the future by the inclusion of a frontage road on the north side of I-94, in addition to existing access located along Selig Drive located south of I-94.

Each of the four ramp terminals would operate as a stop controlled intersection. Turning movements are expected to operate at LOS A during the future peak hours.

A summary of the future peak hour traffic volumes, levels of service, and delay from the Synchro analysis are included in **Table B-14**.

Stadium Interchange

As part of the preferred alternative, the Stadium Interchange would be reconstructed to a service type interchange with free flow ramps for movements exiting I-94 and traffic signal controlled intersections for the entrance ramp terminals. The NBL (S-W) and SBL (N-E) movements would have two turn lanes crossing three thru lanes in each direction. The NBR (S-E) and SBR (N-W) movements would be free-flow through the signalized intersections. Both the Stadium Interchange eastbound and westbound entrance ramps would be metered before entering the I-94 freeway corridor.

The Stadium Interchange signalized intersections are expected to operate at LOS C overall during the future peak hours. The conflicting left turn and thru movements are expected to operate between LOS B and LOS C. As noted previously, the right turn movements are free-flow and therefore have no signal delay (LOS A).

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-15** and **B-16**.

35th Street Interchange

Under the preferred alternative, the 35th Street Interchange would remain a diamond service interchange. The existing westbound exit and entrance ramp connections to and from the north local access road (Park Hill Avenue) would be removed. The future service ramps in both directions would be braided with the Stadium Interchange (west) and 25th/26th/28th Street Interchange (east). 35th Street would remain a four-lane facility with single left turn lanes to access the entrance ramps.

The 35th Street Interchange was assumed to operate under TTI (Texas Transportation Institute) phasing with optimal signal timings due to the close spacing of the north and south ramp terminals, which minimizes internal queue lengths. The north ramp terminal (I-94 EB ramps) is expected to operate at LOS B overall during the future AM and PM peak hours. The south ramp terminal (I-94 WB ramps) is expected to operate at LOS C overall during the future peak hours. No turning movements are expected to operate worse than LOS D at either ramp terminal.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-17** and **B-18**.

25th/26th/28th Street Interchange

The existing 25th, 26th, and 28th Street Interchange would be rebuilt as part of the preferred alternative in a similar configuration as currently exists, except for including braided ramps with the 35th Street Interchange. 25th Street would remain a one-way roadway southbound between the I-94 WB exit ramp and St. Paul Avenue. 26th Street would remain a one-way roadway northbound between St. Paul Avenue and Clybourn Street. St. Paul Avenue would be widened to a four-lane facility between 28th Street and 25th Street, with intersection improvements (additional turn lanes, etc.) at 27th Street, 26th Street, and 25th Street to accommodate future demand. The intersection of 28th Street and St. Paul Avenue would remain stop-controlled for the west and north legs. The intersections of 26th and 25th Streets with St. Paul Avenue would remain signalized.

In general, Synchro analysis of the signalized intersections along St. Paul Avenue indicated overall intersection operations at LOS B or LOS C during the future peak hours with all movements operating at LOS D or better. The signalized intersections were assumed to be constrained to a 90-second cycle length with optimal timings in order to provide coordination between adjacent signals located along 27th Street.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-19** and **B-20**.

Policy Points	
Policy Point 1 Existing Network's Ability to Accommodate Traffic	*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 necessary 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.* The 35th Street Interchange is not a new interchange, and this project is not adding a new interchange to this corridor. This project proposes to reconstruct

and reconfigure the existing interchanges to improve the safety and efficiency of I-94, while minimizing impacts to the surrounding environment. The existing conditions on the corridor are shown on **Exhibits 2-2** and **2-3**.

The HCS analysis input values and the resulting LOS values are shown in **Appendix A** on **Tables A-1** through **A-3** and **A-4** through **A-6** respectively. The summary of the traffic volumes and level of service for the existing conditions is shown on **Exhibits 3-1** through **3-3**. The No Build traffic projections and level of service are shown on **Exhibits 4-1** through **4-3**. The levels of service and queue length information for the intersection analyses are shown in **Appendix B**.

35th Street Interchange

This existing interchange is a diamond interchange with diagonal ramps on the south side connecting directly to 35th Street and slip ramps on the north side connecting to Park Hill Avenue on the north side. Both intersections are traffic signal controlled.

The mainline operates at LOS D in the westbound direction for both AM and PM peaks and in the eastbound for the PM peak. It operates at LOS E in the AM peak in the eastbound direction.

The no build analyses show that in the design year, the mainline eastbound will operate at LOS E within the interchange. The westbound will operate at LOS D in the AM and LOS E in the PM peak. The weave segment west of the interchange will operate at LOS E in both directions for both the AM and PM peak periods. The freeway east of this interchange is a basic freeway segment eastbound and a weave segment westbound which will operate at LOS E in both directions for both the AM and PM peak periods.

Both intersections are traffic signal controlled. The eastbound ramp intersection operates at LOS B in the AM and LOS C in the PM peak. The westbound ramp intersection operates at LOS E in the AM and LOS D in the PM peak. The movements all operate at LOS D or better except the northbound left turn movement which operates at LOS F. The intersection LOS and queue lengths are shown in **Appendix B** on **Tables B-6** and **B-7**.

This interchange is proposed to be reconstructed to a standard diamond with the ramps braided with those of the adjacent interchanges. Park Hill Avenue will be reconstructed to have a cul-de-sac on the west side of 35th Street and terminate at the alley east of 35th Street.

Adjacent Interchanges

Mitchell Boulevard Interchange

This is an existing diamond interchange that has three left side ramps in the median between the eastbound and west bound I-94 roadways. The westbound exit ramp is a normal right side diagonal ramp.

I-94 mainline between the ramps operates at LOS E in the AM peak and LOS D in the PM peak. This interchange is spaced very close to the adjacent interchanges with weaving segments on both sides. The weave to the west operates at LOS F

eastbound in both the AM and PM as well as westbound in the AM peak. The westbound PM peak operates at LOS E. The weave to the east operates at LOS E in the eastbound direction for AM and PM and LOS E in the AM and LOS D in the PM peaks for the westbound direction.

The no build analyses show that with the traffic volumes projected for the design year, the mainline within the interchange will operate at LOS F in the PM peak and LOS E in the AM peak in the eastbound direction. The westbound direction in this segment will operate at LOS E in both AM and PM peaks. The weave segment to the west will fall to LOS F in both directions for both the AM and PM peak periods. The weave segment to the east will operate at LOS E in both directions for both the AM and PM peak periods.

The exit ramps are stop sign controlled. Traffic volumes are very low at this interchange except during events at Miller Park stadium. The stop sign controlled movements operate at LOS A or B. The stop controlled intersection LOS values are shown in **Appendix B** in **Table B-5**.

This interchange is proposed to be removed and replaced with diamond ramps embedded in the Stadium Interchange.

Stadium Interchange

This interchange is a three level High Level Service Interchange with directional ramps serving all turning movements. Each direction has a combination of right and left side ramps.

The existing mainline operates at LOS D within the interchange in the east bound direction for both AM and PM peaks. The westbound operates at LOS D in the AM and LOS C in the PM peak. There are weaving segments on I-94 on either side of the interchange. The Weaving segments on the east side operate at LOS E in both directions for AM and PM peaks. The weaving segments on the west side operate at LOS E for the eastbound direction for both the AM and PM peaks, while the westbound direction operates at LOS E in the AM and LOS D in the PM peak.

The no build analyses show that the mainline will operate at LOS D in the design year in both directions for both the AM and PM peak periods, however the weaving segments on both sides of this interchange will operate at LOS E in both directions for both AM and PM peak periods.

This interchange is proposed to be reconstructed to a service interchange that will have free flow exit ramps from I-94 and traffic signal controlled intersections for the entrance ramps.

25th/26th/28th Street Interchange

There are existing ramps at 25th, 26th, and 28th Streets. The ramps to and from the east are at 25th Street. The westbound exit ramp connects to 26th Street at St. Paul Avenue. The westbound entrance ramp connects at 28th Street and St. Paul Avenue.

The existing mainline eastbound operates at LOS E in the AM and LOS D in the PM

	peak. The mainline westbound operates at LOS D during both the AM and PM peaks. The exit ramp to 26th Street and St. Paul Avenue operates at LOS E. The entrance ramp from 28th Street and St. Paul Avenue attaches to the weave segment connecting to 35th Street which operates at LOS E in the AM and LOS D in the PM peak. The eastbound entrance at 25th Street and St. Paul Avenue attaches to the weave segment connecting to 13th Street which operates at LOS D in both the AM and PM peaks. The No Build analyses show that the eastbound mainline will drop to LOS E in both the AM and PM peaks by the design year and the westbound mainline will drop to LOS E in the AM peak. The intersection of St. Paul and 28th Street is stop sign controlled on the north and west approaches, giving the eastbound left turns on the ramp the right-of-way. The intersection of St. Paul and 26th Street is traffic signal controlled with 26th Street, a one-way street northbound. There is a traffic signal at St. Paul Avenue and 25th Street on which 25th Street is a one-way street southbound. At the ramp intersections, all movements operate at LOS C or better. The intersection LOS and queue lengths are shown in **Appendix B** on **Tables B-8** and **B-9**. This interchange is proposed to be reconstructed maintaining very similar configurations to the existing ramps and access point locations. ***Safety Analyses*** The average total crash rate on I-94 from within the 35th Street Interchange from 2005 to 2009 is 315.6 crashes /100M VMT for eastbound and 225.4 crashes/100M VMT for westbound. This is more than two and a half (westbound) to three and a half (eastbound) times greater than the statewide average total crash rate. **Conclusion** The 35th Street Interchange along with the I-94 mainline require improvements to safely and efficiently accommodate the network's ability to move the traffic that is projected to be using this corridor in the design year of 2040. The reconstruction and reconfiguration of the interchanges as discussed will provide for the safer and more efficient operation for through traffic and those accessing the freeway in this area. Improvements to the local system alone will not alleviate the need to reconfigure this interchange. Elimination of this interchange was considered, but early in the NEPA process, it was determined that it needed to be retained due to the potential for impacts to the community it serves. The need for the project and the interchange modifications are discussed further under the **NEED** section of this report.
Policy Point 2 Transportation System Management	*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 changes in access.* The 35th Street Interchange is not a new interchanges to this corridor. The project is reconstructing the existing roadway and interchanges with modifications to improve the safety and operations in the corridor. Although numerous

