I-43 North-South Corridor Study
Silver Spring Drive to WIS 60
Milwaukee and Ozaukee Counties, Wisconsin

County Line Road Interstate Justification Report

WisDOT Project ID: 1229-04-01

February 2014

U.S. Department of Transportation
Federal Highway Administration

Table of Contents / Policy Points

List of Tables

List of Figures

1 Introduction and Project Purpose

The Wisconsin Department of Transportation (WisDOT) requests approval to modify interchange access in accordance with design standards to accommodate the needs of the Interstate facility within the horizon year of 2040.

For every proposed highway system modification affecting Interstate Highway access, the United States Department of Transportation's Federal Highway Administration (FHWA) requires the completion of an Interstate Justification Report (IJR) containing necessary information for an independent review of the request and ensures all relevant alternatives have been considered. The FHWA has specified eight policy points, which should be met by all proposals for new or revised access to the Interstate Highway System. The FHWA is the final reviewing agency for all Interstate Highway access modification requests.

This report addresses each of the eight policy points for the proposed Interstate access modifications for the existing service interchange at County Line Road/Port Washington Road with I-43. To be consistent with the Southeastern Wisconsin Regional Planning Commission (SEWRPC) comprehensive plan, this report and the analysis contained within assumes that the proposed full access interchange with I-43 at Highland Road is in place. The request for new Interstate access at Highland Road in the City of Mequon, Ozaukee County, Wisconsin is part of a separate report; the *Highland Road Interstate Justification Report* submitted to FHWA in July 2013 and was approved on November 7, 2013.

1.1 Proposed Action

The proposed action is to expand capacity of I-43 to six lanes (three in each direction) and to modify the configuration of the County Line road interchange with I-43.

1.2 Purpose and Need

The purpose of the overall project is to address needed improvements to the study-area freeway corridor, consistent with local and regional transportation and land use planning objectives. The proposed I-43 North-South Freeway Corridor project will provide a safe and efficient transportation system to serve existing and future traffic demand while minimizing impacts to the natural, cultural and built environment to the extent feasible and practicable.

The need for the transportation improvements in the I-43 North-South Freeway Corridor is demonstrated through a combination of factors, including:

- Pavement, freeway design and geometric deficiencies
- Safety
- Existing and future traffic volumes
- Regional land use and transportation planning
- System linkage and route importance

1.3 Study Area

The overall I-43 North-South Freeway Corridor study-area encompasses approximately 14 miles of I-43 from Silver Spring Drive in the City of Glendale (south limit) to WIS 60 in the Village of Grafton (north limit). This IJR focuses on modifying the existing County Line road interchange configuration to and from I-43. Although the proposed interchange utilizes Port Washington Road (CTH W) for some access to the local system, this report refers to the access point as County Line Road. Port Washington Road is a north-south arterial that runs parallel to I-43 throughout the entire study area and crosses I-43 in this area. See Figure 1.

1.4 Alternatives Considered

WisDOT is evaluating several alternatives to accommodate the year 2040 traffic demands. For the proposed action, the following were considered:

1.4.1 No Build Alternative

The No-Build alternative does not consider any safety, capacity, or access improvements to I-43. The study area network would be replaced in-kind with the existing configuration.

1.4.2 Transportation Demand Management

Transportation Demand Management—attempts to reduce the number of auto trips through increased transit ridership. The public transit system element of the 2035 Regional Transportation System Plan assumes a 100 percent increase in public transit (in terms of revenue vehicle-miles of service). The plan recommends several ways to increase bus service in Ozaukee and Milwaukee counties including a rapid transit bus system operating on freeways to provide commute and reverse commute service.

1.4.3 Transportation System Management

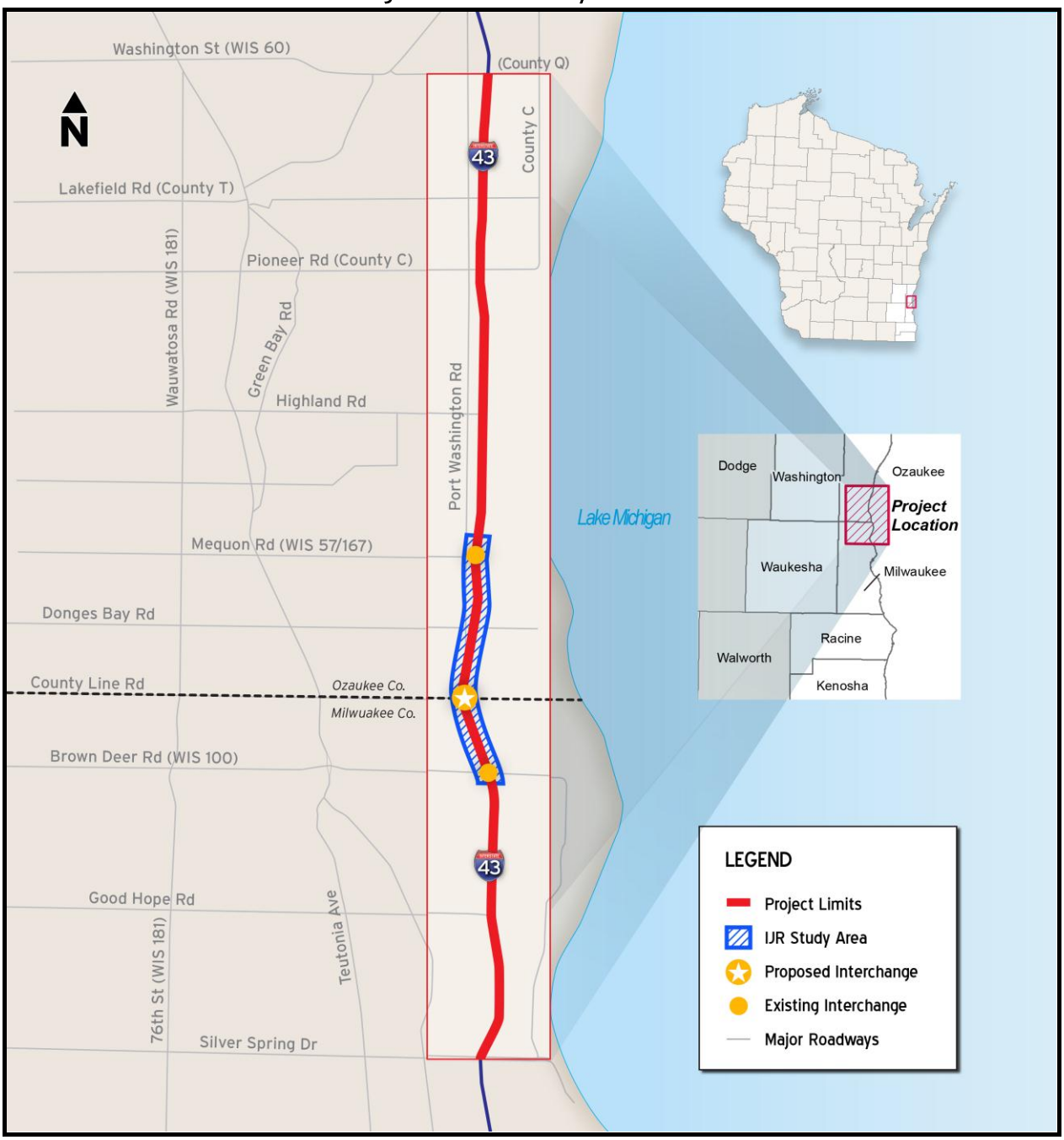
Transportation System Management, or TSM, involves strategies to maximize the safe and efficient use of the existing highway system, potentially extending the life of the network. TSM measures also include engineering design features to improve traffic flow and safety such as improving intersection capacity, widening shoulders, removing street parking or restricting parking to non-peak traffic periods, adding traffic signals, and providing access management including relocating or consolidating driveways on local roads near interchanges where practicable.

1.4.4 Service Interchange Alternatives

The proposed interchange alternatives are listed below. Full descriptions are included in Section 4.

- County Line Road
    - Partial Access (to/from the south)
    - No Access
    - Full Access

Figure 1: I-43 Study Corridor



1.5 Analysis Methodology

1.5.1 Forecasting Methodology Summary

To analyze local street and freeway operations, year 2040 volumes were forecasted through a process approved by WisDOT. See Appendix A for the summary memo describing the process used.

1.5.2 Freeway Analysis

The methodology contained within the 2010 Highway Capacity Manual as represented by the 2010 Highway Capacity Software (HCS) was applied to the various alternatives. Table 1 summarizes the study-specific parameters input into HCS 2010. The segment specific volume data input into the software is in Appendix E. Additionally, since HCS analyzes each intersection and highway segment exclusively, Quadstone's Paramics microsimulation software supplemented the analysis to provide insight into the interaction of the various design features from a system-wide perspective. Where applicable, screen captures are shown to represent the findings within the microsimulation model.

Table 1: HCS Parameters

Parameter	Value	Description
Peak Hour Factor	1.0	Per WisDOT Guidelines (WisDOT FDM 11-05-3.5.2)
Truck Percentage	Varies	Truck percentages calculated from turning movements and nearby automatic traffic data recorders.
Free Flow Speed	75.4 mph	Per HCM 2010 methodology.
Lane Width	12 feet	Proposed design
Right Lateral Clearance	12 feet	Proposed design
Interchange Density	Varies	Total number of ramps within three miles in either direction measured from gore point for each ramp
Recreational Vehicle Percentage	0%	Existing data collection does not classify recreational vehicles. Additionally, weekday peak hour traffic is not considered to be peak vacation travel time. Thus, no recreational vehicles were accounted for in the analysis.
Terrain	Level	Terrain is classified as level throughout the study area according to HCM definitions.

Careful consideration was given to the design hourly volume used for the operational analysis. Data collected within the study area showed that the peak hour volumes are similar to the K200 volumes and best represented the highly directional patterns of the area. WisDOT and FHWA Division Office approved using the K200/peak hour volumes as the design hourly volumes in September 2012.

The WisDOT Facilities Development Manual outlines that reconstructed facilities strive to provide LOS C when feasible. Typically, in urban areas such as Milwaukee County, LOS D is considered acceptable. However, as this corridor transitions from the urban to rural land use in Ozaukee County in the vicinity of the proposed access, the WisDOT and FHWA concurred that LOS C shall be the lowest acceptable level of service. See Appendix C for the memo summarizing the review of the design hour volumes and LOS request and approval.

1.5.3 Intersection Analysis

This study utilized the HCM 2010 output from the Trafficware's Synchro software analysis tool to determine LOS for each movement within each intersection of the study area. The signal timing and phasing associated with the operations analysis was then represented in the

Paramics models and adjusted to best facilitate the needs of the system of intersections within each service interchange. The LOS presented in the tables of this document are output from the HCM 2010 calculations provided by Synchro. Where possible, figures representing screen captures of various points of the Paramics model are displayed to convey the operations of the system of intersections.

1.5.4 Safety Analysis

Crash records compiled by the WisDOT from 2006 to 2010 were reviewed and summarized. See Section 4.2, Safety on the Existing Facility for more information.

2 Existing Network's Ability to Accommodate Traffic

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

The land use surrounding I-43 in the vicinity of County Line Road is generally residential. Land use just north of County Line Road along Port Washington Road is commercial retail. Local land use plans show little to no change in the commercial and residential land uses. As a result, the County Line Road interchange is expected to experience minimal growth.

This section summarizes the No-Build Alternative, or traffic operations of the existing system under the forecast year traffic volumes. See Section 4, Safety Impacts and Operational Analysis for a summary of the operations of the various improvement alternatives within the corridor.

2.1 No Build Alternative Traffic Operations

The No-Build Alternative maintains I-43 and the County Line Road service interchange in situ. I-43 remains a four- lane facility between Bender Road and the north project limits. All service interchanges except Brown Deer Road remain as a conventional diamond configuration. Brown Deer Road remains as a full access cloverleaf design. System maintenance (Regional and Local) would optimize signal timings to enhance 2040 operations at each of the existing service interchange intersections.

2.1.1 I-43 Mainline

Traffic utilizing I-43 is very directional within each peak hour. The majority of users in the morning peak are headed southbound for the City of Milwaukee and return headed northbound in the afternoon peak. Table 2 presents the I-43 freeway, weave and ramp 2040 levels of service on an unimproved I-43 facility. Appendix F summarizes the results graphically.

Table 2: I-43 Mainline No build Levels of Service

Facility	Location	Analysis Type	AM (PM) Volume	AM (PM) LOS	AM (PM) Num. LOS
Freeway & Weave Analysis					
I-43 Northbound	Good Hope Rd. entrance - Brown Deer Rd. EB exit	Freeways	3157 (4603)	C (F)	3.93 (6)
	Brown Deer Rd. EB exit – Brown Deer Rd. EB entrance	Freeways	2577 (4018)	C (E)	3.24 (5.03)
	EB Brown Deer Rd.-WB Brown Deer Rd.	Weave	1897 (3433)	C (D)	3.46 (4.27)
	Brown Deer Rd. WB exit - Brown Deer Rd. WB entrance	Freeways	2207 (3818)	B (D)	2.86 (4.71)
	Brown Deer Rd. WB entrance-Port Washington Rd. exit	Weave	1869 (3473)	B (C)	2.74 (3.69)
	Port Washington Rd. exit - Mequon Rd. exit	Freeways	2132 (3823)	B (D)	2.7 (4.68)
	Mequon Rd. exit - Mequon Rd. entrance	Freeways	1062 (2783)	A (C)	1.67 (3.48)
	Mequon Rd. entrance - CTH C exit	Freeways	1687 (3633)	B (D)	2.1 (4.28)
I-43 Southbound	CTH C entrance – Mequon Rd. exit	Freeways	3868 (2144)	D (B)	4.59 (2.87)
	Mequon Rd. exit - Mequon Rd. entrance	Freeways	2988 (1324)	C (A)	3.45 (1.89)
	Mequon Rd. entrance - County Line Rd. entrance	Freeways	3888 (2340)	D (C)	4.7 (3.08)
	County Line Rd. entrance - Brown Deer Rd. WB exit	Freeways	4333 (2700)	E (C)	5.61 (3.54)
	Brown Deer Rd. WB exit - Brown Deer Rd. WB entrance	Freeways	4018 (2430)	E (C)	5.06 (3.25)
	WB Brown Deer Rd.-EB Brown Deer Rd.	Weave	3703 (2160)	E (C)	5.98 (3.14)
	Brown Deer Rd. EB exit - Brown Deer Rd. EB entrance	Freeways	4523 (2840)	F (C)	6 (3.69)
	Brown Deer Rd. EB entrance - Good Hope Rd. exit	Freeways	5223 (3555)	F (D)	6 (4.74)
Ramp Analysis					
I-43 Northbound	Brown Deer Rd. EB exit	Ramps - Diverge	580 (585)	D (F)	4.53 (6.62)
	Mequon Rd. exit	Ramps - Diverge	1070 (1040)	C (D)	3.06 (4.99)
	Mequon Rd. entrance	Ramps - Merge	625 (850)	B (D)	2.7 (4.57)
I-43 Southbound	Mequon Rd. exit	Ramps - Diverge	880 (820)	E (C)	5.08 (3.11)
	Mequon Rd. entrance	Ramps - Merge	900 (1016)	D (B)	4.59 (2.95)
	County Line Rd.	Ramps - Merge	445 (360)	F (C)	6.17 (3.53)
	Brown Deer Rd. WB exit	Ramps - Diverge	315 (270)	F (C)	6.38 (3.75)
	Brown Deer Rd. EB entrance	Ramps - Merge	700 (715)	F (C)	6.37 (3.86)

As presented in Table 2, southbound I-43 during the AM peak is expected to operate at unacceptable levels of service in numerous sections. Throughout the corridor, the high entering volumes and short ramp lengths contribute to the low levels of service.

During the PM peak, the northbound I-43 facility is expected to operate below acceptable levels of service on the mainline. All of the ramp segments are below acceptable levels of service.

It is expected that these levels of service will create extensive congestion, severe delay and unsafe operating conditions.

2.1.2 Brown Deer Road (WIS 100) Service Interchange

The I-43 service interchange with Brown Deer Road (WIS 100) is currently a full access, free flowing full cloverleaf design. The cloverleaf provides minimal spacing between the entrance and exit ramps along the mainline, creating very short weave sections for vehicles entering and exiting the facility. As a result, crash rates are above the statewide average for an urban Interstate and the highest in the corridor. Refer to Section 4.2.1 for more detail. See Figure 2 for the interchange layout.

Figure 2: Brown Deer Road Service Interchange Diagram

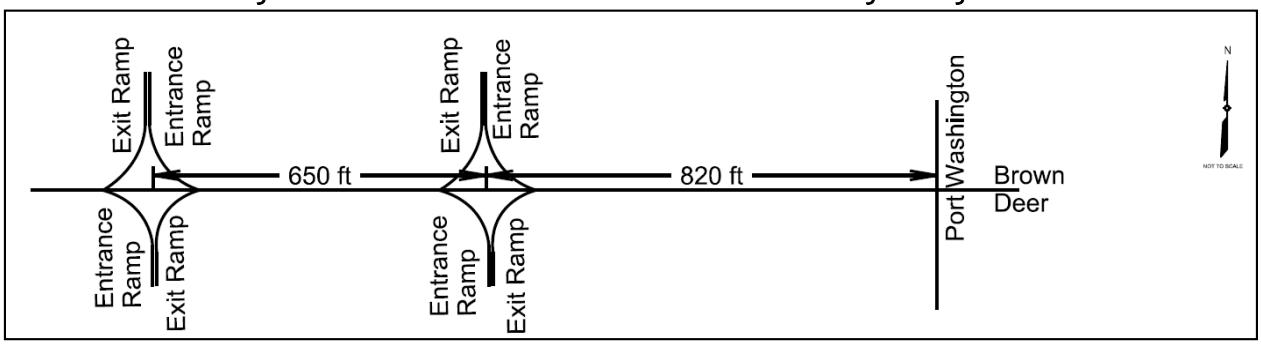


Table 3 presents the 2040 HCM 2010 levels of service at Port Washington Road. All turning movements of the Port Washington Road intersection with Brown Deer Road are expected to operate at LOS D or better.

Table 3: Brown Deer Road 2040 No Build Alternative Levels of Service

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Brown Deer (Existing)	Traffic Signal	AM	D 48.1	C 25.7	C 25.0	D 49.5	D 37.8	D 38.2	D 37.2	C 34.7	D 35.3	D 42.2	D 40.7	D 43.5
		PM	D 52.6	C 32.2	C 32.0	D 48.0	D 49.7	D 50.9	D 43.3	D 41.5	D 42.4	D 46.9	D 45.7	D 54.2

2.1.3 County Line Road/Port Washington Road Service Interchange

The existing I-43 service interchange with County Line Road provides access to and from the south only. The northbound exit ramp intersects with Port Washington Road at a signalized intersection. The southbound entrance ramp intersects with County Line Road. Figure 3 displays the configuration.

Table 4 summarizes the traffic operations at the County Line Road interchange intersections in the year 2040. The east and west approaches of the Port Washington Road intersection with County Line Road operate unacceptably. The intersection is a two-way stop controlled intersection and the volumes on Port Washington Road are not expected to provide adequate gaps for traffic on County Line Road to complete their turning movements.

Figure 3: County Line Road Service Interchange Diagram

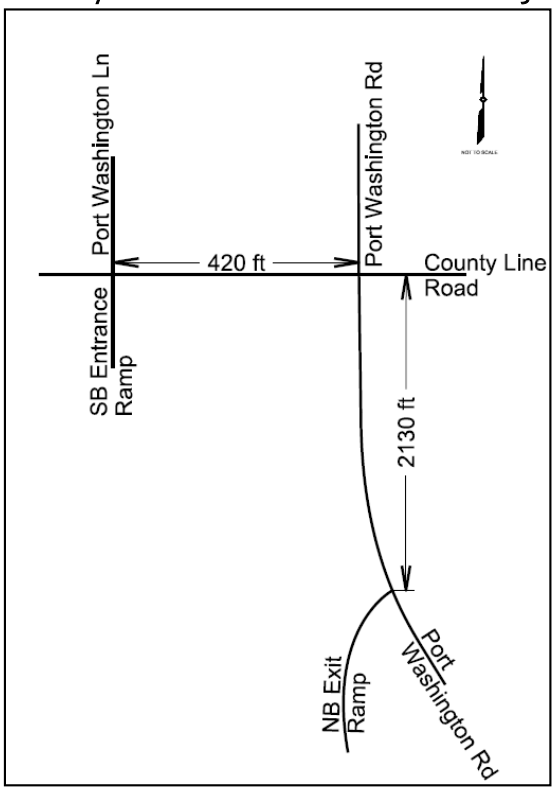


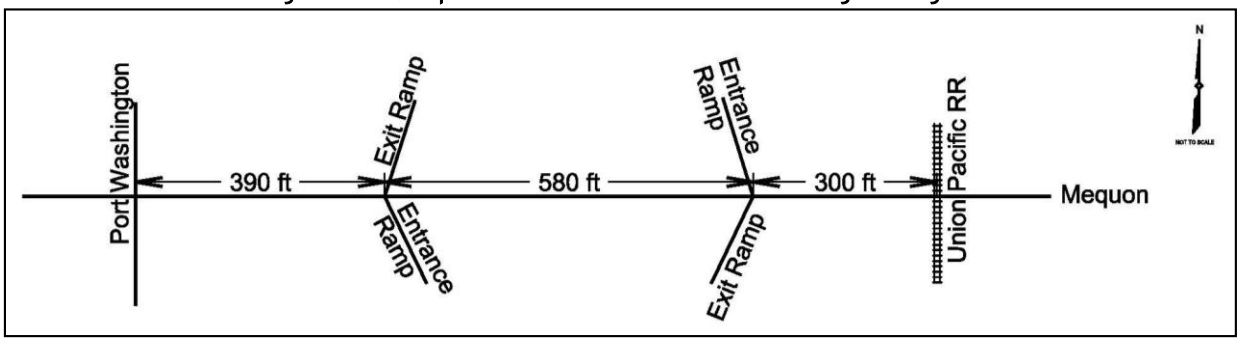
Table 4: County Line Road 2040 No Build Alternative Levels of Service

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington Rd & County Line	Stop Sign	AM	**F 127.0**	C 15.5	C 15.5	**F 154.4**	**F 101.5**	**E 48.5**	B 10.1	A 0.0	A 0.0	B 10.3	A 0.0	A 0.0
		PM	**F 106.9**	**F 93.2**	**F 93.2**	**F 74.4**	**F 51.2**	**D 27.9**	A 8.6	A 0.0	A 0.0	B 12.2	A 0.0	A 0.0
County Line & SB Entrance ramp / Port Washington Ln	Stop Sign	AM	B 13.8	B 12.6	B 11.4	B 12.6	C 17.4	C 17.4				**D 31.6**	**D 31.6**	**D 31.6**
		PM	B 13.3	B 12.2	B 11.0	B 10.7	B 11.3	B 11.3				C 16.9	C 16.9	C 16.9
I-43 NB Exit ramp & Port Washington Rd	Traffic Signal	AM	B 11.0		A 9.6					A 7.5			B 15.3	
		PM	A 8.8		A 7.4					A 8.7			B 12.3	

2.1.4 Mequon Road (WIS 167) Service Interchange

The I-43 service interchange with Mequon Road (WIS 167) is currently a full access diamond interchange. The Mequon Road intersection with Port Washington Road is approximately 390 feet to the west of the southbound ramp terminal intersection. The Union-Pacific Railroad is approximately 300 feet to the east of the northbound ramp terminal intersection. The railroad crossing has signals and a two quadrant gate system. Traffic signals control vehicles at all intersections. See Figure 4.

Figure 4: Mequon Road Service Interchange Diagram



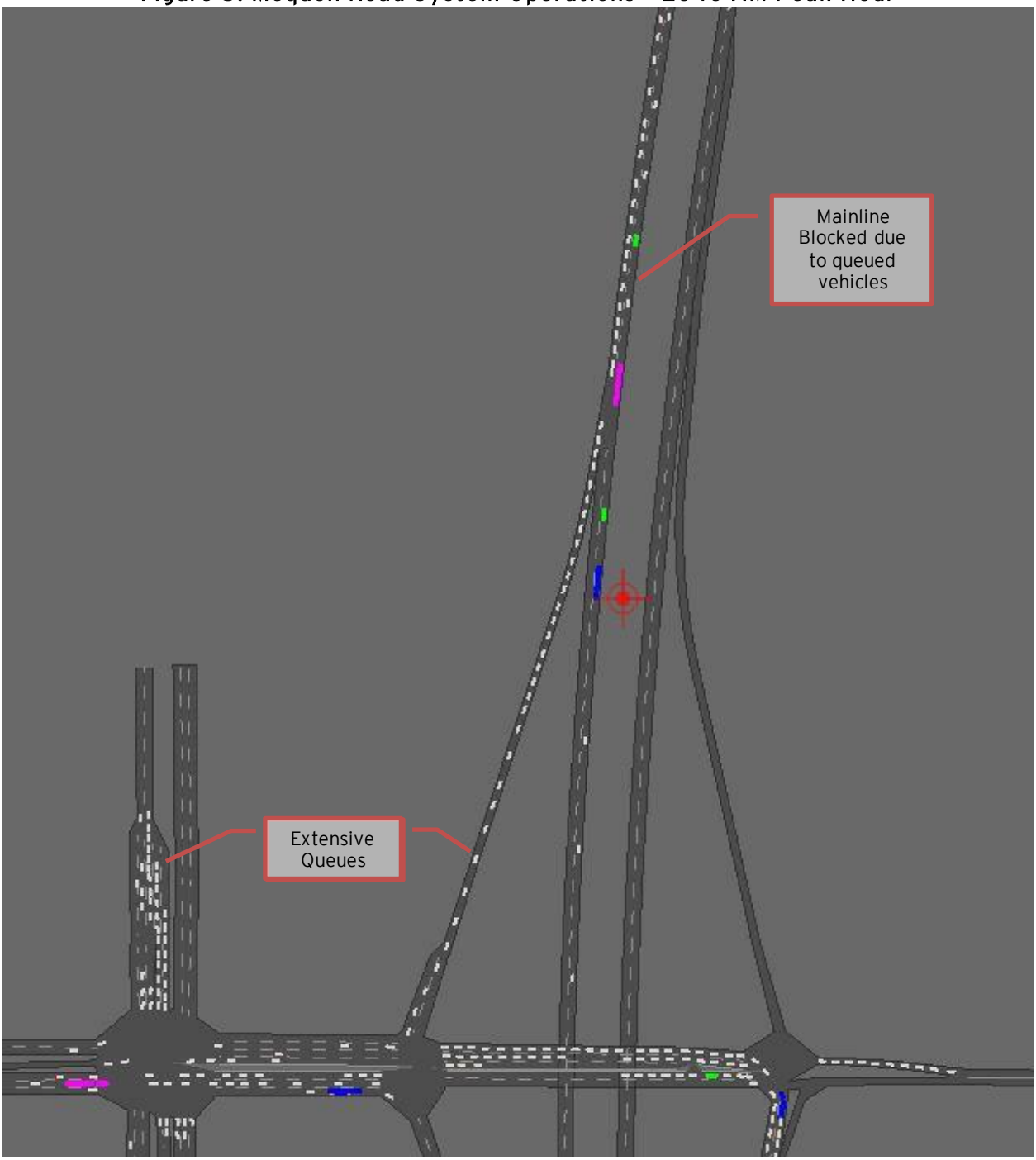
The relatively short distance between the southbound ramp terminal intersection and the Mequon Road intersection with Port Washington Road has a significant impact to intersection system operations. The high volumes from the ramps overburden the east approach causing it to fail and queue cars onto the interchange intersections. The queues extend to the ramps and eventually back into the freeway, creating the unsafe condition of vehicles stopped on the mainline. See Figure 5 on page 11 for a description of the issues.

Table 5 presents the 2040 Synchro/HCM 2010 levels of service on the existing I-43 facility. There are several movements that operate unacceptably in both peak hours. Due to the close spacing of the intersections and the poor levels of service, queues spill over into adjacent intersections and further exacerbate poor levels of service. This was demonstrated in the microsimulation analysis. Figure 5 shows a screen capture of the Paramics model in the AM peak hour showing the extensive queuing. As a result, southbound mainline lanes are blocked.

Table 5: Mequon Road 2040 No Build Levels of Service

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Mequon (Existing)	Traffic Signal	AM	C 28.9	**D 48.4**	C 23.6	**D 49.2**	C 34.7	B 17.1	**D 51.5**	**D 50.2**	C 24.1	**D 49.6**	**D 44.3**	C 28.0
		PM	**D 38.5**	**D 50.5**	B 18.1	**E 64.7**	**D 40.1**	B 14.4	**D 49.5**	**E 68.5**	C 34.7	**E 55.4**	**D 44.6**	C 31.3
I-43 NB ramp & Mequon (Existing)	Traffic Signal	AM	**D 48.1**	C 22.6			**D 48.4**	**D 49.4**	**D 38.3**	- -	C 29.3			
		PM	**F 100.8**	A 0.4			**D 47.4**	**D 48.0**	**F 147.2**	- -	**D 36.2**			
I-43 SB ramp & Mequon (Existing)	Traffic Signal	AM		C 28.3	C 32.3	C 31.6	A 0.6					C 28.3		**D 49.0**
		PM		B 11.3	A 9.2	B 10.0	A 0.7					C 29.1		C 34.8

Figure 5: Mequon Road System Operations – 2040 AM Peak Hour



2.2 Summary

Based on the 2040 analysis of the existing geometric conditions, the I-43 mainline is expected to operate below acceptable conditions for a majority of the segments. In addition, volumes increase throughout the area such that local facilities cannot serve the traffic demand. Failing conditions exist at the closely spaced intersections and ramp terminals at the I-43 service interchanges with Mequon Road. The poor operations at these intersections have the potential to queue vehicles to the mainline and further degrade operations and safety. The modification of these ramp terminal intersections will not provide adequate capacity needed in 2040.

See Section 4.1, Operational Analysis of Alternatives for a summary of how the proposed alternatives address these issues.

