FHWA-WISC-EIS-2014-01-D
INTERSTATE 43 NORTH-SOUTH FREEWAY
SILVER SPRING DRIVE TO WIS 60
Ozaukee and Milwaukee Counties, Wisconsin

WISDOT PROJECT I.D. 1229-04-01
DRAFT ENVIRONMENTAL IMPACT STATEMENT
and Section 4(f) Evaluation

SUBMITTED PURSUANT TO 42 USC 4332 (2) (c) AND 49 USC 303

BY THE

U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION

AND

WISCONSIN DEPARTMENT OF TRANSPORTATION

AND

COOPERATING AGENCIES:

US ARMY CORPS OF ENGINEERS
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

3/12/14 — Date of Approval — For Wisconsin Department of Transportation

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The following persons may be contacted for additional information concerning this document:

Rebecca Burkel
Wisconsin Department of Transportation
Bureau of Technical Services
P.O. Box 7965
Madison, WI 53707-7965
Phone (608) 516-6336
Fax (608) 264-6667

George Poirier
Federal Highway Administration
525 Junction Road, Suite 8000
Madison, WI 53717
Phone (608) 829-7500
Fax (608) 829-7526

FHWA will issue a single Final Environmental Impact Statement and Record of Decision document pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless FHWA determines statutory criteria or practicability considerations preclude issuance of the combined document pursuant to Section 1319.

ABSTRACT

The proposed I-43 North-South Freeway Corridor Study will provide a safe and efficient transportation corridor to correct freeway deficiencies, improve highway safety, address growing traffic volumes and declining traffic operations, support regional land use and transportation plans, maintain a vital link with the highway network and other transportation modes, and to avoid and minimize impacts to the natural, cultural and built environment. This document reviews alternative actions to address these needs including modernization of the facility with or without additional lanes, the addition of an interchange at Highland Road, transportation system management, and travel demand management.

Comments on this Draft Environmental Impact Statement are due by May 12, 2014, or 45 days after the Notice of Availability is published in the *Federal Register*, whichever is later, and should be sent to **Steve Hoff, P.E., Project Manager, WisDOT Southeast Region, 141 NW Barstow St., Waukesha, WI 53187. Email: steve.hoff@dot.wi.gov.**

NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act (NEPA) of 1969, as amended in U.S. Code (USC) 42 USC § 4332, became effective Jan. 1, 1970. This law requires that all federal agencies prepare a detailed environmental impact statement (EIS) for major federal actions that will significantly affect the quality of the human environment. The Federal Highway Administration (FHWA) is therefore required to prepare an EIS on proposals that are funded under its authority if the proposal is determined to be a major action significantly affecting the quality of the human environment.

The EIS process is done in two stages: draft and final. The draft environmental impact statement (DEIS) is circulated for review and comment to federal, state and local agencies with jurisdiction by law or special expertise, and it is made available to the public. Pursuant to Code of Federal Regulations (CFR) 40 CFR § 1502.14(e), the preferred alternative is identified in the DEIS. The DEIS must be made available to the public at least 15 days before the public hearing and no later than the first public hearing notice. A minimum 45-day comment period is provided from the date the DEIS availability notice is published in the *Federal Register*. WisDOT must receive agency comments on or before the date listed on the front cover of the DEIS, unless a time extension is requested and granted by WisDOT. After the DEIS comment period has elapsed, work may begin on the final environmental impact statement (FEIS).

The FEIS includes the following:

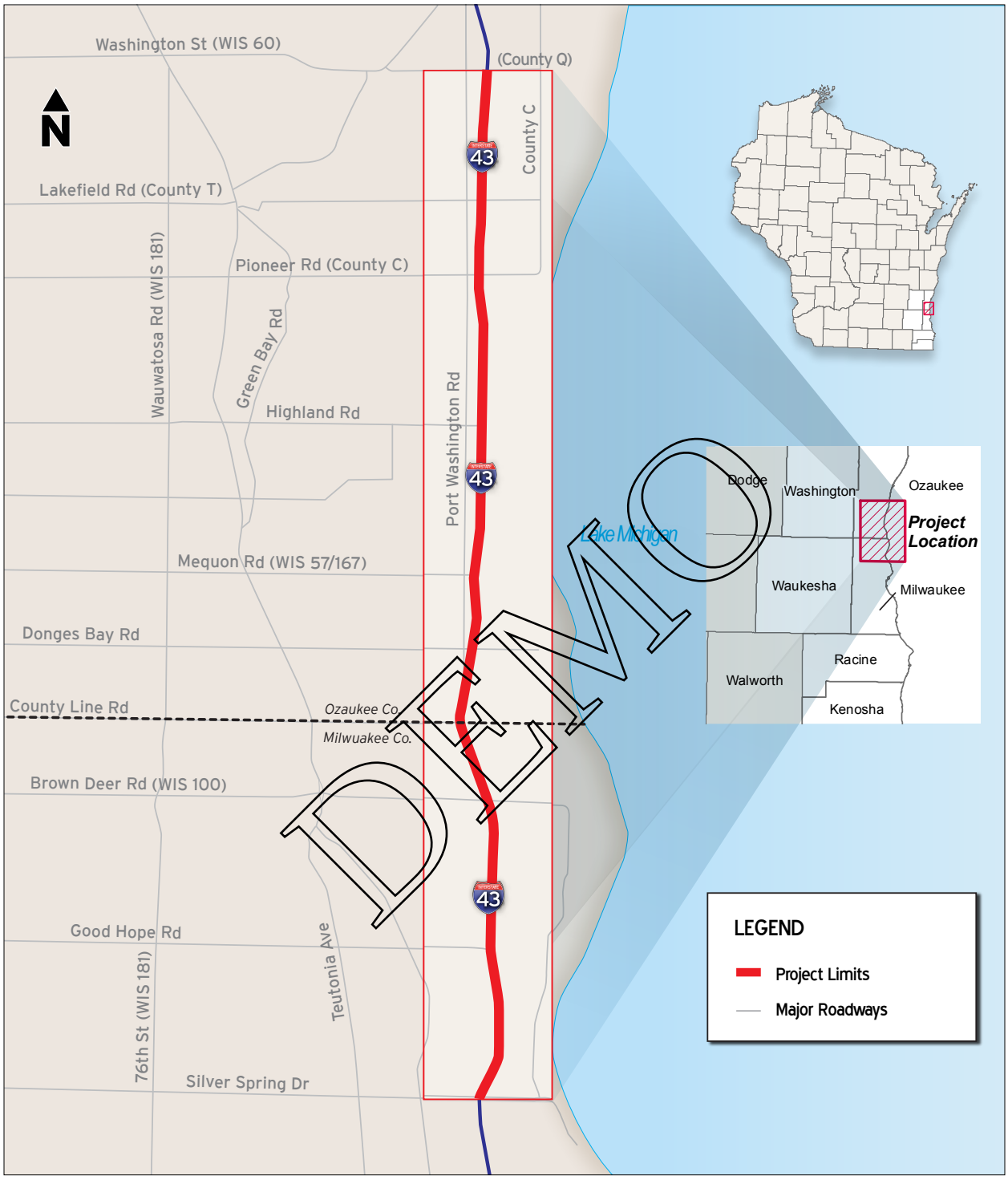
1. Identification of the preferred course of action (alternative) and the basis for its selection.
2. Basic content of the DEIS, along with any changes, updated information, or additional information as a result of agency and public review.
3. Summary of, and responses to substantive comments on social, economic, environmental and engineering aspects received during the public hearing and the agency/public comment period on the DEIS.
4. Resolution of environmental issues and documentation of compliance with applicable environmental laws and related requirements.

The 2012 federal transportation bill, Moving Ahead for Progress in the 21st Century Act (MAP-21) includes several provisions designed to accelerate decision-making in project delivery, such as the concurrent issuance of an FEIS and a Record of Decision (ROD). Section 1319(b) of MAP-21 provides that the lead agency shall, to the maximum extent practicable, combine the FEIS and ROD unless (1) the FEIS makes substantial changes to the proposed action that are relevant to environmental or safety concerns; or (2) there are significant new circumstances or information relevant to environmental concerns and that bear on the proposed action or the impacts of the proposed action.

If no substantive new information is received at the public hearing, FHWA and WisDOT may proceed with the combined issuance of an FEIS and ROD. Both the DEIS and FEIS are full-disclosure documents, which provide a full description of the proposed project, the existing environment, and an analysis of the anticipated beneficial and/or adverse environmental effects.

A federal agency may publish a notice in the *Federal Register,* pursuant to 23 USC §139(l), indicating that one or more federal agencies have taken final action on permits, licenses or approvals for a transportation project. If such notice is published, claims seeking judicial review of those federal agency actions will be barred unless such claims are filed within 150 days after the date of publication of the notice, or within such shorter time period as is specified in the federal laws pursuant to which judicial review of the federal agency action is allowed. If no notice is published, then the periods of time that otherwise are provided by the federal laws governing such claims will apply.

PROJECT LOCATION MAP



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Abbreviations and Acronyms

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADID	advanced identification of wetland disposal areas
APE	area of potential effect
CAC	community advisory committee
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSS	community sensitive solutions
DATCP	Wisconsin Department of Agriculture, Trade, and Consumer Protection
DEIS	draft environmental impact statement
DOA	Wisconsin Department of Administration
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FDM	Facilities Development Manual
FEIS	final environmental impact statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	high-occupancy vehicles
INRA	isolated natural resource areas
LOS	level of service
LWCF Act	Land and Water Conservation Fund Act
MATC	Milwaukee Area Technical College
MCTS	Milwaukee County Transit Service
MLS	Multiple Listing Service
MMSD	Metropolitan Milwaukee Sewerage District
MOVES	Motor Vehicle Emission Simulator
MSATs	mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OSHA	Occupational, Safety, and Health Administration

Abbreviations and Acronyms, continued

ROD	Record of Decision
SEWRPC	Southeastern Wisconsin Regional Planning Commission
SHPO	State Historic Preservation Officer
SIP	state implementation plan
TAC	technical advisory committee
TCF	The Conservation Fund
TDM	travel demand management
TDML	total maximum daily load
THPO	Tribal Historic Preservation Officer
TIP	transportation improvement program
TMP	transportation management plan
TPC	Transportation Projects Commission
Trans 75	*Wisconsin Administrative Code Chapter Trans 75: Bikeways and Sidewalks in Highway Projects*
TRB	Transportation Research Board
TSM	transportation system management
UP Railroad	Union Pacific Railroad
USC	U.S. Code
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish & Wildlife Service
VMT	vehicle miles traveled
vpd	vehicles per day
WCMP	Wisconsin's Coastal Zone Management Program
WDNR	Wisconsin Department of Natural Resources
WisDOT	Wisconsin Department of Transportation

EXECUTIVE SUMMARY

PROPOSED ACTION

The Wisconsin Department of Transportation (WisDOT) and Federal Highway Administration (FHWA) are conducting the I-43 North-South Freeway Corridor Study to develop solutions for addressing deteriorated pavement, design deficiencies, safety concerns, growing travel demand and other existing and emerging problems in the corridor.

The proposed action would reconstruct I-43 between Silver Spring Drive in the city of Glendale (south limit), and WIS 60 in the village of Grafton (north limit) – a distance of about 14 miles (see **Project Location Map)**. The scope of the proposed action includes rebuilding the mainline roadway, bridges, and interchanges; replacing the existing partial interchange at County Line Road with a full-access interchange, or removing the interchange; constructing a new interchange at Highland Road; reconstructing local streets affected by the freeway reconstruction; and enhancing the aesthetic appearance of the reconstructed freeway.

Seven interchanges exist in the corridor: Silver Spring Drive, Good Hope Road, Brown Deer Road (WIS 100), County Line Road, Mequon Road (WIS 57/167), County C (Pioneer Road) and WIS 60.

Purpose and Need for Proposed Action

The purpose of the I-43 North-South Freeway Corridor Study is to address emerging pavement and structural needs, safety issues, and design deficiencies while identifying methods to accommodate existing and projected future traffic volumes. The study also strives to minimize 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 study corridor is demonstrated through a combination of several key factors discussed in the sections below.

PAVEMENT AND DESIGN DEFICIENCIES

The corridor study freeway originally was constructed in the mid-1950s and mid-1960s. Although pavement maintenance and resurfacing has occurred since then, the structure of the I-43 pavement has exceeded its life expectancy. Complete reconstruction of the freeway's substructure and pavement is now required. The I-43 mainline has the following deficiencies:

- Inside and outside shoulders are too narrow and do not meet modern design standards in several locations.
- Vertical clearance (distance between I-43 and the bottom of a bridge over it) does not meet minimum standards in several locations.
- Stopping sight distance (minimum distance required by a driver traveling at a given speed to stop after seeing an object in the roadway) is inadequate in several locations
- The separation distance between the I-43 travel lanes and the parallel local service roads is severely deficient in some areas. For example, portions of Port Washington Road and Jean Nicolet Road are as close as 22 feet, but the recommended standard is 80 feet to 150 feet without retaining walls.
- "Lane continuity" means that drivers following a particular route do not need to change lanes or exit to remain on the route. Just south of Bender Road, I-43 drops one through-lane going

north and adds one through-lane going south. The lane drop contributes to the reduced traffic operations on the freeway.

The interchanges in the study corridor have the following deficiencies:

- Several interchange entrance and exit ramps are too short, making it difficult for drivers to merge on and off the I-43 mainline, or the ramps do not provide enough storage for exiting traffic.
- Local road intersections are too close to the interchange ramp terminals at some locations, causing back-ups and poor traffic operations.
- The County Line Road interchange at the Milwaukee/Ozaukee County line is a partial interchange that provides access to County Line Road via Port Washington Road as a northbound exit from I-43. The only access from County Line Road to I-43 is via a southbound entrance ramp. FHWA regulations call for interchanges on Interstate highways to provide for all traffic movements.

SAFETY

Congestion and geometric deficiencies contribute to a high crash rate in the I-43 North-South Freeway study corridor. During a crash analysis period from 2006 through 2010, a total 1,087 crashes (excluding vehicle-deer crashes) occurred in the study corridor. Of these, 72 percent were property damage crashes, and 27 percent were crashes involving injuries or fatalities. Truck crashes accounted for about 11 percent of the total crashes.

The highest number of crashes on the freeway mainline occur between Good Hope Road and Silver Spring Drive. A majority of the crashes are characterized by rear-end and side-swipe crashes, which reflect locations where the drivers experience congestion and the roadway has geometric deficiencies. As traffic increases over time, crash rates in the corridor are expected to approach or exceed the statewide average rate.

Substandard design and traffic congestion at interchanges also contribute to crashes. The numbers of crashes at the Brown Deer Road and Mequon Road interchanges are approaching the statewide average for urban freeways.

EXISTING AND FUTURE TRAFFIC

On an average weekday, existing traffic volumes on I-43 range from more than 85,000 vehicles per day (vpd) near Silver Spring Drive, to 49,000 vpd at WIS 60. Substantial traffic congestion occurs on a regular basis. Future projections show traffic growing to 112,500 vpd near Silver Spring Drive to 65,000 vpd at WIS 60 by 2040.

Heaviest traffic volumes typically occur during the morning peak-hour travel time (7 to 8 a.m.) and evening peak-hour travel time (4:30 to 5:30 p.m.).

Level of service (LOS) measures roadway congestion using rankings from A to F, with LOS A exhibiting free-flow traffic, and LOS F exhibiting severe congestion that approaches gridlock. FHWA guidance calls for Interstates to provide LOS C; however, LOS D can be acceptable in urban areas. Currently, just more than 60 percent of the study corridor freeway operates at LOS C or better during the morning peak-hour travel time; 70 percent operates at LOS C or better during the evening peak-hour travel time. LOS in the study corridor is worst from the Good Hope Road interchange to where a third southbound lane picks up just south of Bender Road.

Projected traffic volumes for 2040 show that more than 60 percent of the study corridor freeway would operate at LOS D or worse (20 percent at LOS F) during the morning peak-hour travel

time. Congestion is associated with the heavy southbound morning peak-hour traffic, with sections of the study corridor freeway operating at LOS E and LOS F as far north as Mequon Road in Ozaukee County. During the evening peak-hour travel time, northbound lanes throughout the entire corridor and most of the southbound lanes in Milwaukee County would operate at LOS D or worse.

REGIONAL TRANSPORTATION PLANNING

Recommendations for improvements in the I-43 North-South Freeway study corridor are provided in the two reports published by the Southeastern Wisconsin Regional Planning Commission (SEWRPC): Planning Report No. 39: *A Regional Transportation System Plan for Southeastern Wisconsin: 2035* (June 2006) and Memorandum Report No. 197: *Review, Update and Reaffirmation of the Year 2035 Regional Transportation Plan* (June 2010).

Key regionwide recommendations in these reports include the following:

- Improve freeway system service interchanges:
  - Lengthen and widen ramp tapers.
  - Convert multipoint exits to single point exits.
  - Provide selected auxiliary lanes to address closely spaced interchanges.
- Improve I-43 mainline:
  - Improve freeway horizontal and vertical curvatures, grades, and vertical clearances to meet federal design standards.
  - Provide full inside and outside shoulders.

Specific recommendations for the I-43 North-South Freeway study corridor include the following:

- Provide six travel lanes on the I-43 mainline and add auxiliary lanes between interchanges.
- Reconstruct interchanges at County C, Mequon Road, County Line Road, Brown Deer Road, and Good Hope Road for improved ramp geometry and better operations.
- Investigate reconfiguration of Brown Deer Road interchange to a diamond style interchange.
- Add a new interchange at Highland Road.
- At the Silver Spring interchange, construct new pavement and preserve existing bridges and retaining walls because this freeway segment was recently reconstructed.
- Consider relocating the County Line interchange northbound exit ramp to Port Washington Road farther north.

SYSTEM LINKAGE AND ROUTE IMPORTANCE

I-43 is a part of the National Highway System and is identified in WisDOT's statewide, multimodal transportation plan, *Connections 2030*, as a system-level priority corridor linking south-central and eastern Wisconsin. FHWA has identified and designated highways as part of the National Highway System to ensure connectivity to the national defense highway network and other important regional transportation routes, and to provide a high level of safety, design and operational standards. *Connections 2030* priority corridors are critical to Wisconsin's travel patterns and support the state's economy. I-43 is also a designated federal and state "long truck route," which allows longer commercial vehicles to use the freeway.

Alternatives

The I-43 North-South Freeway Corridor Study evaluated a no-build alternative and a range of build alternatives that would address the study's purpose and need to varying degrees.

WisDOT and FHWA have identified in this draft environmental impact statement (DEIS) a preferred alternative that would address long-term needs in the study corridor while minimizing to the extent possible and practicable impacts to adjacent developments and environmental resources. WisDOT and FHWA will select a preferred alternative after reviewing input received at a public hearing and during the public comment period for this DEIS. The preferred alternative will be based on engineering and environmental factors, and input from citizens, state and federal resource agencies, cooperating and participating agencies, Native American tribes, local officials and other interested parties.

NO-BUILD ALTERNATIVE

The No-Build Alternative serves as a baseline for impact comparison to the build alternatives. Under the No-Build Alternative, the study corridor freeway and its interchanges would be maintained in its current configuration. Over time and as needed, WisDOT would replace existing pavement, structures and other highway elements. This alternative does not provide capacity expansion, or design and safety improvements on the freeway mainline or at the interchanges. The No-Build Alternative would have fewer environmental impacts and would cost less than the build alternatives; however, it would not address substandard design elements, safety concerns, or forecast traffic volumes. Therefore, the No-Build Alternative is not a viable long-term solution for addressing current and emerging problems in the I-43 North-South Freeway study corridor.

TRANSPORTATION SYSTEM MANAGEMENT AND TRAVEL DEMAND MANAGEMENT ELEMENTS

The build alternatives for I-43 and its interchanges as discussed in the "Project-Level Highway Improvements" subsection below include regionwide transportation system management (TSM) and travel demand management (TDM) elements recommended in SEWRPC's regional transportation plan. TSM elements in the I-43 North-South Freeway study corridor include ramp metering, traffic detectors, closed circuit television cameras, and crash investigation sites. TDM elements include rapid bus service and special event service in Milwaukee County provided by the Milwaukee County Transit System (MCTS) and the Ozaukee County Express. Transit improvements planned in the study corridor, such as rapid and express bus routes, would not be precluded or affected by the proposed highway improvements. Existing transit service or future expanded service would be enhanced by the study's proposed highway improvements due to safer and more efficient conditions that could also reduce transit travel times.

TSM elements optimize existing transportation facilities to maximum carrying capacity and travel efficiency through freeway, and local road traffic management and other measures to help alleviate congestion. TDM elements reduce personal vehicular travel by increasing transit use or shifting personal vehicular travel to alternative times and routes, allowing for more efficient use of the existing transportation system's capacity.

PROJECT-LEVEL HIGHWAY IMPROVEMENTS

WisDOT developed, evaluated and screened an initial broad range of highway improvement alternatives based on purpose and need factors, costs, environmental constraints, impacts to natural resources and abutting development, and input from resource agencies, local officials, and the public. The initial range included the following build alternatives:

- Spot improvements
- I-43 mainline modernization with no capacity expansion (maintaining four traffic lanes)
- I-43 mainline modernization with capacity expansion (adding additional lane for six traffic lanes)

The South Segment of the I-43 mainline, between Silver Spring Drive and Green Tree Road, included several alignment alternatives that would reconstruct I-43 along its centerline, shifting east or west of its existing alignment or raising the alignment to minimize right of way impacts. The South Segment alternatives include reconstructing Jean Nicolet Road and converting Port Washington Road from two to four lanes. The North Segment of the I-43 mainline between Green Tree Road and WIS 60 included alignment alternatives generally centered on the existing alignment, but with widening options to the inside median or to the outside shoulders. WisDOT considered a range of interchange configurations at each interchange, including:

- Diamond
- Tight Diamond
- Diverging Diamond
- Split Diamond
- Horseshoe

Section 2 provides detailed information about the initial range of alternatives considered and the screening process to determine the reasonable and preferred alternatives to be carried forward for detailed evaluation in the DEIS. The reasonable alternatives that best address current and future deficiencies, safety, and traffic demand while minimizing impacts to the natural and built environment are summarized in the next sections. The sections below also identify the preferred alternative for the I-43 mainline and interchanges.

PREFERRED ALTERNATIVES

- **I-43 Mainline South Segment (Silver Spring Drive to Green Tree Road:** Modernization – 6 Lanes (Shifted East)
- **I-43 Mainline North Segment (Green Tree Road to WIS 60):** Modernization – 6 Lanes; additional lanes added to inside median
- **Good Hope Road Interchange:** Tight Diamond
- **Brown Deer Road Interchange:** Diverging Diamond
- **County Line Road Interchange:** Split Diamond Hybrid
- **Mequon Road Interchange:** Tight Diamond
- **Highland Road Interchange:** Tight Diamond
- **County C Interchange:** Diamond

I-43 FREEWAY MAINLINE

The Modernization – 6 Lanes (Mainline Shifted East) alternative was carried forward for detailed analysis and is WisDOT's preferred alternative in the South Segment. Under this alternative, I-43 would be reconfigured to six lanes between Silver Spring Drive and Bender Road with spot improvements that replace median barriers and improve inside and outside shoulders to current design standards. I-43 would then be widened with a "best fit" alignment between Bender Road and the Union Pacific (UP) Railroad bridge but generally offset to the east of the existing freeway centerline from the UP Railroad bridge to Green Tree Road. The alternative would include other alignment adjustments at spot locations to minimize impacts, and it would replace the UP Railroad bridge. Reconstruction would involve replacing pavement, correcting vertical profiles to increase clearances at all bridges and widening inside and outside shoulders to meet current standards. Under this alternative, Jean Nicolet Road would be reconstructed as a two-lane facility on its existing alignment with a sidewalk on the west side and a bike lane on both sides of the road. As proposed, Port Washington Road would be shifted east and reconstructed as a four-lane facility between Bender Road and Daphne Road, with sidewalk on the east side and bike lanes on both sides of the road.

Improvements in the North Segment I-43 mainline (Green Tree Road to WIS 60) also involve reconstructing the existing four-lane freeway to six lanes, replacing pavement, correcting vertical profiles to increase clearances at all bridges and reconstructing inside and outside shoulders to meet current standards. Widening is proposed to occur generally on the inside (median) to minimize right of way impacts in both the Milwaukee County and Ozaukee County portions of the I-43 mainline. Barrier treatment options in the median, which would be determined during the preliminary engineering phase, would include a concrete barrier or beam guard. The Modernization-6 Lanes alternative, with inside widening, is the preferred alternative for the North Segment of the I-43 mainline.

I-43 INTERCHANGES

The reasonable interchange alternatives retained for detailed study in this DEIS are summarized below. Further information about the initial range of alternatives considered and the screening process leading to the reasonable alternatives is provided in **Section 2**.

Silver Spring Drive

The Silver Spring Interchange was reconstructed in 1992 and upgraded in 2006. It does not require improvements at this time. In the long term, the Silver Spring Drive interchange would be evaluated when I-43 mainline to the south of Silver Spring Drive is studied for possible future improvements.

Good Hope Road

WisDOT's preferred alternative for the Good Hope Road interchange is a Tight Diamond, which would include the following elements:

- Reconstructs ramps to current design standards to improve safety.
- Ramps on east side pulled closer to I-43 to maximize distance between the ramps and the Port Washington Road/Good Hope Road intersection for better traffic operations.
- Retains the recently reconstructed Good Hope Road bridges over I-43.

Brown Deer Road

WisDOT is considering two reasonable alternatives at the Brown Deer Road interchange. The Diamond alternative would include the following elements:

- Replaces existing loop ramps with standard Diamond ramps.
- Ramps on east side would be pulled closer to I-43 to maximize distance between ramps and the Port Washington Road/Brown Deer Road intersection for better traffic operations.
- Retains the recently reconstructed Brown Deer Road bridges over I-43.

WisDOT is also considering a Diverging Diamond interchange alternative. This alternative would include the following elements:

- Ramps on east side would be pulled closer to I-43 to maximize distance between ramps and the Port Washington Road/Brown Deer Road intersection.
- Eastbound and westbound traffic on Brown Deer Road cross to opposite lanes on the I-43 overpass bridge to facilitate turning movements.
- Retains the recently reconstructed Brown Deer Road bridges over I-43.
- Provides adequate capacity for a longer period beyond the design year of 2040, as compared with the Diamond interchange.

WisDOT's preferred alternative is the Diverging Diamond interchange.

County Line Road

The County Line Road interchange is a partial interchange with I-43 access to and from the south only. FHWA regulations require that interchanges provide for all movements to and from Interstate freeways. Consistent with FHWA regulations, WisDOT is considering a No Access alternative, which removes the existing partial interchange, or reconstructing the interchange as a Split Diamond Hybrid to provide for all traffic movements. While the partial interchange does not meet FHWA's Interstate requirements, the city of Mequon asked WisDOT to submit a request to FHWA to consider an exception. A decision from FHWA is pending. WisDOT is retaining a Partial Diamond interchange alternative for detailed study. The Partial Diamond interchange alternative would extend the northbound exit ramp further north to terminate at the Port Washington Road/Katherine Drive intersection. Extending the ramp further north removes weaving conflicts with the northbound entrance ramp from the Brown Deer Road interchange. The southbound entrance ramp from County Line Road would be reconstructed at its existing location.

WisDOT's preferred alternative for the County Line Road interchange is the Split Diamond Hybrid, which would include the following elements:

- Shifts the northbound exit ramp further north to increase weaving distance between the exit ramp and the Brown Deer interchange northbound entrance ramp.
- Provides full access with ramps split between County Line Road and Port Washington Road.
- Maintains local access on Port Washington Lane.

The two subalternatives of the Split Diamond Hybrid feature different access options for the Katherine Drive/Port Washington Road intersection and the northbound entrance ramp.

The Split Diamond Hybrid (Grade Separation) would:

- Access the northbound entrance ramp from Port Washington Road.
- Construct a Port Washington Road bridge over Katherine Drive and route Katherine Drive to a new

intersection with Port Washington Road approximately 900 feet south of the existing intersection.

The Split Diamond Hybrid (without Grade Separation) would:

- Access the northbound entrance ramp from Katherine Drive.
- Reconstruct the existing Katherine Drive/Port Washington Road intersection in the same general location.

WisDOT would select a preferred subalternative after the public hearing and comment period on the DEIS. If either the No Access or Split Diamond Hybrid alternative is selected as the preferred alternative, SEWRPC would amend its long-range transportation plan before FHWA issues a Record of Decision (ROD) for the study. If FHWA approves the waiver for a Partial Diamond interchange, WisDOT may consider it as a preferred alternative.

Mequon Road

WisDOT's preferred alternative for the Mequon Road interchange is the Tight Diamond, which would include the following elements:

- Upgrades interchange to current FHWA design standards.
- Shifts I-43 mainline east and pulls southbound ramps closer to I-43 to maximize distance between the ramps and the Port Washington Road/Mequon Road intersection.

Highland Road

WisDOT is considering two reasonable alternatives at the Highland Road interchange. The Tight Diamond interchange, which is the preferred alternative, would provide new access to and from I-43 and would feature the following elements:

- Interchange ramps pulled in to minimize impacts to wetlands, the UP Railroad tracks east of I-43 and development west of I-43.
- Requires retaining walls.

Construction of a new Highland Road interchange will depend on agreement between WisDOT and the city of Mequon regarding construction funding. Without this agreement, WisDOT would implement the No Access alternative, which would not provide new access at Highland Road.

County C

WisDOT's preferred alternative for the County C interchange is the Diamond, which would include the following elements:

- Upgrades interchange to current FHWA design standards.
- Provides more storage space between west ramp terminals and intersection of Port Washington Road/County C intersection.

WIS 60

The existing ramps on the south side of the WIS 60 interchange would be adjusted slightly to accommodate the I-43 mainline transition from the new six-lane facility to the existing four-lane facility at this location. There would be no substantive changes to existing ramp geometry.

Environmental Impacts

Table S-1 summarizes environmental impacts of the reasonable build alternatives retained for detailed study. Detailed information on potential environmental effects, along with proposed mitigation measures for unavoidable adverse effects, is provided in **Section 3**.

Time Frame for Implementing Proposed Action

If a build alternative is selected at the conclusion of the current environmental impact statement (EIS) phase, the I-43 North-South Freeway Corridor Study would be considered for funding enumeration by the legislative Transportation Projects Commission (TPC) in fall 2014 along with several other statewide major transportation projects. If this study is enumerated by the TPC, it will proceed to the engineering design phase. Construction would depend on funding availability. The earliest construction would likely start is year 2020.

Other Federal or State Actions Required

If a build alternative is selected at the conclusion of the EIS process and the I-43 North-South Freeway Corridor Study proceeds to the engineering design phase, WisDOT will apply to the U.S. Army Corps of Engineers (USACE) for a permit to place fill in waters of the United States under Section 404 of the Clean Water Act. WisDOT will also request Water Quality Certification from the Wisconsin Department of Natural Resources (WDNR) under Section 401 of the Clean Water Act, consistent with standards contained in NR 103 and NR 299, Wisconsin Administrative Code.

Property acquisition and residential or business relocations will be done in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended by U.S. Code (USC) Title 49 USC § 24.

Regulatory Compliance

Planning, agency coordination, community involvement and impact evaluation for the I-43 North-South Freeway Corridor Study has been conducted in accordance with the National Environmental Policy Act and Wisconsin Environmental Policy Act, Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act, Endangered Species Act, National Historic Preservation Act, Resource Conservation and Recovery Act, and other federal and state laws, policies and procedures for environmental impact analysis and preparation of environmental documents. This document is also in compliance with U.S. Department of Transportation (USDOT) and FHWA policies for implementing Presidential Executive Order on Environmental Justice 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations. Neither minority populations nor low-income populations will experience disproportionately high and adverse impacts if a build alternative is implemented.

