

US 41
DEPERE - SUAMICO
(MEMORIAL DRIVE TO COUNTY M)
BROWN COUNTY, WISCONSIN
PROJECT I.D. 1133-10-01

**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 (FHWA)
and

State of Wisconsin Department of Transportation (WisDOT)

Cooperating Agencies

U.S. Army Corps of Engineers and
Wisconsin Department of Natural Resources (pursuant to 23 USC 139)

APPROVALS

1/24/2011 
Date For Federal Highway Administration

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ABSTRACT

The proposed US 41 improvements evaluated in this EIS extend from Memorial Drive to County M in Brown County, Wisconsin, a distance of approximately 3.3 miles. Proposed improvements include reconstructing the US 141/Velp Avenue, I-43, and County M interchanges and providing additional capacity on US 41. US 41 is a major freeway connecting the Milwaukee and Chicago metropolitan areas with the Fox River Valley industrial area and recreational resources in northeastern Wisconsin and upper Michigan. It is also a National Highway System (NHS) route and is planned for future designation as an Interstate Highway. The existing US 41 freeway has insufficient capacity to meet existing and future mobility needs. The existing interchanges at US 141/Velp Avenue, I-43 and County M have insufficient capacity, operational deficiencies and safety concerns. As traffic increases, capacity and operational deficiencies will contribute to additional mobility and safety concerns. This EIS evaluates the social, environmental, and economic impacts of the No-Build Alternative and a range of Build Alternatives for addressing project purpose and need.

Comments on this Draft EIS are due by March 28, 2011, or 45 days after the Notice of Availability is published in the Federal Register, whichever is later, and should be sent to:

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National Environmental Policy Act Statement

The National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4332) 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 for proposals funded under its authority if such proposals are determined to be major actions significantly affecting the quality of the human environment.

The EIS process is carried out in two stages. The **Draft EIS** is circulated for review by federal, state, and local agencies with jurisdiction by law or special expertise, and made available to the public. The Draft EIS 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 Draft EIS availability notice is published in the *Federal Register*. WisDOT must receive public and agency comments on or before the date listed on the front cover of the Draft EIS unless a time extension is requested and granted by WisDOT. After the Draft EIS comment period has elapsed, work may begin on the Final EIS.

The **Final EIS** includes the following:

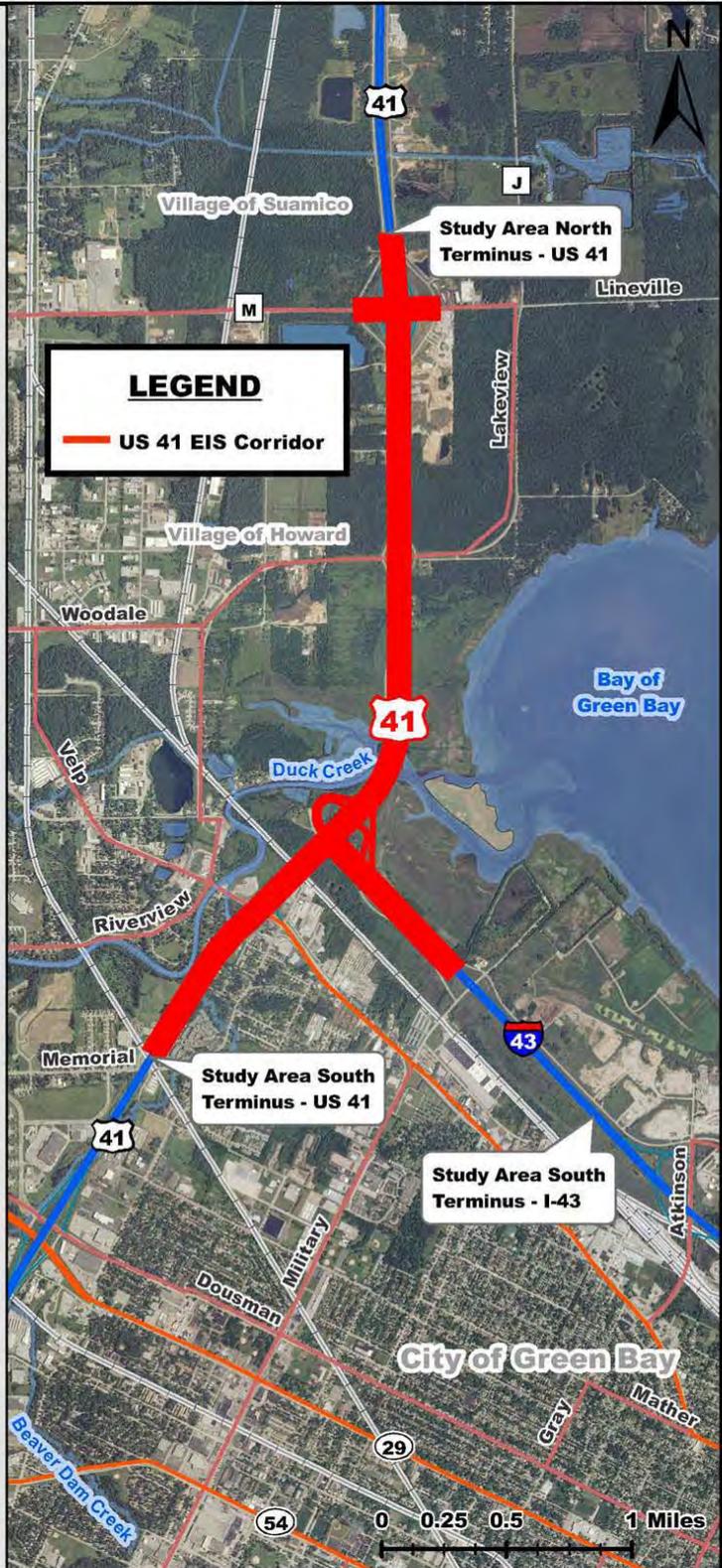
1. Identification of the preferred course of action (alternative) and the basis for its selection.
2. Basic content of the Draft EIS along with any changes, updated information, or additional information as a result of agency and public review.
3. Summary and disposition of substantive comments on social,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

Final administrative action by FHWA (Record of Decision) cannot occur sooner than 90 days after filing the Draft EIS, or 30 days after filing the Final EIS with the U.S. Environmental Protection Agency. Both the Draft and Final EIS are full-disclosure documents that provide descriptions of the proposed action, the affected environment, alternatives considered and an analysis of beneficial 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 180 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.

Study Area Location Map

US 41
DePere – Suamico
(Memorial Drive to County M)
Brown County
Project I.D. 1133-10-01



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AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ACM	asbestos containing materials
APE	area of potential effects
ATC	American Transmission Company
BMP	best management practice
CCRG	Community Cultural Resources Group
C/D	collector/distributor
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CP	coordination plan
CSD	community-sensitive design
County	county trunk highway
dB	decibel
dBA	decibel A-weighted
DNR	Wisconsin Department of Natural Resources
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FDM	Facilities Development Manual
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	flood insurance rate map
FWS	U.S. Fish and Wildlife Service
GBMSD	Green Bay Metropolitan Sewerage District
GDHS	Geometric Design of Highways and Streets
GIS	geographic information system
HMVMT	hundred mile vehicle miles traveled
HOT	high occupancy toll
HOV	high occupancy vehicle
IAJR	interstate access justification report
IAM	impact analysis methodology
ICE	indirect and cumulative effects
I-43	Interstate Highway 43

ITS	intelligent transportation system
LOS	level of service
LWCF	Land and Water Conservation Fund
mph	miles per hour
MPO	Metropolitan Planning Organization
MSAT	mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NEPA	National Environmental Policy Act
NHI	Natural Heritage Inventory
NHS	National Highway System
NPS	National Park Service
NRHP	National Register of Historic Places
PDI	pavement distress index
PIM	public informational meeting
PM	particulate matter
ppm	parts per million
ORAP	Outdoor Recreation Act Program
ROD	Record of Decision
SAFETEA-LU	Safe, Accountable, and Flexible Efficient Transportation Equity Act—A Legacy for Users
SHPO	State Historic Preservation Office
TDM	transportation demand model
TMP	transportation management plans
TNM	Traffic Noise Model®
TSM	Transportation System Management
TSS	total suspended solids
TTC	temporary traffic control
USACE	U.S. Army Corps of Engineers
US 41	United States Highway 41
WisDOT	Wisconsin Department of Transportation

Summary

Proposed Action

The proposed action is to reconstruct US 41 from Memorial Drive to County M/Lineville Road in Brown County, Wisconsin (See location map inside front cover). Proposed improvements include providing additional traffic capacity on US 41 and reconstructing the interchanges at US 141/Velp Avenue, I-43, and County M to meet current design standards and to improve traffic flow and safety. See EIS Section 1 for more information on the proposed improvements.

History/Relationship to Other Proposed Actions

Improvements in the US 41 corridor in Brown County were initially evaluated in the *US 41 Orange Lane to County M Expansion Study* (WisDOT Project I.D. 1133-03-01) that covered the approximate 14 mile portion of US 41 from Orange Lane near the County F interchange to the County M interchange (see Exhibit S-1, Page S-7). The scope of improvements under the original study included upgrading the existing interchanges and providing additional capacity on US 41. An Environmental Assessment for the original study was approved by the Federal Highway Administration (FHWA) on June 6, 2002 and a Finding of No Significant Impact was approved on April 4, 2003. It should be noted that the original corridor study did not include improvements at the County M interchange, and only minor improvements were proposed at the I-43 interchange. The project is currently being designed in manageable sections and will be constructed in stages based on funding allocation and other factors. The US 41 project design sections are illustrated in Exhibit S-1.

Based on additional engineering and environmental evaluation in the preliminary design phase, WisDOT in cooperation with FHWA, has refined the previous improvement concepts to varying degrees throughout the corridor. In general, design refinements have been made to provide interchange configurations that best address local and regional mobility needs, particularly at the major systems interchanges (freeway to freeway interchanges) like the US 41/I-43 interchange, and to improve traffic flow and safety on US 41. The design refinements also include using roundabouts rather than signalized intersections at interchange ramp terminals and local road intersections.

Updated environmental documentation has been prepared to account for changes in impacts due to the design refinements and more detailed information on affected environmental resources including wetlands. The level of updated environmental documentation was determined by WisDOT and FHWA based on the extent of the design refinements and magnitude of environmental impacts in a particular US 41 project section. The status of updated environmental documentation for the US 41 project sections is indicated in Exhibit S-1. WisDOT and FHWA in consultation with state and federal review agencies determined that an EIS would be prepared for the Memorial Drive to County M project section primarily due to the magnitude of wetland impacts.

Each project section within the entire US 41 corridor consists of stand-alone improvements that do not require or foreclose improvements in the remainder of the US 41 corridor. Reconstructing a particular interchange and/or making capacity improvements on a particular portion of US 41 would have independent utility whether or not additional improvements are made.

Purpose and Need for Proposed Action

The purpose of the proposed action is to make transportation improvements in the US 41 Memorial Drive to County M corridor that accomplish the following objectives:

- Meet traffic demand and mobility needs including future conversion of US 41 to an Interstate Highway
- Improve traffic flow and safety on US 41 and its interchanges
- Address geometric and operational deficiencies
- Provide reasonable and safe local access while at the same time preserving freeway operations and safety
- Minimize impacts to the natural and built environment to the maximum extent practicable

The need for proposed improvements is based on a combination of the following factors (see Section 1 for more detailed information):

System Linkage and Route Importance

US 41 and I-43 provide a vital north-south transportation link between the Chicago-Milwaukee metropolitan area, the Fox River Valley industrial area, and recreational areas in northeastern Wisconsin and upper Michigan. US 41 is a multi-lane backbone highway under WisDOT's *Connections 2030* Plan for providing a network of high quality highways linking the state's economic centers and designated with maximum service and safety characteristics. US 41 is a National Highway System (NHS) route serving major population centers, multimodal transportation facilities and meeting national defense requirements. US 41 is also being planned for future conversion to an Interstate Highway between Milwaukee and I-43 in Green Bay.

Traffic Demand/Operations

Existing (2005) Annual Average Daily Traffic (AADT) in the US 41 project corridor ranges from 50,200 AADT to 61,200 AADT. In design year 2035, traffic is expected to reach 80,500 AADT to 97,700 AADT, an increase of 60% to 66%. Existing traffic volumes between Memorial Drive and US 141/Velp Avenue already exceed the threshold at which capacity improvements should be considered and the remainder of the corridor will exceed this threshold in the design year. Existing traffic on I-43 between US 41 and Atkinson Drive is 38,400 AADT and is expected to reach 55,700 AADT in 2035, an increase of 45%.

The traffic operations analysis indicates that most of the existing US 41 freeway will operate at an unacceptable Level of Service (LOS) in design year 2035 (LOS D, E, or F compared to LOS C which is the acceptable LOS for *Connections 2030* backbone highways). In addition, all existing signalized intersections except the US 141/Velp Avenue/Atkinson Drive intersection will operate at LOS F in the PM peak hour.

Highway Deficiencies

The existing US 41 freeway and its interchanges were constructed over 35 years ago to handle substantially lower traffic volumes than it does today. The existing US 41 typical section (number of driving lanes, shoulder widths) is not sufficient to accommodate projected traffic in design year 2035, and does not meet current design standards. Close proximity of the US 141/Velp Avenue and I-43 interchanges causes operational deficiencies and safety concerns due to inadequate traffic weaving distances. The length of the exit ramps at the US 141/Velp Avenue interchange is substandard. The tight loop ramps at the I-43 interchange have design speeds that are less than desirable for System interchanges (freeway to freeway interchanges) and the speed differential between the freeway mainline and the loop ramps increases the potential for vehicles to run off the road if speed isn't sufficiently reduced to negotiate the controlling loop ramp radius.

Safety

The US 41 mainline from Memorial Drive to I-43 has an average annual crash rate above the statewide average rate for similar highways. The average injury and fatal crash rate in the section between US 141/Velp Avenue and I-43 is also above the statewide average. All ramps at the I-43 interchange have average annual crash rates and average injury and fatal crash rates above the statewide average.

Alternatives

Alternative A: No Build

Under the No Build Alternative, US 41 would not be expanded to provide additional roadway capacity. Any future work along US 41, including the interchanges, would attempt to maintain current capacity levels, preserve an acceptable roadway surface, and address safety concerns at critical locations. The No Build would fail to address future traffic demands, highway deficiencies, and safety concerns along US 41. The No Build Alternative will serve as a comparison to the Build Alternatives discussed in the study.

Build Alternatives

Four build alternatives were developed and evaluated during preparation of the EIS. Build Alternatives B, C, D and E include a range of options for improving traffic capacity, traffic operations and safety on the US 41 freeway mainline and its interchanges. The main difference among the Build Alternatives occurs along the US 41 mainline between US 141/Velp Avenue and I-43 where various improvement levels are being considered, and at the US 41/I-43 System Interchange, where various interchange configurations are being considered.

Improvements that are common to all of the Build Alternatives include the following.

- Widen the US 41 freeway mainline, from Memorial Drive to County M, from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
- Reconstruct the US 141/Velp Avenue interchange including roundabouts at the ramp terminals and at the US 141/Velp Avenue and Memorial Drive intersection.
- Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections.
- Construct new bridges over US 141/Velp Avenue, Canadian National (CN) Railroad, Wietor Drive, I-43, and Duck Creek.
- Replace the County EB/Lakeview Drive and County M bridges over US 41.
- Realign Beaver Dam Creek and replace the box culvert south of US 141/Velp Avenue interchange
- Build storm water detention ponds along US 141/Velp Avenue and County EB/Lakeview Drive.
- Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M.

Alternative B: US 41 expansion with minor improvements to I-43/US 41 interchange

In addition to the common improvements for all build alternatives, Alternative B has the following key design features:

- Expand US 41 along its existing alignment from US 141/Velp Avenue to I-43.
- Extend the on and off ramps at the US 141/Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Construct an outside auxiliary lane along northbound and southbound US 41 between the US 141/Velp Avenue and I-43 interchanges to improve traffic weaving conditions.
- Make minor improvements to existing ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline.
- Maintain access from US 141/Velp Avenue to I-43 via US 41 as it is today.

Alternative B was eliminated from further consideration as a reasonable build alternative because it would not address operational and safety issues resulting from the short weaving section along the US 41 mainline. Further, Alternative B would not be compatible with future conversion of US 41 to an Interstate Highway. See Section 2 for more information.

Alternative C: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43

In addition to the common improvements for all build alternatives, Alternative C has the following key design features:

- Expand US 41 along its existing alignment from US 141/Velp Avenue to I-43.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between US 141/Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.
- Extend the on and off ramps at the US 141/Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.
- Improve the semi-directional ramp from southbound US 41 to southbound I-43 to a 60 mph design speed, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from US 141/Velp Avenue to I-43 via US 41 as it is today.

Alternative C was eliminated from further consideration as a reasonable build alternative because it would not provide any substantive traffic operations, safety or access benefits compared to Alternative D, and because it would have greater impacts to public use lands and higher quality wetlands. See Section 2 for more information.

Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with freeway split configuration

In addition to the common improvements for all build alternatives, Alternative D has the following key design features:

- Expand US 41 on a revised alignment that would allow for a freeway split for southbound US 41 to southbound I-43 within the existing interchange footprint.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between US 141/Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.
- Extend the on and off ramps at the US 141/Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.
- Improve the semi-directional ramp from southbound US 41 to southbound I-43, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from US 141/Velp Avenue to I-43 via US 41 as it is today.

Alternative D was retained for consideration as a reasonable build alternative because it meets project purpose and need. See Section 2 for more information.

Alternative E: US 41 expansion with Full Reconfiguration of I-43/US 41 Interchange

In addition to the common improvements for all build alternatives, Alternative E has the following key design features:

- Expand US 41 including a revised northbound alignment, and a raised northbound gradeline to accommodate the southbound US 41 to southbound I-43 ramp within the existing interchange footprint and the northbound I-43 to southbound US 41 flyover ramp piers and foundations.
- Reconstruct I/43/US 41 System Interchange with directional ramps (all loop ramps eliminated)
- In order to accommodate the FHWA recommended design speed for the direct ramps at the US 41/I-43 interchange, eliminate existing access between US 141/Velp Avenue and I-43 via US 41; Atkinson Avenue or an alternate route would be used to access southbound I-43 from US 141/Velp Avenue or to access US 141/Velp Avenue from northbound I-43.

Alternative E was retained for consideration as a reasonable build alternative because it meets project purpose and need. See Section 2 for more information.

Environmental Effects

Primary environmental effects for the Build Alternatives include wetland impacts, stream crossings/realignment, residential displacements, and impacts to public use lands. Exhibit S-2 lists the impacts that have been quantified for the No Build and Build Alternatives. Detailed information on the environmental effects of Build Alternatives D and E (retained for further study) is provided in Sections 3 and 4.

Time Frame for Proposed Action

If a build alternative is selected for the proposed action, WisDOT anticipates that construction could begin in 2013. The construction schedule will depend on availability and prioritization of funds for the overall Brown County US 41 improvements and other statewide transportation projects.

Lead Agency/Cooperating and Participating Agencies

The environmental review process for the US 41 Memorial Drive to County M project is being conducted under the 2005 federal transportation bill, SAFETEA-LU (*Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users*). SAFETEA-LU Section 6002, *Efficient Environmental Reviews for Project Decision making*, provides an opportunity for agencies, local officials and others to become cooperating or participating agencies in the environmental review process.

The Federal Highway Administration (FHWA) and WisDOT are joint lead agencies for the US 41 Memorial Drive to County M project and are responsible for managing the environmental review and documentation process.

Cooperating agencies are those that have jurisdiction by law or special expertise with respect to the project's environmental impacts. The U.S. Army Corps of Engineers (USACE) and the Wisconsin Department of Natural Resources (DNR) have agreed to be cooperating agencies for the project.

Participating agencies are those that have an interest in the project. The U.S. Department of the Interior Fish and Wildlife Service (Fish & Wildlife Service), Environmental Protection Agency (EPA), Bay-Lake Regional Planning Commission, and the Brown County Planning Commission/Green Bay Metropolitan Planning Organization have agreed to be participating agencies.

More information on the SAFETEA-LU environmental review process and agency responses is provided in Section 5.

Other Required Activities

Prior to construction of any Build Alternative requiring discharge of fill material into waters of the United States, including wetlands, authorization would be required from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. Such authorization is contingent on meeting Clean Water Act Section 404(b)(1) *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* administered by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. These guidelines state that dredged or fill material should not be discharged into aquatic ecosystems, including wetlands, unless no other practicable alternatives are demonstrated, that such discharge will not have unacceptable adverse impacts, and that all practicable measures to minimize adverse effects are undertaken.