	Transportation System Management (TSM) applications are proposed to be incorporated as part of this project, TSM alone cannot resolve the need to modify the interchanges as proposed. Existing ITS features are currently in place along this segment of I-94. Improved ITS and TMP improvements were studied (including a doubling of transit), however mainline and interchange improvements as proposed are still needed. To provide an acceptable LOS, Transportation System Management features are proposed to be included in the design of the preferred alternative. These include Ramp Metering, Ramp Gates, Closed Circuit Cameras, Variable Message Signs, and Traffic Detectors. These features alone being added to the existing facility will not meet the purpose and need of the project. The SEWRPC's build traffic forecasts include TSM strategies as part of the base-line assumptions, including a doubling of transit use. Existing TSM applications currently in use that will be carried forward in the proposed design consist of ramp metering, providing driver information on changeable message signs, closed circuit cameras, traffic detectors, ramp gates, and encouraging the use of transit. The existing ramps have ramp meters that were installed under previous projects: Mitchell Boulevard eastbound and westbound, Stadium N-E, S-E, N-W and S-W, 35th Street, 28th Street westbound, and 25th Street eastbound. Wrong way driver detection has been installed on the eastbound exit ramp to Mitchell Boulevard consisting of wrong way signs with flashing LEDs to get the attention and warn drivers that start to go on to the ramp in the wrong direction. Geometric improvement only alternatives without increased lanes were also analyzed and found not to adequately meet the project purpose and need. All of the proposed alternatives would not preclude the implementation of more transit use, but would provide for improved operations for existing transit use and future transit growth. **Conclusion** Transportation System Management measures have been investigated. These measures are incorporated into the proposed design alternative. However, these measures alone were studied and will not provide an acceptable level of service in the design year or eliminate the need to modify the existing interchanges as proposed with the preferred alternative. The design of the preferred alternative does not preclude the future implementation of additional TSM measures.
Policy Point 3 ***Safety Impacts and Operational Analysis***	*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, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access. The crossroads and the local street*

	network, to at least the first major intersection on either side of the proposed change in access, shall 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. Requests for a proposed change in access must 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. Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative. The existing facility was constructed in 1963 and does not conform to current design standards. This proposed project will not add any additional access points to the interstate, but will reconstruct and reconfigure the existing access points to operate more safely and efficiently. The proposed design will address the current safety issues with revisions to the corridor to improve roadway geometrics, freeway operations, ramp capacity, and ramp/mainline merge and diverge characteristics. Traffic analyses (HCM and Paramics) and safety analyses (ISATe) show the proposed design will substantially improve existing conditions. The improvements to I-94 in the preferred alternative include reconstruction to the proposed roadway cross section by providing four mainline travel lanes in each direction, including reconstruction with added improvements to the interchanges and auxiliary lanes where needed between interchanges. Alternatives providing geometric and operational improvements without added mainline traffic lanes were studied and found to not adequately meet the project's purpose and need. The preferred alternative for the corridor is shown on **Exhibits 5-2** through **5-3**. The individual interchanges are shown on **Exhibits 6-3** through **6-5**. The projected design year traffic volumes and levels of service are shown on **Exhibits 7-2** through **7-3**. **Appendix A** has **Tables A-13** through **A-15** of HCS analysis input data and **Tables A-16** through **A-18** show the Level of Service along with the density values for each segment of the freeway and ramps. **Appendix B** has the tables of the intersection analyses results. **35th Street Interchange** This interchange will be reconstructed as a diamond interchange. The ramps will be braided with the ramps of the adjacent interchanges to eliminate the weaving that occurs under the current configuration. All four ramps will be diagonal ramps. Park Hill Avenue will be terminated with a cul-de-sac west of 35th Street and into an alley intersection east of 35th Street eliminating the slip ramp connections that currently exist. The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-4**.

	The I-94 eastbound mainline will operate at LOS C through the area of this interchange. The I-94 westbound will operate at LOS C west of the interchange and in the AM peak east of the interchange. I-94 will operate at LOS D in the PM peak east of the interchange. The ramps will all operate at LOS C. The ramp terminal intersections will be traffic signal controlled. All movements will operate at LOS D or better in the AM and PM peak periods. The levels of service and delay values are shown in **Table B-17** and the queue lengths are shown in **Table B-18** in **Appendix B**. ***Adjacent Interchanges*** **<u>Stadium Interchange</u>** The Stadium Interchange is proposed to be reconstructed to an interchange with free flow ramps for the movements exiting I-94 and traffic signal controlled intersections at the entrance ramp terminals. This will be a four level interchange, including the embedded interchange to 44th and 46th Streets which is the relocation of Mitchell Boulevard Interchange. The top level will consist of the ramps that exit I-94 and enter WIS 175/341. The second level will be the WIS 175/WIS 341 mainline roadway with the ramp intersections that provide the entrance to I-94. The third level down is the I-94 mainline. The bottom level consists of the 44th and 46th Street ramp connections. The embedded interchange has diagonal ramps connecting I-94 to and from the west to 44th Street. 46th Street has ramps that combine with the Stadium Interchange ramps to and from the east. The Mitchell Boulevard Interchange access is proposed to be relocated to provide safer and more efficient operations between the existing tightly spaced Hawley Road and Mitchell Boulevard Interchanges. The freeway entrance and exit ramps at the Mitchell Boulevard Interchange will be removed. Having entrance and exit ramps in the narrow cemetery area contributes to congestion and there is no space to physically locate the ramps without impacting the cemeteries or having very short and unsafe merge distances on the interstate. With the embedded interchange within the Stadium Interchange, sufficient distances can be provided for the merging and diverging maneuvers between each of the stadium and relocated local service ramps and the partial interchange ramps at Hawley Road. The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-3**. The segment of I-94 west of the Stadium Interchange will operate at LOS D in both directions for both the AM and PM peak periods. The segment to the east will operate at LOS C. The I-94 entrance ramps will have traffic signal controlled ramp terminal intersections with WIS 175/WIS 341 consisting of two-phase signal control. All movements in these intersections will operate at LOS C or better. The traffic volume, LOS and delay values as well as the queue lengths for these intersections are shown in **Appendix B** in **Tables B-15** and **B-16.**

The embedded interchange replaces the access that currently exists at the Mitchell Boulevard Interchange. There is very low demand for this access other than when events occur at Miller Park. The unsignalized intersection analyses shows that during the normal AM and PM peak periods these intersections will operate at LOS A. The levels of service and delay values are shown in **Table B-14** in **Appendix B**.

25th/26th/28th Street Interchange

This interchange will be reconstructed in a similar configuration as it exists today. There are ramps at 25th, 26th, and 28th Streets. The ramps to and from the east are at 25th Street. The westbound exit ramp connects to 26th Street at St. Paul Avenue. The westbound entrance ramp is at 28th Street and St. Paul Avenue. Improvements will also be made to the portion of St. Paul Avenue that connects the ramp intersections to improve operations, safety and direction finding.

The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-5**.

The I-94 mainline will operate at LOS D through the area of this interchange. The eastbound exit will operate at LOS C. The eastbound entrance connects to the weave segment with 13th Street which will operate at LOS D. The westbound exit will operate at LOS D. The westbound entrance connects to the weave segment with the Stadium exit which will operate at LOS C.

St. Paul Avenue will be widened between the ramp intersections to two through lanes in each direction and exclusive turn lanes at the intersections. The intersection of 28th Street and St. Paul Avenue will be stop sign controlled. The intersections of 27th, 26th and 25th Streets with St. Paul Avenue will be traffic signal controlled. All movements at these intersections will operate at LOS D or better. The levels of service and delay values are shown in **Table B-19** and the queue lengths are shown in **Table B-20** in **Appendix B**.

Safety

The I-94 freeway mainline and ramp segments were analyzed using HSM methods using the ISATe tool. This analysis showed that the preferred alternative will provide a reduction in crashes of approximately 20% over the no-build alternative. Some features in the preferred alternative that will enhance the safety performance are increased mainline capacity, added auxiliary lanes increased spacing between ramps on I-94, addition of traffic signal improvements at crossroad ramp terminals, and removal of the left-side ramps.

Conclusion

The 35th Street Interchange modifications have been developed in conjunction with the I-94 mainline preferred alternative to improve the safety and efficiency of the traffic operations within the area of influence. There are no additional access points being added to the interstate as part of this improvement. There are proposed local street improvements adjacent to the interchanges and between the interchanges where necessary to accommodate the projected design year

	traffic. The improvements between the interchanges will help drivers more safely and efficiently travel between interchange ramps.
Policy Point 4 **Local Road Access**	*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 vehicles, HOV's, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards.* The 35th Street Interchange is proposed to be a full access interchange that connects to a public street. Braided ramps between the Stadium Interchange and the 35th Street Interchange will allow the two closely spaced interchanges to operate safely and more efficiently. Therefore, there will be no access from WIS 175 or Miller Park Way to the 35th Street interchange. Traffic on WIS 175/Miller Park Way will be able to access 35th Street from Wisconsin Avenue north of I-94 or National Avenue south of I-94. Access to the 35th Street interchange will continue to be provided for motorists on I-94. The exceptions to standards that are anticipated are summarized in the Compliance with Policies and Engineering Standards of this document. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review and approval by WisDOT and FHWA later in the design of this project. For more detail on the exceptions to standards, including the exceptions that were identified for other alternatives, see the 13 Controlling Criteria Exceptions to Standards Memorandum on Remaining Alternatives Prior to Preferred Alternative Selection in **Appendix F.** **Conclusion** The 35th Street Interchange will provide a balance between addressing long-term mobility needs and safety concerns while minimizing impacts to the existing development and environmental resources to the maximum extent practical. Due to the 35th Street Interchange close proximity east of the Stadium Interchange, the 35th Street Interchange is proposed to be reconstructed with braided ramps between 35th Street and the Stadium Interchange. Motorists will no longer be able to access to/from the 35th Street Interchange from/to the WIS 375/Miller Park Way. Traffic on WIS 175/Miller Park Way will be able to access 35th Street from Wisconsin Avenue north of I-94 or National Avenue south of I-94. Proposed signing will direct drivers.
Policy Point 5 **Regional Transportation Plans**	*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.* The proposed I-94 E-W project is included in the current SEWRPC Long-Range