Local Concerns and Unresolved Issues

Some local residents in the vicinity of the County Line Road interchange have expressed concerns about the traffic impacts of a full access interchange. The city of Mequon has requested that WisDOT retain a partial interchange to minimize impacts and retain local access. WisDOT is retaining a Partial Diamond interchange alternative for detailed evaluation.

Because the partial interchange would not meet current Interstate interchange standards, both WisDOT and FHWA staff would continue to coordinate with the city to minimize impacts if the Split Diamond Hybrid alternative is selected as the preferred alternative after the public hearing on the DEIS.

The USACE does not concur with the preferred Highland Road Tight Diamond interchange alternative since the No Access alternative is the least environmentally damaging alternative to wetlands. The No Access alternative creates substantially greater traffic operations and business access impacts at the Port Washington Road/Mequon Road intersection, which requires added infrastructure to accommodate traffic volumes. The alternative does not meet the purpose and need of being consistent with SEWRPC's regional long-range transportation plans. But, if the city of Mequon determines not to participate in the local cost-share for interchange construction, WisDOT would move forward with the No Access alternative as the preferred alternative. Other known concerns and issues have been addressed to the extent practicable based on the level of engineering detail and environmental information available at this stage.

Table ES-1: Impacts Summary

Environmental Factors	Alternatives								
			Brown Deer Road Interchange		County Line Road Interchange			Highland Road Interchange	
	No-Build	Build[1]	Diamond	Diverging Diamond[2]	No Access	Split Diamond Hybrid[2, 3]	Partial Diamond	No Access	Tight Diamond[2]
New right of way (acres)	0	23.12	1.84	2.14	1.59	1.72	1.72	0	1.32
Traffic LOS in design year 2040	E/F	C/D	C/D	C/D	NA	C	C	N/A	C
Residential relocations	0	12	0	0	0	0	0	0	0
Commercial relocations	0	3	0	0	0	0	0	0	0
Total wetland (acres)	0	20.3	0.75	0.72	1.01	1.03	1.03	2.10	5.43
Advanced identification of wetland disposal areas (acres)	0	2.51	0	0	0	0	0	0	0
Environmental corridors and isolated natural resource areas (acres)	0	4.07	0	0	0	0	0	0	0.16
Stream crossings	21[4]	20[4]	0	0	1	1	1	0	0
100-year floodplain crossings	8	7	0	0	0	0	0	0	1
100-year floodplain fill (acres)	0	4.78	0	0	0	0	0	0	0.14
Farmland (acres)	0	9.6	0	0	0	0	0	0	0
Threatened/endangered species (potential for impacts)	No	Yes[5]	Yes[5]	Yes[5]	Yes[5]	Yes[5]	Yes[5]	Yes[5]	Yes[5]
Historic structures/properties (North Shore Water Treatment Plant)	0	1	0	0	0	0	0	0	0
Archaeological sites	0	0	0	0	0	0	0	0	0
Public use facilities (Craig Counsell Park, Nicolet High School land)	0	2	0	0	0	0	0	0	0
Noise receptors impacted (design year 2040)	N/A	• 290 residences • 2 school athletic fields • 1 place of worship • 1 day care center	• 290 residences • 2 school athletic fields • 1 place of worship • 1 day care center	• 290 residences • 2 school athletic fields • 1 place of worship • 1 day care center	• 280 residences • 2 school athletic fields • 1 place of worship • 2 day care centers	• 279-280 residences[5] • 2 school athletic fields • 1 place of worship • 1 day care center	• 280 residences • 2 school athletic fields • 1 place of worship • 2 day care centers	• 290 residences • 2 school athletic fields • 1 place of worship • 1 day care center	• 290 residences • 2 school athletic fields • 1 place of worship • 1 day care center

Notes:

1. The build alternative includes the preferred I-43 mainline Modernization – 6 Lanes alternatives for the South and North segments, and preferred alternatives for the interchanges at Good Hope Road, Mequon Road and County C.

2. Preferred alternative.

3. Includes theSplit Diamond Hybrid grade separation/without grade separation subalternatives.

4. Stream crossings include Fish Creek, its tributaries and tributaries to the Milwaukee River, including Ulao Creek and Indian Creek. All existing structures are either concrete box culverts or pipe culverts.

5. Potential habitat for the seaside crowfoot (Ranunculus cymbalaria), a state-listed threatened species, observed in the study corridor. Impacts to other threatened and endangered species and their habitat in the study corridor can be avoided.

6. Residential noise receptors impacted: 279 with Split Diamond Hybrid (without Grade Separation); 280 with Split Diamond Hybrid (Grade Separation).

Environmental Factors	Alternatives								
			Brown Deer Road Interchange		County Line Road Interchange			Highland Road Interchange	
	No-Build	Build[1]	Diamond	Diverging Diamond[2]	No Access	Split Diamond Hybrid[2, 3]	Partial Diamond	No Access	Tight Diamond[2]
Potential contaminated sites (recommended for further investigation)	N/A	30	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives
Air quality concerns	No	No	No	No	No	No	No	No	No
Indirect effects anticipated?	Land use effect: Increasing congestion could cause development to shift away from primary study area (and to a lesser extent within secondary study area) to locations within the region that have less congestion	Land use effect: Facilitates planned redevelopment and development within primary study area (and to a lesser extent within the secondary study area)	Limited land use effect: Maintains existing access; supports existing businesses and neighborhoods and planned redevelopment within Milwaukee County primary study area	Limited land use effect: Maintains existing access; supports existing businesses and neighborhoods and planned redevelopment within Milwaukee County primary study area	Limited land use effect: Established land uses minimize effect; changed travel patterns; access available from nearby interchanges	Limited land use effect: Established land uses minimize effect. Some local concerns about traffic impacts and travel indirection of the “Grade Separation” subalternative; the “without Grade Separation” subalternative minimizes indirection. Supports Port Washington Road business corridors in Mequon, Bayside and Fox Point.	No change from existing conditions	Limited land use effect: Planned land uses likely to occur regardless of interchange alternative; nearby freeway access is already available.	Improved access and local implementation of the Mequon East Growth Area Plan would facilitate planned land uses.
Cumulative effects anticipated?	No	Limited effect: Mitigation measures minimize effects	Limited effect: Mitigation measures minimize effects	Limited effect: Mitigation measures minimize effects	Limited effect: Mitigation measures minimize effects	Limited effect: Mitigation measures minimize effects	No change from existing conditions	Limited effect: Mitigation measures minimize effects	Limited effect: Mitigation measures minimize effects
Environmental justice effects anticipated?	No	Build alternative’s indirect and cumulative land use effects could facilitate employment land uses in areas that are not accessible by transit.	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives	Part of corridorwide analysis; no difference among interchange alternatives

Notes:

1. The build alternative includes the preferred I-43 mainline Modernization – 6 Lanes alternatives for the South and North segments, and preferred alternatives for the interchanges at Good Hope Road, Mequon Road and County C.

2. Preferred alternative.

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4. Stream crossings include Fish Creek, its tributaries and tributaries to the Milwaukee River, including Ulao Creek and Indian Creek. All existing structures are either concrete box culverts or pipe culverts.

5. Potential habitat for the seaside crowfoot (Ranunculus cymbalaria), a state-listed threatened species, observed in the study corridor. Impacts to other threatened and endangered species and their habitat in the study corridor can be avoided.

6. Residential noise receptors impacted: 279 with Split Diamond Hybrid (without Grade Separation); 280 with Split Diamond Hybrid (Grade Separation).

1. PURPOSE AND NEED FOR THE PROPOSED ACTION

The Wisconsin Department of Transportation (WisDOT) and the Federal Highway Administration (FHWA) initiated the I-43 North-South Freeway Corridor Study in northern Milwaukee County and southern Ozaukee County to address emerging pavement and structural needs, safety needs, design deficiencies and growing travel demand. The formal announcement of the I-43 North-South Freeway Corridor Study was published in the *Federal Register* on April 6, 2012.

Section 1.0 describes the purpose of the proposed project and the need for improvements being considered in the I-43 North-South Freeway study corridor. Purpose and need factors encompass improvements intended to correct existing problems, and problems that may occur later during the project's 30-year planning period, ending in the year 2040. This section highlights these problems in the corridor in detail.

Together, the purpose and need for improvements in the I-43 North-South Freeway study corridor will shape the range of alternatives developed and evaluated, leading to the preferred alternative. The alternatives evaluation process determines the most appropriate solution(s) to identified and anticipated problems. The preferred alternative will be selected, in part, based on how well it satisfies the study's purpose and need.

1.1. PROJECT LOCATION

The I-43 North-South Freeway study corridor encompasses about 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) (**Exhibit 1-1**). Other municipalities in the study area include the villages of River Hills, Fox Point, and Bayside; the city of Mequon; and the town of Grafton.

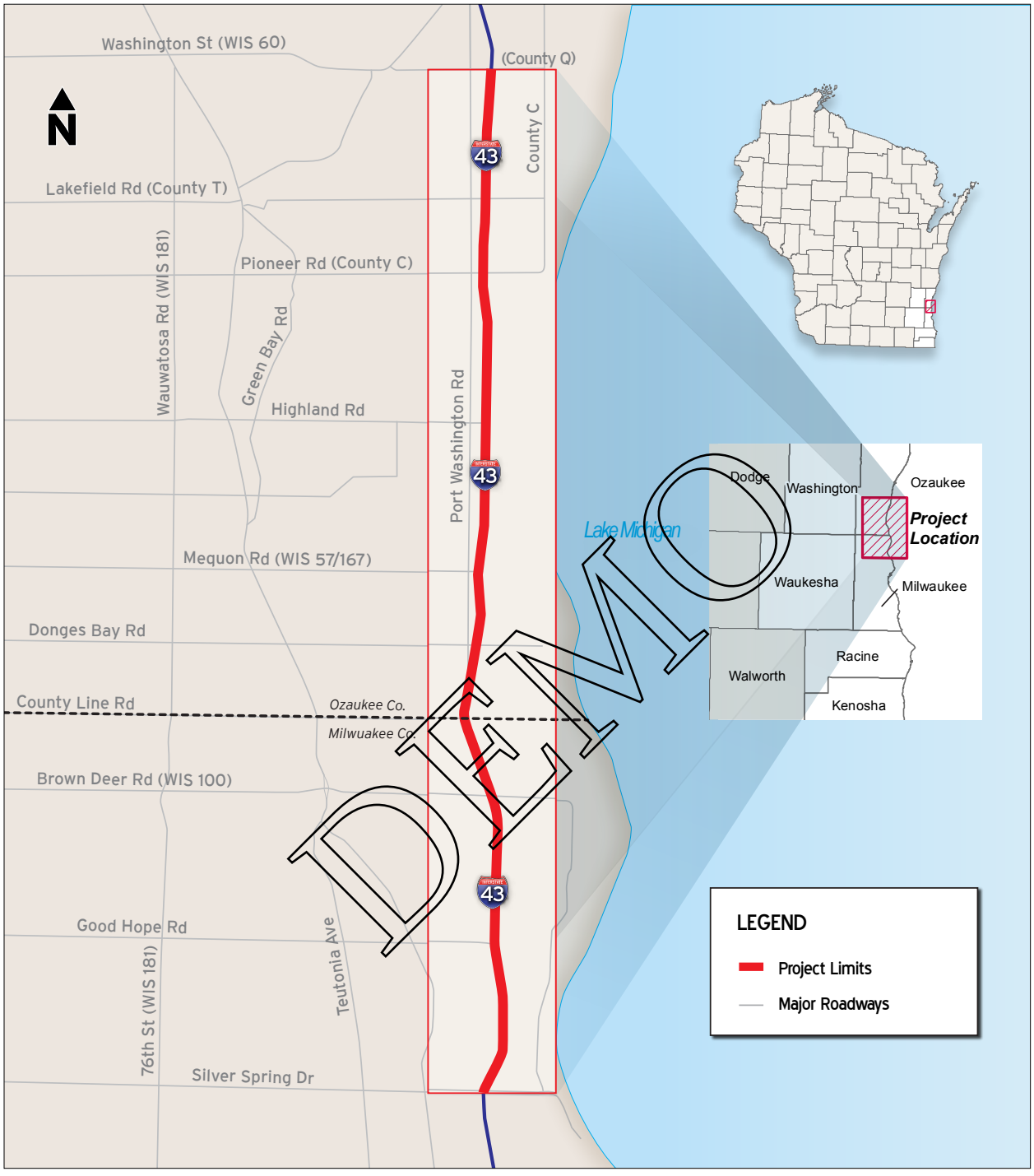
Seven interchanges exist in the corridor located at Silver Spring Drive, Good Hope Road, Brown Deer Road (WIS 100), County Line Road, Mequon Road (WIS 57/167), County C (Pioneer Road) and WIS 60.

WisDOT and FHWA considered projected future traffic volumes, design deficiencies, crash rates and other freeway features when they determined the project limits. The agencies specifically, for example, considered the drop from six lanes to four lanes on I-43 just north of Silver Spring Drive, and north of WIS 60, where the freeway becomes less urbanized. The project limits are consistent with the following criteria used by FHWA[1] to determine project termini:

- Connects logical termini and is sufficiently long enough to address environmental matters on a broad scope;
- Has independent utility or independent significance. That is, a proposed action is usable and a reasonable expenditure even if no additional transportation improvements in the area are made; and
- Does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

[1] *Code of Federal Regulations (CFR) 23 CFR § 771.111(f)*

Exhibit 1-1: North-South Freeway Corridor Project Limits



1.2. PURPOSE OF THE PROPOSED PROJECT

The proposed I-43 North-South Freeway Corridor Study alternatives will provide a safe and efficient transportation system to serve existing and future travel demand, and support regional and local land use planning objectives articulated in the regional transportation plans. Study alternatives must also minimize impacts to the natural, cultural and built environment to the extent feasible and practicable.

The purpose of the I-43 North-South freeway corridor study is to address emerging pavement and structural needs, safety issues and design deficiencies while identifying methods to accommodate existing and projected future traffic volumes.

1.3. NEED FOR THE PROPOSED ACTION

The need for the proposed improvements sets the stage for developing and evaluating possible alternatives. The need for the transportation improvements in the I-43 North-South Freeway study corridor is demonstrated through a combination of factors including the following elements:

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

1.3.1. Pavement, Freeway Design and Geometric Deficiencies

Exhibit 1-2 and **Exhibit 1-3** summarize some of the key substandard road elements along the I-43 North-South Freeway study corridor that are discussed in greater detail in this subsection.

I-43 has six travel lanes with a narrow, barrier-separated median at Silver Spring Drive. Going north, I-43 narrows to four travel lanes just south of Bender Road. Between Bender Road and Good Hope Road, the median ranges in width from 22 feet to 48 feet, with either a concrete barrier or beam guard, and narrow curbed shoulders. Between Good Hope Road and County Line Road the freeway has flush, paved shoulders, and the median changes between concrete and grass with a concrete barrier or cable guard in the center. The remainder of the study corridor freeway north of County Line Road has a grass median between 60 feet and 70 feet wide, with paved shoulders ranging in width from 6 feet to 11 feet.

Seven service interchanges are located along the study corridor freeway. Interchanges in the corridor are about 2 miles apart in Milwaukee County, and between 3 and 4 miles apart in Ozaukee County. The greatest distance between interchanges is the 4 miles between Mequon Road and Pioneer Road (County C). The general rule for interchange spacing, according to the American Association of State Highway and Transportation Officials (AASHTO), is a minimum of 1 mile for freeways in urban areas and 2 miles in rural areas. The I-43 North-South study corridor freeway is considered urban.

Service interchanges connect freeways with surface streets and cross roads.

Exhibit 1-2: I-43 Existing Substandard Road Elements, Milwaukee County

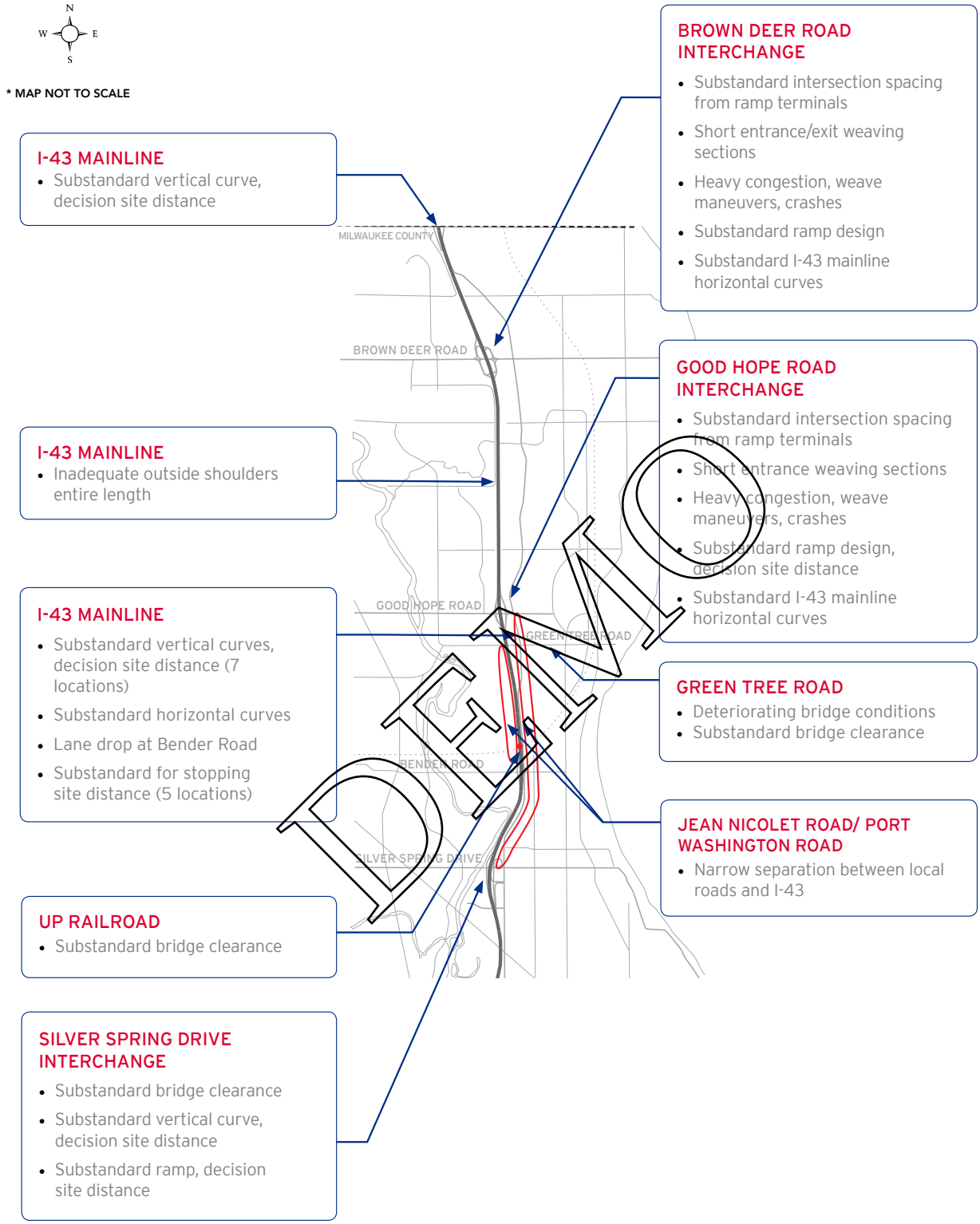
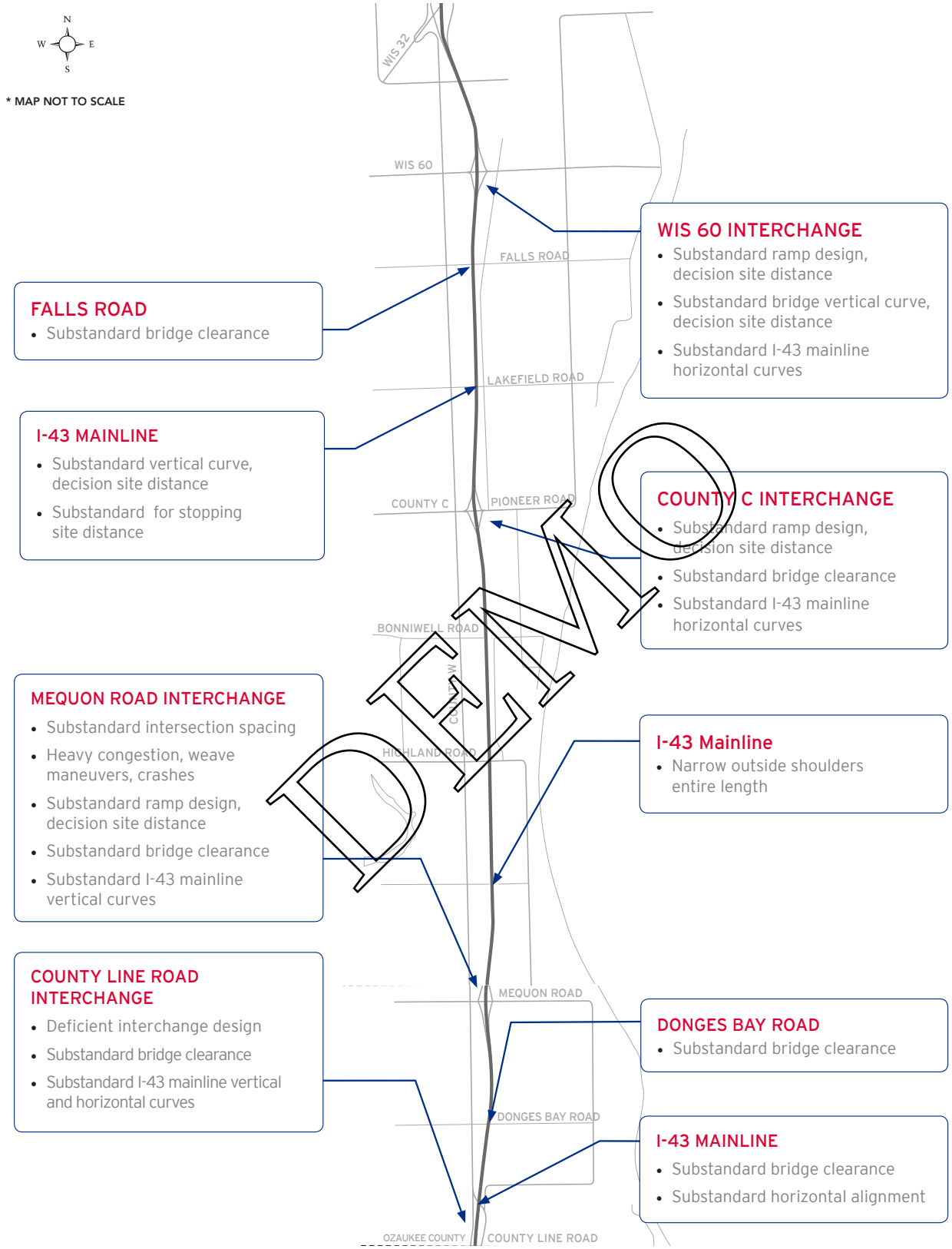


Exhibit 1-3: Existing Substandard Road Elements, Ozaukee County



Several more local and county highways cross over or under the study corridor freeway. Union Pacific (UP) Railroad tracks pass over I-43 just north of Bender Road and run parallel along the east side of the freeway north of Donges Bay Road. Port Washington Road (County W) is the frontage road on the east side of I-43 from Silver Spring Drive to Daphne Road. Jean Nicolet Road is the frontage road from Montclaire Avenue to Green Tree Road on the west side of I-43.

PAVEMENT CONDITION

WisDOT's evaluation shows that I-43's pavement has exceeded its life expectancy. The study corridor freeway first was constructed between the mid-1950s and mid-1960s. Concrete pavement eventually wears and cracks. As water enters the pavement, it rusts the tie bars that hold slabs of concrete together (**Exhibit 1-4**). Water also runs through the cracks to the gravel base under the pavement, washing out the finer gravel material and creating a void that makes the base for the pavement less stable. Heavy trucks, and hot and cold temperature extremes add to the stresses on the pavement.

WisDOT resurfaced I-43 in Milwaukee County with a layer of asphalt pavement in the late 1970s, and in Ozaukee County in the early 1980s. This effort returned the roadway to a smooth riding surface but did not address the cracks in the original pavement or possible voids in the gravel base under the pavement. WisDOT reconstructed I-43 between Silver Spring Drive and Bender Road in the early 1990s when it reconstructed the Silver Spring interchange.

WisDOT resurfaced I-43 from Bender Road to WIS 60 once again in the late 1990s, and it plans to overlay this segment again in 2014. The planned 2014 resurfacing will extend the life and drivable condition of the pavement for a few years until I-43 is reconstructed.

Each resurfacing has a shorter and shorter life span because the original pavement, still in place after more than 55 years, provides a less effective base as it continues to crack and deteriorate (**Exhibit 1-5**). A condition called "faulting" occurs in the joints that cross the roadway as slabs of concrete are pushed up at slightly different elevations, making for an uneven driving surface. The study corridor freeway asphalt overlay shows signs of chipping away in the joints between the lanes, resulting in a V-shaped depression in the roadway.

Exhibit 1-4: Basic Pavement Components

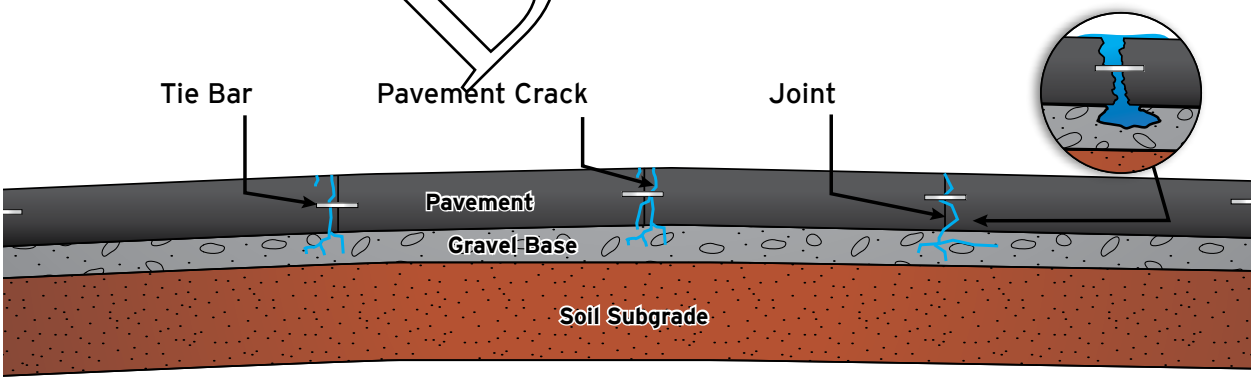
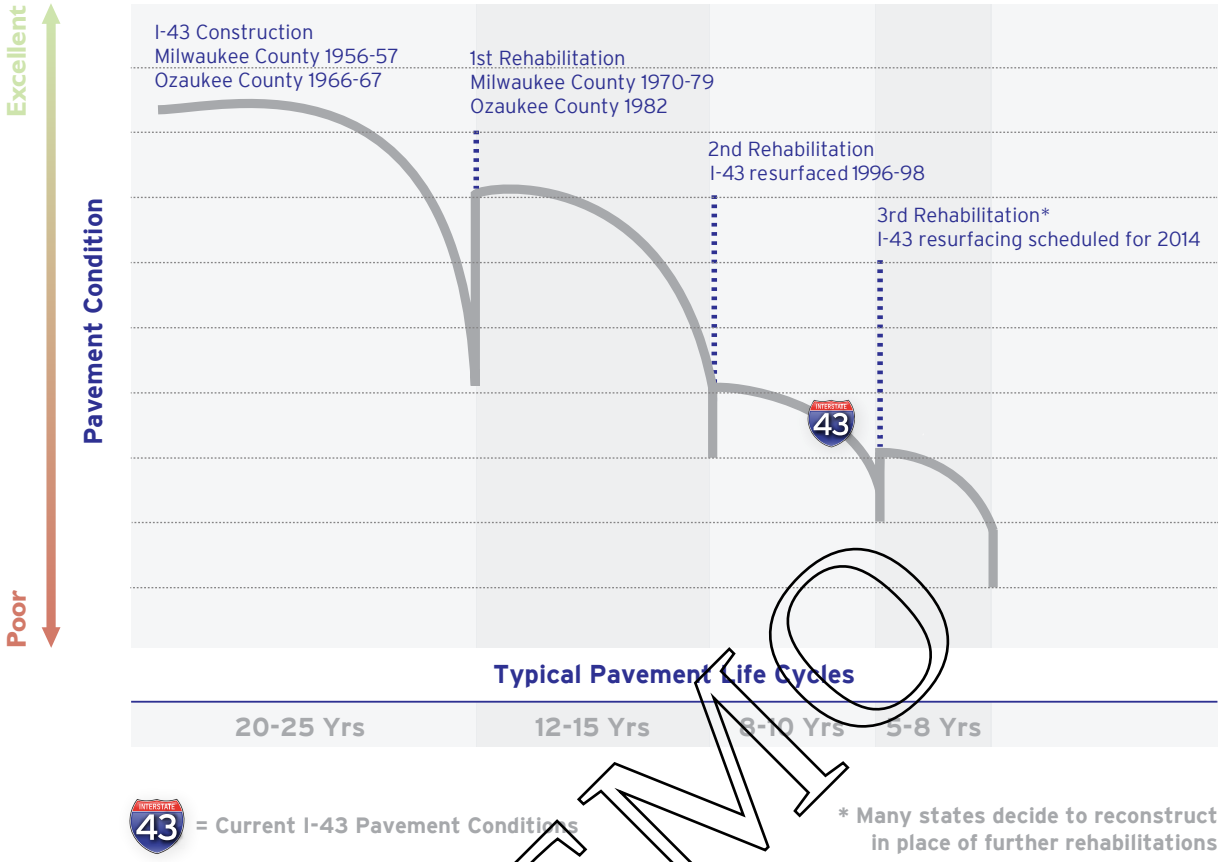


Exhibit 1-5: Pavement Life



BRIDGE CONDITION

The bridges on the study corridor freeway generally are in fair or good condition, as measured by the FHWA's National Bridge Inventory, which evaluates bridges with a scale of 0 to 9. One exception is the Green Tree Road bridge over I-43, which has a rating of 4, defined as "meets minimum tolerable limits to be left in place as is." The Port Washington Road bridge crossing over I-43 has a rating of 5 (fair condition) and the rest have ratings of 6 (good condition) or higher. During the next 10 years, the condition of several of these bridges likely will deteriorate, even with routine maintenance and there will come a point when it becomes more cost effective to simply replace the bridges. Replacement also provides the opportunity to bring the basic design of the bridges up to current standards, including vertical clearance, discussed in greater detail later in this section.

FREEWAY DESIGN DEFICIENCIES

This section describes various design-related deficiencies that exist along the I-43 North-South Freeway study corridor, including road separation, access control, interchange design, lane continuity and ramp design.