Clean Water Act authorization is also contingent on obtaining water quality certification from the Wisconsin Department of Natural Resources under Section 401 of the Clean Water Act and Wisconsin Administrative Code Chapter NR 299 (*Water Quality Certification*).

Property acquisition and residential or business relocations will be in accordance with the Uniform *Relocation Assistance and Real Property Acquisition Policies Act of 1970* as amended (49 CFR Part 24).

Regulatory Compliance

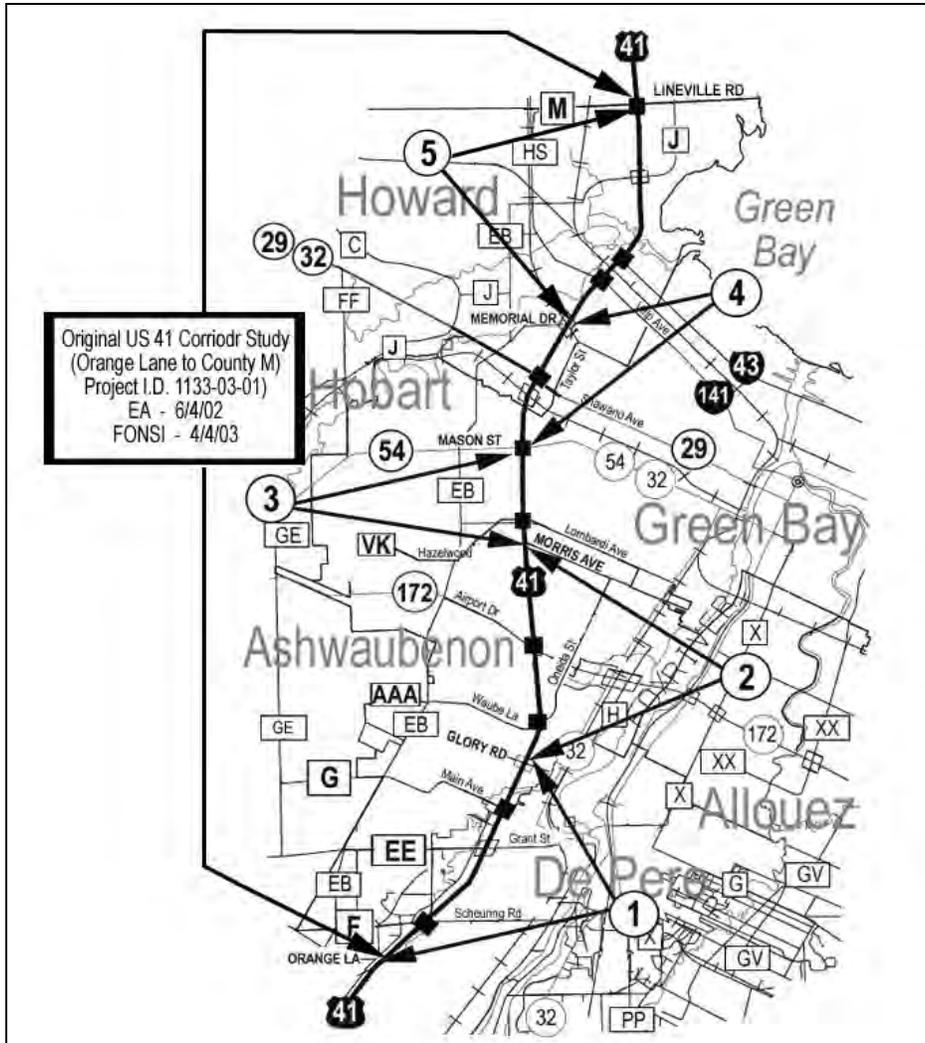
Planning, agency coordination, community involvement and impact evaluation for the project has been conducted in accordance with the National and Wisconsin Environmental Policy Acts, Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act, Endangered Species Act, National Historic Preservation Act and other federal and state laws, policies, and procedures for environmental impact analysis and preparation of environmental documents.

This document is in compliance with U.S. Department of Transportation and FHWA policies for implementing *Presidential Executive Order on Environmental Justice 12898—Federal Actions to Address Environmental Justice in Minority and Low-income Populations*. Neither minority nor low-income populations will have disproportionate adverse impacts under the Build Alternatives.

Local Concerns and Unresolved Issues

There are no known local concerns or unresolved issues with respect to the alternatives and impacts considered in this EIS. All known concerns and issues have been addressed to the extent practicable based on the level of engineering detail and environmental information available for purposes of preparing the EIS.

US 41 Brown County Project Sections



LEGEND

- | | |
|--|--|
| <p>1. Orange Lane to Glory Road
 (Project I.D. 1133-06-00)</p> <ul style="list-style-type: none"> • Re-evaluation of the original 2002 EA for Scheuring Road Interchange - 7/1/09 • Re-evaluation of the original 2002 EA for remainder of project section - 9/4/09 | <p>4. Mason Street to Memorial Drive
 US 41 leg (Project I.D. 1133-03-02)
 WIS 29 leg County J to US 41 (Project I.D. 9202-07-01/02)</p> <ul style="list-style-type: none"> • New EA 9/10/09 • FONSI 1/8/10 |
| <p>2. Glory Road to Morris Avenue
 (Project I.D. 1133-09-00)</p> <ul style="list-style-type: none"> • Re-evaluation of the original 2002 EA - 10/19/09 | <p>5. Memorial Drive to County M
 (Project I.D. 1133-10-01)</p> <ul style="list-style-type: none"> • New EIS (completion targeted January 2012) |
| <p>3. Morris Avenue to Mason Street
 (Project I.D. 1133-03-02)</p> <ul style="list-style-type: none"> • Re-evaluation of the original 2002 EA - 4/1/10 | |

Impact Summary Table

Environmental Factors	Alternative A No Build ¹	Alternative B ² US 41 expansion with minor ramp improvements to I-43/US 41 Interchange (Eliminated from further study) ³	Alternative C ² US 41 expansion with C/D roadways between Velp Ave and I-43 (Eliminated from further study) ⁴	Alternative D ² US 41 expansion with C/D roadways between Velp Ave and I-43 and compatibility of I-43/US 41 interchange to full reconfiguration	Alternative E ² US 41 expansion with full reconfiguration of I-43/US 41 interchange
Construction Cost Estimate (2010 \$)	NA	\$155 M	\$205 M	\$220 M	\$230 M
New right-of-way (acres)	0	13	30	29	37
Residential Displacements	0	13	13	13	13
Business Displacements	0	1	1	1	1
Stream Crossings	0	2 Beaver Dam Creek (realignment required) Duck Creek	3 Beaver Dam Creek (realignment required) Duck Creek (2 locations)	2 Beaver Dam Creek (realignment required) Duck Creek	2 Beaver Dam Creek (realignment required) Duck Creek
Wetland Impacts ⁵ (acres)	0	42	49	55	54
Threatened or Endangered Species ⁶	No	Possible	Possible	Possible	Possible
Archaeological Sites	0	0	0	0	0
Historic Structures	0	0	0	0	0
Public Use Land (acres)	0	2.2 <ul style="list-style-type: none">Wietor Wharf Park (1.7) embankment fillDeerfield Docks (0.1) embankment fillGordon Nauman Cons. Area (0.15) embankment fillDNR Peat's Lake unit (0.2) parcel east of US 41 (frontage road cul-de-sac)	13.6 <ul style="list-style-type: none">Wietor Wharf Park (0.9) embankment fill, boardwalkDeerfield Docks (0.55) embankment fill, boardwalkGordon Nauman Cons. Area (0.55) embankment fillDNR Peat's Lake units (11.6) parcel along I-43 (severance) parcel west of US 41 (severance) parcel east of US 41 (frontage road cul-de-sac)	8.4 <ul style="list-style-type: none">Wietor Wharf Park (0.8) embankment fill, boardwalkDeerfield Docks (0.55) embankment fill, boardwalkGordon Nauman Cons. Area (0.55) embankment fillDNR Peat's Lake units (6.5) parcel along I-43 (severance) parcel east of US 41 (frontage road cul-de-sac)	12.2 <ul style="list-style-type: none">Wietor Wharf Park (0.4) embankment fillDeerfield Docks (0.1) embankment fillGordon Nauman Cons. Area (1.1) embankment fillDNR Peat's Lake units (10.6) parcel along I-43 (severance) parcel east of US 41 (frontage road cul-de-sac)
Section 4(f) Evaluation Required	No	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Gordon Nauman Cons. Area 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)
Section 6(f) or Similar Compensation Required ⁷	No	Yes 1 DNR Peat's Lake unit (parcel east of US 41)	Yes Wietor Wharf Park (boardwalk) Deerfield Docks Park (boardwalk) 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes Wietor Wharf Park (boardwalk) Deerfield Docks Park (boardwalk) 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)	Yes 2 DNR Peat's Lake units (parcel along I-43 and parcel east of US 41)
Contaminated Sites (petroleum)	0	3	3	3	3
Environmental Justice Concerns	No	No	No	No	No

NOTES:

- The No Build Alternative does not address the project's key purpose and need factors and therefore is not a viable course of action. It serves as a baseline of comparison to the build alternatives.
- Proposed improvements common to all of the Build Alternatives include the following:
 - Widen the US 41 freeway mainline from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
 - Reconstruct the US 141/Velp Avenue interchange including roundabouts at the ramp terminals and at the US 141 (Velp Avenue)/Memorial Drive intersection.
 - Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections.
 - Construct new bridges over US 141/Velp Avenue, Canadian National (CN) Railroad, I-43, Wietor Drive, and Duck Creek.
 - Replace the County EB/Lakeview Drive and County M bridges over US 41.
 - Construct a new frontage road with a five-legged roundabout at the US 141/Velp Avenue interchange ramp terminal west of US 41.
 - Realign Beaver Dam Creek and replace the box culvert south of US 141/Velp Avenue interchange.
 - Build stormwater detention ponds along US 141/Velp Avenue and County EB/Lakeview Drive.
 - Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M.
- Alternative B has been eliminated from further consideration as a reasonable build alternative because it does not address the operational and safety issues resulting from the short weaving section along the US 41 mainline.
- Alternative C has been eliminated from further consideration as a reasonable build alternative because of the substantial impacts to Section 4(f) resources compared to Alternatives D and E that address project purpose and need. In addition, Alternative C would impact and fragment higher quality wetlands compared to Alternatives D and E due to the southbound US 41 to southbound I-43 flyover ramp.
- Wetland impacts include areas under proposed bridges that will not be directly filled by the proposed improvements. Total acreage shown includes 1.1 acres of additional impacts for the 5-legged roundabout option in the northwest quadrant of the US 141/Velp Avenue interchange.
- Previous information from the U.S. Fish & Wildlife Service indicates there are no known federally-listed threatened or endangered species in the project's are of potential effect. Previous information from DNR indicates the project area could provide habitat for the following species:
 - Blanding's turtle and Wood turtle (endangered)
 - Common tern (endangered)
 - Black crowned night heron, Cattle egret (special concern)
- Peat's Lake unit along I-43 has utilized LWCF and ORAP funds. Peat's Lake unit east of US 41 utilized Pittman-Robertson and ORAP funds. Wietor Wharf Park utilized Dingell-Johnson funds for boardwalk. Deerfield Docks Park utilized Dingell-Johnson funds for boardwalk and pier.

SECTION 1
Purpose and Need for Proposed Action

SECTION 1

Purpose and Need for Proposed Action

Introduction

Section 1 describes the purpose and need for proposed improvements in the Memorial Drive to County M section of the US 41 corridor in Brown County. Purpose and need factors encompass existing problems and those anticipated to occur by the project's design year (2035).

1.1 Proposed Action

The Wisconsin Department of Transportation (WisDOT), in consultation with the Federal Highway Administration (FHWA), is proposing to reconstruct US 41 from Memorial Drive to County M, a length of approximately 3.3 miles in Brown County, Wisconsin (see Exhibit 1-1 – Study Area Location Map).

Proposed improvements include reconstructing the interchanges at US 141/Velp Avenue, I-43 and County M to meet current design standards, adding an additional lane in each direction on the US 41 mainline, adding auxiliary lanes along US 41 in both directions, constructing new bridges along US 41 over US 141/Velp Avenue, CN Railroad, Wietor Drive, I-43, and Duck Creek, and replacing the County EB/Lakeview Drive structure and the County M structure over US 41.

In addition, roundabouts would be constructed at the US 141/Velp Avenue interchange ramp terminals, the US 141/Velp Avenue/Memorial Drive intersection east of US 41, the County M interchange ramp terminals, and the frontage road intersections with County M. WisDOT is committed to using roundabouts where appropriate based on the following benefits of roundabouts compared to signalized intersections:

- Roundabouts improve safety by providing slower intersection entry speeds and minimizing the potential for turning movement conflicts.
- Roundabouts provide more intersection capacity than signalized intersections, resulting in less delay for traffic entering and exiting the intersections.
- Roundabouts have lower impact collisions due to the intersection entry angle.
- Roundabouts generally have lower maintenance costs than signalized intersections.

Other improvements include replacing the box culvert for Beaver Dam Creek, constructing stormwater detention ponds in the southwest quadrant of US 141/Velp Avenue interchange and near the County EB/Lakeview Drive overpass, and constructing crash investigation sites along the northbound and southbound off ramps at the US 141/Velp Avenue and County M interchanges. Crash investigation sites are pull out areas that help minimize traffic backups and delay by allowing vehicles involved in minor crashes to move off the freeway. Accommodating for crash investigation sites was a US 41 corridor wide application. More detailed information on the proposed action is provided in Section 2.

1.2 Purpose of Proposed Action

The purpose of the proposed action is to make transportation improvements in the US 41 corridor as described in Section 1.1, and as supported by the need factors in Section 1.3. Key objectives of the proposed improvements include the following:

- Meet traffic demand and mobility needs including future conversion of US 41 to an Interstate Highway
- Improve traffic flow and safety on US 41 and its interchanges
- Address geometric and operational deficiencies
- Provide reasonable and safe local access while at the same time preserving freeway operations and safety
- Minimize impacts to the natural and built environment to the maximum extent practicable.

1.3 Need for Proposed Action

The need for the proposed action is based on a combination of factors that include system linkage and route importance (including possible future conversion of US 41 to an Interstate Highway), traffic demand/operations, existing highway deficiencies, and safety concerns. The remainder of Section 1 discusses these factors.

1.3.1 System Linkage and Route Importance

US 41 and I-43 provide a vital north-south transportation link with trip lengths and travel densities of an interstate or inter-regional nature. US 41 connects the Chicago-Milwaukee metropolitan area with the Fox River Valley industrial area and recreational areas of northeastern Wisconsin and upper Michigan. US 41 is a multi-lane principal arterial highway under WisDOT's *Connections 2030* Plan developed to provide a network of high quality highways linking the state's economic centers, and designed with maximum service and safety characteristics. US 41 is also a component of the National Highway System (NHS). Highways in the NHS serve major population centers, multimodal transportation facilities, and meet national defense requirements.

US 41 and I-43 are designated as long truck routes by the 2009 Wisconsin Long Truck Operators Map. This designation allows trucks up to 65 feet in length to use these highways and exemplifies the importance of the US 41 corridor to commercial interests within and outside the state.

The 2005 federal transportation bill, SAFETEA-LU (*Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users*) includes the future conversion of US 41 to an Interstate facility between Milwaukee and I-43 in Green Bay. A study for the Interstate conversion is being conducted under a separate WisDOT project. Improvements made to US 41 will not preclude future conversion of US 41 to an Interstate Highway. Improvements made to I-43 will need to meet interstate standards. See 'Existing Highway Deficiencies' for more information.

Within the project area, US 41 and I-43 serve the City of Green Bay, Village of Howard, Village of Suamico, and surrounding communities. The regional and local plans for these communities include the US 41 expansion project. The plans include the *Green Bay Metropolitan Planning Organization Long-Range Transportation Plan* completed in November 2005 and amended in 2007, and the *Brown County Comprehensive Plan* completed by the Brown County Planning Commission in October 2004. Current and planned growth and development in these communities contributes a high volume of commuter traffic and heavy truck traffic on both freeways.

Summary: System linkage and route importance are key factors in developing improvements that enhance regional and local mobility and that are compatible with the possible future conversion of US 41 to an Interstate Highway.

1.3.2 Traffic Demand/Operations

Existing and Forecast Traffic

Traffic volumes are expressed as Annual Average Daily Traffic (AADT) volumes that reflect average travel conditions rather than daily or seasonal fluctuations. According to the US 41 Traffic Study – Brown County Forecasted Traffic Volume Network memo prepared for WisDOT by CH2MHill in 2007, existing peak hour and AADT volumes were obtained from traffic counts of the mainline segments and ramps, and from intersection turning movements. The year 2035 AADT forecasts were provided from the regional travel demand model.

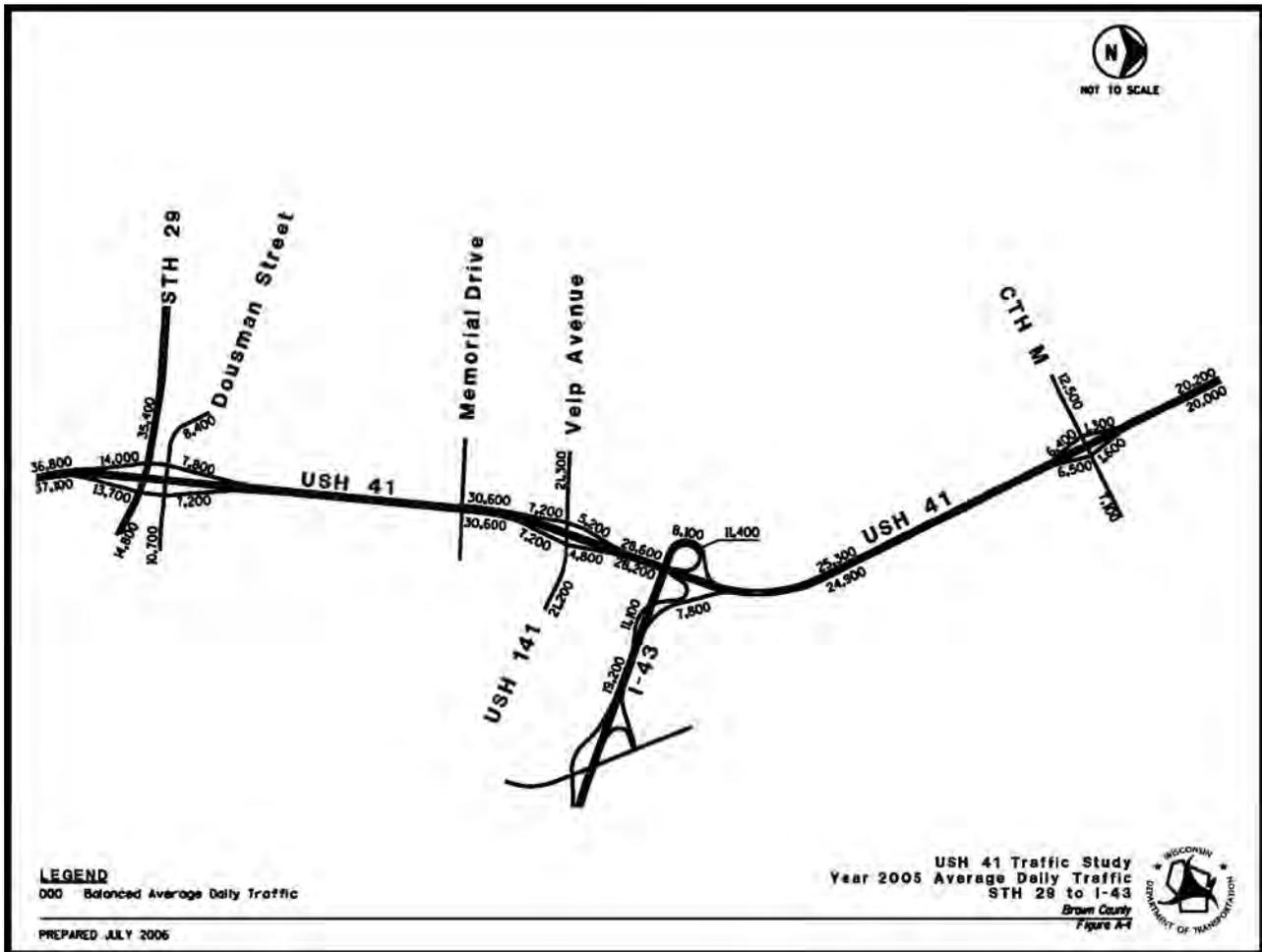
Existing and forecasted traffic is summarized in Table 1-1. The traffic data covers existing traffic (2005) through design year 2035. The existing traffic in 2005 was compared to more recent traffic counts in 2009, and there was not a significant difference.