	Transportation Plan (2035 Regional Land Use and Transportation Plan). The Preliminary Engineering phase of this project is in the TIP. The 2035 regional transportation system plan proposed modernization and limited expansion of the southeastern Wisconsin freeway system. A doubling of transit use was analyzed prior to analyzing capacity expansion as called for in the SEWRPC Plan. The 2035 regional transportation plan included a full interchange at Hawley Road and did not reflect the relocation of the access provided by the existing Mitchell Boulevard interchange to a new location within the Stadium Interchange. On September 16, 2015, the SEWRPC Commission amended the 2035 regional transportation plan as follows: • Convert from full to half interchange at Hawley Road. • Remove existing interchange at Mitchell Boulevard. • Provide service ramps to non-arterial roadways at the Stadium Interchange. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016. The 35th Street Interchange conforms to SEWRPC's 2035 regional transportation plan. **Conclusion** The project is consistent with local and regional land use plans and as such, also conforms with fiscal constraint and air quality requirements. The next phase(s) of the project will be included in the SEWRPC TIP prior to signing of the ROD. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016.
Policy Point 6 Multiple Interchange Additions	*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 proposed and desired access within the context of a longer-range system or network plan.* The 35th Street Interchange is not a new access point. No additional interchanges are proposed to be added as part of this project and none are proposed for the future. The spacing of interchanges along this corridor is less than one mile. With the tight interchange spacing, it is not feasible to add any additional interchanges in this corridor. The 35th Street Interchange has ramps braided with those of the adjacent interchanges to improve the spacing of access points along the freeway

	due to this close spacing. The Mitchell Boulevard interchange will be replaced with an embedded interchange and two of the ramps combined with the Stadium Interchange ramps to reduce the number of access points entering the freeway. The regional plan does not include any additional interchanges within this corridor. The design team looked at trying to reduce the number of interchanges in the corridor, but other than relocating or modifying the design to improve on existing access points, were not able to eliminate any interchanges. The interchanges within this influence area are proposed to be modified to provide safer and more efficient operations as well as accommodating the additional mainline lanes that are included with this project. **Conclusion** This area is fully developed with closely spaced interchanges. No additional interchanges are proposed to be added as part of this project and none are proposed for the future.
Policy Point 7 ***Appropriate Coordination***	*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. 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.* The I-94 East-West Project team has demonstrated appropriate coordination between the development and related transportation system improvements through its significant public involvement and outreach efforts with the City of Milwaukee, City of Wauwatosa, City of West Allis, Village of West Milwaukee, Milwaukee County, local business groups, individual businesses, community leaders, and residents of the area. For the design of the Stadium Interchange, the project team has had several coordination meetings with area stakeholders including the stadium board and the Milwaukee Brewers, Menomonee Valley Partners, Hunger Task Force, and cultural resource groups. Through this coordination, this project and all of its alternatives have and will continue to be developed in an orderly and coordinated manner to serve the public. Over 100 people having a connection to Marquette University High School submitted comments requesting that the 35th Street Interchange with I-94 remain open. Property owners and representatives from community organizations expressed concern about property acquisition and impacts to the community if access is changed or views of adjacent properties are altered. There was not a clear preference for particular design options. Input on whether travel lanes should or should not be added was evenly mixed.

	Conclusion No new interchanges are proposed in this corridor. New development is not a driving force for the design of this interchange since the surrounding area is fully developed. The project team has had extensive coordination with local officials and stakeholders throughout the project's area of influence. The proposed 35th Street Interchange modifications provide a balance between providing for the needs expressed by the stakeholders and reducing the impacts to the surrounding properties.
Policy Point 8 ***Environmental Planning***	*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.* The I-94 East-West Corridor Study Draft EIS was approved and signed by FHWA and WisDOT on November 4, 2014. A Notice of Availability for the Draft EIS appeared in the Federal Register on November 14, 2014, beginning the 60-day comment period that was slated to end on January 13, 2015. A two week extension of the comment period was requested and granted with the comment period for the I-94 East-West Corridor Study Draft EIS ending on January 27, 2015. Public Hearings for the project were held on December 3rd and 4th. The preferred alternative was announced on February 17, 2015. Following the end of the public comment period, FHWA and WisDOT are preparing a Final EIS, slated for approval in December 2015. This engineering and operational acceptance is being sought prior to approval of the FEIS. A Record of Decision is anticipated in the spring of 2016. Coordination meetings were held between the design team, WisDOT and FHWA (Division and Headquarters) prior to the selection of the preferred alternative and Draft Environmental Impact Statement. The engineering and operational review and approval schedule has been coordinated with FHWA and will be completed prior to review and approval of the Final EIS. **Conclusion** The design of the 35th Street Interchange modifications have been developed to improve the traffic operations of the I-94 mainline as well as the entering and exiting traffic movements. The development of the proposed modifications has taken place as part of the NEPA process. All of the interchange modifications and the local street/intersection improvements to mitigate the change in access are covered in the EIS.

Chapter 5: 25th/26th/28th STREET INTERCHANGE

EXISTING CONDITIONS

The aerial photography of the existing corridor is shown in **Exhibits 2-1** through **2-3**.

Existing Land Use

Existing land use in the I-94 East-West Corridor generally consists of high density urban development, including commercial, residential, institutional, industrial, parks, transportation, and utilities.

Land uses in the east segment (Yount Drive to 16th Street) maintain an urban character. Land uses east of the Stadium Interchange are divided by I-94. The area north of I-94 is generally residential and commercial, while the area south of I-94 is part of the Menomonee Valley industrial park.

North of I-94, the Merrill Park neighborhood is located between 35th Street and 27th Street. The neighborhood consists of single-family, two-family, and multifamily housing. The three main commercial corridors in this segment are Wisconsin Avenue, 35th Street, and 27th Street. Between 25th Street and 16th Street, there is a mix of land uses that serve the Marquette University campus. Institutional uses include Marquette University High School, St. Rose and St. Leo Catholic School, and three churches.

Directly south of I-94 from 35th Street to 27th Street is a utility corridor consisting of overhead electrical transmission lines and towers. On the east end of the I-94 East-West Corridor, the electrical transmission lines originate at a substation on the north side of I-94 at 27th Street. The transmission lines cross the freeway just west of the substation and parallel I-94 before crossing over I-94 again just east of Mitchell Boulevard. Along Greves Street, 27th Street, and St. Paul Avenue is a cluster of commercial and industrial properties, while east of 25th Street to 16th Street, Badger Truck Center is adjacent to I-94 along with additional commercial uses. South of these land uses is the Menomonee Valley, which is home to many industrial properties and Potawatomi Hotel and Casino.

Operational Performance

Existing Freeway Analysis – HCS 2010

Analyses of the freeway operations for the existing conditions were conducted using balanced year 2009 AM and PM peak hour traffic volumes and existing geometrics. The peak hour factor used for the existing analysis was 0.96. Level terrain and a posted mainline speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-1**. **Tables A-2** and **A-3** have the input information for ramp and weaving segment analyses.

The I-94 EB mainline within the 25th, 26th, 28th Street Interchange operates at LOS E during the AM peak hour and at LOS D during the PM peak hour. The westbound I-94 freeway mainline operates at LOS D during the existing AM and PM peak hours.

The density values and LOS for each of the mainline freeway segments is shown in **Table A-4**. **Tables A-5** and **A-6** have the density values and LOS for each of the ramp terminals and weaving segments analyzed.

The existing traffic volumes and levels of service for the freeway and ramps are shown on schematic diagrams of the facility. These are included in **Exhibit 3-3**.

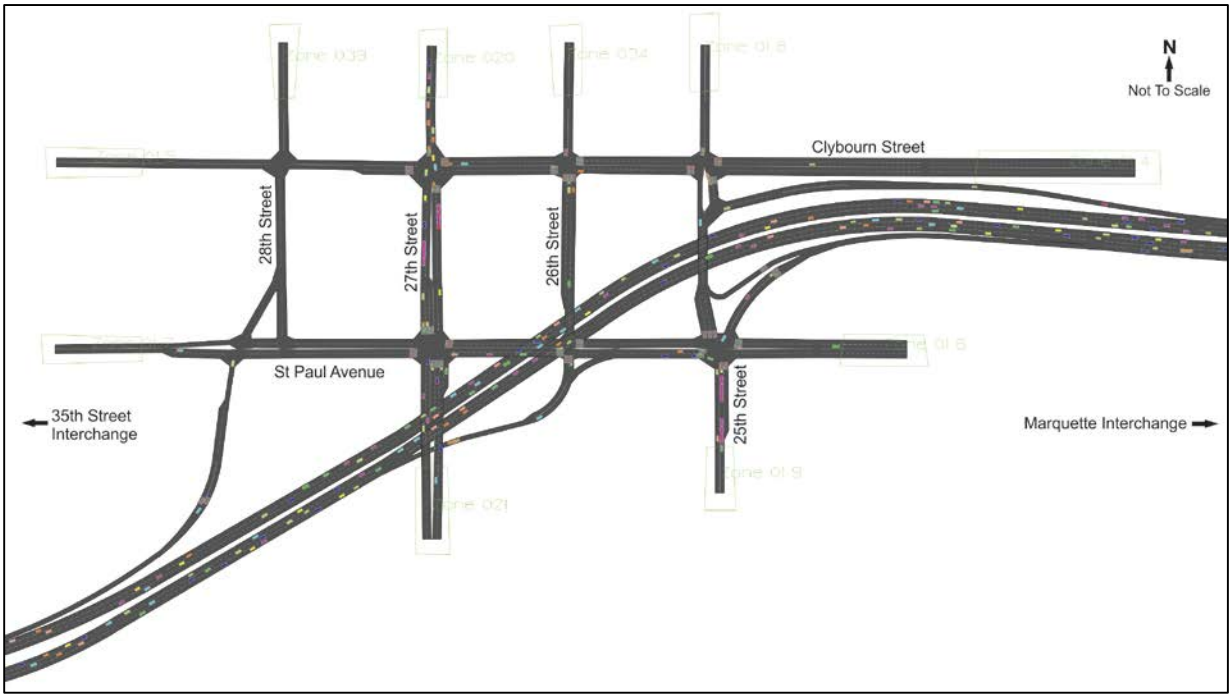
Existing Freeway Analysis – Paramics

Existing AM and PM peak hour LOS is not reported based on Paramics model outputs, as there is no direct correlation between the inherent assumptions included in the Highway Capacity Manual methodology and Paramics microsimulation modeling. Therefore, visual observations of the model and resulting speeds are primarily utilized to convey model operations.

The existing AM peak period Paramics model shows slightly slower speeds and minor congestion throughout the duration of the AM peak hour (7-8AM) along I-94 within the 25th, 26th, 28th Street Interchange influence area, which is consistent with HCS 2010 analysis of the existing conditions. Congestion and slower speeds along I-94 EB and WB between 35th Street and the Marquette Interchange develops due to a combination of sub-standard vertical and horizontal geometry, short ramp spacing, and heavy demands. Speeds are mostly consistent throughout the AM peak hour in each direction of I-94, averaging approximately 50 mph. There are slower speeds along I-94 WB between the 25th Street exit ramp and the 35th Street exit ramp, which can be attributed to weaving operations between 28th Street and 35th Street, in addition to congestion resulting from downstream operations approaching the Stadium Interchange.