FREEWAY/OUTER ROAD SEPARATION

The distance between I-43 and the parallel local service roads is severely deficient in some areas. Port Washington and Jean Nicolet roads, between Silver Spring Drive and Green Tree Road, are

only about 28 feet from I-43, with some areas as close as 22 feet.[2] Both WisDOT and AASHTO follow federal Interstate guidelines for freeway design. WisDOT design standards call for a desirable 85-foot separation between arterials and frontage roads in urban areas. AASHTO recommends outer separation widths between 80 feet and150 feet, although much narrower widths may be used in urban areas where retaining walls are used. Retaining walls can provide a measure of safety in such conditions; however, they are located only along a portion of this section of I-43.

ACCESS CONTROL

WisDOT has developed standards to control access between ramp termini and local roads and driveways, allowing interchanges to operate efficiently. For example, when a local road intersection is close to a ramp terminal, high traffic volume can cause substantial queuing, weaving and overall poor operations (**Exhibit 1-6**). WisDOT standards call for a desirable distance of 1,320 feet between a ramp terminal and an adjacent crossroad intersection to maintain interchange function.

Good Hope Road represents an example of how substandard spacing can impact traffic operations: The Port Washington Road/Good Hope Road intersection is 300 feet east of the northbound off- and on-ramps for the Good Hope Road interchange with I-43. This short distance between the intersection and the interchange ramps causes traffic queues.

Table 1-1 identifies the study corridor freeway interchanges and their respective distances to the nearest cross-road intersection, many of which are less than 1,320 feet.

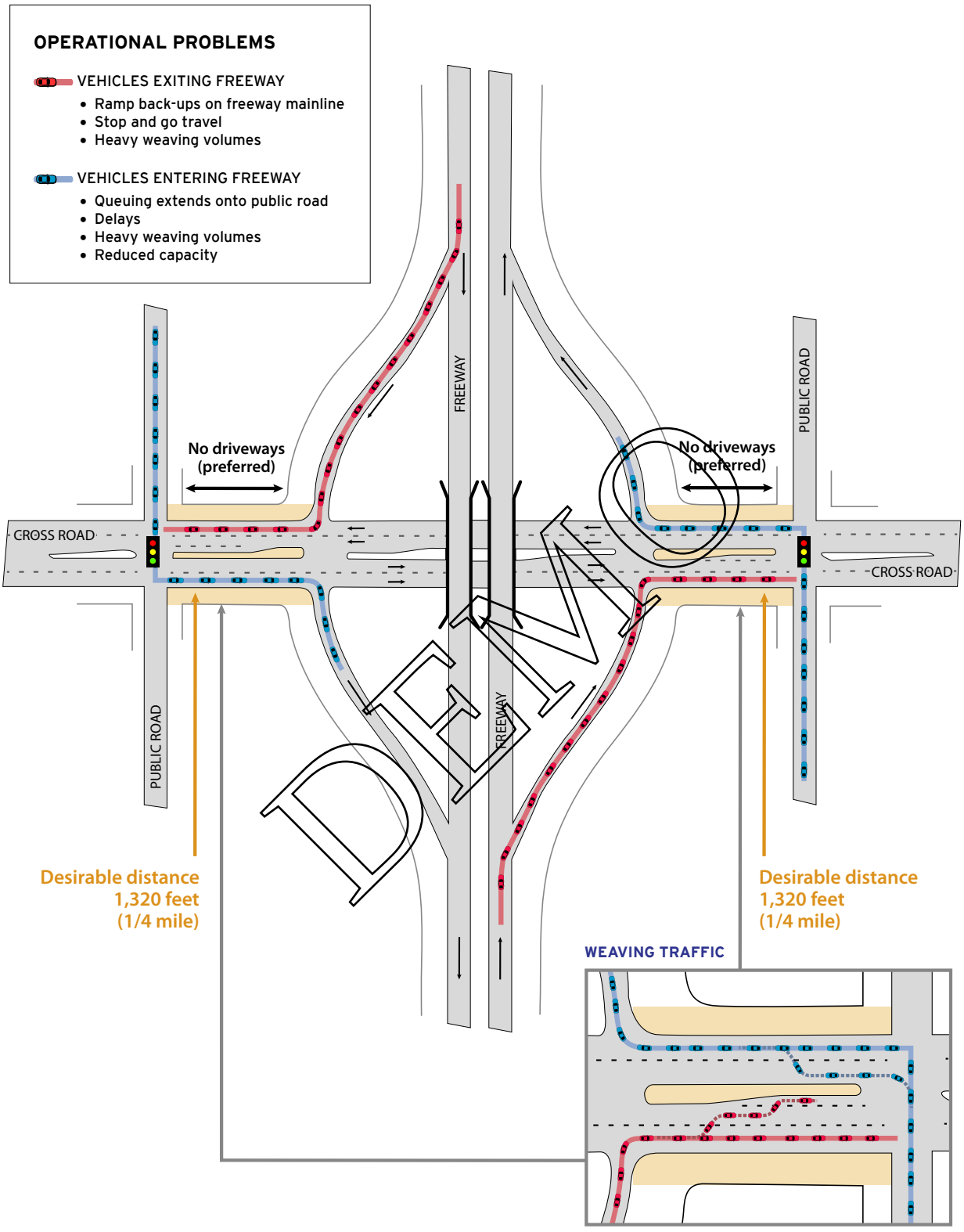
Table 1-1: Existing Distances from Interchange Ramp Terminals to Nearest Roadway Intersections

I-43 Cross Road Interchange	Nearest Roadway Intersection to the West/North	Ramp Terminal to Intersection (Feet)	Nearest Roadway Intersection to the East/South	Ramp Terminal to Intersection (Feet)
Silver Spring Drive	Milwaukee River Parkway	1000’	Silver Spring Drive (ramp terminals intersect Port Washington Road)	600’-800’
Good Hope Road	Pheasant Lane	475’	Port Washington Road	300’
Brown Deer Road	Spruce Road	1700’	Port Washington Road	800’
Port Washington Road	Ravine Lane	650’	Laramie Lane	150’
County Line Road	Pheasant Lane	360’	Port Washington Road	420’
Mequon Road	Port Washington Road	400’	San Marino Drive	830’
County C	Port Washington Road	530’	Lake Shore Drive	1550’
WIS 60	Port Washington Road	1200’	Washington Street	360’

Source: WisDOT

[2] *Distances measured from the edges of travel lanes.*

Exhibit 1-6: Substandard Access Control



Similar operational issues with interchanges can occur when local driveways are too close to ramp terminals. Locations that have driveways within 1,320 feet of an interchange ramp terminal include the following:

- Silver Spring Drive
  - Right-in/right-out driveway to businesses, south side of Silver Spring, west of Port Washington Road
- Brown Deer Road
  - Two right-in/right-out driveways to businesses, south side of Brown Deer Road, west of Port Washington Road
  - Five right-in/right-out driveways to businesses, north side of Brown Deer Road, west of Port Washington Road
- WIS 60
  - Right-in/right-out driveway to businesses, south side of WIS 60, east of Port Washington Road
  - Right-in/right-out driveway to businesses, north side of WIS 60, east of Port Washington Road

PARTIAL INTERCHANGE

WisDOT will also evaluate alternatives at the County Line Road interchange. The existing partial interchange at the Milwaukee/Ozaukee County line provides access to County Line Road via Port Washington Road as a northbound exit from I-43. The only access from County Line Road to I-43 is via a southbound entrance ramp. Because the Interstate serves broader regional and instate travel needs, FHWA policy states that all service interchanges on Interstate routes shall provide full access, serving all traffic movements.[3]

The County Line Road interchange does not provide an intuitive path to return to I-43 northbound. Drivers, especially those unfamiliar with the area, expect to be able to re-enter the freeway at the same location they exit.

LANE CONTINUITY

Lane continuity means drivers do not need to change lanes or exit to remain on a route. Just south of Bender Road, I-43 drops one through lane going north and adds one through-lane going south. The lane drop contributes to the reduced level of service on the freeway.

RAMP DESIGN DEFICIENCIES

Several of the I-43 North-South study corridor freeway interchange ramps have design deficiencies that impact overall level of service and safety. Some key deficiencies are discussed below.

Ramp Taper Rate

Adequate merging distance is often measured by a ramp's taper length, which should be between 50:1 and 70:1 for a freeway entrance ramp (the merge lane becomes 1 foot narrower every 50 feet), based on AASHTO standards. Using this criterion, several ramps on the study corridor are considered deficient (**Table 1-2**). While the existing ramps on I-43 are a taper type of ramp, AASHTO guidance calls for a preferable parallel type ramp (**Exhibit 1-7**), which allows vehicles more distance to get up to speed before entering traffic, or to slow down outside of active traffic lanes to exit the freeway.

[3] *The Code of Federal Regulations (CFR) 23 CFR §625.4 specifically lists "A Policy on Design Standards Interstate System" (AASHTO, January 2005) as an applicable standard.*

Table 1-2: Deficient Ramp Tapers

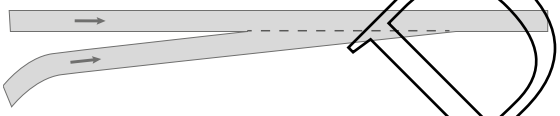
Location	Taper Length
Good Hope Road	
Northbound entrance ramp	30:1
Southbound entrance ramp	25:1
Brown Deer Road	
Northbound entrance ramp	No taper; served by auxiliary lane
Mequon Road	
Northbound entrance ramp	35:1
Southbound entrance ramp	45:1
County C	
Northbound entrance ramp	45:1
Southbound entrance ramp	40:1
WIS 60	
Northbound ramp	45:1
Southbound ramp	30:1

Source: WisDOT

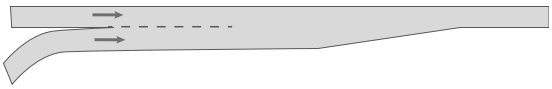
Exhibit 1-7: Entrance and Exit Ramp Types

ENTRANCE RAMP

Taper Type

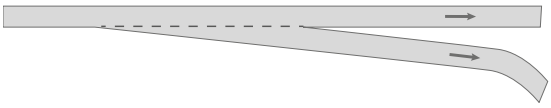


Parallel Type



EXIT RAMP

Taper Type



Parallel Type

Acceleration/Deceleration Lanes

Ramp design includes careful consideration for adequate deceleration lanes on exit ramps and acceleration lanes on entrance ramps. Deceleration lanes allow drivers to safely stop at the end of a ramp. Acceleration lanes allow drivers to get up to speed and enter the freeway at the same speed as the freeway traffic. A difference in speed, or speed differential presents a safety concern.

The required length of the acceleration/deceleration lanes varies depending on the tightness of curves on the ramp. An entrance ramp that has a gradual curve allows drivers to accelerate on the ramp, and therefore, the length of the acceleration lane need not be as long as an entrance ramp that has tighter curves.

The Good Hope Road and Brown Deer Road interchanges have substandard ramp lengths that make it difficult to merge into I-43 traffic, hence reducing the queue space to enter the freeway when the interchanges are congested. The Brown Deer Road interchange also has substandard curves within its loop ramps, which creates an inadequate acceleration lane. Currently, the Brown Deer Road interchange has the most design deficiencies and has the highest crash rate reported in the corridor.

Several of the entrance and exit ramps listed in **Table 1-3** have inadequate acceleration and deceleration lengths based on AASHTO freeway design guidelines.

Ramp Lane Width

According to WisDOT guidelines, single-lane curbed freeway ramps should have a 22-foot width measured from face-of-curb to face-of-curb. Curbed ramps with a substandard width of less than 22 feet exist at the following locations:

- Good Hope Road southbound on-ramp: 19 feet wide
- Brown Deer Road northbound off-ramp (southeast quadrant): 20 feet wide
- Brown Deer Road northbound on-ramp (southeast quadrant): 20 feet wide
- Brown Deer Road northbound off-ramp (northeast quadrant): 20 feet wide
- Brown Deer Road northbound on-ramp (northeast quadrant): 19 feet wide
- Brown Deer Road southbound off-ramp (northwest quadrant): 20 feet wide
- Brown Deer Road southbound on-ramp (northwest quadrant): 20 feet wide
- Port Washington Road northbound off-ramp: 19 feet wide

GEOMETRIC DESIGN DEFICIENCIES

Freeways must meet the minimum values for several controlling design criteria, such as freeway alignment, cross slopes, sight distances, lane and shoulder widths and vertical clearances. The design standards developed for the controlling criteria are based on guidelines in the AASHTO's *A Policy on Geometric Design of Highways and Streets* (2001) and *A Policy on Design Standards – Interstate System* (2005), and WisDOT's *Facilities Development Manual* (FDM). These standards are the basis for evaluating the study corridor freeway for acceptability, function and safety.

Table 1-3: Ramp Acceleration and Deceleration Lengths

Connecting Highway	Ramp	Approximate Existing Acceleration/Deceleration Length (Feet)	AASHTO-Recommended Minimum Acceleration/ Deceleration Length (Feet)
Silver Spring Drive	NB on*	925	180
	NB off*	1,020	300
	SB on*	1035	300
	SB off*	745	350
Good Hope Road	NB on	460	1,020
	NB off	280	405
	SB on	415	1,020
	SB off*	425	240
Brown Deer Road	NB on*	>1,020	1,020
	NB on loop	600	1,100
	NB off	30	405
	NB off loop*	600	430
	SB on*	930	180
	SB on loop	800	910
	SB off	30	430
	SB off loop	800	430
Port Washington Road	NB off*	>480	480
County Line Road	SB on	400	1,100
Mequon Road	NB on	425	820
	NB off	50	390
	SB on	1,460	1,620
	SB off	35	490
Pioneer Road (County C)	NB on	475	1,000
	NB off	65	390
	SB on	430	1000
	SB off	30	390
WIS 60	NB on	510	820
	NB off	30	390
	SB on*	1,200	820
	SB off	60	340

Notes:
1. *Non-deficient ramps noted by asterisk.*
2. *NB = northbound, SB = southbound*

CROSS SLOPE

In addition to vertical alignment, the roadway should have a crown that allows water to drain to the side of the road. Freeways are typically designed with a minimum 2 percent crown, or cross slope, to let water drain (the elevation of the road slopes down 2 feet for every 100 feet of road, or about ¼ inch for every 1 foot). Some mainline pavement in the study-area freeway system was originally constructed with less than the minimum 2 percent cross slope (**Table 1-4**).

Table 1-4: I-43 Cross Slopes

Location	Cross Slope (Percent)
I-43 from Daphne Road to Green Tree Road	1.3 to 1.4
I-43 northbound and southbound from Green Tree Road to County Line Road	1.0
I-43 northbound and southbound from County Line Road to WIS 60	1.5

Source: WisDOT

HORIZONTAL ALIGNMENT

Horizontal alignment refers to the curvature of the road at a given design speed. Design speed is the maximum speed that can be safely maintained over a specific section of the highway. It is affected by factors such as highway type, topography, adjacent land use, and driver expectations. To account for a wide range of actual vehicle running speeds, the design speed is generally 5 mph greater than the posted speed limit. Several locations in the study area have substandard geometric features that equate to design speeds that are less than the recommended design speed. **Exhibit 1-2** and **Exhibit 1-3** call out the I-43 mainline locations that are below the minimum recommended design speed based on horizontal and vertical alignment.

VERTICAL ALIGNMENT

Vertical alignment refers to the grade or steepness of a roadway. In general, the flatter the road, the safer it is to drive on; however, WisDOT and AASHTO guidelines recommend a slight grade on freeways to ensure that water properly drains off the roadway. **Table 1-5** shows the sections in the study area that do not meet the recommended percent grade guidelines.

Stopping sight distance can be inadequate even if vertical alignment is adequate, and vice versa. A crest in the road or median barriers can interfere with a driver's line of sight around a curve and affect stopping sight distance. Vertical grade measures the steepness of a roadway. A gradual transition to a steep grade may not affect a driver's line of sight.

STOPPING SIGHT DISTANCE

Stopping sight distance is the minimum distance required to stop for a driver traveling at a given speed after sighting an object in his or her path. Minimum stopping sight distance is based on the roadway's design speed. On hill crests, sight is obstructed by the roadway between the driver and an object; at hill bottoms, sight is restricted at night because headlights do not fully illuminate the roadway. Median barriers may reduce stopping sight distance around curves. **Exhibit 1-2** and **Exhibit 1-3** identify areas along I-43 where the minimum recommended design speed for stopping sight distance is not met.

Table 1-5: Vertical Alignment – Substandard Locations

Location	Existing Grade (Percent)	Maximum Grade Recommended (Percent)
I-43 at Silver Spring Drive	3.3	3.0
I-43 North of Silver Spring Drive	3.4 to 3.64	3.0
		Minimum Grade Recommended (Percent)
I-43 south of Calumet Road	0.25	0.5
I-43 north of Brown Deer Road	0.37	0.5
I-43 SB – South of County Line Road	0.02	0.5
I-43 NB – South of County Line Road	0.20	0.5
I-43 south of Donges Bay Road	0.33	0.5
I-43 north of Donges Bay Road	0.20	0.5
Mequon Road NB off-ramp to I-43	0.42	0.5
Mequon Road SB on-ramp to I-43	0.16	0.5
I-43 south of Highland Road	0.00	0.5
I-43 north of Highland Road	0.40	0.5
I-43 at Bonniwell Road	0.03	0.5
I-43 south of County C	0.34	0.5
I-43 south of County C	0.25	0.5
I-43 at County C	0.07	0.5
I-43 north of County C	0.00	0.5
County C SB on-ramp to I-43	0.31	0.5
County C SB off-ramp to I-43	0.47	0.5
County C NB on-ramp to I-43	0.42	0.5
I-43 south of Lakefield Road	0.00	0.5
I-43 at WIS 60	0.00	0.5
WIS 60 SB on-ramp to I-43	0.41	0.5
WIS 60 SB off-ramp to I-43	0.26	0.5

Source: WisDOT
Note: NB = northbound, SB = southbound

DECISION SIGHT DISTANCE

Decision sight distance provides a driver sufficient time for safe decision making. While stopping sight distance is the minimum distance required to bring a vehicle to a complete stop, decision sight distance gives the driver sufficient time to detect an object, recognize its threat potential, select an appropriate speed and path, and perform the required action safely and efficiently. These decisions most commonly occur before exits, and at major forks and lane drops. The minimum decision sight distance is based on AASHTO's and WisDOT's design criteria. **Exhibit 1-2** and **Exhibit 1-3** identify areas along I-43 that do not meet AASHTO's or WisDOT's minimum standard for decision sight distance.

CROSS SECTION ELEMENTS

A roadway's cross section refers to the ditches, shoulders, median and travel lanes that make up the roadway. The width of travel lanes and width of shoulders on both the inside and outside of the travel lanes are key elements of freeway design. Narrow inside shoulders result in distressed vehicles having to cross over lanes of traffic to reach a safe area on the outside shoulder. In addition, shoulders provide room for drivers to avoid crashes and give space for snow storage and emergency vehicle access. WisDOT's and AASHTO's policies for roadways with three or more lanes call for 12-foot inside and outside shoulders, for two-lane roadways, policies calls or 6-foot inside and 12-foot outside shoulders. Locations with substandard inside or outside shoulder widths are listed below:

- I-43 northbound and southbound – Silver Spring Drive to Bender Road: outside shoulders 10 feet wide
- I-43 northbound and southbound – Bender Road to Green Tree Road: outside shoulder 8.5 feet wide
- I-43 northbound and southbound – Green Tree Road to Good Hope Road: outside shoulder 8 feet wide
- I-43 northbound and southbound – Good Hope Road to Brown Deer Road: outside shoulder 10 feet wide
- I-43 northbound and southbound – Near Brown Deer Road: outside shoulder ranges from 0 feet to 6 feet wide
- I-43 northbound and southbound – County Line Road to WIS 60: outside shoulder 10 feet to 11 feet wide

VERTICAL CLEARANCE

Vertical clearance is the distance between the top of a roadway and the bottom of a bridge over it. Adequate vertical clearance is required to prevent tall trucks from hitting overpasses. Minimum vertical clearance requirements differ based on the type of roadway. Because Interstate highways are part of the National Highway System, they require a minimum 16-foot clearance to accommodate oversized vehicles. WisDOT and AASHTO guidelines call for a 16-foot, 4-inch clearance to allow for a 3- to 4-inch asphalt overlay in the future. **Table 1-6** lists the bridges in the I-43 North-South Freeway study area that do not meet the vertical clearance criteria.

Table 1-6: Substandard Vertical Clearances

Location	I-43	Structure Number	Existing Vertical Clearance (Feet-Inch)	Minimum Vertical Clearance Required for Reconstructed Bridge (Feet-Inch)
I-43 NB over Silver Spring Drive	Over	B-40-583	16’	16’-3”
I-43 NB-off over Silver Spring Drive	Over	B-40-586	15’-9”	16’-3”
Railroad bridge over I-43	Under	B-40-24	14’-8”	16’-4”
Green Tree Road over I-43	Under	B-40-149	14’-11”	16’-4”
County Line Road over I-43	Under	B-40-338	14’-7”	16’-4”
Port Washington Road over I-43	Under	B-45-17	14’-9”	16’-4”
Donges Bay Road over I-43	Under	B-45-18	15’	16’-4”
I-43 NB over Mequon Road (WIS 57/167)	Over	B-45-19	14’-10”	16’-4”
I-43 SB over Mequon Road (WIS 57/167)	Over	B-45-20	14’-10”	16’-4”
Pioneer Road over I-43	Under	B-45-22	15’	16’-4”
Falls Road over I-43	Under	B-45-25	15’-1”	16’-4”
WIS 60 over I-43	Under	B-45-15	16’-2”	16’-4”

Source: WisDOT

1.3.2. Safety

The frequency and severity of crashes help define highway safety. WisDOT maintains a database of crashes that occur annually on the state highway system. This section describes the nature of crashes on the I-43 North-South Freeway study corridor and overall crash rates compared the statewide average crash rate. Congestion and geometric and design deficiencies contribute to crashes in the corridor.

MAINLINE CRASHES

Table 1-7 shows the total number of crashes (not including deer/other animal crashes) on the I-43 North-South Freeway study corridor mainline from 2006 to 2010. In those five years, a total 1,087 crashes were reported between Silver Spring Drive and WIS 60. Seventy-two percent were property damage crashes, and 27 percent were injury or fatality crashes. Truck crashes[4] accounted for about 11 percent of the total crashes between 2006 and 2010.

Exhibit 1-8 and **Exhibit 1-9** show the numbers and types of crashes from interchange to interchange between 2006 through 2010 in Milwaukee and Ozaukee counties. Crashes on I-43 from Silver Spring Drive to Good Hope Road show that almost a third of the total 312 crashes were rear-end crashes (110 northbound crashes and 44 southbound crashes) and another 56

[4] *Includes all vehicles requiring a commercial driver’s license; that is, trucks that weigh more than 26,000 pounds (medium-duty trucks, heavy-duty trucks and tractor-trailers) and passenger buses with 16 or more seats (including the driver).*

crashes (34 northbound and 22 southbound crashes) were side-swipe crashes. Rear-end and side-swipe crashes indicate congestion as well as inadequate acceleration/deceleration lanes, weaving and substandard ramp spacing. Just north of Silver Spring Drive and south of Bender Road, I-43 northbound drops from three to two lanes, causing traffic congestion most severely in the afternoon rush hour, with 110 northbound rear-end crashes reported.

Table 1-7: Total Number of Crashes

Year	Property Damage Only	Crashes with Injuries	Crashes with Fatalities	Total
2006	132	52	3	187
2007	176	64	1	241
2008	176	60	0	236
2009	136	57	0	193
2010	177	53	0	230
Total	797	286	4	1,087

Source: WisDOT, 2012

Exhibit 1-8 shows a high number of rear-end crashes between Good Hope Road and Brown Deer Road. More than a third of the total 310 crashes in this section of I-43 were rear-end crashes (43 northbound crashes and 90 southbound crashes) and another 47 crashes (22 northbound and 25 southbound) were side-swipe crashes. Unlike the Silver Spring Drive to Good Hope Road section, this section presents more rear-end and side-swipe crashes in the southbound direction, reflecting heavy congestion in the morning peak hours.

While **Exhibit 1-9** does not show a large number of crashes from County Line Road to Mequon Road, the southbound rear-end crashes in that location are four times what they are in the northbound direction. Public comments received at an August 2012 public information meeting for the I-43 North-South Freeway Corridor Study confirmed that congestion during the morning rush hour in the southbound lanes near Mequon Road causes traffic backups on the I-43 mainline.

CRASH RATES

WisDOT uses crash data and traffic volume to develop statewide average crash rates for urban and rural highways. These statewide average crash rates are the basis for the safety evaluation of the I-43 North-South Freeway study corridor. Crash rates are calculated as crashes per 100 million vehicle miles traveled.

Exhibit 1-10 shows the crash rates in the corridor for the years 2006 to 2010 compared with the statewide urban freeway crash rate. The segments with the highest rates occur near the Brown Deer Road interchange in Milwaukee County and the Mequon Road interchange in Ozaukee County. The higher crash rates at these interchanges reflect the combined traffic congestion discussed above and geometric deficiencies discussed in subsections below. Freeway design deficiencies and increasing traffic congestion are expected to continue to push crash rates toward and beyond the statewide average.

Exhibit 1-8: Crash Types (2006-2010) – Milwaukee County

Brown Deer Rd to County Line Rd

	Northbound	Southbound
NO C	19	23
REAR	5	10
SSOP	1	0
ANGL	0	0
SSS	1	4
UNKN	0	0
BLNK	0	0
HEAD	0	0
TOTAL	63	

Good Hope Rd to Brown Deer Rd

	Northbound	Southbound
NO C	46	62
REAR	43	90
SSOP	0	2
ANGL	4	10
SSS	22	25
UNKN	0	0
BLNK	0	1
HEAD	1	4
TOTAL	310	

Silver Spring Dr to Good Hope Rd

	Northbound	Southbound
NO C	57	35
REAR	110	44
SSOP	0	1
ANGL	4	3
SSS	34	22
UNKN	0	1
BLNK	0	0
HEAD	0	1
TOTAL	312	

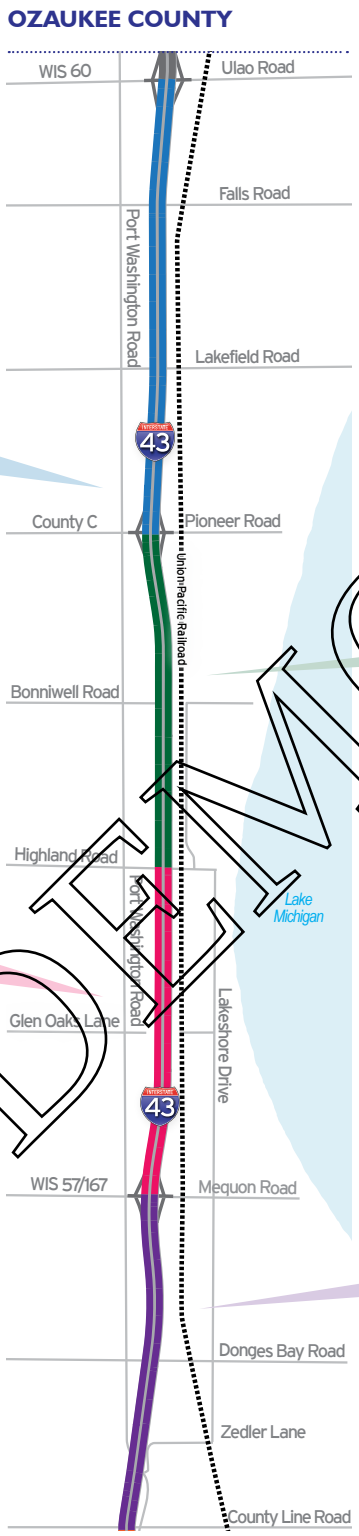
LEGEND

N W E S

* MAP NOT TO SCALE

NO C	No Collision (single vehicle crash typically)
REAR	Rear-end
SSOP	Side swipe - opposite side
ANGL	Angle
SSS	Side swipe - same direction
UNKN	Unknown
BLNK	Blank (not recorded)
HEAD	Head-on

Exhibit 1-9: Crash Types (2006-2010) – Ozaukee County



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* MAP NOT TO SCALE

County C to WIS 60

	Northbound	Southbound
NO C	36	52
REAR	7	7
SSOP	0	0
ANGL	3	7
SSS	4	10
UNKN	0	0
BLNK	0	0
HEAD	2	1
TOTAL	129	

Highland Rd to County C

	Northbound	Southbound
NO C	34	22
REAR	8	9
SSOP	0	0
ANGL	2	0
SSS	9	3
UNKN	0	0
BLNK	0	0
HEAD	0	1
TOTAL	88	

Mequon Rd to Highland Rd

	Northbound	Southbound
NO C	20	21
REAR	2	0
SSOP	0	0
ANGL	1	1
SSS	3	4
UNKN	0	0
BLNK	1	0
HEAD	0	0
TOTAL	53	

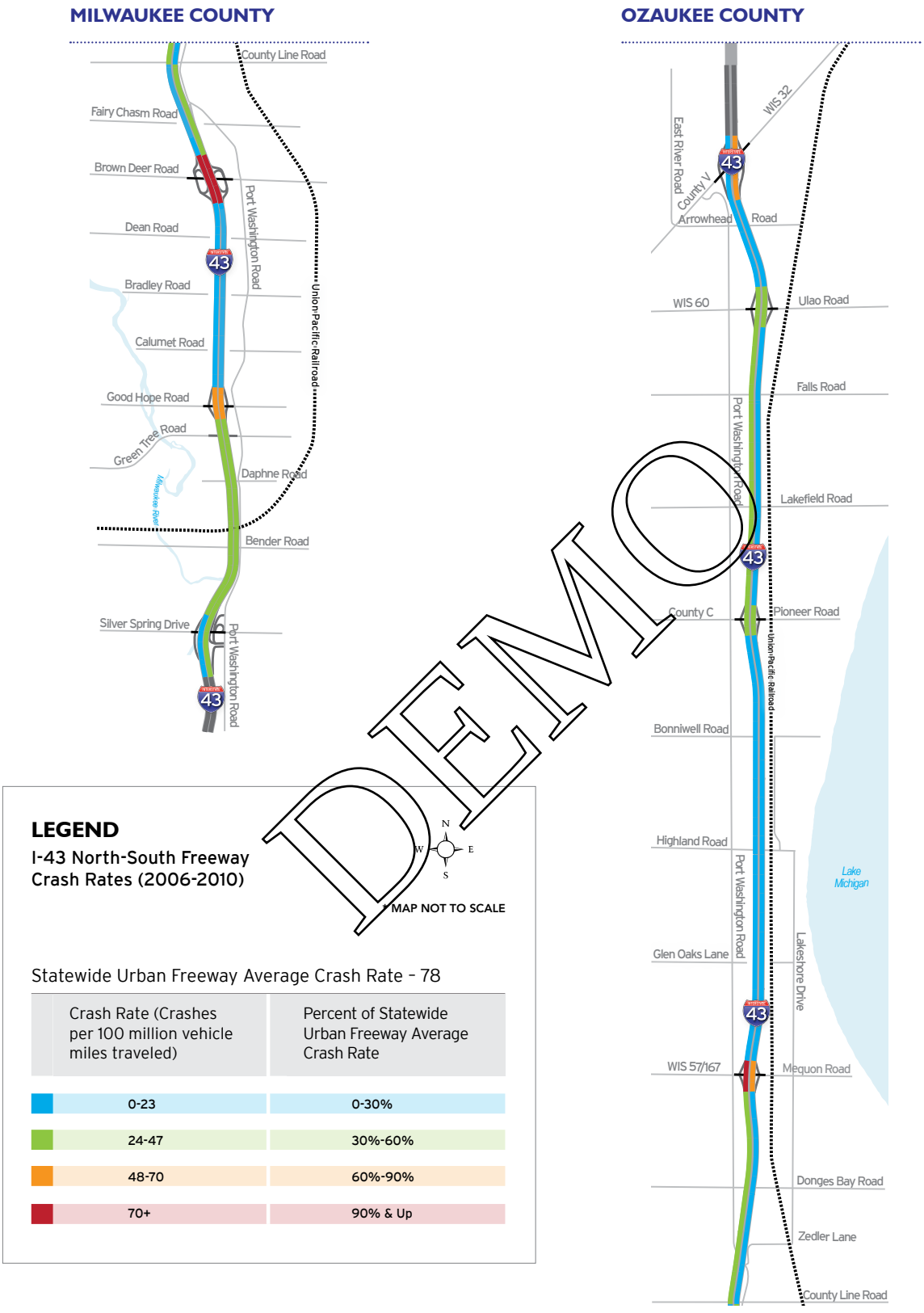
County Line Rd to Mequon Rd

	Northbound	Southbound
NO C	23	42
REAR	10	40
SSOP	0	0
ANGL	2	2
SSS	5	8
UNKN	0	0
BLNK	0	0
HEAD	0	0
TOTAL	132	

LEGEND

NO C	No Collision (single vehicle crash typically)
REAR	Rear-end
SSOP	Side swipe - opposite side
ANGL	Angle
SSS	Side swipe - same direction
UNKN	Unknown
BLNK	Blank (not recorded)
HEAD	Head-on

Exhibit 1-10: Annual Average Crash Rate Summary



SERVICE INTERCHANGE CRASHES

Table 1-8 summarizes crashes that have occurred on interchange ramps between 2006 and 2010. The crash data indicate a higher number of crashes associated with interchanges with substandard design and/or heavier traffic in Milwaukee County (Silver Spring Drive, Good Hope Road and Brown Deer Road). The higher number of crashes at Silver Spring Drive may be related to heavier traffic congestion where I-43 transitions from a six-lane to a four-lane facility. Ramp crashes on the Good Hope Road southbound ramp correlates with poor level of service, substandard design and heavy morning southbound traffic.