**Table 1-1
Existing and Forecast Traffic (2005 – 2035)**

Roadway Segment	Existing Traffic 2005 AADT	Future Traffic 2015 AADT	Future Traffic 2035 AADT	Percent Increase (2005-2035)
US 41 Mainline, Memorial Drive to US 141/Velp Avenue	61,200	73,400	97,700	60%
US 41 Mainline, US 141/Velp Ave to I-43	56,800	69,300	94,400	66%
US 41 Mainline, I-43 to County M	50,200	60,300 <td 80,500	60%	
I-43, Atkinson Drive to US 41	38,400	44,200	55,700	45%

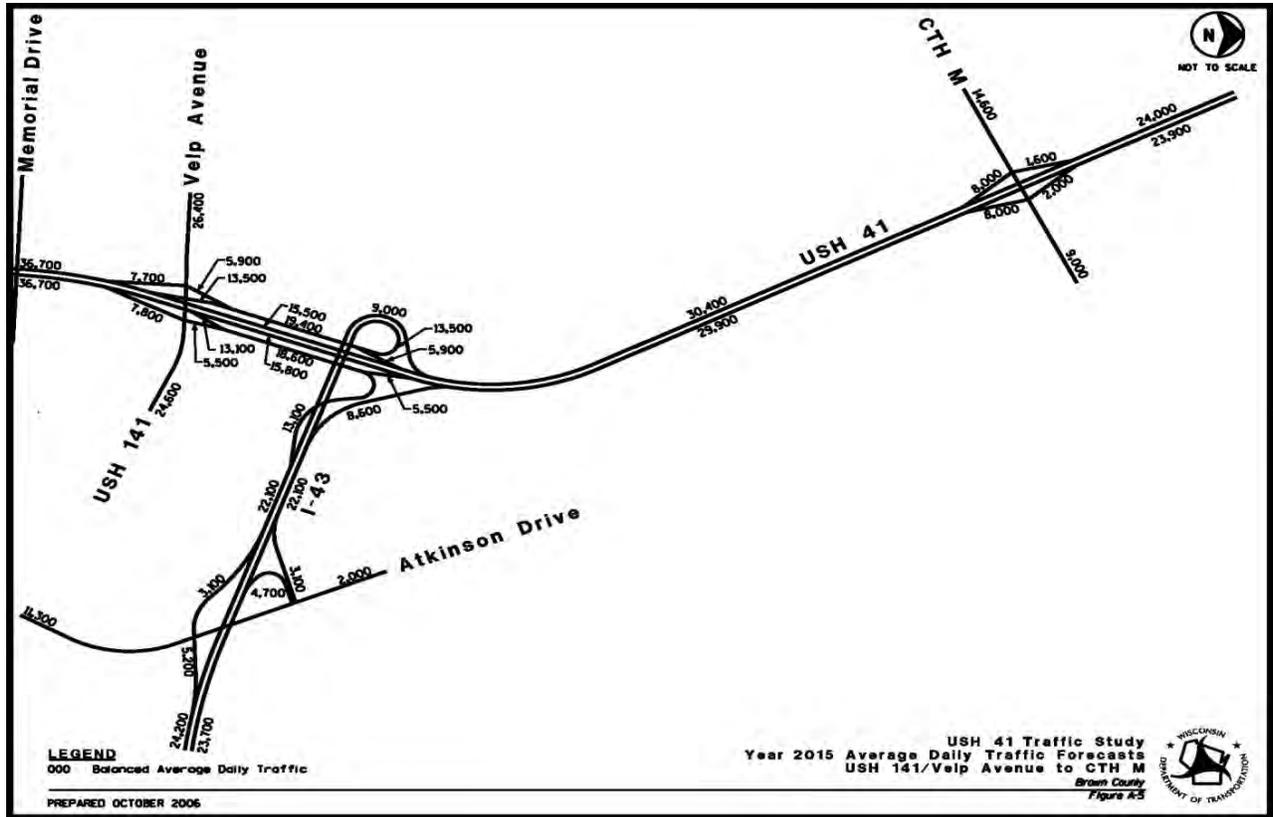
The alignment diagrams (Figures 1-1 through 1-3) illustrate traffic volumes (AADT) on the US 41 mainline, ramps and sideroads.

**Figure 1-1
Existing AADT (Year 2005)**



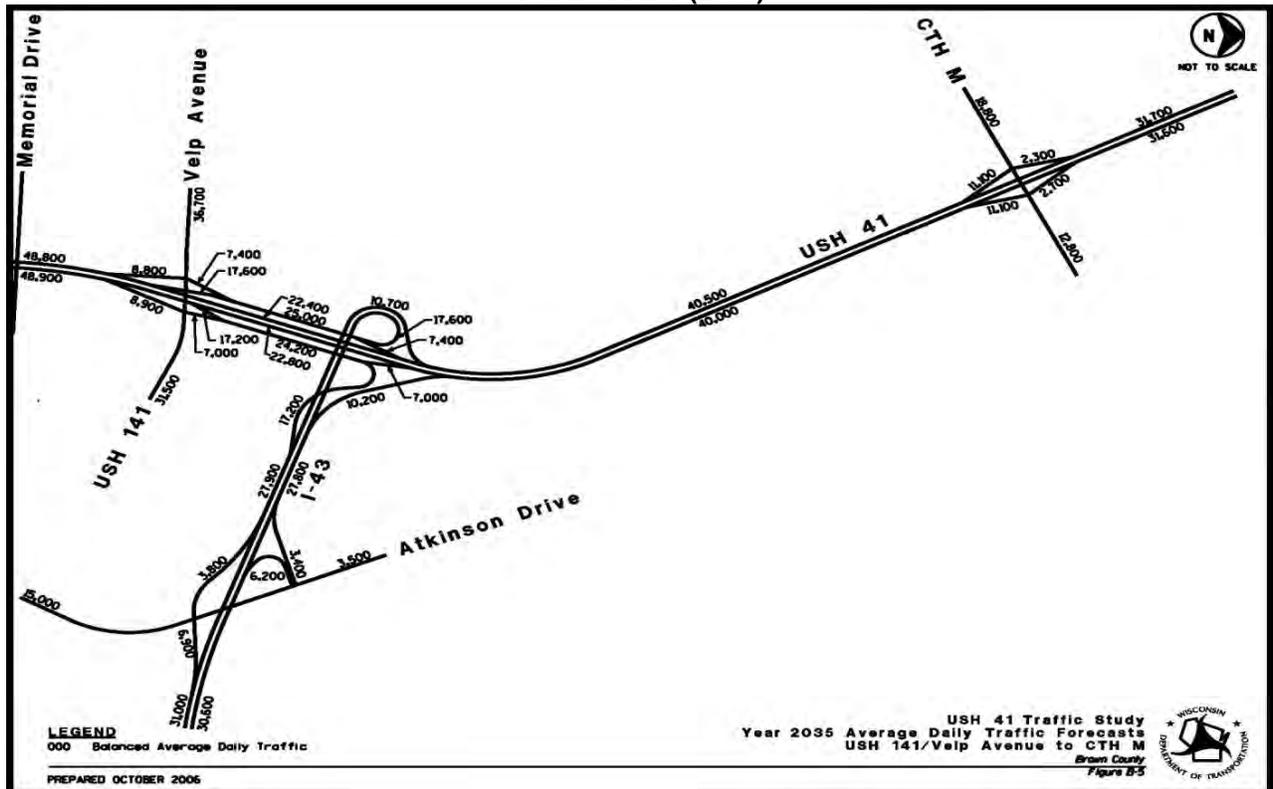
Source: US 41 Traffic Study – Brown County Forecasted Traffic Volume Network Memo. CH2MHill®, January 2007.

Figure 1-2
Future AADT (2015)



Source: US 41 Traffic Study – Brown County Forecasted Traffic Volume Network Memo. CH2MHill®, January 2007.

Figure 1-3
Future AADT (2035)



Source: US 41 Traffic Study – Brown County Forecasted Traffic Volume Network Memo. CH2MHill®, January 2007.

According to WisDOT's Facilities Development Manual (FDM), Procedure 11-15-1, Figure 1, 60,000 AADT is the threshold volume that can be safely handled at an acceptable service level on a 4-lane backbone highway. Current traffic volumes on US 41, between Memorial Drive and US 141/Velp Avenue are already above this threshold, and the segments of US 41 between US 141/Velp Avenue and County M will meet or exceed this threshold by 2015. Therefore, improvements on US 41 that address traffic capacity and mobility are warranted such as additional through lanes and auxiliary lanes, and improvements that separate regional and local traffic movements.

The number and size of trucks in the traffic stream affects traffic operations, safety and contributes to the level of congestion. On US 41, trucks comprise approximately 10.9% of the AADT according to WisDOT's forecasts for design year 2035. The level of truck traffic should also be taken into consideration for design purposes, since trucks take more time to change lanes, occupy more roadway space, require more turning room, and consequently have a greater effect on traffic flow and congestion than passenger vehicles.

Level of Service (LOS)

Level of Service measures a highway's ability to handle traffic. LOS is affected by factors such as AADT volumes, peak hour volumes, truck traffic, number of driving lanes, lane width, vertical grades, ability to pass, and presence or absence of traffic signals. The *Highway Capacity Manual 2000* (Transportation Research Board Special Report 209) establishes guidelines for the appropriate LOS on various types of highways. LOS values range from A (free flow conditions) to F (conditions over capacity).

WisDOT also uses a numeric LOS scale which was developed to balance the social, environmental, and monetary costs of using LOS C as the performance threshold against the costs of accepting more congestion on the state's highways before capacity improvements are considered. Both alpha and numeric LOS values are provided in Table 1-2.

**Table 1-2
Level of Service (LOS) Values and Descriptions**

LOS Alpha Scale	LOS Numeric Scale	Description
A	1.01 to 2.00	No Congestion
B	2.01 to 3.00	No Congestion
C	3.01 to 4.00	Minimal Congestion
D	4.01 to 5.00	Moderate Congestion
E	5.01 to 6.00	Severe Congestion
F	6.01 or higher	Extreme Congestion

The acceptable LOS for *Connections 2030* backbone highways is LOS C, according to WisDOT's Facilities Development Manual (FDM), Procedure 11-5-3, and as shown in Table 1-3.

**Table 1-3
Acceptable Levels of Service**

Highway System Type	Rural and Small Urban Areas	Urbanized Areas with Population > 50,000	Acceptable Level of Service (LOS) Established for Project
Corridors 2020 Backbone Routes (US 41 is also a NHS route)	LOS C (<= 4.0)	LOS C (<= 4.0)	LOS C (<= 4.0) (US 41 and I-43)
Corridors 2020 Connector Routes and NHS Routes (not including NHS Backbone Routes)	LOS C (<= 4.0)	Mid LOS D (<= 4.5)	
Other Principal Arterials	LOS D (<= 5.0)	Mid LOS E (<= 5.5)	
Minor Arterials	LOS D (<= 5.0)	Mid LOS E (<= 5.5)	
Collectors & Local Function Roads	LOS D (<= 5.0)	Mid LOS E (<= 5.5)	

According to the *US 41 EIS Paramics Traffic Operations Report* prepared for WisDOT by Strand Associates in 2010, US 41 and I-43 freeway operations were analyzed under the existing conditions and future no build conditions. In the existing conditions, all but two of the freeway segments in the study area operate at a LOS C or better. The southbound basic and diverge segments on US 41 between US 141/Velp Avenue and WIS 29 operate at LOS D in the AM peak hour.

In the future, many of the freeway segments within, and around this study area will be nearing or exceeding capacity. As shown in Table 1-4, the AM peak hour has a poor LOS for southbound traffic, while the PM peak hour has substantially worse traffic operations for northbound vehicles, and demonstrates the need for an improvement in the study area. The projected average speeds on each of the four unacceptable LOS freeway segments listed in Table 1-4 are less than 20 miles per hour.

**Table 1-4
Design Year 2035 LOS for Freeway Sections**

LOS (Numeric scale)	Freeway Section	Peak Hour
LOS E (5.58)	US 41 from US 141/Velp Avenue to Mason Street – southbound	AM
LOS D (4.53)	US 41 from US 141/Velp Avenue to County M – southbound	AM
LOS F (>6)	US 41 from Mason Street to County M – northbound	PM
LOS F (>6)	I-43 from Webster Avenue to US 41 – northbound	PM

The Paramics Traffic Operations Report showed the network will have substantial congestion in design year 2035 at the existing signalized intersections throughout the corridor during both AM and PM peak hours. All but the US 141/Velp Avenue/Atkinson Avenue intersection would operate at LOS E or LOS F. The unsignalized intersections listed in Table 1-5 have failing approach movements (LOS F) in the PM peak hour:

**Table 1-5
Design Year 2035 Unsignalized Intersections Operating at LOS F**

LOS	Freeway Section/Intersection	Peak Hour
LOS F	US 141/Velp Avenue and Island Court – northbound and eastbound	PM
LOS F	US 141/Velp Avenue and Memorial Drive – westbound and northbound	PM
LOS F	County M and West Deerfield Avenue – northbound and southbound	PM
LOS F	County M and US 41 Northbound Ramps – northbound	PM
LOS F	County M and East Deerfield Avenue – northbound and southbound	PM
LOS F	Atkinson Avenue and I-43 Northbound Ramps – eastbound	PM

Summary: The effect of increased congestion on mobility in the US 41 corridor and within the interchange areas is a key factor in developing proposed improvements that separate local and regional traffic movements to the extent possible. Traffic increases on US 41 will make merge/diverge operations more difficult and dangerous. Without capacity expansion on US 41 and geometric improvements to its interchanges, delays on US 41 will increase and safety problems will worsen.

1.3.3 Existing Highway Deficiencies

The existing US 41 freeway mainline and its interchanges within the project area were constructed over 35 years ago and designed to handle lower volume traffic conditions. The construction AADT when US 41 was previously built from US 141/Velp Avenue to County M was 15,450, with a design year (1990) AADT of 23,300. There have been some improvements since then to increase the capacity of the interchanges, but they do not meet current design standards. The traffic demand is evidence of US 41 subsequent designation as a backbone highway under *Connections 2030*, its designation as a National Highway System (NHS) route, and as a possible future Interstate highway under SAFETEA-LU.

The US 41 mainline and interchanges are exhibiting signs of deterioration due to aging of the roadway infrastructure, bridges, drainage structures, guardrail and barrier walls. US 41 from Memorial Drive to County M has been overlaid with asphalt once since the original concrete pavement was constructed in 1970-71. The asphalt overlay on US 41 occurred in 1999 north of Duck Creek, and in 2003 south of Duck Creek. I-43 was originally constructed with concrete in 1978, and overlaid with asphalt in 2002. The Pavement Distress Index (PDI) value is 14.50, as surveyed in 2003. A PDI value of 100 is excellent, and a value of less than 50 is considered poor. A low PDI can contribute to a diminishing return on investment for resurfacing US 41 in the future.

Inadequate traffic capacity due to lack of channelization for turning movements and/or lack of intersection traffic control at ramp terminal intersections is also of concern at these interchanges. See the previous section addressing LOS deficiencies at the intersections within the project area.

The existing US 41 northbound and southbound roadway lanes are 12 feet wide, the median is 60 feet wide (measured between yellow marked edgelines, of opposing lanes), the shoulders adjacent to the median side are 6 feet wide, and the outside shoulders are 10 feet wide. Existing I-43 is also a four-lane divided freeway with the same geometry as US 41, except that the median is 64 feet wide. The existing US 41 roadway typical section is sufficient for existing traffic conditions. However, the typical section for the design year 2035 traffic volumes requires additional capacity on US 41, additional shoulder width, and therefore additional structure width.

Except for the Military Avenue structure over I-43, none of the grade separation structures in the project corridor meet current design standards for vertical clearance. The deficient vertical clearances are shown in bold in Table 1-6. The design standards are 14.75 feet full clearance for local roads and 16.75 feet full clearance for state and county highways, according to WisDOT's Facilities Development Manual (FDM), Procedure 11-35-1.

**Table 1-6
Grade Separation Structures**

Structure Number	Structure Location	Existing Minimum Vertical Clearance (feet)	Roadway Width (feet)
B-05-0064	US 41 SB over US 141 SB	14.9	39.0
B-05-0065	US 41 NB over US 141 SB	14.9	39.0
B-05-0068	US 41 SB over I 43 SB	16.2	49.9
B-05-0069	US 41 SB over I 43 SB	16.5	49.9
B-05-0227	Military Avenue over I 43	16.8	45.5
B-05-0129	County EB (Lakeview Dr) over US 41	16.3	44.0
B-05-0130	County M (Lineville Rd) over US 41	16.4	71.0

Note: Dimensions shown in bold are substandard

There are access control spacing deficiencies in the project area. Per WisDOT's FDM, Procedure 11-5-5, the minimum standard for separation distance between interchange ramp terminals and adjacent side roads is 1,000 feet and the desirable distance is 1,320 feet. Table 1-7 lists the locations where the separation distance between interchange ramp terminals and adjacent side roads does not meet current design standards.

**Table 1-7
Locations with Inadequate Separation Between
Interchange Ramps and Side Roads**

Interchange Ramp Intersection	Adjacent Side Road Intersection	Separation Distance (feet)
US 141/Velp Avenue and US 41 NB ramp terminal	Memorial Drive and US 141/Velp Avenue	350
US 141/Velp Avenue and US 41 SB ramp	Island Court and US 141/Velp Avenue	500
County M and US 41 NB ramp terminal	East Deerfield Avenue and County M	385
County M and US 41 SB ramp terminal	West Deerfield Avenue and County M	385

There are also several locations where the frontage roads along both sides of US 41 between Duck Creek and County M (East and West Deerfield Avenue) do not meet current design standards for separation distance between the edge of the highway and the frontage road. Per WisDOT's FDM, Procedure 11-25-45, the required distance between the edge of the through lane on a rural arterial highway and the edge of the through lane on the frontage road is 85 feet minimum and 115 feet desirable. In some areas, the existing separation distance between US 41 and these frontage roads is 50-60 feet.

The tight loop ramps at the I-43 interchange have design speeds that are less than desirable for System Interchanges (freeway to freeway interchange). Most of the existing ramp design speeds are less than 50% of the freeway mainline design speeds. Per FDM Procedure 11-30-1, the ramp design speed for freeway to freeway interchanges should be within 85% of the freeway mainline design speed, and no lower than 10 mph below the mainline design speed. For US 41 and I-43, the design speed is 70 mph, therefore the ramp design speed should be a minimum of 60 mph for a Systems Interchange.

Table 1-8 lists the design speeds for each of the existing ramps at the US 41/I-43 interchange.

**Table 1-8
Existing Horizontal Design Speeds
For the Tight Loop Ramps at US 41/I-43 Interchange**

Interchange Ramp Direction	Existing Design Speed (mph)	Ramp Type
Northbound US 41 to Southbound I-43	30	Loop
Northbound I-43 to Northbound US 41	45	Directional
Southbound US 41 to Southbound I-43	35	Semi-directional
Northbound I-43 to Southbound US 41	30	Loop

According to the 2004 American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets (GDHS), a guide value for ramp design speed as related to highway design speed is that a directional ramp (Northbound I-43 to Northbound US 41 ramp) should be designed for a 50-60 mph speed, a semi-directional ramp (Southbound US 41 to Southbound I-43 ramp) should be designed for a 50-60 mph speed, and loop ramps should be designed for a minimum of 30 mph (Northbound US 41 to Southbound I-43 ramp and Northbound I-43 to Southbound US 41 ramp)

The speed differential between the freeway mainline and the loop ramps increase the potential for vehicles to run off the road if speed isn't sufficiently reduced to negotiate the controlling loop ramp radius. All four of the US 41/I-43 interchange ramps have a substandard superelevation (banking of the curved roadway so it can be safely maneuvered at reasonable speeds). Per FDM Procedure 11-30-1, the maximum superelevation rate for ramps is 6 percent. The maximum superelevation rate that currently exists on all four of the US 41/I-43 interchange ramps is 8 percent. In addition, all the ramps have an outside shoulder width of 8 feet, which is less than the current minimum design standard of 10 feet for a system ramp.

The lengths of the exit ramps on diamond-type interchanges are typically in the range of 900 to 1,200 feet from the crossroad terminal to the point where the mainline shoulder meets the ramp shoulder, according to FDM Procedure 11-30-1. The exit ramps for US 141/Velp Avenue both have substandard length. The southbound exit ramp is 800 feet long, and the northbound exit ramp is 850 feet long.