Figure 1 shows a screen capture from the existing AM peak period Paramics model at the 25th, 26th, 28th Street Interchange, which represents operations at approximately 7:30 AM. **Tables A-19 and A-20** in **Appendix A** include the existing AM peak period Paramics model speeds for roadway sections within the 25th, 26th, 28th Street Interchange area of influence.

Figure 1

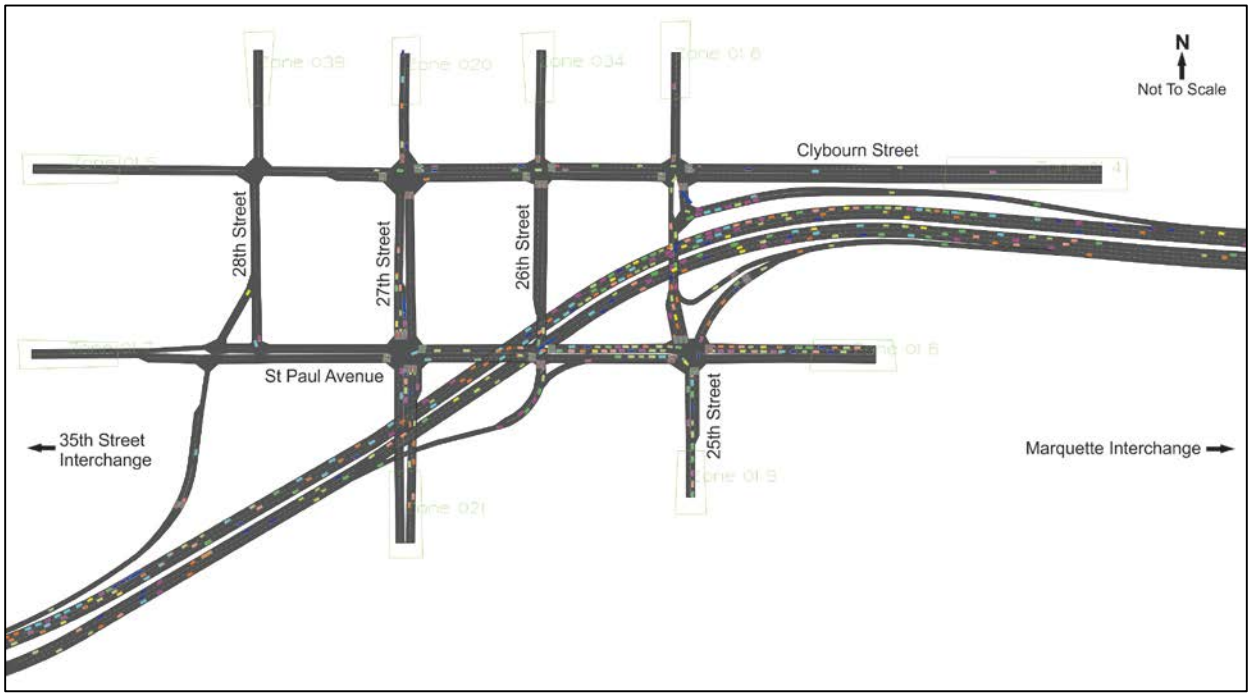


The existing PM peak period Paramics model shows similar operations as occurs during the AM peak hour along I-94 EB through the 25th, 26th, 28th Street Interchange, as speeds average approximately 52 mph, mainly due to slightly less demand. I-94 EB speeds are mostly consistent throughout the PM peak hour.

Operations along I-94 WB in the existing PM peak period Paramics model indicates significantly slower speeds and increased congestion, which starts to occur at approximately 5 PM and extends into the hour after (5:30-6:30PM). Average PM peak hour speeds west of the 25th, 26th, 28th Street Interchange start to decrease at the beginning of the hour, as congestion builds upstream due to the operational issues approaching and through the Stadium Interchange. This congestion builds and continues to extend upstream throughout the remainder of the PM peak hour, affecting the upstream roadway sections at about 5 PM. The existing PM peak period Paramics model demonstrates average speeds of about 36 mph along I-94 WB.

Figure 2 shows a screen capture from the existing PM peak period Paramics model at the 25th, 26th, 28th Street Interchange, which represents operations at approximately 5 PM. **Tables A-21 and A-22** in **Appendix A** include the existing PM peak period Paramics model speeds for roadway sections within the 25th, 26th, 28th Street Interchange area of influence.

Figure 2



Intersection Analysis

Existing peak hour operations of the service interchange ramp terminals were analyzed using Synchro. The intersection peak hour factors and turning movement truck percentages were calculated for each ramp terminal based on existing count data collected for the AM and PM peak hours.

In general, the existing ramp terminals operate between LOS B and LOS F overall during the existing peak hours. Turning movements at the 35th Street Interchange mainly operate at LOS D or better outside of one turning movement. Turning movements at the 25th, 26th, 28th Street Interchange mostly operate between LOS B and LOS D, with a couple at LOS E or LOS F.

The results of the intersection analyses are shown in the tables in **Appendix B**. More detail is provided in the discussion for **Policy Point 1**.

35th Street Interchange

The existing interchange is a diamond. The westbound ramps are slip ramps that connect to Park Hill Avenue. The eastbound ramps connect directly to 35th Street. The intersections are traffic signal controlled.

In general, the 35th Street Interchange north ramp terminal (I-94 WB ramps) operates at LOS E during the existing AM peak hour and at LOS D during the existing PM peak hour. Outside of the northbound left turn movement, which operates at LOS F during both peak hours, the remaining turning movements operate at LOS D or better. The south ramp terminal (I-94 EB ramps) and corresponding turning movements operate at LOS D or better during both existing peak hours.

A summary of the levels of Service from the Synchro analysis for all of the movements are in **Table B-6** with queue lengths summarized in **Table B-7**.

25th/26th/28th Street Interchange

The existing interchange is split between 25th, 26th, and 28th Streets, where the ramps to and from the east are located at 25th Street, the I-94 EB exit ramp is located at 26th Street, and the I-94 WB entrance ramp is located at 28th Street. Each of these roadways are directly connected via St. Paul Avenue. The EB exit, EB entrance, and WB exit ramp terminals are signalized. The intersection of 28th Street and St. Paul Avenue is stop controlled for the north and west approaches, which allows the primary approach (east) to operate free-flow.

The signalized intersections along St. Paul Avenue between 27th Street and 25th Street, which includes the ramp terminals at 25th and 26th Streets, operate between LOS B and LOS C during the existing AM peak hour. All movements operate at LOS D or better, except for the southbound left turn movement at the intersection of 27th Street and St. Paul Avenue. The 25th and 26th Street ramp terminals operate between LOS B and LOS C during the existing PM peak hour, with all turning movements at LOS C or better. The intersection of 27th Street and St. Paul Avenue operates at LOS F overall during the PM peak hour, predominately due to the southbound thru movement which operates at LOS F.

A summary of the levels of service from the Synchro analysis is included in **Table B-8** with queue lengths summarized in **Table B-9.**

Existing Safety Conditions

The average total crash rate on I-94 from east of the 35th Street Interchange to 16th Street, including within the 25th, 26th, 28th Street Interchange, from 2005 to 2009 is 365.5 crashes /100M VMT for eastbound and 194.1 crashes /100M VMT for westbound. The existing westbound and eastbound average total crash rates are approximately two to four times greater than the average statewide crash rate, respectively. This is about three times greater than the statewide average total crash rate. The breakdown of freeway mainline crashes by severity is shown in **Table 1**.

Table 1

Segment	Number of Crashes			Total
	Property Damage	Injury	Fatal	
I-94 EB 35th Entrance to 26th St Exit	50	21	0	71
I-94 EB 26th St Exit to 25th St Entrance	147	61	0	208
I-94 EB 25th St Entrance to 16th St	154	100	0	254
I-94 WB 16th St to 25th St Exit	116	37	0	153
I-94 WB 25th St Exit to 28th St Entr	89	37	0	126
I-94 WB 28th St Entr to 35th St Exit	17	4	0	21
I-94 EB Exit Ramp to 26th St	7	2	0	9
I-94 EB Entrance Ramp from 25th St	2	1	0	3
I-94 WB Exit Ramp to 25th St	1	0	0	1
I-94 WB Entrance Ramp from 28th St	9	2	0	11

The average total crash rate on service ramps within the I-94 East-West Stadium Interchange study area is 0.5 crashes/1MEV from 2005 to 2009. The total crash rate on the 25th/26th Street ramps is 0.3 crashes/1MEV. The total crash rate on the 28th Street ramp is 0.6 crashes/1MEV.
For more detail on the crashes within the corridor, see the Crash Analysis Technical Memorandum, which is included as **Appendix D**.

Existing Environmental Constraints

East of the Stadium Interchange is a crossing of the Menomonee River. This is not a new crossing as I-94 already crosses the river.

The 25th, 26th, 28th Street Interchange abuts a dense residential and commercial area to the north, a utility corridor to the south, and an electrical substation at 27th Street in the northwest quadrant.

ALTERNATIVES

Many alternatives were considered. There were alternatives that were looked at that had fatal flaws. The following are some of the alternatives that were looked at and eliminated due to impacts or unacceptable operations:

- Split Diamond at 27th/35th Streets
- Tight Urban Diamond at 27th Street with I-94 realignment (Off-alignment)

East Segment Build Alternatives

The east segment of the study area is from Yount Drive, just west of the Stadium Interchange, to 16th Street. This segment includes the existing 35th Street and 25th/26th/28th Street service interchanges and the Stadium Interchange.

27th Street Diamond Interchange with Off-alignment Alternative

East of 32nd Street, I-94 would be reconstructed about 400 feet south of its current alignment. I-94 would rejoin its existing alignment near 18th Street. This alternative would result in six commercial displacements.

Braided ramps would be provided between the 35th and 27th Street interchanges. The 27th Street area interchange would be reconstructed so that all ramps directly connect to 27th Street, which is also State Highway 57 (WIS 57). Currently, the ramps at this interchange connect to 25th, 26th, 28th Streets, and St. Paul Avenue, all local roads.

A diamond interchange at 27th Street is only feasible with the Off-alignment alternative. An electrical substation serving downtown Milwaukee is located in the northwest quadrant of 27th Street and I-94. The existing ramp configuration was built around the substation. Any impact to the substation would be extremely costly.