3 Transportation System Management

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

3.1 Existing Elements

3.1.1 Existing Transportation System Management

Currently, the southbound entrance ramps from Brown Deer Road, County Line Road and Mequon Road utilize a ramp meter to control entering traffic. Throughout the corridor, there are also system detector stations within the study area that collect data that is then shared with the public. Closed circuit cameras monitor conditions and are located at Brown Deer Road and Mequon Road.

In addition to the physical elements in place along I-43, there is a regional Traffic Incident Management program called the TIME Program that brings emergency responders, WisDOT, local DPW, and others together on a monthly basis to improve incident management on the freeway and identify how elements of automated traffic management systems could be improved or better utilized.

3.1.2 Existing Traffic Demand Management

There are two Park and Ride lots, one near the Brown Deer Road interchange and the other near the CTH C interchange. These are used frequently and often fill beyond capacity. Ozaukee County has expressed interest in expanding the Park and Ride facility at the CTH C interchange.

In the Milwaukee County portion of the I-43 project corridor (Silver Spring Drive to County Line Road), the Milwaukee County Transit System (MCTS) provides rapid bus service on I-43 and regular bus service on Port Washington Road. MCTS also provides special event service between Milwaukee destinations (Summerfest/lakefront festival grounds, Miller Park, State Fair Park) and Brown Deer Road/WIS 100.

The Ozaukee County Express (Route 143) provides bus service between Ozaukee County and downtown Milwaukee. It is operated by Ozaukee County under contract with MCTS. Route 143 generally follows I-43 between Port Washington and Milwaukee. Stops along Port Washington Road serve area businesses and community facilities. Route 143 provides 10 trips per day between downtown Milwaukee and points within the I-43 study area.

In addition to express bus service, the Ozaukee County shared ride taxi service provides transportation to anywhere in Ozaukee County. Other transportation services in the county are primarily aimed at serving the transportation needs of special needs groups such as seniors, disabled, low-income or veterans.

3.2 Future Elements

3.2.1 Future Transportation System Management

The I-43 study area is a part of the "Titletown Corridor" as designated in the *WisDOT Traffic Operations Infrastructure Plan (TOIP)*, May 2008. The TOIP recommends low to medium deployment density for the Ozaukee County section of I-43 and high density deployment for the Milwaukee County section. Deployment strategies include:

- ***Ramp Metering*** – traffic signals on freeway entrance ramps to control the rate of vehicle entry onto the freeway to reduce congestion on the adjacent and downstream

freeway segments. To encourage ridesharing and transit use, preferential access for HOVs can be provided (if requested and justified by the transit authority) at ramp meter locations to allow such vehicles to bypass traffic waiting at a ramp meter signal. Ramp meters are proposed for all southbound entrance ramps in the project corridor, and northbound entrance ramps in Milwaukee County.

- *Traffic Detectors* – There are devices embedded in the pavement at various intervals to detect travel speed and time, traffic congestion, traffic flow breakdowns and incidents, and to regulate ramp meters.
- *Freeway Monitoring/Advisory Information* –permanent variable message signs to provide real-time information to travelers on downstream freeway traffic conditions, current travel times to selected areas, and information on lane and ramp closures.
- *Closed-circuit television cameras* – These provide live video images to WisDOT and local law enforcement, allowing for rapid confirmation of congested areas, incident location, and immediate determination of the appropriate response.
- *Crash investigation sites* – These are designated safe zones where motorists can go if they are involved in a crash or an incident on the freeway.
- *Enhanced mile-marker reference posts* (with highway shield and mile number) – These assist motorists in identifying specific locations along the freeway when reporting incidents.

The recommendations focus on surveillance and managing of the traffic. Although the enhancements listed above will be implemented in the proposed action, they alone will not accommodate the year 2040 forecast volumes.

3.2.2 Future Traffic Demand Management

The proposed access alternatives would not adversely affect existing or potential transit service in the I-43 corridor either on the I-43 mainline, at the interchanges, or on adjacent arterial streets.

Existing transit service in the I-43 corridor, as well as any future expanded service would be enhanced by the proposed highway improvements due to a safer and more efficient facility that could also reduce transit travel times throughout the corridor.

3.3 Regional Plan TSM & TDM Recommendations

The TSM element of the Southeastern Wisconsin Regional Planning Commission's *A Regional Transportation System Plan for Southeastern Wisconsin: 2035* recommends such measures as freeway traffic management (ramp meters, bus, and high-occupancy vehicle lanes on ramps), intelligent transportation systems (advanced traveler information for transit and highway travel conditions), and travel demand management (ridesharing, telecommuting, and flexible work schedules). TSM measures also include engineering design features to improve traffic flow and safety such as improving intersection capacity, widening shoulders, removing street parking or restricting parking to non-peak traffic periods, adding traffic signals, and providing access management including relocating or consolidating driveways where practicable. With the TSM measures already in place, the regional transportation plan documents the need for additional capacity on several highways, including the I-43 north-south corridor. The preferred alternative will consider TSM elements; but TSM will not, by itself, meet the purpose and need of the project, especially for safety concerns.

4 Safety Impacts and Operational Analysis

Policy Point 3: An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and 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 (23 CRF 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operation impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.3(a) and 655.603(d)). 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 local street network (23 CFR 625.3(a) and 655.604(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

4.1 Operational Analysis of Alternatives

4.1.1 Proposed Alternatives

The County Line interchange has three access options to and from I-43. These options include:

(a) Partial Access (to/from the south)
(b) No Access
(c) Full Access

The Partial Access maintains the existing access to and from the south but relocates the northbound exit ramp to the north to meet design standards on I-43. Forecasted volumes represent the change in access location. The No Access alternative removes the existing southbound entrance and northbound exit ramps. Users must utilize the interchanges with Mequon Road or Brown Deer Road to access I-43. The Full Access alternative provides identical access to and from the south as the Partial Access alternative and adds two additional access ramps to and from the north: the southbound exit to Port Washington Road and the northbound entrance from Katherine Drive.

The proposed action includes capacity improvements and design updates to meet current standards for the I-43 mainline. Based on traffic operations of the no build condition (See Section 2.1.1), there is a need for capacity expansion on I-43. Due to the proximity and interaction of Port Washington Road to the Interstate, especially at the service interchanges, design improvements are also investigated in order to provide acceptable levels of service at the interchange cross-road intersections with Port Washington Road.

4.1.2 Proposed Alternative Traffic Volumes

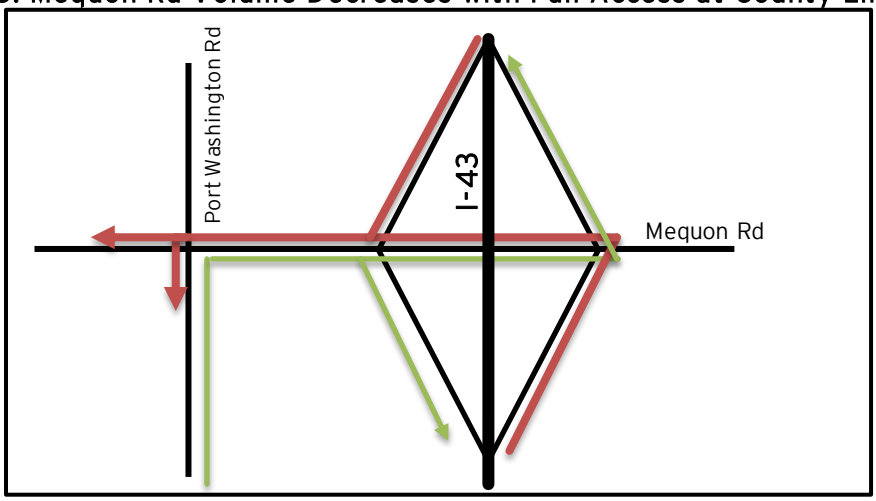
As discussed previously, to be consistent with the approved regional comprehensive plan, the analysis presented in this section assumes that the proposed full access interchange with I-43 at Highland Road is in place. The request for new Interstate access at Highland Road in the City of Mequon, Ozaukee County, Wisconsin is part of a separate report, the *Highland Road Interstate Justification Report* submitted to FHWA in July 2013 and approved on November 7, 2013. The study area volumes were forecasted to represent year 2040 conditions according to the methodology outlined in Appendix A.

The impact to 2040 peak hour traffic volumes will slightly reduce the traffic demand at Mequon Road and Brown Deer Road Interchanges with full access at County Line Road. Removing access will increase traffic at the two adjacent interchanges. The following sections summarize the impact to volumes compared to the partial access alternative.

4.1.2.1 Full and Partial County Line Access

At the Mequon Interchange, the reduction in traffic from the full access alternative at County Line occurs for movements from Port Washington to the northbound and southbound entrance ramps, northbound exit ramp to west Mequon/south Port Washington, and from southbound exit ramp to west Mequon/south Port Washington See Figure 6.

Figure 6: Mequon Rd Volume Decreases with Full Access at County Line Road



At the Brown Deer Interchange, the reduction in traffic with the full access at County Line occurs for the southbound exit ramp and the northbound entrance ramp, with traffic origins/destinations along both east and west Brown Deer Road and to Port Washington Road (See Figure 7). The schematic comparison of the AM and PM peak hour forecasts at Mequon and Brown Deer with partial County Line and full County Line access are shown in Figure 8 to Figure 11.

Figure 7: Brown Deer Volume Decreases with Full Access at County Line Road

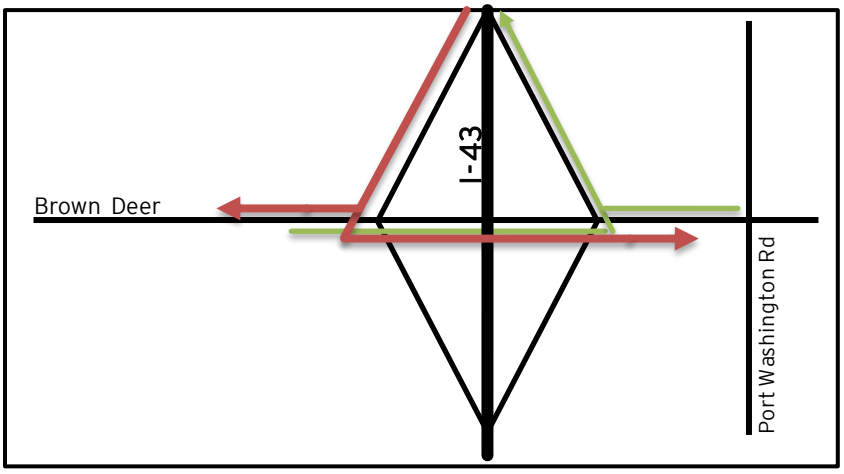


Figure 8: AM Peak Hour Volumes at Brown Deer with Full and Partial Access at County Line

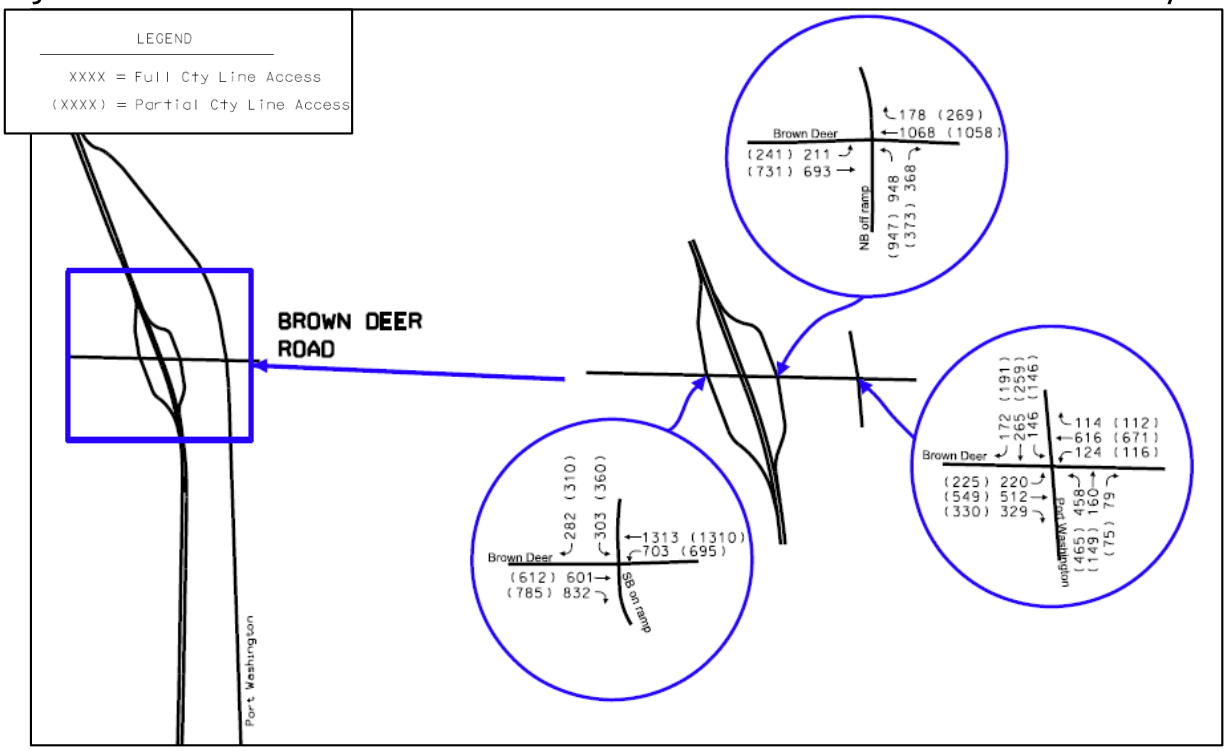


Figure 9: AM Peak Hour Volumes at Mequon Rd with Full and Partial Access at County Line

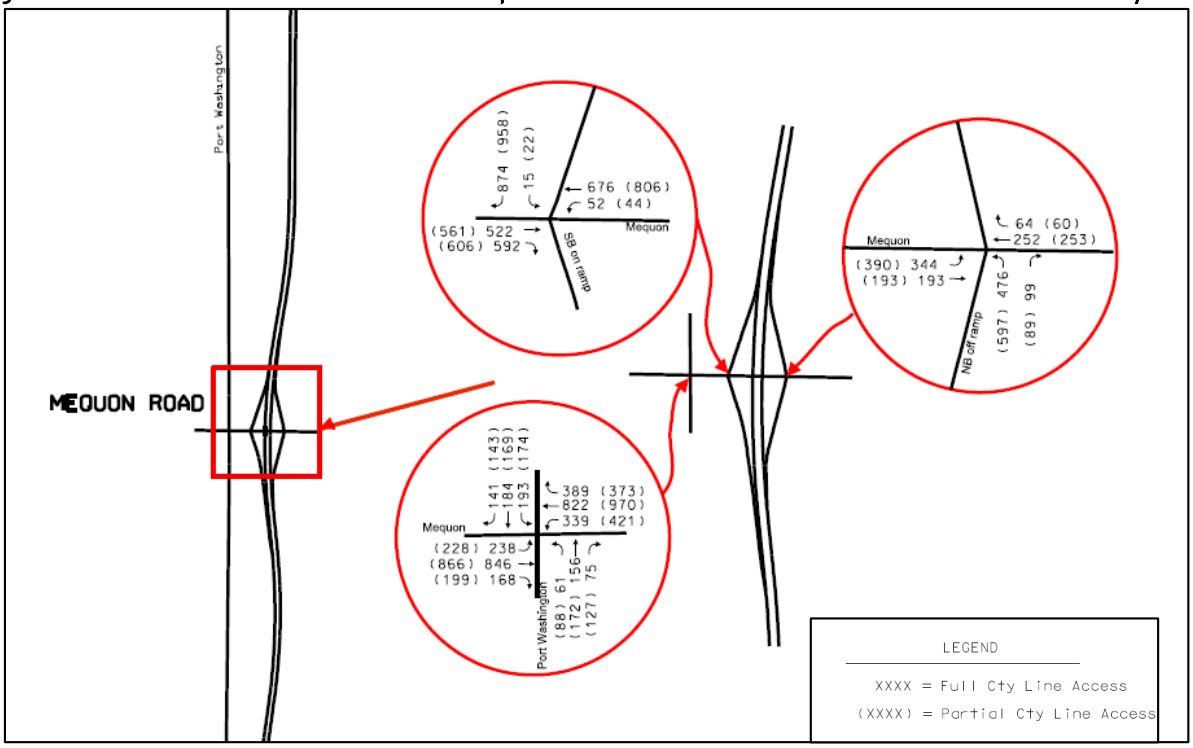


Figure 10: PM Peak Hour Volumes at Brown Deer with Full and Partial Access at County Line

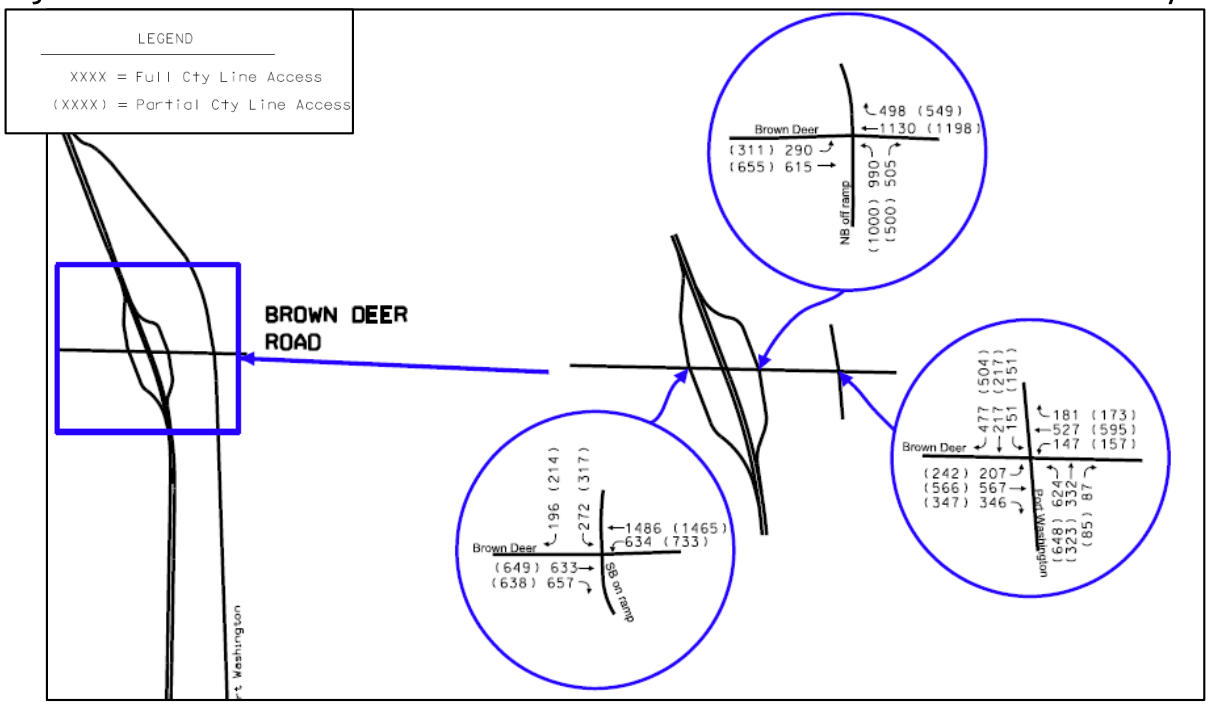
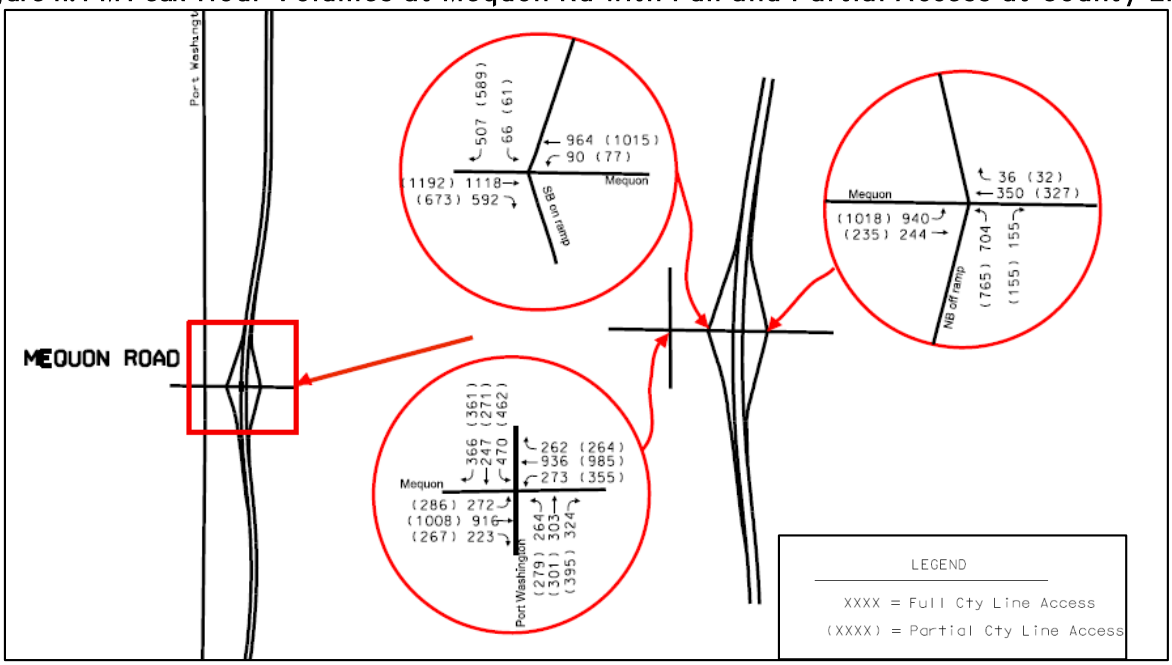


Figure 11: PM Peak Hour Volumes at Mequon Rd with Full and Partial Access at County Line



4.1.2.2 No Access at County Line

Removing the existing partial access at County Line will increase volume at both the Mequon and Brown Deer Interchanges. Volume shifts from removing the partial access are expected to increase volume on the entrance and exit ramps to and from the south at Mequon (Figure 12) and Brown Deer (Figure 13). Volume comparison for Mequon and Brown Deer Interchanges under the partial and no access alternatives at County Line are shown in Figure 14 to Figure 17.

Figure 12: Mequon Interchange Volume Increase with No Access at County Line

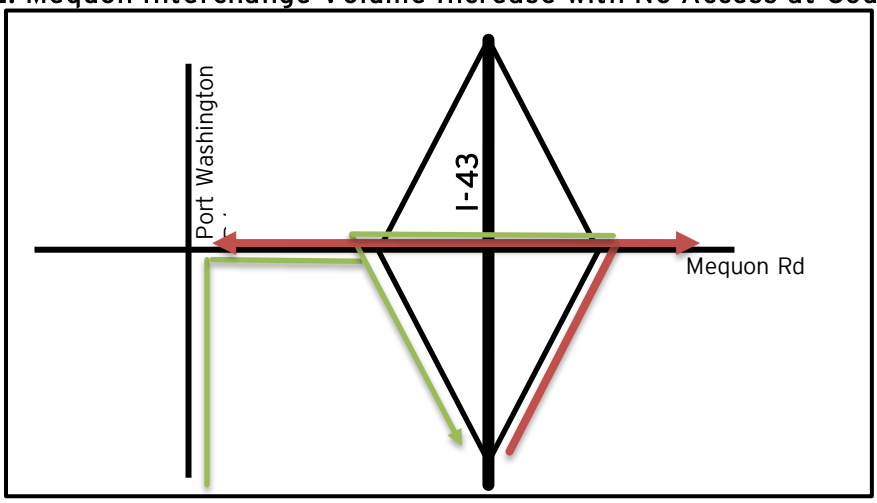


Figure 13: Brown Deer Interchange Volume Increases with No Access at County Line

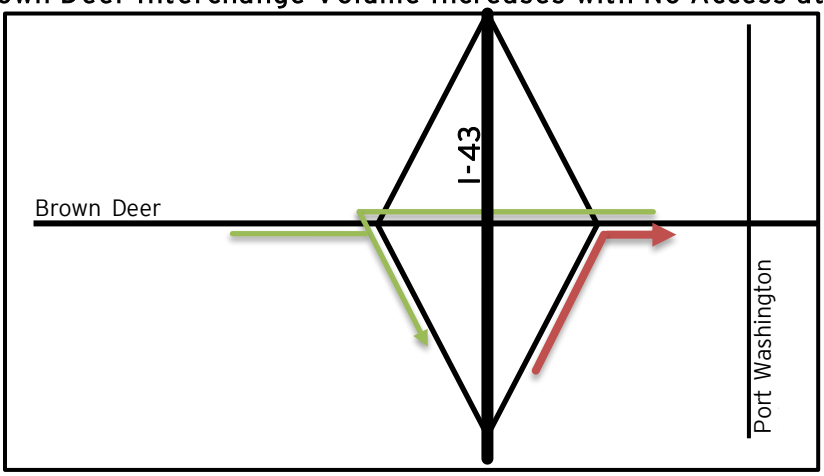


Figure 14: AM Peak Hour Volumes at Brown Deer with No Access and Partial Access at County Line

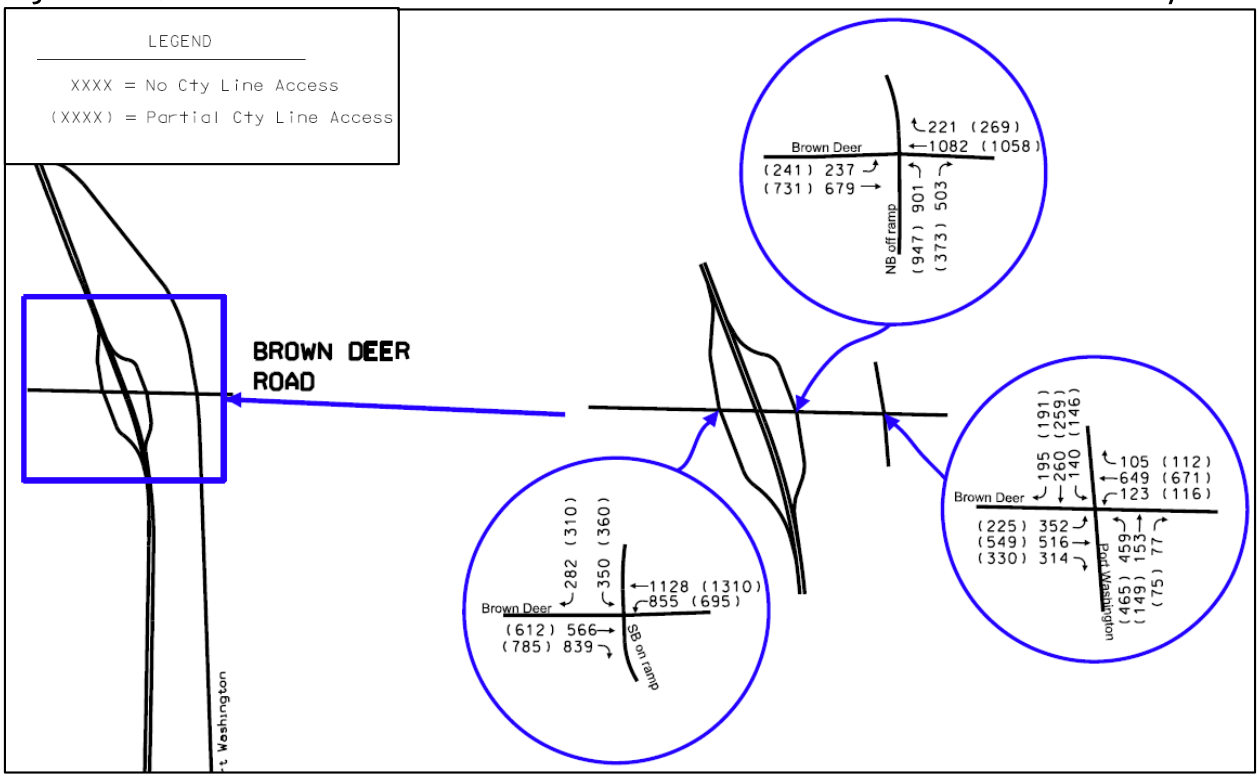


Figure 15: AM Peak Hour Volumes at Mequon Road with No Access and Partial Access at County Line

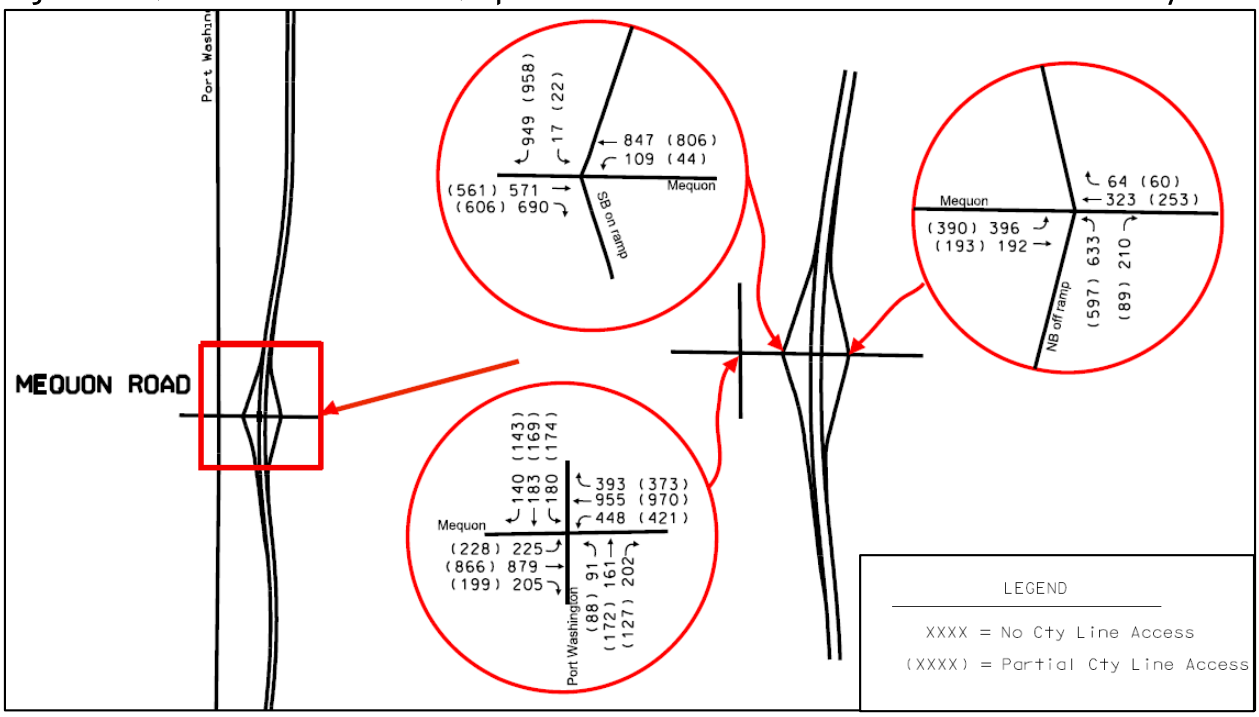


Figure 16: PM Peak Hour Volumes at Brown Deer with No Access and Partial Access at County Line