The proximity of the interchanges at US 141/Velp Avenue and I-43 cause operational deficiencies and safety concerns due to inadequate traffic weaving distances. Desirable interchange spacing in urban areas is 1 mile. The US 141/Velp Avenue interchange is less than 1/3 mile from the I-43 interchange.

Traffic weaving occurs along US 41, between the US 141/Velp Avenue interchange northbound on ramp and the I-43 interchange southbound off ramp, and along US 41 between the I-43 southbound on ramp and the US 141/Velp Avenue interchange southbound off ramp. The deficiency in interchange spacing leads to weaving conflicts, which has an effect on LOS, traffic capacity, lane speed differential, and safety. According to the 2004 AASHTO GDHS a guideline of 2,000 feet is the minimum recommended length between successive ramps. The existing weave distance is approximately 1,400 feet along northbound US 41 between the on-ramp from US 141/Velp Avenue to the off-ramp to southbound I-43, and approximately 1,430 along southbound US 41 between the on-ramp from northbound I-43 to the off-ramp to US 141/Velp Avenue, neither of which meets the 2,000 feet guideline for weaving distances.

<p><i>Summary: Reconstruction of the US 41 mainline and its interchanges is required to improve traffic operations and capacity and to address existing deficiencies.</i></p>

1.3.4 Safety

Highway safety is measured by the frequency and severity of crashes. An important objective of proposed improvements in the US 41 corridor is to minimize crash potential through roadway mainline and intersection design features and access management.

There was one fatality along US 41 mainline, between I-43 and County M, in the reporting period 2005 to 2007. The fatal crash involved a sideswipe-same direction of two southbound vehicles south of the County EB overpass. The average annual fatal crash rate is 0.8 hundred million vehicles miles traveled (HMVMT) for US 41 between I-43 and County M, which is above the statewide average crash rate (2005-2007) of 0.5 HMVMT.

Table 1-9 presents crash data for the US 41 mainline from 2005 through 2007. Table 1-9 includes segment lengths, traffic volumes (AADT) and total crashes, which are used to develop the crash rates for comparison to statewide average crash rates for rural interstate highways. The statewide average crash rate for the reporting period (2005-2007) was 62 crashes per hundred million vehicles miles traveled (HMVMT), and the statewide average injury and fatal crash rate is 18.9 crashes per HMVMT. As indicated in Table 1-9, the US 41 segment between US 141/Velp Avenue and I-43 has the highest crash rate, 121 crashes per HMVMT. The short distance, which includes the weaving movements between interchanges, used in the equation for determining the crash rate per HMVMT results in a high crash rate between US 141/Velp Avenue and I-43. All crash data and statewide average crash rates, exclude accidents that involve deer.

**Table 1-9
US 41 and I-43 Mainline Crash Data (2005-2007)**

Roadway Segments	Segment Length (miles)	AADT (2006)	Total Crashes	Average Annual Total Crash Rate (HMVMT)	Average Injury and Fatal Crash Rate (HMVMT)
US 41 mainline (Memorial Drive to US 141/Velp Ave)	0.8	57,200*	32	64	14.0
US 41 mainline (US 141/Velp Avenue to I-43)	0.40	52,900	28	121	30.2
US 41 mainline (I-43 to County M)	2.30	47,300	58	49	15.1
I 43 (US 41 to Atkinson Drive)	2.0	34,600	16	21	9.2

Note: Rates shown in bold are substandard

* AADT 2006 from WisDOT website, US 41 Detail, Brown County

Source: Crash Analysis Data for ID 1133-10-00 Projects. Strand Associates®, February 2010.

Each ramp for the US 41 and I-43 Systems Interchange was analyzed separately in a Crash Analysis Report prepared by Strand Associates. Statewide average ramp crash rates are not available; therefore the results were instead compared to the statewide rural interstate average crash rates. The statewide average annual total crash rate is 62 crashes per HMVMT, and the statewide average injury and fatal crash rate is 18.9 crashes per HMVMT. As shown in Table 1-10 below, both the total crash rate and average injury and fatal crash rate exceeded the statewide average for all 4 ramps at this interchange. All crash data and statewide average crash rates, exclude accidents that involve deer.

**Table 1-10
US 41 / I-43 Ramp Crash Data (2005-2007)**

Roadway Segments	Segment Length (miles)	AADT (2006)	Total Crashes	Average Annual Total Crash Rate (HMVMT)	Average Injury and Fatal Crash Rate (HMVMT)
US 41 Southbound to I-43 Southbound Ramp	0.88	10,390	10	100	30.0
US 41 Northbound to I-43 Southbound Ramp	0.62	12,410	14	166	35.6
I-43 Northbound to US 41 Northbound Ramp	0.47	8,940	11	239	108.7
I-43 Northbound to US 41 Southbound Ramp	0.65	13,110	13	139	32.2

Note: Rates shown in bold are substandard

Source: Crash Analysis Data for ID 1133-10-00 Projects, Prepared by Strand Associates®, February 2010.

Summary: Safety concerns are an important consideration in developing proposed improvements that improve traffic weaving conditions between the US 141/Velp Avenue and I-43 interchanges, minimize speed differential on the freeway, and that separate regional and local traffic movements to the extent possible.

SECTION 2
Alternatives

SECTION 2

Alternatives

Introduction

Section 2 describes the range of alternatives developed to address the key purpose and need factors identified in Section 1. Section 2 evaluates the alternatives, identifies reasonable alternatives retained for detailed study, and explains why other alternatives were eliminated from further consideration.

2.1 Description of Initial Range of Alternatives

2.1.1 Alternative A: No Build

The No Build Alternative would maintain the existing four-lane freeway and all of the interchanges as they are. There would be no capacity improvements to the US 41 mainline and no improvements would be made to the existing interchanges at US 41/Velp Avenue, I-43, or County M. No improvements to substandard bridge clearances or other deficiencies would be made. Over time, minimal improvements would be made that attempt to maintain current service levels, repair/rehabilitate existing structures, keep the driving surface in good condition, and address safety concerns at spot locations.

2.1.2 Build Alternatives

Build Alternatives B, C, D and E include a range of options for improving traffic capacity, traffic operations and safety on the US 41 freeway mainline and its interchanges. The main difference among the Build Alternatives occurs along the US 41 mainline between US 141/Velp Avenue and I-43 where various improvement levels are being considered, and at the US 41/I-43 System Interchange, where various interchange configurations are being considered.

Improvements that are common to all of the Build Alternatives include the following. These improvements are illustrated on Exhibits 2-3 through 2-6.

- Widen the US 41 freeway mainline, from Memorial Drive to County M, from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
- Reconstruct the US 141/Velp Avenue interchange including roundabouts at the ramp terminals and at the US 141/Velp Avenue and Memorial Drive intersection. See 2.1.2(a) and 2.2.6 for more information on roundabout options in northwest quadrant of the US 141/Velp Avenue interchange. Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections.
- Construct new bridges over US 141/Velp Avenue, Canadian National (CN) Railroad, Wietor Drive, I-43, and Duck Creek.
- Replace the County EB/Lakeview Drive and County M bridges over US 41.
- Realign Beaver Dam Creek and replace the box culvert south of US 141/Velp Avenue interchange (see 2.1.2(b) for more information)
- Build storm water detention ponds along US 141/Velp Avenue and County EB/Lakeview Drive. Stormwater ponds will not be constructed within wetlands that would not otherwise be impacted by the US 41 improvements.
- Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M. While the existing separation distance does not meet minimum design standards (see EIS Section 1), WisDOT determined that moving the frontage roads up to 35 feet farther away from the US 41 mainline to meet minimum standards would cause substantial impacts to wetlands and abutting development. Therefore, the existing separation distance will be maintained to minimize environmental impacts.

Section 2.1.2(a) and 2.1.2(b) focus on the roundabout options, common to all of the build alternatives for the southbound US 41 ramp terminal at US 141/Velp Avenue. Section 2.1.3 through 2.1.6 focus on the section of US 41 from US 141/Velp Avenue to I-43.

2.1.2(a) Roundabout Options in Northwest quadrant of US 141/Velp Avenue interchange

Two roundabout options as summarized below were considered in the northwest quadrant of the US 141/Velp Avenue interchange. An overview of the roundabout options is provided in Exhibit 2-1 (Page 2-16) and additional comparison information is provided in section 2.2.6.

Option A: Five-legged roundabout with new local access frontage road

- Requires roundabout with additional fifth leg connecting to new frontage road
- Provides connectivity to local road system at Memorial Drive
- Includes right-in, right-out only access to existing driveway in northwest quadrant near Beaver Dam Creek
- Requires lengthening of four structures over railroad

The two-lane frontage road associated with the five-legged roundabout would parallel the west side of US 41 from US 141/Velp Avenue to just south of the CN Railroad. The road would then follow along the south side of the railroad tracks in order to connect to the existing cul-de-sac at the northerly terminus of Memorial Drive on the east side of US 41.

Option B: Four-legged roundabout with right-in, right-out access

- Includes right-in, right-out only access to existing driveway in northwest quadrant near Beaver Dam Creek
- Does not provide connectivity to local road system at Memorial Drive
- Does not require lengthening of structures over railroad

2.1.2(b) Realignment of Beaver Dam Creek

Beaver Dam Creek, a tributary to Duck Creek, crosses US 41 just south of the US 141/Velp Avenue interchange. The existing creek follows the east side of US 41 and then has a sharp bend at the inlet and outlet of the box culvert that crosses US 41. Common to all of the build alternatives is to realign Beaver Dam Creek, as shown in Exhibit 2-2 (Page 2-17).

The realignment of Beaver Dam Creek is needed due to the US 41 mainline expansion and the US 141/Velp Avenue interchange reconfiguration. The relocated channel will cross US 41 approximately 400' to the south of its present location. The new alignment will facilitate a wider stream cross section with further separation from US 41. This will provide for better stream habitat, lessen the amount of retaining walls required, avoid impacts to nearby Lehner Park (Section 4f property) and allow for a better crossing angle at US 41. The structure length at the realigned box culvert crossing on US 41 is the same length that would have been needed if the structure were replaced at its present location.

This Beaver Dam Creek realignment is estimated to cost approximately \$200,000 to construct. It would require approximately 3.8 new acres of right-of-way and 8 additional residential displacements (4 additional displacements on each side of US 41). Wetland impacts for the Beaver Dam Creek realignment would be approximately 1.3 acres along the east side of US 41. These impacts are included in each of the proposed build alternatives.

2.1.3 Alternative B: US 41 expansion with minor ramp improvements to I-43/US 41 interchange

An overview of Alternative B is provided in Exhibit 2-3 (Page 2-18). Key design features in addition to common improvements to all build alternatives include the following:

- Expand US 41 along its existing alignment from US 141/Velp Avenue to I-43.
- Extend the on and off ramps at the US 141/Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Construct an outside auxiliary lane along northbound and southbound US 41 between the US 141/Velp Avenue and I-43 interchanges to improve traffic weaving conditions.
- Make minor improvements to existing ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline.
- Maintain access from US 141/Velp Avenue to I-43 via US 41 as it is today.

2.1.4 Alternative C: US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43

An overview of Alternative C is provided in Exhibit 2-4 (Page 2-19). Key design features in addition to common improvements to all build alternatives include the following:

- Expand US 41 along its existing alignment from US 141/Velp Avenue to I-43.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between US 141/Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.
- Extend the on and off ramps at the US 141/Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.
- Improve the semi-directional ramp from southbound US 41 to southbound I-43 to a 60 mph design speed, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from US 141/Velp Avenue to I-43 via US 41 as it is today.

2.1.5 Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with Freeway Split Configuration

An overview of Alternative D is provided in Exhibit 2-5 (Page 2-20). Key design features in addition to common improvements to all build alternatives include the following:

- Main difference between Alternative C and D is that under Alternative D, US 41 mainline would be reconstructed on a revised alignment that would allow for a freeway split for southbound US 41 to southbound I-43 within the existing interchange footprint.
- Construct Collector-Distributor (C/D) roads on both sides of US 41 between US 141/Velp Avenue and I-43. The C/D roads would accommodate traffic weaving movements rather than having those movements occur on the US 41 freeway mainline.
- Extend the on and off ramps at the US 141/Velp Avenue interchange and realign them slightly to meet current design standards and accommodate roundabouts at the interchange ramp terminals.
- Make minor improvements to existing indirect loop ramp geometry at the I-43/US 41 System Interchange to accommodate the wider US 41 mainline. Additional lighting along with enhanced signing and marking will be added to mitigate the tight loop ramps.

- Improve the semi-directional ramp from southbound US 41 to southbound I-43, and the directional ramp from northbound I-43 to northbound US 41, to a 70 mph design speed.
- Maintain access from US 141/Velp Avenue to I-43 via US 41 as it is today.

2.1.6 Alternative E: US 41 expansion with full reconfiguration of I-43/US 41 interchange

An overview of Alternative E is provided in Exhibit 2-6 (Page 2-21). Key design features in addition to common improvements to all build alternatives include the following:

- Expand US 41 including a revised northbound alignment, and a raised northbound gradeline, to accommodate the southbound US 41 to southbound I-43 ramp within the existing interchange footprint and the northbound I-43 to southbound US 41 flyover ramp piers and foundations.
- Reconstruct I/43/US 41 System Interchange with direct ramps (all loop ramps eliminated)
- In order to accommodate the FHWA recommended design speed for the direct ramps at the US 41/I-43 interchange, eliminate existing access between US 141/Velp Avenue and I-43 via US 41; Atkinson Avenue or an alternate route would be used to access southbound I-43 from US 141/Velp Avenue or to access US 141/Velp Avenue from northbound I-43.

2.2 Alternatives Evaluation and Screening

This subsection evaluates the alternatives described in Section 2.1 in terms of the following criteria as applicable. The alternatives retained for detailed study are also identified.

Ability to address key purpose and need factors

Detailed information on purpose and need is provided in EIS Section 1. Key purpose and need factors considered in this alternatives evaluation are listed below. **A comparison among the alternatives for these factors is provided in Figure 2-1.**

- System linkage and route importance
- Traffic and truck volumes
- Traffic operations
- Geometric deficiencies
- Safety

Environmental Impacts

Detailed information on environmental impacts is provided in EIS Section 3. Key impacts considered in this alternatives evaluation include construction cost, new right-of-way acquisition, residential and business displacements, stream crossings, wetlands, and public use land acquisition as applicable.

Input from Local Officials and the Public

Views of local officials and the public are based on the local officials meeting and a public information meeting held on March 3, 2010 and the public information meeting held on August 18, 2010 at which versions of the alternatives described in Section 2.1 were presented. In addition, there were two public informational meetings for this project prior to the determination that an EIS would be prepared. One public informational meeting was held on March 27, 2007, to inform the public of the proposed project, along with a range of alternatives for Wietor Wharf Park access. A second public informational meeting was held on November 27, 2007 to give the public an update on the proposed project design, along with introducing roundabouts at the US 141/Velp Avenue interchange. Local officials' meetings were held in advance of each public information meeting to obtain input on project design features and other aspects in preparation for the public information meetings.

Interchange Access Justification Report

As discussed in EIS Section 1, US 41 is planned for future conversion to an Interstate Highway and I-43 is an existing Interstate Highway. Design standards for the Interstate System including any changes in access are governed by the Federal Highway Administration (FHWA) in accordance with 23 CFR Part 625, *Design Standards for Highways*. Under its policy guidance, FHWA evaluates requests for additional and revised access to the Interstate System. The intent is to protect the operation, safety and capacity of the Interstate System.

Proposed changes to the Interstate System are documented through an *Interchange Access Justification Report* (IAJR) that is reviewed and approved by FHWA. The IAJR for the US 41 corridor in Brown County was prepared by WisDOT and submitted to FHWA in March 2010.

FHWA reviewed the build alternatives presented in the IAJR to determine their compatibility with future conversion of US 41 to an Interstate Highway. FHWA provided its findings on June 21, 2010, agreeing that Alternative B be dropped from further consideration, and recommending that Alternatives C, D, and E be retained for further development and consideration in the project's EIS phase. The following recommendations were made for Alternatives C and D:

- The southbound US 41 to southbound I-43 directional ramp should be designed to provide a minimum design speed of 50-60 mph.
- The northbound I-43 to northbound US 41 directional ramp should be designed to provide a minimum design speed of 50-60 mph.
- The design speed for the existing loop ramps meets minimum design standards, however a higher design speed is desirable, because these ramps are part of the US 41/I-43 system interchange.

2.2.1 Alternative A: No Build

The No Build Alternative would not be compatible with system linkage and route importance. US 41 is designated as a backbone highway under *Connections 2030* and as a National Highway System route. US 41 and I-43 are designated long truck routes allowing trucks up to 65 feet in length to use these highways. The US 41/I-43 interchange is a major System Interchange (freeway to freeway interchange).

The No Build Alternative would not provide additional freeway mainline capacity, which is needed to accommodate design year (2035) traffic volumes and high truck volumes that comprise approximately 10.9% of the AADT on US 41 and I-43.

The No Build Alternative would not provide an acceptable operational Level of Service (LOS) in design year 2035. Backbone highways require a minimum of LOS C. Without improvements, southbound US 41 south of the US 141/Velp Avenue interchange will operate at LOS E in the AM peak and northbound US 41 at the I-43 interchange will operate at LOS F in the PM peak. Westbound I-43 east of Military Avenue will operate at LOS F in the PM peak.

The No Build Alternative would not address existing geometric deficiencies. Existing deficiencies include insufficient capacity/substandard roadway geometry, grade separation structures with substandard vertical clearance, interchange on and off ramps that are too short, tight loop ramps at the I-43 interchange that have an undesirable design speed less than 50% of the freeway mainline design speed, insufficient traffic weaving distance on US 41 from US 141/Velp Avenue to I-43, and insufficient distance between interchange ramps and cross roads.

The No Build Alternative would not address the high crash rate on US 41 from US 141/Velp Avenue to I-43, which exceeds the statewide average crash rate for similar freeways. It would also fail to address the high ramp crash rates at the I-43 interchange where the total rates and injury/fatal crash rates are well above the statewide average ramp crash rates. Safety concerns due to insufficient traffic weaving distances on northbound and southbound US 41 from US 141/Velp Avenue to I-43 would not be addressed.

Further, the No Build Alternative would be incompatible with the regional and local plans that include the US 41 expansion project. The plans include the *Green Bay Metropolitan Planning Organization Long-Range Transportation Plan* completed in November 2005 and amended in 2007, and the *Brown County Comprehensive Plan* completed by the Brown County Planning Commission in October 2004.

Because the No Build Alternative does not address the project's key purpose and need factors, it is not a viable alternative and has been eliminated from further consideration. The No Build Alternative serves as a baseline for comparison to the Build Alternatives.

2.2.2 Alternative B: US 41 expansion with minor ramp improvements to I-43/US 41 interchange (Eliminated from further consideration)

Proposed improvements under Alternative B would not be compatible with system linkage and route importance as it does not meet FHWA expectations for future interstate conversion.

The US 41 traffic operation analysis indicates that Alternative B would improve traffic operations when compared to the No Build Alternative. Specifically, the traffic operations analysis indicates the following for the design year 2035:

- Traffic operations in the AM and PM peak hours would be at LOS C or better and no freeway segments would have operations at LOS F.
- Segments that would have operations at LOS D or E include the following:
 - US 41 southbound basic segment north of County M (LOS D in AM peak hour)
 - US 41 northbound basic segment north of County M (LOS D in PM peak hour)
 - US 41 northbound merge segment at County M (LOS D in PM peak hour)
 - I-43 northbound merge and basic segments from Atkinson Avenue to US 41 (LOS D in PM peak hour)
 - I-43 northbound diverge segment from Atkinson Avenue to US 41 (LOS E in PM peak hour)

Alternative B includes adding an auxiliary lane to the weaving sections on US 41 between US 141/Velp Avenue and I-43. This improves freeway operations of the northbound weave to LOS C in the PM peak hour compared to LOS F for the No Build Alternative.

Alternative B does not fully address geometric deficiencies or safety concerns on US 41. It would not improve the tight loop ramps at the I-43 interchange. The speed differential between the freeway mainline and the loop ramps is less than desirable which increases the potential for vehicles to run off the road if speed isn't sufficiently reduced to negotiate the controlling loop ramp radius. The loop ramps have a substandard superelevation (banking of the curved roadway so it can be safely maneuvered at reasonable speeds). The loop ramps also have substandard shoulder widths.