Some businesses in the Menomonee Valley are concerned that the consolidated 27th Street Interchange under the Off-alignment alternative would hinder business development because it would remove the 25th Street ramp and introduce extra turning movements for customers and freight trucks coming from the east. The Potawatomi Hotel and Casino is particularly concerned about losing the 25th Street ramp because access to the Valley at 13th Street can be blocked by freight trains.

This alternative was eliminated from further consideration because of concerns from City of Milwaukee and local stakeholders about right-of way acquisition, business displacement impacts, and change in access to the Menomonee Valley with the Off-alignment alternative and a consolidated 27th Street Interchange.

25th/26th/28th Street Interchange with On-alignment Alternative

East of 32nd Street, the freeway would remain close to its current alignment and be widened to the south. The centerline of reconstructed I-94 would move about 50 feet south of the existing freeway centerline. The entrance and exit ramps in the 27th Street area would remain where they are today at 25th, 26th, and 28th Streets and St. Paul Avenue because there would not be enough room to consolidate them at 27th Street. This alternative would improve sight distance compared to the existing freeway, but not to the extent of the Off-alignment alternative. The sight distance would meet American Association of State Highway and Transportation (AASHTO) minimum criterion. As noted previously, the improved sight distance under the Off-alignment alternative would result in about 1 percent fewer crashes than under the On-alignment alternative.

The intersection of 27th Street and St. Paul Avenue would need more extensive reconstruction under this alternative than the Off-alignment alternative. This is because most of the exiting freeway traffic destined for 27th Street would first get to St. Paul Avenue at 25th or 26th Street, and then turn onto 27th Street at its intersection with St. Paul Avenue. Similarly, most of the traffic entering the freeway at 25th and 28th Streets would also use the 27th/St. Paul intersection. This alternative would result in eight commercial displacements.

Preferred Alternative

The On-alignment alternative with the 25th, 26th, 28th Street Interchange has been identified as the preferred alternative for the east segment of the I-94 East-West Corridor project. The *I-94 East-West Corridor Preferred Alternative Identification Technical Memorandum* in **Appendix H** provides supporting documentation that established the basis for the recommendation of the preferred alternative.

FUTURE YEAR TRAFFIC

Year 2040 traffic forecasts were used to analyze the traffic operations of the alternatives considered for implementation. Average weekday traffic and peak hour forecasts were provided by SEWRPC. K30 volumes do not represent the peak hour traffic volumes in this corridor because of the special traffic generators in the area (Miller Park, State Fair Park, Summerfest and other festivals held in the area).

K200 volumes were found to closely approximate the typical AM and PM peak hours, so these were used for the design hourly volumes in the analyses as concurred with by WisDOT and FHWA. The basis for the design year traffic projections used for this project and the approval on September 20, 2012 by FHWA are documented in the memo on DHV and LOS in **Appendix C**.

No-Build Conditions

The No-Build analyses were conducted using the projected design year (2040) AM and PM peak hour traffic volumes and the existing geometric conditions. The peak hour factor used for the no-build analysis was 0.97. Level terrain and a mainline free flow speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes for each basic freeway segment are shown in **Appendix A** in **Table A-7**. **Tables A-8** and **A-9** have the input information for ramp and weaving segment analyses.

The 2040 no-build analysis shows levels of service along I-94 ranging from LOS C to LOS F. I-94 mainline would operate at LOS E or F on most segments in the design year if no improvement is made to this facility. The LOS for the freeway segments are shown in **Table A-10**. The weaving and ramp segments are shown in **Tables A-11** and **A-12**.

While the No-Build alternative would include continued maintenance of the I-94 corridor facility, it would not address the purpose and need of the project. As traffic volumes increase, an increase in congestion and crashes can be expected if there is no improvement to the facility.

The No-Build alternative is not considered a reasonable course of action, but is retained as a basis for comparison to the Build Alternative.

The No-Build traffic volumes and levels of service for the freeway and ramps are shown on schematic diagrams in **Exhibits 4-1** through **4-3**.

ALTERNATIVES ANALYSIS

Compliance with Policies and Engineering Standards

The design for the I-94 East-West Corridor Project is intended to meet or exceed current interstate standards where feasible. However, it is acknowledged that there will be exceptions to standards in some locations to minimize impacts to the surrounding development and environmental/cultural resources. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review and approval by WisDOT and FHWA later in the design process. The anticipated exceptions to standards for the preferred alternative are in this section. For more detail on these and exceptions for other alternatives see the Exceptions to Standards memo in **Appendix F**.

The following are areas where exceptions are anticipated to be necessary to avoid excessive impacts:

The East Segment On-Alignment Alternative has shoulders wider than 12’ proposed in spot locations to provide the needed sight distance.

Stopping Sight Distance (SSD)

Bridge and retaining wall parapets as SSD sight obstructions along the inside (left) shoulder of the horizontal curve on the eastbound exit ramp to 26th Street, just south of St. Paul Ave.

Concrete barrier creates a SSD sight obstruction along the outside (right) shoulder of the horizontal curve on the westbound entrance ramp from 28th Street, just east of the I-94/ramp gore.

Environmental Impacts

This project is in a developed urban area with no natural areas. There are few environmental impacts in the east segment of the I-94 corridor.

Ten commercial properties would be acquired as part of the On-alignment alternative, including some properties located south of I-94. The properties are a mix of vacant and active businesses. Additionally, three residences along 35th Street would be displaced. The On-alignment alternative would acquire 2 fewer acres of land than the Off-alignment alternative.

Safety

The corridor was analyzed with the ISATe tool to predict the frequency and severity of crashes on the alternatives considered. The 25th, 26th, 28th Street Interchange is within the segment that was analyzed to compare the east leg alternatives. The limits of this segment are from just west of 32nd Street to 16th Street. The ISATe tool predicted that the preferred alternative will have a reduction of 28% in total crashes, 20% in fatal and injury crashes and 30% in property damage only crashes over the replace in kind alternative.

The ISATe tool predicted approximately 74% of the crashes as multiple vehicle crashes and 26% of the crashes as single vehicle for the existing alignment. The distribution is approximately 62% multiple vehicle and 38% single vehicle for the on alignment and 60% multiple vehicle and 40% single vehicle for the off alignment. The technical memorandum that summarized this analysis is included as **Appendix E**.

Safety Improvements in the Proposed Design

The proposed design will address the existing safety issues with the following revisions to the corridor:

- Alignment improvements, flatter horizontal curves and vertical curves with better sight distance.
- Braided ramps with the 35th Street Interchange, eliminating the weaving movements.
- Increase the I-94 mainline and St. Paul Avenue capacity as a measure to reduce the number of crashes due to congested conditions on the freeway and on St. Paul Avenue between the ramps.
- Increase acceleration and deceleration distances at the entrance and exit ramps to provide safer and more efficient merging and diverging operations.
- Less congested conditions will help emergency responders arrive more quickly when a crash does occur.

The proposed design for the preferred alternative is shown on **Exhibits 5-1** through **5-3**. The spacing of the access points is improved from the existing condition and the distances are shown on these exhibits. The design of each interchange is shown on **Exhibits 6-3** through **6-5**. The signing plan for the proposed design is shown on **Exhibits 8-1** through **8-3**. Type 2 signing will also be provided along St. Paul Avenue to direct drivers to the entrance ramp at 28th and St. Paul Avenue. With the interchange configuration remaining, local drivers are familiar with the access pattern. **Table 2** shows the proposed spacing of the ramp terminals along I-94 within the corridor along with the standard spacing for each ramp configuration.

Table 2 Proposed Ramp Spacing

Route	From	To	Proposed	Required	Auxiliary Lane*
I-94 EB	35th Street Exit	Stadium Entrance	1950'	500'	No
I-94 EB	Stadium Entrance	26th Street Exit	2285'	1000'	No
I-94 EB	26th Street Exit	35th Street Entrance	1700'	1600'	Yes
I-94 EB	35th Street Entrance	25th Street Entrance	1651’	500'	No
I-94 EB	25th Street Entrance	13th Street Exit	1700'	1600'	Yes
I-94 WB	I-43 S-W Entrance	25th Street Exit	2020'	2000'	No
I-94 WB	25th Street Exit	35th Street Exit	2175'	1000'	No
I-94 WB	35th Street Exit	28th Street Entrance	2150'	500'	No
I-94 WB	28th Street Entrance	Stadium Exit	1280'	2000'	Yes

* AASHTO recommends the inclusion of an auxiliary lane when ramp spacing s 1500’ or less.

Operational Performance

The preferred alternative HCS 2010 analyses were conducted using the projected design year (2040) AM and PM peak hour traffic volumes and the proposed design geometrics. The peak hour factor used for the build alternative analysis was 0.97. Level terrain and a mainline operating speed of 55 mph were used for the HCS analysis. Traffic volumes, percent of heavy vehicles and number of lanes input for each freeway segment are shown in **Appendix A** in **Table A-13**. The input information for the ramp and weaving segments are in **Tables A-14** and **A-15**.

The proposed design for the preferred alternative is shown on **Exhibits 5-1** through **5-3**. **Exhibits 6-3** through **6-5** show each proposed interchange. The projected 2040 AM and PM peak traffic volumes and the level of service from the HCS analyses are shown on **Exhibits 7-2** through **7-3**.

Freeway Analysis – HCS 2010

The preferred alternative was analyzed in HCS. Traffic volumes, percent of heavy vehicles and number of lanes input for each segment are shown in **Tables 11A** through **11C**. The density values and LOS are shown in **Table A-16** for freeway segments, **Table A-17** for weaving segments, and **Table A-18** for ramp segments. The Level of service within the interchange and in the weave segment immediately east of the interchange is LOS D on I-94 eastbound for both AM and PM peak periods. Westbound I-94 will operate at LOS C in these areas. The ramps to and from the east will operate at LOS D in both AM and PM. The eastbound exit ramp and the weave segment westbound just west of the interchange will operate at LOS C in both time periods.

Freeway Analysis – Paramics

The preferred alternative was also analyzed using Paramics microsimulation during the design year (2040) peak periods.

Overall, the future peak period Paramics models of the preferred alternative indicated acceptable operations within the 25th, 26th, 28th Street Interchange influence area associated with the design year traffic forecast. As previously indicated, LOS is not reported based on Paramics model outputs and as such, visual observations of the model and resulting speeds are used to convey operations.