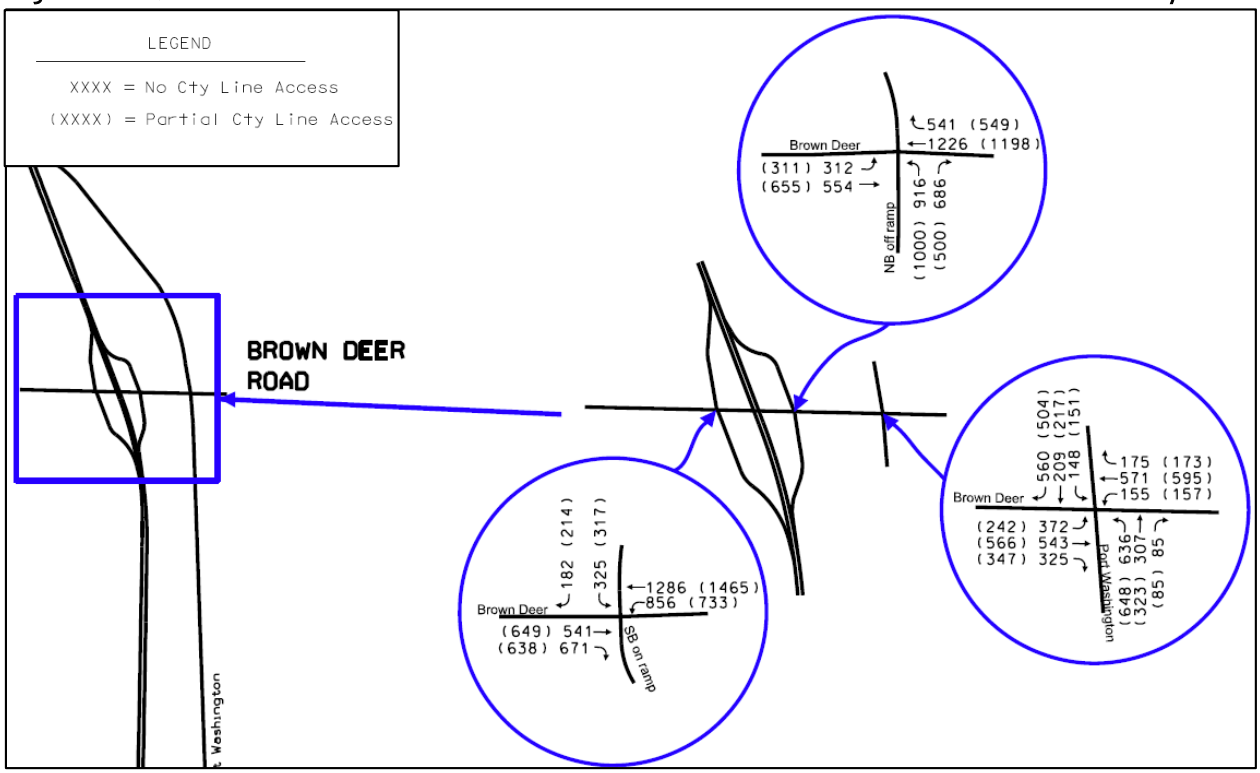
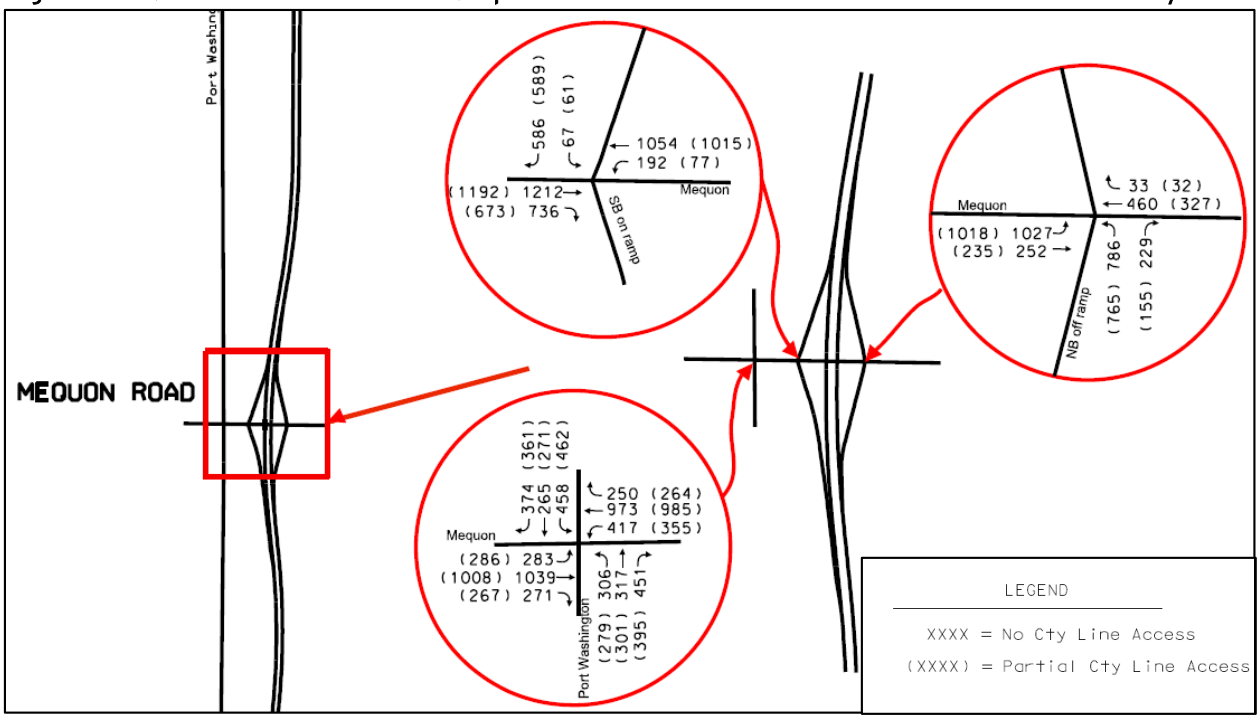


Figure 17: PM Peak Hour Volumes at Mequon Road with No Access and Partial Access at County Line



The 2040 peak hour turning movement forecasts comparison for Mequon and Brown Deer Interchanges under the three County Line access options are shown in Table 6 and Table 7. The table cells highlighted in green indicate the expected reduction in volume based on adding access at County Line to and from the north. The cells highlighted in red indicate turning movements were an increase of volume is expected by the removal of ramps at County Line

to and from the south. Other volume changes occur between the three alternatives that are not highlighted and are considered secondary impacts caused by local traffic adjusting their routes due to change in traffic demands at the highlighted locations. The volumes are displayed graphically in Appendix B: Year 2040 Turning Movement Forecasts.

Table 6: Year 2040 AM Peak Hour Volume Comparison

Intersection	Access Type	Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Mequon Rd & Port Washington Rd	Full Access	238	846	168	**339**	**822**	389	61	156	**75**	193	184	141
	Partial Access	228	866	199	421	970	373	88	172	127	174	169	143
	No Access	225	879	205	448	955	393	91	161	**202**	180	183	140
Mequon Rd & SB ramp	Full Access		**522**	**592**	52	**676**					15		**874**
	Partial Access		561	606	44	806					22		958
	No Access		571	**690**	**109**	847					17		949
Mequon Rd & NB ramp	Full Access	**344**	193			252	64	**476**		99			
	Partial Access	390	193			253	60	597		89			
	No Access	396	192			**323**	64	**633**		**210**			
Brown Deer & Port Washington Rd	Full Access	220	512	329	124	616	114	458	160	79	146	265	172
	Partial Access	225	549	330	116	671	112	465	149	75	146	259	191
	No Access	**352**	516	314	123	649	105	459	153	77	195	260	140
Brown Deer & SB ramp	Full Access		601	832	703	1313					**303**		**282**
	Partial Access		612	785	695	1310					360		310
	No Access		566	**839**	**855**	1128					350		282
Brown Deer & NB ramp	Full Access	**211**	**693**			1068	**178**	948		368			
	Partial Access	241	731			1058	269	947		373			
	No Access	237	679			1082	221	901		**503**			

Table 7: Year 2040 PM Peak Hour Volume Comparison

Intersection	Access Type	Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Mequon Rd & Port Washington Rd	Full Access	272	916	223	**273**	**936**	262	264	303	**324**	470	247	366
	Partial Access	286	1008	267	355	985	264	279	301	395	462	271	361
	No Access	283	1039	271	417	973	250	306	317	**451**	458	265	374
Mequon Rd & SB ramp	Full Access		**1118**	**592**	90	**964**					66		**507**
	Partial Access		1192	673	77	1015					61		589
	No Access		1212	**736**	**192**	1054					67		586
Mequon Rd & NB ramp	Full Access	**940**	244			350	36	**704**		155			
	Partial Access	1018	235			327	32	765		155			
	No Access	1027	252			**460**	33	**786**		**229**			
Brown Deer & Port Washington Rd	Full Access	207	567	346	147	527	181	624	332	87	151	217	477
	Partial Access	242	566	347	157	595	173	648	323	85	151	217	504
	No Access	**372**	543	325	155	571	175	636	307	85	148	209	560
Brown Deer & SB ramp	Full Access		633	657	634	1486					**272**		**196**
	Partial Access		649	638	733	1465					317		214
	No Access		541	**671**	**856**	1286					325		182
Brown Deer & NB ramp	Full Access	**290**	**615**			1130	**498**	990		505			
	Partial Access	311	655			1198	549	1000		500			
	No Access	312	554			1226	541	916		**686**			

4.1.2.3 Facility Operations with Partial Access at County Line Road with Proposed I-43 Capacity

The following sub-sections summarize the operations of the interchange intersections with I-43 and the cross street intersection with Port Washington Road for the proposed action of replacing the partial access to I-43 from County Line Road. The mainline I-43 operations are presented first, followed by the County Line Road interchange operations and then the adjacent interchanges of Brown Deer Road (south) and Mequon Road (north.)

I-43 Mainline Operations with Partial Access at County Line Road

The proposed action for I-43 includes an additional lane in each direction throughout the study area for a total of six lanes, three in each direction. Ramps exiting and entering the facility are updated to meet current WisDOT and AASHTO design standards. The analysis of

the mainline assumes that all service interchanges are constructed such that enough capacity is provided and vehicles can enter the facility without congestion.

Table 8 presents the results of the HCS analysis with the proposed I-43 mainline capacity and design improvements. Mainline expansion of I-43 is expected to provide acceptable conditions for year 2040 traffic (LOS D or better in Milwaukee County and LOS C or better in Ozaukee County.) Appendix F summarizes the results graphically.

Table 8: I-43 Mainline Level of Service with Capacity and Partial Access at County Line Road

Facility	Location	Analysis Type	2040 Volume AM (PM)	AM (PM) LOS	AM(PM) Num. LOS
Freeway & Weave Analysis					
I-43 Northbound	Good Hope entrance ramp to Brown Deer exit ramp	Freeways	3772 (5019)	C (D)	3.18 (4.08)
	Brown Deer exit ramp to Brown Deer entrance ramp	Freeways	2452 (3519)	B (B)	2.23 (2.96)
	Brown Deer entrance ramp to County Line exit ramp	Freeways	2962 (4379)	B (C)	2.6 (3.56)
	County Line exit ramp to Mequon exit ramp	Freeways	2632 (3979)	B (C)	2.3 (3.18)
	Mequon exit ramp to Mequon entrance ramp	Freeways	1946 (3059)	A (B)	1.88 (2.56)
	Mequon entrance ramp to Highland exit ramp	Freeways	2396 (4109)	B (C)	2.13 (3.26)
I-43 Southbound	Highland entrance ramp to Mequon exit ramp	Freeways	4462 (3064)	C (B)	3.43 (2.44)
	Mequon exit ramp to Mequon entrance ramp	Freeways	3482 (2414)	B (B)	2.89 (2.13)
	Mequon entrance ramp to County Line entrance ramp	Freeways	4132 (3164)	C (B)	3.31 (2.66)
	County Line entrance ramp to Brown Deer exit ramp	Freeways	4492 (3484)	C (B)	3.66 (2.97)
	Brown Deer exit ramp to Brown Deer entrance ramp	Freeways	3822 (2953)	C (B)	3.18 (2.58)
	Brown Deer entrance ramp to Good Hope exit ramp	Freeways	5302 (4324)	D (C)	4.33 (3.56)
Ramp Analysis					
I-43 Northbound	Brown Deer exit ramp	Ramps - Diverge	1320 (1500)	B (C)	2.76 (3.59)
	Brown Deer entrance ramp	Ramps - Merge	510 (860)	B (C)	2.79 (3.7)
	County Line exit ramp	Ramps - Diverge	330 (400)	B (C)	2.75 (3.64)
	Mequon exit ramp	Ramps - Diverge	686 (920)	B (C)	2.56 (3.31)
	Mequon entrance ramp	Ramps - Merge	450 (1050)	B (C)	2.25 (3.24)
I-43 Southbound	Mequon exit ramp	Ramps - Diverge	980 (650)	C (B)	3.25 (2.45)
	Mequon entrance ramp	Ramps - Merge	650 (750)	B (B)	2.96 (2.51)
	County Line entrance ramp	Ramps - Merge	360 (320)	C (B)	3.23 (2.67)
	Brown Deer exit ramp	Ramps - Diverge	670 (531)	C (C)	3.66 (3.04)
	Brown Deer entrance ramp	Ramps - Merge	1480 (1371)	D (C)	4.17 (3.51)

County Line Road Operations with Partial Access at County Line Road

The existing northbound exit ramp accesses Port Washington Road south of County Line Road. The proposed action shifts the northbound exit ramp north of County Line Road to intersect Port Washington Road at Katherine Drive. Moving this ramp terminal north of County Line increases the ramp spacing between the Brown Deer entrance ramp and the northbound County Line exit ramp. The existing southbound entrance ramp location at County Line Road is maintained and a right turn storage bay is added to the southbound approach to improve operations and minimize vehicle queues on Port Washington Lane. The County Line Road Partial Access design is provided in Appendix G.

All existing access points to local streets along Port Washington Lane and Katherine Drive are maintained in the Partial Access Alternative. Additionally, there are no real estate impacts and approximately 0.25 acres of standard wetlands may be impacted.

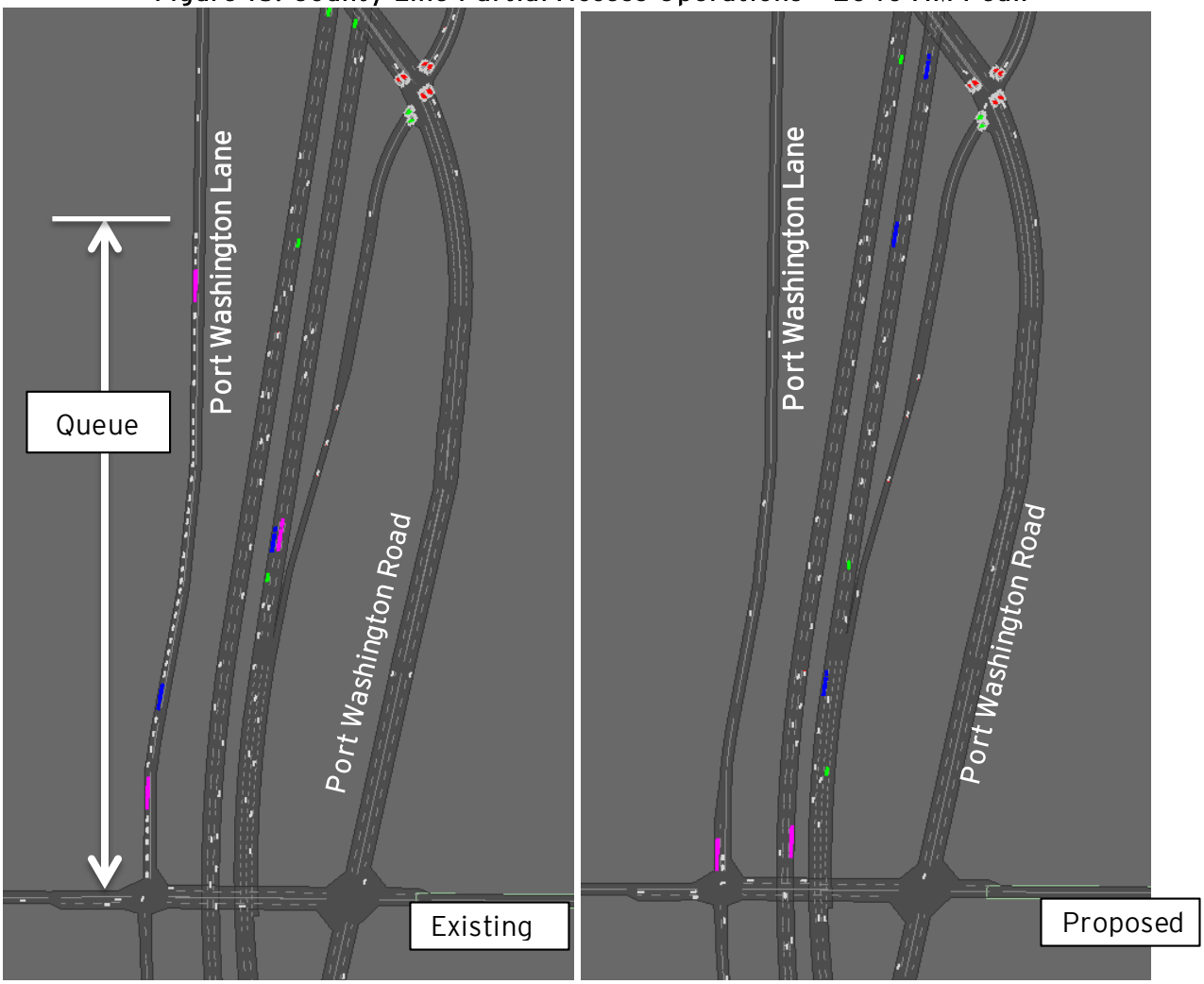
The partial access scenario maintains the existing access to I-43 to and from the south. Northbound exiting traffic that wishes to continue north must re-enter the Interstate facility by continuing north approximately 1.7 miles via Port Washington Road, a four-lane arterial. See Section 4.4 for the Signing Concept Plan that describes the wayfinding signing plan. Table 9 presents the expected operations of the County Line Road Partial Access Alternative.

Table 9: County Line Road 2040 Partial Access Levels of Service

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington Rd & County Line (Existing)	Stop Sign	AM	**D** **32.2**	B 14.1		**E** **35.9**		C 20.8	A 9.8	A 0.0	A 0.0	A 9.0	A 0.0	A 0.0
		PM	**E** **36.1**	**D** **30.9**		**D** **31.5**		C 17.5	A 8.8	A 0.0	A 0.0	A 8.5	A 0.0	A 0.0
County Line & SB Entrance ramp / Port Washington Ln (Improved)	Stop Sign	AM	B 13.4	B 11.1		B 12.3	C 16.6					C 16.3		B 13.0
		PM	B 13.1	B 11.0		B 10.6	B 11.2					B 13.4		B 10.6
I-43 NB Exit ramp / Katherine & Port Washington Rd (Proposed)	Traffic Signal	AM	B 13.1	B 12.1		B 13.5		A 0.0		A 9.7	A 9.7	B 10.0	B 10.3	
		PM	B 17.0	B 10.7		B 11.6		A 0.0		B 13.9	B 13.9	B 12.4	B 12.8	

As presented in Table 9, the existing geometry and stop control at Port Washington & County Line have one minor movement with LOS E in each peak and all other movements operate at LOS D or better. The County Line and southbound entrance ramp intersection with Port Washington Lane has LOS C or better with the right turn storage provided. Without this storage, LOS is expected to degrade to LOS D with extensive vehicle queues. Vehicle queues with and without the right turn storage at County Line and the southbound entrance ramp are presented in Figure 18, Additionally, the remaining intersections of the Partial Access Alternative operate acceptably and vehicle queues are not expected to impact the Interstate or adjacent intersections.

Figure 18: County Line Partial Access Operations – 2040 AM Peak



Brown Deer Road Operations with Partial Access at County Line Road

The Brown Deer Road structures over I-43 were replaced in 2010 and a significant emphasis is placed on finding alternatives that maintain the current structures. The current design is a full access cloverleaf interchange. As discussed later in Section 0, the highest crash rates of the corridor occur within the interchange entrance and exit ramps.

The recommended alternative in the proposed action at Brown Deer Road removes the rural style cloverleaf interchange and replaces it with a Diverging Diamond Interchange (DDI) design that meets current standards. This design type addresses crashes associated with the cloverleaf design. See Appendix G for the proposed design of Brown Deer Road.

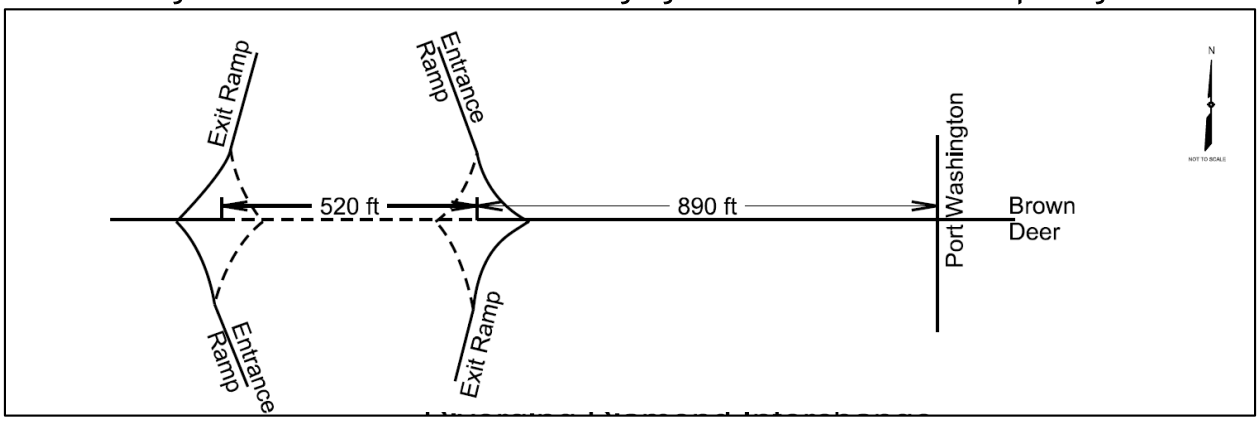
The Diverging Diamond Interchange reconfigures the existing free flow cloverleaf ramps to a diamond-style interchange. The unique feature of the Diverging Diamond Interchange is that within the interchange intersections, the traffic on Brown Deer Road drive on the left side of the roadway after crossing over at signalized intersections. There are several benefits as a result:

- Provides free flow movements to the entrance ramps
- Simplifies signal phasing and reduces lost time

- Reduces conflict points
- Prevents wrong-way turning movements to entrance ramps
- Accommodates high turning to through movement volumes

The spacing between the northbound ramp terminal and Port Washington Road is approximately 890 feet, or 100 feet less than the standard diamond design. See Figure 19 for the proposed intersection spacing as a DDI.

Figure 19: Brown Deer Road Diverging Diamond Intersection Spacing



Signal phasing is simplified to a two-phase signal with a DDI as turning movements do not require separate protected phases and are removed from vehicle queues. Since turning vehicles are primarily served as free flowing movements, turn storage bays are not required and reduces the geometry needed within the interchange. To minimize queues between the northbound ramp terminal and Port Washington Road, the northbound dual right turn is controlled by a traffic signal. This will control vehicles and minimize lane changes as they approach the Port Washington Road intersection.

The Intersection of Port Washington Road at Brown Deer Road is maintained since the existing configuration accommodates future traffic as identified in Section 2.1.2. Table 10 presents the expected levels of service of the DDI.

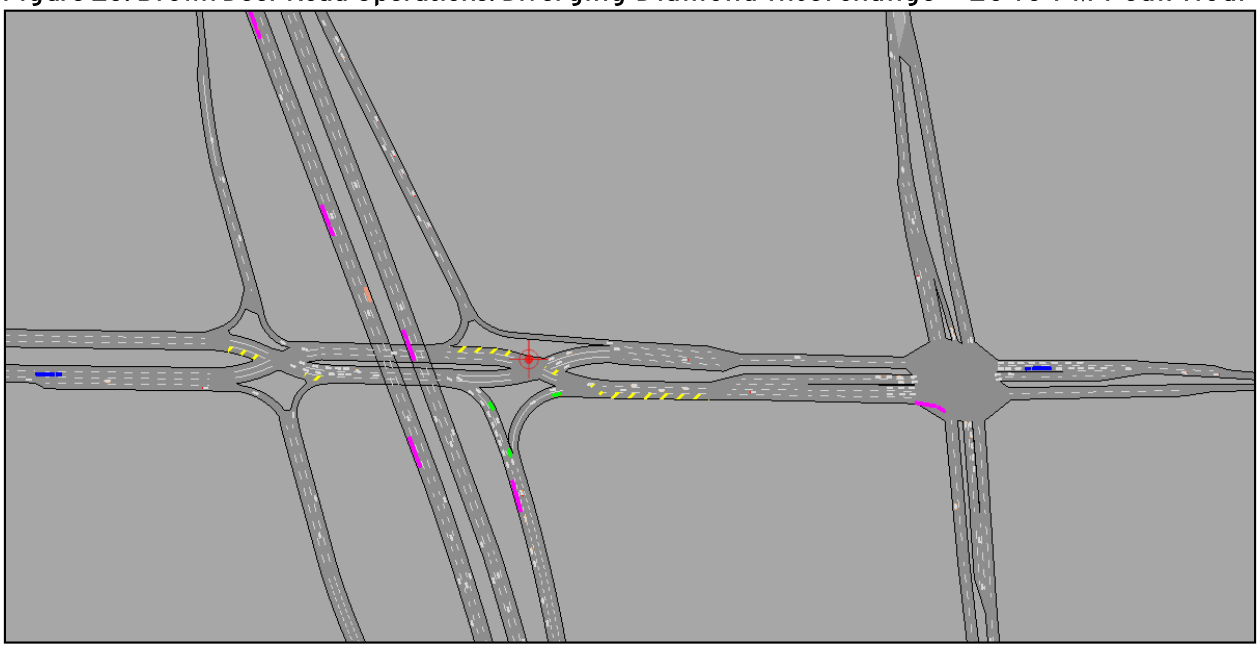
Table 10: 2040 Levels of Service Brown Deer Road for County Line Road Partial-Access Alternative

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Brown Deer	Traffic Signal	AM	D 43.1	C 31.5	C 31.2	D 37.8	D 50.9	D 51.8	D 54.1	D 35.9	D 36.8	D 41.2	C 34.9	C 24.9
		PM	D 46.5	D 38.9	D 38.7	D 38.6	D 52.2	D 53.6	D 51.5	D 48.8	D 50.3	D 42.8	D 43.9	D 44.0
I-43 NB off ramp & Brown Deer - DDI	Traffic Signal	AM	A 0.0	B 19.4			B 18.9	A 0.0	C 25.2		B 17.1			
		PM	A 0.0	C 20.2			C 21.3	A 0.0	C 28.3		B 19.7			
I-43 SB off ramp & Brown Deer - DDI	Traffic Signal	AM		B 16.7	A 0.0	A 0.0	C 30.7					C 22.6		B 16.6
		PM		B 18.2	A 0.0	A 0.0	D 43.7					C 22.6		B 17.2

As presented in Table 10, the Brown Deer corridor proposed as a DDI operates acceptably at LOS D or better. Additionally, the existing configuration of the Brown Deer Road intersection with Port Washington Road operates acceptable at LOS D or better.

There are two timing coordination schemes that can be applied to the intersections within a DDI. One emphasizes the continuous movement across the interchange for the through vehicles, while the other emphasizes exiting ramp traffic. The results of the timing scenarios were tested in the microsimulation model. The scheme emphasizing the exit ramp traffic provided minimum queues and better overall operations. Figure 20 presents a screen shot of the microsimulation model.