Table 1-8: Ramp Crash Data

Interchange	Direction	Property Damage	Injury	Interchange Total
Silver Spring Drive	NB	21	9	71
	SB	26	7	
	Unknown	7	1	
Good Hope Road	NB	6	1	49
	SB	29	7	
	Unknown	5	1	
Brown Deer Road	NB	15	11	49
	SB	13	4	
	Unknown	6	0	
Port Washington and County Line Road	NB	2	1	3
	SB	0	0	
	Unknown	0	0	
Mequon Road	NB	2	3	16
	SB	5	3	
	Unknown	1	2	
County C	NB	6	3	19
	SB	8	1	
	Unknown	1	0	
WIS 60	NB	3	1	12
	SB	5	3	
	Unknown	0	0	
TOTAL		*161*	*58*	

Source: WisDOT
Note: NB = northbound, SB = southbound

1.3.3. Existing and Future Traffic Volumes

Roadways are typically designed to accommodate traffic volumes projected to occur 20 to 25 years in the future. For the I-43 North-South Freeway Corridor Study, 2040 is used as the "design year." However, traffic volume is not the only factor that indicates how congested a roadway is, especially during heavy travel periods. Therefore, in addition to traffic volume, the term "level of service" (LOS) is used in this section. **Exhibit 1-11** illustrates the various levels of service. FHWA guidance calls for Interstates to provide LOS C, but LOS D can be acceptable in urban areas. The I-43 North-South Freeway study corridor will experience increased traffic growth and associated declining levels of service through the year 2040.

Level of service is the measure of a roadway's congestion using rankings ranging from A to F. Freeway LOS is based on the number of cars per hour per lane mile, with LOS A exhibiting free-flow traffic and LOS F exhibiting severe congestion that approaches gridlock.

Exhibit 1-11: Levels of Service

EXISTING TRAFFIC VOLUMES

On an average weekday, traffic volumes on I-43 range from more than 85,000 vehicles per day (vpd) near Silver Spring Drive to 49,000 vpd at the north project limits at WIS 60 (**Table 1-9**).

Table 1-9: Existing and Future Average Weekday Traffic

Freeway Segment	2010 Existing (vpd)	2040 Future (vpd)	2010-2040 Traffic Growth (Percent)	2010-2040 Annual Growth Rate (Percent)
WIS 60 to County C	49,000	65,000	33	0.9
County C to Mequon	53,620	68,000	27	0.8
Mequon Road to County Line Road	54,940	75,000	37	1.0
County Line Road to Brown Deer Road	60,560	84,000	39	1.1
Brown Deer Road to Good Hope Road	75,000	104,000	39	1.1
Good Hope Road to Silver Spring Drive	85,460	112,500	32	0.9
Average growth			*32*	
Average growth rate				*0.93*

Source: Southeastern Wisconsin Regional Planning Commission

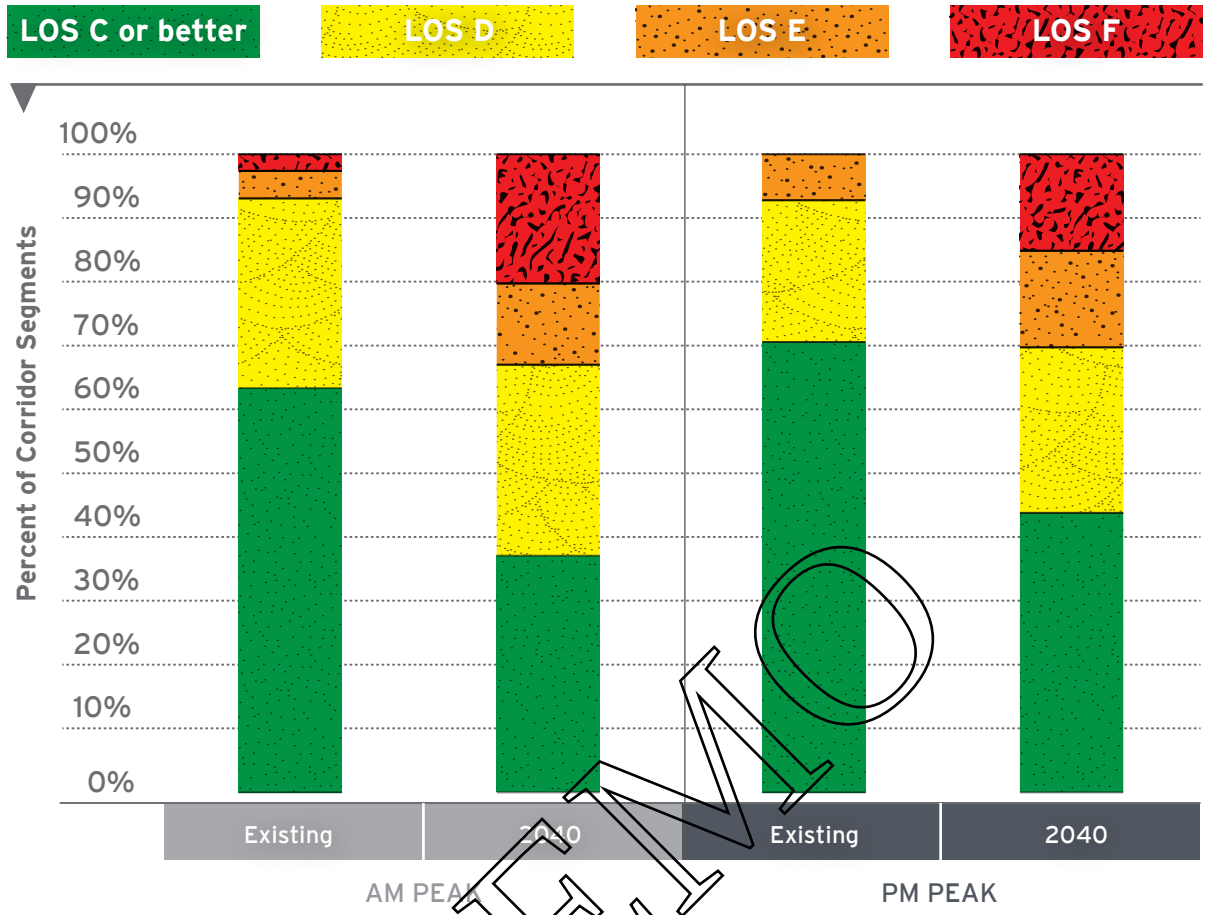
Heaviest traffic volumes are typically associated with morning (7 to 8 a.m.) and evening (4:30 to 5:30 p.m.) peak-hour commute times. **Exhibit 1-12** summarizes the existing overall freeway LOS, showing that just more than 60 percent of the corridor operates at LOS C or better during the morning peak travel time. **Exhibit 1-13** and **Exhibit 1-14** illustrate traffic operations by location throughout the study corridor for the morning and evening peak-hour LOSs. In general, morning LOS decreases as traffic travels southbound from Ozaukee County, and peak-hour traffic volumes increase, indicating a heavy morning commute into Milwaukee County. LOS is worst from the Good Hope Road interchange to where a third southbound lane picks up just south of Bender Road.

During the evening peak-hour travel time, 70 percent of the I-43 corridor operates at LOS C or better (**Exhibit 1-12**). As **Exhibit 1-14** shows, sections of I-43 with LOS D occur in both the northbound and southbound lanes in Milwaukee County, but northbound lanes also exhibit LOS E. This pattern indicates that evening travel may spread out over nonpeak travel times, or traffic is finding alternate routes.

FUTURE TRAFFIC VOLUMES

According to projections from the Southeastern Wisconsin Regional Planning Commission (SEWRPC), traffic in the study corridor is expected to increase on average about 32 percent between 2010 and 2040, or just less than 1 percent growth per year (**Table 1-9**). LOS in the corridor is expected to decline by 2040 (**Exhibit 1-12**). More than 60 percent of I-43 would operate at LOS D or worse during the morning peak travel time. Notably, 20 percent of the corridor would operate at LOS F. **Exhibit 1-15** shows that, again, congestion is associated with

Exhibit 1-12: I-43 North-South Freeway Study Corridor Level of Service



the heavy southbound morning peak hour traffic, with sections of the freeway operating at LOS E and F as far north as Mequon Road (County C).

During the 2040 evening peak hour, northbound lanes throughout the study corridor in Milwaukee and Ozaukee counties and most of the southbound lanes in Milwaukee County operate at LOS D or worse (**Exhibit 1-16**). As expected, congestion is worst in Milwaukee County where traffic volumes are highest.

Exhibit 1-13: Existing Traffic Operations, Morning Peak Hours (7 to 8 a.m.), Milwaukee and Ozaukee Counties

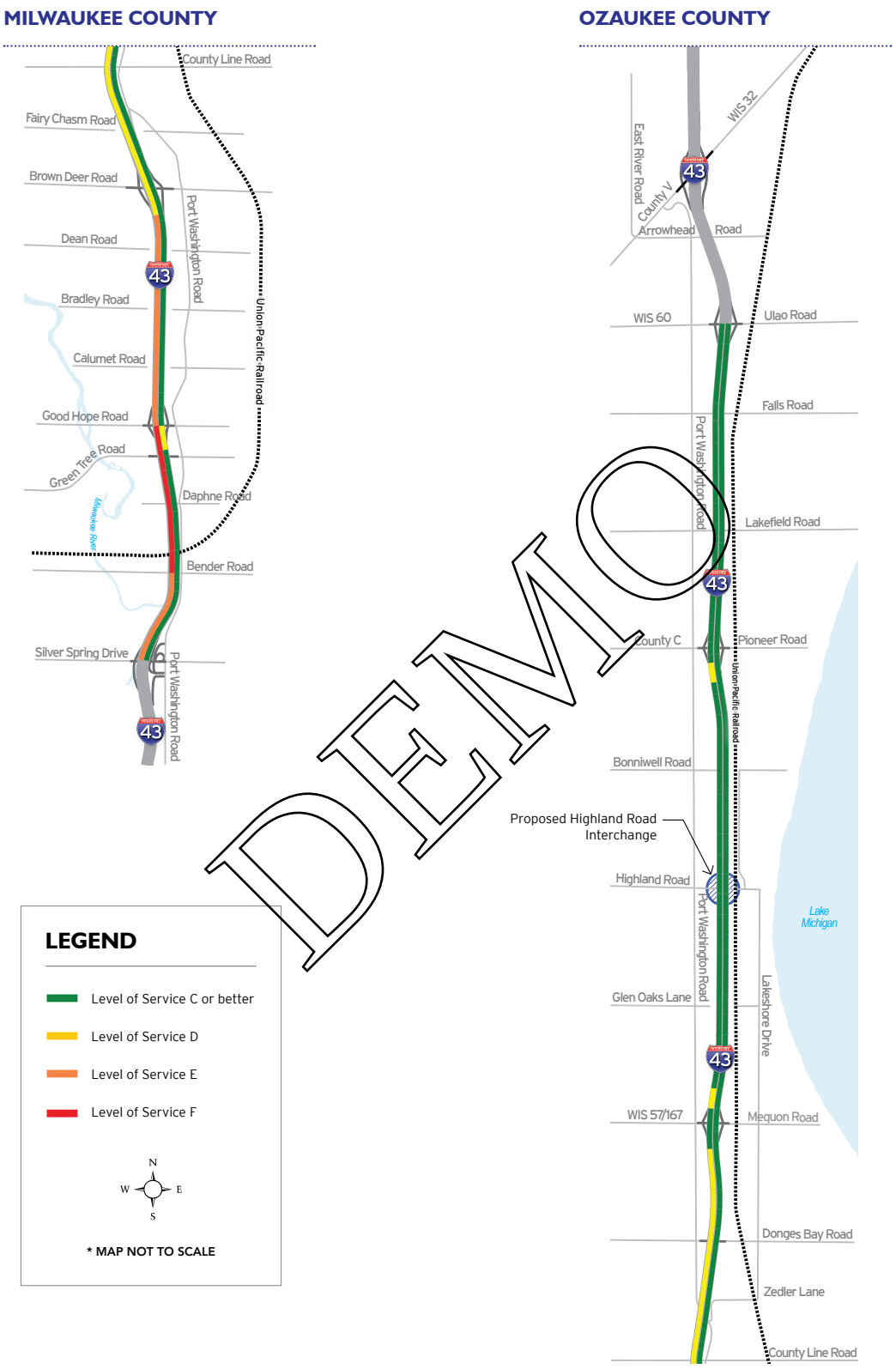


Exhibit 1-14: Existing Traffic Operations, Evening Peak Hours (4:30 to 5:30 p.m.), Milwaukee and Ozaukee Counties

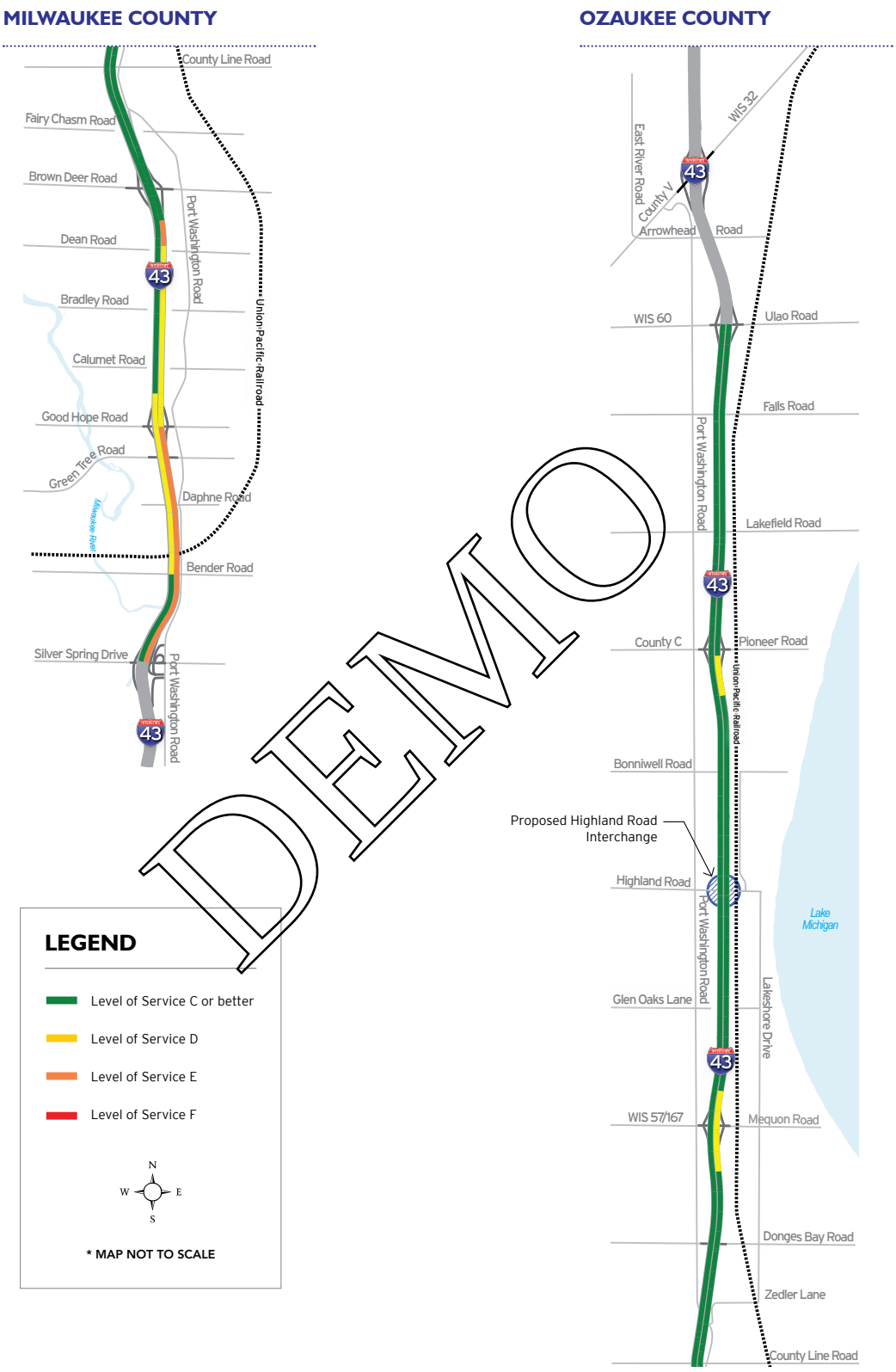


Exhibit 1-15: Future (2040) Traffic Operations, Morning Peak Hours (7 to 8 a.m.), Milwaukee and Ozaukee Counties

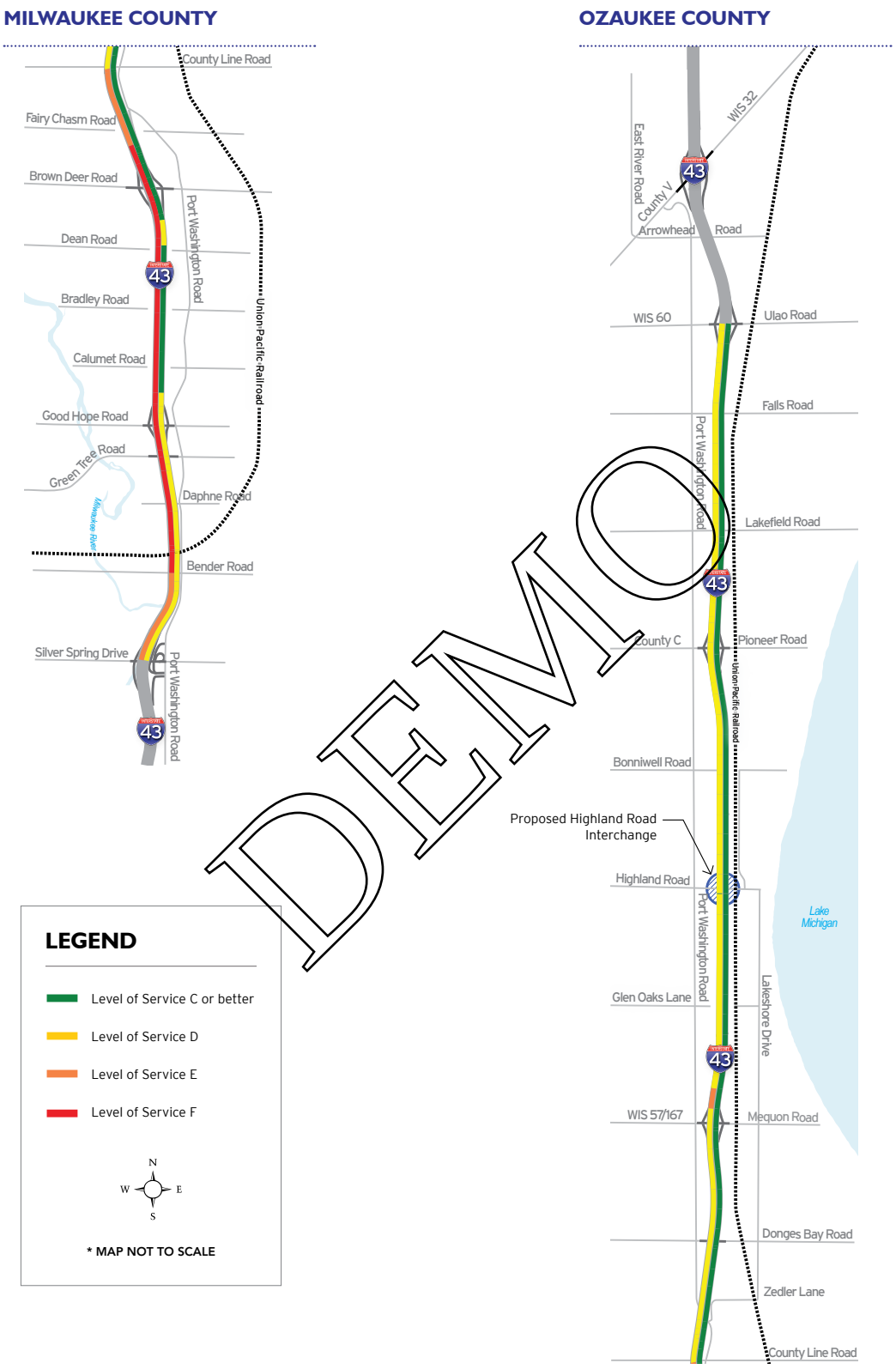
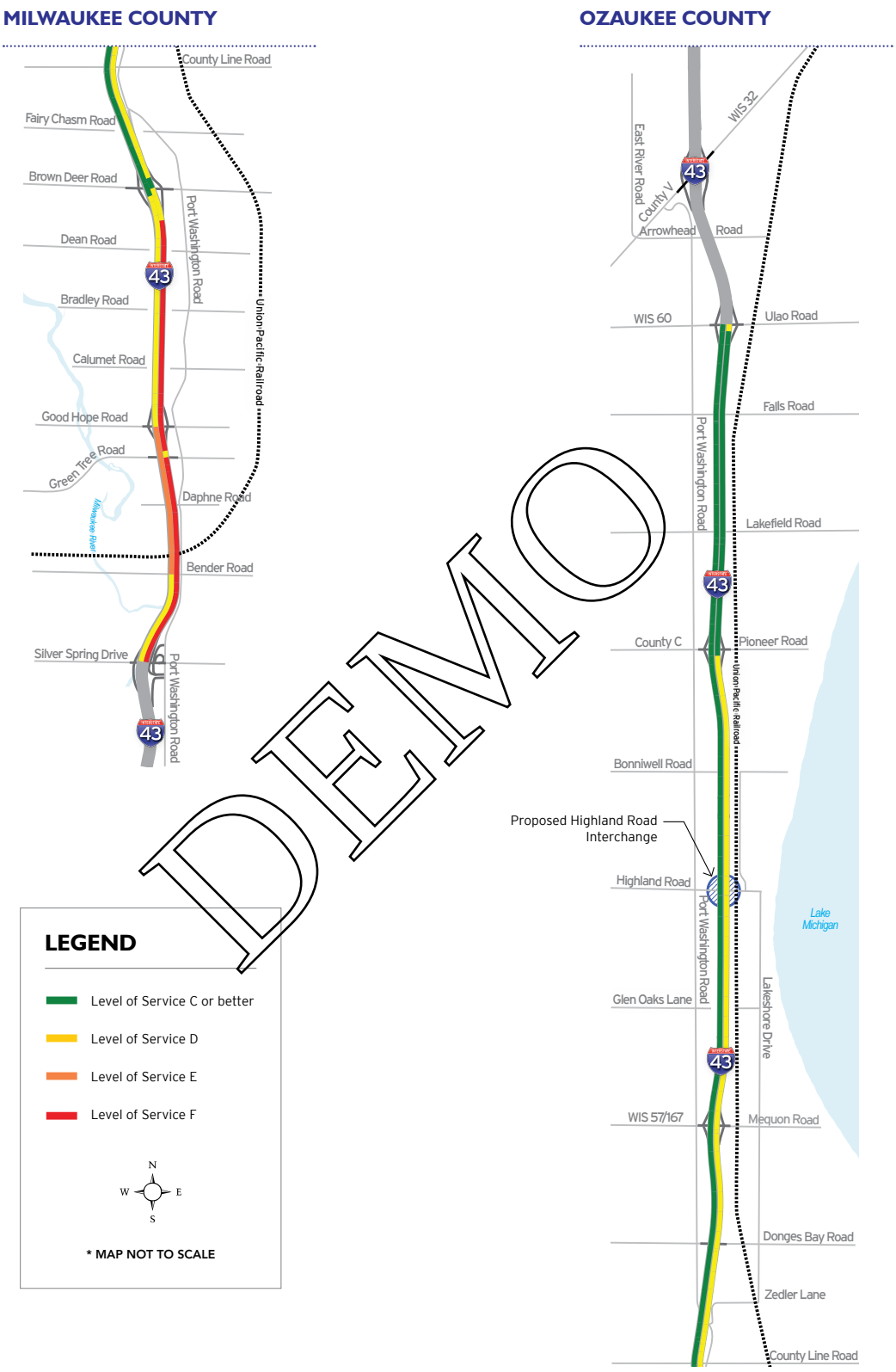


Exhibit 1-16: Future (2040) Traffic Operations, Evening Peak Hours (4:30 to 5:30 p.m.), Milwaukee and Ozaukee Counties



1.3.4. Regional Land Use and Transportation Planning

SEWRPC is the official planning agency for southeastern Wisconsin. SEWRPC's principal responsibility is to prepare an advisory comprehensive plan for the physical development of the region, including a regional land use plan, which is the basis of all other plan elements, including transportation.

SEWRPC PLANS AND REPORTS

The implementation of SEWRPC plan recommendations, including the determination as to how much they are implemented, is the responsibility of local, state or other federal resource agencies, based on additional planning, programming and engineering/environmental studies. Adopted regional and statewide plans and studies relevant to the I-43 North-South Freeway Corridor Study are summarized below.

PLANNING REPORT NO. 47: A REGIONAL FREEWAY SYSTEM RECONSTRUCTION PLAN FOR SOUTHEASTERN WISCONSIN

SEWRPC published in 2003 a regional freeway system plan to address the anticipated need to reconstruct the southeastern Wisconsin freeway system during the next 30 years. SEWRPC conducted its study in the context of the 2020 regional land use and transportation system plans. The 2020 regional transportation system plan proposed modernization and limited expansion of the southeastern Wisconsin freeway system.

The Southeastern Wisconsin Regional Freeway System Advisory Committee made several freeway system recommendations for updates to the 2020 regional transportation system plan. The current 2035 regional transportation plan incorporates the committee's recommendations, which include the following items:

- Improve freeway system service interchanges:
  - Lengthen and widen ramp tapers;
  - Convert multipoint exits to single point exits; and
  - Provide selected auxiliary lanes to address closely spaced interchanges.
- Improve freeway mainline:
  - Improve freeway horizontal and vertical curvatures, grades and vertical clearances to meet standards; and
  - Provide full inside and outside shoulders.

In addition to recommending six lanes throughout the study area, the 2003 regional freeway system plan also provides the following conceptual design recommendations:

- Reconstruct interchanges at Pioneer Road (County C), WIS 60, Mequon Road (WIS 57/167), Brown Deer Road (WIS 100), and Good Hope Road (County PP) for improved ramp geometry and better operations. Investigate reconfiguration of Brown Deer Road interchange to diamond style interchange;
- Add a new interchange at Highland Road;
- At the recently reconstructed Silver Spring interchange, construct new pavement with substandard shoulders, and preserve existing bridges and retaining walls because this freeway segment was recently reconstructed; and
- Add auxiliary lanes between interchanges. Also, consider relocating northbound exit ramp to Port Washington Road further north.

PLANNING REPORT NO. 48: A REGIONAL LAND USE PLAN FOR SOUTHEASTERN WISCONSIN: 2035

SEWRPC completed in June 2006 bits most recent regional land use plan. **Table 1-10** shows key growth projections in Milwaukee and Ozaukee counties between 2000 and 2035. The projections strongly influence transportation planning. In both counties, vehicle miles traveled increases at a faster rate than population, households or employment. While Ozaukee County is experiencing greater growth in all these categories, Milwaukee County still contains a significantly higher percentage of the region's population and employment.

Table 1-10: Growth Projections

	Percent Increase (2000-2035)		Percent of Region (2035)	
Growth Factors	**Milwaukee County**	**Ozaukee County**	**Milwaukee County**	**Ozaukee County**
Population	7.1	22.8	44.3	4.4
Households	13.2	29.4	46.2	4.3
Employment	<0.1	21.5	45.7	4.5
Urban Land Use	5.2	11.5	27.7	7.2
Vehicle Miles Traveled	16.0	42.7	N/A	N/A

Sources: A Regional Land Use Plan for Southeastern Wisconsin: 2035 *(Tables 28, 30, 31 and 35)*; A Regional Transportation System Plan for Southeastern Wisconsin: 2035 *(Table 107)*

PLANNING REPORT NO. 39: A REGIONAL TRANSPORTATION SYSTEM PLAN FOR SOUTHEASTERN WISCONSIN: 2035 *AND* MEMORANDUM REPORT NO. 197: REVIEW, UPDATE AND REAFFIRMATION OF THE YEAR 2035 REGIONAL TRANSPORTATION PLAN

SEWRPC published its 2035 regional transportation plan in June 2006; in June 2010, the agency completed an interim review and update of the plan, which affirmed much of the plan, with minor modifications and updates. The plan forecasts traffic growth and transportation demand based on the regional land use plan data such as population, household and employment growth. The plan recommends freeway and surface arterial street improvements to address traffic congestion unlikely to be alleviated by future land use, systems management, demand management, bicycle and pedestrian facilities, and public transit measures that are proposed in the plan. Based on the plan's identified transportation needs, the 2035 regional transportation system recommends improvements to the I-43 North-South Freeway study corridor and incorporates the findings from its 2003 *A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin*.

The 2035 regional transportation system plan also recognizes that WisDOT will conduct preliminary engineering and environmental impact studies for the 127 miles of freeway widening proposed in the plan, including the I-43 North-South Freeway study corridor. The plan acknowledges that, during preliminary engineering, alternatives will be considered including spot improvements and rebuilding to modern design standards, with and without additional lanes. A no-build alternative will also be considered. The plan further acknowledges that only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

A TRANSPORTATION IMPROVEMENT PROGRAM FOR SOUTHEASTERN WISCONSIN: 2011-2014

In accordance with the federal 1990 Clean Air Act Amendments, proposed highway improvements must be included in an approved transportation improvement program (TIP). The TIP lists state and local highway, public transit and other transportation improvement projects proposed for implementation over a four-year period. Transportation projects receiving U.S. Department of Transportation (USDOT) (which includes FHWA) funds should be included in the TIP. SEWRPC published in February 2011 its TIP titled *A Transportation Improvement Program for Southeastern Wisconsin: 2011-2014*. The I-43 North-South Freeway Corridor Study is included in the amendment to the 2011-2014 TIP as TIP No. 787: "Preliminary engineering for reconstruction of IH 43 from Silver Spring Drive to STH 60 in Ozaukee and Milwaukee Counties (14.11 mi)."