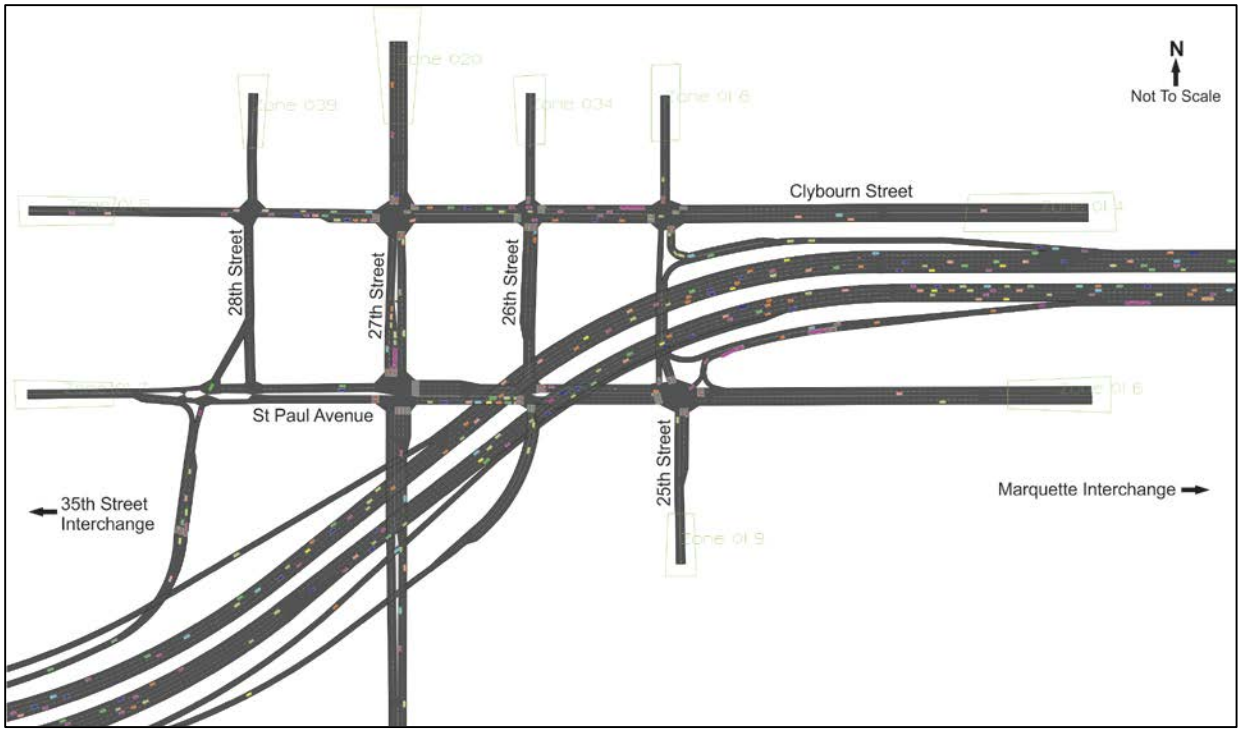
In general, the future AM peak period Paramics model demonstrated consistent speeds and stable operations throughout the AM peak hour along I-94 at the 25th, 26th, 28th Street Interchange, due to the improved geometrics, ramp spacing, and the additional capacity along I-94. One roadway section indicated slightly slower speeds than expected, but not to unacceptable levels. I-94 EB between the 26th Street exit ramp and 35th Street entrance ramp (48 mph) and I-94 WB between the35th Street exit ramp and 28th Street entrance ramp (51 mph) operated below the posted speed limit (55 mph) for the corridor.

Operations along I-94 EB are partially impacted by a combination of the mainline lane merge from five lanes to four lanes upstream of the 35th Street entrance ramp, whereas operations along I-94 WB are partially impacted by weaving operations and approach lane changing upstream of the Stadium Interchange. Both directions of I-94 are also slightly impacted by the on-alignment geometry of the preferred east leg alternative, which has horizontal and vertical features similar to existing conditions and therefore a slight impact on operations during the heavy AM peak hour demand.

All remaining roadway sections along both directions of I-94 included within the area of influence operate near or slightly greater than the posted speed limit.

Figure 3 shows a screen capture from the future AM peak period Paramics model in the 25th, 26th, 28th Street Interchange area, which represents operations at approximately 7:30 AM. **Tables A-23** and **A-24** in **Appendix A** shows the future AM peak period Paramics model speeds for roadway sections location within the 25th, 26th, 28th Street Interchange area of influence.

Figure 3

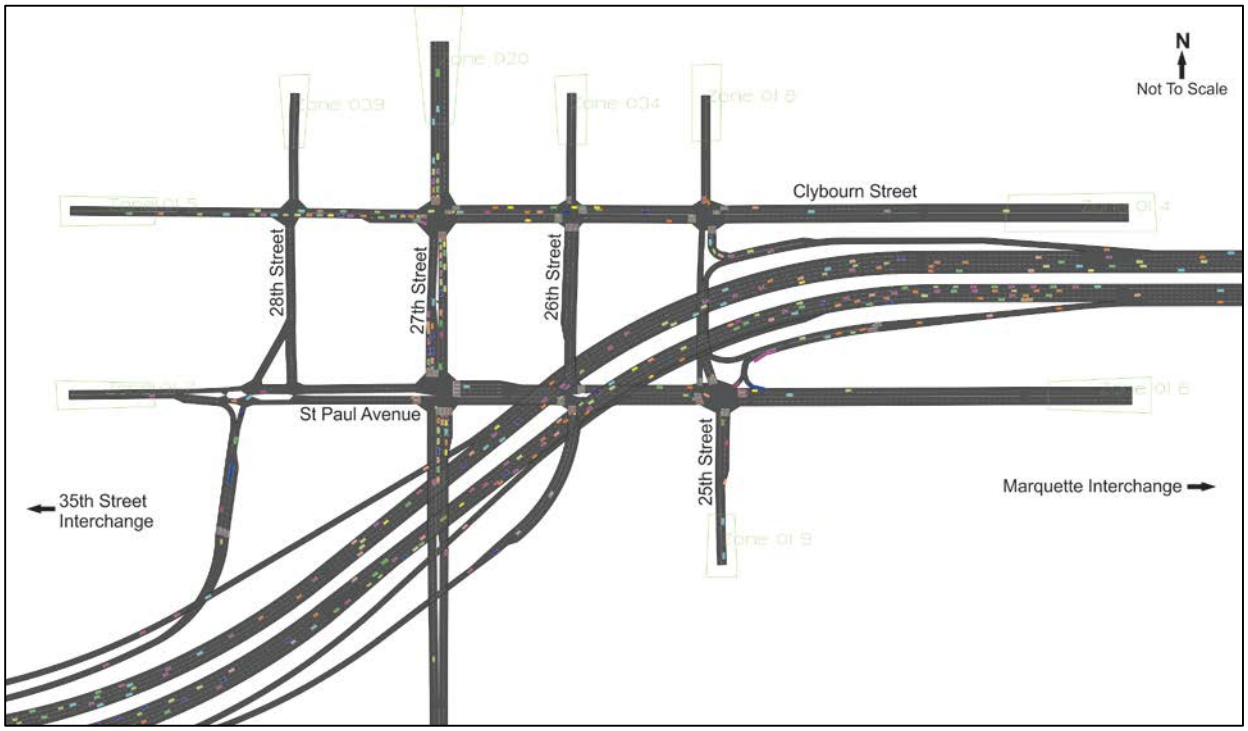


Similar to the future AM peak hour, the future PM peak period Paramics model also demonstrated consistent speeds and stable operations throughout the PM peak hour within the 25th, 26th, 28th Street Interchange influence area, due to the improved geometrics and additional capacity associated with the preferred alternative.

The same roadway sections in each direction of I-94 between the 25th, 26th, and 28th Street and 35th Street Interchanges detailed in the future AM peak period model discussion are similarly impacted during the PM peak period. I-94 EB between the 26th Street exit ramp and 35th Street entrance ramp (49 mph) and I-94 WB between the 25th Street exit ramp and 28th Street entrance ramp (51-52 mph) operated below the posted speed limit. As noted previously, these locations are partially impacted by a combination of weaving and lane changing, in addition to the horizontal and vertical geometric features of the on-alignment alternative. All remaining roadway sections of I-94 in both directions included within the area of influence operate at or better than the posted speed limit.

Figure 4 shows a screen capture from the future PM peak period Paramics model in the 25th, 26th, 28th Street Interchange area, which represents operations at approximately 5 PM. **Tables A-25** and **A-26** in **Appendix A** shows the future PM peak period Paramics model speeds for roadway sections located within the 25th, 26th, 28th Street Interchange area of influence.

Figure 4



Intersection Analysis

Design year peak hour operations of the service interchange ramp terminals were analyzed using Synchro. The analysis included the ramp terminals located along St. Paul Avenue, in addition to the nearest signalized intersections on 27th Street and Clybourn Street, which allowed for the identification of potential local street impacts due to ramp terminal operations. The peak hour factor used for the future AM and PM peak hour analysis was 0.87 and 0.97, respectively. Existing peak hour truck percentages at the ramp terminals were assumed to remain unchanged in the design year peak hours.

In general, the ramp terminals are expected to operate between LOS B and LOS D overall during the future peak hours. Turning movements at the 35th Street Interchange will operate between LOS A and LOS D during the future peak hours. Turning movements will mainly operate between LOS B and LOS D at the 25th, 26th, 28th Street Interchange during the future peak hours, specifically along St. Paul Avenue. Since the ramp terminals generally operated at, or better than, LOS D during the future peak hours, the

proposed design of the ramp terminal intersections was deemed acceptable by the I-94 EW design team.

The results of the future design year AM and PM peak hour intersection analyses are shown in the tables included in **Appendix B.**

35th Street Interchange

Under the preferred alternative, the 35th Street Interchange would remain a diamond service interchange. The existing westbound exit and entrance ramp connections to and from the north local access road (Park Hill Avenue) would be removed. The future service ramps in both directions would be braided with the Stadium Interchange (west) and St. Paul Avenue/25th Street Interchange (east). 35th Street would remain a four-lane facility with single left turn lanes to access the entrance ramps.

The 35th Street Interchange was assumed to operate under TTI (Texas Transportation Institute) phasing with optimal signal timings due to the close spacing of the north and south ramp terminals, which minimizes internal queue lengths. The north ramp terminal (I-94 EB ramps) is expected to operate at LOS B overall during the future AM and PM peak hours. The south ramp terminal (I-94 WB ramps) is expected to operate at LOS C overall during the future peak hours. No turning movements are expected to operate worse than LOS D at either ramp terminal.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-17** and **B-18**.