Figure 20: Brown Deer Road Operations: Diverging Diamond Interchange – 2040 PM Peak Hour



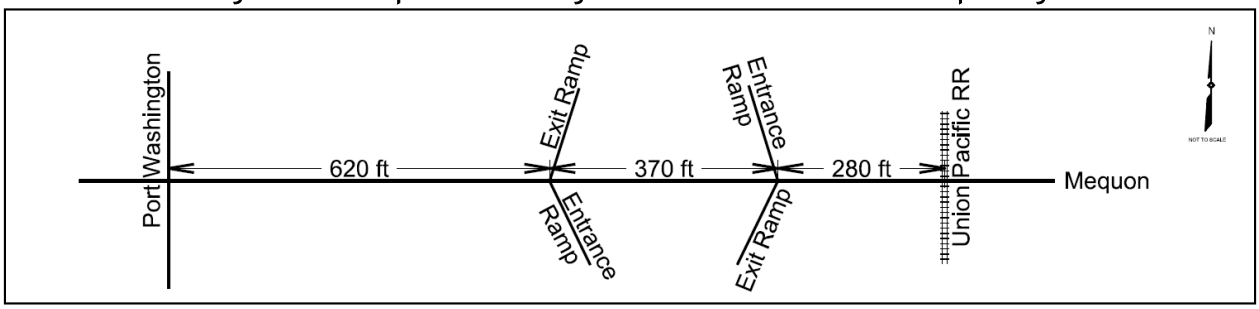
Mequon Road Operations with Partial Access at County Line Road

As identified in Section 2.1.4, the existing interchange design provides approximately 390 feet (See Figure 4) between Port Washington Road and the southbound ramp terminal. As a result, significant traffic fills the turn storage on the westbound approach of the Mequon Road intersection with Port Washington Road and the resulting queues impact the operations of the southbound ramp terminal. Refer to the *Highland Road Interstate Justification Report* submitted to FHWA in July 2013 for proposed actions without the proposed Highland Road access.

The tight diamond allows the horizontal shift of the I-43 alignment to the east in order to increase the distance between the southbound ramp terminal intersection and the Mequon Road intersection with Port Washington Road. Figure 21 presents the intersection spacing of the Tight Diamond Alternative.

In this alternative the eastbound approach to the Mequon Road intersection with Port Washington Road was modified to provide an additional eastbound left turn lane.

Figure 21: Mequon Road Tight Diamond Intersection Spacing



As presented in Figure 21, the tight diamond provides an additional 230 feet of intersection spacing between Port Washington Road and the southbound ramp terminal. Because the alignment of mainline I-43 is shifted to the east, the tight diamond does not provide an increase in intersection spacing between the Union Pacific railroad and the northbound ramp terminal. This spacing remains approximately 280 feet.

Table 11 summarizes the results of the HCM 2010 intersection analysis. Note that eastbound and westbound movements between the three intersections operate at levels above those listed below, as HCS 2010 does not take into account the full impact of a coordinated signal system.

Table 11: 2040 Levels of Service Mequon Road for County Line Road Partial-Access Alternative

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Mequon	Traffic Signal	AM	**D** **48.5**	**D** **46.7**	C 26.2	**D** **37.0**	B 18.3	A 6.2	**D** **41.5**	C 33.3	C 20.3	**D** **50.2**	C 33.3	B 10.7
		PM	**D** **49.9**	**D** **52.3**	C 30.1	**D** **43.9**	C 26.4	A 5.9	**D** **52.3**	**D** **53.9**	**D** **37.7**	**D** **53.5**	**D** **43.2**	C 24.6
I-43 NB ramp & Mequon	Traffic Signal	AM	**D** **40.5**	A 8.6			C 21.3	C 20.0	**D** **35.8**	- -	C 26.5			
		PM	C 33.2	B 10.1			**D** **50.5**	**D** **41.3**	**D** **46.4**	- -	C 31.1			
I-43 SB ramp & Mequon	Traffic Signal	AM		C 31.6	A 0.0	**D** **39.5**	B 15.1					B 19.1		C 29.1
		PM		A 7.8	A 0.0	**D** **35.6**	A 7.9					**D** **37.6**		**D** **48.9**

As presented in Table 11, the proposed Mequon Road and Port Washington Road intersection improvements allow the intersection to operate at LOS D. The delays associated with LOS D at the intersection are close to the LOS E threshold. This suggests that operations will degrade to unacceptable shortly after the year 2040. The ramp terminal is expected to operate at LOS D or better.

Additional Impacts of Partial Access at County Line Road

As discussed above, the proposed action maintains existing partial access to I-43 at County Line Road. This conforms to local and regional land use plan assumptions. It also supports the existing and future travel patterns to and from the regional central business district of the City of Milwaukee. It does not conform to FHWA's policies on providing full movements at interchange access points.

However, the unique alignment of the parallel Port Washington Road crossing over I-43 at this location provides a straightforward way to reentry of I-43 if the need should arise. See Appendix H: Signing Plan for the conceptual signing plan, including wayfinding signs.

4.1.2.4 Facility Operations with No Access at County Line Road with Proposed I-43 Capacity

The following sub-sections summarize the operations of the interchange intersections with I-43 and the cross street intersection with Port Washington Road with no access to I-43 from County Line Road. The mainline I-43 operations are presented first, followed by the County Line Road intersection operations and then the adjacent interchanges of Brown Deer Road (south) and Mequon Road (north.)

I-43 Mainline Operations with No Access at County Line Road

The proposed action for I-43 includes an additional lane in each direction throughout the study area for a total of six lanes, three in each direction. Ramps exiting and entering the facility are updated to meet current WisDOT and AASHTO design standards. The analysis of the mainline assumes that all service interchanges are constructed such that enough capacity is provided and vehicles can enter the facility without congestion.

The No Access at County Line Road removes the service ramps to and from the south. As a direct result, the interchange density decreases slightly and creates a 2.7 mile section of freeway without access, an increase of approximately 0.5 mile when compared to the existing condition. See Appendix G for the I-43 corridor design with no access to and from County Line Road.

Table 12 presents the results of the HCS analysis with the proposed I-43 mainline capacity with No Access at County Line and adjacent interchange design improvements. Mainline expansion of I-43 is expected to provide acceptable conditions for year 2040 traffic (LOS D or better in Milwaukee County and LOS C or better in Ozaukee County.) Appendix F summarizes the results graphically.

Table 12: I-43 Mainline Level of Service with Capacity and No Access at County Line Road

Facility	Location	Analysis Type	2040 Volume AM (PM)	AM (PM) LOS	AM(PM) Num. LOS
Freeway & Weave Analysis					
I-43 Northbound	Good Hope entrance ramp to Brown Deer exit ramp	Freeways	3748 (5012)	C (D)	3.16 (4.07)
	Brown Deer exit ramp to Brown Deer entrance ramp	Freeways	2344 (3410)	B (B)	2.14 (2.89)
	Brown Deer entrance ramp to Mequon exit ramp	Freeways	2802 (4263)	B (C)	2.41 (3.36)
	Mequon exit ramp to Mequon entrance ramp	Freeways	1959 (3248)	A (B)	1.88 (2.69)
	Mequon entrance ramp to Highland exit ramp	Freeways	2419 (4308)	B (C)	2.14 (3.4)
I-43 Southbound	Highland entrance ramp to Mequon exit ramp	Freeways	4434 (3046)	C (B)	3.41 (2.43)
	Mequon exit ramp to Mequon entrance ramp	Freeways	3468 (2393)	B (B)	2.87 (2.11)
	Mequon entrance ramp to Brown Deer exit ramp	Freeways	4267 (3321)	C (B)	3.49 (2.86)
	Brown Deer exit ramp to Brown Deer entrance ramp	Freeways	3635 (2418)	C (B)	3.05 (2.49)
	Brown Deer entrance ramp to Good Hope exit ramp	Freeways	5329 (4341)	D (C)	4.36 (3.58)

Facility	Location	Analysis Type	2040 Volume AM (PM)	AM (PM) LOS	AM(PM) Num. LOS
Ramp Analysis					
I-43 Northbound	Brown Deer exit ramp	Ramps - Diverge	1404 (1602)	B (C)	2.78 (3.63)
	Brown Deer entrance ramp	Ramps - Merge	458 (853)	B (C)	2.7 (3.63)
	Mequon exit ramp	Ramps - Diverge	843 (1015)	B (C)	2.68 (3.5)
	Mequon entrance ramp	Ramps - Merge	460 (1060)	B (C	2.26 (3.36)
I-43 Southbound	Mequon exit ramp	Ramps - Diverge	966 (653)	C (B)	3.24 (2.45)
	Mequon entrance ramp	Ramps - Merge	799 (928)	C (B	3.09 (2.63)
	Brown Deer exit ramp	Ramps - Diverge	632 (507)	C (B)	3.53 (2.94)
	Brown Deer entrance ramp	Ramps - Merge	1694 (1527)	D (C)	4.27 (3.58)

County Line Road Operations with No Access at County Line Road

The County Line No Access Alternative maintains the existing geometry at County Line Road and Port Washington Road intersections while removing the existing southbound entrance ramp from County Line Road and the northbound exit ramp at Port Washington Road. Users must travel the local system to Mequon Road or Brown Deer Road to access I-43. To access I-43, users must travel approximately 1.7 miles north to Mequon Road or approximately 1.5 miles south to Brown Deer Road. Additional improvements for County Line Road intersections with Port Washington Road and Port Washington Lane, beyond the removal of the I-43 ramps, are under local jurisdiction and should be further evaluated by local stakeholders. The County Line Road No Access design is provided in Appendix G. The year 2040 peak hour traffic forecasts for the No Access Alternative at County Line are provided in Appendix B.

Table 13 presents the expected operations of the No Access alternative. The HCM 2010 analysis indicates the existing geometry at the Port Washington Lane and County Line Road intersection, and the Port Washington Road and County Line Road intersection is acceptable. However, the analysis suggests that with 2040 peak hour forecasts, the Port Washington Road and County Line intersection fails under stop control and needs to be signalized to provide adequate operations. A signal warrant analysis was not completed as part of this report but it is recommended that the intersection be monitored to determine when traffic signal control may be warranted.

Table 13: County Line Road 2040 No Access Levels of Service

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington Rd & County Line Rd (Improved)	Traffic Signal	AM	B 15.9	B 16.9		B 13.9		B 13.9	B 14.2		B 11.7	B 11.4		B 11.9
		PM	B 12.8	B 12.8		A 9.6		A 9.6	B 13.1		B 14.2	B 11.4		B 12.0
County Line Rd & Port Washington Ln	Stop Sign	AM	B 11.8	B 10.4			B 12.1					B 12.9		B 12.9
		PM	B 12.0	B 10.4			A 9.9					B 10.7		B 10.7

Brown Deer Road Operations with No Access at County Line Road

The No-Access alternative shifts traffic to the adjacent interchanges at Mequon Road (north) and Brown Deer Road (south.) The shift in traffic impacts the Brown Deer Road intersection with Port Washington Road such that acceptable levels of service cannot be maintained with the existing geometry. To provide adequate levels of service, an additional southbound right turn lane (two total) and a new westbound right turn lane are required. Adding the turn lanes requires the closing of three driveways to adjacent businesses and approximately 0.18 acres of right-of-way.

Figure 22 displays the design necessary to provide acceptable levels of service for the County Line No-Access alternative. See Appendix G for the full interchange design. Table 14 summarizes the levels of service for proposed designs of the Brown Deer Road intersection with Port Washington Road.

Figure 22: County Line No Access Alternative - Brown Deer Road/Port Washington Road Intersection Improvements

Table 14 2040 Levels of Service Brown Deer Road for County Line Road No-Access Alternative

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Brown Deer	Traffic Signal	AM	**D 49.2**	C 34.0	C 33.4	**D 36.1**	**D 39.0**	C 30.2	**D 48.3**	**D 36.7**	**D 37.7**	**D 39.2**	**D 35.5**	C 22.2
		PM	**D 48.4**	**D 43.7**	**D 41.7**	**D 38.5**	**D 45.6**	**D 42.4**	**D 49.9**	**D 41.0**	**D 41.9**	**D 42.6**	**D 39.4**	C 31.3
I-43 NB ramp & Brown Deer - DDI	Traffic Signal	AM	A 0.0	B 19.0			B 19.0	A 0.0	C 24.1	- -	B 18.3			
		PM	A 0.0	B 19.3			C 21.5	A 0.0	C 26.0	- -	C 22.0			
I-43 SB ramp & Brown Deer - DDI	Traffic Signal	AM		B 16.5	A 0.0	A 0.0	C 24.9					C 22.2	- -	A 0.0
		PM		B 17.8	A 0.0	A 0.0	C 30.9					C 22.8	- -	A 0.0

As presented in Table 14, the recommended improvements at the Brown Deer Road intersection with Port Washington Road are able to accommodate additional traffic from County Line Road and provide adequate operations at LOS D or better. Additionally, the increased traffic from County Line Road redistributes the turning movement volumes within the DDI. Green time provided by the simplified signal phasing is reallocated to accommodate the change in traffic pattern.

Mequon Road Operations with No Access at County Line Road

The shift of traffic to the Mequon Road interchange does not require any changes in the proposed design of the interchange and the Mequon Road intersection with Port Washington Road. See Appendix G for the Mequon Road interchange design.

Peak hour volumes vary slightly when access is not provided to County Line Road. Specifically the northbound right and westbound left turn movements are expected to serve more volume then either of the other alternatives. Peak hour volumes are provided graphically in Appendix B.

Table 15 presents the expected operations of Mequon Road. The proposed design of Mequon Road provides enough capacity for the northbound right and westbound left turn movements. These movements, as well as the rest of the interchange, are provided acceptable operations at LOS D or better.

Table 15: 2040 Levels of Service Mequon Road for County Line Road No-Access Alternative

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Mequon	Traffic Signal	AM	**D** **48.1**	**D** **48.8**	C 26.3	**D** **40.3**	B 17.6	A 6.4	**D** **41.7**	C 33.1	C 21.5	**D** **51.3**	C 33.6	B 10.7
		PM	**D** **49.3**	**D** **53.6**	B 18.9	**D** **50.2**	C 24.4	A 2.6	**D** **54.3**	**D** **54.8**	**D** **39.2**	**D** **52.1**	**D** **42.9**	B 14.2
I-43 NB ramp & Mequon	Traffic Signal	AM	**D** **40.9**	A 8.6			C 22.0	C 20.1	**D** **37.7**	- -	C 32.8			
		PM	C 32.7	A 9.3			**D** **55.0**	**D** **39.5**	**D** **54.1**	- -	**D** **36.0**			
I-43 SB ramp & Mequon	Traffic Signal	AM		C 31.7	A 0.0	**D** **51.5**	B 15.5					B 19.0		C 28.8
		PM		A 7.7	A 0.0	**D** **41.2**	A 8.0					**D** **37.8**		**D** **47.8**

Additional Impacts of No Access at County Line Road

As discussed above, the removal of access at County Line Road reduces the friction along I-43, extending the acceptable operations north of the Brown Deer Road and south of the Mequon Road interchanges. There are little to no impacts to rights-of-way and wetlands in the County Line Road area.

However, the removal of access does not conform to local and regional land use plans, which assume the partial access remains in place. Additionally, the removal of access shifts existing users to the adjacent interchanges and requires additional lanes and impacts right-of-way at the Brown Deer Road intersection with Port Washington Road. (See Figure 22.)

4.1.2.5 Operations of Full Access with Proposed Capacity and Interchange Improvements

The following sub-sections summarize the operations of the interchange intersections with I-43 and the cross street intersection with Port Washington Road if the partial access to I-43 from County Line Road is replaced with a full access interchange. The mainline I-43 operations are presented first, followed by the County Line Road interchange operations and then the adjacent interchanges of Brown Deer Road (south) and Mequon Road (north.)

I-43 Mainline Operations with Full Access at County Line Road

The proposed action for I-43 includes an additional lane in each direction throughout the study area for a total of six lanes, three in each direction. Ramps exiting and entering the facility are updated to meet current WisDOT and AASHTO design standards. The analysis of the mainline assumes that all service interchanges are constructed such that enough capacity is provided and vehicles can enter the facility without congestion.

The full access alternative provides access to and from I-43 in all directions at one interchange location. The County Line Road Full Access design is provided in Appendix G.

Table 16 presents the results of the HCS analysis with the proposed I-43 mainline capacity with Full Access at County Line and adjacent interchange design improvements. Mainline expansion of I-43 is expected to provide acceptable conditions for year 2040 traffic (LOS D or better in Milwaukee County and LOS C or better in Ozaukee County.) Appendix F summarizes the results graphically.

Table 16: I-43 Mainline Level of Service with Capacity and Full Access at County Line Road

Facility	Location	Analysis Type	AM (PM) Volume	AM (PM) LOS	AM (PM) Num. LOS
Freeway & Weave Analysis					
I-43 Northbound	Good Hope Rd. entrance ramp to Brown Deer Rd. exit ramp	Freeways	3758 (5109)	C (D)	3.18 (4.14)
	Brown Deer Rd. exit ramp to Brown Deer Rd. entrance ramp	Freeways	2442 (3614)	B (C)	2.21 (3.03)
	Brown Deer Rd. entrance ramp to County Line Rd. / Port Washington Rd. exit ramp	Freeways	2831 (4402)	B (C)	2.5 (3.58)
	County Line Rd. /Port Washington Rd. exit ramp to County Line Rd. /Port Washington Rd. entrance ramp	Freeways	2421 (3930)	B (C)	2.14 (3.14)
	County Line Rd. /Port Washington Rd. entrance ramp to Mequon Rd. exit ramp	Freeways	2578 (4093)	B (C)	2.26 (3.25)
	Mequon Rd. exit ramp to Mequon Rd. entrance ramp	Freeways	2003 (3234)	A (B)	1.91 (2.67)
	Mequon Rd. entrance ramp to Highland Rd. exit ramp	Freeways	2411 (4210)	B (C)	2.14 (3.33)
I-43 Southbound	Highland Rd. entrance ramp to Mequon Rd. exit ramp	Freeways	4413 (3126)	C (B)	3.39 (2.49)
	Mequon Rd. exit ramp to Mequon Rd. entrance ramp	Freeways	3514 (2553)	B (B)	2.9 (2.23)
	Mequon Rd. entrance ramp to County Line Rd. /Port Washington Rd. exit ramp	Freeways	4158 (3235)	C (B)	3.34 (2.7)
	County Line Rd. /Port Washington Rd. exit ramp to County Line Rd. /Port Washington Rd. entrance ramp	Freeways	4026 (2988)	C (B)	3.25 (2.53)
	County Line Rd. /Port Washington Rd. entrance ramp to Brown Deer Rd. exit ramp	Freeways	4403 (3439)	C (B)	3.59 (2.94)
	Brown Deer Rd. exit ramp to Brown Deer Rd. entrance ramp	Freeways	3818 (2971)	C (B)	3.18 (2.60)
	Brown Deer Rd. entrance ramp to Good Hope Rd. exit ramp	Freeways	5353 (4262)	D (C)	4.38 (3.51)
Ramp Analysis					
I-43 Northbound	Brown Deer Rd. exit ramp	Ramps - Diverge	1316 (1495)	B (C)	2.74 (3.53)
	Brown Deer Rd. entrance ramp	Ramps - Merge	389 (788)	B (C)	2.69 (3.69)
	County Line Rd. /Port Washington Rd. exit ramp	Ramps - Diverge	410 (472)	B (C)	2.84 (3.8)
	County Line Rd. /Port Washington Rd. entrance ramp	Ramps - Merge	157 (163)	B (C)	2.44 (3.21)
	Mequon Rd. exit ramp	Ramps - Diverge	575 (859)	B (C)	2.51 (3.28)
	Mequon Rd. entrance ramp	Ramps - Merge	408 (976)	B (C)	2.24 (3.28)
I-43 Southbound	Mequon Rd. exit ramp	Ramps - Diverge	899 (573)	C (B)	3.2 (2.47)
	Mequon Rd. entrance ramp	Ramps - Merge	644 (682)	B (B)	2.98 (2.53)
	County Line Rd. /Port Washington Rd. exit ramp	Ramps - Diverge	132 (247)	C (B)	3.58 (2.96)
	County Line Rd. /Port Washington Rd. entrance ramp	Ramps - Merge	377 (451)	C (B)	3.43 (3)
	Brown Deer Rd. exit ramp	Ramps - Diverge	585 (468)	C (C)	3.64 (3.08)
	Brown Deer Rd. entrance ramp	Ramps - Merge	1535 (1291)	D (C)	4.23 (3.45)

County Line Road Operations with Full Access at County Line Road

The proposed full access alternative provides access to and from I-43 in all directions. Access to the proposed northbound entrance ramp is provided off of Katherine Drive making the interchange design resemble a spilt design with local road between the access ramps. Similarly, the southbound access ramps are also split. The proposed southbound exit ramp terminates at Port Washington Road and the southbound entrance remains in the existing location off of County Line Road. The County Line Road Full Access design is provided in Appendix G.

The year 2040 peak hour traffic forecasts for full access at County Line are provided in Appendix B. For the full access scenario, the intersections at Port Washington Lane and County Line Road, and Port Washington Road at County Line Road are under local jurisdiction. Any recommended improvements listed for this alternative other than the relocation of ramps should be further evaluated by local stakeholders.

The intersection analysis of Port Washington Road and County Line shows the need for improvements prior to the year 2040. For the proposed design, Port Washington Road and County Line is signalized to provide acceptable levels of service. A traffic signal warrant analysis has not been completed as part of this IAJR and it is recommended that the intersection be reevaluated by local stakeholders before design year 2040. Table 17 presents the operational analysis of full access design. The proposed interchange implements a coordinated signal plan so there is no vehicular delay between the ramps; the impact of signal coordination is not evaluated by HCM 2010.

Table 17: County Line Road 2040 Full Access Levels of Service

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
I-43 NB Entrance Ramp & Katherine Drive (Proposed)	Stop Sign	AM							C 17.5	A 8.4			A 8.4	
		PM							B 13.6	A 8.6			A 8.6	
Port Washington Rd & County Line (Proposed)	Traffic Signal	AM	**D 43.2**	**D 37.9**		C 34.1		C 33.9	A 7.6		A 5.7	A 5.0	A 5.1	B 10.4
		PM	**D 36.0**	C 30.6		C 28.3		C 28.4	A 6.1		A 6.3	A 5.4	A 5.5	B 13.3
County Line & Port Washington Ln (Existing)	Stop Sign	AM	A 9.1		A 8.9	B 13.5	C 21.8					B 10.3		
		PM	A 9.5		A 9.3	C 18.6	C 17.3					B 10.8		
I-43 NB exit ramp & Port Washington RD (New)	Traffic Signal	AM	C 20.4	B 17.5			B 14.3	B 12.7	C 27.8	B 17.4	C 20.3			
		PM	C 21.3	B 17.1			B 13.8	B 12.5	C 27.1	B 15.6	B 18.0			
I-43 SB exit ramp & Port Washington RD (New)	Traffic Signal	AM		B 17.6	B 12.4		B 16.5		C 20.3		B 17.7	B 19.1		B 18.4
		PM		B 12.2	A 8.7		B 12.4		C 26.7		B 19.7	C 24.3		C 21.1

As presented in Table 17, installing a traffic signal at Port Washington Road and County Line Road allows all turning movements to operate at LOS D or better. With the northbound entrance ramp access on Katherine Drive, drivers destined to northbound I-43 must turn onto Katherine Drive then turn left when vehicle gaps occur in the southbound Katherine Drive traffic. The additional traffic on Katherine Drive does not impact operations significantly. The permitted northbound left at the ramp terminal is expected to serve the I-43 traffic at LOS C or better. Traffic to and from Katherine Drive has minimal impact and operations expected at LOS A. The remaining ramp terminals on Port Washington Road and County Line Road operate acceptably at LOS C or better.

Brown Deer Road Operations with Full Access at County Line Road

The recommended alternative in the proposed action at Brown Deer Road removes the rural style cloverleaf interchange and replaces it with a Diverging Diamond Interchange (DDI) design that meets current standards. This design type addresses crashes associated with the cloverleaf design. See Appendix G for the proposed design of Brown Deer Road. For the full access scenario, the intersection of Port Washington Road and Brown Deer Road remains as the existing configuration.

The year 2040 peak hour traffic forecasts for full access at County Line are provided in Appendix B. Table 18 presents the expected operations of the Brown Deer Interchange with Full Access at County Line Road. The proposed DDI and existing intersection at Brown Deer Road and Port Washington Road operate acceptably at LOS D or better.

Table 18: 2040 Levels of Service Brown Deer Road for County Line Road Full-Access Alternative

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Brown Deer	Traffic Signal	AM	D 42.7	C 30.7	C 31.1	D 38.1	D 45.1	D 45.9	D 52.8	D 36.4	D 37.4	D 41.2	D 35.0	C 24.3
		PM	D 44.5	D 38.9	D 38.7	D 38.3	D 46.4	D 47.7	D 48.4	D 49.9	D 51.5	D 42.8	D 43.9	D 40.5
I-43 NB ramp & Brown Deer - DDI	Traffic Signal	AM	A 0.0	B 19.1			B 18.9	A 0.0	C 25.2	- -	B 17.1			
		PM	A 0.0	B 19.9			C 20.8	A 0.0	C 28.0	- -	B 19.8			
I-43 SB ramp & Brown Deer - DDI	Traffic Signal	AM		B 16.6	A 0.0	A 0.0	C 30.9					C 20.6	- -	B 16.4
		PM		B 18.2	A 0.0	A 0.0	D 46.7					C 21.2	- -	B 17.0

Mequon Road Operations with Full Access at County Line Road

The recommended alternative in the proposed action for Mequon Road is the tight diamond. The tight diamond allows the horizontal shift of the I-43 alignment to the east in order to increase the distance between the southbound ramp terminal intersection and the Mequon Road intersection with Port Washington Road. The alternatives at County Line Road do not impact the proposed action at Mequon Road. See Appendix G for the proposed action at Mequon Road.

Although the alternatives at County Line Road do not alter the roadway geometrics, the peak hour volumes vary slightly when full access is provided to County Line Road. The westbound left and northbound right at Mequon Road and Port Washington Road are expected to

decrease with the additional access at County Line Road. Peak hour volumes are provided in Appendix B. Table 19 presents the expected operations of Mequon Road.

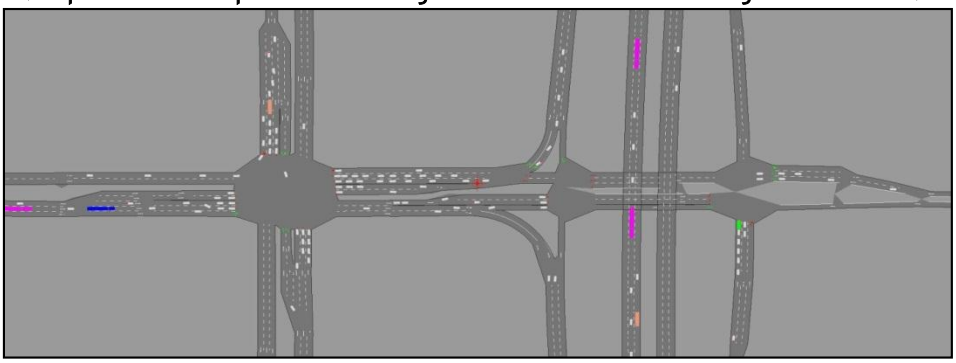
Table 19: 2040 Levels of Service Brown Deer Road for County Line Road Full-Access Alternative

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Port Washington & Mequon	Traffic Signal	AM	**D 39.6**	**D 39.0**	C 28.4	**D 49.4**	**D 49.5**	**D 46.1**	**D 44.5**	**D 43.6**	C 24.3	**D 50.2**	**D 44.4**	C 25.6
		PM	**D 53.9**	**D 46.1**	C 30.0	**D 46.8**	C 29.3	B 16.7	**D 51.1**	**D 47.2**	C 33.6	**D 51.1**	**D 38.3**	C 30.3
I-43 NB ramp & Mequon	Traffic Signal	AM	C 30.7	B 11.9			**D 39.6**	**D 36.6**	C 34.6	- -	C 27.7			
		PM	C 30.5	A 9.2			**D 50.5**	**D 41.3**	**D 53.6**	- -	C 32.8			
I-43 SB ramp & Mequon	Traffic Signal	AM		**D 39.5**	A 0.0	**D 37.9**	B 14.5					C 25.4		C 39.4
		PM		C 26.1	A 0.0	**D 35.6**	A 7.9					**D 37.6**		**D 48.9**

All of the Mequon Road intersections operate at LOS D conditions or better during the AM and PM peak hours. Many of the movements at the intersections are at LOS D, indicating that the intersections operate very close to the maximum capacity, leaving very little room for additional growth in traffic beyond the forecasted 2040 volumes.

Figure 23 presents a screenshot of the Paramics model during the 2040 PM peak. Vehicle queues are expected on all approaches of Port Washington Road but are not long enough to sever access to turn lanes or impact operations at adjacent intersections.

Figure 23: Mequon Road Operations: Tight Diamond Interchange – 2040 PM Peak Hour



Additional Impacts of Full Access at County Line Road

As discussed in the operational impacts discussed above, the full access alternative does not provide significant relief to the adjacent interchanges. The travel patterns of the area are mainly to and from the south. As a result, the access ramps to and from the north serve minimal traffic. Additionally, to minimize impacts, the split-diamond design incorporates local roads, which increases the potential for wrong-way entry to the Interstate and likely reducing safety of the facility.

4.2 Safety on the Existing Facility

4.2.1 Interstate Crashes

In 2010, the Wisconsin statewide average crash rate for urban interstates was 78 crashes per 100 million vehicle miles traveled. For the years from 2006 to 2010, I-43 in the proposed access study area had a crash rate less than 30% of the statewide average. Within the Mequon Road interchange, southbound I-43 was within 90% and northbound was within 60%-90% of the statewide rate. Within the Brown Deer Road interchange, both directions were the highest within the corridor and above 90% of the statewide average. This indicates that crashes are more prevalent within the influence of ramps, especially southbound at the Mequon Road interchange where entering volumes are highest within the study area. Additionally, the tight spacing of the entry and exit ramps of the cloverleaf design at Brown Deer Road greatly influences the crash rate. See Figure 24 and Table 20 for a summary of the crash rates.