STATEWIDE PLANS

CONNECTIONS 2030: STATEWIDE LONG-RANGE TRANSPORTATION PLAN

Adopted in October 2009, *Connections 2030* is WisDOT's long-range, statewide, multimodal transportation plan that serves as a vision for all transportation modes during the next 20 years. The plan identifies priority corridors throughout the state. These corridors all serve critical economic and population centers, are significant transportation corridors, have significant travel and economic development growth, and serve an important role for other transportation modes. I-43 is a priority corridor, connecting Milwaukee and Green Bay. The long-range plan recommended studying I-43 reconstruction between the Marquette Interchange in Milwaukee County and WIS 57 in Ozaukee County.

WISCONSIN ADMINISTRATIVE CODE CHAPTER TRANS 75: BIKEWAYS AND SIDEWALKS IN HIGHWAY PROJECTS

Trans 75 (implemented in December 2010) states that WisDOT "shall include bikeways and sidewalks in all new highway construction and reconstruction projects funded in whole or in part from state funds or federal funds..." Trans 75 complies with USDOT's "Complete Streets" policy.[5] I-43 and the interchange ramps in the study area are exempt from Trans 75 requirements because bicycles and pedestrians are prohibited on these roadways; however, any local roadways reconstructed as part of this project would be subject to Trans 75 requirements. WisDOT will accommodate local pedestrian and bicycle facilities, where practicable and consistent with Trans 75 and USDOT policy, as part of the alternatives development process.

1.3.5. System Linkage and Route Importance

I-43 is a part of the National Interstate System and identified in the state's *Connections 2030* plan as a system-level priority corridor linking south-central and eastern Wisconsin. Priority corridors are "critical to Wisconsin's travel patterns and support the state's economy."[6] I-43 is also a designated federal and state "long truck route," allowing longer commercial vehicles to use the freeway.

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[5] *From USDOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, signed March 11, 2010 and announced March 15, 2010: "The United States Department of Transportation (DOT) is providing this Policy Statement to reflect the Department's support for the development of fully integrated active transportation networks. The establishment of well-connected walking and bicycling networks is an important component for livable communities, and their design should be a part of Federal-aid project developments. Walking and bicycling foster safer, more livable, family-friendly communities; promote physical activity and health; and reduce vehicle emissions and fuel use. Legislation and regulations exist that require inclusion of bicycle and pedestrian policies and projects into transportation plans and project development. Accordingly, transportation agencies should plan, fund, and implement improvements to their walking and bicycling networks, including linkages to transit."*

[6] *http://www.dot.wisconsin.gov/projects/state/2030-maps.htm. Accessed Sept. 18, 2013.*

The National Highway System is a priority system of highways that have been identified and designated for the following reasons:

- Ensure connectivity to the national defense highway network and other important regional transportation routes; and
- Provide a high level of safety, design and operational standards.

The 190-mile-long I-43 corridor connects to I-39/I-90 in Beloit at the Wisconsin/Illinois border, and to US 41/US 141 in Green Bay in northeastern Wisconsin (**Exhibit 1-17**). The freeway is a gateway to popular tourist locations in northern Wisconsin and links major industrial centers in south-central Wisconsin, Milwaukee and Green Bay.

In the Milwaukee metropolitan area, I-43/I-894 is part of a bypass around the city of Milwaukee for through-traffic, and it provides an important freeway connection for several Milwaukee County communities. I-43 is concurrent with I-94 and US 41 between the Mitchell Interchange and the Marquette Interchange, serving as part of the north-south freeway link between Chicago and Milwaukee.

According to SEWRPC's 2003 regional freeway reconstruction plan, I-43 serves a substantial amount of through-traffic in southeastern Wisconsin. That is, more than 15 percent of weekday trips are defined as travel with neither end of the trip located within the county in which the freeway segment is located. The I-43 North-South Freeway study area also serves substantial intercounty traffic: trips have an origin in one county and destination in another county. Intercounty trips account for more than 20 percent of weekday traffic.

In addition to serving through trips, the study corridor freeway is an important commuter route for the about 480,000 employees who work in Milwaukee and Ozaukee counties.

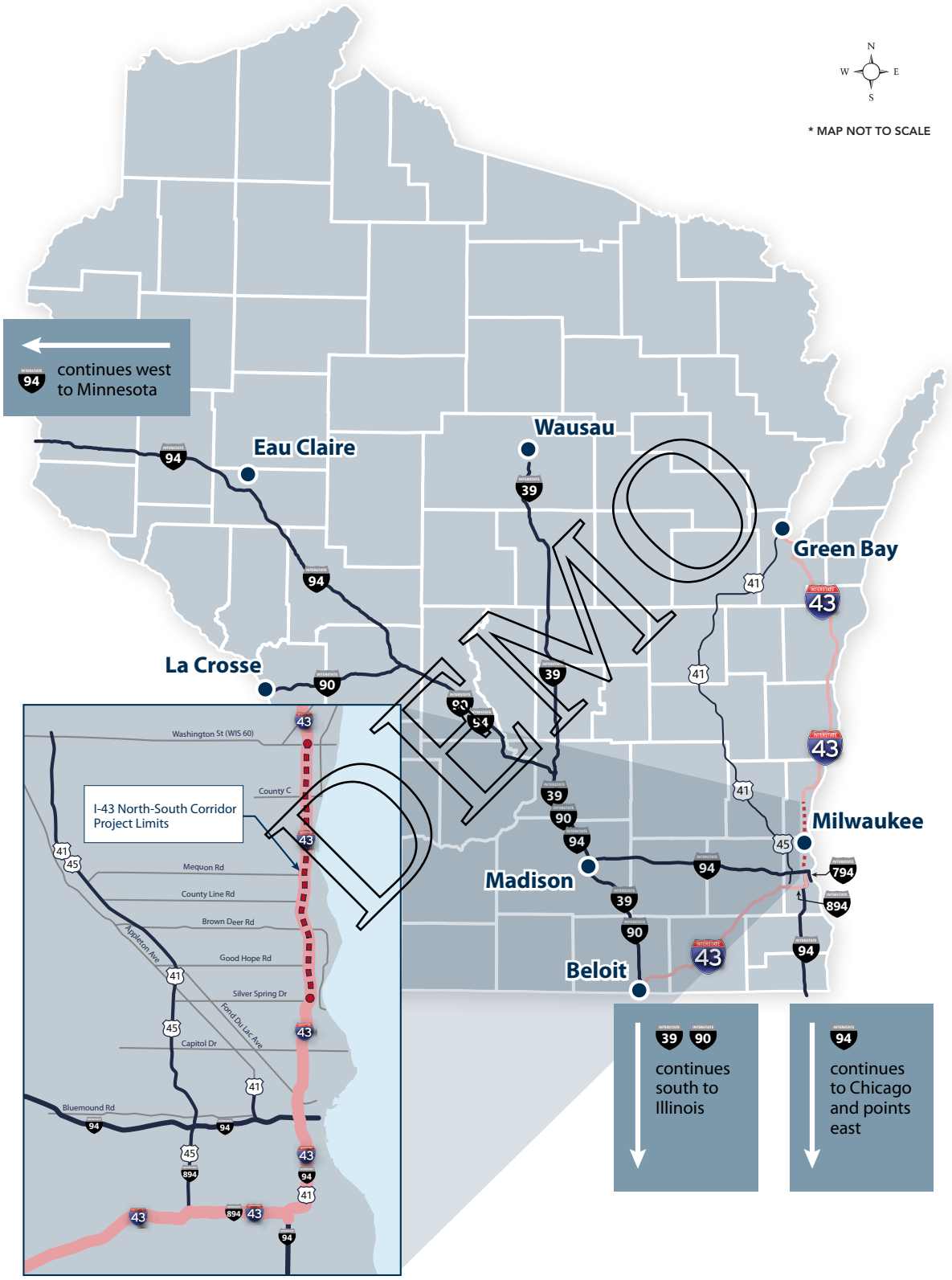
As a major north-south route through eastern Wisconsin, I-43 serves a network of connecting highways that carry traffic between Lake Michigan on the east, and destinations to the west (**Table 1-11** and **Exhibit 1-17**).

Table 1-11: Highways Connecting to I-43

Connecting Highway	Average Daily Traffic (2010)	Regional Connections from I-43
Silver Spring Drive	21,500-42,200	Links I-43 to US 41/45, city of Glendale, village of Whitefish Bay and Milwaukee's west side
Good Hope Road	27,600 (2007)	Links I-43 to US 41/45, Milwaukee's west side, the village of Fox Point, and the city of Glendale
Brown Deer Road	23,300 (2009)	Links I-43 to US 45/41, Milwaukee's northwest side, village of Brown Deer, village of Bayside and village of River Hills
County Line Road	5,200	Links I-43 to Milwaukee's northwest side and city of Mequon
Mequon Road	28,700	Links I-43 to US 41/45, city of Mequon and village of Germantown
County C	12,900	Links I-43 to Village of Cedarburg
WIS 60	15,600	Links I-43 to village of Grafton, village of Jackson, US 45 and US 41

Source: WisDOT

Exhibit 1-17: System Linkages



INTERMODAL LINKAGE

In addition to highway system linkages, the I-43 North-South Freeway Corridor provides important connections to air, rail, intercity bus and water transportation in southeastern Wisconsin.

AIRPORT ACCESS

Wisconsin's two international airports include Austin Straubel International Airport, located north of the study area in Green Bay, and General Mitchell International Airport, located south of the study area in Milwaukee. I-43 is an important access route for passengers arriving and departing from these airports.

INTERCITY BUS ACCESS

Indian Trails, Jefferson Lines, Lamers and Greyhound bus companies utilize the study corridor freeway to provide intercity bus service.

LOCAL BUS ACCESS

Milwaukee County Transit Service (MCTS) uses I-43 for express bus service. In Milwaukee County, express buses connect northern Milwaukee county communities and the University of Wisconsin-Milwaukee and downtown Milwaukee. MCTS also operates the Ozaukee County Express, which provides service between Port Washington in Ozaukee County and downtown Milwaukee.

PASSENGER TRAIN ACCESS

An Amtrak Station is located at General Mitchell International Airport and at the Milwaukee Intermodal Station, about 7 miles south of the study area in downtown Milwaukee. I-43 provides a freeway access route for those in the study area to the Amtrak services.

PORT ACCESS

I-43 is part of the highway network serving the Port of Milwaukee, about 8 miles south of the study area. This port on Lake Michigan is a regional transportation and distribution center with a primary market that includes Wisconsin, northern and western Illinois, and Minnesota. The Lake Express Ferry operates out of the port, providing service between Milwaukee and Muskegon, Mich. I-43 also provides Interstate access to Manitowoc, where the Badger Ferry provides service to Ludington, Mich.

1.3.6. Environmental Aspects

As noted in **Subsection 1.2**, the purpose of the proposed action also includes minimizing impacts to the natural and built environment to the extent feasible and practicable. The I-43 study corridor travels through heavily developed and rural areas. Important natural resources throughout the corridor include wetlands, waterways, floodplains and managed open space. Many neighborhoods and commercial areas adjacent to the corridor will be sensitive to impacts to noise, air quality and local access. Cultural resources including parks, recreation areas, and historic resources are also present. WisDOT and FHWA consider, during the development, evaluation and refinement of the alternatives for implementing purpose and need, how to best avoid and minimize impacts to existing development and environmental resources.

The U.S. Army Corps of Engineers (USACE), a cooperating agency to this project, may adopt this environmental impact statement to fulfill its agency responsibilities pursuant to the National Environmental Policy Act of 1969 (NEPA) and to comply with Code of Federal Regulations (CFR) 40 CFR §§ 1500-1508.[7] For projects affecting resources protected under the Clean Water Act, the development of alternatives must consider 40 CFR § 230.404(b)(1), "Guidelines for Specification of Disposal Sites for Dredged or Fill Material."[8] These guidelines state that dredged or fill material should not be discharged into aquatic ecosystems, including wetlands, unless the following conditions are met:

- No practicable alternatives can be demonstrated;
- Such discharge will not have unacceptable adverse impacts; and
- All practical measures are taken to minimize negative effects.

1.3.7. Summary of Need

The purpose of the proposed I-43 North-South Freeway Corridor Study is to provide a safe and efficient transportation corridor that meets identified transportation needs while minimizing impacts to the natural, cultural and built environment. The study has identified the following key needs:

- **Pavement, design and geometric deficiencies along the I-43 North-South study corridor:**
  - The pavement has been rehabilitated and resurfaced twice since initial construction in the 1950s and '60s. These improvements help extend pavement life, but underlying deterioration continues to undermine its useful life. The planned pavement resurfacing in 2014 is expected to maintain the driving surface for a short period time before complete reconstruction is scheduled.
  - All the interchanges have substandard distances between ramp terminals and local intersections. Three interchanges have substandard distances between ramp terminals and local driveways.
  - All interchanges have substandard ramp design.
  - Ten locations along the freeway mainline have substandard horizontal or vertical curves.
  - Twenty-four areas along the freeway mainline have substandard vertical alignments.
  - Nearly the entire length of the freeway mainline has a substandard cross slope.
  - Six locations have substandard stopping sight distance, and 14 locations have substandard decision sight distance.
  - Twelve locations have substandard vertical clearance under bridges.
- **Highway safety:** The character of crashes and related crash rates reflect the design deficiencies and traffic congestion along the freeway corridor. The highest number of crashes occur in the more congested parts of the freeway corridor in Milwaukee County, between Good Hope Road and Silver Spring Drive. The highest crash rates occur at interchanges with substandard ramp designs.
- **Existing and future traffic volumes:** Traffic operations in Milwaukee County are poor in many sections of the freeway now, and poor operations are expected to expand throughout almost the entire corridor into Ozaukee County by the year 2040.

[7] *http://www.gpo.gov/fdsys/granule/CFR-2011-title40-vol33/CFR-2011-title40-vol33-part-id1102/content-detail.html. Accessed Sept. 18, 2013.*

[8] *Administered by U.S. Environmental Protection Agency (EPA) and USACE (1977)*

- **Regional land use and transportation planning:** SEWRPC's regional plans have identified the need to address improvements to the I-43 North-South Freeway study corridor to accommodate anticipated land use and travel patterns.
- **System linkage and route importance:** The I-43 North-South Freeway is a critical transportation corridor linking several economic activity areas, the highway network within and beyond Wisconsin. The corridor also provides access to multiple transportation modes, including regional airports, intercity and local bus service, passenger rail, ferry service, and the Port of Milwaukee.

1.4. LOCAL GOVERNMENT, PUBLIC AND AGENCY INPUT

1.4.1. Public Meetings

In August 2012, WisDOT held public information meetings at which the public could review exhibits illustrating the need for the study and speak with the study team members. WisDOT prepared the study purpose and need using input from the August 2012 public information meeting and data collected on the study corridor. Additional public information meetings in January 2013 and August 2013 provided input on alternatives WisDOT developed during the study. Public comments from the meetings assisted WisDOT in screening and refining the alternatives described in **Section 2**. **Section 5** provides additional information on comments received at the public meetings.

1.4.2. Stakeholder Meetings

WisDOT held initial stakeholder meetings in July 2012 and August 2012 to gather input from local governments and major retail, medical services and a high school in the study area. The stakeholders were in favor of capacity expansion while avoiding or minimizing socioeconomic and environmental impacts. Stakeholders noted traffic concerns with afternoon backups north of Silver Spring Drive at the point where I-43 tapers from three to two lanes, and the morning traffic backups just south of Pioneer Road in Ozaukee County. Others noted areas of congestion near the interchanges at Good Hope Road, Brown Deer Road, and Mequon Road. In general, stakeholders were in favor of a new interchange at Highland Road.

Other areas of concern the stakeholders identified are drainage and stormwater management; pedestrian and bicycle accommodations; park-and-ride lot locations; proximity to water utilities; the potential new interchange at Highland Road; potential changes to the partial interchange at County Line Road; and noise impacts, especially in the Milwaukee County portion of the project.

WisDOT continues to meet with stakeholders in local communities to receive input on the study alternatives and impacts. Additionally WisDOT established a Technical Advisory Committee (TAC) and a Community Advisory Committee (CAC) to provide input on the alternatives at study milestones. **Section 5** provides detailed discussion stakeholder outreach.

1.4.3. Agency Scoping Meeting

WisDOT and FHWA held an agency scoping meeting in August 2012 to discuss the corridor, purpose and need factors, the environmental process and the schedule. The participants included representatives from SEWRPC, the cities of Mequon and Glendale, U.S. Environmental Protection Agency (EPA), USACE, Wisconsin Department of Natural Resources

(WDNR), North Shore Water Commission and the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP). Agency representatives expressed concern about stormwater management and emphasized that WisDOT and FHWA follow the hierarchy of avoid, minimize and mitigate to address impacts from the build alternatives (**Section 2**).

1.5. RELATIONSHIP TO OTHER PROPOSED ACTIONS

WisDOT plans a pavement overlay project in 2014 for I-43 from south of Silver Spring Drive to WIS 32. The project will maintain the driving surface until the freeway can be reconstructed, pending the outcome of the I-43 North-South Freeway Corridor Study. WisDOT's conversations with other municipalities did not identify significant local projects in the study area at this time.

2. ALTERNATIVES CONSIDERED

Section 2 describes the range of alternatives developed to address the purpose and need factors identified in **Section 1** as follows:

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

For the purposes of this draft environmental impact statement (DEIS), the Wisconsin Department of Transportation (WisDOT) and Federal Highway Administration (FHWA) have identified a preferred alternative that may best address the current and long-term needs in the I-43 North-South Freeway study corridor. See **Subsection 2.8** for more information.

As noted in **Subsection 2.9**, WisDOT and FHWA will review and consider input from the public hearing and public comment period on the DEIS and select a preferred alternative. The preferred alternative will be presented in the final environmental impact statement (FEIS), along with reasons for its selection.

2.1. DEVELOPMENT OF ALTERNATIVES

The regional transportation planning process establishes the basis for project-level alternatives developed for the I-43 North-South Freeway Corridor Study. The following subsections describe the regional planning context and the public and agency input that helped define the need for the I-43 North-South Freeway Corridor Study and establish the range of alternatives to be more fully developed for the study, which are described in **Subsection 2.2**.

2.1.1. Regional Planning Context

WisDOT, FHWA and local governments are partners with the Southeastern Wisconsin Regional Planning Commission (SEWRPC) in the regional transportation planning process and use as a basis for further study the recommendations in SEWRPC's *Planning Report No. 39: A Regional Transportation System Plan for Southeastern Wisconsin: 2035* (2035 regional transportation plan). As noted in the plan's introduction, SEWRPC's regional transportation planning is closely coordinated with WisDOT's statewide transportation planning to ensure consistency with statewide transportation plans and forecasts. At least every four years, FHWA and the Federal Transit Administration (FTA) must jointly verify that the metropolitan transportation planning process is being carried out in accordance with applicable provisions of federal law.

As part of the 2035 regional transportation plan, SEWRPC designed, tested and evaluated multiple regional plan scenarios to ensure that full and adequate consideration was given to resolving future transportation problems through land use decisions, public transit, bicycle and pedestrian facilities, transportation systems management (TSM) measures, and travel demand management (TDM) measures. SEWRPC considers these measures before evaluating highway projects that would potentially add capacity to existing arterial streets and highways or build new highway facilities.

Preliminary engineering/environmental corridor studies for arterial street and highway improvements are based on recommendations in the 2035 regional transportation plan. TSM

and TDM elements for specific highway projects rely on TSM and TDM recommendations from the regional transportation planning process. This is because TSM and TDM improvements generally need to be implemented on a broader scale than an individual highway corridor to maximize their effectiveness. The following alternative plan scenarios are presented in detail in the 2035 regional transportation plan.

NO BUILD PLAN SCENARIO

This plan scenario would maintain the existing transportation system, including the existing public transit system as it existed in base year 2005, resurface and reconstruct the existing arterial street and highway system without additional traffic lanes, and operate and manage the transportation system as it was operated and managed in base year 2005.

TRANSPORTATION SYSTEMS MANAGEMENT ONLY PLAN SCENARIO

SEWRPC's TSM Only Plan scenario includes both TSM and TDM elements. TSM elements optimize existing transportation facilities to maximum carrying capacity and travel efficiency through freeway traffic management, street and highway traffic management and other measures to help alleviate congestion. TDM elements reduce personal vehicular travel or shift such travel to alternative times and routes, allowing for more efficient use of the existing transportation system's capacity. The TSM Only Plan scenario would include all proposed improvements to the transportation system without highway capacity expansion.

SEWRPC's evaluation of the TSM Only Plan scenario included assignment of forecast travel demand to determine the extent to which such actions would meet current and future transportation needs and resolve traffic congestion problems. SEWRPC found that even with significantly expanded public transit, bicycle and pedestrian facilities, TSM and TDM measures implemented regionwide, traffic congestion on the regional highway system would double in the next 30 years. Because of these findings, the TSM Only Plan scenario was not selected as the recommended alternative by SEWRPC in the 2035 regional transportation plan.

Key **TSM** elements recommended in the 2035 regional transportation plan include the following:

- **Operational control:** Measures to improve freeway operations during average weekday rush hours and during traffic incidents, including freeway operating condition monitoring, ramp metering, freeway vehicular entrance control, and continuous use of traffic detectors to measure speed, volume and density of freeway traffic.
- **Advisory information:** Readily available information on travel conditions and travel times so motorists can choose more efficient travel routes resulting in a more efficient transportation system. Information sources include roadway variable message signs and the WisDOT Website, which contains maps showing areas with traffic congestion, incident locations and views of the freeway system from closed circuit television cameras. WisDOT also maintains a regional "511" call-in number that allows the public to get information about current travel conditions and construction.
- **Incident management:** Timely detection of freeway incidents through the use of closed circuit television, enhanced freeway location reference markers, freeway service patrols, crash investigation sites, ramp closure devices, and alternate route designations.
- **Arterial street and highway traffic management:** Improvements in this TSM category are typically implemented in the near-term (two to six years) and are similar to the spot improvements identified for the I-43 North-South Freeway Corridor Study (Subsection 2.3 through Subsection 2.5). For example, improvements could include adding turn lanes and

reconstructing intersections, improving signal timing, and adding auxiliary lanes or collector-distributor roads at select locations to improve traffic flow and safety.

Key **TDM** elements discussed in the 2035 regional transportation plan include the following:

- **Public transit:** The 2035 regional transportation plan recommends significant improvement and expansion of public transit in southeastern Wisconsin, including development of a rapid transit and express transit system, improvement of existing local bus service, and integration of local bus service with the recommended rapid and express transit service.

  Rapid transit bus service would operate over freeways connecting the urbanized areas, urban centers and outlying areas of the region. Express bus service would consist of a grid of limited-stop, higher speed routes located largely within Milwaukee County. The routes would connect major employment centers and shopping areas, other major activity centers, tourist attractions, entertainment centers and residential areas. None of the transit routes included in the 2035 regional transportation plan would use dedicated bus lanes on freeways.

  Altogether, recommended regional transit service in year 2035 would be increased by about 100 percent or double the service levels that existed in 2005, as measured in terms of revenue transit vehicle-miles of service provided.[1]

- **Preferential treatment for high-occupancy vehicles (HOV):** HOV provisions are intended to efficiently move transit vehicles, vanpools and carpools on the existing highway system. Such treatments include HOV bypass lanes at metered freeway on-ramps, reserved bus lanes along congested highways, transit priority signal system and dedicated parking for carpools and vanpools. Currently, HOV bypass lanes are on more than half of the metered freeway on-ramps in Milwaukee County, and at one on-ramp (Mequon Road) in Ozaukee County. Reserve bus lanes like those along Bluemound Road in Waukesha County allow buses to bypass traffic backups at traffic signals. Expanded use of reserve lanes is recommended on congested streets and highways. The 2035 regional transportation plan does not recommend bus lanes or HOV lanes on I-43.

- **Park-and-ride lots and other miscellaneous TDM measures:** The 2035 regional transportation plan recommends park-and-ride lots to promote carpooling and serve public transit, thereby reducing the number of cars on the freeway system. Park-and-ride lots are recommended at major intersections and interchanges where sufficient demand may be expected to warrant them. WisDOT has also implemented its RIDESHARE program that matches potential carpoolers based on route and personal preferences. Other TDM measures include telecommuting and flexible work schedules. These strategies can be recommended to area businesses, but the decision to provide these options to employees is at the discretion of the employer.

TRANSPORTATION SYSTEMS MANAGEMENT PLUS HIGHWAY PLAN SCENARIO

Based on the outcome of evaluating the TSM Only Plan scenario, SEWPRC identified a number of arterial street and highway improvements to address congestion and deficiencies that would be expected to remain after full implementation of the TSM Only Plan scenario.

The TSM Plus Highway Plan scenario was selected as the recommended alternative in the 2035 regional transportation plan, based on the results of the assessment of the No Build and TSM Only scenarios and their inability to accommodate future travel demand within Southeastern

[1] *Since the 2035 regional transportation plan was adopted in 2006, fixed-route public transit service provided within Southeastern Wisconsin has been in decline. Between the years 2006 and 2012 fixed-route public transit revenue vehicle-miles of service declined by about 10 percent.*

Wisconsin. This assessment was conducted, in part, using SEWRPC's regional travel demand model, which is the technical basis for the regional traffic forecasts in the 2035 plan. The travel demand model, established in 1963, is now in its fourth generation and is the most effective method for evaluating travel demand in southeastern Wisconsin. The regional traffic forecasts are a key element in evaluating alternatives for street and highway improvements. The forecasts assume that all components of the TSM Only Plan scenario have already been implemented at the regional level. In other words, the traffic forecasts for the I-43 North-South Freeway Corridor Study and other highways in the southeast Wisconsin region represent the amount of "residual traffic" that will continue to use the arterial street and highway system and contribute to increasing congestion and safety concerns even after full implementation of public transit, bicycle and pedestrian, TSM and TDM elements of the 2035 regional transportation plan.

WISDOT'S ROLE IN IMPLEMENTING THE TSM PLUS HIGHWAY PLAN SCENARIO

In selecting the TSM Plus Highway Plan scenario, SEWRPC's Advisory Committee on Regional Transportation System Planning (local officials and agency representatives who guide and direct the regional planning process) emphasized that proposed highway improvements including preservation projects, would need to undergo preliminary engineering and environmental studies by responsible state, county or municipal governments before implementation. The I-43 North-South Freeway Corridor Study by WisDOT and FHWA serves this purpose.

WisDOT has jurisdiction to implement TSM elements, some TDM elements and capacity expansion for highway projects, but does not have the jurisdiction to implement transit capital improvements. As stated in Wisconsin Statutes § 85.062(2), "No major transit capital improvement project may be constructed using any state transportation revenues unless the major transit capital improvement project is specifically enumerated under subsection (3)."

Implementing the 2035 regional transportation plan's transit recommendations depends on funding availability and commitments at the federal, state and local levels as well as fluctuations in revenue over time. For example, state funding to the Milwaukee County Transit System (MCTS) increased by 29 percent from 1995-2000, and by another 7 percent between 2000 and 2005. The 2011-2013 biennial budget decreased statewide transit funding by 10 percent and the current 2013-2015 biennial budget increases funding by 4 percent.

The regional transportation plan notes that implementation of the recommended public transit expansion would be dependent upon the continued commitment of the state to be a partner in the maintenance, improvement and expansion, and attendant funding of public transit. The state historically has funded 40 percent to 45 percent of transit operating costs, and has increased funding to address inflation in the cost of providing public transit, and to provide for transit improvement and expansion.

Moreover, implementing the recommended expansion of public transit in Southeastern Wisconsin depends on attaining dedicated local funding for public transit. Most public transit systems nationwide have dedicated local funding, typically a sales tax of 0.25 percent to 1.0 percent, and they are not nearly as dependent upon federal and state funding. This is not the case with Milwaukee and Ozaukee counties and as such, the counties rely heavily on property tax revenues. The local share of public transit funding in Southeastern Wisconsin is provided through county or municipal budgets, and represents about 15 percent of the total operating costs and 20 percent of the total capital costs of public transit. In Wisconsin, because the local share of funding public transit is largely provided by property taxes, public transit must annually compete with mandated services and projects. Increasingly, due to the constraints in property-

tax-based funding, counties and municipalities have found it difficult to provide funding to address transit needs, and to respond to funding decisions at the federal and state level.

It is appropriate for WisDOT to rely on SEWRPC's evaluation of transit options conducted as part of the regional transportation planning process, per FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. This technical advisory states that reasonable and feasible transit options should be considered on all proposed major highway projects in urbanized areas with more than 200,000 people, even though such options may not be within the existing FHWA funding authority. The technical advisory goes on to say that consideration of this alternative (transit) may be accomplished by reference to the regional or area transportation plan where that plan considers mass transit, or by an independent analysis during early project development.

2.1.2. Public and Agency Input

Alternatives development also includes extensive public and agency input. Building on the SEWRPC transportation planning process, FHWA uses a collaborative environmental review process during project studies[2] that includes a coordination plan and impact analysis methodology. The review process provides an opportunity for public and agency input on purpose and need, alternatives and impact assessment. Public outreach has included public information meetings, advisory committees, meetings with local officials and neighborhood groups. Coordination with state and federal review agencies has included a scoping meeting and additional meetings/correspondence regarding purpose and need, alternatives and impact assessment. The alternatives described in subsequent sections include alternatives derived from the SEWRPC planning process, suggestions from the public and agency review process to improve those alternatives, and suggestions of additional alternatives to consider. See **Section 5** for additional information about public involvement and agency coordination.

2.1.3. Reasonable Alternatives Concept

The Council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act[3] (NEPA) require an environmental impact statement (EIS) to include detailed analysis of reasonable alternatives. Subsequent CEQ guidance states: "In determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."[4] The term "reasonable alternatives" is generally understood to mean alternatives that address project purpose and need, and that avoid, minimize or mitigate overall social, environmental and economic impacts to the extent practicable.

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[2] *U.S. Code (USC) 23 USC § 139*

[3] *Code of Federal Regulations (CFR) 40 CFR § 1502.14*

[4] *"Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18, 026, March 23, 1981. https://www.federalregister.gov/articles/2011/01/21/2011-1188/final-guidance-for-federal-departments-and-agencies-on-the-appropriate-use-of-mitigation-and. Accessed Sept. 23, 2013.*

2.2. INITIAL RANGE OF STUDY ALTERNATIVES CONSIDERED

WisDOT developed the project-level alternatives to address the study purpose and need, which includes the recommendations for the highway components in the 2035 regional transportation plan. If the I-43 North-South Freeway Corridor Study has recommendations that are different than those included in the 2035 regional transportation plan, the plan would be amended to reflect the conclusions of this more detailed level of study. The 2035 regional transportation plan recommends full implementation of all of the plan elements, which include public transit, bicycle and pedestrian, TSM, TDM and highway improvements.