25th/26th/28th Street Interchange

The existing 25th, 26th, 28th Street Interchange would be rebuilt as part of the preferred alternative in a similar configuration as currently exists, including braided ramps with the 35th Street Interchange. 25th Street would remain a one-way roadway southbound between the I-94 WB exit ramp and St. Paul Avenue. 26th Street would remain a one-way roadway northbound between St. Paul Avenue and Clybourn Street. St. Paul Avenue would be widened to a four-lane facility between 28th Street and 25th Street, with intersection improvements (additional turn lanes, etc.) at 27th Street, 26th Street, and 25th Street to accommodate future demand. The intersection of 28th Street and St. Paul Avenue would remain stop-controlled for the west and north legs. The intersections of 26th and 25th Streets with St. Paul Avenue would remain signalized.

In general, Synchro analysis of the signalized intersections along St. Paul Avenue indicated overall intersections operations at LOS B or LOS C during the future peak hours with all movements operating at LOS D or better. The signalized intersections were assumed to be constrained to a 90-second cycle length with optimal timings in order to provide coordination between adjacent signals located along 27th Street.

A summary of the future peak hour traffic volumes, levels of service, delay, and queue lengths from the Synchro analysis are included in **Tables B-19** and **B-20**.

Policy Points	
Policy Point 1 Existing Network's Ability to Accommodate Traffic	*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 necessary 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.

The 25th, 26th, 28th Street Interchange is not a new interchange, and this project is not adding a new interchange to this corridor. This project will reconstruct and reconfigure the existing interchanges to improve the safety and efficiency of I-94, while minimizing impacts to the surrounding environment. The existing conditions on the corridor are shown on **Exhibits 2-1, 2-2** and **2-3**.

The HCS analysis input values and the resulting LOS values are shown in **Appendix A** on **Tables A-1** through **A-3** and **A-4** through **A-6** respectively. The summary of the traffic volumes and level of service for the existing conditions is shown on **Exhibit 3-3**. The No Build traffic projections and level of service are shown on **Exhibit 4-3**. The levels of service and queue length information for the intersection analyses are shown in **Appendix B**.

25th/26th/28th Street Interchange

There are existing ramps at 25th, 26th, and 28th Streets. The ramps to and from the east are at 25th Street. The eastbound exit ramp connects to 26th Street at St. Paul Avenue. The westbound entrance ramp connects at 28th Street and St. Paul Avenue.

The existing mainline eastbound operates at LOS E in the AM and LOS D in the PM peak. The mainline westbound operates at LOS D during both the AM and PM peaks. The exit ramp to 26th Street and St. Paul Avenue operates at LOS E. The entrance ramp from 28th Street and St. Paul Avenue attaches to the weave segment connecting to 35th Street which operates at LOS E in the AM and LOS D in the PM peak. The eastbound entrance at 25th Street and St. Paul Avenue attaches to the weave segment connecting to 13th Street which operates at LOS D in both the AM and PM peaks.

The No Build analyses show that the eastbound mainline will drop to LOS E in both the AM and PM peaks by the design year and the westbound mainline will drop to LOS E in the AM peak.

The intersection of St. Paul and 28th Street is stop sign controlled on the north and west approaches, giving the eastbound left turns on the ramp the right-of-way. The intersection of St. Paul and 26th Street is traffic signal controlled with 26th Street a one-way street northbound. There is a traffic signal at St. Paul Avenue and 25th Street on which 25th Street is a one-way street southbound. At the ramp intersections, all movements operate at LOS C or better. The intersection LOS and queue lengths are shown in **Appendix B** on **Tables B-8** and **B-9**.

This interchange is proposed to be reconstructed maintaining very similar configurations to the existing ramps and access point locations.

Adjacent Interchanges

35th Street Interchange

This existing interchange is a diamond interchange with diagonal ramps on the south side connecting directly to 35th Street and slip ramps on the north side connecting to Park Hill Avenue on the north side. Both intersections are traffic signal controlled.

	The mainline operates at LOS D in the westbound direction for both AM and PM peaks and in the eastbound for the PM peak. It operates at LOS E in the AM peak in the eastbound direction. The no build analyses show that in the design year, the mainline eastbound will operate at LOS E within the interchange. The westbound will operate at LOS D in the AM and LOS E in the PM peak. The weave segment west of the interchange will operate at LOS E in both directions for both the AM and PM peak periods. The freeway east of this interchange is a basic freeway segment eastbound and a weave segment westbound which will operate at LOS E in both directions for both the AM and PM peak periods. Both intersections are traffic signal controlled. The eastbound ramp intersection operates at LOS B in the AM and LOS C in the PM peak. The westbound ramp intersection operates at LOS E in the AM and LOS D in the PM peak. The movements all operate at LOS D or better except the northbound left turn movement which operates at LOS F. The intersection LOS and queue lengths are shown in **Appendix B** on **Tables B-6** and **B-7**. This interchange is proposed to be reconstructed to a standard diamond with the ramps braided with those of the adjacent interchanges. Park Hill Avenue will be reconstructed to have a cul-de-sac on the west side of 35th Street and terminate at the alley east of 35th Street. ***Safety Analyses*** The average total crash rate on I-94 from east of the 35th Street Interchange to 16th Street from 2005 to 2009 is 365.5 crashes/100M VMT for eastbound and 194.1 crashes/100M VMT for westbound, which is approximately two (westbound) to four (eastbound) times greater than the average statewide crash rate. Additional detail on the crashes within the corridor is discussed in the Crash Analysis Technical Memorandum, which is included as **Appendix D**. <u>Conclusion</u> The 25th, 26th, 28th Street Interchange along with the I-94 mainline require improvements to safely and efficiently accommodate the network's ability to move the traffic that is projected to be using this corridor in the design year of 2040. The reconstruction and reconfiguration of the interchanges as discussed will provide for the safer and more efficient operation for through traffic and those accessing the freeway in this area. Improvements to the local system alone will not alleviate the need to reconfigure this interchange. Elimination of this interchange was considered, but early in the NEPA process, it was determined that it needed to be retained due to the potential for impacts to the community it serves. The need for the project and the interchange modifications are discussed further under the **NEED** section of this report.
<u>Policy Point 2</u> Transportation System Management	*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 changes in access.* The 25th, 26th, 28th Street Interchange is not a new interchanges to this corridor.

	The project is reconstructing the existing roadway and interchanges with modifications to improve the safety and operations in the corridor. Although numerous Transportation System Management (TSM) applications are proposed to be incorporated as part of this project, TSM alone cannot resolve the need to modify the interchanges as proposed. Existing ITS features are currently in place along this segment of I-94. Improved ITS and TMP improvements were studied (including a doubling of transit), however mainline and interchange improvements as proposed are still needed. To provide an acceptable LOS, Transportation System Management features are proposed to be included in the design of the preferred alternative. These include Ramp Metering, Ramp Gates, Closed Circuit Cameras, Variable Message Signs, and Traffic Detectors. These features alone being added to the existing facility will not meet the purpose and need of the project. The SEWRPC's build traffic forecasts include TSM strategies as part of the base-line assumptions, including a doubling of transit use. Existing TSM applications currently in use that will be carried forward in the proposed design consist of ramp metering, providing driver information on changeable message signs, closed circuit cameras, traffic detectors, ramp gates, and encouraging the use of transit. The existing ramps have ramp meters that were installed under previous projects: 35th Street, 28th Street westbound, and 25th Street eastbound. Geometric improvement only alternatives without increased lanes were also analyzed and found not to adequately meet the project purpose and need. All of the proposed alternatives would not preclude the implementation of more transit use, but would provide for improved operations for existing transit use and future transit growth. **Conclusion** Transportation System Management measures have been investigated. These measures are incorporated into the proposed design alternative. However, these measures alone were studied and will not provide an acceptable level of service in the design year or eliminate the need to modify the existing interchanges as proposed with the preferred alternative. The design of the preferred alternative does not preclude the future implementation of additional TSM measures.
Policy Point 3 ***Safety Impacts and Operational Analysis***	*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, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access. The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall 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. Requests for a proposed change in access must 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. Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative.

The existing facility was constructed in 1963 and does not conform to current design standards. This proposed project will not add any additional access points to the interstate, but will reconstruct and reconfigure the existing access points to operate more safely and efficiently.

The proposed design will address the current safety issues with revisions to the corridor to improve roadway geometrics, freeway operations, ramp capacity, and ramp/mainline merge and diverge characteristics. Traffic analyses (HCM and Paramics) and safety analyses (ISATe) show the proposed design will substantially improve existing conditions.

The improvements to I-94 in the preferred alternative include reconstruction to the proposed roadway cross section by providing four mainline travel lanes in each direction, including reconstruction with added improvements to the interchanges and auxiliary lanes where needed between interchanges. Alternatives providing geometric and operational improvements without added mainline traffic lanes were studied and found to not adequately meet the project's purpose and need.

The preferred alternative for the corridor is shown on **Exhibits 5-1** through **5-3**. The individual interchanges are shown on **Exhibits 6-4** through **6-5**. The projected design year traffic volumes and levels of service are shown on **Exhibits 7-2** through **7-3**. **Appendix A** has **Tables A-13** through **A-15** of HCS analysis input data and tables **A-16** through **A-18** show the Level of Service along with the density values for each segment of the freeway and ramps. **Appendix B** has the tables of the intersection analyses results.

25th/26th/28th Street Interchange

This interchange will be reconstructed in a similar configuration as it exists today. There are ramps at 25th, 26th, and 28th Streets. The ramps to and from the east are at 25th Street. The westbound exit ramp connects to 26th Street at St. Paul Avenue. The westbound entrance ramp is at 28th Street and St. Paul Avenue. Improvements will also be made to the portion of St. Paul Avenue that connects the ramp intersections to improve operations, safety and direction finding.

The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-5**.

The I-94 mainline will operate at LOS D through the area of this interchange. The eastbound exit will operate at LOS C. The eastbound entrance connects to the weave segment with 13th Street which will operate at LOS D. The westbound exit will operate at LOS D. The westbound entrance connects to the weave segment with the Stadium exit which will operate at LOS C.