Table 20: I-43 Mainline 2006-2010 Crash Summary in the Proposed Action Study Area

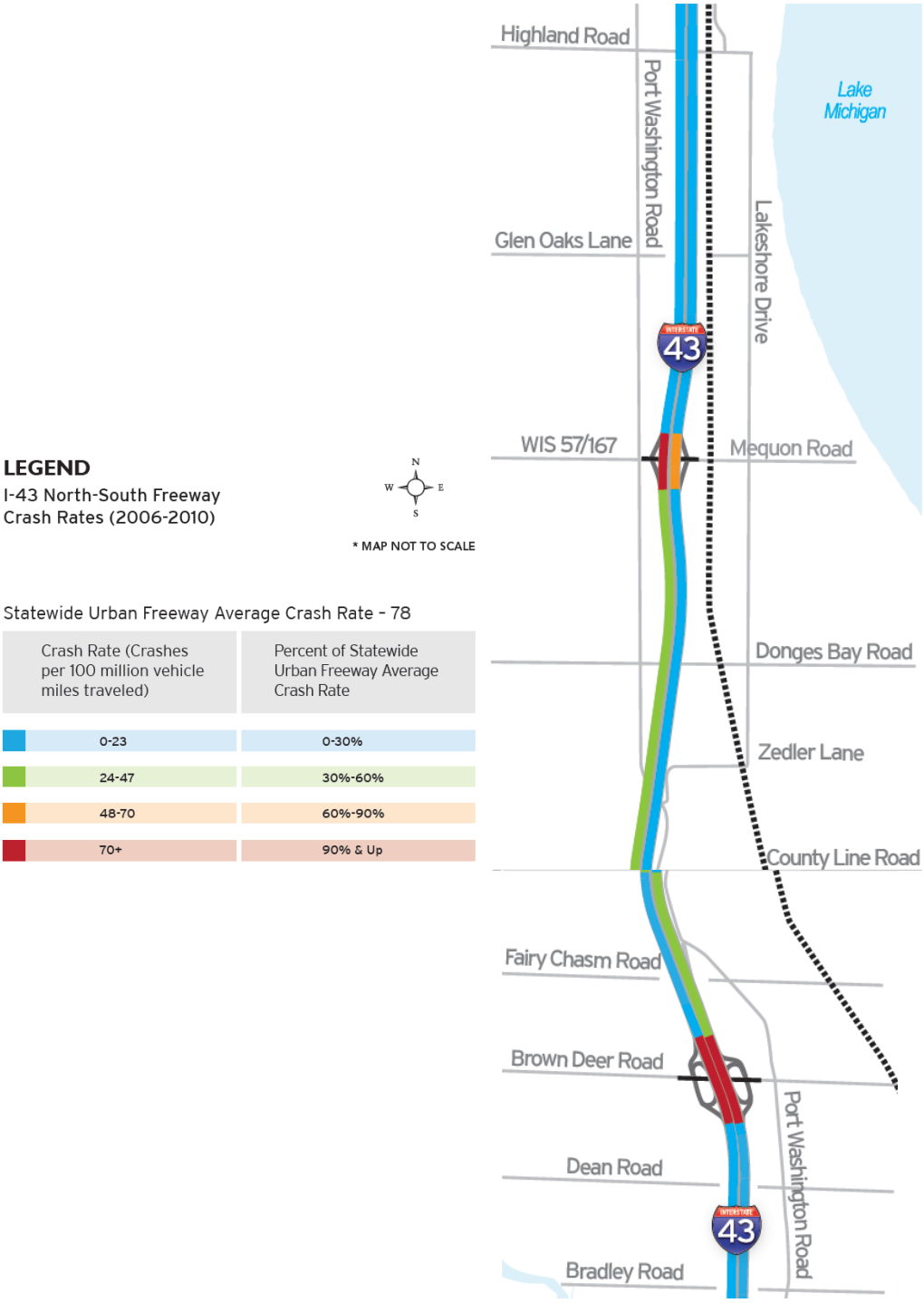
Facility	Segment	Total Crashes	2010 AADT	Crash Rate (per 1M VMT
I-43 Southbound	Brown Deer Road interchange	30	29,000	**94.5**
	Between Brown Deer and County Line	3	34,150	21.9
	County Line Road interchange	12	32,250	33.4
	Between County Line & Mequon Rd	37	31,450	37.9
	Mequon Road interchange	15	23,300	73.5
I-43 Northbound	Brown Deer Road interchange	25	29,000	**78.7**
	Between Brown Deer and County Line	4	34,150	29.2
	County Line Road interchange	8	32,250	22.3
	Between County Line & Mequon Rd	16	31,450	16.4
	Mequon Road interchange	11	23,300	53.9

Table 21 further breaks down the crashes within the proposed access study area by type of collision. As shown, approximately half of the crashes don't involve other vehicles. This is similar to the rest of the corridor study area. The remaining crashes were either side swipes or rear-ends, particularly in the southbound direction. This is an indication of congested merging conditions both at Mequon Road and Brown Deer Road, where entering volumes are highest. It is expected that without access at County Line Road, the southbound entering volumes from Mequon Road and Brown Deer Road would increase; increasing the likelihood of crashes if the facilities are not improved.

Table 21: Crash Type Summary Comparison to I-43 Study Area

Crash Type	Crashes in Proposed Access Study Area		Crashes in I-43 Study Area		Percent of Crashes in Proposed Access Study Area		Percent of Crashes in I-43 Study Area	
	NB	SB	NB	SB	NB	SB	NB	SB
No Collision with other vehicle	49	90	235	257	55.06%	39.30%	45.28%	45.25%
Rear-end	24	101	185	200	26.97%	44.10%	35.65%	35.21%
Sideswipe	14	24	79	79	15.73%	10.48%	15.22%	13.91%
Angle	2	10	16	23	2.25%	4.37%	3.08%	4.05%
Head-on	0	3	3	7	0.00%	1.31%	0.58%	1.23%
Unknown/Blank	0	1	1	2	0.00%	0.44%	0.19%	0.35%
Total	89	229	519	568	--	--	--	--

Figure 24: Study Area Crash Rates Relative to the Statewide Average



4.2.2 Intersection Crashes

Crash data from 2008 to mid-2011 was used to develop crash rates at the ramp terminal and service road intersections with Port Washington Road (CTH W.) The crash rates at each of the intersections are generally low. Note that the intersection with the highest crash rate was reconstructed in 2010. Data from after the reconstruction show that crash rates have decreased. In addition, the proposed action removes this intersection with Port Washington Road.

Table 22: I-43 Corridor Intersection Crash Rates - 2008 to July 2011

Intersection	Annual Daily Intersection Approach Volumes	Total	Crash Rate (per 1MEV[1])
Brown Deer Rd & I-43 NB/SB ramps	64,600	58	0.69
Brown Deer Rd & Port Washington Rd	23,700	36	1.16
Port Washington Rd & I-43 NB ramp[2]	12,300	23	1.43
County Line Rd & I-43 SB ramp	10,950	1	0.07
County Line Rd & Port Washington Rd	15,650	20	0.98
Port Washington Rd & Katherine Dr	11,950	6	0.38
Mequon Rd & Port Washington Rd	43,150	30	0.53
Mequon & I-43 SB ramp	27,650	7	0.19
Mequon & I-43 NB ramp	15,850	5	0.24
Total	--	186	--

1) MEV = million entering vehicles
2) The I-43 NB exit ramp to County Line Road/Port Washington Road was reconstructed in 2010 due to its crash history.

4.3 Safety Improvements in the Proposed Designs

4.3.1 I-43 Mainline

The expansion of I-43 from four lanes to six lanes and updating the design to meet WisDOT and AASHTO design standards should improve general safety along the freeway. Expanded use of ramp meters will also improve safety. Ramp meters will be used for all southbound entrance ramps in the project area and for all northbound entrance ramps in Milwaukee County. Ramp meters spread out entrance ramp traffic platoons, which mitigate the merging safety issues that are more likely to occur with platooning traffic.

4.3.2 Service Interchange

The following sections discuss the safety impacts due to the proposed designs at each service interchange.

4.3.2.1 County Line Road Interchange

The County Line Road interchange is currently a partial diamond. The future interchange design alternatives include removing access, keeping the partial diamond or reconstruction as

a split diamond. From 2008 to 2011, the northbound I-43 off ramp intersection had the highest crash rate (1.43 crashes per one million entering vehicles) in the I-43 study area. (See Table 22.) However, the intersection was reconstructed in 2010, which included the installation of bike lanes and traffic signals. The number of crashes was reduced by 90% of what they were prior to the reconstruction.

Due to design improvements on the mainline, the northbound off ramp will be moved north to Katherine Drive, regardless of what future access is provided. Currently, the Port Washington Road intersection with Katherine Drive currently has a low crash rate of 0.38. It is expected that the Katherine Drive intersection with Port Washington Road and the northbound ramp terminal would be signalized and crash rates may increase due to the volume increase.

4.3.2.2 Brown Deer Road Interchange

The Brown Deer Road interchange is currently composed of free flow ramps. Along Brown Deer Road and I-43 all ramps exit and enter from the right side. Although this prevents the left turning conflict points it also creates weaving conditions on the mainline and cross street. The short distance available for the weave as well as a high speed differential between entering and exit traffic contribute to unsafe conditions. As a result, the Brown Deer Road interchange has the highest crash rates of the study area, which are above the state wide average. (See Table 20.)

The proposed designs at Brown Deer Road include a diamond and a diverging diamond. The diamond style of the proposed designs removes the weaving conditions on the mainline. Therefore, safety is expected to improve dramatically on I-43 in the Brown Deer Road interchange. However, since the interchange intersections are moving from free flow to controlled conditions, the rate and type of crashes are expected to change. Typically, standard traffic signal controlled intersections are associated with rear-end and angle crashes. These types are expected to increase. The Diverging Diamond Interchange design reduces the number of conflicts compared to the tight diamond alternative, which may lead to safer operations.

4.3.2.3 Mequon Road Interchange

The Mequon Road interchange is currently a diamond with two items contributing to relatively high crash rates. The tight spacing between the southbound ramp terminal and Port Washington Road creates queues that occasionally back down the southbound exit ramp. The other contributing factor is the short acceleration lane for the southbound entrance ramp. There's a high volume entering the facility at this point, which exacerbates the substandard design.

Future design alternatives include reconstruction as a tight diamond with the mainline shifted east. This alternative increases the distance between the closely spaced intersections at Port Washington Road and the southbound ramp. Increasing the distance between these intersections would remove instances where queues would block closely spaced adjacent interchanges. The entrance ramp will also be designed according to current standards and provide adequate acceleration distance to accommodate the year 2040 traffic volumes.

4.4 Signing Concept Plan

The signing concept plan for the proposed action of partial access interchange is in Appendix H. The plan includes signing to exit I-43 as well as way-finding signs to provide direction back to I-43 in the case of exiting the facility mistakenly.

5 Local Road Access

Policy Point 4: The proposed access connects to a public road and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.3(a), 625.4(a)(2), and 655.603(d)).

The proposed alternatives connect local public roads to the Interstate Highway System. The service interchanges at Brown Deer Road (WIS 100), and Mequon Road (WIS 167) provide full access. The proposed alternative at the County Line Road interchange maintains the existing access pattern to and from the south. WisDOT recommends maintaining the existing partial access due to the following reasons:

- Surrounding land use is fully developed as residential.
- Long term land use plans for the City of Mequon, Village of River Hills, and Village of Fox Point maintain the current residential land use in the surrounding area.
- Traffic desires to travel to and from the City of Milwaukee, located south of the current access.
- Traffic to and from the north can be served easily through the local network and adjacent interchanges.
- The surrounding community has voiced strong support of maintaining the current partial access.
- The Southeast Wisconsin Regional Planning commission does not show a need for full access in SEWRPC Planning Report No. 49, *A Regional Transportation System Plan for Southeastern Wisconsin: 2035.*

As part of the I-43 North-South Corridor project, the proposed access will be designed to meet or exceed current standards for Federal aid projects on the Interstate System.

6 Regional Transportation Plans

Policy Point 5: The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be 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.

6.1 Transportation Plan

The Southeastern Wisconsin Regional Planning Commission states in its most recent transportation plan, *A Regional Transportation System Plan for Southeastern Wisconsin: 2035*, recommends capacity expansion of the I-43 facility as it is reconstructed.

The Plan also recommended the additional access to the Interstate at Highland Road, stating:

> On the existing freeway system three new freeway interchanges (IH 94 with Calhoun Road, IH 94 with Drexel Ave., and IH 43 with Highland Road) are recommended in the plan, and the conversion of two half interchanges to full interchanges (IH 94 with S. 27th Street and IH 94 with CTH P) are recommended.

The review of the proposed access at Highland Road was summarized in a separate IJR submitted to FHWA in May 2013. The Highland Road IJR received approval on November 7, 2013. The regional long range transportation plan does not recommend a full interchange at County Line Road.

6.2 Local Plans

Communities along the I-43 North-South Freeway study corridor have comprehensive land use plans, and all of the communities depend on I-43 to provide access to and from communities. Most of the communities cite their proximity to I-43 as an amenity of strength. The build alternatives generally conform to local plan goals and policies. Some communities do not have goals specifically related to I-43; however, many do. Communities with goals relevant to I-43 access and improvements include Glendale, Fox Point, Mequon, Town of Grafton, Village of Grafton and Ozaukee County.

7 Multiple Interchange Additions

Policy Point 6: In corridors where the potential exists for future multiple interchange addition, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 213 CFR 625.2(a), 655.603(d), and 771.111).

For this report, no additional new access points are currently proposed for the I-43 North-South corridor. Similarly, the SEWRPC Regional Plan contains recommendation of only three new access points in the entire southeast region. The SEWRPC report, *A Regional Transportation System Plan for Southeastern Wisconsin: 2035*, states:

> On the existing freeway system three new freeway interchanges (IH 94 with Calhoun Road, IH 94 with Drexel Ave., and IH 43 with Highland Road) are recommended in the plan, and the conversion of two half interchanges to full interchanges (IH 94 with S. 27th Street and IH 94 with CTH P) are recommended.

The review of the proposed access at Highland Road was summarized in a separate IJR submitted to FHWA in May 2013. The Highland Road IJR received approval on November 7, 2013. The regional long range transportation plan does not recommend a full interchange at County Line Road.

8 Appropriate Coordination

Policy Point 7: When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with adjoining local street network and Interstate access point (23 CFR 625.3(a) and 655.603(d)).

WisDOT continues to actively coordinate with the study area county and municipal officials. Representatives from the City of Glendale, Village of River Hills, City of Mequon, Town of Grafton, Village of Grafton, Village of Bayside, Village of Fox Point, Village of Whitefish Bay, Milwaukee County, and Ozaukee County take part in technical advisory and citizen advisory committee meetings conducted by WisDOT. Three of these meetings have taken place to date, with two more on the schedule. Additionally, WisDOT has met with local officials in direct meetings as part of the Indirect and Cumulative Effect Study to discuss land use, the potential interchange and the associated impacts of each.

9 Environmental Planning

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

The Draft Environmental Impact Statement is scheduled for completion in March 2014 with a combined Final Environmental Impact Statement/Record of Decision in August 2014. The full impact of the proposed alternatives will be included in the EIS documentation.

10 Conclusions

The proposed alternative for partial access at the County Line Road interchange with I-43 is expected to accommodate the year 2040 forecasted volumes in a safe, efficient manner.

This Interstate Justification Report demonstrates that the partial and full access alternatives:

- Enhance the safety of the mainline and service interchanges,
- Minimize impacts as it maintains access to the local network, and
- Provide acceptable levels of service on I-43.

Additionally, the partial access alternative conforms to the recommendation of the Southeastern Wisconsin Regional Planning Commission's regional transportation plan.

Table 23 summarizes the alternatives and lists positives and negatives attributes of each access alternative.

Table 23: Summary of Alternative Comparison

Alternative	Positives	Negatives
No access	• Less friction from ramps on I-43 • No impacts beyond those associated with I-43 mainline reconstruction	• Does not support current and future land use • Less access to I-43 • Additional operational improvements necessary at Brown Deer Road and Port Washington Road • Potential operational improvements may be necessary at County Line Road and Port Washington Road • Against public desire
Partial access	• Maintains existing access • Supports current and future land use • Supports current and future travel patterns • Conforms with public desire • In SEWRPC comprehensive plan • Straightforward way-finding to adjacent interchanges	• Does not conform with FHWA Policy
Full access, split ramps	• Conforms with FHWA Policy	• Impacts local access & circulation • North ramps serve minimal traffic • No operational benefit at adjacent interchanges

The I-43 North-South Draft Environmental Impact Statement includes analysis for all three access options and indicates the full access option is preferred. WisDOT requests FHWA approval on the engineering and operational acceptability of all three options. Based on the above table summarizing the analysis of the impacts on access to I-43 at County Line Road, the items supporting the partial access outweigh those that don't support it. Additionally, the negative items associated by providing full access dissipate the need for full access. Finally, local input prefers a partial access interchange. Therefore, WisDOT concludes that the partial access is reasonable and requests the FHWA to consider supporting a partial interchange.

Appendix A: Forecasting Methodology

To: Steve Hoff, I-43 North South Corridor Project Manager
Keegan Dole, I-94 East-West Traffic
Ertan Ornek, Diodos Engineering

From: Rob Beuthling, PE,
Marty Hawley, PE

Subject: I-43 N-S & I-94 E-W Corridor Studies Traffic Volume Forecasting Methodology

Date: September 28, 2012

1. INTRODUCTION

Following the establishment of the existing calibrated Paramics models, the next step is to forecast traffic volumes to represent future year conditions. The main objective of the traffic forecasts is to provide insight into the traffic volumes that can be expected on the network as well as the turning movements and operations at the interchange intersections.

The peak hour microsimulation forecasts are based on the growth in travel volumes established by the demand model for each origin-destination pair in the modeled area. The main advantage of this process is to capture traffic increases in specific areas where a general, model-wide rate may under or over-estimate growth.

To forecast traffic for use in evaluation of alternatives, HNTB utilizes Paramics and travel demand models and the underlying trip tables that load traffic on to the roadway network. The first process is to forecast the trip tables for input in the Paramics models that represent future volume conditions. The second process utilizes the output of the future Paramics models, typically in segment and turning movement counts and develops design traffic volumes. The two processes are explained below.

2. FUTURE YEAR PARAMICS TRIP TABLE FORECASTING PROCESS

In the first process, HNTB utilizes three methodologies to forecast trip tables for input into Paramics. The result of each method is reviewed for each trip pair in the trip table in context of volume and trip ends of the trips being represented. Each method starts with the existing (base), calibrated Paramics trip table.

In Method A, the percent and actual difference between the base and future year travel demand model trips are applied to the calibrated base year Paramics trip table for each individual origin-destination trip pair. The average of the percent difference forecast and the absolute difference forecasts is consider the result of method A.

Method B incorporates any adjustments made during existing Paramics model calibration and applies the adjustments to the future base travel demand model trip tables for the AM and PM peak.

Method C applies the corridor-wide travel demand growth rates to the calibrated base year Paramics trip table. The specific growth rate will be established is established for each peak hour based on the final SEWRPC forecasts.

For each origin-destination trip pair in the entire matrix, the engineer evaluates the result of each method manually and applies a forecast method for each trip pair. The resulting forecasted value for that trip pair (and every other trip pair) is then used as input for the future year Paramics model run.

3. PEAK HOUR DESIGN TRAFFIC FORECASTING PROCESS

After the future input trip tables are complete and accepted, they are input in a "free flow network." A free flow network typically is the no-build network with any intersection control removed and mainline capacity temporarily added. This removal of control and additional capacity allows all traffic to complete their trip within Paramics and therefore be fully assigned to the network. Subsequent analysis of no-build traffic operations with Paramics restores the traffic control and original capacity.

The assigned mainline, ramp and intersection volumes are extracted from the free flow network and used to begin the future design volumes. The volumes are compared with the existing volumes in several checks that incorporate the calibration of the model and associated growth. These include:

- characteristics such as calibrated level (within a GEH[1] 5 of the existing balanced count),
- if the modeled volume is greater than the existing balanced count, and
- if the future volume is greater than the existing Paramics model volume and the balanced count.

Based on the aforementioned parameters, there are essentially four different scenarios used to determine forecast volumes for planning and design purposes for the future horizon year. They are described below. The flowchart shown in **Figure 1** diagrams the process.

Case 1:

In cases where:

- the existing Paramics model assignment matches is within GEH 5 of the existing balanced count, and
- the future modeled volume is greater than the existing modeled volume, and
- both the existing and future modeled volumes are greater than the existing balanced count,

The future Paramics modeled volume is accepted as the future forecast volume.

The future forecast volume is used in this situation because as expected the future Paramics model volume is showing growth over the existing Paramics model volume which was already higher than the balanced count. Thus, a somewhat conservative forecast is attained.

Case 2:

In cases where:

- the existing Paramics model assignment matches is within GEH 5 of the existing balanced count, and

[1] The GEH statistic is calculated using the following equation:

$$\text{GEH} = \sqrt{\frac{(M-C)^2}{(M+C)*0.5}}$$

Where: M = Modeled Flow (vehicles / hour)
C = Target Flow (vehicles / hour)

- the future Paramics modeled volume is greater than the existing Paramics modeled volume,
- but the future Paramics modeled volume and existing Paramics modeled volume are both not greater than the existing balanced count,

The growth rate between the existing and future modeled volumes is applied to the existing balanced count and accepted as the future forecasted volume.

In this case, the Paramics model growth rate is used because even though the future model volume is higher than the existing Paramics model volume, they are not both higher than the balanced count. Therefore, the Paramics model growth rate is applied to the count to attain a more conservative forecast volume.

Case 3:

In cases where:

- the Paramics future modeled volume is not greater than the existing Paramics modeled volume, OR
- the existing Paramics model assignment is not within GEH 5 of the existing balanced count AND the future Paramics modeled volume is not greater than the existing balanced count,

The corridor-wide annual growth rate (specific peak rate) is applied to the existing balanced count.

The Paramics model is verified to ensure no calibration or validation errors are made at these locations. In these cases, the Paramics future model is not showing the volume growth that is expected; therefore the average corridor growth rate is applied instead.

Case 4:

In cases where:

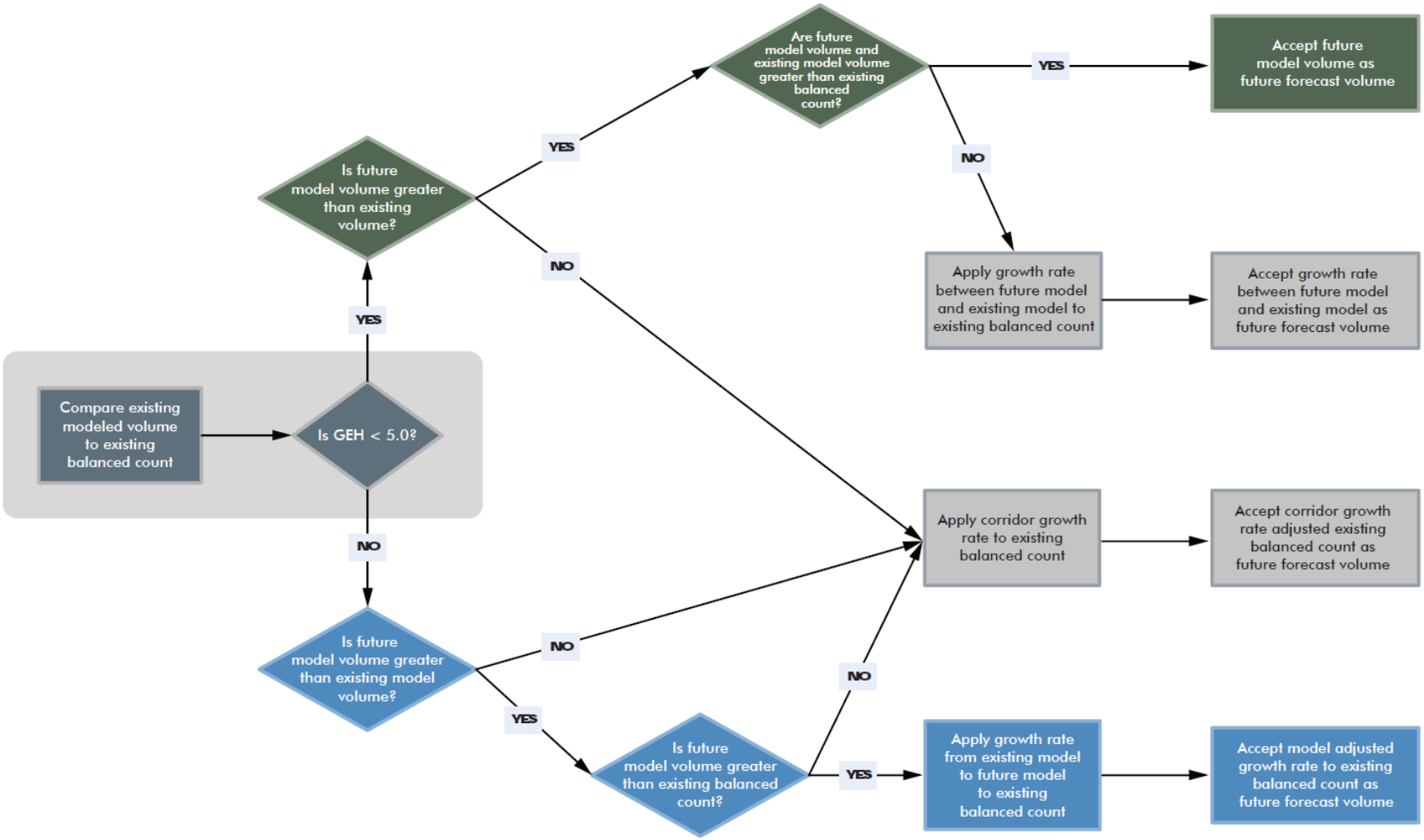
- the existing Paramics model assignment is not within GEH 5 of the existing balanced count, and
- the future Paramics modeled volume is greater than both the existing Paramics modeled volume and the balanced count,

The growth rate between the existing and future Paramics modeled volumes is applied to the existing balanced count and accepted as the future forecasted volume.

The Paramics model growth rate is used and applied in these cases because even though it is not calibrated within GEH 5, the demand model growth is still represented.

Each of the mainline, ramp and turning volumes go through the above process and each are reviewed for consistency. The entire set is then balanced for use in design and analysis purposes. The results are not typically integrated back into the Paramics model.