At the outset of the study, WisDOT initiated public outreach activities and technical reviews to arrive at the initial range of alternatives and the alternatives selected for detailed analysis in this DEIS. Public outreach activities included a series of public information meetings to present the study purpose and need and the range of alternatives that could respond to needs. WisDOT also established a Technical Advisory Committee (TAC) and a Community Advisory Committee (CAC) to provide local input during the alternatives development process. The TAC provided input on technical aspects of the alternatives, while the CAC provided a local neighborhood and business perspective on alternatives. These meetings were also supplemented with meetings with local officials, neighborhoods and individuals to help refine alternatives. **Section 5** provides more detail about the TAC, CAC and public meetings.

WisDOT also conducted monthly reviews of alternatives with WisDOT and FHWA staff to obtain input on specific technical considerations through the development process. In addition to monthly technical reviews, WisDOT held a value engineering study and road safety audit for the study. The value engineering study convened outside experts to review alternatives and identify additional improvements and cost efficiencies. The road safety audit reviewed the alternatives to identify potential safety issues and to ensure that existing safety conditions in the I-43 North-South Freeway Corridor Study are addressed. The initial range of alternatives for the study corridor includes the following:

- No-Build Alternative (maintain existing highway configuration)
- Regionwide TSM and TDM elements
- Build alternatives – highway improvement components
  - Spot improvements (spot safety and operational improvements with minimal or no right of way acquired)
  - Reconstruct to modern design standards without capacity expansion (no additional lanes and minimal right of way acquired)
  - Reconstruct to modern design standards with capacity expansion (additional lanes and right of way acquired)

These alternatives are further described in the following subsections. The build highway improvement concepts, which also include TSM and TDM elements, are discussed by freeway mainline and interchange alternatives.

2.2.1. No-Build Alternative

As described in **Subsection 1.3.1**, I-43 is a four-lane freeway from just south of Bender Road to WIS 60, with varying median and shoulder widths, as well as several pavement, design and geometric deficiencies. Under the No-Build Alternative, I-43 would be maintained in its current configuration. Over time and as needed, WisDOT would replace existing pavement, structures,

and other highway elements. No capacity expansion, or design and safety improvements would occur on the freeway mainline or at the interchanges.

This is essentially the No Build Plan scenario developed and evaluated by SEWRPC in the 2035 regional transportation plan. That is, the alternative would maintain the existing transportation system, including the existing public transit system as it existed in base year 2005, resurface and reconstruct the existing arterial street and highway system without additional traffic lanes, and operate and manage the transportation system as it was operated and managed in base year 2005.

While the No-Build Alternative would address deteriorated pavement and structure conditions, have minimal environmental impacts and lower construction cost than the build alternatives, it would not meet the study purpose and need to address substandard design elements, safety concerns, or forecasted traffic volumes. Although the No-Build Alternative does not meet study purpose and need, it serves as the baseline for impact comparison to the build alternatives.

2.2.2. Regionwide TSM and TDM Elements

TSM and TDM elements recommended by SEWRPC's 2035 transportation plan already are in place on portions of the southeastern Wisconsin freeway system, or are planned for implementation over time on the entire freeway system, including I-43.

- **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. Existing ramp meters are located at the following interchanges:
  - Silver Spring Drive southbound on-ramp (includes HOV bypass lane)
  - Good Hope Road southbound on-ramp
  - Brown Deer Road eastbound to southbound on-ramp (includes HOV bypass lane) and westbound to southbound on-ramp
  - County Line Road southbound on-ramp
  - Mequon Road southbound on-ramp

  Ramp meters are proposed for all southbound entrance ramps in the study corridor, and also for all northbound ramps in Milwaukee County.
- **Traffic detectors:** Devices embedded in the pavement or mounted adjacent to the I-43 mainline at various intervals to detect travel speed and time, traffic congestion, traffic flow breakdowns and incidents, and to regulate ramp meters. Traffic detectors are in place at ramp meter locations, as well as on the I-43 mainline. Detectors would be placed at all additional metered ramps. Additional detectors in the freeway mainline would be determined during subsequent design phases.
- **Freeway monitoring/advisory information:** Permanently installed 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. There is a variable message sign at County Line Road for southbound I-43, and additional sign locations would be determined during subsequent design phases.
- **Closed circuit television cameras:** 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. Closed circuit television cameras are currently located along I-43 at Silver Spring Drive, Daphne Road, Good Hope Road, Brown Deer Road and Mequon Road. Subsequent design phases would help determine locations for additional cameras.

- **Crash investigation sites:** Designated safe zones where motorists can go if they are involved in a crash or an incident on the freeway. Crash investigation sites are located at the northbound and southbound exit ramps for the Brown Deer Road interchange. WisDOT would determine additional site locations during subsequent design phases.
- **Enhanced mile-marker reference posts (with highway shield and mile number):** Assist motorists in identifying specific locations along the freeway when reporting incidents. These markers are not yet in place.

The following TDM elements, as recommended in SEWRPC's 2035 regional transportation plan, are currently in place in the I-43 North-South Freeway study corridor (see also **Subsection 3.2** for detailed description of transit services):

- In the Milwaukee County portion of the I-43 study corridor (Silver Spring Drive to County Line Road), 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 (Henry Maier Festival Park, Miller Park, Wisconsin State Fair Park) and Brown Deer Road/WIS 100, utilizing the existing park-and-ride lot at the I-43/Brown Deer Road/WIS 100 interchange.
- 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. Within the study corridor, park-and-ride lots are located at the Brown Deer Road/WIS 100, Pioneer Road/ County Road C, and Silver Spring Drive interchanges. Other stops along Port Washington Road serve area businesses and community facilities.

In addition to express bus service, the Ozaukee County Shared Ride Taxi service provides transportation to anywhere in the county. The service also provides paratransit services for special needs groups such as seniors, disabled, low-income or veterans.

Transit improvements planned in the study corridor, such as rapid and express bus routes, would not be precluded or affected by the proposed arterial street, interchange and highway improvements discussed in Subsection 2.3 through Subsection 2.5.

Existing transit service in the study corridor, as well as any future expanded service would be enhanced by the proposed highway improvements due to a safer and more efficient freeway that could also provide reduced transit travel times throughout the corridor.

TIME OF DAY SHOULDER USE

During public meetings, WisDOT received comments about using highway shoulders as a temporary traffic lane (shoulder running lane) during peak travel times as an alternative to adding a general travel lane. WisDOT evaluated this TSM element assuming a 19-foot shoulder, consisting of a 14-foot travel lane and 5-foot shoulder (the typical dimensions for a median shoulder lane).[5]

Under future (year 2040) conditions, WisDOT's analysis found that an I-43 shoulder running lane between Silver Spring Drive and WIS 32 (in Ozaukee County) would be required for about seven hours using a 70 mph free-flow speed. Up to 13 consecutive hours of shoulder running

[5] *FHWA-HOP-10-023 publication "Efficient Use of Highway Capacity – A Summary."*

lane would be required when existing speed limits (55 mph in Milwaukee County and 65 mph in Ozaukee County) are assumed. Advantages to implementing shoulder running lanes include:

- Better incident management and emergency vehicle use during off-peak travel hours, when shoulder running is not allowed. If an incident occurs during off peak hours, the shoulder lane could be opened to mitigate unforeseen traffic congestion.
- Potential for express bus lane or other managed lane measures (HOV lane, high-occupancy/ toll lanes lane, etc.)
- Potentially less right of way cost.

Disadvantages to the implementation of shoulder running lanes include:

- Reduced access to incidents while shoulders are in use
- Less median-side shoulder space during peak traffic periods
  - Increased crashes
  - Increase in severity of crashes
- May impact future studies and designs of other freeway segments, which cannot accommodate time of day shoulder use
- Inability to handle traffic during construction

The extensive need for capacity and disadvantages of a very narrow shoulder when in use limits the effectiveness of this design. This also may limit the ability to provide a safe, efficient highway as called for in the study purpose and need. It is recommended that a design and operation of time-of-day-based shoulder running not be implemented.

2.2.3. Highway Improvement Element

As discussed in **Subsection 2.1**, SEWRPC's 2035 regional transportation plan recommends improvements to I-43, including capacity expansion, in conjunction with the TSM and TDM elements discussed in **Subsection 2.2.2**. The 2035 regional transportation plan also states that WisDOT will perform a preliminary environmental study and engineering (this DEIS) to develop and evaluate specific improvement options, including capacity expansion and alternative ways to provide it. While SEWRPC's 2035 regional transportation plan demonstrates the need for capacity expansion by adding travel lanes in the study corridor, WisDOT also considers other types of capacity expansion improvements at the project level to determine whether the purpose and need for the I-43 North-South Freeway Corridor Study could be met without adding travel lanes.

2.3. PROJECT-LEVEL BUILD ALTERNATIVES – I-43 MAINLINE

WisDOT developed project-level build alternatives based on recommendations in SEWRPC's 2035 regional transportation plan and the purpose and need factors discussed in **Section 1**. In addition to the study purpose and need factors, WisDOT considered costs, environmental constraints and input from resource agencies and the public to help adjust or screen alternatives. I-43 currently transitions from six travel lanes (three in each direction) to four travel lanes (two in each direction) near Bender Road, just north of Silver Spring Drive, to the study's north terminus at WIS 60. The 2035 regional transportation plan recommends a six-lane facility throughout the study limits. The alternatives represent efforts to present different impact tradeoffs to abutting development and ways to minimize impacts.

The highway improvements discussed in the following subsections are described by mainline

alternatives and by each interchange in the study corridor. For ease of discussion noted in **Subsection 2.3.1**, the I-43 mainline alternatives are described by the South Segment of the corridor, and the North Segment (**Exhibit 2-1**). All build alternatives include the TSM and TDM elements described in **Subsection 2.2.2**.

2.3.1. I-43 Mainline Alternatives – South Segment: Silver Spring Drive to Green Tree Road

Due to unique land uses and right of way constraints, the South Segment of I-43 is addressed separately from the rest of the I-43 mainline. The South Segment is about 2 miles long, extending from Silver Spring Drive to Green Tree Road. The main issues and concerns in the South Segment include tight right of way, a railroad crossing over I-43, and parallel side roads in close proximity to I-43 (Port Washington Road east of I-43 and Jean Nicolet Road west of I-43). There is also a safety concern related to the northbound third lane drop north of Silver Spring Drive. Alternatives are described below.

ACTIONS COMMON TO SOUTH SEGMENT BUILD ALTERNATIVES

There are actions common to many of the South Segment Build Alternatives: reconstructing the Union Pacific (UP) Railroad bridge over I-43, providing pedestrian access between Nicolet High School and its athletic fields east of I-43 and reconstructing a portion of Port Washington Road to a four-lane roadway. Alternatives for each of these actions are described below.

UNION PACIFIC RAILROAD BRIDGE

Many of the South Segment alternatives would require reconstructing the UP Railroad bridge over Jean Nicolet Road, I-43 and Port Washington Road. WisDOT proposes to construct a new bridge immediately north of the existing bridge and match into the existing east and west bridge approaches. This alternative would avoid disrupting train traffic as the new bridge is constructed. Train traffic would use the existing bridge until the new bridge is complete and then switch to the new bridge. The existing bridge would be removed once trains switch to the new bridge.

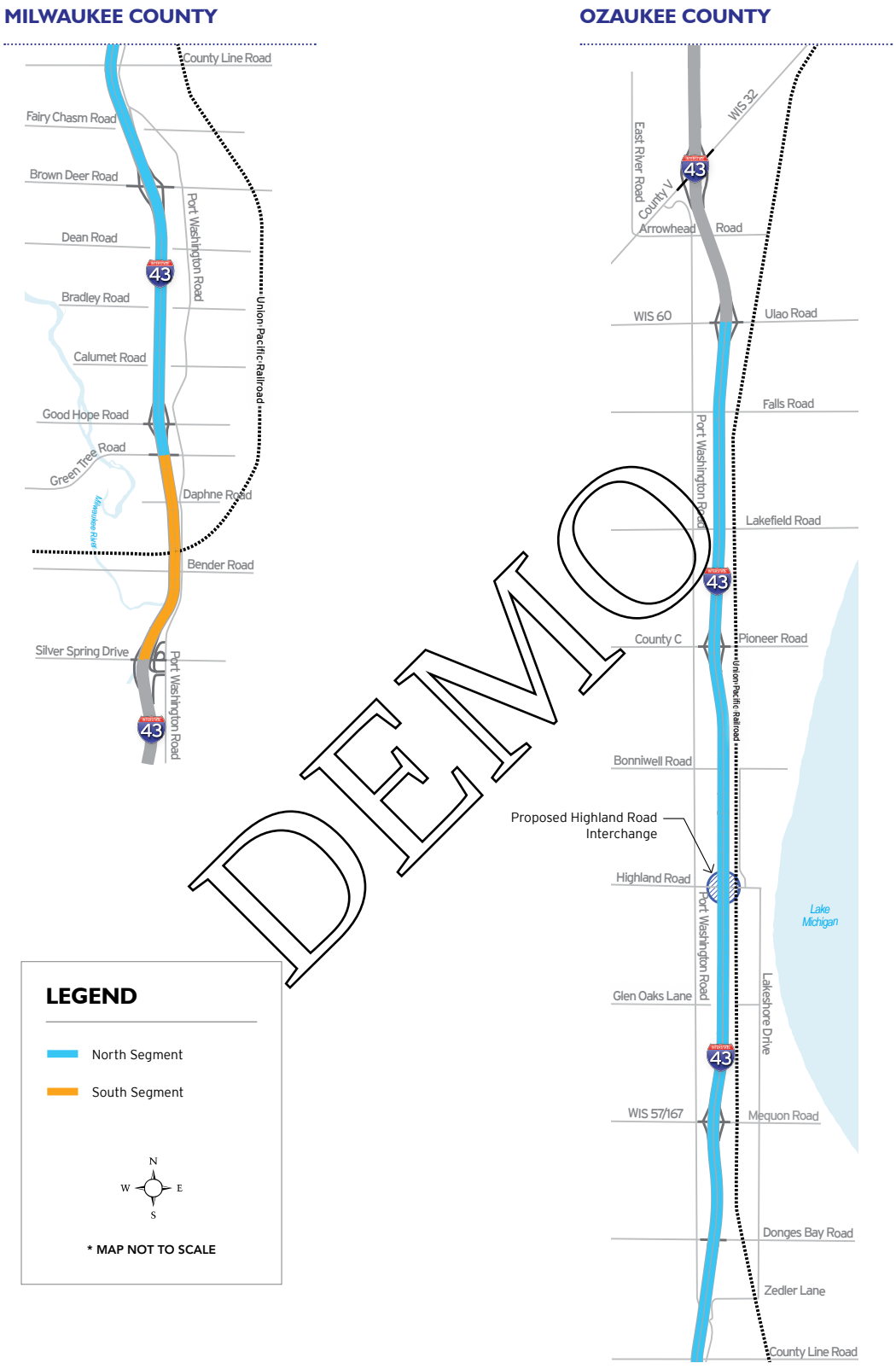
NICOLET HIGH SCHOOL PEDESTRIAN ACCESS

Currently, Nicolet High School maintains a tunnel that allows a pedestrian connection between the high school campus, west of I-43 to athletic fields east of I-43. The tunnel does not meet standards in accordance with the Americans with Disabilities Act (ADA), and there are safety concerns with the lack of lighting and visibility. As noted in alternatives descriptions below, many of South Segment build alternatives would replace the tunnel. Replacement options include a pedestrian tunnel or overpass bridge, or possibly a multiuse trail along Jean Nicolet Drive, Green Tree Road and Port Washington Road. WisDOT will develop a recommended alternative through additional coordination with Nicolet High School.

RECONSTRUCT PORT WASHINGTON ROAD TO A FOUR-LANE ROADWAY

Most of Port Washington is a local four-lane north-south arterial street in the city of Glendale, with the exception of a two-lane section between Bender Road and Daphne Road. The city of Glendale has long-term plans to widen Port Washington Road; however, the location of the existing UP Railroad bridge piers has prevented implementation in the past. The I-43 North-South Freeway Corridor Study is an opportunity for WisDOT to coordinate with the city to widen the remaining two-lane section of Port Washington Road. As a main north-south arterial, Port

Exhibit 2-1: Location of I-43 Mainline North and South Segments



Washington Road is an alternate route for traffic diverting from the freeway during construction and incidents. Completing the four-lane section between Bender Road and Daphne Road would help make traffic operations more efficient. Most of the build alternatives for the South Segment of the I-43 mainline described below include a four-lane Port Washington Road. The city of Glendale also supports constructing Port Washington Road as a four-lane road (see **Appendix C**). Because Port Washington Road is a local road, the city and WisDOT will develop a cost-share agreement that defines the roles and responsibilities related to funding the four-lane construction.

SPOT IMPROVEMENTS

This alternative addresses safety deficiencies and would retain the existing four-lane highway. A temporary concrete barrier is currently in place to transition traffic from six to four lanes from about 900 feet south of Bender Road to the UP Railroad bridge. WisDOT would remove the temporary barrier that shields the existing fence atop the retaining wall. Parapet (a type of permanent barrier) would be constructed on the existing retaining wall. The pavement would also be milled, overlain and restriped. A median shoulder and barrier would be added from Bender Road to Good Hope Road. Currently, there is no inside shoulder and the outside shoulder is substandard at 9 ½ feet wide. The median would have a 42-inch-high concrete barrier. Substandard shoulders would be reconstructed to provide 10-foot inside shoulders and 12-foot outside shoulders. The Green Tree Road bridge over I-43 is reaching the end of its useful life and would be replaced, along with correcting a substandard curve and bridge clearance. The existing UP Railroad bridge and the Nicolet High School pedestrian tunnel would remain in place. Port Washington Road would remain in its existing configuration. **Exhibit 2-2** illustrates spot improvement locations for the study corridor, including the South Segment.

MODERNIZATION – 4 LANES (CENTERED)

This alternative would retain the existing four-lane highway and reconstruct it to modern design standards on its present alignment (**Exhibit 2-9**). Reconstruction would involve replacing pavement, correcting vertical profiles to increase clearances at all bridges to the current design standard of 16 feet 9 inches. The Green Tree Road overpass bridge would be replaced. The substandard vertical and horizontal curves noted in **Subsection 1.3.1**, would be corrected. Existing substandard shoulders would be reconstructed to paved to meet current standards. Barrier treatment in the median would include a 42-inch concrete barrier. Limited right of way would be required with this alternative. The Nicolet High School pedestrian tunnel would be replaced, but the existing UP Railroad bridge would remain in place and Port Washington Road would remain in its existing configuration.

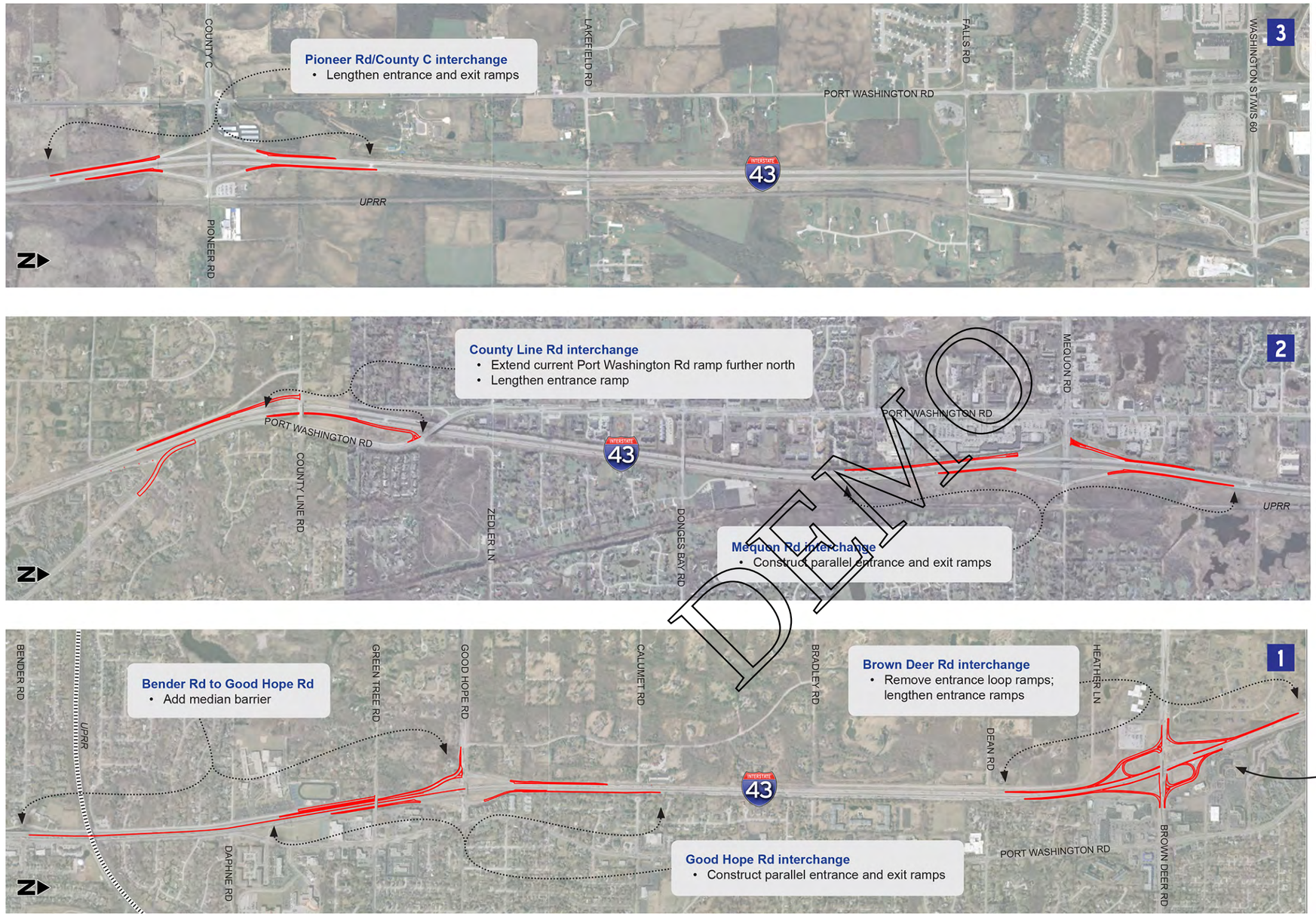
MODERNIZATION – 6 LANES

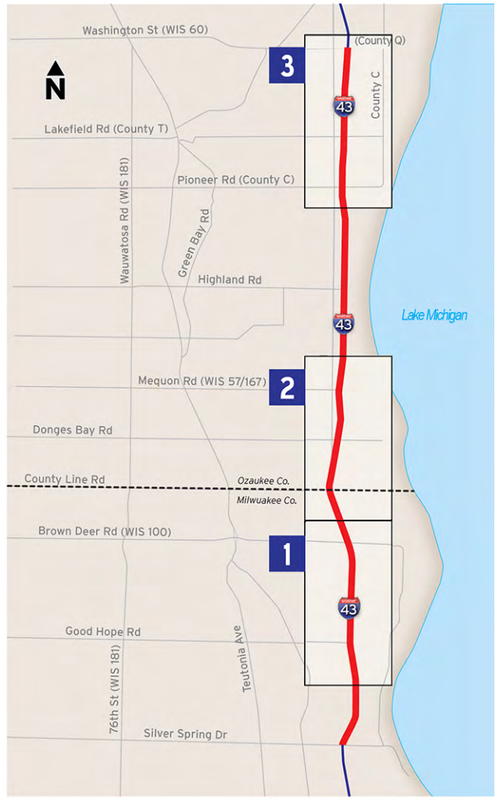
WisDOT developed and evaluated several design options that would reconstruct the South Segment of the I-43 mainline to modern design standards and provide additional capacity. Key features of each alternative are summarized as follows.

MODERNIZATION – 6 LANES (CENTERED)

I-43 would be centered and widened on both sides between the UP Railroad bridge and Daphne Road to accommodate an additional travel lane in each direction (**Exhibit 2-3**). I-43 would be widened with a “best fit” alignment (generally centered on the existing highway, but using slight

Exhibit 2-2: I-43 North-South Corridor Spot Improvements





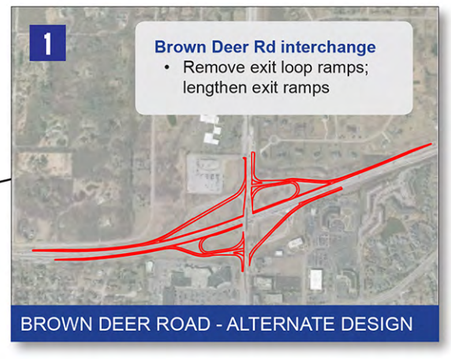
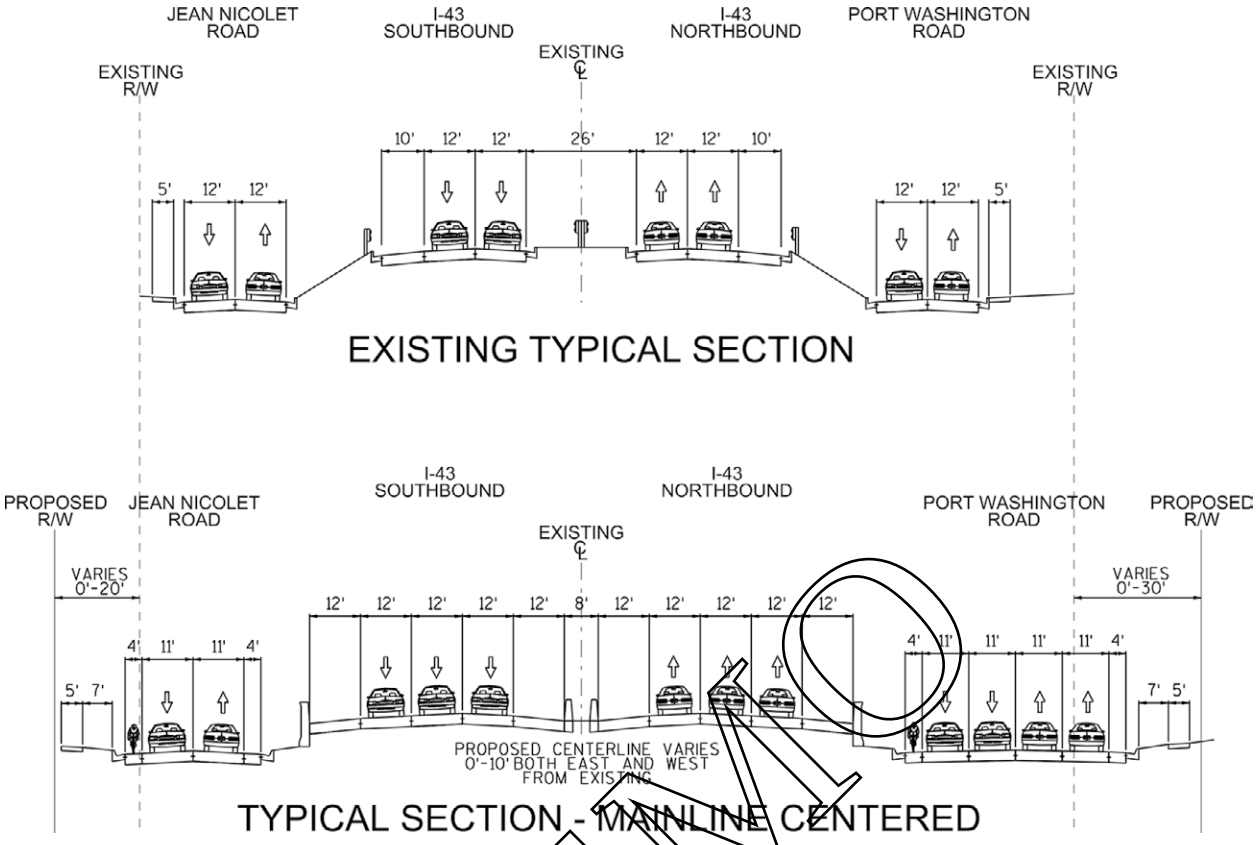


Exhibit 2-3: Modernization – 6 Lanes (Centered)

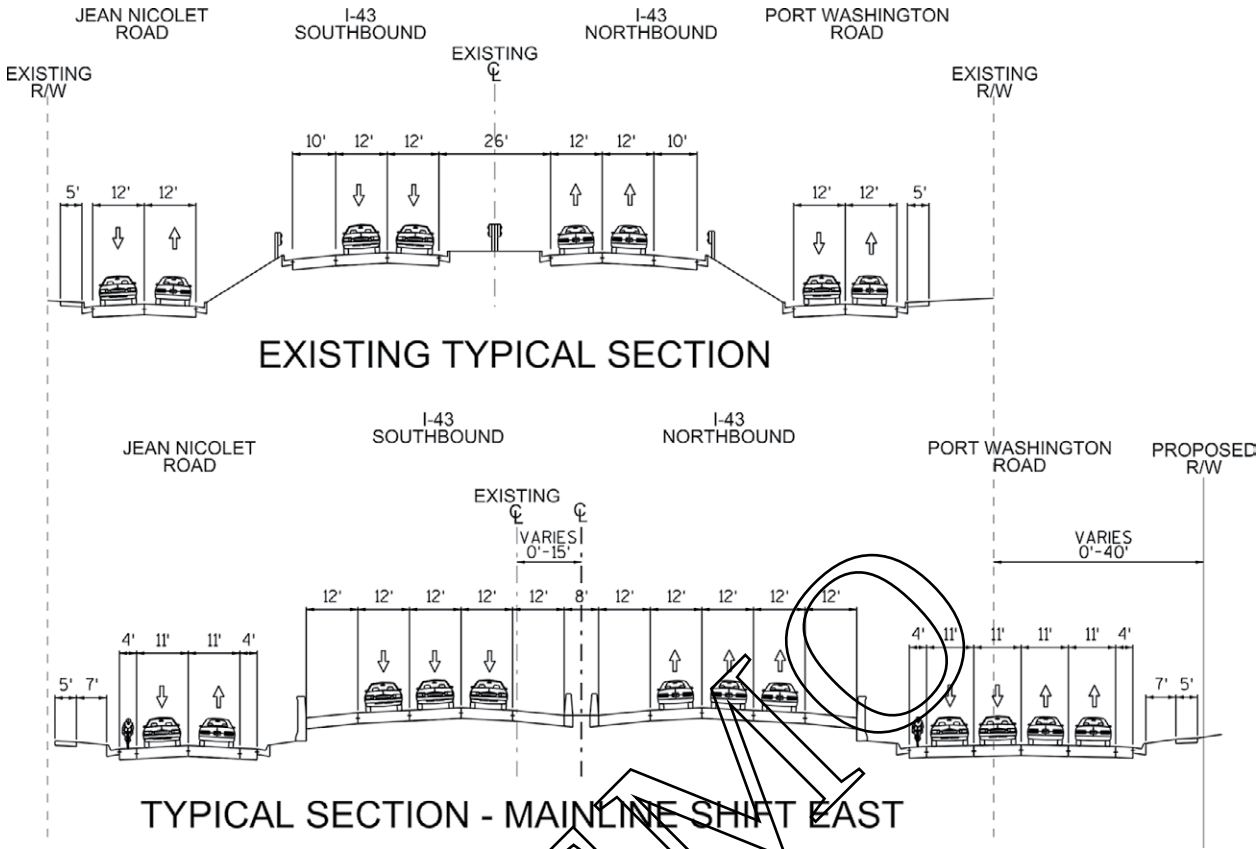


off-center shifts at key locations to minimize impacts) from Bender Road to the UP Railroad bridge and from Daphne Road to Green Tree Road. From about 700 feet south of Bender Road to Bender Road, where the six-lane-to-four-lane transition is located, I-43 mainline would be improved to bring it up to current design standards. Work would include removing the temporary barrier that currently channelizes the northbound lane drop, rehabilitating the existing retaining wall and parapet, mill and overlay the pavement to remove the lane drop, add lane striping and provide new pavement marking. Jean Nicolet Road would be shifted west and reconstructed as a continuous two-lane road from Montclaire Avenue south of Bender Road to Green Tree Road. The reconstructed road would include a sidewalk on the west side and bike lanes on both sides as required under *Wisconsin Administrative Code Chapter Trans 75: Bikeways and Sidewalks in Highway Projects* (Trans 75). Port Washington Road would be shifted east and reconstructed as a four-lane facility from Bender Road to Daphne Road. The roadway would include a sidewalk on the east side, and bike lanes on both sides. The UP Railroad bridge and Nicolet High School pedestrian tunnel would be replaced.