	St. Paul Avenue will be widened between the ramp intersections to two through lanes in each direction and exclusive turn lanes at the intersections. The intersection of 28th Street and St. Paul Avenue will be stop sign controlled. The intersections of 27th, 26th and 25th Streets with St. Paul Avenue will be traffic signal controlled. All movements at these intersections will operate at LOS D or better. The levels of service and delay values are shown in **Table B-19** and the queue lengths are shown in **Table B-20** in **Appendix B**. ***Adjacent Interchanges*** **35th Street Interchange** This interchange will be reconstructed as a diamond interchange. The ramps will be braided with the ramps of the adjacent interchanges to eliminate the weaving that occurs under the current configuration. All four ramps will be diagonal ramps. Park Hill Avenue will be terminated with a cul-de-sac west of 35th Street and into an alley intersection east of 35th Street eliminating the slip ramp connections that currently exist. The proposed interchange along with the intersection lane configurations are shown on **Exhibit 6-4**. The I-94 eastbound mainline will operate at LOS C through the area of this interchange. The I-94 westbound will operate at LOS C west of the interchange and in the AM peak east of the interchange. I-94 will operate at LOS D in the PM peak east of the interchange. The ramps will all operate at LOS C. The ramp terminal intersections will be traffic signal controlled. All movements will operate at LOS D or better in the AM and PM peak periods. The levels of service and delay values are shown in **Table B-17** and the queue lengths are shown in **Table B-18** in **Appendix B**. **Conclusion** The 25th, 26th, 28th Street Interchange modifications have been developed in conjunction with the I-94 mainline preferred alternative to improve the safety and efficiency of the traffic operations within the area of influence. There are no additional access points being added to the interstate as part of this improvement. There are proposed local street improvements adjacent to the interchanges and between the interchanges where necessary to accommodate the projected design year traffic. The improvements between the interchanges will help drivers to more efficiently and safely travers between interchange ramps.
Policy Point 4 ***Local Road Access***	*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 vehicles, HOV's, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards.* Full access is provided through the combination of ramps in the 25th/26th/28th Street area. A consolidated interchange was not possible as part of the On-alignment alternative, given the existing constraints of the large substation and

	commercial properties that would need to be relocated. The intersection of 27th Street and St. Paul Avenue will require more extensive reconstruction. This is because most of the exiting freeway traffic destined for 27th Street first goes to St. Paul Avenue at 25th or 26th Street, and then turns onto 27th Street at its intersection with St. Paul Avenue. Similarly, most of the traffic entering the freeway at 25th and 28th Streets go through the 27th/St. Paul intersection. The design for the I-94 East-West Corridor Project is intended to meet or exceed current interstate standards where feasible. However, it is acknowledged that there will be exceptions to standards in some locations needed to minimize impacts to the surrounding development and environmental/cultural resources. The exceptions to standards that are anticipated are summarized in the Compliance with Policies and Engineering Standards of this document. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review and approval by WisDOT and FHWA later in the project design. For more detail on the exceptions to standards, including the exceptions that were identified for other alternatives, see the 13 Controlling Criteria Exceptions to Standards Memorandum on Remaining Alternatives Prior to Preferred Alternative Selection in **Appendix F.** **<u>Conclusion</u>** The 25th, 26th, 28th Street Interchange will provide a balance between addressing long-term mobility needs and safety concerns while minimizing impacts to the existing development and environmental resources to the maximum extent practical. Traffic patterns will remain the same at this intersection, maintaining access that drivers are familiar with and resulting in less reassignment of travel routes.
<u>Policy Point 5</u> Regional Transportation Plans	*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.* The proposed I-94 E-W project is included in the current SEWRPC Long-Range Transportation Plan (2035 Regional Land Use and Transportation Plan). The Preliminary Engineering phase of this project is in the TIP. The 2035 regional transportation system plan proposed modernization and limited expansion of the southeastern Wisconsin freeway system. A doubling of transit use was analyzed prior to analyzing capacity expansion as called for in the SEWRPC Plan. The 2035 regional transportation plan included a full interchange at Hawley Road and did not reflect the relocation of the access provided by the existing Mitchell Boulevard interchange to a new location within the Stadium Interchange. On September 16, 2015, the SEWRPC Commission amended the 2035

	regional transportation plan as follows: • Convert from full to half interchange at Hawley Road. • Remove existing interchange at Mitchell Boulevard. • Provide service ramps to non-arterial roadways at the Stadium Interchange. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016. The 25th, 26th, 28th Street Interchange conforms to SEWRPC's 2035 regional transportation plan. **Conclusion** The project is consistent with local and regional land use plans and as such, also conforms with fiscal constraint and air quality requirements. The next phase(s) of the project will be included in the SEWRPC TIP prior to signing of the ROD. The next phase of the project is not included in the recently approved 2015-2018 SEWRPC TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the ROD. The ROD is currently scheduled for spring of 2016.
Policy Point 6 Multiple Interchange Additions	*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 proposed and desired access within the context of a longer-range system or network plan.* The 25th, 26th, 28th Street Interchange is not a new access point. No additional interchanges are proposed to be added as part of this project and none are proposed for the future. The spacing of interchanges along this corridor is less than one mile. With the tight interchange spacing, it is not feasible to add any additional interchanges in this corridor. The 25th, 26th, 28th Street Interchange has ramps braided with the adjacent 35th Street Interchange to improve the spacing of access points along the freeway due to this close spacing. The regional plan does not include any additional interchanges within this corridor. The design team looked at trying to reduce the number of interchanges in the corridor, but other than relocating or modifying the design to improve on existing access points, were not able to eliminate any interchanges. The interchanges within this influence area are proposed to be modified to provide safer and more efficient operations as well as accommodating the additional mainline lanes that are included with this project. **Conclusion** This area is fully developed with closely spaced interchanges. No additional

	interchanges are proposed to be added as part of this project and none are proposed for the future.
Policy Point 7 Appropriate Coordination	*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. 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.* The I-94 East-West Project team has demonstrated appropriate coordination between the development and related transportation system improvements through its significant public involvement and outreach efforts with the City of Milwaukee, City of Wauwatosa, City of West Allis, Village of West Milwaukee, Milwaukee County, local business groups including the Menomonee Valley Partners, individual businesses, community leaders, and residents of the area. Menomonee Valley Partners (MVP) has expressed concern over the business displacement impacts on St. Paul Avenue and the long bridge that would carry I-94 over St. Paul Avenue. MVP and the City of Milwaukee are currently updating the land use plan for the Menomonee Valley, with a focus on redeveloping St. Paul Avenue. MVP and the Potawatomi Casino and Hotel (located on Canal Street in the Menomonee Valley) have expressed concern about consolidating access at 27th Street because it would change access to the Menomonee Valley. Currently, casino visitors arriving on I-94 from the west can exit at 26th Street and make two right turns to reach the Menomonee Valley by 25th Street. Under the Off-alignment alternative, casino visitors, as well as other visitors to the Menomonee Valley, would need to make a left turn onto 27th Street and then two right turns to reach the Valley by 25th Street. The City of Milwaukee is concerned about the right-of-way acquisition and the business displacement impacts of consolidating the 27th Street Interchange. Taking into consideration these comments, the 25th, 26th, 28th Street Interchange remains in a similar configuration. **Conclusion** No new interchanges are proposed in this corridor. New development is not a driving force for the design of this interchange since the surrounding area is fully developed. The project team has had extensive coordination with local officials and stakeholders throughout the project's area of influence. The proposed 25th, 26th, 28th Street Interchange modifications provide a balance between providing for the needs expressed by the stakeholders and reducing the impacts to the surrounding properties.
Policy Point 8 Environmental Planning	*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.*

The I-94 East-West Corridor Study Draft EIS was approved and signed by FHWA and WisDOT on November 4, 2014. A Notice of Availability for the Draft EIS appeared in the Federal Register on November 14, 2014, beginning the 60-day comment period that was slated to end on January 13, 2015. A two week extension of the comment period was requested and granted with the comment period for the I-94 East-West Corridor Study Draft EIS ending on January 27, 2015. Public Hearings for the project were held on December 3rd and 4th. The preferred alternative was announced on February 17, 2015. Following the end of the public comment period, FHWA and WisDOT are preparing a Final EIS, slated for approval in December 2015. This engineering and operational acceptance is being sought prior to approval of the FEIS. A Record of Decision is anticipated in the spring of 2016.

Coordination meetings were held between the design team, WisDOT and FHWA (Division and Headquarters) prior to the selection of the preferred alternative and Draft Environmental Impact Statement. The engineering and operational review and approval schedule has been coordinated with FHWA and will be completed prior to review and approval of the Final EIS.

Conclusion

The design of the 25th, 26th, 28th Street Interchange modifications have been developed to improve the traffic operations of the I-94 mainline as well as the entering and exiting traffic movements. The development of the proposed modifications has taken place as part of the NEPA process. All of the interchange modifications and the local street/intersection improvements to mitigate the change in access are covered in the EIS.

Chapter 6:
Full Corridor Funding Plan and Conclusion

FUNDING PLAN

Funding for the project is anticipated to be a combination of State, Federal and Local Funding. The majority of the funding will be State funding for the Design, Real Estate, Utility and Construction of the project. Federal funds will be utilized during the Construction. Local funds will be minimal and only to cover CSS enhancements and contract utility work.

Conclusion

Identification of a preferred alternative was based on engineering and environmental factors and input from citizens, state and federal resource agencies, cooperating and participating agencies, and local officials.

The preferred alternative is the At-grade alternative with a half interchange at Hawley Road (access to and from the west) for the west segment and On-alignment alternative for the east segment because they provide the best solution for addressing long-term mobility needs and safety concerns while minimizing impacts to existing development and environmental resources to the maximum extent practical. The preferred alternative includes the Split Diamond at 68th and 70th Streets, the Half Diamond at Hawley Road, the Two-Intersection-Left Turn interchange configuration with the embedded ramps at 44th and 46th Streets for the Stadium Interchange, the diamond with Braided ramps at 35th Street, and the existing configuration with ramps at 25th, 26th, and 28th Streets.

West Segment

The **At-grade alternative with a half interchange at Hawley Road** (access to and from the west) was identified as the preferred alternative for the west segment of the I-94 East-West Corridor project. The basis for identifying the At-grade alternative with a half interchange at Hawley Road as the preferred alternative is as follows:

- Addresses existing and future traffic demand
- Addresses safety on I-94
- Has No Adverse Effect on historic properties
- Has Minimal impact to Section 4(f) properties.
- Has Less residential displacements
- Has Lower Construction Cost
- Is Constructible
- Included City of Milwaukee input
- Included Stakeholder and Public input

East Segment

The **On-alignment alternative** was identified as the preferred alternative for the east segment of the I-94 East-West Corridor project. The basis for identifying the On-alignment alternative is as follows:

- Addresses existing and future traffic demand
- Addresses safety on I-94
- Has No Adverse Effect on historic properties
- Has Minimal impact to Section 4(f) properties.
- Has Less residential displacements
- Has Lower Construction Cost
- Is Constructible
- Included City of Milwaukee input
- Included Stakeholder and Public input