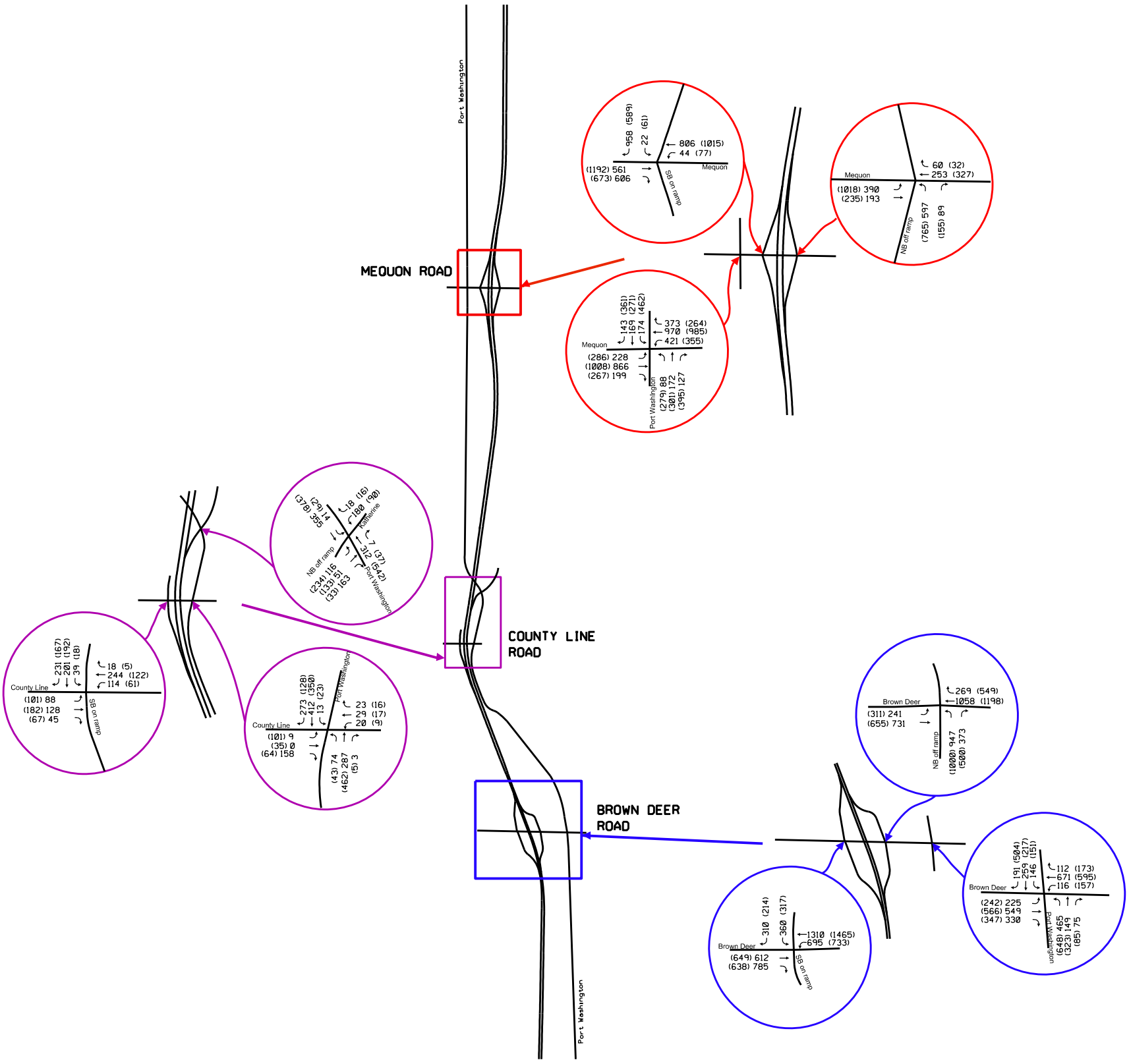
Figure 1: Traffic Forecasting Methodology



Appendix B: Year 2040 Turning Movement Forecasts

N

NOT TO SCALE



LEGEND

XXXX = AM PEAK HOUR

(XXXX) = PM PEAK HOUR

Note: Forecasts assume full build (w/ Highland)

Interstate 43

Brown Deer Road to Mequon Road

YEAR 2040 BALANCED TURNING MOVEMENTS

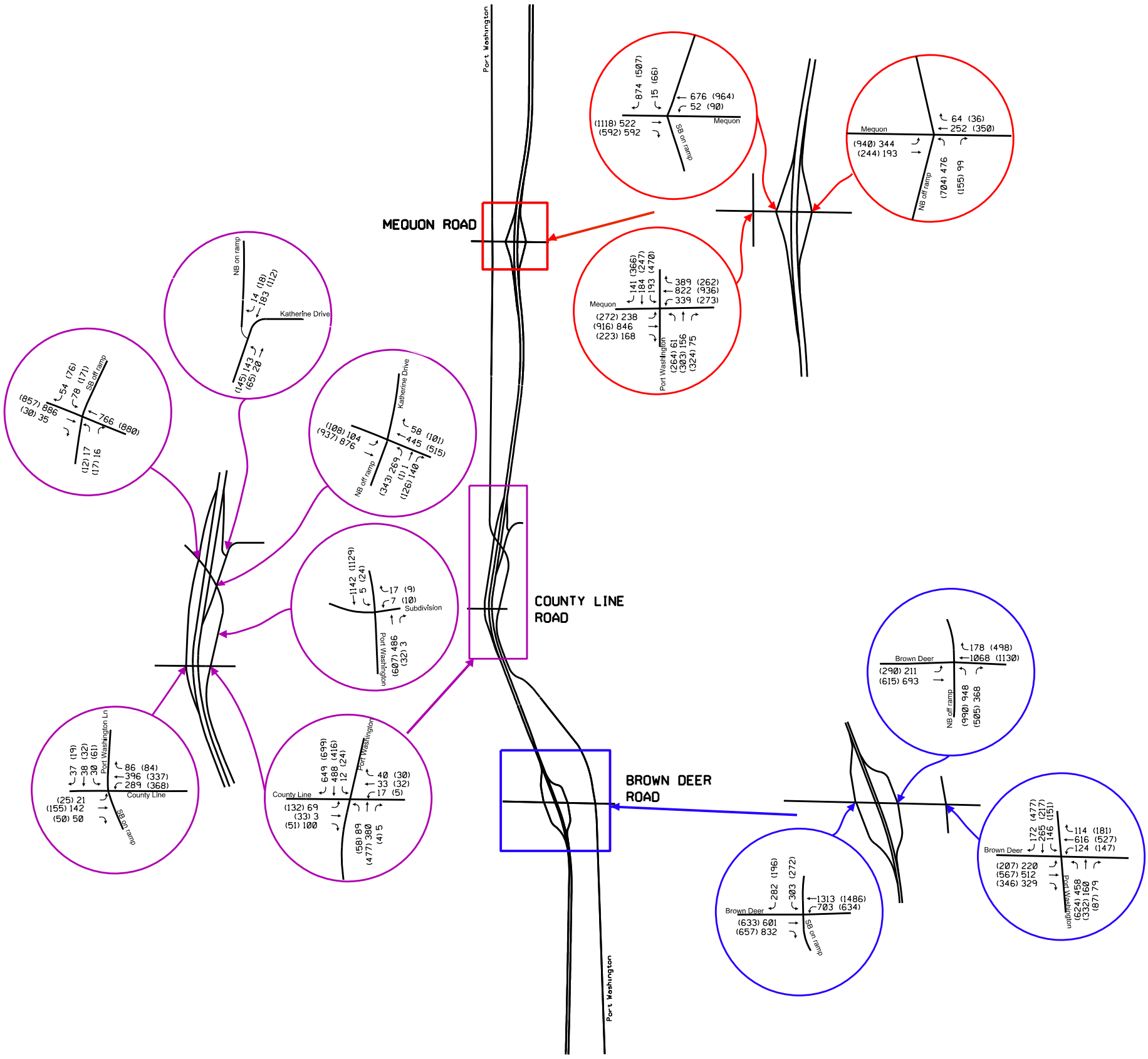
Sheet 1 of 1

WISCONSIN DEPARTMENT OF TRANSPORTATION

Created: 2/14/14

N

NOT TO SCALE



LEGEND

XXXX = AM PEAK HOUR

(XXXX) = PM PEAK HOUR

Note: Forecasts assume Highland Interchange, Full County Line Interchange, and capacity expansion on I-43.

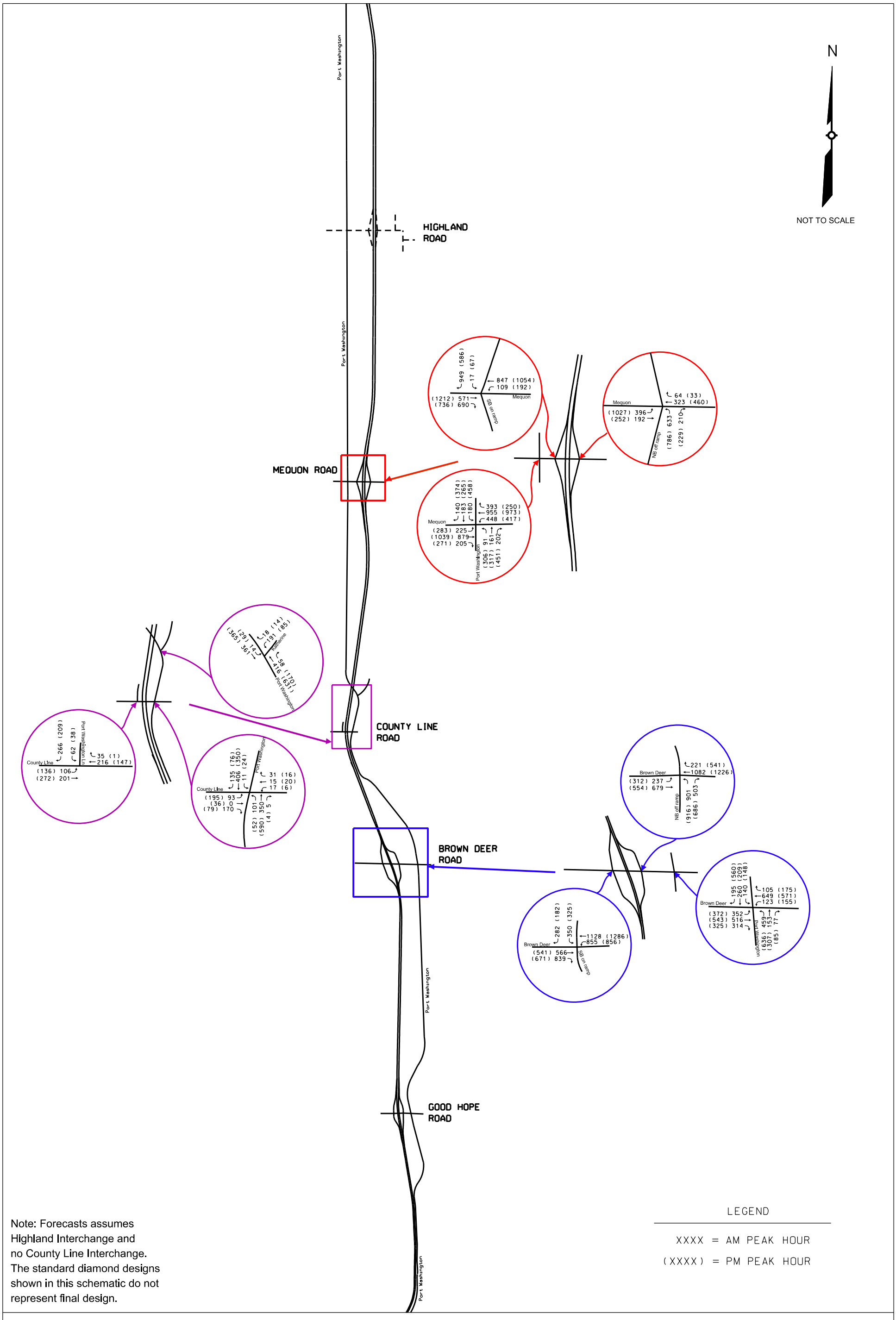
Interstate 43

Brown Deer Road to Mequon Road

YEAR 2040 BALANCED TURNING MOVEMENTS

Sheet 1 of 1

Created 2/14/2014



Note: Forecasts assumes Highland Interchange and no County Line Interchange. The standard diamond designs shown in this schematic do not represent final design.

LEGEND

XXXX = AM PEAK HOUR

(XXXX) = PM PEAK HOUR

Interstate 43

YEAR 2040 BALANCED TURNING MOVEMENTS

(No County Line Interchange)

Appendix C: Design Hour Methodology

TO: Manojoy Nag, P.E.
SE Freeways, WisDOT

From: Rob Beuthling, P.E., PTOE
I-43 Project Team

RE: Design Hourly Volume and Level of Service for I-43 North-South Corridor Study

Date: September 26, 2012

Two important parameters for a traffic analysis include a design hourly volume and minimum acceptable level of service. Traffic analysis must incorporate these to deliver viable alternatives from a traffic operations perspective. This memo discusses both parameters for use in the I-43 North-South Corridor Study.

Design Hourly Volume

From Chapter 11-5-1 of the Wisconsin Department of Transportation (WisDOT) Facilities Development Manual (FDM), "The WisDOT policy is to use the 30th highest hour volume (K30) as the Design Hour Volume (DHV) for mainline freeways." Additionally, the FDM states that, "There may be unique circumstances where K30 is not realistic to use because of exceptionally high hourly volume peaking characteristics. These conditions may occur on highly recreational routes, or routes that are in close proximity to a stadium or seasonal shopping mall. Additionally, higher design hour volumes may be justified when the LOS using K30 cannot be achieved because of social, environmental, or financial constraints." When this occurs, the FDM suggests reviewing volumes that represent the 100th highest hour (K100) or 250th highest hour (K250), depending on how urbanized the area is.

Currently, the WisDOT has an agreement with the Federal Highway Administration that the 200th highest hour (K200) should be used as the appropriate DHV for the freeway system in Milwaukee County and I-94 in Waukesha County.

The I-43 Corridor Study project area extends from Bender Road in Milwaukee County to WIS 60 in Ozaukee County. Using K200 for the Milwaukee County and K30 for Ozaukee County would be problematic in establishing a balanced volume set for analysis and design purposes. Thus, HNTB reviewed available data pertaining to volume levels at three locations in the proximity of the study area to determine if current peak hour volumes represent K200 in the project study area.

Table 1 summarizes data received from three automatic traffic recorder (ATR) locations. ATR 40-0018 (I-43 at Capitol Drive) & 40-0019 (I-94 at River Hills) are located in Milwaukee County, while ATR 45-0001 (I-43 at Falls Rd) is located in Ozaukee County. The annual average weekday two-way and directional data for each ATR is presented for the years 2009 and 2010. The data from 2011 was not included due to ATR malfunctions and adjacent construction. The percent of the hourly volume of the respective AADT is shown as well. The ATR 40-0018 (I-43 at Capitol Drive) experienced technical difficulties in 2011 and therefore its data during that time were not included in the review. Additionally, the Brown Deer Road and Good Hope Road interchanges with I-43 were under construction during 2010 and early 2011, which reduced volumes compared to 2009.

Table 1 shows that traffic within the corridor is highly directional. The southbound direction experiences the highest volumes in the morning while the northbound volumes are highest in the evening. The data also show that the peak hour volumes in the dominant direction (southbound in AM, northbound in PM) are near or at the same levels as the 200th highest hourly volume for the same direction. Because the peak hour volumes align with the K200 volumes, The I-43 team recommends utilizing the peak hours for the design volumes throughout the entire corridor for the project analyses.

To evaluate future conditions, the Southeastern Wisconsin Regional Planning Commission will provide peak hour traffic volumes for the year 2040 for the project study area. The I-43 team will utilize these for the operational analysis in HCS and Paramics. The methodology using the SEWRPC data incorporates trips on an origin-destination basis, which will be used for calibration of existing conditions and throughout the forecasting process. One of the benefits of using the origin-destination data is that it incorporates the directionality within the forecasts, so that no directional factors have to be applied.

Minimum Level of Service

Another important aspect in the alternative analysis and design process is the establishment of a minimum level of service to provide. In table 3.1 of Chapter 11-5 in the WisDOT FDM, the minimum acceptable levels of service for a Wisconsin Interstate (a Corridors 2020 route) is LOS C for both rural & small urban areas as well as urbanized areas with a population greater than 50,000. However, both nationally and statewide, LOS D has been accepted as a minimal level due to provide cost-effective alternatives while minimizing degradation in travel times.

Thus, the I-43 project team recommends providing a minimum LOS D in the more urbanized Milwaukee County portion of the corridor and LOS C in more rural Ozaukee County portion of the corridor. Note that preliminary analysis of no-build 2040 conditions indicate a six-lane mainline cross section may be required to provide LOS C in Ozaukee County up to the northern limits of the study area, the WIS 60 interchange with I-43.

Table 1: Design Hour Volume Data for I-43

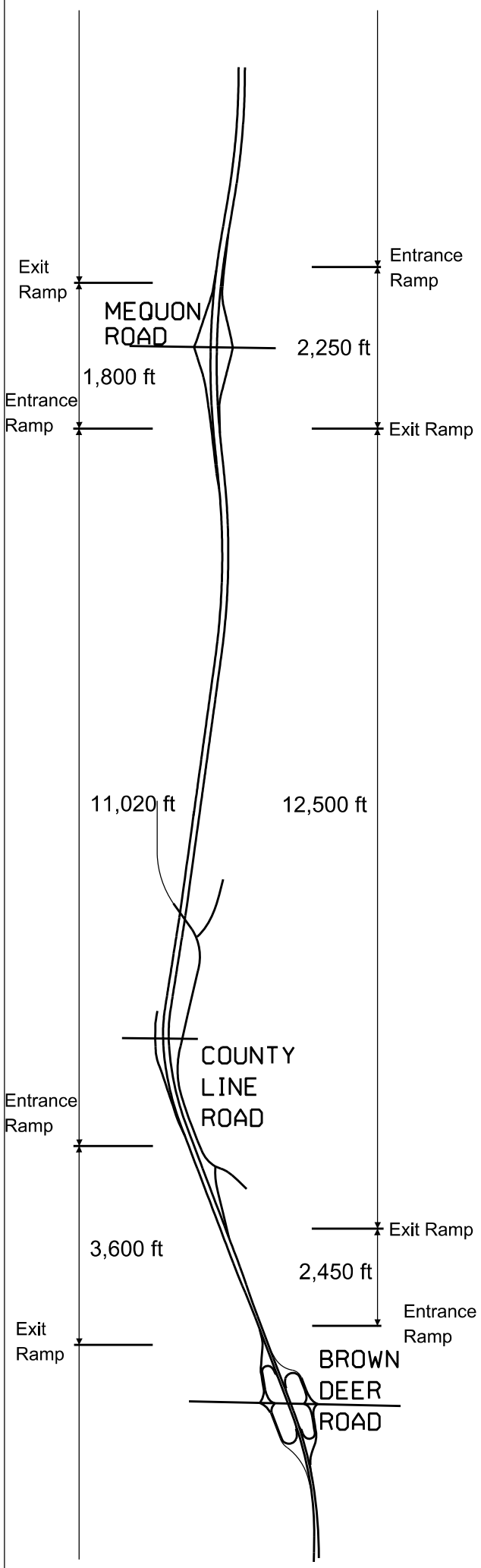
ATR	Location	Volume Slice	2009						2010					
			Two-way Volume	Two-way %	SB (Neg.) Dir.	SB %	NB (Pos.) Dir.	NB %	Two-way Volume	Two-way %	SB (Neg.) Dir.	SB %	NB (Pos.) Dir.	NB %
40-0018	I-43 - AT WEST CAPITOL DR MILWAUKEE (Milwaukee Co.)	AADT	109,371		54,501		54,869		113,011		56,217		56,793	
		AM Peak	9,090	8.3%	***4,987***	***9.2%***	4,103	7.5%	9,263	8.2%	***5,009***	***8.9%***	4,254	7.5%
		PM Peak	9,230	8.4%	4,313	7.9%	***4,991***	***9.1%***	9,282	8.2%	4,333	7.7%	***5,029***	***8.9%***
		30th	10,257	9.4%	5,628	10.3%	5,494	10.0%	10,450	9.2%	5,596	10.0%	5,585	9.8%
		100th	10,077	9.2%	5,371	9.9%	5,373	9.8%	10,197	9.0%	5,427	9.7%	5,440	9.6%
		200th	9,900	9.1%	***4,963***	***9.1%***	***5,257***	***9.6%***	10,017	8.9%	***5,007***	***8.9%***	***5,299***	***9.3%***
40-0019	I-43 - AT CALUMET RD RIVER HILLS (Milwaukee Co.)	AADT	75,940		38,149		37,792		72,840		37,004		35,836	
		AM Peak	5,890	7.8%	***3,655***	***9.6%***	2,236	5.9%	5,614	7.7%	***3,461***	***9.4%***	2,152	6.0%
		PM Peak	6,514	8.6%	2,846	7.5%	***3,668***	***9.7%***	6,153	8.4%	2,724	7.4%	***3,429***	***9.6%***
		30th	7,087	9.3%	4,092	10.7%	4,029	10.7%	6,967	9.6%	4,018	10.9%	3,950	11.0%
		100th	6,894	9.1%	3,915	10.3%	3,928	10.4%	6,676	9.2%	3,780	10.2%	3,822	10.7%
		200th	6,751	8.9%	***3,551***	***9.3%***	***3,841***	***10.2%***	6,511	8.9%	***3,387***	***9.2%***	***3,694***	***10.3%***
45-0001	I-43 - 0.1 MI S OF FALLS RD - GRAFTON (Ozaukee Co.)	AADT	46,796		23,653		23,143		47,614		24,052		23,563	
		AM Peak	3,719	7.9%	***2,655***	***11.2%***	1,064	4.6%	3,674	7.7%	***2,573***	***10.7%***	1,101	4.7%
		PM Peak	4,021	8.6%	1,592	6.7%	***2,540***	***11.0%***	4,074	8.6%	1,649	6.9%	***2,532***	***10.7%***
		30th	4,730	10.1%	2,938	12.4%	2,957	12.8%	4,890	10.3%	2,925	12.2%	3,039	12.9%
		100th	4,468	9.5%	2,819	11.9%	2,771	12.0%	4,551	9.6%	2,780	11.6%	2,802	11.9%
		200th	4,266	9.1%	***2,628***	***11.1%***	***2,650***	***11.5%***	4,361	9.2%	***2,620***	***10.9%***	***2,681***	***11.4%***

Note that the volumes represent the hour with the highest volume within the respective time period. In some cases, the hour represented by the two-way total is different than the directional peak hour, so adding the two directional volumes may not equal the two-way volume.

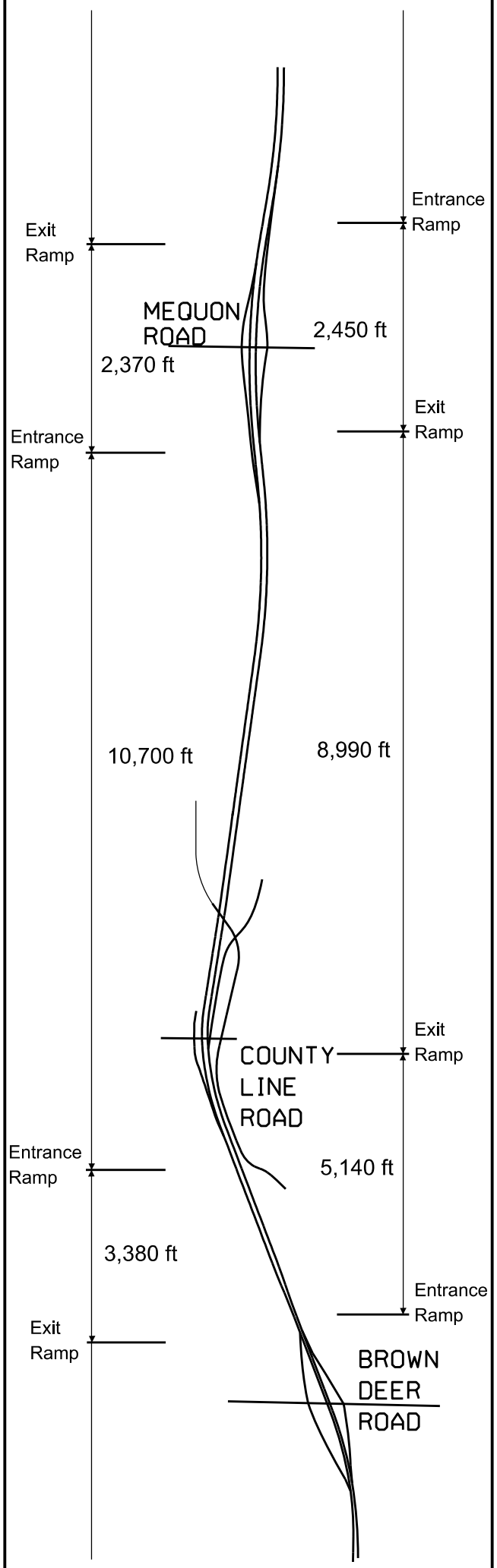
Appendix D: I-43 Existing and Proposed Ramp Spacing

N

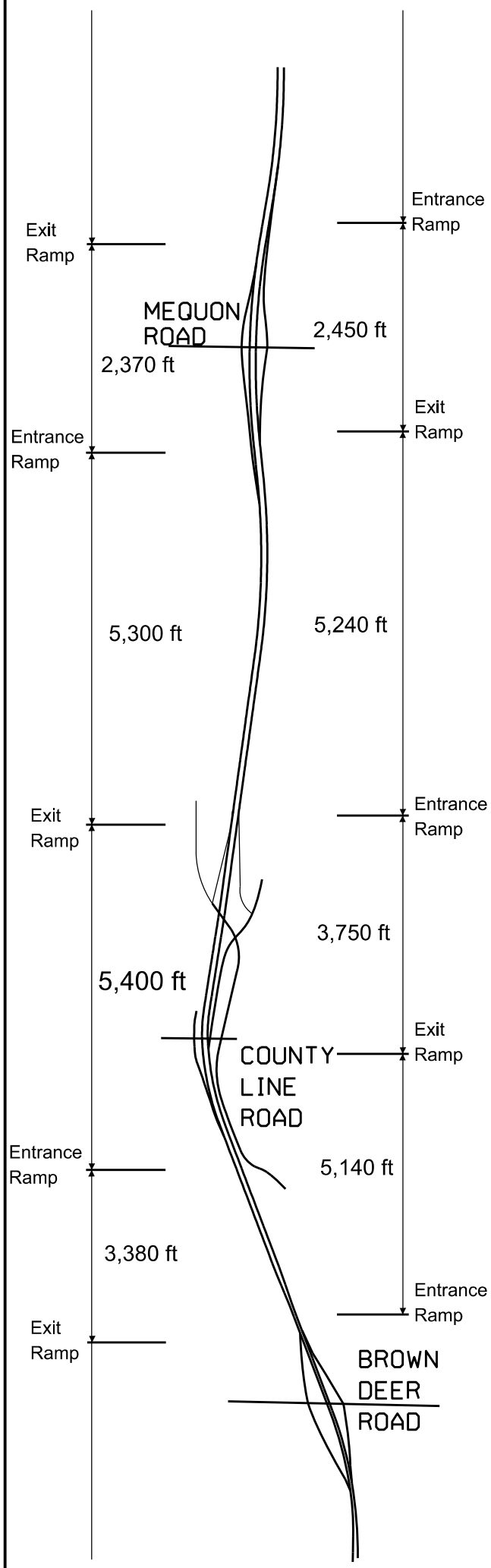
NOT TO SCALE



Existing



Partial County Line



Full County Line

Interstate 43

Brown Deer Road to Mequon Road

Existing and Proposed I-43 Mainline Ramp Spacing

Appendix E: HCS 2010 Inputs

No Build AM Peak 2040

BASIC FREEWAY DATA

ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer EB off	NB	2	3157	0.97	9	0.0	65	No	12	10	1.33	No	Level
16	IH 43 NB	Brown Deer EB off	Brwn Dr EB on	NB	2	2577	0.97	9	0.0	60	No	12	10	1.33	No	Level
18	IH 43 NB	Brown Deer WB off	Brwn Dr WB on	NB	2	2207	0.97	9	0.0	60	No	12	10	1.33	No	Level
20	IH 43 NB	Port Wash off	Mequon off	NB	2	2132	1.00	9	0.0	55	No	12	10	1.16	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	2	1062	1.00	9	0.0	65	No	12	10	0.83	Yes	Level
24	IH 43 NB	Mequon on	CTH C off	NB	2	1687	1.00	9	0.0	70	No	12	10	0.66	Yes	Level
49	IH 43 SB	CTH C on	Mequon off	SB	2	3868	1.00	7	0.0	65	No	12	10	0.66	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	2	2988	1.00	7	0.0	65	No	12	10	0.83	Yes	Level
53	IH 43 SB	Mequon on	County Line Rd on	SB	2	3888	1.00	7	0.0	50	No	12	10	1.16	Yes	Level
55	IH 43 SB	County Line Rd on	Brwn Dr WB off	SB	2	4333	0.97	6	0.0	50	No	12	10	1.33	No	Level
57	IH 43 SB	Brown Deer WB off	Brwn Dr WB on	SB	2	4018	0.97	6	0.0	50	No	12	10	1.33	No	Level
59	IH 43 SB	Brown Deer EB off	Brwn Dr EB on	SB	2	4523	0.97	6	0.0	50	No	12	10	1.33	No	Level
61	IH 43 SB	Brwn Dr EB on	Good Hope off	SB	2	5223	0.97	6	0.0	50	No	12	10	1.66	No	Level

RAMP DATA

Ramp Info / Mainline Info / Adjacent Ramp Info

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length 1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15	IH 43 NB	Brown Deer EB off	Diverge	NB	1	Right	45	580	200		5	0.0	0.97	Level	2	55	0	9	0.0	0.97	Level	No								
21	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	55	1070	325		3	0.0	1.00	Level	2	65	0	9	0.0	1.00	Level	No								
23	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	55	625	300		7	0.0	1.00	Level	2	65	0	9	0.0	1.00	Level	No								
50	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	55	880	275		3	0.0	1.00	Level	2	65	0	7	0.0	1.00	Level	No								
52	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	55	900	675		3	0.0	1.00	Level	2	65	0	7	0.0	1.00	Level	No								
54	IH 43 SB	County Line Rd	Merge	SB	1	Right	45	445	575		6	0.0	0.97	Level	2	55	0	6	0.0	0.97	Level	No								
56	IH 43 SB	Brown Deer WB off	Diverge	SB	1	Right	45	315	350		5	0.0	0.97	Level	2	55	0	6	0.0	0.97	Level	No								
60	IH 43 SB	Brown Deer EB on	Merge	SB	1	Right	45	700	1250		5	0.0	0.97	Level	2	55	4523	6	0.0	0.97	Level	No								

WEAVE DATA (v.2010)

ID	Facility	Weave On Ramp	Weave Off Ramp	Direction	Weave Config	Segement Type	Weave Lanes	Maneuver Lanes	Weave Length	FFS	Min. Segment Speed	Freeway Max Cap.	Weave Terrain	I_C Density	Min. Lane Changes, RF	Min. Lane Changes, FR	Min. Lane Changes, RR	Vol FF	Vol RR	Vol FR	Vol RF	PHF FF	PHF RR	PHF FR	PHF RF	HV FF	HV RR	HV FR	HV RF	RV FF	RV RR	RV FR	RV RF
17	IH 43 NB	EB Brown Deer	WB Brown Deer	NB	One-Sided	Freeway	3	2	675	60	15	2250	Level	1	1	1		1897	0	680	310	0.97	0.97	0.97	0.97	9	5	5	5	0	0	0	0
19	IH 43 NB	Brown Deer WB on	Port Wash off	NB	One-Sided	Freeway	3	2	2150	60	15	2250	Level	1	1	1		1869	47	338	263	0.97	0.97	0.97	0.97	9	5	2	2	0	0	0	0
58	IH 43 SB	WB Brown Deer	EB Brown Deer	SB	One-Sided	Freeway	3	2	900	50	15	2250	Level	1	1	1		3703	0	315	820	0.97	0.97	0.97	0.97	6	5	5	5	0	0	0	0

No Build 2040 PM Peak Hour

BASIC FREEWAY DATA

ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured ?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer EB off	NB	2	4603	0.97	5	0.0	65	Yes	12	10	1.33	No	Level
16	IH 43 NB	Brown Deer EB off	Brwn Dr EB on	NB	2	4018	0.97	5	0.0	70	Yes	12	10	1.33	No	Level
18	IH 43 NB	Brown Deer WB off	Brwn Dr WB on	NB	2	3818	0.97	5	0.0	70	Yes	12	10	1.33	No	Level
20	IH 43 NB	Port Wash off	Mequon off	NB	2	3823	1.00	4	0.0	65	Yes	12	10	1.16	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	2	2783	1.00	4	0.0	65	Yes	12	10	0.83	Yes	Level
24	IH 43 NB	Mequon on	CTH C off	NB	2	3633	1.00	4	0.0	70	Yes	12	10	0.66	Yes	Level
49	IH 43 SB	CTH C on	Mequon off	SB	2	2144	1.00	7	0.0	65	Yes	12	10	0.66	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	2	1324	1.00	7	0.0	70	Yes	12	10	0.83	Yes	Level
53	IH 43 SB	Mequon on	County Line Rd on	SB	2	2340	1.00	7	0.0	65	Yes	12	10	1.16	Yes	Level
55	IH 43 SB	County Line Rd on	Brwn Dr WB off	SB	2	2700	0.97	8	0.0	65	Yes	12	10	1.33	No	Level
57	IH 43 SB	Brown Deer WB off	Brwn Dr WB on	SB	2	2430	0.97	8	0.0	65	Yes	12	10	1.33	No	Level
59	IH 43 SB	Brown Deer EB off	Brwn Dr EB on	SB	2	2840	0.97	8	0.0	65	Yes	12	10	1.33	No	Level
61	IH 43 SB	Brwn Dr EB on	Good Hope off	SB	2	3555	0.97	8	0.0	60	Yes	12	10	1.66	No	Level