Extending and realigning the US 141/Velp Avenue interchange ramps would reduce the traffic weaving distance on US 41 between this interchange and the I-43 interchange. The northbound weaving distance would be reduced by approximately 150 feet and the southbound weaving distance by about 90 feet. The crash rates for the traffic weaving sections are above the statewide average crash rate. Therefore, reducing the weaving distance would likely increase the potential for crashes along these weaving segments.

The speed differential between the median lane and the outside lane of the US 41 northbound traffic weaving section ranges between 24 and 35 mph in the 2035 PM peak hour. For the US 41 southbound weave, the speed differential ranges between 13 and 30 mph in the 2035 AM peak hour. With vehicles travelling at different speeds in a substandard weaving section it is anticipated to increase the amount of accidents between US 141/Velp Avenue and I-43 interchange.

Alternative B would retain existing access between US 141/Velp Avenue and I-43 via US 41.

Alternative B is estimated to be the least expensive to construct (\$155 million). It would require approximately 13 new acres of right-of-way, 13 residential displacements and one business displacement. Two stream crossings are required (Beaver Dam Creek and Duck Creek). Wetland impacts would be approximately 43 acres.

Section 4(f) property impacts would total approximately 0.55 acres. The impacts would include 0.15 acres from the Gordon Nauman Conservation Area, and 0.4 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit) owned by DNR. Section 6(f) property impacts would total approximately 0.4 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit).

Input from local officials and the public at the March 3, 2010 meeting indicated general support for Alternative B because it would maintain existing access between US 141/Velp Avenue and I-43, similar to Alternative C. However, there were safety concerns with Alternative B because it would not address traffic weaving and would retain the tight loop ramps at the I-43 interchange. In addition, there were concerns from local officials that Alternative B would not be compatible with future conversion of US 41 to an Interstate Highway.

This alternative has been eliminated from further consideration as a reasonable build alternative because it does not address the operational and safety issues resulting from the short weaving section along the US 41 mainline. The IAJR dated March 25, 2010 includes a statement that Alternative B no longer be included as an alternative for further study.

2.2.3 Alternative C: US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43 (Eliminated from further consideration)

Proposed improvements under Alternative C would be compatible with system linkage and route importance and would provide additional capacity on US 41, which is needed to accommodate design year (2035) traffic volumes.

Alternative C does not fully address geometric deficiencies on US 41. This alternative would not eliminate the tight loop ramps at the I-43 interchange, and would have all of the same geometric-associated safety concerns about the tight loop ramps as Alternative B, except that the ramp entry and exit points are separated from mainline US 41.

The US 41 traffic operation analysis indicates that Alternative C would improve traffic operations compared to the No Build Alternative or Alternative B. Specifically, the traffic operations analysis indicates the following for the design year 2035:

- Traffic operations in the AM and PM peak hours would be at LOS C or better and no freeway segments would have operations at LOS E or LOS F.
- The following segments would experience congestion at LOS D:
 - US 41 southbound basic segment at County M and north of County M (AM peak hour)
 - US 41 northbound basic segment at County M and north of County M (PM peak hour)
 - US 41 northbound merge segment at County M (PM peak hour)
 - I-43 northbound basic and diverge segments between Atkinson Avenue and US 41 (PM peak hour)

The addition of C/D roadways under Alternative C improves safety and traffic operations by removing traffic weaving movements from the US 41 freeway mainline, compared to the No Build Alternative or Alternative B. A C/D (collector/distributor) roadway is a one-way road next to a freeway that is used for some or all of the ramps that would otherwise merge directly into or split from the main lanes of the freeway. The weaving between exiting and entering vehicles from both the US 141/Velp Avenue interchange and the I-43 interchange would occur on a two lane C/D roadway, prior to merging onto the US 41 mainline. With lower speeds and traffic volumes on the C/D roadways, it is reasonable to assume that there would be fewer and less severe crashes. Weaving segments on the C/D roadways would operate at LOS C or better in the AM and PM peak hours.

The speed differential between the median lane and the outside lane of the northbound C/D road ranges between 5 and 21 mph in the PM peak hour and the speed differential for the southbound C/D roadway ranges between 15 and 26 mph in the AM peak hour. These speed differentials are less than the speed differentials that would occur with Alternative B where traffic weaving takes place on the US 41 mainline.

Alternative C would retain existing access between US 141/Velp Avenue and I-43 via US 41.

Alternative C is estimated to cost about \$205 million to construct. It would require approximately 30 new acres of right-of-way, 13 residential displacements and one business displacement. Three stream crossings would be required (one for Beaver Dam Creek and two crossing locations for Duck Creek). Wetland impacts for Alternative C would be approximately 51 acres.

Section 4(f) property impacts would total approximately 12.15 acres. The impacts would include 0.55 acres from the Gordon Nauman Conservation Area, and 11.6 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). Section 6(f) property impacts would total approximately 5.5 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). In addition, there would be minor impacts to the park enhancements (boardwalks) at Wietor Wharf Park and Deerfield Docks for which Dingell-Johnson funds were used, and which would require compensation similar to Land and Water Conservation Fund (LWCF) Section 6(f) impacts.

Input from local officials and the public at the March 3, 2010 and August 18, 2010 meetings indicated general support for Alternative C because it would maintain existing access between US 141/Velp Avenue and I-43. There was further support for Alternative C because it would be compatible with future conversion of US 41 to an Interstate Highway. There were safety concerns with Alternative C because it would retain the tight loop ramps at the I-43 interchange.

Based on the IAJR, FHWA requested that the directional ramp at the I-43 interchange (NB I-43 to NB US 41 ramp) and the semi-directional ramp at the I-43 interchange (SB US 41 to SB I-43 ramp) be designed to a minimum 50-60 mph design speed. FHWA also noted that while the loop ramps at the I-43 interchange meet minimum design standards, a higher design speed is desirable for the US 41/I-43 System Interchange.

WisDOT and FHWA have agreed that Alternative C and Alternative D provide essentially the same function pertaining to traffic operations, safety and access. However, Alternative D provides this function within a smaller environmental footprint, including fewer impacts to public use lands and does not create fragmentation of high quality wetlands. Therefore, Alternative C has been eliminated from further consideration as a build alternative.

2.2.4 Alternative D: US 41 expansion with C/D roadways between US 141/Velp Ave and I-43 with Freeway Split Configuration

Proposed improvements under Alternative D would be compatible with system linkage and route importance and would provide additional capacity on US 41, which is needed to accommodate design year (2035) traffic volumes.

Alternative D does not fully address geometric deficiencies on US 41. This alternative would not eliminate the tight loop ramps at the I-43 interchange, and would have all of the same geometric-associated safety concerns about the tight loop ramps as Alternative B, except that the ramp entry and exit points are separated from mainline US 41.

Freeway operations, and the lane speed differentials, for Alternative D would be the same as those under Alternative C. The main difference between these alternatives is that the US 41 mainline would be constructed on a revised alignment that would allow for a freeway split for southbound US 41 to southbound I-43, which would reduce the amount of impacts west of US 41 compared to Alternative C. This revised alignment would involve raising the grade of southbound US 41 mainline considerably from just north of the CN Railroad to north of Duck Creek to allow for the construction of a bridge for the southbound US 41 ramp to southbound I-43 ramp over the northbound US 41 mainline.

Similar to Alternative C, the C/D roadways would improve safety compared to the No Build Alternative or Alternative B. With lower speeds and traffic volumes on the C/D roadways, it is reasonable to assume that there would be fewer and less severe crashes.

Alternative D would retain existing access between US 141/Velp Avenue and I-43 via US 41.

Alternative D is estimated to cost about \$220 million to construct. It would require approximately 29 new acres of right-of-way, 13 residential displacements and one business displacement. Two stream crossings would be required (Beaver Dam Creek and Duck Creek with a minor channel realignment of Beaver Dam Creek). Wetland impacts for Alternative D would be approximately 57 acres.

Section 4(f) property impacts would total approximately 7.05 acres. The impacts would include 0.55 acres from the Gordon Nauman Conservation Area, and 6.5 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). Section 6(f) property impacts would total approximately 6.5 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). In addition, there would be minor impacts to the park enhancements (boardwalks) at Wietor Wharf Park and Deerfield Docks for which Dingell-Johnson funds were used, and which would require compensation similar to LWCF Section 6(f) impacts.

Input from local officials and the public at the March 3, 2010 and August 18, 2010 meetings indicated general support for Alternative D because it would maintain existing access between US 141/Velp Avenue and I-43. There was further support for Alternative D because it would be compatible with future conversion of US 41 to an Interstate Highway. There were safety concerns with Alternative D because it would retain the tight loop ramps at the I-43 interchange.

Based on the IAJR, FHWA requested that the directional ramp at the I-43 interchange (NB I-43 to NB US 41 ramp) and the semi-directional ramp at the I-43 interchange (SB US 41 to SB I-43 ramp) be designed to a minimum 50-60 mph design speed. FHWA also noted that while the loop ramps at the I-43 interchange meet minimum design standards, a higher design speed is desirable for the US 41/I-43 System Interchange. FHWA recommended that Alternative D be retained for further development and consideration in the project's EIS phase.

2.2.5 Alternative E: US 41 expansion with full reconfiguration of I-43/US 41 interchange

Proposed improvements under Alternative E would be compatible with system linkage and route importance and would provide additional capacity on US 41, which is needed to accommodate design year (2035) traffic volumes. Eliminating the tight loop ramps at the I-43 interchange would be desirable for a System Interchange.

The US 41 traffic operation analysis indicates that Alternative E would improve traffic operations compared to the No Build Alternative and other build Alternatives. Specifically, the traffic operations analysis indicates the following for the design year 2035:

- Traffic operations in the AM and PM peak hours would be at LOS C or better and no freeway segments would have operations at LOS E or LOS F.
- The following segments would experience congestion at LOS D:
 - US 41 southbound basic segment at County M and north of County M (AM peak hour)
 - US 41 northbound basic segment at County M and north of County M (PM peak hour)
 - US 41 northbound merge segment at County M (PM peak hour)

Alternative E is the only alternative that offers high-speed direct ramps to replace the existing tight loop ramps at the US 41/I-43 interchange. The high-speed direct ramps at the US 41/I-43 System Interchange provide free-flow movements for regional traffic. In addition, the high-speed direct ramps would address the safety concerns described previously for Alternatives B, C, and D, associated with tight loop ramps and weaving.

Alternative E would remove existing access between US 141/Velp Avenue and I-43 via US 41. Removal of the northbound US 141/Velp Avenue to southbound I-43 connection and the northbound I-43 to southbound US 141/Velp Avenue connection is expected to reduce the amount of traffic on I-43 between Atkinson Avenue and US 41. However, it will increase the amount of traffic along US 141/Velp Avenue from Atkinson Drive to US 41, by approximately 500 vehicles in the 2035 AM peak hour and 1,100 vehicles in the 2035 PM peak hour.

Alternative E is estimated to cost about \$230 million to construct. It would require approximately 37 new acres of right-of-way, 13 residential displacements and one business displacement. Two stream crossings would be required (Beaver Dam Creek and Duck Creek). Wetland impacts for Alternative E would approximately 55 acres.

Section 4(f) property impacts would total approximately 11.7 acres. The impacts would include 1.1 acres from the Gordon Nauman Conservation Area, and 10.6 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). Section 6(f) property impacts would total approximately 10.6 acres from the Green Bay West Shores Wildlife Area (Peats Lake Unit). There would be no impacts to the boardwalks at Wietor Wharf Park or Deerfield Docks.

Input from local officials and the public at the March 3, 2010 and August 18, 2010 meetings indicated general support for Alternative E because it would address long-term traffic mobility and safety concerns. In addition, Alternative E was supported because it would be compatible with future conversion of US 41 to an Interstate Highway. The main opposition to Alternative E was that it would eliminate existing access between US 141/Velp Avenue and I-43 via US 41. Some people asked whether Alternative E could be refined to include this access, but further analysis indicated this access cannot be accommodated because of the grade differential between US 141/Velp Avenue and the ramps for US 41 northbound to I-43 southbound and I-43 northbound to US 41 southbound.

Based on the IAJR, FHWA recommended that Alternative E be retained for further development and consideration in the project's EIS phase. There were no concerns with the proposed design of this alternative relative to future conversion of US 41 to an Interstate Highway.

2.2.6 Comparison of Roundabout Options in Northwest Quadrant of US 141/Velp Avenue Interchange

The local community (Village of Howard) has informed WisDOT of the potential for commercial development in the northwest quadrant of the US 141/Velp Avenue Interchange, which is zoned "Highway Commercial". Therefore, as part of this project, WisDOT has evaluated two different options for the southbound ramp terminal at this interchange, which is adjacent to/serves this area, and is common to all of the build alternatives. One option would be a standard 4-leg roundabout with no new/additional frontage road, and the other option would be a 5-leg roundabout with a new frontage road paralleling US 41 and serving this area zoned "Highway Commercial". See Exhibit 2-1 (Page 2-16) for a plan view of these two options and the discussion below for additional detail.

Option 1: 4-leg roundabout without new frontage road

This option would involve a standard 4-leg roundabout at the southbound ramp terminal, and would not include a new frontage road servicing the area zoned "Highway Commercial". Access to this area would be maintained at the existing driveway location along Velp Avenue. However, this access would be restricted to "right-in, right-out" only due to the proposed extension of the median/splitter island further west on Velp Avenue. Despite the restricted access, traffic analysis shows that the 4-leg roundabout would provide good traffic operations with relatively low queues and delays for the design year traffic forecast (AM Peak Hour LOS B, and PM Peak Hour LOS B).

Option 2: 5-leg roundabout with new frontage road

This option would involve a 5-leg roundabout at the southbound ramp terminal, along with a new frontage road as the 5th leg, paralleling the west side US 41, servicing the area zoned "Highway Commercial" in the northwest quadrant of the interchange, and turning to the east to go under US 41 and connect to Memorial Drive on the east side of US 41. FHWA requires that the 5th leg of the roundabout (the new frontage road) provide local connectivity rather than dead-ending, hence the proposed connection to Memorial Drive. This option would provide additional access to the "Highway Commercial" area via driveways off the new frontage road, along with the connection to Memorial Drive. As with the 4-leg roundabout option, the existing driveway/access along Velp Ave. would be restricted to "right-in, right-out only" due to the proposed extension of the splitter island on Velp Avenue further west. The 5-leg option would provide good traffic operations and additional access/traffic movements to and from this area. Requirements/needs of the 5 leg option above and beyond the 4-leg option include approximately 2.9 acres of new right-of-way, 1.1 acres of wetland, and \$2.3 million construction cost. Construction of this option would require local cost share. Recent feedback from the Village of Howard indicates that they are not in favor of this option due to factors such as cost, impact to developable land, and incompatibility with potential future development in the Memorial Drive area.

**Figure 2-1
Alternatives Comparison to Key Purpose and Need Factors**

Purpose & Need Factors	Alternative A ¹ No Build (ELIMINATED FROM FURTHER STUDY)	Alternative B ² US 41 expansion with minor ramp improvements to I-43/US 41 interchange: (ELIMINATED FROM FURTHER STUDY) ³	Alternative C ⁴ US 41 expansion with C/D roadways between Velp Avenue and I-43 (ELIMINATED FROM FURTHER STUDY) ⁴	Alternative D ² US 41 expansion with C/D roadways between Velp Avenue and I-43 and compatibility of I-43/US 41 interchange to full reconfiguration	Alternative E ² US 41 expansion with full reconfiguration of I-43/US 41 interchange
System Linkage/Route Importance <ul style="list-style-type: none"> Backbone Highway (US 41) NHS route (US 41) Long truck route (US 41 and I-43) US 41/I-43 = Systems Interchange (freeway to freeway interchange) Future conversion to Interstate Highway (US 41) 	Not addressed	Minor improvements to US 41/I-43 Systems Interchange Not compatible for future Interstate conversion	Improvements to US 41/I-43 Systems Interchange Compatible for future Interstate conversion	Improvements to US 41/I-43 Systems Interchange Compatible for future Interstate conversion	High speed ramps at US 41/I-43 interchange provide free-flow movements for regional traffic Compatible for future interstate conversion
Traffic Volumes (Design Year 2035) (60,000 AADT threshold for 4-lane backbone highways) <ul style="list-style-type: none"> US 41: 80,500 – 97,700 AADT I-43: 55,700 AADT 	Not addressed	Proposed 6-lane US 41 freeway mainline meets design standard	Proposed 6-lane US 41 freeway mainline meets design standard	Proposed 6-lane US 41 freeway mainline meets design standard	Proposed 6-lane US 41 freeway mainline meets design standard
Truck Volumes (Design Year 2035) (High truck volumes contribute to congestion) <ul style="list-style-type: none"> US 41: 10.9% of AADT I-43: 11% of AADT US 141/Velp Avenue: 5.7% of AADT 	Not addressed	Tight loop ramps at I-43 interchange undesirable for high truck volumes Additional US 41 mainline capacity benefits truck traffic	Tight loop ramps at I-43 interchange undesirable for high truck volumes Additional US 41 mainline capacity benefits truck traffic	Tight loop ramps at I-43 interchange undesirable for high truck volumes Additional US 41 mainline capacity benefits truck traffic	High speed ramps at US 41/I-43 interchange provide maximum benefits for truck traffic Additional US 41 mainline capacity benefits truck traffic
Traffic Operations (LOS C required for backbone highways) <ul style="list-style-type: none"> SB US 41 south of US 141/Velp Avenue = LOS E in AM peak SB US 41 from US 141/Velp Avenue to County M = LOS D in AM peak NB US 41 from Mason St. to County M = LOS F in PM peak NB I-43 south of US 41 = LOS F in PM peak 	Not addressed	Some operations below LOS C	Operations at LOS C or better	Operations at LOS C or better	Operations at LOS C or better
Geometric Deficiencies <ul style="list-style-type: none"> Insufficient capacity/substandard roadway geometry Grade separation structures have substandard vertical clearance Interchange on and off ramps too short Tight loop ramps at I-43 interchange have design speed less than 50% of freeway mainline design speed ⁵ Insufficient traffic weaving distance (US 41 from US 141/Velp to I-43) Insufficient distance between interchange ramps and cross roads Insufficient frontage road separation (US 41 from I-43 to County M) 	Not addressed	Does not improve tight loop ramps at I-43 interchange Does not address insufficient weaving distance between US 141/Velp Avenue and I-43 Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Other geometric deficiencies addressed	Does not improve design speeds for tight loop ramps at I-43 interchange Improves design speed for ramp from southbound US 41 to southbound I-43 to 60 mph and from northbound I-43 to northbound US 41 to 70 mph C/D roads remove weaving movements from US 41 mainline and provide minimum recommended 1600 ft. weaving distance Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Provides desirable 800 ft. spacing between northbound US 41 merge points for the CD road and northbound I-43. Other geometric deficiencies addressed	Does not improve design speeds for tight loop ramps at I-43 interchange Improves design speed for ramps from southbound US 41 to southbound I-43 and from northbound I-43 to northbound US 41 to 70 mph C/D roads remove weaving movements from US 41 mainline and provide minimum recommended 1600 ft. weaving distance Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Provides desirable 800 ft. spacing between northbound US 41 merge points for the CD road and northbound I-43. Other geometric deficiencies addressed	High speed ramps replace existing tight loop ramps at US 41/I-43 interchange Does not address insufficient frontage road separation between I-43 and County M along northbound US 41 Other geometric deficiencies addressed
Access Access between US 141/Velp Ave. and I-43 via US 41	Provided	Provided	Provided	Provided	Eliminated
Safety (Statewide crash rate comparison = 83.7 crashes per HMVMT) <ul style="list-style-type: none"> NB US 41 from US 141/Velp Ave. to I-43 = 101.4 per HMVMT SB US 41 from I-43 to US 141/Velp Ave. = 169.7 per HMVMT 	Not addressed	Does not separate out mainline traffic for NB and SB US 41 weaving sections between US 141/Velp Ave. and I-43. Otherwise, improves safety	Improves safety	Improves safety	Improves safety

NOTES:

- The No Build Alternative does not address the project's key purpose and need factors and therefore is not a viable course of action. It serves as a baseline of comparison to the build alternatives.
- Proposed improvements common to all of the Build Alternatives include the following:
 - Widen the US 41 freeway mainline from 4 to 6 lanes and add auxiliary lanes along northbound and southbound US 41.
 - Reconstruct the US 141/Velp Avenue interchange including roundabouts at the ramp terminals and at the US 141 (Velp Avenue)/Memorial Drive intersection.
 - Reconstruct the County M interchange including roundabouts at the ramp terminals and at the County M/frontage road intersections
 - Construct new bridges over US 141/Velp Avenue, Canadian National (CN) Railroad, I-43, Wietor Drive, and Duck Creek
 - Replace the County EB/Lakeview Drive and County M bridges over US 41.
 - Construct a new frontage road with a five-legged roundabout at the US 141/Velp Avenue interchange ramp terminal west of US 41
 - Realign Beaver Dam Creek and replace the box culvert south of US 141/Velp Avenue interchange.
 - Build stormwater detention ponds along US 141/Velp Avenue and County EB/Lakeview Drive
 - Maintain the existing separation distance between the US 41 mainline and the frontage roads from I-43 to County M
- Alternative B has been eliminated from further consideration as a reasonable build alternative because it does not address the operational and safety issues resulting from the short weaving section along the US 41 mainline
- Alternative C has been eliminated from further consideration as a reasonable build alternative because of the substantial impacts to Section 4(f) resources compared to Alternatives D and E that address project purpose and need. In addition, Alternative C would impact and fragment higher quality wetlands compared to Alternatives D and E due to the southbound US 41 to southbound I-43 flyover ramp
- Per WisDOT FDM Chapter 11-30-1, the ramp design speed for freeway to freeway interchanges should be in the upper range or 85% of the freeway mainline design speed (within 10 mph of the mainline design speed)

2.3 Other Alternatives Considered

2.3.1 Improvements without Additional Capacity on US 41

WisDOT considered a lower level of improvements that would include the addition of collector/distributor (C/D) roads or auxiliary lanes to help with the existing weaving problem between the US 141/Velp Avenue interchange and I-43, without adding additional lanes to US 41 mainline. Included in this alternative, would be reconstruction of the US 141/Velp Avenue interchange, the County M interchange, and minor ramp modifications to the US 41/I-43 interchange to match the new C/D roadways or auxiliary lanes.