MODERNIZATION – 6 LANES (MAINLINE SHIFTED EAST)

I-43 would be shifted east between the UP Railroad bridge and Daphne Road and widened to accommodate an additional travel lane in each direction (**Exhibit 2-4**). I-43 would be widened with a “best fit” alignment (generally offset to the east of the existing centerline, but using shifts at key locations to minimize impacts) from Bender Road to the UP Railroad bridge and from

Exhibit 2-4: Modernization – 6 Lanes (Mainline Shifted East)

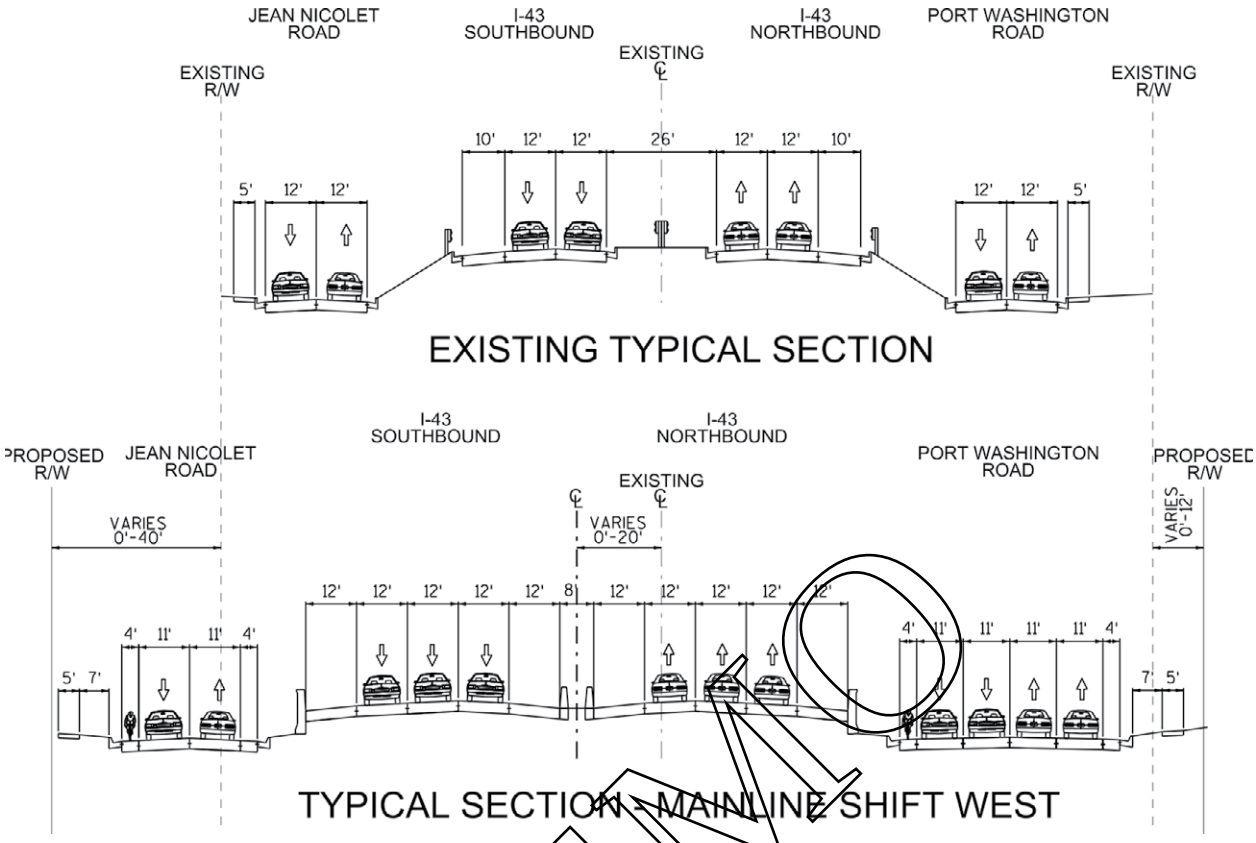


Daphne Road to Green Tree Road. From about 700 feet south of Bender Road to Bender Road, where the six-lane-to-four-lane transition is located, I-43 mainline would be improved to bring it up to current design standards. Work would include removing the temporary barrier that currently channelizes the northbound lane drop, rehabilitating the existing retaining wall and parapet, mill and overlay the pavement to remove the lane drop, add lane striping and provide new pavement marking. Jean Nicolet Road would be reconstructed on existing alignment as a continuous two-lane road from Montclaire Avenue to Green Tree Road. Similar to the Modernization – 6 Lanes (Centered) alignment, the reconstructed Jean Nicolet Road would include a sidewalk and bike lanes. Port Washington Road would be shifted east and reconstructed as a four-lane facility from Bender Road to Daphne Road. Similar to the Modernization – 6 Lanes (Centered) alignment, the reconstructed Port Washington Road would include a sidewalk and bike lanes. The UP Railroad bridge and Nicolet High School pedestrian tunnel would be replaced.

MODERNIZATION – 6 LANES (MAINLINE SHIFTED WEST)

I-43 would be shifted west between the UP Railroad bridge and Daphne Road and widened to accommodate an additional travel lane in each direction (**Exhibit 2-5**). I-43 would be widened with a “best fit” alignment (generally offset to the west of the existing centerline, but using shifts at key locations to minimize impacts) from Bender Road to the UP Railroad bridge and from Daphne Road to Green Tree Road. From about 700 feet south of Bender Road to Bender

Exhibit 2-5: Modernization – 6 Lanes (Mainline Shifted West)

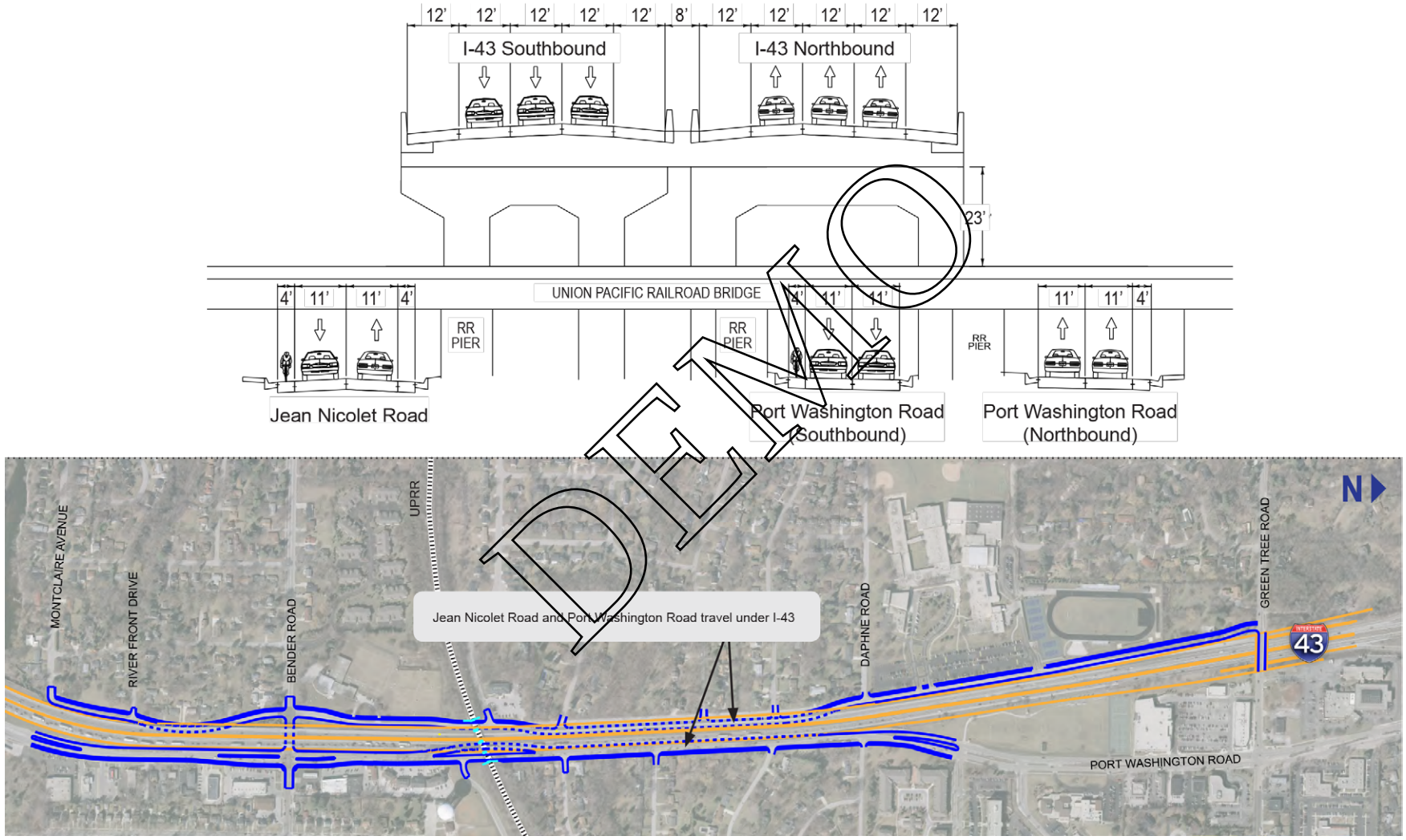


Road, where the six-lane-to-four-lane transition is located, I-43 mainline would be improved to bring it up to current design standards. Work would include removing the temporary barrier that currently channelizes the northbound lane drop, rehabilitating the existing retaining wall and parapet, mill and overlay the pavement to remove the lane drop, add lane striping and provide new pavement marking. Jean Nicolet Road would be shifted west and reconstructed as a continuous two-lane road from Montclaire Avenue to Green Tree Road. Similar to the Modernization – 6 Lanes (Centered) alignment, the reconstructed Jean Nicolet Road would include a sidewalk and bike lane. Port Washington Road is maintained on existing alignment and reconstructed as a four-lane facility from Bender Road to Daphne Road. Similar to the Modernization – 6 Lanes (Centered) alignment, the reconstructed Port Washington Road would include a sidewalk and bike lanes. The UP Railroad bridge and Nicolet High School pedestrian tunnel would be replaced.

MODERNIZATION – 6 LANES (ELEVATED OVER UNION PACIFIC RAILROAD BRIDGE)

I-43 would be shifted west, widened to accommodate an additional travel lane in each direction, and elevated from south of Bender Road to south of Green Tree Road with I-43 going over the existing UP Railroad bridge. I-43 is about 33 feet above the UP Railroad bridge, or about 58 feet above existing I-43. The UP Railroad bridge would remain in place (**Exhibit 2-6**). Jean Nicolet Road would be reconstructed as a two-lane facility from Montclaire Avenue to Green Tree Road. Portions of Jean Nicolet Road travel under elevated I-43. The reconstructed road would include a sidewalk on the west side and bike lanes on both sides as required under Trans 75. Port

Exhibit 2-6: Modernization – 6 Lanes (Elevated over Union Pacific Railroad Bridge)



Washington Road would be reconstructed as a four-lane facility from Bender Road to Daphne Road. Portions of Port Washington Road travel under elevated I-43. A sidewalk would be provided on the east side of the roadway, and bike lanes on both sides. The Nicolet High School pedestrian tunnel would be replaced.

MODERNIZATION – 6 LANES (RAISED)

I-43 would be on a "best fit" alignment and widened to accommodate an additional travel lane in each direction; the highway profile would be raised from north of the UP Railroad bridge to the south of Green Tree Road (about 25 feet above existing I-43 near Coventry Court (**Exhibit 2-7**). From about 700 feet south of Bender Road to Bender Road, where the six-lane-to-four-lane transition is located, I-43 mainline would be reconstructed to bring it up to current design standards. Work would include removing the temporary barrier that currently channelizes the northbound lane drop, rehabilitating the existing retaining wall and parapet, mill and overlay the pavement to remove the lane drop, add lane striping and provide new pavement marking. Jean Nicolet Road would be partially removed from Montclaire Avenue to Green Tree Road; one of the following two access options would replace service (a sidewalk and bike lanes would be provided):

- Access option 1: Cul de sac Fairfield Court and Apple Tree Road; construct a local access road between Brentwood Lane and Acacia Road.
- Access option 2: Cul de sac Apple Tree Road and Acacia Road; construct a local access road between Fairfield Court and Brentwood Lane.

Alternative access to Nicolet High School on the west side of I-43 would be provided by a connection between Daphne Road and the remaining segment of Jean Nicolet Road. A new underpass at Coventry Court also provides vehicle and pedestrian access to Nicolet High School and the playing fields east of I-43. The Nicolet High School pedestrian tunnel would be removed. The UP Railroad bridge and would be replaced. Port Washington Road would be reconstructed as a four-lane facility from Bender Road to Daphne Road. Portions of Port Washington Road travel under elevated I-43. The reconstructed road would include a sidewalk and bike lanes.

MODERNIZATION – 6 LANES (DEPRESSED)

I-43 would be on a "best fit" alignment and widened to accommodate an additional travel lane in each direction. The highway profile would be lowered with retaining walls on both sides from north of the UP Railroad bridge to the south of Green Tree Road (about 20 feet below existing I-43 near Apple Tree Road (**Exhibit 2-8**). From about 700 feet south of Bender Road to Bender Road, where the six-lane-to-four-lane transition is located, I-43 mainline would be reconstructed to bring it up to current design standards. Work would include removing the temporary barrier that currently channelizes the northbound lane drop, rehabilitating the existing retaining wall and parapet, mill and overlay the pavement to remove the lane drop, add lane striping and provide new pavement marking. Jean Nicolet Road would be reconstructed as a local access road between Fairfield Court and Apple Tree Road. A sidewalk and bike lanes would be provided. Alternative access to Nicolet High School on the west side of I-43 would be provided by a local access road that connects to Daphne Road. A new overpass at Coventry Court also provides vehicle and pedestrian access to Nicolet High School and the playing fields east of I-43. The Nicolet High School pedestrian tunnel would be removed. Port Washington Road would be reconstructed as a four-lane facility from Bender Road to Daphne Road. Portions of Port Washington Road travel under elevated I-43. The reconstructed road would include a sidewalk and bike lanes. The UP Railroad bridge would be replaced.

Exhibit 2-7: Modernization – 6 Lanes (Raised)

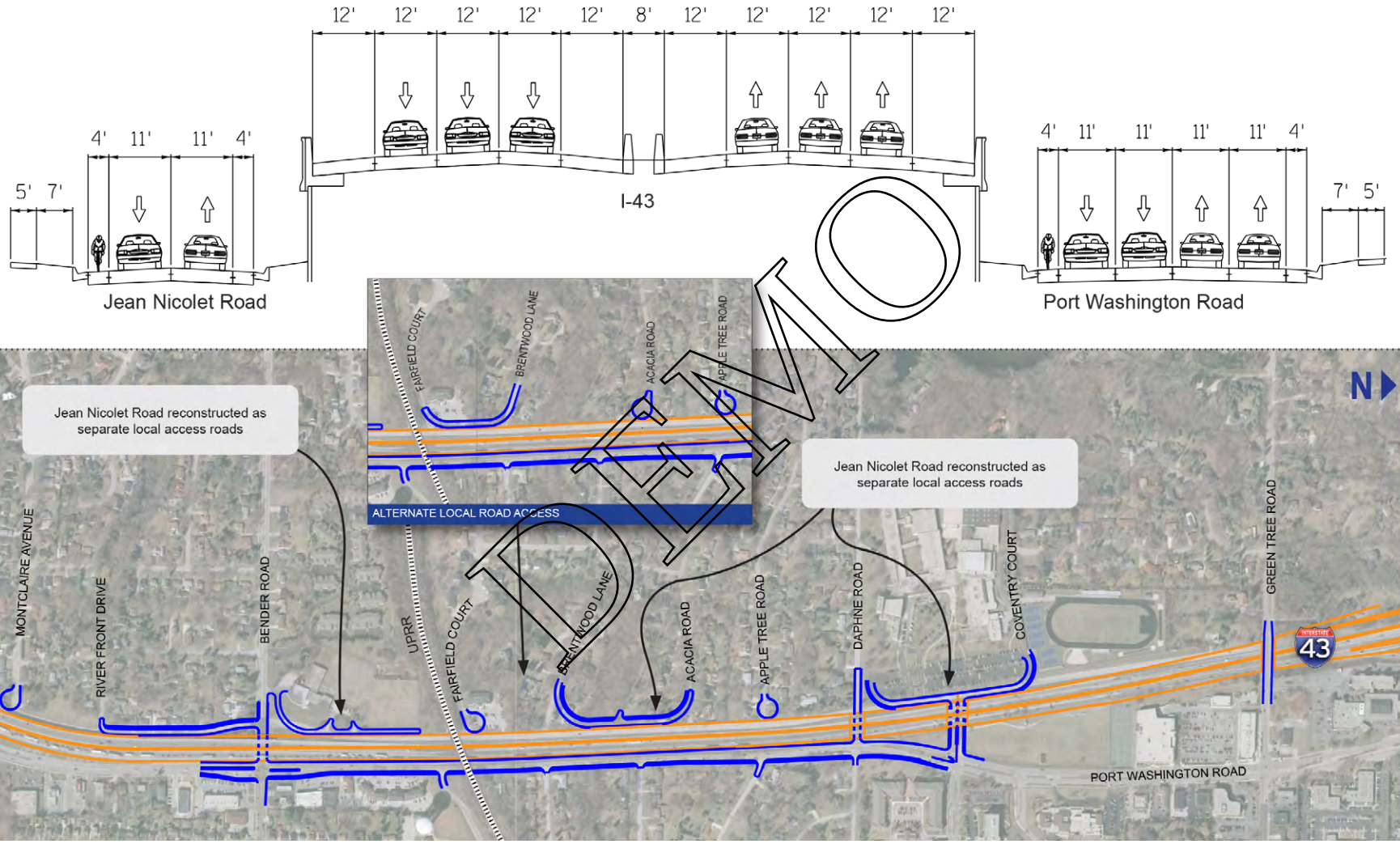
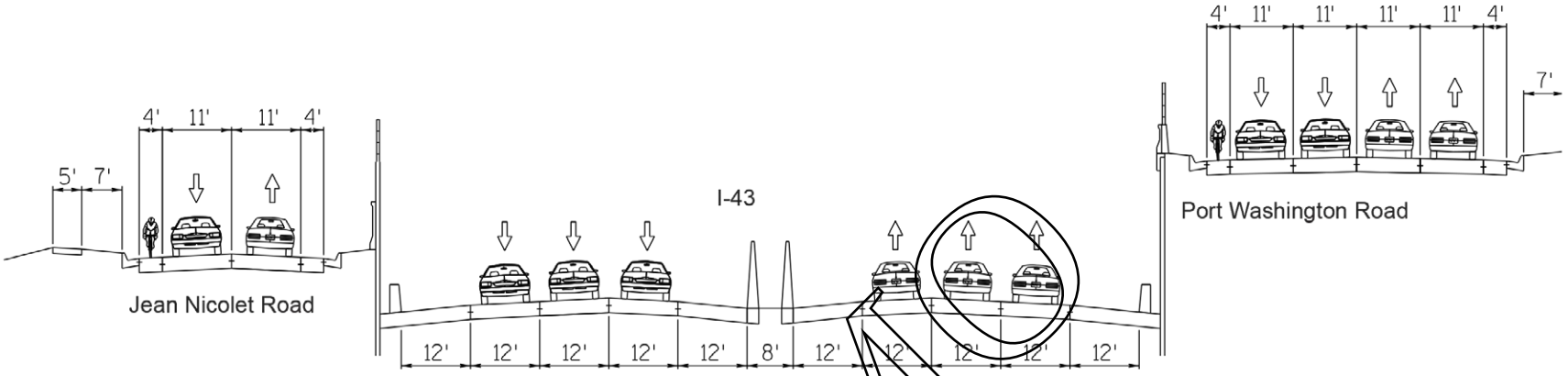
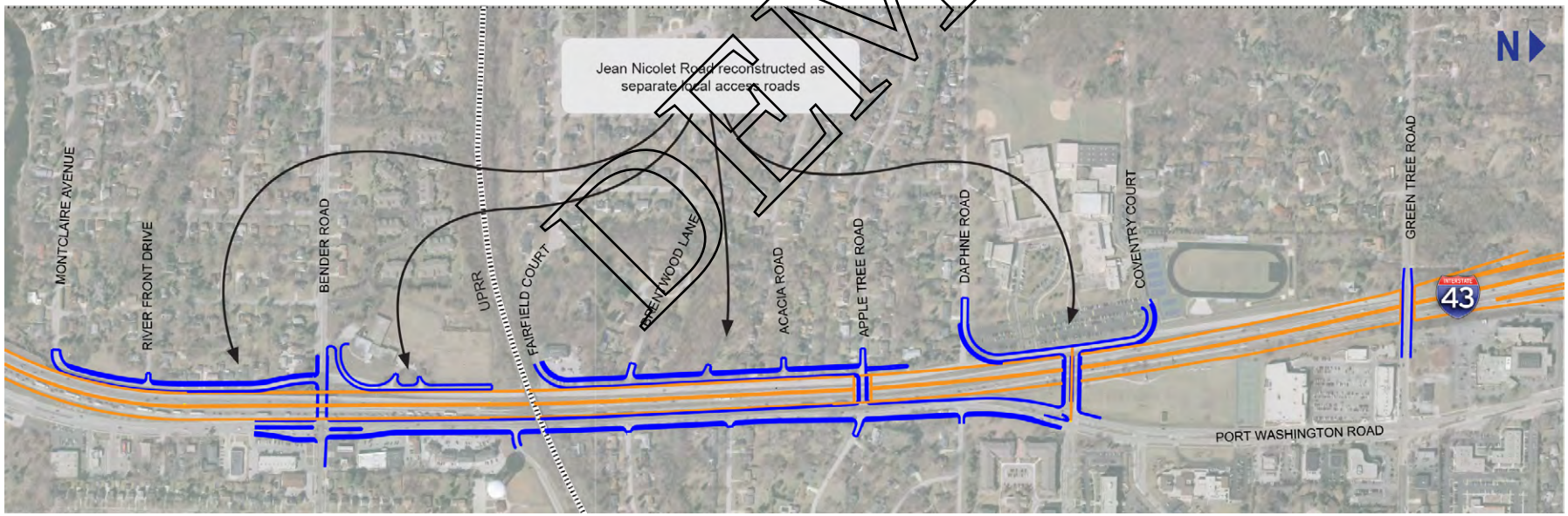


Exhibit 2-8: Modernization – 6 Lanes (Depressed)





2.3.2. I-43 Mainline Alternatives – North Segment: Green Tree Road to WIS 60

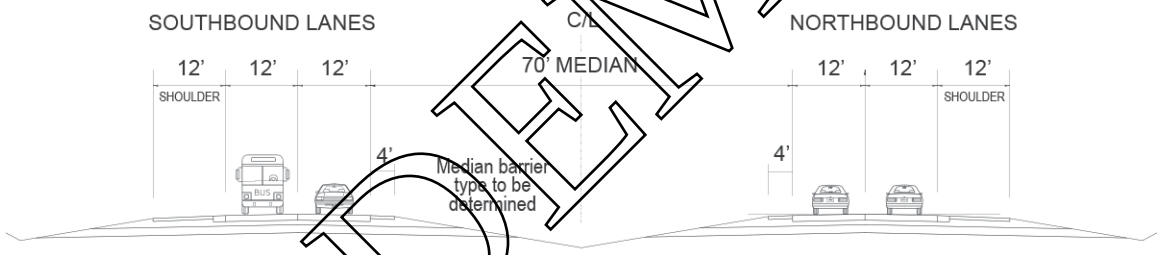
This section describes the two build alternatives for the North Segment of the I-43 mainline, from Green Tree Road to WIS 60, a distance of approximately 12 miles (**Exhibit 2-1**). In Milwaukee County, I-43 passes through a substantially developed corridor, ranging from dense residential, institutional and commercial development near the south study limits, to lower density suburban development toward the Milwaukee/Ozaukee County Line. The low-density development continues north into Ozaukee County, but becomes more rural in nature as I-43 continues north to the WIS 60 interchange.

The North Segment does not include spot improvements because most operational and safety deficiencies are located at interchanges. Pavement, design and geometric deficiencies are addressed under the "Reconstruct to Modern Design Standards" alternatives described below. Spot improvements for interchanges are described by interchange in Subsection 2.4.1 through Subsection 2.4.6.

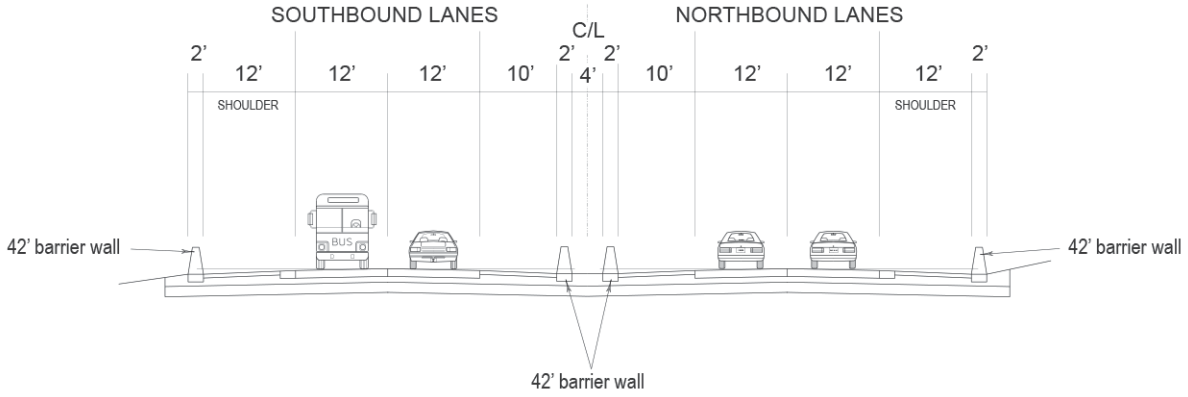
MODERNIZATION – 4 LANES

This alternative would retain the existing four-lane highway and reconstruct it to current design standards generally on its current alignment (**Exhibit 2-9**). Reconstruction would involve replacing pavement, correcting vertical profiles to increase clearances at all bridges to the standard of 16 feet 9 inches. Substandard vertical and horizontal curves noted in **Subsection 1.3.1** would be corrected. Existing substandard shoulders would be reconstructed to meet

Exhibit 2-9: I-43 Mainline North Segment Typical Section: Modernization – 4 Lanes



I-43 – County Line Road to WIS 60 (Ozaukee County)



I-43 – Bender to County Line Road (Milwaukee County)

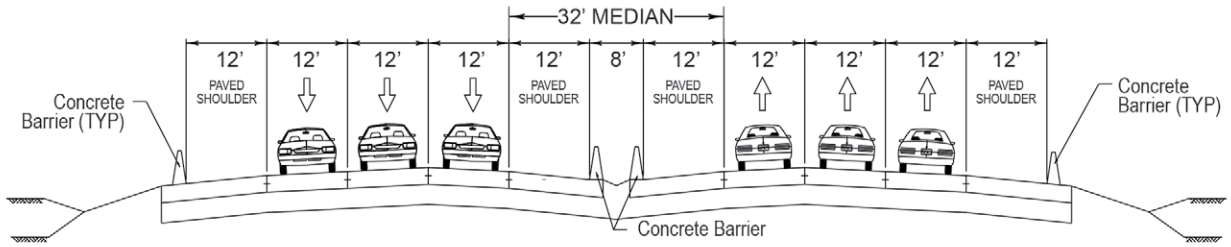
current standards. Barrier treatments in the median could range from a 42-inch concrete barrier or beam guard. No additional right of way would be required with this alternative. Overpass bridges at Donges Bay Road and Lakefield Road in Ozaukee County would be replaced to correct substandard bridge clearances. Bike and pedestrian facilities would be provided on roads crossing over or under I-43, as required by the ADA and Trans 75.

MODERNIZATION – 6 LANES

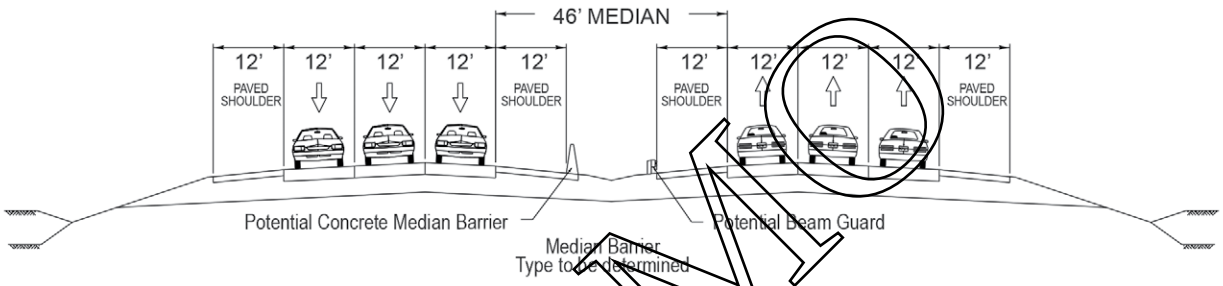
This alternative is similar to the Modernization – 4 Lanes alternative, except that I-43 would be widened to six lanes generally along the existing highway centerline (except the South Segment portion described in **Subsection 2.3.1**). Pavement would be replaced and all substandard features, including vertical clearances, vertical and horizontal curves, median and shoulders are reconstructed to current design standards. Overpass bridges at Donges Bay Road and Lakefield Road in Ozaukee County would be replaced to correct substandard bridge clearances. Bike and pedestrian facilities would be provided on roads crossing over or under I-43, as required by the ADA and Trans 75. Due to differing right of way constraints, the following widening options are described by county:

- **Milwaukee County option:** I-43 would be reconstructed to six lanes primarily by widening to the inside median to minimize right of way impacts in a densely developed corridor (**Exhibit 2-10**). Barrier treatment options in the median include a 42-inch concrete barrier and beam guard.
- There are two widening options for I-43 in **Ozaukee County**:
  - Inside widening (Option 1): This option is similar to inside widening in Milwaukee County.
  - Outside widening (Option 2): This option adds the third northbound and southbound lanes and outside shoulders to the outside of I-43 (**Exhibit 2-10**). Widening to the outside is being considered in Ozaukee County, where there are fewer right of way constraints. Barrier treatment options could range from a maintained wide median or beam guard.