RAMP DATA

Ramp Info / Mainline Info / Adjacent Ramp Info

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15	IH 43 NB	Brown Deer EB off	Diverge	NB	1	Right	45	585	200		5	0.0	0.97	Level	2	55	0	5	0.0	0.97	Level	No								
21	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	55	1040	325		1	0.0	1.00	Level	2	65	0	4	0.0	1.00	Level	No								
23	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	55	850	300		2	0.0	1.00	Level	2	65	0	4	0.0	1.00	Level	No								
50	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	55	820	275		6	0.0	1.00	Level	2	65	0	7	0.0	1.00	Level	No								
52	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	55	1016	675		2	0.0	1.00	Level	2	65	0	7	0.0	1.00	Level	No								
54	IH 43 SB	County Line Rd	Merge	SB	1	Right	45	360	575		2	0.0	0.97	Level	2	55	0	8	0.0	0.97	Level	No								
56	IH 43 SB	Brown Deer WB off	Diverge	SB	1	Right	45	270	350		5	0.0	0.97	Level	2	55	0	8	0.0	0.97	Level	No								
60	IH 43 SB	Brown Deer EB on	Merge	SB	1	Right	45	715	1250		5	0.0	0.97	Level	2	55	2840	8	0.0	0.97	Level	No								

WEAVE DATA (v.2010)

ID	Facility	Weave On Ramp	Weave Off Ramp	Direction	Weave Config	Segement Type	Weave Lanes	Maneuver Lanes	Weave Length	FFS	Min. Segment Speed	Freeway Max Cap.	Weave Terrain	I_C Density	Min. Lane Changes, RF	Min. Lane Changes, FR	Min. Lane Changes, RR	Vol FF	Vol RR	Vol FR	Vol RF	PHF FF	PHF RR	PHF FR	PHF RF	HV FF	HV RR	HV FR	HV RF	RV FF	RV RR	RV FR	RV RF
17	IH 43 NB	EB Brown Deer	WB Brown Deer	NB	One-Sided	Freeway	3	2	675	70	15	2400	Level	1	1	1		3433	0	585	385	0.97	0.97	0.97	0.97	5	5	5	5	0	0	0	0
19	IH 43 NB	Brown Deer WB on	Port Wash off	NB	One-Sided	Freeway	3	2	2150	70	15	2400	Level	1	1	1		3473	35	345	350	0.97	0.97	0.97	0.97	5	1	1	5	0	0	0	0
58	IH 43 SB	WB Brown Deer	EB Brown Deer	SB	One-Sided	Freeway	3	2	900	65	15	2350	Level	1	1	1		2160	0	270	680	0.97	0.97	0.97	0.97	8	5	5	5	0	0	0	0

Build 2040 AM Peak Hour

BASIC FREEWAY DATA

ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer off	NB	3	3772	0.97	9	0.0		No	12	12	1.00	No	Level
16	IH 43 NB	Brown Deer off	Brwn Dr on	NB	3	2452	0.97	9	0.0		No	12	12	1.00	No	Level
18	IH 43 NB	Brwn Dr on	Port Wash off	NB	3	2962	0.97	9	0.0		No	12	12	1.17	No	Level
20	IH 43 NB	Port Wash off	Mequon off	NB	3	2632	1.00	9	0.0		No	12	12	1.00	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	3	1946	1.00	9	0.0		No	12	12	1.00	Yes	Level
24	IH 43 NB	Mequon on	Highland off	NB	3	2396	1.00	9	0.0		No	12	12	1.00	Yes	Level
80	IH 43 SB	Highland on	Mequon off	SB	3	4462	1.00	7	0.0		No	12	12	0.83	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	3	3482	1.00	7	0.0		No	12	12	1.00	Yes	Level
53	IH 43 SB	Mequon on	County Line Rd on	SB	3	4132	1.00	7	0.0		No	12	12	1.00	Yes	Level
55	IH 43 SB	County Line Rd on	Brwn Dr off	SB	3	4492	0.97	6	0.0		No	12	12	1.17	No	Level
57	IH 43 SB	Brown Deer off	Brwn Dr on	SB	3	3822	0.97	6	0.0		No	12	12	1.00	No	Level
61	IH 43 SB	Brwn Dr on	Good Hope off	SB	3	5302	0.97	6	0.0		No	12	12	1.00	No	Level

RAMP DATA

Ramp Info / Mainline Info / Adjacent Ramp Info

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15aur	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1320	1400	0	5	0.0	0.97	Level	3	55	3772	9	0.0	0.97	Level	Yes	Upstream	On	7120	575	0.97	4	0	Level
15adr	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1320	1400	0	5	0.0	0.97	Level	3	55	3772	9	0.0	0.97	Level	Yes	Downstrean	Off	2450	510	0.97	5	0	Level
17aur	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	510	600		5	0.0	0.97	Level	3	55	2452	9	0.0	0.97	Level	Yes	Upstream	Off	2450	1320	0.97	5	0	Level
17adr	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	510	600		5	0.0	0.97	Level	3	55	2452	9	0.0	0.97	Level	Yes	Downstrean	On	5160	330	0.97	2	0	Level
19	IH 43 NB	Port Wash off	Diverge	NB	1	Right	50	330	670		2	0.0	0.97	Level	3	55	0	9	0.0	0.97	Level	Yes	Upstream	On	5160	510	0.97	5	0	Level
21aur	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	686	700		3	0.0	1.00	Level	3	65	2632	9	0.0	1.00	Level	No								
21adr	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	686	700		3	0.0	1.00	Level	3	65	2632	9	0.0	1.00	Level	Yes	Downstrean	On	2450	450	1.00	7	0.0	Level
23aur	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	450	960		7	0.0	1.00	Level	3	65	1946	9	0.0	1.00	Level	Yes	Upstream	Off	2450	686	1.00	3	0.0	Level
23adr	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	450	960		7	0.0	1.00	Level	3	65	1946	9	0.0	1.00	Level	Yes	Downstrean	Off	7750	505	1.00	5	0.0	Level
50aur	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	980	1050		3	0.0	1.00	Level	3	65	4462	7	0.0	1.00	Level	Yes	Upstream	On	7700	550	1.00	5	0.0	Level
50adr	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	980	1050		3	0.0	1.00	Level	3	65	4462	7	0.0	1.00	Level	Yes	Downstrean	On	3020	650	1.00	3	0.0	Level
52aur	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	650	1260		3	0.0	1.00	Level	3	65	3482	7	0.0	1.00	Level	Yes	Upstream	Off	3020	980	1.00	3	0.0	Level
52adr	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	650	1260		3	0.0	1.00	Level	3	65	3482	7	0.0	1.00	Level	No								
54	IH 43 SB	County Line Rd	Merge	SB	1	Right	50	360	1175		6	0.0	0.97	Level	3	55	0	6	0.0	0.97	Level	Yes	Downstrean	Off	3900	670	0.97	5	0	Level
56aur	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	670	700		5	0.0	0.97	Level	3	55	4492	6	0.0	0.97	Level	Yes	Upstream	On	3900	360	0.97	6	0	Level
56adr	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	670	700		5	0.0	0.97	Level	3	55	4492	6	0.0	0.97	Level	Yes	Downstrean	On	3080	1480	0.97	5	0	Level
60aur	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1480	1120	1120	5	0.0	0.97	Level	3	55	3822	6	0.0	0.97	Level	Yes	Upstream	Off	3080	670	0.97	5	0	Level
60adr	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1480	1120	1120	5	0.0	0.97	Level	3	55	3822	6	0.0	0.97	Level	Yes	Downstrean	Off	7320	872	0.97	3	0	Level

Build 2040 PM Peak Hour

BASIC FREEWAY DATA

ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured ?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer off	NB	3	5019	0.97	5	0.0		No	12	12	1.00	No	Level
16	IH 43 NB	Brown Deer off	Brwn Dr on	NB	3	3519	0.97	5	0.0		No	12	12	1.00	No	Level
18	IH 43 NB	Brown Deer on	Port Wash off	NB	3	4379	0.97	5	0.0		No	12	12	1.17	No	Level
20	IH 43 NB	Port Wash off	Mequon off	NB	3	3979	1.00	4	0.0		No	12	12	1.00	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	3	3059	1.00	4	0.0		No	12	12	1.00	Yes	Level
24	IH 43 NB	Mequon on	Highland off	NB	3	4109	1.00	4	0.0		No	12	12	1.00	Yes	Level
80	IH 43 SB	Highland on	Mequon off	SB	3	3064	1.00	7	0.0		No	12	12	0.83	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	3	2414	1.00	7	0.0		No	12	12	1.00	Yes	Level
53	IH 43 SB	Mequon on	County Line Rd on	SB	3	3164	1.00	7	0.0		No	12	12	1.00	Yes	Level
55	IH 43 SB	County Line Rd on	Brwn Dr off	SB	3	3484	0.97	8	0.0		No	12	12	1.17	No	Level
57	IH 43 SB	Brown Deer off	Brwn Dr on	SB	3	2953	0.97	8	0.0		No	12	12	1.00	No	Level
61	IH 43 SB	Brwn Dr on	Good Hope off	SB	3	4324	0.97	8	0.0		No	12	12	1.00	No	Level

RAMP DATA

Ramp Info | **Mainline Info** | **Adjacent Ramp Info**

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15aur	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1500	1400		5	0.0	0.97	Level	3	55	5019	5	0.0	0.97	Level	Yes	Upstream	On	7120	1100	0.97	1	0	Level
15adr	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1500	1400		5	0.0	0.97	Level	3	55	5019	5	0.0	0.97	Level	Yes	Downstream	Off	2450	860	0.97	5	0	Level
17aur	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	860	600		5	0.0	0.97	Level	3	55	3519	5	0.0	0.97	Level	Yes	Upstream	Off	2450	1500	0.97	5	0	Level
17adr	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	860	600		5	0.0	0.97	Level	3	55	3519	5	0.0	0.97	Level	Yes	Downstream	On	5160	400	0.97	1	0	Level
19	IH 43 NB	Port Wash off	Diverge	NB	1	Right	50	400	670		1	0.0	0.97	Level	3	55	0	5	0.0	0.97	Level	Yes	Upstream	On	5160	860	0.97	5	0	Level
21aur	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	920	700		1	0.0	1.00	Level	3	65	3979	4	0.0	1.00	Level	No								
21adr	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	920	700		1	0.0	1.00	Level	3	65	3979	4	0.0	1.00	Level	Yes	Downstream	On	2450	1050	1.00	2	0.0	Level
23aur	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	1050	960		2	0.0	1.00	Level	3	65	3059	4	0.0	1.00	Level	Yes	Upstream	Off	2450	920	1.00	1	0.0	Level
23adr	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	1050	960		2	0.0	1.00	Level	3	65	3059	4	0.0	1.00	Level	No	Downstream	Off	7750	500	1.00	5	0.0	Level
50aur	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	650	1050		6	0.0	1.00	Level	3	65	3064	7	0.0	1.00	Level	No	Upstream	On	7700	401	1.00	5	0.0	Level
50adr	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	650	1050		6	0.0	1.00	Level	3	65	3064	7	0.0	1.00	Level	Yes	Downstream	On	3020	750	1.00	2	0.0	Level
52aur	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	750	1260		2	0.0	1.00	Level	3	65	2414	7	0.0	1.00	Level	Yes	Upstream	Off	3020	650	1.00	6	0.0	Level
52adr	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	750	1260		2	0.0	1.00	Level	3	65	2414	7	0.0	1.00	Level	No								
54	IH 43 SB	County Line Rd	Merge	SB	1	Right	50	320	1175		2	0.0	0.97	Level	3	55	0	8	0.0	0.97	Level	Yes	Downstream	Off	3900	531	0.97	5	0	Level
56aur	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	531	700		5	0.0	0.97	Level	3	55	3484	8	0.0	0.97	Level	Yes	Upstream	On	3900	320	0.97	2	0	Level
56adr	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	531	700		5	0.0	0.97	Level	3	55	3484	8	0.0	0.97	Level	Yes	Downstream	On	3080	1371	0.97	5	0	Level
60aur	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1371	1120		5	0.0	0.97	Level	3	55	2953	8	0.0	0.97	Level	Yes	Upstream	Off	3080	531	0.97	5	0	Level
60adr	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1371	1120		5	0.0	0.97	Level	3	55	2953	8	0.0	0.97	Level	Yes	Downstream	Off	7320	695	0.97	4	0	Level

No County Line Access - 2040 AM Peak Hour

BASIC FREEWAY DATA

ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer off	NB	3	3748	0.97	9	0.0		No	12	12	1.00	No	Level
16	IH 43 NB	Brown Deer off	Brwn Dr on	NB	3	2344	0.97	9	0.0		No	12	12	1.00	No	Level
20	IH 43 NB	Brwn Dr on	Mequon off	NB	3	2802	1.00	9	0.0		No	12	12	1.00	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	3	1959	1.00	9	0.0		No	12	12	1.00	Yes	Level
24	IH 43 NB	Mequon on	Highland off	NB	3	2419	1.00	9	0.0		No	12	12	1.00	Yes	Level
80	IH 43 SB	Highland on	Mequon off	SB	3	4434	1.00	7	0.0		No	12	12	0.83	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	3	3468	1.00	7	0.0		No	12	12	1.00	Yes	Level
55	IH 43 SB	County Line Rd on	Brwn Dr off	SB	3	4267	0.97	6	0.0		No	12	12	1.17	No	Level
57	IH 43 SB	Brown Deer off	Brwn Dr on	SB	3	3635	0.97	6	0.0		No	12	12	1.00	No	Level
61	IH 43 SB	Brwn Dr on	Good Hope off	SB	3	5329	0.97	6	0.0		No	12	12	1.00	No	Level

RAMP DATA

Ramp Info / Mainline Info / Adjacent Ramp Info

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15aur	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1404	1400		5	0	0.97	Level	3	55	3748	9	0	0.97	Level	Yes	Upstream	On	7120	575	0.97	4	0	Level
15adr	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1404	1400		5	0	0.97	Level	3	55	3748	9	0	0.97	Level	Yes	Downstream	Off	2450	458	0.97	5	0	Level
17aur	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	458	600		5	0	0.97	Level	3	55	2344	9	0	0.97	Level	Yes	Upstream	Off	2450	1404	0.97	5	0	Level
17adr	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	458	600		5	0	0.97	Level	3	55	2344	9	0	0.97	Level	No								
21aur	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	843	700		3	0	1	Level	3	65	2802	9	0	1	Level	No								
21adr	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	843	700		3	0	1	Level	3	65	2802	9	0	1	Level	Yes	Downstream	On	2450	460	1	7	0	Level
23aur	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	460	960		7	0	1	Level	3	65	1959	9	0	1	Level	Yes	Upstream	Off	2450	843	1	3	0	Level
23adr	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	460	960		7	0	1	Level	3	65	1959	9	0	1	Level	Yes	Downstream	Off	7750	505	1	5	0	Level
50aur	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	966	1050		3	0	1	Level	3	65	4434	7	0	1	Level	Yes	Upstream	On	7700	550	1	5	0	Level
50adr	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	966	1050		3	0	1	Level	3	65	4434	7	0	1	Level	No								
52aur	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	799	1260		3	0	1	Level	3	65	3468	7	0	1	Level	Yes	Upstream	Off	3020	966	1	3	0	Level
52adr	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	799	1260		3	0	1	Level	3	65	3468	7	0	1	Level	No								
56aur	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	632	700		5	0	0.97	Level	3	55	4267	6	0	0.97	Level	No								
56adr	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	632	700		5	0	0.97	Level	3	55	4267	6	0	0.97	Level	Yes	Downstream	On	3080	1694	0.97	5	0	Level
60aur	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1694	1120		5	0	0.97	Level	3	55	3635	6	0	0.97	Level	Yes	Upstream	Off	3080	632	0.97	5	0	Level
60adr	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1694	1120		5	0	0.97	Level	3	55	3635	6	0	0.97	Level	Yes	Downstream	Off	7320	872	0.97	3	0	Level

No County Line Access - 2040 PM Peak Hour

BASIC FREEWAY DATA

ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer off	NB	3	5012	0.97	5	0.0		No	12	12	1.00	No	Level
16	IH 43 NB	Brown Deer off	Brwn Dr on	NB	3	3410	0.97	5	0.0		No	12	12	1.00	No	Level
20	IH 43 NB	Port Wash off	Mequon off	NB	3	4263	1.00	4	0.0		No	12	12	1.00	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	3	3248	1.00	4	0.0		No	12	12	1.00	Yes	Level
24	IH 43 NB	Mequon on	Highland off	NB	3	4308	1.00	4	0.0		No	12	12	1.00	Yes	Level
80	IH 43 SB	Highland on	Mequon off	SB	3	3046	1.00	7	0.0		No	12	12	0.83	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	3	2393	1.00	7	0.0		No	12	12	1.00	Yes	Level
55	IH 43 SB	County Line Rd	Brwn Dr off	SB	3	3321	0.97	8	0.0		No	12	12	1.17	No	Level
57	IH 43 SB	Brown Deer off	Brwn Dr on	SB	3	2814	0.97	8	0.0		No	12	12	1.00	No	Level
61	IH 43 SB	Brwn Dr on	Good Hope off	SB	3	4341	0.97	8	0.0		No	12	12	1.00	No	Level

RAMP DATA

Ramp Info / Mainline Info / Adjacent Ramp Info

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15aur	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1602	1400		5	0.0	0.97	Level	3	55	5012	5	0.0	0.97	Level	Yes	Upstream	On	7120	1100	0.97	1	0	Level
15adr	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1602	1400		5	0.0	0.97	Level	3	55	5012	5	0.0	0.97	Level	Yes	Downstream	Off	2450	853	0.97	5	0	Level
17aur	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	853	600		5	0.0	0.97	Level	3	55	3410	5	0.0	0.97	Level	Yes	Upstream	Off	2450	1602	0.97	5	0	Level
17adr	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	853	600		5	0.0	0.97	Level	3	55	3410	5	0.0	0.97	Level	No								
21aur	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	1015	700		1	0.0	1.00	Level	3	65	4263	4	0.0	1.00	Level	No								
21adr	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	1015	700		1	0.0	1.00	Level	3	65	4263	4	0.0	1.00	Level	Yes	Downstream	On	2450	1060	1.00	2	0.0	Level
23aur	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	1060	960		2	0.0	1.00	Level	3	65	3248	4	0.0	1.00	Level	Yes	Upstream	Off	2450	1015	1.00	1	0.0	Level
23adr	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	1060	960		2	0.0	1.00	Level	3	65	3248	4	0.0	1.00	Level	Yes	Downstream	Off	7750	500	1.00	5	0.0	Level
50aur	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	653	1050		6	0.0	1.00	Level	3	65	3046	7	0.0	1.00	Level	Yes	Upstream	On	7700	1060	1.00	2	0.0	Level
50adr	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	653	1050		6	0.0	1.00	Level	3	65	3046	7	0.0	1.00	Level	No								
52aur	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	928	1260		2	0.0	1.00	Level	2	65	2393	7	0.0	1.00	Level	Yes	Upstream	Off	3020	653	1.00	6	0.0	Level
52adr	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	928	1260		2	0.0	1.00	Level	2	65	2393	7	0.0	1.00	Level	No								
56aur	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	507	700		5	0.0	0.97	Level	2	55	3321	8	0.0	0.97	Level	No								
56adr	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	507	700		5	0.0	0.97	Level	3	55	3321	8	0.0	0.97	Level	Yes	Downstream	On	3080	1527	0.97	5	0	Level
60aur	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1527	1120		5	0.0	0.97	Level	3	55	2814	8	0.0	0.97	Level	Yes	Upstream	Off	3080	507	0.97	5	0	Level
60adr	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1527	1120		5	0.0	0.97	Level	3	55	2814	8	0.0	0.97	Level	Yes	Downstream	Off	7320	0	0.00	0	0	Level

Full County Line Access - 2040 AM Peak Hour

BASIC FREEWAY DATA

ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer off	NB	3	3758	0.97	9	0.0		No	12	12	1.00	No	Level
16	IH 43 NB	Brown Deer off	Brwn Dr on	NB	3	2442	0.97	9	0.0		No	12	12	1.00	No	Level
18	IH 43 NB	Brwn Dr on	Port Wash off	NB	3	2831	0.97	9	0.0		No	12	12	1.17	No	Level
20	IH 43 NB	Port Wash off	Port Wash on	NB	3	2421	1.00	9	0.0		No	12	12	1.00	Yes	Level
82	IH 43 NB	Port Wash on	Mequon on	NB	3	2578	1.00	9	0.0		No	12	12	1.00	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	3	2003	1.00	9	0.0		No	12	12	1.00	Yes	Level
24	IH 43 NB	Mequon on	Highland off	NB	3	2411	1.00	9	0.0		No	12	12	1.00	Yes	Level
80	IH 43 SB	Highland on	Mequon off	SB	3	4413	1.00	7	0.0		No	12	12	0.83	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	3	3514	1.00	7	0.0		No	12	12	1.00	Yes	Level
53	IH 43 SB	Mequon on	Port Wash off	SB	3	4158	1.00	7	0.0		No	12	12	1.00	Yes	Level
84	IH 43 SB	Port Wash off	Port Wash On	SB	3	4026	1.00	7	0.0		No	12	12	1.00	Yes	Level
55	IH 43 SB	Port Wash on	Brwn Dr off	SB	3	4403	0.97	6	0.0		No	12	12	1.17	No	Level
57	IH 43 SB	Brown Deer off	Brwn Dr on	SB	3	3818	0.97	6	0.0		No	12	12	1.00	No	Level
61	IH 43 SB	Brwn Dr on	Good Hope off	SB	3	5353	0.97	6	0.0		No	12	12	1.00	No	Level

RAMP DATA

Ramp Info / Mainline Info / Adjacent Ramp Info

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15aur	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1316	1400		5	0.0	0.97	Level	3	55	3758	9	0.0	0.97	Level	Yes	Upstream	On	7120	575	0.97	4	0	Level
15adr	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1316	1400		5	0.0	0.97	Level	3	55	3758	9	0.0	0.97	Level	Yes	Downstream	Off	2450	389	0.97	5	0	Level
17aur	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	389	600		5	0.0	0.97	Level	3	55	2442	9	0.0	0.97	Level	Yes	Upstream	Off	2450	1316	0.97	5	0.0	Level
17adr	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	389	600		5	0.0	0.97	Level	3	55	2442	9	0.0	0.97	Level	Yes	Downstream	On	5160	410	0.97	2	0.0	Level
19aur	IH 43 NB	Port Wash off	Diverge	NB	1	Right	50	410	500		2	0.0	0.97	Level	3	55	2831	9	0.0	0.97	Level	Yes	Upstream	On	5160	389	0.97	5	0.0	Level
19adr	IH 43 NB	Port Wash off	Diverge	NB	1	Right	50	410	500		2	0.0	0.97	Level	3	55	2831	9	0.0	0.97	Level	Yes	Downstream	On	2040	157	0.97	5	0.0	Level
81aur	IH 43 NB	Port Wash on	Merge	NB	1	Right	50	157	700		5	0	0.97	Level	3	55	2421	9	0	0.97	Level	Yes	Upstream	Off	2040	410	0.97	2	0	Level
81adr	IH 43 NB	Port Wash on	Merge	NB	1	Right	50	157	700		5	0	0.97	Level	3	55	2421	9	0	0.97	Level	Yes	Downstream	Off	6800	575	1	3	0	Level
21aur	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	575	700		3	0	1	Level	3	65	2578	9	0	1	Level	Yes	Upstream	On	6800	157	0.97	5	0	Level
21adr	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	575	700		3	0	1	Level	3	65	2578	9	0	1	Level	Yes	Downstream	On	2450	408	1	7	0	Level
23aur	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	408	960		7	0	1	Level	3	65	2003	9	0	1	Level	Yes	Upstream	Off	2450	575	1	3	0	Level
23adr	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	408	960		7	0	1	Level	3	65	2003	9	0	1	Level	Yes	Downstream	Off	7750	505	1	5	0	Level
50aur	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	899	1050		3	0	1	Level	3	65	4413	7	0	1	Level	Yes	Upstream	On	7700	550	1	5	0	Level
50adr	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	899	1050		3	0	1	Level	3	65	4413	7	0	1	Level	Yes	Downstream	On	3020	644	1	3	0	Level
52aur	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	644	1260		3	0	1	Level	3	65	3514	7	0	1	Level	Yes	Upstream	Off	3020	899	1	3	0	Level
52adr	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	644	1260		3	0	1	Level	3	65	3514	7	0	1	Level	Yes	Downstream	Off	5620	132	1	3	0	Level
83aur	IH 43 SB	County Line Rd off	Diverge	SB	1	Right	60	132	500		5	0	1	Level	3	55	4158	6	0	0.97	Level	Yes	Upstream	On	5620	644	1	3	0	Level
83adr	IH 43 SB	County Line Rd off	Diverge	SB	1	Right	60	132	500		5	0	1	Level	3	55	4158	6	0	0.97	Level	Yes	Downstream	On	3830	377	0.97	6	0	Level
54adr	IH 43 SB	County Line Rd	Merge	SB	1	Right	50	377	850		6	0	0.97	Level	3	55	4026	6	0	0.97	Level	Yes	Downstream	Off	2300	585	0.97	5	0	Level
54aur	IH 43 SB	County Line Rd	Merge	SB	1	Right	50	377	850		6	0	0.97	Level	3	55	4026	6	0	0.97	Level	Yes	Upstream	Off	3830	132	1	5	0	Level
56aur	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	585	700		5	0	0.97	Level	3	55	4403	6	0	0.97	Level	Yes	Upstream	On	2300	377	0.97	6	0	Level
56adr	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	585	700		5	0	0.97	Level	3	55	4403	6	0	0.97	Level	Yes	Downstream	On	3080	1535	0.97	5	0	Level
60aur	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1535	1120	1120	5	0	0.97	Level	3	55	3818	6	0	0.97	Level	Yes	Upstream	Off	3080	585	0.97	5	0	Level
60adr	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1535	1120	1120	5	0	0.97	Level	3	55	3818	6	0	0.97	Level	Yes	Downstream	Off	7320	872	0.97	3	0	Level

Full County Line Access - 2040 PM Peak Hour

BASIC FREEWAY DATA

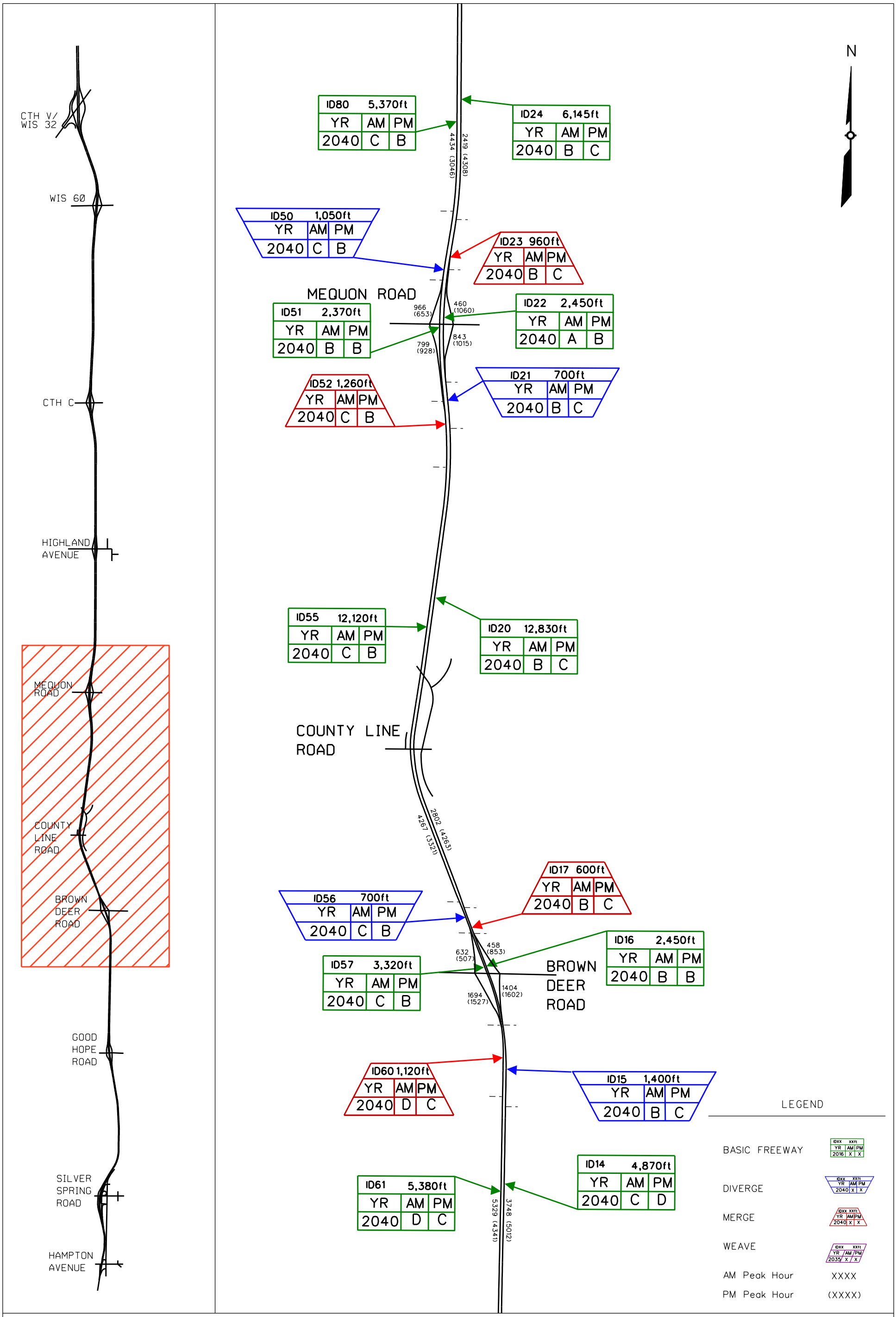
ID	Facility	SegmentA	SegmentB	Dir	No. of Lanes	Volume (vph)	PHF	HV %	RV %	Speed (mph)	Speed Measured?	Lane Width (ft)	RT-Lat Clearance	Total Ramp Density (rp/mi)	Rual?	Terrain
14	IH 43 NB	Good Hope on	Brown Deer off	NB	3	5109	0.97	5	0.0		No	12	12	1.00	No	Level
16	IH 43 NB	Brown Deer off	Brwn Dr on	NB	3	3614	0.97	5	0.0		No	12	12	1.00	No	Level
18	IH 43 NB	Brwn Dr on	Port Wash off	NB	3	4402	0.97	5	0.0		No	12	12	1.17	No	Level
20	IH 43 NB	Port Wash off	Port Wash on	NB	3	3930	1.00	4	0.0		No	12	12	1.00	Yes	Level
82	IH 43 NB	Port Wash on	Mequon on	NB	3	4093	1.00	4	0.0		No	12	12	1.00	Yes	Level
22	IH 43 NB	Mequon off	Mequon on	NB	3	3234	1.00	4	0.0		No	12	12	1.00	Yes	Level
24	IH 43 NB	Mequon on	Highland off	NB	3	4210	1.00	4	0.0		No	12	12	1.00	Yes	Level
80	IH 43 SB	Highland on	Mequon off	SB	3	3126	1.00	7	0.0		No	12	12	0.83	Yes	Level
51	IH 43 SB	Mequon off	Mequon on	SB	3	2553	1.00	7	0.0		No	12	12	1.00	Yes	Level
53	IH 43 SB	Mequon on	Port Wash off	SB	3	3235	1.00	7	0.0		No	12	12	1.00	Yes	Level
84	IH 43 SB	Port Wash off	Port Wash On	SB	3	2988	1.00	7	0.0		No	12	12	1.00	Yes	Level
55	IH 43 SB	Port Wash on	Brwn Dr off	SB	3	3439	0.97	8	0.0		No	12	12	1.17	No	Level
57	IH 43 SB	Brown Deer off	Brwn Dr on	SB	3	2971	0.97	8	0.0		No	12	12	1.00	No	Level
61	IH 43 SB	Brwn Dr on	Good Hope off	SB	3	4262	0.97	8	0.0		No	12	12	1.00	No	Level