The addition of auxiliary lanes or a C/D roadway to the weaving sections on US 41 between US 141/Velp Avenue and I-43 would improve the freeway operations and safety at that location. However, this alternative would not address the need for additional capacity on US 41 to accommodate design year (2035) traffic volumes. Similar to traffic operations under the No Build alternative, with this alternative there would be several segments of US 41 and I-43 that would operate at LOS F. In addition, the projected speeds in the PM peak hour on each of the failing freeway segments would be less than 20 miles per hour.

WisDOT and FHWA have eliminated this alternative from further consideration because it fails to meet the project purpose and need.

2.3.2 US 41 Expansion with the US 141/Velp Avenue Interchange Removed

This alternative involved expansion of US 41 mainline facilities from four lanes to six lanes within its existing alignment and included removing the US 141/Velp Avenue Interchange access to US 41, with no changes to the US 41/I-43 System Interchange ramps. See Figure 2-2.

Removal of the US 141/Velp Avenue interchange was evaluated because the existing close spacing between the US 41/Velp Avenue interchange and the US 41/I-43 interchange does not meet current design standards and is not desirable for a future Interstate facility. There are also safety concerns due to traffic weaving movements between the interchanges.

Figure 2-2: US 41/Velp Ave Interchange Removed



Source: US 41 EIS Traffic Operations Modeling Draft Report. Strand Associates®, January 2010.

According to the US 41 Traffic Operations Report prepared for WisDOT by Strand Associates in 2010, removal of the US 41 and US 141/Velp Avenue interchange would cause substantial traffic diversion to the US 41/WIS 29 interchange and the I-43/Atkinson Avenue interchange. Intersection operations would be adversely affected by the additional traffic in design year 2035. Freeway operations south of WIS 29 would also be adversely affected due to the heavy delays experienced at the northbound US 41 and WIS 29 ramp terminal intersection. Removal of the US 141/Velp Avenue interchange would also likely result in substantial local impacts such as:

- Loss of business along US 141/Velp Avenue
- Longer trips for roadway users
- Delayed response time for emergency vehicles
- Longer snow removal routes (US 141/Velp Avenue is the primary access point for Brown County)
- Loss of I-43 as an alternative route for traffic incident management

WisDOT and FHWA have determined that this alternative be eliminated from further consideration based on the traffic operations analysis, and substantial impacts to regional and local traffic mobility/travel patterns that would occur if this existing freeway access is removed.

2.3.3 Transportation System Management

Transportation System Management (TSM) is the application of low cost improvements that maximize the efficiency of the existing highway system while minimizing social and environmental impacts. The US 41 Project scope includes Intelligent Transportation System (ITS) elements should the need for ITS applications become identified. The design team has specifically considered the use of ramp metering, ramp gates, High Occupancy Vehicle (HOV) lanes or High Occupancy Toll (HOT) lanes, permanent ITS cameras and variable messages boards along the corridor. The use of permanent cameras and dynamic signs will assist the driving public with the status of roadway conditions and will be implemented to assist with roadway efficiencies.

Specific TSM measures under consideration include the following:

- A 14-16.75 foot inside shoulder that could be a future HOV or HOT lane.
- Interchange ramp slopes, acceleration distances and right-of-way will be designed and provided to accommodate future ramp metering that could be implemented in the future if needed without additional impacts to the surrounding properties.
- Ramp gates will be provided to allow emergency responders to quickly close ramps in the event of an incident on the freeway.
- Permanent ITS cameras and changeable message boards will be used at various locations along the corridor to monitor and provide information on traffic conditions and incidents.

Incorporating TSM measures into the project will help improve traffic operations and safety to some extent, but would not address system linkage and route importance, traffic demand, geometric deficiencies or safety concerns discussed in EIS Section 1. Therefore, the TSM alternative is not a viable stand-alone alternative for meeting project purpose and need.

2.3.4 Transportation Demand Management

Transportation Demand Management (TDM) strives to reduce the number of automobile trips through increased transit ridership and other strategies such as use of carpooling and park-ride lots. In the Green Bay metropolitan area, bus transit is used to the extent available and some employers are able to offer flexible hours to reduce peak hour traffic.

WisDOT maintains a statewide RIDESHARE program to encourage commuters to use carpooling and to encourage employers to provide commuting incentives. The program includes on line registration for matching carpool and bicycle commuters. Information on park-ride facilities is also provided and many of the state's park-ride facilities have overnight parking, bike racks, telephones and shelters. Employers are encouraged to provide carpool incentives, participate in employee commuter tax benefits and provide flexible work hours. There are several existing park-ride lots in the US 41 corridor and WisDOT is proposing additional lots at locations with the highest use potential, including the County M interchange.

TDM measures have limited potential to alleviate traffic congestion in the US 41 corridor, but would provide alternative travel options. TDM measures would not address system linkage and route importance, traffic demand, geometric deficiencies or safety concerns discussed in EIS Section 1. Therefore, the TDM alternative is not a viable stand-alone alternative for meeting project purpose and need.

2.3.5 Other Transportation Modes

Mass Transit

The City of Green Bay has bus service but not along the US 41 corridor. Greyhound and Jefferson bus lines provide inter-city bus service in the region.

Passenger Rail Service

There is no passenger rail service at this time within the Green Bay metropolitan area. The *Midwest Regional Rail Initiative Report* indicates that rail service for the Green Bay area may be available by 2017 at the very earliest as a part of the Chicago-Milwaukee-St. Paul/Green Bay route.

Pedestrian and Bicycle Connections

WisDOT's design guidelines for the US 41 corridor include providing accommodations for pedestrians and bicyclists at freeway underpass and overpass locations where practicable. WisDOT and the Village of Howard are discussing conceptual plans for providing bicycle and pedestrian accommodations at locations such as the Duck Creek crossings. Discussions are also being held with the Green Bay Metropolitan Sewerage District (GBMSD) concerning use of a GBMSD maintenance road for bicycle and pedestrian traffic.

The US 41 project provides opportunities for enhancing multi-modal transportation and WisDOT is committed to including project design features that enhance transit, pedestrian and bicycle travel where possible and practicable. While a substantial increase in bus, rail, pedestrian and bicycle travel would potentially reduce the number of auto trips in the US 41 corridor, this reduction would not address the need for additional capacity on US 41, existing highway deficiencies, or safety concerns. Therefore other transportation modes are not a viable stand-alone solution for addressing project purpose and need.

2.4 Selection of Preferred Alternative

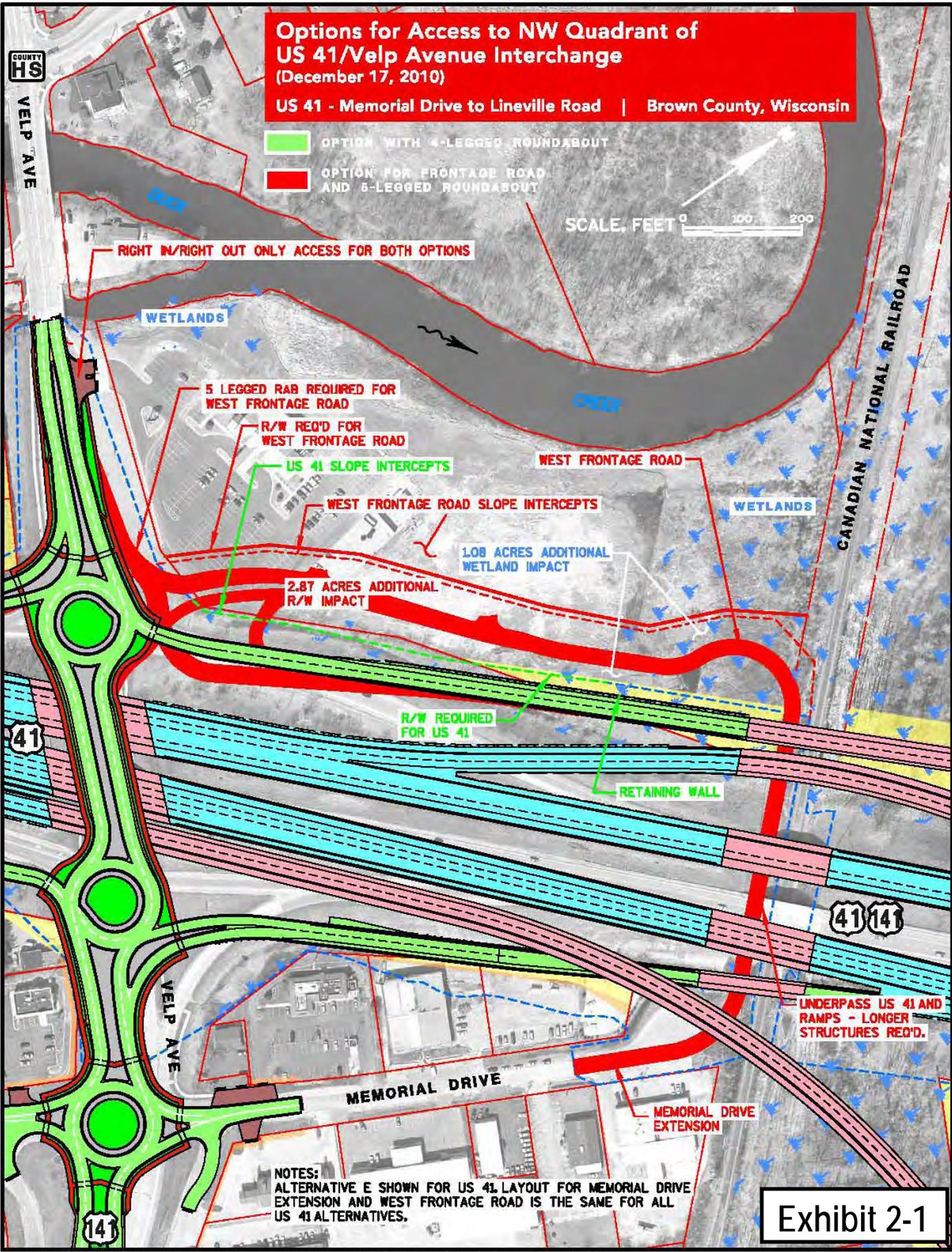
Build Alternatives D and E described in the EIS remain under consideration. WisDOT and FHWA will identify a preferred alternative after reviewing input received at the public hearing and during the public comment period for the EIS. The selected alternative will be based on engineering and environmental factors, input from the public, local officials, and state and federal review agencies. Selection of the preferred alternative will also be done in accordance with the Clean Water Act Section 404(b)(1) *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (40 CFR Part 230), administered by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. The guidelines state that dredged or fill material should not be discharged into aquatic ecosystems, including wetlands, unless no other practicable alternatives are demonstrate, that such discharge will not have unacceptable adverse impacts, and that all practicable measures to minimize adverse effects are undertaken.

**Options for Access to NW Quadrant of
US 41/Velp Avenue Interchange**
(December 17, 2010)

US 41 - Memorial Drive to Lineville Road | Brown County, Wisconsin

- OPTION WITH 4-LEGGED ROUNDABOUT
- OPTION FOR FRONTAGE ROAD AND 6-LEGGED ROUNDABOUT

SCALE, FEET 0 100 200



NOTES:
ALTERNATIVE E SHOWN FOR US 41. LAYOUT FOR MEMORIAL DRIVE
EXTENSION AND WEST FRONTAGE ROAD IS THE SAME FOR ALL
US 41 ALTERNATIVES.

Exhibit 2-1

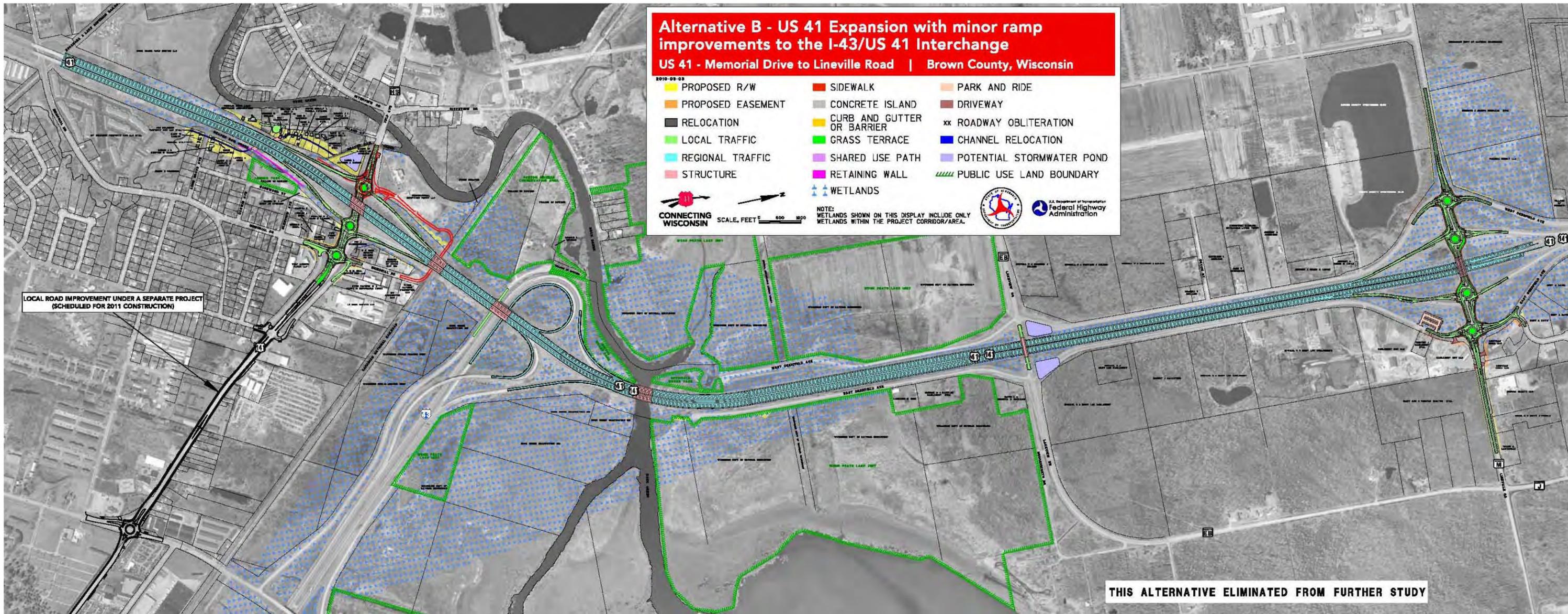


Exhibit 2-3

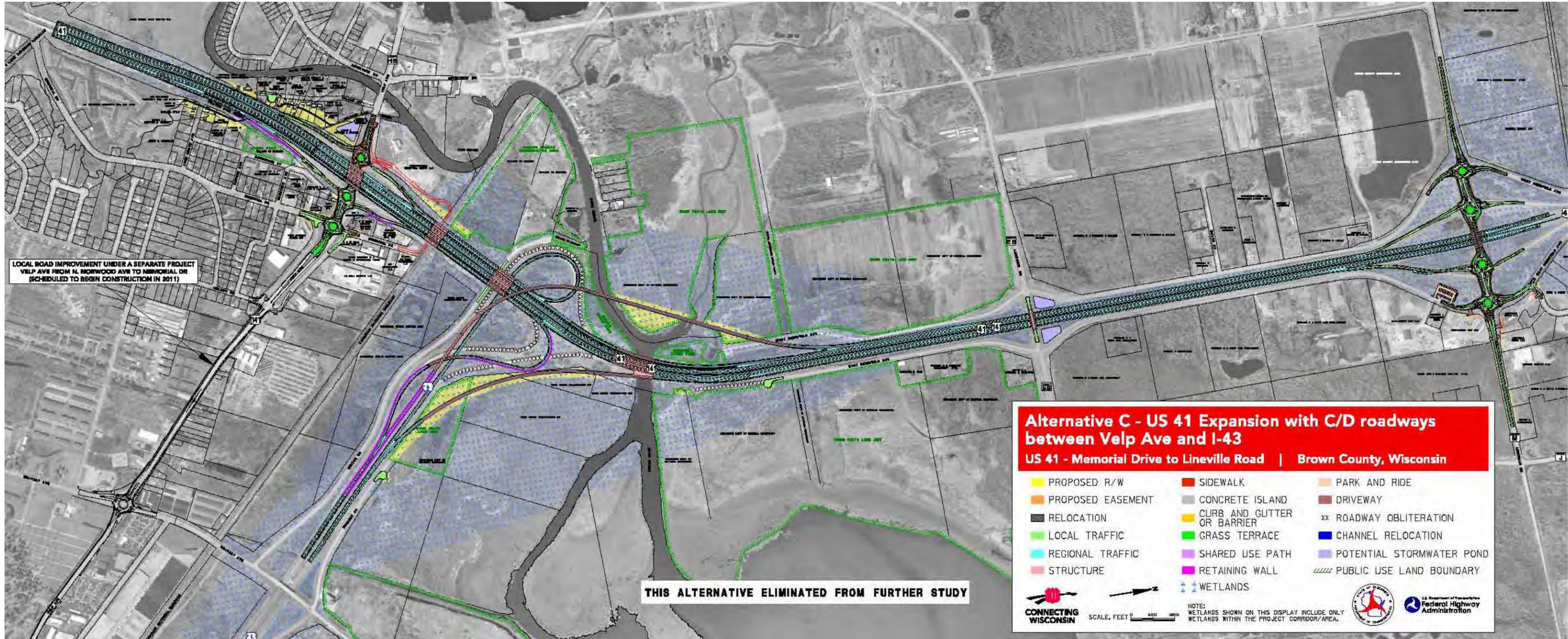
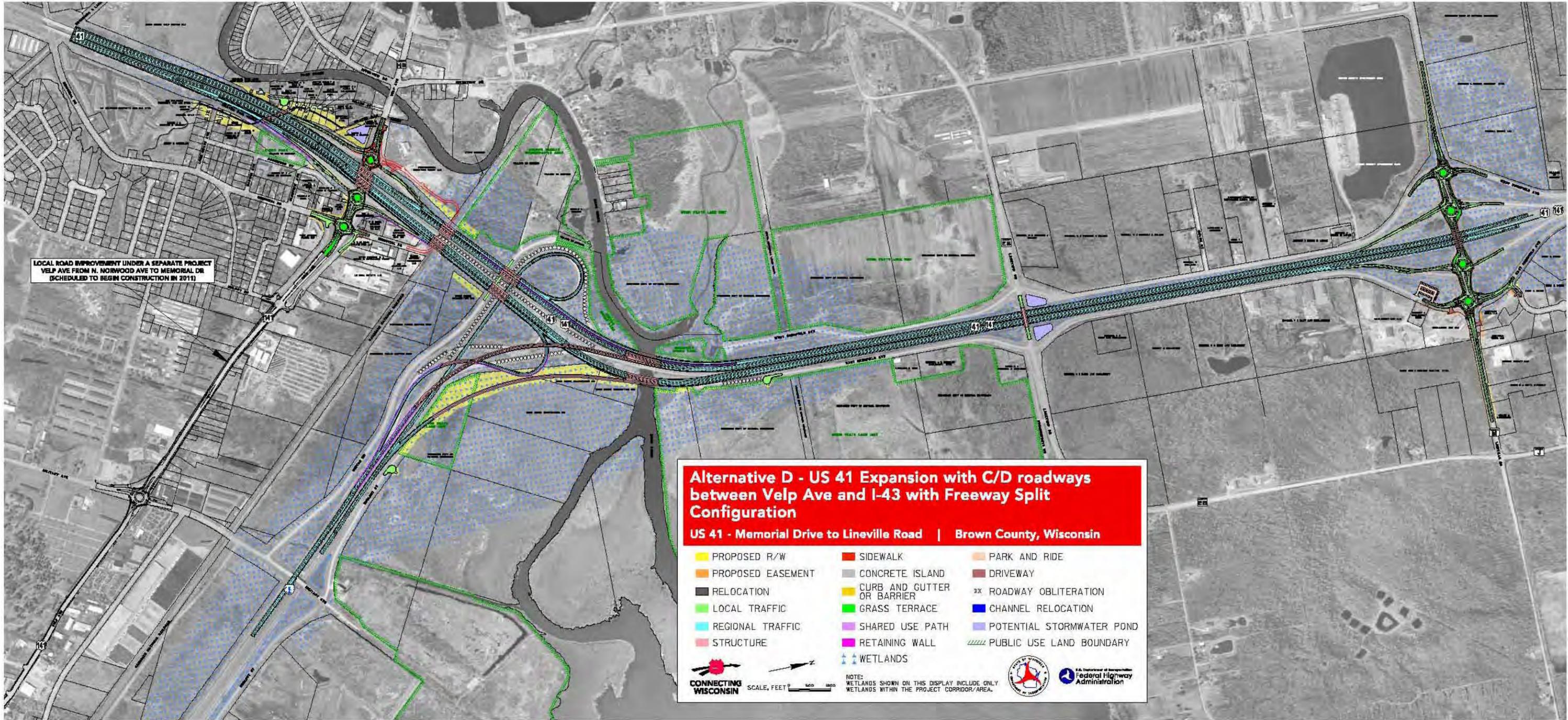