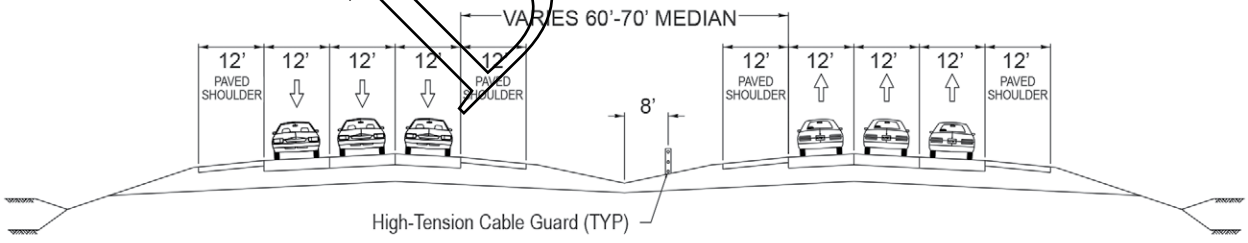
Exhibit 2-10: I-43 Mainline North Segment Typical Section: Modernization – 6 Lanes



Proposed Typical I-43 Roadway Section
Widening to the inside
Milwaukee & Ozaukee County
Green Tree Road to Mequon Road



Proposed Typical I-43 Roadway Section
Widening to the Inside
Mequon Road to WIS 60



Proposed Typical I-43 Roadway Section
Widening to the Outside

2.4. PROJECT-LEVEL BUILD ALTERNATIVES – INTERCHANGES

Seven interchanges exist in the I-43 North-South Freeway study corridor at the following locations:

- Silver Spring Drive
- Good Hope Road
- Brown Deer Road
- County Line Road
- Mequon Road
- County C
- WIS 60

WisDOT is considering build alternatives at five of the interchanges and constructing a new interchange at Highland Road. No new work is proposed at either the Silver Spring Drive or WIS 60 interchanges.

The Silver Spring interchange was reconstructed in1992 and upgraded in 2006. The interchange is adequate in terms of pavement, design and geometry and operates at acceptable levels of service for traffic; it meets the study purpose and need. Because this interchange does not require improvements at this time, and because interchange traffic operations are influenced primarily by traffic coming from the south, no changes to the existing interchange are proposed as part of the current I-43 North-South Freeway Corridor Study. Long-term, the Silver Spring Drive interchange would be evaluated when the I-43 freeway to the south of Silver Spring Drive is studied for possible future improvements. The build alternatives primarily address the operational and safety concerns caused by the drop from six to four lanes just north of the interchange, and they would provide some improvements to the northbound movement from Silver Spring Drive as the lane drop on the curve at Bender Road would be removed. Traffic operations and safety analyses for the I-43 North-South Freeway Corridor Study indicate that improvements north of Silver Spring Drive will not force or preclude future improvement options south of Silver Spring Drive. For these reasons, Silver Spring Drive is also the logical southern terminus for this study.

The WIS 60 interchange was reconstructed in 2001, including the bridges over I-43. The interchange is adequate in terms of pavement, design and geometry and operates at acceptable levels of service for traffic; it meets the study purpose and need. The interchange does not require improvements at this time.

Similar to Silver Spring Drive, the WIS 60 interchange is in close proximity to an interchange to the north (WIS 32) and the interchange's operation is more influenced by the section of I-43 to the north and the WIS 32 interchange in particular. Projected travel demand, crash rates and land use transition at WIS 60. I-43 in Milwaukee County currently experiences congestion, and SEWRPC projects that traffic congestion will extend to WIS 60 by the year 2040, as noted in **Exhibit 1-12**. Crash rates north of WIS 60 (between WIS 60 and WIS 57) are about half the crash rates between Silver Spring Drive and WIS 60. Land use transitions substantially from urban/suburban development north of WIS 60, which is the northernmost access point to communities in the Milwaukee urbanized area, which includes the city of Mequon and the village of Grafton.

If capacity expansion is selected as part of the preferred alternative for the I-43 North-South Freeway study corridor, the three-lane section would transition at the overpass bridge of the WIS 60 interchange. The southbound on-ramp and the northbound off-ramp would be improved

at the connection point with I-43 to bring them up to current standards. This would involve adding additional ramp length to provide better merging and exiting movements. Long-term, the WIS 60 interchange would be evaluated when the I-43 freeway to the north of WIS 60 is studied for possible future improvements.

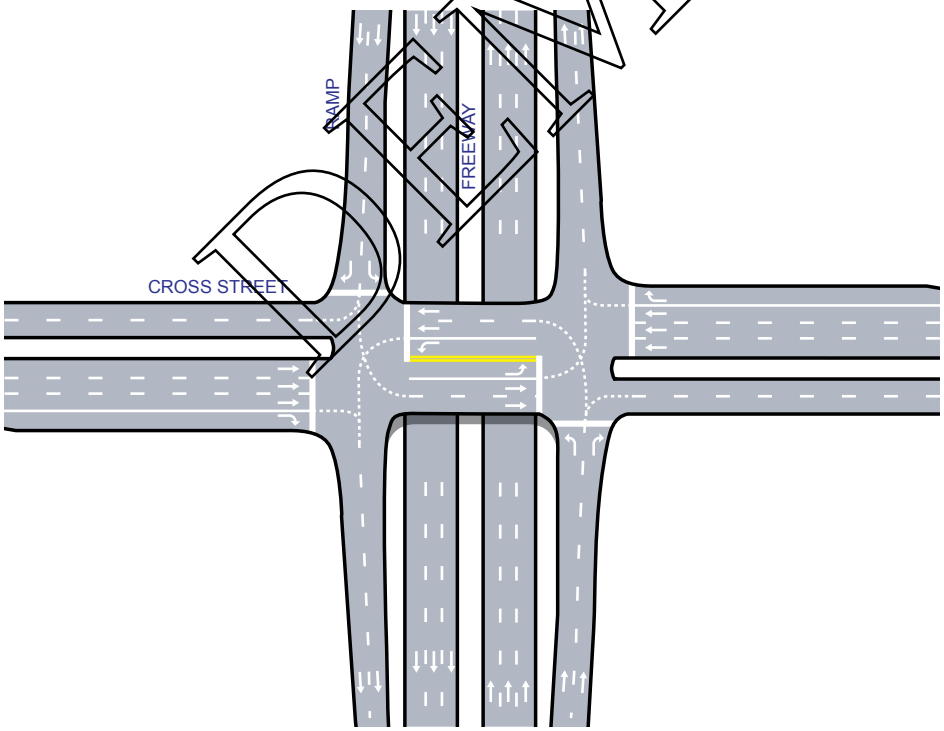
As noted for the Silver Spring interchange, traffic operations and safety analyses for the I-43 North-South Freeway Corridor Study indicate that improvements south of WIS 60 will not force or preclude future improvement options north WIS 60. For these reasons, WIS 60 is also the logical northern terminus for this study.

The remaining interchange alternatives are discussed individually in Subsection 2.4.1 through Subsection 2.4.6. All of the interchange alternatives would be compatible with either a four-lane or six-lane freeway facility.

The following information about interchange types is provided to assist reviewers in understanding the various types of interchanges considered and/or evaluated in the I-43 North-South Freeway Corridor Study:

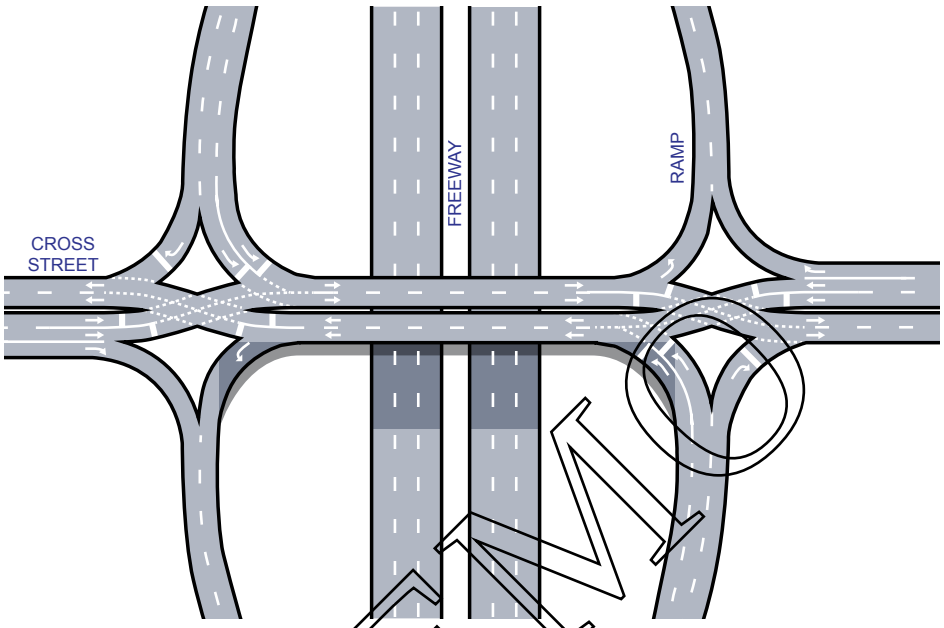
- A **diamond** is a traditional and common interchange type that has “diamond” on and off ramps (typically four, one in each quadrant) connecting a cross-street and freeway. The ramp intersections with the cross-street can have stop signs, traffic signals or roundabouts. A tight diamond interchange (**Exhibit 2-11**) is similar to a traditional diamond interchange except that ramps are located in closer to the freeway mainline. Tight diamond interchanges are typically constructed in dense urban or suburban areas where right of way is limited.

Exhibit 2-11: Tight Diamond Interchange



- A **diverging diamond interchange** (**Exhibit 2-12**) connects a freeway with a cross-street. The diverging diamond interchange is based on a standard diamond interchange with a shift in the cross-street traffic within the interchange that more safely and efficiently facilitates heavy left-turn movements. Within the interchange, traffic on the cross-street briefly drives on the opposite side of the road which allows left-turns to occur without stopping or crossing oncoming traffic. The intersecting ramps and cross-street roadways use directional lanes to cross over each other at a signalized intersection.

Exhibit 2-12: Diverging Diamond Interchange



- A **split-diamond interchange** (**Exhibit 2-13**) has half of a diamond interchange at one location and half at another location. Instead of having all of the on and off ramps at one location, they are split between the two locations with a frontage road or collector roadway system between them.
- A **single-point interchange** (**Exhibit 2-14**) connects a freeway with a cross-street. The name "single point" refers to the fact that all through traffic on the cross-street, as well as traffic turning left onto or off the freeway, can be controlled from a single set of traffic signals. This reduces traffic delay compared to a conventional diamond interchange. The free-flowing freeway can travel either over or under the signalized cross-street intersection. Typically, the right-turn movements to and from the cross-street are free-flowing but may need to be controlled for pedestrian accommodation.
- A **horseshoe interchange** (**Exhibit 2-15**) has both entrance ramps combined on the same U-shaped ramp. For example, northbound and southbound traffic is split on the ramp allowing for a long traffic weaving section and ramp storage.

Exhibit 2-13: Split Diamond Interchange

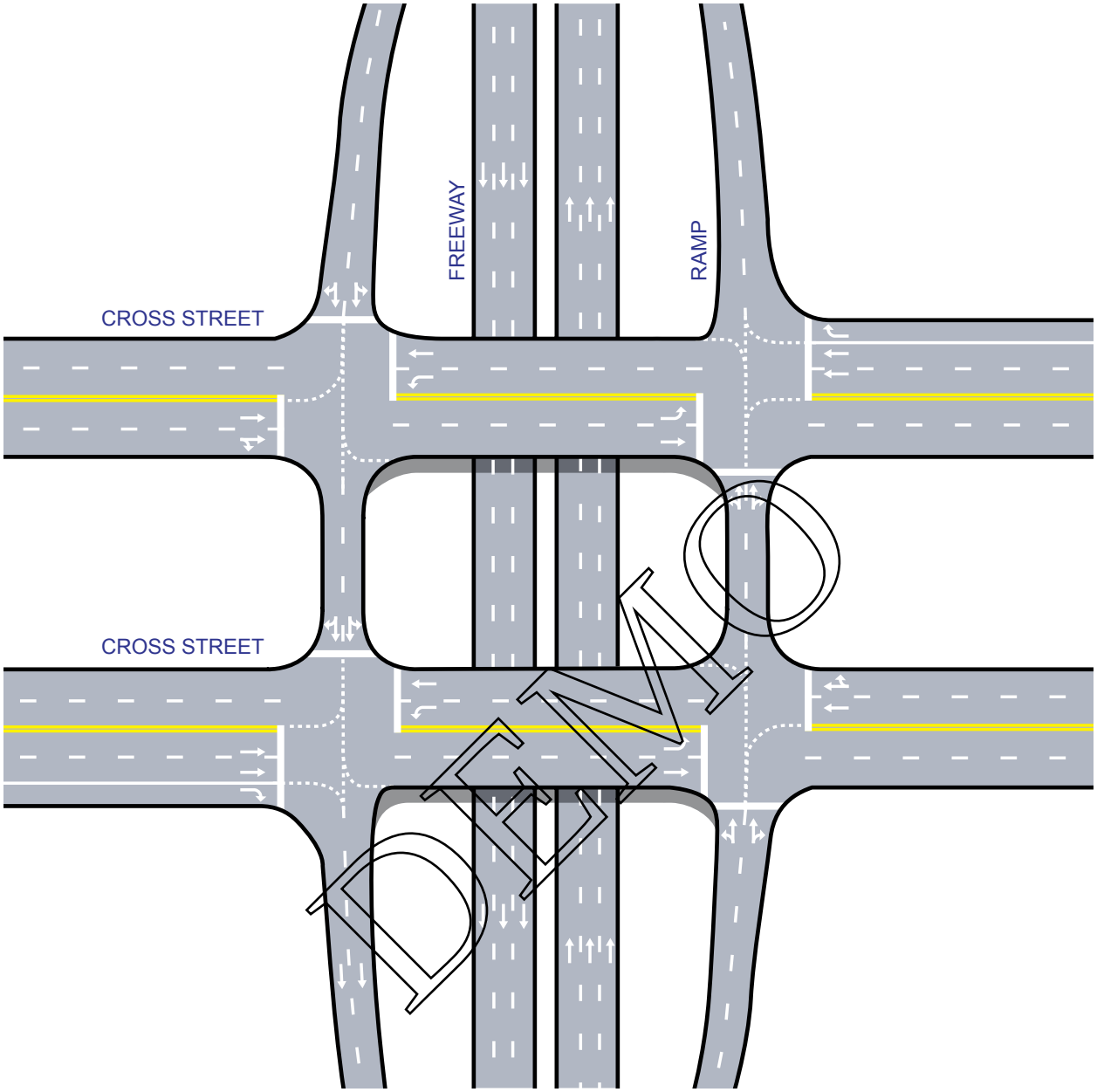


Exhibit 2-14: Single-Point Interchange

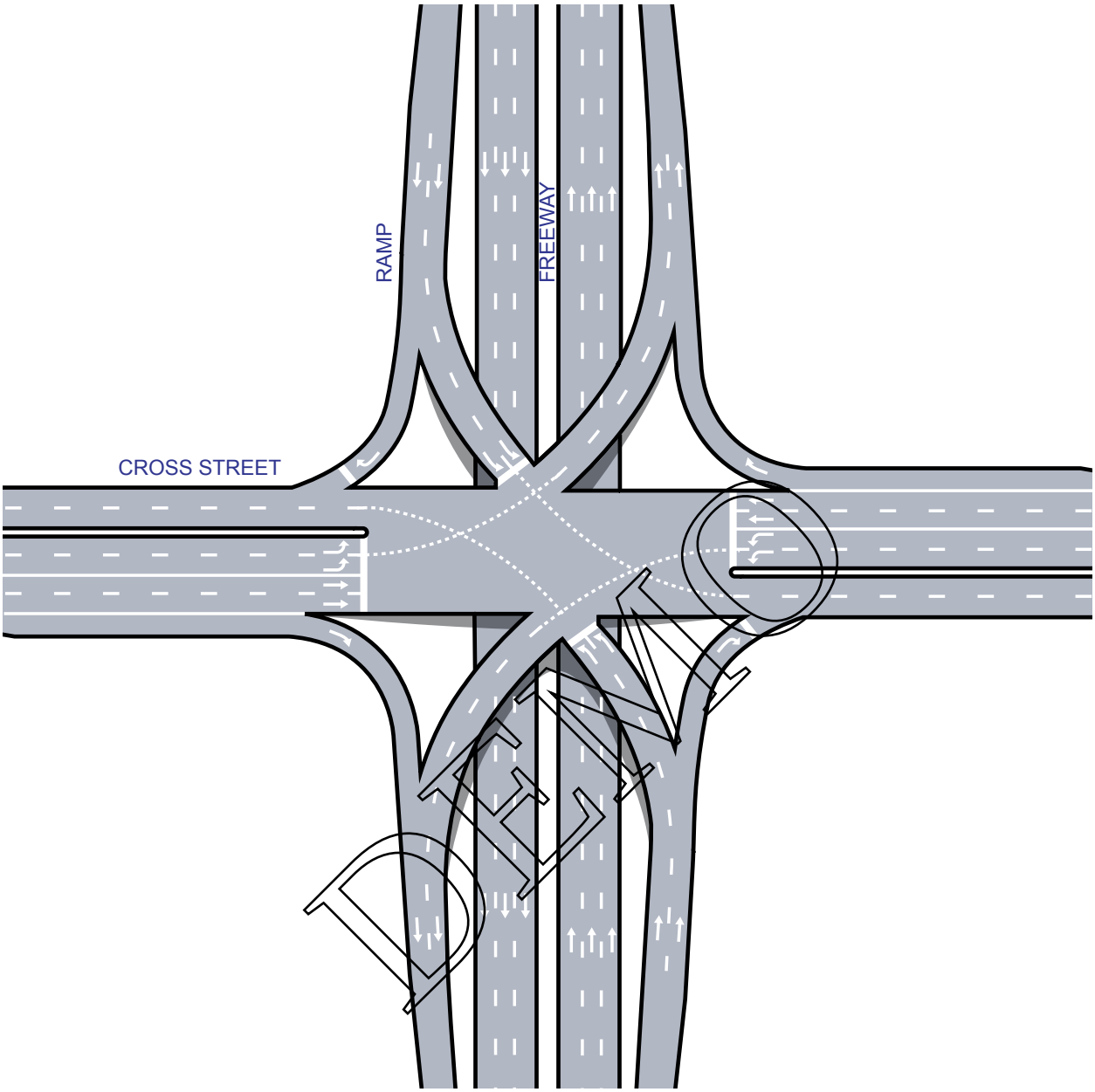
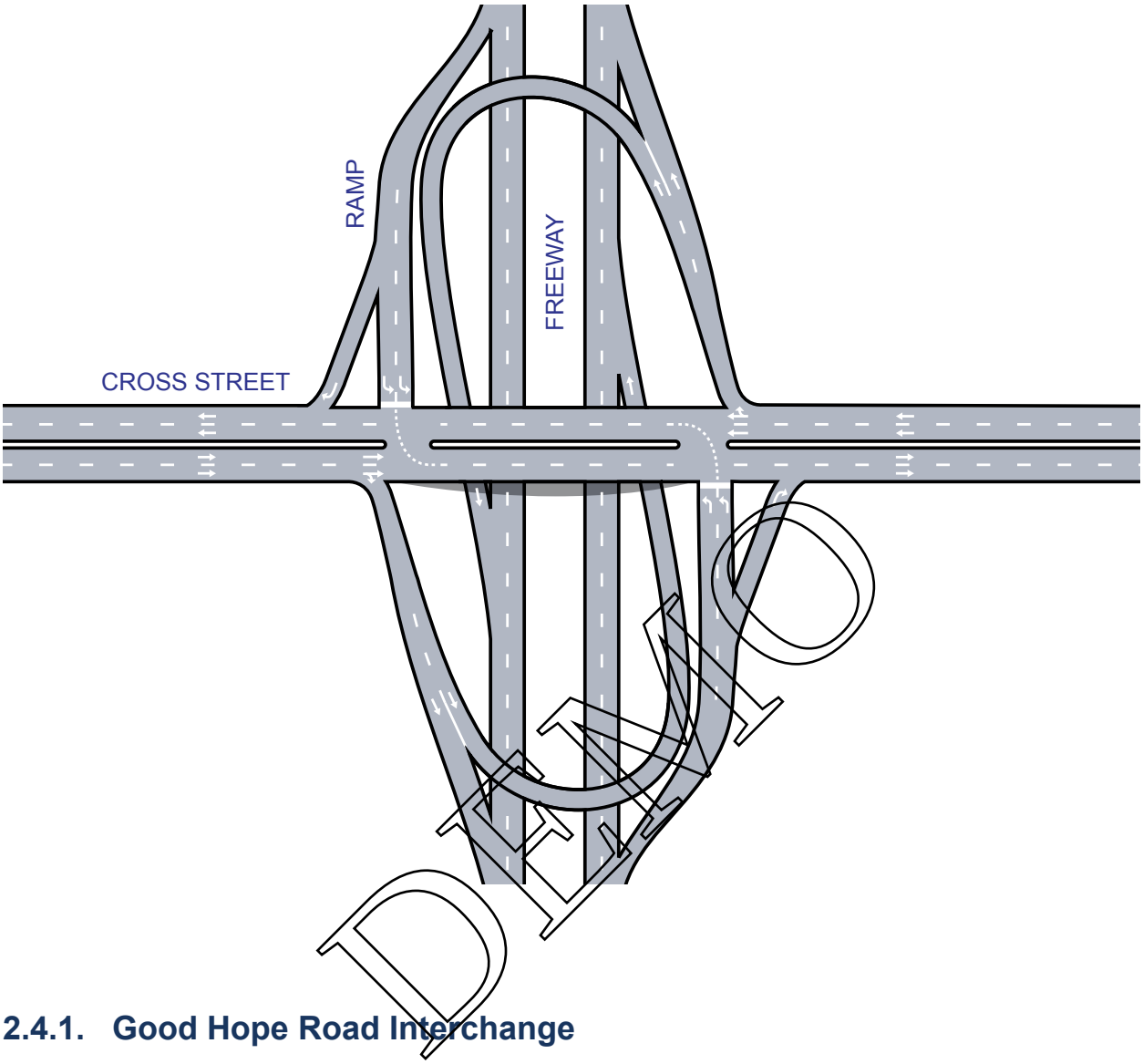


Exhibit 2-15: Horseshoe Interchange



2.4.1. Good Hope Road Interchange

The existing interchange has a standard diamond configuration. The main challenges in the Good Hope interchange area include the following:

- Close proximity of Port Washington Road/Good Hope Road intersection to the interchange ramp intersection on Good Hope Road.
- Inadequate ramp storage.
- High traffic volumes and congestion.
- Substandard acceleration and deceleration distances.
- The Good Hope Road bridges were replaced in 2010 and meet current design standards, including bicycle and pedestrian accommodations. It is desirable to maintain the existing bridges to minimize reconstruction costs.

SPOT IMPROVEMENTS

This alternative adds parallel entrance and exit ramps, along with lengthening the southbound entrance ramp to current design standards. Spot improvements allow for more ramp storage and provide longer transition lengths for merging with mainline traffic. **Exhibit 2-2** illustrates Spot Improvements for the entire corridor, including the Good Hope Road interchange.

TIGHT DIAMOND INTERCHANGE

As noted in **Subsection 2.4**, a tight diamond interchange minimizes the overall footprint of an interchange in a densely developed area. At the Good Hope Road interchange, a tight diamond also helps maximize traffic operations for movements between the ramp intersections and the Good Hope Road/Port Washington Road intersection. Bike and pedestrian access on Good Hope Road would be provided according to ADA and Trans 75 requirements. Three subalternatives were developed to address traffic operations and/or retain the recently reconstructed Good Hope Road bridges over I-43 (**Exhibit 2-16**).

TIGHT DIAMOND

The I-43 mainline is maintained in its current location, but the northbound entrance and exit ramps are shifted closer to the mainline to minimize the interchange footprint and increase spacing between the Port Washington Road/Good Hope Road intersection and the interchange ramp intersection on Good Hope Road. This alternative also increases the weaving distance for traffic turning left from Port Washington Road onto Good Hope Road to access the I-43 northbound entrance ramp. This alternative retains the recently reconstructed Good Hope Road bridges over I-43.

TIGHT DIAMOND (MAINLINE SHIFTED WEST)

The I-43 mainline and northbound entrance and exit ramps are shifted west to further increase spacing between the Port Washington Road/Good Hope Road intersection and the interchange ramp intersection on Good Hope Road. This alternative increases the weaving distance for traffic turning left from Port Washington Road onto Good Hope Road to access the I-43 northbound entrance ramp. This alternative would require replacing the recently reconstructed Good Hope Road bridges over I-43.

TIGHT DIAMOND INTERCHANGE WITH NORTHBOUND RAMP SPLIT (HOOK RAMP)

This subalternative keeps the I-43 mainline on existing highway alignment to retain the existing Good Hope Road bridges. In order to facilitate traffic operations, this interchange splits the northbound exit into two movements; one for westbound movement onto Good Hope Road and the other is a “hook” ramp for northbound/southbound turns onto Port Washington Road. This alternative allows for increased weave distance for traffic turning left from Port Washington Road onto Good Hope Road to access the I-43 northbound entrance ramp.

SPLIT DIAMOND INTERCHANGE

This alternative uses Green Tree Road to the south and Good Hope Road to split traffic movements between these two roadways (**Exhibit 2-16**). The northbound exit ramp and southbound entrance ramp are at Green Tree Road and the northbound entrance ramp and southbound exit ramp are at Good Hope Road. Collector-distributor roads are provided on both sides of I-43 between Green Tree Road and Good Hope Road. This alternative splits traffic

volumes between the Green Tree Road and Good Hope Road overpasses, thus making the diamond configuration function more efficiently. This alternative retains the existing Good Hope Road bridges. Bike and pedestrian access on Good Hope Road would be provided according to ADA and Trans 75 requirements.

DIVERGING DIAMOND INTERCHANGE

This alternative features a northbound ramp terminal intersection pulled in tighter to the I-43 mainline to increase spacing between the interchange ramp intersection on Good Hope Road and the Port Washington Road intersection to the east. Eastbound and westbound traffic on Good Hope Road cross to opposite sides on the I-43 overpass bridge to facilitate turning movements (**Exhibit 2-16**). The existing Good Hope Road bridges are retained with this alternative. Bike and pedestrian access on Good Hope Road would be provided according to ADA and Trans 75 requirements.

SINGLE-POINT INTERCHANGE

All ramps are brought together at one point on the Good Hope Road bridge over I-43 (**Exhibit 2-16**). This allows for a longer traffic weave section on Good Hope Road and greater intersection spacing between Port Washington Road and the interchange ramp intersection on Good Hope Road. It also creates a single intersection that's designed to handle high traffic volumes. The existing Good Hope Road bridges can be retained with this alternative. Bike and pedestrian access on Good Hope Road would be provided according to ADA and Trans 75 requirements. This alternative features a subalternative that further improves traffic operations at the northbound exit.

SINGLE-POINT INTERCHANGE WITH NORTHBOUND RAMP SPLIT (HOOK RAMP)

This alternative features a single-point interchange with split northbound exit movements. Westbound movements use the single point intersection on the Good Hope Road bridge over I-43. The "hook" exit ramp allows for northbound/southbound turns onto Port Washington Road. This configuration allows for increased weave distance for traffic turning left from Port Washington Road onto Good Hope Road to access the I-43 northbound entrance ramp. The existing Good Hope Road bridges are retained with this alternative.

HORSESHOE INTERCHANGE

Northbound and southbound entrance ramps are combined on a U-shaped ramp on each side of Good Hope Road. Northbound and southbound traffic is split on the ramp, allowing for a longer traffic weaving section and more ramp storage. The I-43 mainline and northbound entrance and exit ramps are shifted west to increase spacing between Port Washington Road and the interchange ramp intersection on Good Hope Road (**Exhibit 2-16**). This alternative increases ramp storage and the traffic weaving distance for traffic turning left from Port Washington Road onto Good Hope to access the I-43 northbound entrance ramp. This alternative would require replacing the Good Hope Road bridges. Bike and pedestrian access on Good Hope Road would be provided according to ADA and Trans 75 requirements.

Exhibit 2-16: Good Hope Road Interchange Build Alternatives

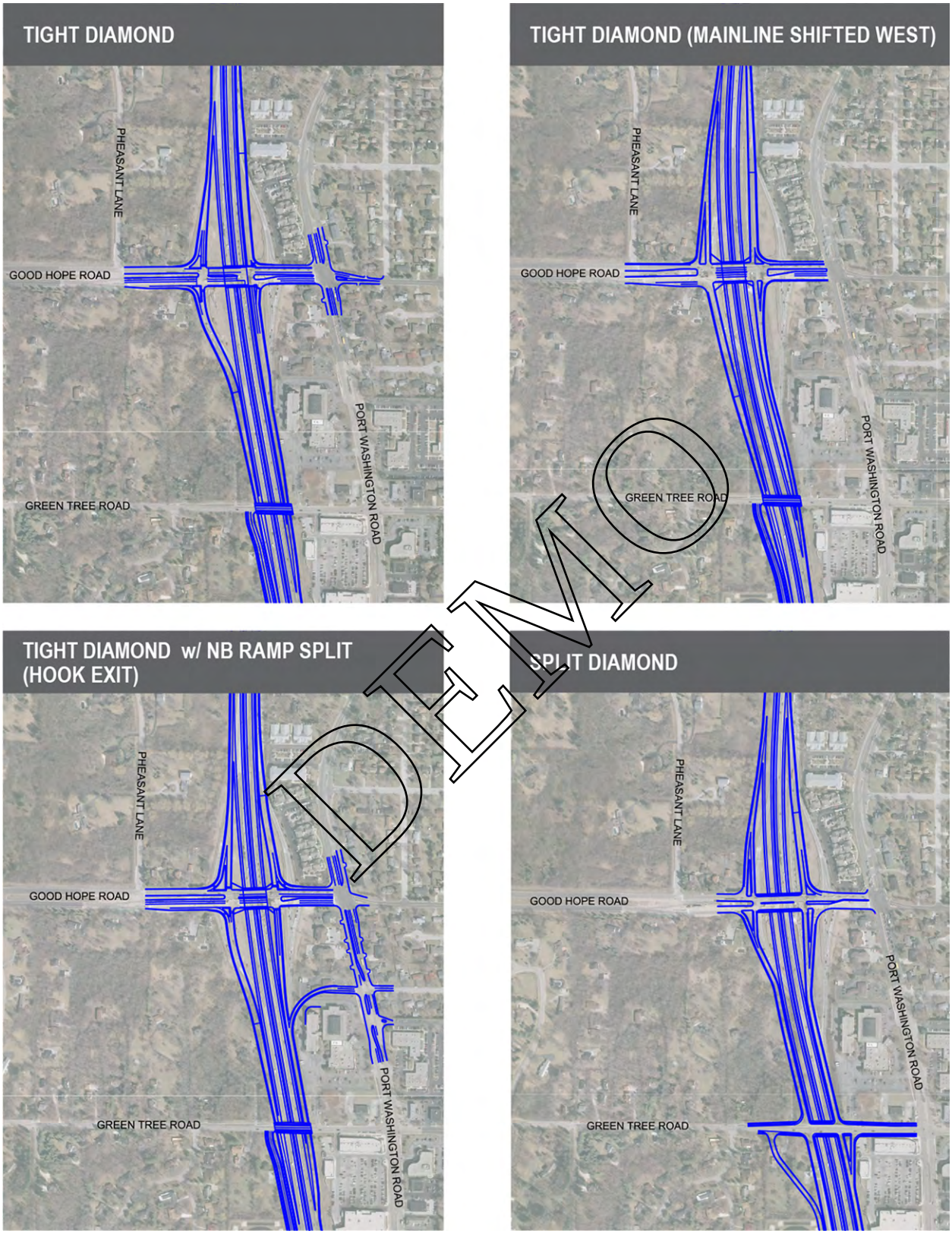


Exhibit 2-16: Good Hope Road Interchange Build Alternatives (continued)