RAMP DATA

Ramp Info / Mainline Info / Adjacent Ramp Info

ID	Facility	Interchange	Type	Direction	Ramp Lanes	Side	Ramp Speed	Ramp Vol	Accel/Decel Length1 (ft)	Accel/Decel Length2 (ft)	RampHV	RV %	RampPHF	RampTerrain	Main Lanes	Main Operating Speed	MainVol	MainHV	RV %	MainPHF	MainTerrain	Adjacent?	AdjLocation	AdjType	AdjDist	AdjVol	AdjPHF	AdjHV	RV %	AdjTerrain
15aur	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1495	1400	0	5	0.0	0.97	Level	3	55	5109	5	0.0	0.97	Level	Yes	Upstream	On	7120	1100	0.97	1	0	Level
15adr	IH 43 NB	Brown Deer off	Diverge	NB	1	Right	50	1495	1400	0	5	0.0	0.97	Level	3	55	5109	5	0.0	0.97	Level	Yes	Downstream	Off	2450	788	0.97	5	0	Level
17aur	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	788	600		5	0.0	0.97	Level	3	55	3614	5	0.0	0.97	Level	Yes	Upstream	Off	2450	1495	0.97	5	0.0	Level
17adr	IH 43 NB	Brown Deer on	Merge	NB	1	Right	50	788	600		5	0.0	0.97	Level	3	55	3614	5	0.0	0.97	Level	Yes	Downstream	On	5160	472	0.97	1	0.0	Level
19aur	IH 43 NB	Port Wash off	Diverge	NB	1	Right	50	472	500		1	0.0	0.97	Level	3	55	4402	5	0.0	0.97	Level	Yes	Upstream	On	5160	788	0.97	5	0.0	Level
19adr	IH 43 NB	Port Wash off	Diverge	NB	1	Right	50	472	500		1	0.0	0.97	Level	3	55	4402	5	0.0	0.97	Level	Yes	Downstream	On	2040	163	0.97	5	0.0	Level
81aur	IH 43 NB	Port Wash on	Merge	NB	1	Right	50	163	700		5	0.0	0.97	Level	3	55	3930	5	0.0	0.97	Level	Yes	Upstream	Off	2040	472	0.97	1	0.0	Level
81adr	IH 43 NB	Port Wash on	Merge	NB	1	Right	50	163	700		5	0.0	0.97	Level	3	55	3930	5	0.0	0.97	Level	Yes	Downstream	Off	6800	859	1.00	1	0.0	Level
21aur	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	859	700		1	0.0	1.00	Level	3	65	3930	4	0.0	1.00	Level	No	Upstream	On	6800	163	0.97	5	0.0	Level
21adr	IH 43 NB	Mequon Rd off	Diverge	NB	1	Right	60	859	700		1	0.0	1.00	Level	3	65	3930	4	0.0	1.00	Level	Yes	Downstream	On	2450	976	1.00	2	0	Level
23aur	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	976	960		2	0.0	1.00	Level	3	65	3234	4	0.0	1.00	Level	Yes	Upstream	Off	2450	859	1.00	1	0	Level
23adr	IH 43 NB	Mequon Rd on	Merge	NB	1	Right	60	976	960		2	0.0	1.00	Level	3	65	3234	4	0.0	1.00	Level	Yes	Downstream	Off	7750	500	1.00	5	0	Level
50aur	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	573	1050		6	0	1	Level	3	65	3126	7	0	1	Level	Yes	Upstream	On	7700	401	1	5	0	Level
50adr	IH 43 SB	Mequon Rd off	Diverge	SB	1	Right	60	576	1050		6	0	1	Level	3	65	3126	7	0	1	Level	Yes	Downstream	On	3020	682	1	2	0	Level
52aur	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	682	1260		2	0	1	Level	3	65	2553	7	0	1	Level	Yes	Upstream	Off	3020	573	1	6	0	Level
52adr	IH 43 SB	Mequon Rd on	Merge	SB	1	Right	60	682	1260		2	0	1	Level	3	65	2553	7	0	1	Level	Yes	Downstream	Off	5620	247	1	3	0	Level
83aur	IH 43 SB	County Line Rd o	Diverge	SB	1	Right	60	247	500		2	0	1	Level	3	65	3235	7	0	1	Level	Yes	Upstream	On	5620	682	1	2	0	Level
83adr	IH 43 SB	County Line Rd o	Diverge	SB	1	Right	60	247	500		2	0	1	Level	3	65	3235	7	0	1	Level	Yes	Downstream	On	3830	451	0.97	2	0	Level
54adr	IH 43 SB	County Line Rd	Merge	SB	1	Right	50	451	850		2	0	0.97	Level	3	55	3235	8	0	0.97	Level	Yes	Downstream	Off	2300	468	0.97	5	0	Level
54aur	IH 43 SB	County Line Rd	Merge	SB	1	Right	50	451	850		2	0	0.97	Level	3	55	3235	8	0	0.97	Level	Yes	Upstream	Off	3830	247	1	2	0	Level
56aur	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	468	700		5	0	0.97	Level	3	55	3439	8	0	0.97	Level	Yes	Upstream	On	2300	451	0.97	2	0	Level
56adr	IH 43 SB	Brown Deer off	Diverge	SB	1	Right	50	468	700		5	0	0.97	Level	3	55	3439	8	0	0.97	Level	Yes	Downstream	On	3080	1291	0.97	5	0	Level
60aur	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1291	1120	1120	5	0	0.97	Level	3	55	2971	8	0	0.97	Level	Yes	Upstream	Off	3080	468	0.97	5	0	Level
60adr	IH 43 SB	Brown Deer on	Merge	SB	1	Right	50	1291	1120	1120	5	0	0.97	Level	3	55	2971	8	0	0.97	Level	Yes	Downstream	Off	7320	695	0.97	4	0	Level

Appendix F: Year 2040 No Build and Build HCS 2010 Mainline Schematics

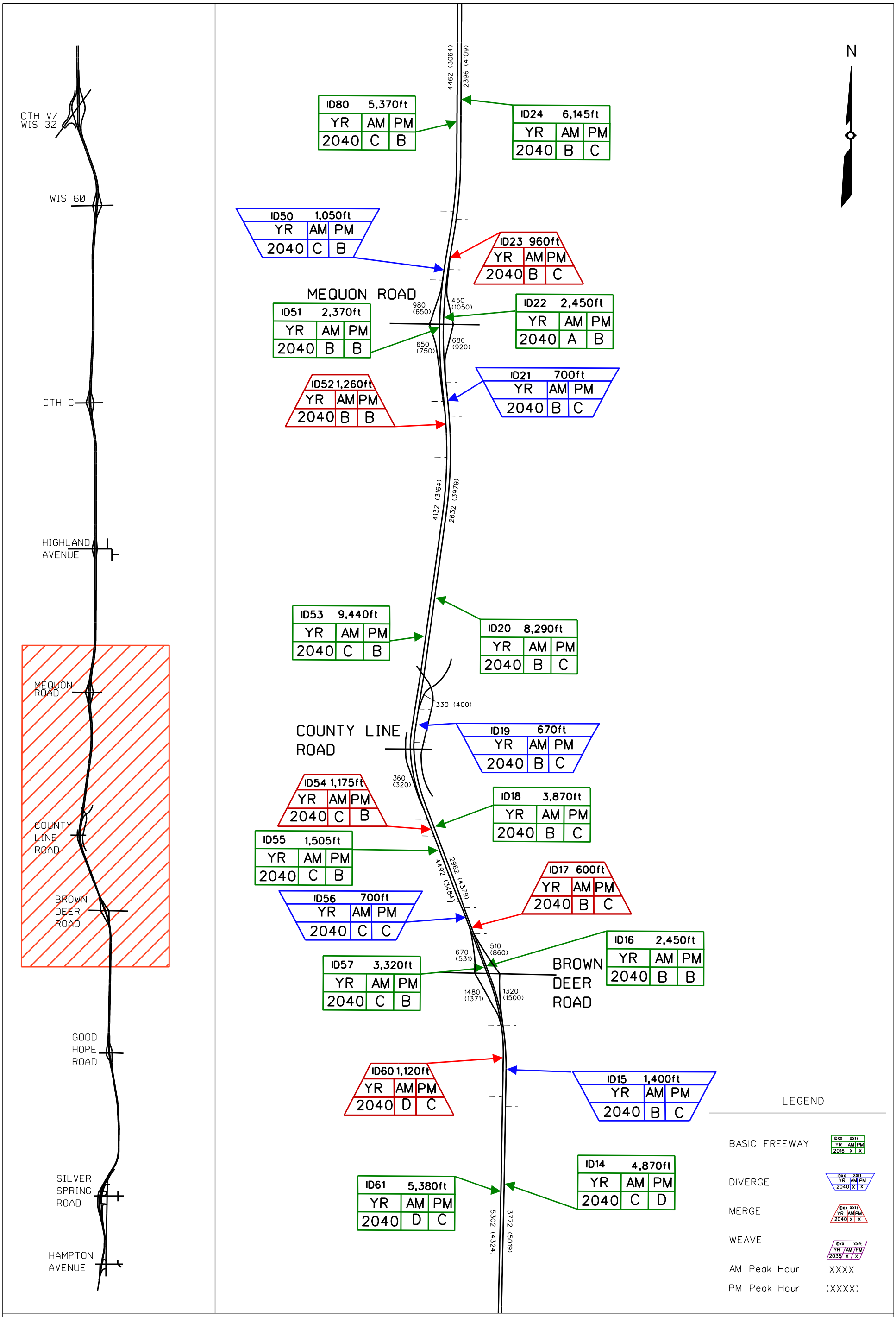


Interstate 43

Brown Deer to Mequon

Year 2040 Build - No Interchange at County Line

HCS 2010 Freeway Basic, Ramp, and Weave Analysis

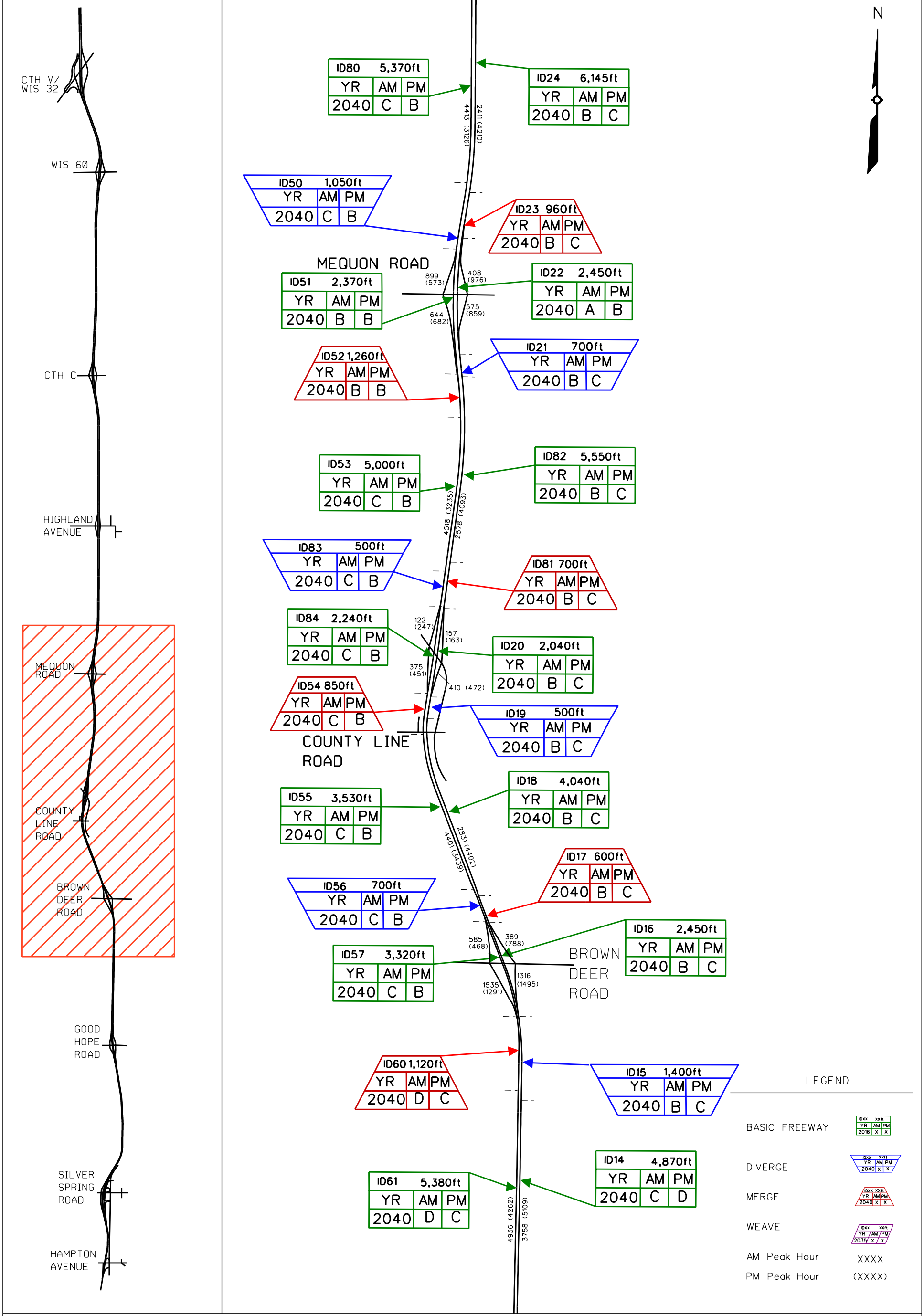


Interstate 43

Brown Deer to Mequon

Year 2040 Build - Partial Interchange at County Line

HCS 2010 Freeway Basic, Ramp, and Weave Analysis



Interstate 43

Brown Deer to Mequon

Year 2040 Build - Full Interchange at County Line

HCS 2010 Freeway Basic, Ramp, and Weave Analysis

Appendix G: Interchange Designs

U.S. Department of Transportation
Federal Highway Administration

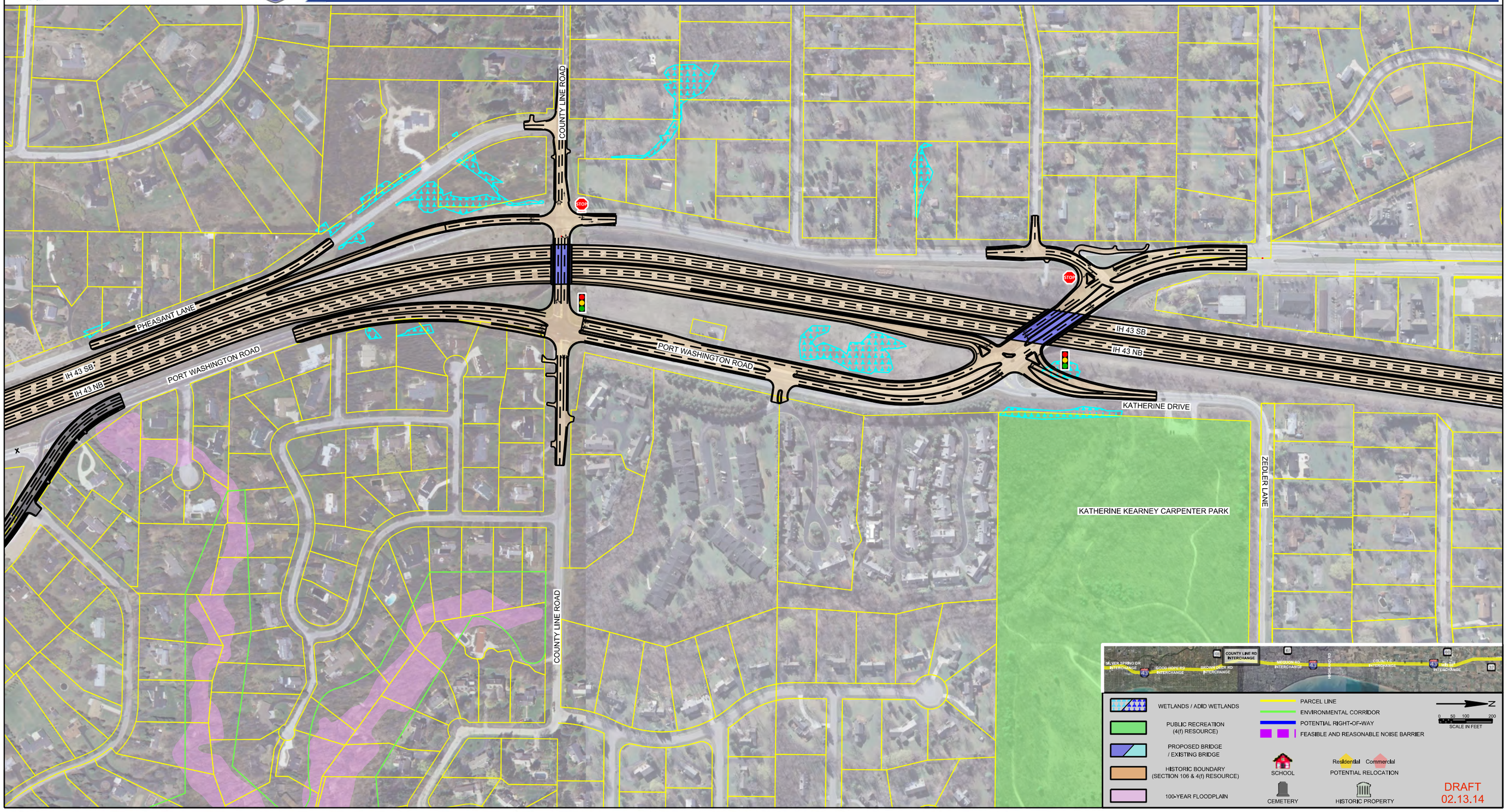
I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

County Line Road Interchange

Partial Diamond*

* Interchange alternatives are compatible with 4-lane and 6-lane (shown) I-43 mainline alternatives.



U.S. Department of Transportation
Federal Highway Administration

I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

County Line Road Interchange

Split Diamond Hybrid with Grade Separation

COUNTY LINE ROAD
STOP
PORT WASHINGTON LANE
PHEASANT LANE
IH 43 SB
IH 43 NB
PORT WASHINGTON ROAD
IH 43 SB
IH 43 NB
KATHERINE DRIVE
ZEDLER LANE
KATHERINE KEARNEY CARPENTER PARK
PORT WASHINGTON LANE
IH 43 SB
IH 43 NB
ROAD
NB On Ramp
KATHERINE DRIVE

Split Diamond Hybrid Without Grade Separation

SILVER SPRING DR INTERCHANGE
GOOD HOPE RD INTERCHANGE
BROWN DEER RD INTERCHANGE
COUNTY LINE RD INTERCHANGE
MEQUON RD INTERCHANGE
MILWAUKEE
COUNTY G INTERCHANGE
WIS 167 INTERCHANGE

WETLANDS / ADID WETLANDS
PUBLIC RECREATION (4(f) RESOURCE)
PROPOSED BRIDGE / EXISTING BRIDGE
HISTORIC BOUNDARY (SECTION 106 & 4(f) RESOURCE)
100-YEAR FLOODPLAIN

PARCEL LINE
ENVIRONMENTAL CORRIDOR
POTENTIAL RIGHT-OF-WAY
FEASIBLE AND REASONABLE NOISE BARRIER

SCHOOL
Residential Commercial
POTENTIAL RELOCATION
CEMETERY
HISTORIC PROPERTY

N
0 50 100 200
SCALE IN FEET

Preferred Alternative

DRAFT
02.13.14

PUBLIC HEARING
APRIL 30, 2014 & MAY 1, 2014

U.S. Department of Transportation
Federal Highway Administration

INTERSTATE 43

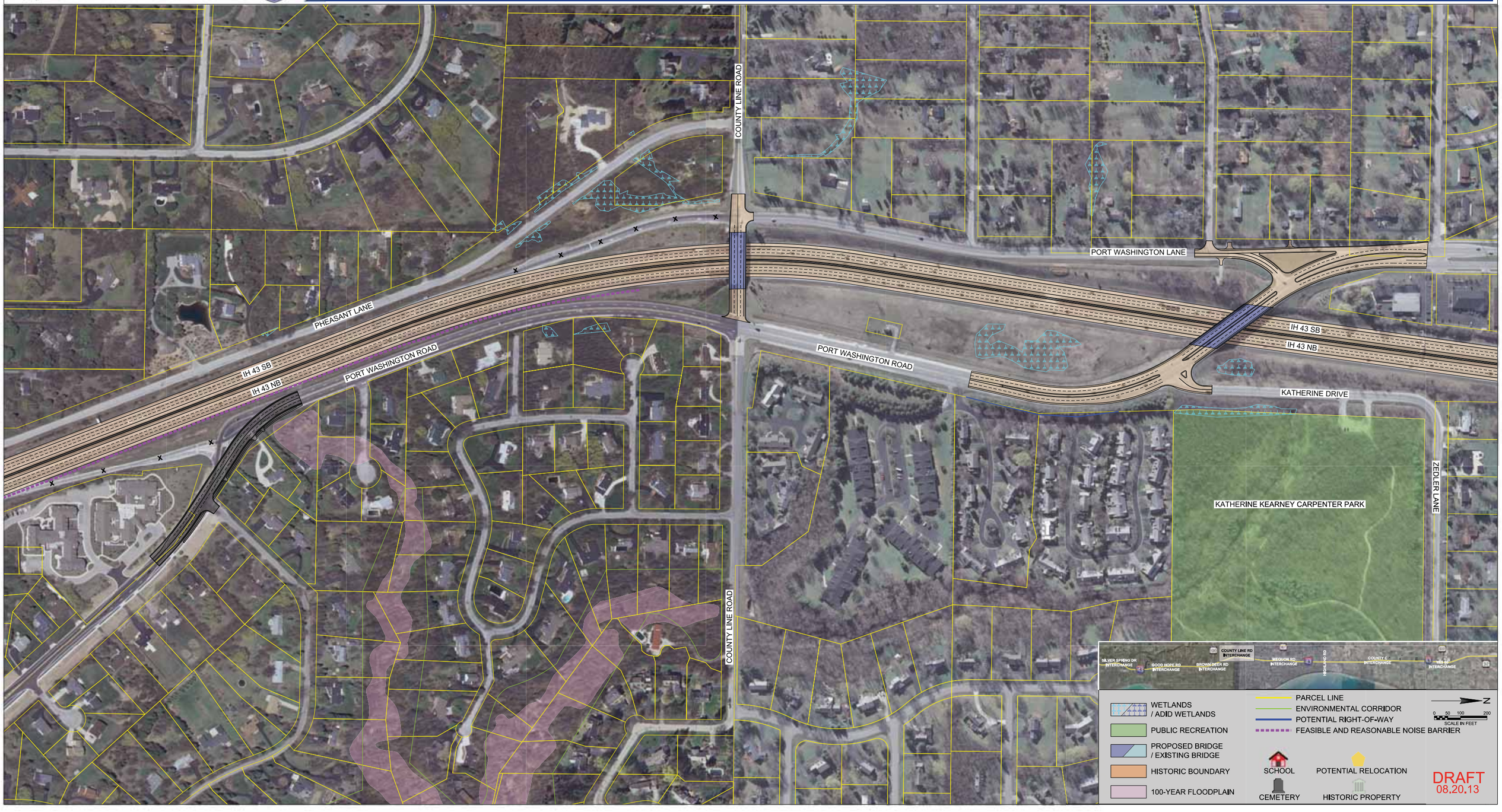
I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

County Line Road Interchange

No Access*

* Interchange alternatives are compatible with 4-lane and 6-lane (shown) I-43 mainline alternatives.



U.S. Department of Transportation
Federal Highway Administration

INTERSTATE 43

I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

Brown Deer Road Interchange

Diverging Diamond*

* Interchange alternatives are compatible with 4-lane and 6-lane (shown) I-43 mainline alternatives.

DRAFT
08.20.13

U.S. Department of Transportation
Federal Highway Administration

I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

Mequon Road Interchange

Tight Diamond - Mainline Shifted East with Highland Road Interchange*

* Interchange alternatives are compatible with 4-lane and 6-lane (shown) I-43 mainline alternatives.

Intersection Modification
REQUIRED WITHOUT THE ADDITION OF HIGHLAND ROAD INTERCHANGE

167
MEQUON ROAD
PORT WASHINGTON ROAD
IH 43 SB
IH 43 NB
UP RR
SAN MARINO DRIVE
MILWAUKEE METROPOLITAN SEWERAGE DISTRICT
GREENSEAMS FLOOD MITIGATION PROPERTY

SILVER SPRING DR INTERCHANGE
GOOD HOPE RD INTERCHANGE
BROWNDEER RD INTERCHANGE
COUNTY LINE RD INTERCHANGE
MEQUON RD INTERCHANGE
HIGHLAND RD
COUNTY C INTERCHANGE
WIS 60 INTERCHANGE

WETLANDS / ADID WETLANDS
PUBLIC RECREATION
PROPOSED BRIDGE / EXISTING BRIDGE
HISTORIC BOUNDARY
100-YEAR FLOODPLAIN
PARCEL LINE
ENVIRONMENTAL CORRIDOR
POTENTIAL RIGHT-OF-WAY
FEASIBLE AND REASONABLE NOISE BARRIER
SCHOOL
CEMETERY
POTENTIAL RELOCATION
HISTORIC PROPERTY

N
0 50 100 200
SCALE IN FEET

DRAFT
10.30.13

Appendix H: Signing Plan

I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

IJR - Signing

*Alternatives shown are not final and are for display purposes only.

N

0' 200' 400'

Brown Deer Road

I-43 SB

I-43 NB

Pheasant Lane

Port Washington Road

EXIT 82
32 100
Brown Deer Rd
EXIT ONLY

EXIT 82

EXIT 83
COUNTY W
County Line Rd
Port Washington Rd
1 Mile
NO REENTRY NORTHBOUND

EXIT 82
32 100
Brown Deer Rd
EXIT ONLY

EXIT 82

TO 43

TO 43

WEST
100
Brown Deer Rd
ONLY

EAST
32
Brown Deer Rd
ONLY

I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

IJR - Signing

*Alternatives shown are not final and are for display purposes only.

N

0' 200' 400'

PARK & RIDE

CRASH INVESTIGATION SITE

EXIT 82

City of Port Washington AHEAD

TO NORTH 43

TO NORTH 43 SOUTH 43

SOUTH 43

EXIT 82

100 32

Brown Deer Rd

1 Mile

Pheasant Lane

I-43 SB

I-43 NB

Port Washington Lane

Port Washington Road

Katherine Drive

EXIT 83

County W

County Line Rd

Port Washington Rd

EXIT ONLY

TO SOUTH 43 TO NORTH 43

TO NORTH 43 TO SOUTH 43

SOUTH 43 TO NORTH 43

County Line Road

EXIT 83

TO NORTH 43

Mequon

NEXT 2 EXITS

County W North Port Washington Rd

ONLY

Katherine Dr

ONLY

County W South Port Washington Rd County Line Rd

ONLY

I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

IJR - Signing

*Alternatives shown are not final and are for display purposes only.

N

0' 200' 400'

Port Washington Road

TO NORTH 43

I-43 SB

I-43 NB

Donges Bay Road

EXIT 85

SOUTH 57

WEST 167

Mequon Rd

1 Mile

Theinsville

NEXT EXIT

EXISTING

57 NORTH

Plymouth

AHEAD

EXISTING ON MEDIAN

I-43 North-South Freeway Corridor Study

Project ID: 1229-04-01 | Silver Spring Dr to WIS 60 | Milwaukee and Ozaukee Counties

IJR - Signing

*Alternatives shown are not final and are for display purposes only.

N

0' 200' 400'

Mequon Road

Port Washington Road

I-43 SB

I-43 NB