Exhibit 2-4



LOCAL ROAD IMPROVEMENT UNDER A SEPARATE PROJECT
 VELP AVE FROM N. NOBWOOD AVE TO MEMORIAL DR
 (SCHEDULED TO BEGIN CONSTRUCTION IN 2011)

Exhibit 2-5

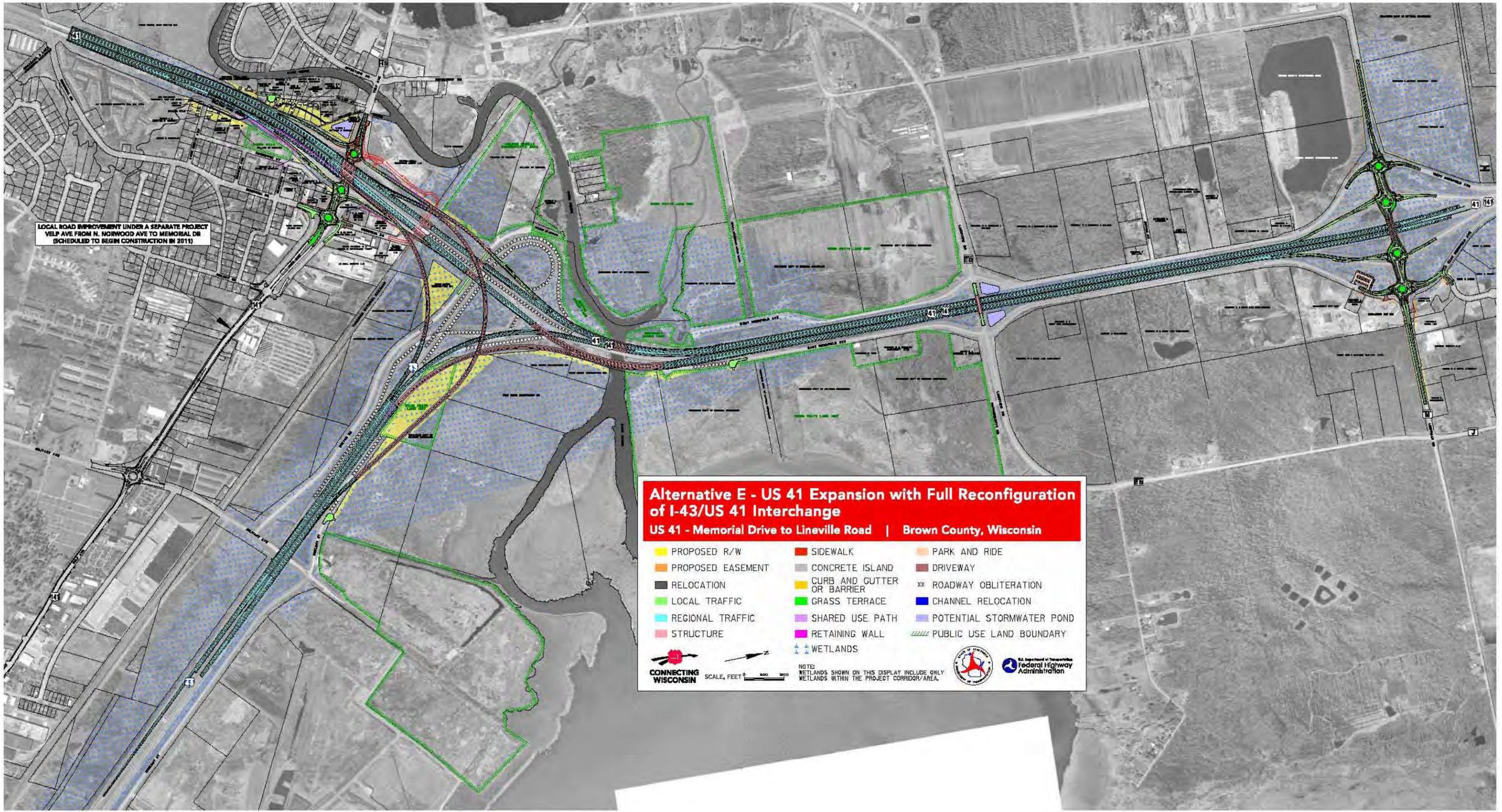


Exhibit 2-6

SECTION 3
Existing Conditions, Environmental Impacts and Measures to Mitigate
Adverse Impacts

SECTION 3

Existing Conditions, Environmental Impacts and Measures to Mitigate Adverse Impacts

Section 3 describes existing conditions in the US 41 Memorial Drive to County M project corridor, the beneficial and adverse socioeconomic and environmental effects of the No Build Alternative and Build Alternatives D and E, and measures to minimize and mitigate adverse effects. To minimize duplication in the EIS, discussion of applicable environmental factors is referenced to other EIS sections and/or EIS appendices.

3.1 Transportation and Land Use Planning

Transportation, land use and related documents relevant to the US 41 Memorial Drive to County M project area are summarized in Table 3-1.

**Table 3-1
Summary of Transportation, Land Use and Related Documents**

Entity	Plan Name	Year Adopted	Comments
Federal Transportation Legislation	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).	2005	US 41 is designated as a National Highway System (NHS) route. US 41 is also proposed for conversion to an Interstate Highway between Milwaukee and Green Bay.
FHWA	Transportation Management Plans (TMPs) for Work Zones	2004	A TMP lays out coordinated transportation management strategies and describes how they will be used to manage the work zone impacts of a project. The scope of the TMP depends on expected work zone impacts and whether the project is significant. A significant project is one that alone or in combination with other concurrent nearby projects is anticipated to cause sustained work zone impacts that are greater than what is considered tolerable based on the agency's policy and engineering judgment and that would have a relatively high level of disruption. For projects not classified as significant, the TMP may consist of a Temporary Traffic Control plan (TTC). The level of traffic control and documentation needed for the US 41 project will be determined in the final design phase when more detailed information is available relative to construction staging.
WisDOT	Connections 2030, WisDOT Long-range Transportation Plan	2009	Establishes system-level priority corridors critical to statewide travel patterns and the state's economy. The plan also includes Corridors 2030 backbone highways. The US 41 corridor in Brown County is included in the Green Bay Metropolitan Planning Area priority corridor. Projects include US 41 capacity expansion and interchange improvements, and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay. US 41 is a designated multi-lane backbone highway.

Entity	Plan Name	Year Adopted	Comments
DNR	Wisconsin Land Legacy Report	2006	The purpose of the report is to identify places considered important in meeting the State's conservation and recreation needs. The report identifies 229 Legacy Places, including the Suamico, Little Suamico, and Pensaukee Rivers, which lie to the north of the US 41 corridor study area in Oconto County.
Brown County	Green Bay Metropolitan Planning Organization Long-range Transportation Plan	2005	Includes proposed US 41 expansion from County F near DePere to County M in the Village of Howard.
Brown County	2010-2014 Transportation Improvement Program for Green Bay Urbanized Area	2009	Includes proposed US 41 expansion from County F to County M, and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay.
Brown County	Brown County Comprehensive Plan	2007	Acknowledges future US 41 expansion and interchange improvements from County F to I-43.
Brown County	Park and Outdoor Recreation Plan, 2008-2013	2008	Identifies countywide recreation needs and cultural, historical, and natural resources that should be considered for possible protection, preservation or restoration. The Plan proposes a trail area in the City of Green Bay near Military Avenue.
City of Green Bay	Green Bay Smart Growth 2022	2003	Acknowledges future US 41 expansion and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay.
Village of Suamico	Village of Suamico Comprehensive Plan	2005	Acknowledges US 41 expansion, and potential land use changes that may occur in Suamico as a result of expansion.
Village of Howard	Village of Howard Comprehensive Plan	2002	Includes proposed US 41 expansion and interchange improvements within Village of Howard limits.
Bay-Lake Regional Planning Commission	Bay-Lake Regional Planning Commission Regional Comprehensive Plan	2005	Acknowledges future US 41 expansion and conversion of US 41 to an Interstate Highway from Milwaukee to Green Bay.

Existing Land Use

Existing land use in the US 41 Memorial Drive to County M corridor is illustrated in Exhibit 3-1 (Page 3-52). The project area contains a diverse range of land uses, from sensitive natural areas/environmental corridors on the north end and surrounding the Bay of Green Bay, to highly urbanized areas south of US 141/Velp Avenue.

Natural Areas/Woodlands/Undeveloped Open Space predominates along US 41, north of the I-43/US 41 interchange.

There are concentrations of residential land uses south of US 141/Velp Avenue in the southeastern part of the Village of Howard, and in the Memorial Drive area in the southern part of the village. There are several pockets of rural residential development and scattered homes adjacent to US 41 in the northeast part of the Village of Howard.

The main area of commercial land use within the US 41 project area is at the US 141/Velp Avenue interchange. This area is part of a series of strip developments along US 141/Velp Avenue, Military Avenue, and a portion of Glendale Avenue. These developments are a mixture of highway-oriented uses and neighborhood businesses that include small suburban strip malls, gas stations/convenience stores, taverns and restaurants, small office complexes, and various retail stores.

Future Land Use

Future land use is illustrated in Exhibit 3-2 (Page 3-53). Future land use maps indicate that residential and industrial development is planned along US 41 north of the I-43/US 41 interchange. Land use south of the interchange is anticipated to remain similar to its present use.

3.2 Indirect and Cumulative Effects

The indirect and cumulative effects (ICE) analysis for proposed improvements in the US 41 Memorial Drive to County M project section was conducted by Vandewalle & Associates in accordance with WisDOT's 2007 *Guidance for Conducting a Cumulative Effects Analysis* and *Guidance for Conducting an Indirect Effects Analysis*. Key findings are summarized below. The ICE analysis report is available upon request at the WisDOT Northeast Region office.

The ICE analysis utilized a local expert panel approach to obtain input on existing planning and development patterns and how development patterns could change as a result of the US 41 project alternatives. The panel included the Green Bay Metropolitan and Brown County planner, representatives from the Village of Howard, and the manager of the regional port authority. Information packets were sent to participants in preparation for a workshop held on October 5, 2010. The packets included information on indirect and cumulative effects, study area inventory (natural resources, existing and future land use maps), alternatives summary and maps, and a questionnaire to facilitate discussion at the workshop.

The ICE analysis included the following alternatives (see EIS Section 2 for more information):

- Alternative A—No Build
- Alternative C—US 41 expansion with minor ramp improvements to I-43/US 41 interchange
- Alternative D—US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43
- Alternative E—US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43 and freeway split configuration

Alternative C was subsequently eliminated from further consideration by WisDOT (see Section 2). Alternatives D and E include the five-legged roundabout option with local access frontage road at the US 141/Velp Avenue interchange.

Expert panel participants were asked to respond to the following questions for each alternative in preparation for additional discussion at the workshop:

- What changes do you anticipate in the study area under the [alternative] with regard to residential, commercial, industrial and institutional development (less, more or about the same development)?
- What do you feel will be the impact of the [alternative] on farmland, wetlands, woodlands, historic sites, community character, other resources (ranging from no impact to high impact)?
- In general will greenfield development in the study area increase or decrease as a result of the [alternative]? greenfield development is that which occurs on previously undeveloped land.
- In general, will infill and redevelopment in the study area increase or decrease as a result of [alternative]?

The ICE analysis area is shown on Figure 3-1. It encompasses a reasonable area of influence along US 41 and I-43 commensurate with the scope of the proposed US 41 improvements.

The results of the ICE analysis are summarized in Sections 3.2.1 and 3.2.2.

Figure 3-1: Indirect and Cumulative Effects Analysis Area



3.2.1 Indirect Effects

Indirect effects are defined as project impacts caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects or other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems (Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, 40 CFR Part 1508).

Potential indirect effects of Alternative A (No build) and Build Alternatives D and E that have been retained for detailed study in the EIS are summarized in Table 3-2. These are the indirect effects that were identified by the local expert panel.

**Table 3-2
Summary of Indirect Effects**

Indirect Effects Considered in ICE Analysis	Alternatives		
	Alternative A No Build	Alternative D US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43	Alternative E US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43 and freeway split configuration
Traffic patterns	Increased traffic on US 41 could cause local traffic to divert to local roadways having a positive impact on US 41 and a negative impact on local roadways.	US 41 improvements could result in actual or perceived travel time reductions. This could encourage residents and businesses to locate farther away. As a result, neighboring communities to the north could experience an increase in population/employment growth. On the other hand, the US 41 improvements could also encourage infill and redevelopment within the US 41 project area.	Same as Alternative D with this additional input: Elimination of present access between US 141/Velp Avenue and I-43 would decrease traffic volumes on US 41 and I-43 while increasing traffic on Velp Avenue, and at the US 41/Velp Avenue and I-43/Atkinson Drive interchanges.
Wetlands	Small, isolated wetlands are not regulated by municipal wetland regulations. Increased congestion on US 41 would reduce likelihood of infill/redevelopment adjacent to US 41. Therefore, development of wetlands in outlying greenfield areas could occur. Lack of the 5-legged roundabout at the US 141/Velp Avenue interchange could delay timing of development in the Black Forest Restaurant area which is adjacent to regulated wetlands.	Wetland fill due to the expanded US 41 footprint could result in continued spread of invasive species (phragmites, reed canary grass, purple loosestrife). Incremental development of unprotected wetlands will likely occur at a slightly accelerated rate. The 5-legged roundabout at the US 141/Velp Avenue interchange would encourage development of vacant land north of the Black Forest Restaurant. Additional development would pose potential impacts to Duck Creek and adjacent wetlands.	Same as Alternative D.
Farmland/woodland	Without US 41 improvements, development would occur in less congested areas leading to conversion of farmland and woodlands to urban development.	US 41 improvements could facilitate regional growth within and beyond the study area thereby leading to conversion of farmland and woodland to urban development. The improvements could also facilitate infill and redevelopment adjacent to US 41.	Same as Alternative D.
Water quality (Duck Creek, Beaver Dam Creek, Bay of Green Bay)	Increasing traffic volumes and stormwater runoff could further impact these water resources which have already been negatively affected by past land use practices.	Increasing traffic volumes and stormwater runoff from the expanded highway could further impact these water resources which have already been negatively affected by past land use practices.	Same as Alternative D.
Threatened or endangered species	Spot improvements would have minimal effect on potential threatened or endangered species habitat.	US 41 improvements could expand existing barriers between wildlife habitat areas.	Same as Alternative D.
Business impacts	With increased congestion on US 41, local businesses may choose to relocate to less congested areas. New businesses could also be dissuaded from locating along the US 41 corridor.	US 41 improvements could encourage denser commercial and industrial development along the corridor, including new businesses. The 5-legged roundabout and local frontage road at the US 141/Velp Avenue interchange could spur infill development and redevelopment particularly along Velp Avenue, including vacant land north of the Black Forest Restaurant. The US 41 improvements could also accelerate new development in planned growth areas.	Same as Alternative D with this additional input: Elimination of present access between US 141/Velp Avenue and I-43 could result in slower infill and redevelopment along Velp Avenue west of US 41 than would occur under Alternative D. Alternatively, increased traffic on Velp Avenue east of US 41 could result in more rapid infill and redevelopment along Velp Avenue east of US 41 than would occur under Alternative D.

Indirect Effects Considered in ICE Analysis	Alternatives		
	Alternative A No Build	Alternative D US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43	Alternative E US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43 and freeway split configuration
Neighborhood impacts	Potential diversion of local traffic from US 41 to local streets could cause noise and air quality impacts to residential areas.	Thirteen homes will be directly impacted (acquired). There could be marginal additional noise impacts in nearby residential areas. There would be minimal indirect impacts on long-term integrity of home values.	Same as Alternative D.
Community character	Roundabouts would have a positive effect on community character. Because these are not part of Alternative A, this is viewed as a missed opportunity to improve community character.	Potential economic growth coupled with local land use and zoning could ultimately result in improved community character. Roundabouts would have a positive effect on community character.	Same as Alternative D.
Historic sites	No impacts identified.	No impacts identified.	No impacts identified.
Notes: 1. Summary of Indirect Effects listed in this table were identified by the local expert panel.			

As noted in Table 3-3, the expert local panel identified three main resources that would likely be affected in the future by incremental planned development (small wetlands not protected by municipal wetland regulations, farmland, and woodland). These resources have also been affected by past incremental actions over time. According to the Brown County Comprehensive Plan, wetlands occupied about 10% of the county in the mid 1800's based on land survey information at that time. This estimate is noted as probably being conservative because the survey likely did not include most small wetland areas. Based on the county's 2000 land use inventory, wetlands currently occupy about 45 square miles or 8% of the county. The comprehensive plan indicates that agricultural land decreased by about 22% between 1970 and 2000, and is expected to decline by another 20% by year 2030. Based on an inventory by the U.S. Forest Service, woodlands occupied about 14% of Brown County in 1996. According to the county's 2000 land use inventory, woodlands now occupy about 11% of the county.

In summary, the expert local panel did not identify any substantive cumulative effects for Alternatives D or E compared to Alternative A (no build). The proposed US 41 improvements, within the context of other past and reasonably foreseeable actions, are likely to contribute slightly to the pace of population growth and development in the study area. Because land along US 41 is already largely built out, plans for the study area generally call for infill and redevelopment of land surrounding the US 41 corridor. As a result, the contribution of the proposed US 41 improvements to future cumulative resource loss would likely be minimal.

3.2.2 Cumulative Effects

Cumulative effects are defined as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR, Part 1508).

The cumulative effects analysis addressed resources identified to have either direct or indirect effects as a result of the proposed US 41 improvements. The study area for cumulative effects was the same as the indirect effects study area (Figure 3-1). The timeframe for the cumulative effects analysis is 25 years, which generally corresponds to the 2035 design year for the US 41 project. Local and regional comprehensive plans also have a 20-40 year planning timeframe.

Other past, present, and reasonably foreseeable actions or activities that could also contribute to cumulative effects in the analysis area were identified by the expert panel and US 41 project team:

WisDOT Actions

In addition to the US 41 Memorial Drive to County M project, other highway improvements within or adjacent to the ICE analysis area are also being proposed or studied:

- Expansion of US 41 and reconstruction of the interchanges from County F/Scheuring Road in DePere to Memorial Drive in the Village of Howard.
- Future expansion of US 41 between County M/Lineville Road and County B.
- Future conversion of US 41 to an Interstate highway.
- Right-of-way preservation for future conversion of WIS 29 to a freeway facility from the Shawano County line to US 41.
- WIS 172 improvements (roundabouts near Austin Straubel International Airport and pavement rehabilitation from US 41 to I-43).

Wisconsin Department of Natural Resources actions

Through its Land Legacy Report, DNR has identified important places to be preserved for conservation and recreation for the next 50 years including preservation of waterways to protect fish populations in the bay of Green Bay.

Department of Agriculture, Trade, and Consumer Protection actions

Through the state's Working Lands Initiative, DATCP has prepared a schedule by which counties are required to update their farmland preservation plans. Brown County is scheduled to update its plan in 2019.

Study area community actions

The Village of Howard and Village of Suamico comprehensive plans indicate that environmentally sensitive areas such as wetlands and floodplains should not be developed. Both plans encourage the continuation of farming operations over the next 20 years, but also allow future development on agricultural land as outward growth continues.

The City of Green Bay will continue protecting wetlands and floodplains through existing and updated zoning ordinances and by following guidelines in the city's surface water management plan. The city's comprehensive plan states that agricultural land is considered an interim use that will gradually be converted to other uses.

Potential cumulative effects of Alternative A (No Build) and Build Alternatives D and E that have been retained for detailed study in the EIS are summarized in Table 3-3. These are the cumulative effects that were identified by the local expert panel.

**Table 3-3
Summary of Cumulative Effects**

Cumulative Effects Considered in ICE Analysis	Alternatives		
	Alternative A No Build	Alternative D US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43	Alternative E US 41 expansion with C/D roadways between US 141/Velp Avenue and I-43 and freeway split configuration
Wetlands	Small, isolated wetlands are not regulated by municipal wetland regulations. Incremental development of unprotected wetlands will likely occur over time in areas planned for development beyond the US 41 project area, particularly to the north (Village of Suamico and southern Oconto County)	Same as Alternative A with this additional input: Alternative D will directly affect approximately 55 acres of wetland that will be fully compensated through state and federal requirements and there will be no net loss of wetland. However, the increase in the amount of disturbed land due to the expanded roadway footprint could result in the spread of invasive species beyond the study area, particularly along US 41 in the Village of Suamico and southern Oconto County. Note: 57 acres of wetland impact for Alternative E assumed in ICE analysis; impacts have since been updated to 55 acres.	Same as Alternative D. Note: 57 acres of wetland impact for Alternative E assumed in ICE analysis; impacts have since been updated to 94 acres.
Farmland/woodland	Development of farmland and woodland will occur with or without US 41 improvements because such areas are generally designated for development in local comprehensive plans. Without US 41 improvements, development would likely occur in less congested areas leading to modest acceleration of planned development of farmland and woodland in the Village of Suamico, southern Oconto County, and Village of Hobart.	Same as Alternative A with this additional input: The US 41 improvements could accelerate new development beyond the study area and may also increase infill and redevelopment along US 41. Incremental loss of farmland and woodland will likely occur at a more rapid rate than under Alternative A.	Same as Alternative D.
Threatened or endangered species	Over time, impacts to threatened or endangered species habitat could occur as land is developed in accordance with community comprehensive plans.	Same as Alternative A with this additional input: The US 41 improvements have the potential for impacting threatened or endangered species habitat beyond the study area, particularly in the Village of Suamico and southern Oconto County.	Same as Alternative D.
Business impacts	With increased congestion on US 41, commercial and industrial development may occur in less congested areas such as the Village of Suamico, southern Oconto County, and Village of Hobart.	The US 41 improvements may accelerate new development in planned growth areas beyond the study area, particularly in the Village of Suamico, southern Oconto County, and the Village of Hobart.	Same as Alternative D.
Notes: 1. Summary of Cumulative Effects listed in this table were identified by the local expert panel.			

In summary, the expert local panel did not identify any substantive cumulative effects for Alternatives D or E compared to Alternative A (no build). The proposed US 41 improvements, within the context of other past and reasonably foreseeable actions, are likely to contribute slightly to the pace of population growth and development in the study area. Because land along US 41 is already largely built out, plans for the study area generally call for infill and redevelopment of land surrounding the US 41 corridor. As a result, the impacts of the proposed US 41 improvements will likely be minimal.

3.2.3 Measures to Minimize Potential Adverse Effects

The indirect effects analysis did not indicate the need to revise the proposed improvements or to otherwise mitigate the potential indirect effects. The proposed improvements are not anticipated to conflict or interfere with local planning goals and objectives. Further, as development occurs, local governments have the statutory authority to manage any potential adverse impacts through land use planning and zoning.

Existing and future local land use regulations and other tools as identified by the local expert panel will play a role in helping to avoid, minimize or mitigate the potential for adverse cumulative effects. Commonly used land use and planning tools are listed below. In addition, WisDOT will take measures to ensure that adverse effects to natural resources are minimized and mitigated to the extent practicable through highway design and construction practices.

Comprehensive planning

Wisconsin law requires adoption of comprehensive plans to guide local land use decisions. At the time of the ICE analysis, all study area municipalities had adopted comprehensive plans in place.

Zoning ordinances

Zoning ordinances and maps are used to determine appropriate locations for specific land uses. All study area municipalities have zoning ordinances in place for protection of natural resources including wetlands, shorelands, and floodplains.

Subdivision/land division ordinances

These ordinances determine the manner in which land may be divided and provide design standards for the type and density of public works projects. All municipalities in the study area exercise subdivision and land division authority.

Extraterritorial jurisdiction

Villages and cities have the authority to regulate land divisions within their extraterritorial boundaries in unincorporated areas. Such extraterritorial powers can guide the location of development and help ensure that such development is compact and can be served by public water and sewer.

Official mapping

Adopted maps may be used by municipalities to show the location of planned public facilities including roadways. The maps serve as a tool for preserving land that is planned for future development. All municipalities in the study area have existing and future land use maps in their adopted comprehensive plans.

Tax Incremental Financing (TIF)

Municipalities may adopt TIF districts to direct development and redevelopment to specific locations, which decreases development pressure in natural or planned preservation areas. All of the municipalities in the US 41 study area have adopted TIF districts.

In addition to the local regulations/tools summarized above, federal regulations such as the Clean Water Act, Endangered Species Act, National Historic Preservation Act, and state regulations concerning wetland and water quality protection, and preservation of threatened or endangered species habitat are in place. These regulations also provide opportunities for minimizing potential impacts to environmental resources.

3.3 Socioeconomic Factors

The US 41 Memorial Drive to County M project area lies entirely in Brown County. Municipalities in the project area include the Village of Howard, Village of Suamico and the City of Green Bay.

Table 3-4 displays population growth from 1970 to 2009 for project area municipalities and Brown County. The Town of Suamico experienced substantial population increases with a growth rate of nearly 28 percent. The Village of Howard experienced stable population growth during this same period, with a

growth rate of nearly 19 percent. Alternatively, the City of Green Bay experienced small population increases during this period.

**Table 3-4
Population Trends (2000)**

	1970	1980	1990	2000	2009 Estimate	%Change 2000-2009
City of Green Bay	87,809	87,899	96,466	102,767	103,500	0.7%
Village of Howard	4,911	8,240	9,874	13,546	16,110	18.9%
Town of Suamico*	2,830	4,003	5,214	8,686	11,080	27.6%
Brown County	158,244	175,280	194,594	226,778	245,426	8.2%
*Note: The Town of Suamico was incorporated as a village in 2003 Sources: U.S. Census 2000 was used, because it is the most recent, available census data						

Table 3-5 shows population projections for the project area and Brown County. Brown County as a whole is expected to increase its population by nearly 21%.

**Table 3-5
Population Forecasts (2009)**

	2010	2015	2020	2025	2030	%Change 2010-2030
City of Green Bay	107,147	110,654	114,088	117,033	119,370	11.4%
Village of Howard	16,022	16,565	17,098	17,557	17,927	11.9%
Village of Suamico	11,064	11,556	12,042	12,479	12,851	16.2%
Brown County	254,040	268,255	282,409	295,423	306,931	20.8%
Sources: Wisconsin Department of Administration, 2009						

Table 3-6 lists the total number of housing units, occupied housing units, and median home value in the project area municipalities and Brown County. Nearly half of Brown County's housing stock is within the City of Green Bay. Housing in Green Bay is also substantially more affordable than other project area communities.

**Table 3-6
Housing Characteristics (2000)**

	Total Housing Units	Occupied Housing Units	Median Value of Single Family Homes
City of Green Bay	43,123	41,591	\$96,400
Village of Howard	5,350	5,236	\$127,100
Town of Suamico*	3,078	2,966	\$157,800
Brown County	90,199	87,295	\$116,100
*Note: The Town of Suamico was incorporated as a village in 2003 Sources: U.S. Census 2000 was used, because it is the most recent, available census data			

Table 3-7 shows income and employment trends in the project area communities and Brown County. Median household income for project area communities ranges from about \$38,000 to \$65,000, with the City of Green Bay at the low end and the Village of Suamico at the high end. The median household income for Brown County is about \$46,000.

The percentage of families below the poverty level in project area communities is lower than the County average of 4.6 %, with the exception of the City of Green Bay, which is at 7.4 %. The percentage of the adult population in the labor force for each community is also depicted in Table 3-7. In Brown County, 72% of the adult population is in the labor force. The City of Green Bay is slightly below the County average. The Village of Howard and the Village of Suamico are above the county average.

**Table 3-7
Income and Employment Trends (2000)**

	Median Household Income	Percent of Families below Poverty Level	Percent of Population in Labor Force
City of Green Bay	\$38,820	7.4%	70.3%
Village of Howard	\$51,974	3.2%	78.4%
Town of Suamico*	\$65,189	1.0%	79.8%
Brown County	\$46,447	4.6%	72.0%
*Note: The Town of Suamico was incorporated as a village in 2003 Sources: U.S. Census 2000 was used, because it is the most recent, available census data			

Table 3-8 shows the racial composition in the project area communities and Brown County. Totals greater than 100 are due to persons reporting more than one race.

**Table 3-8
Racial Composition (2000)**

	White	Black or African American	American Indian and Alaska Native	Asian	Hispanic Origin/other
City of Green Bay	86%	1%	3%	4%	7%
Village of Howard	96%	1%	1%	1%	1%
Town of Suamico*	98%	0.5%	0.5%	0.5%	0.5%
Brown County	91%	1%	2%	2%	4%
*Note: The Town of Suamico was incorporated as a village in 2003 Sources: U.S. Census 2000 was used, because it is the most recent, available census data					

Tables 3-9 and 3-10 provide data on commuting patterns for project area communities. Place of work data provides an indication of how the US 41 corridor is used for worker commuting. According to 2000 Census data, there were a total of 216,120 workers in the project area. Of those, over 45,900 workers (21%) commute to the City of Green Bay. Approximately 19,000 commute to the Village of Ashwaubenon (9%), 8,800 commute to the City of De Pere (4%), and 5,000 commute to the Village of Howard (2%).

**Table 3-9
Commuting Patterns—Worker Destinations (2000)**

Place of Residence	Total workers:	Percentage of Total	Place of Residence	Total workers:	Percentage of Total
C. De Pere	11,218		C. Green Bay	51,993	
C. Green Bay	3,487	31%	C. Green Bay	28,521	55%
C. De Pere	3,331	30%	V. Ashwaubenon	9,188	18%
V. Ashwaubenon	1,958	17%	C. De Pere	2,969	6%
V. Howard	377	3%	V. Howard	2,240	4%
V. Allouez	369	3%	T. Bellevue	1,640	3%
T. Bellevue	233	2%	V. Allouez	1,446	3%
V. Allouez	7,014		V. Ashwaubenon	9,568	
C. Green Bay	3,096	44%	V. Ashwaubenon	3,633	38%
V. Ashwaubenon	1,196	17%	C. Green Bay	3,425	36%
V. Allouez	909	13%	C. De Pere	750	8%
C. De Pere	600	9%	V. Howard	313	3%

T. Bellevue	239	3%	V. Allouez	234	2%
V. Howard	203	3%	T. Bellevue	197	2%
V. Hobart	2,604		V. Howard	7,686	
C. Green Bay	996	38%	C. Green Bay	3,519	46%
V. Ashwaubenon	526	20%	V. Ashwaubenon	1,240	16%
V. Hobart	308	12%	V. Howard	1,145	15%
C. De Pere	191	7%	C. De Pere	521	7%
V. Howard	143	5%	V. Allouez	210	3%
V. Pulaski	74	3%	T. Bellevue	127	2%
T. Lawrence	865		T. Pittsfield	1,318	
C. Green Bay	214	25%	C. Green Bay	506	38%
V. Ashwaubenon	186	22%	V. Ashwaubenon	158	12%
C. De Pere	128	15%	T. Pittsfield	136	10%
T. Lawrence	102	12%	V. Howard	115	9%
C. Appleton	36	4%	V. Pulaski	93	7%
V. Howard	33	4%	C. De Pere	80	6%
T. Suamico	4,982		Brown County	118,872	
C. Green Bay	2,138	43%	Brown County	108,890	92%
V. Ashwaubenon	860	17%	Outagamie County	4,074	3%
T. Suamico	488	10%	Kewaunee County	876	1%
V. Howard	482	10%	Winnebago County	859	1%
C. De Pere	283	6%	Manitowoc County	818	1%
V. Allouez	68	1%	Oconto County	644	1%
Sources: U.S. Census 2000 was used, because it is the most recent, available census data					

**Table 3-10
Mean Travel Time to Work (2000)**

Place of Residence	Mean Travel Time to Work
City of Green Bay	17 minutes
Village of Howard	18 minutes
Town of Suamico*	22 minutes
Brown County	18 minutes
*Note: The Town of Suamico was incorporated as a village in 2003	
Sources: U.S. Census 2000 was used, because it is the most recent, available census data	

3.4 Environmental Justice

Presidential Executive Order on Environmental Justice 12898 requires federal agencies to address the impacts of their programs with respect to environmental justice. The Executive Order states that to the extent practicable and permitted by law, neither minority nor low-income populations may receive disproportionately high or adverse impacts as a result of a proposed project. The order also requires that representatives of any low-income or minority population that could be affected by the project be given the opportunity to be included in the impact assessment and public involvement process.

Localized census Block Group data supplemented by the project's public involvement activities were used to determine the presence of minority or low-income populations in the project's area of potential effect.

Census Block Groups

Figure 3-2 displays the census block groups that contain or border the US 41 Memorial Drive to County M project corridor. The U.S. Census Bureau data for 2000 indicates the following population characteristics for these census block groups. Totals greater than 100 are due to persons reporting more than one race.

Total population—9,852
White alone—9,104 (92.4% of total population)
Black or African American alone—112 (1.1% of total population)
American Indian and Alaska Native alone —84 (1.7% of total population)
Asian alone —239 (2.4% of total population)
Some other race alone—72 (<1% of total population)
Two or more races—151 (1.5% of total population)
Hispanic or Latino—201 (2% of total population)

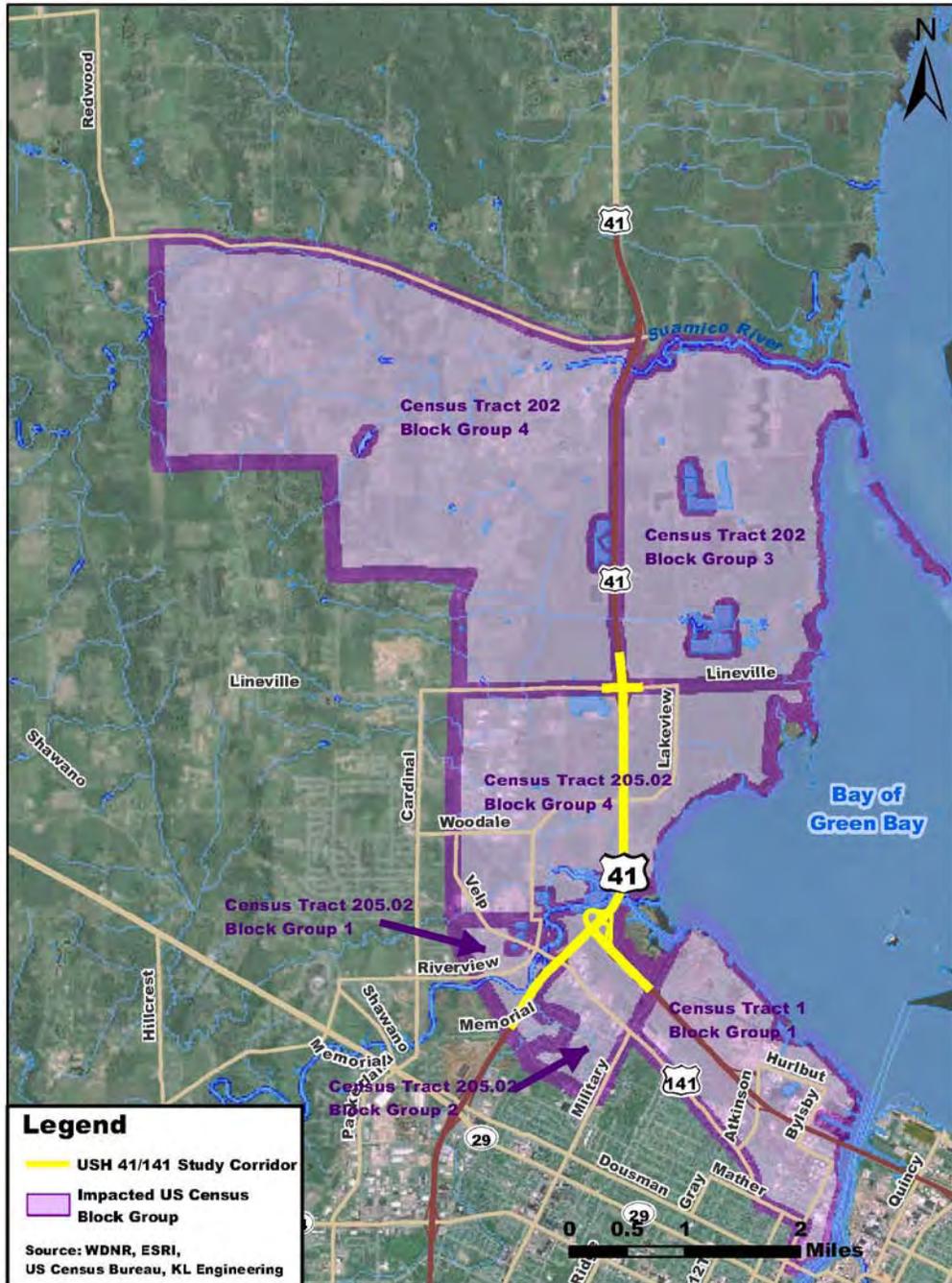
According to the U.S. Census Bureau data for 2000, none of the US Census Block Groups adjacent to the project area have a median household income lower than \$32,165 (1999 dollars). Median household income for the census block groups is substantially above the national poverty line guideline of \$18,310 for households with 3 persons (Department of Health and Human Services, Federal Register, August 2010).

According to U.S. Census Bureau data for 2000, there is no indication that the proposed improvements would disproportionately affect any individuals, groups, or populations subject to Environmental Justice requirements.

During the project's public involvement activities, the project team also had an opportunity to visit with affected residential and business property owners and other area residents. These opportunities gave no indication that the proposed improvements would affect any populations subject to Environmental Justice requirements.

There are no Environmental Justice concerns with the No Build or Build Alternatives.

Figure 3-2: US 41 Project Corridor Census Block Groups



3.5 Residential Development

Residential development in the project area lies predominantly within the Village of Howard. There are concentrations of residential development south of US 141/Velp Avenue in the southeastern part of the Village, and in the Memorial Drive area in the southern part of the village. There are several pockets of rural residential development and scattered homes adjacent to US 41 in the northeast part of the Village of Howard. Most new residential development in the Village of Howard has been progressing outward from the older residential core area, to the north and west.

According to the *Village of Howard Comprehensive Plan*, about 78% of the housing units in the village are under 20 years old and a substantial number of homes were built within the last 10 years. In the last 5 years there has been a steady climb in the number of new single-family homes, a moderate increase in the number of new duplexes, and a small amount of new apartment construction. The majority of residential properties in the village are single-family residences. In 2000, 89% of the acres devoted to residential use in the Village of Howard were for single-family residences. Two-family residences (duplexes) and multifamily residences comprised about 5% each.

A large percentage of the multifamily residences in the Village of Howard are located south of US 141/Velp Avenue and east of US 41.

3.5.1 Residential Displacements

The No Build Alternative would have no residential displacements.

Residential displacements are the same for Build Alternatives D and E. The proposed improvements will displace approximately 13 single-family homes. This estimate is based on preliminary engineering concept plans and is subject to change when more detailed engineering plans are developed.

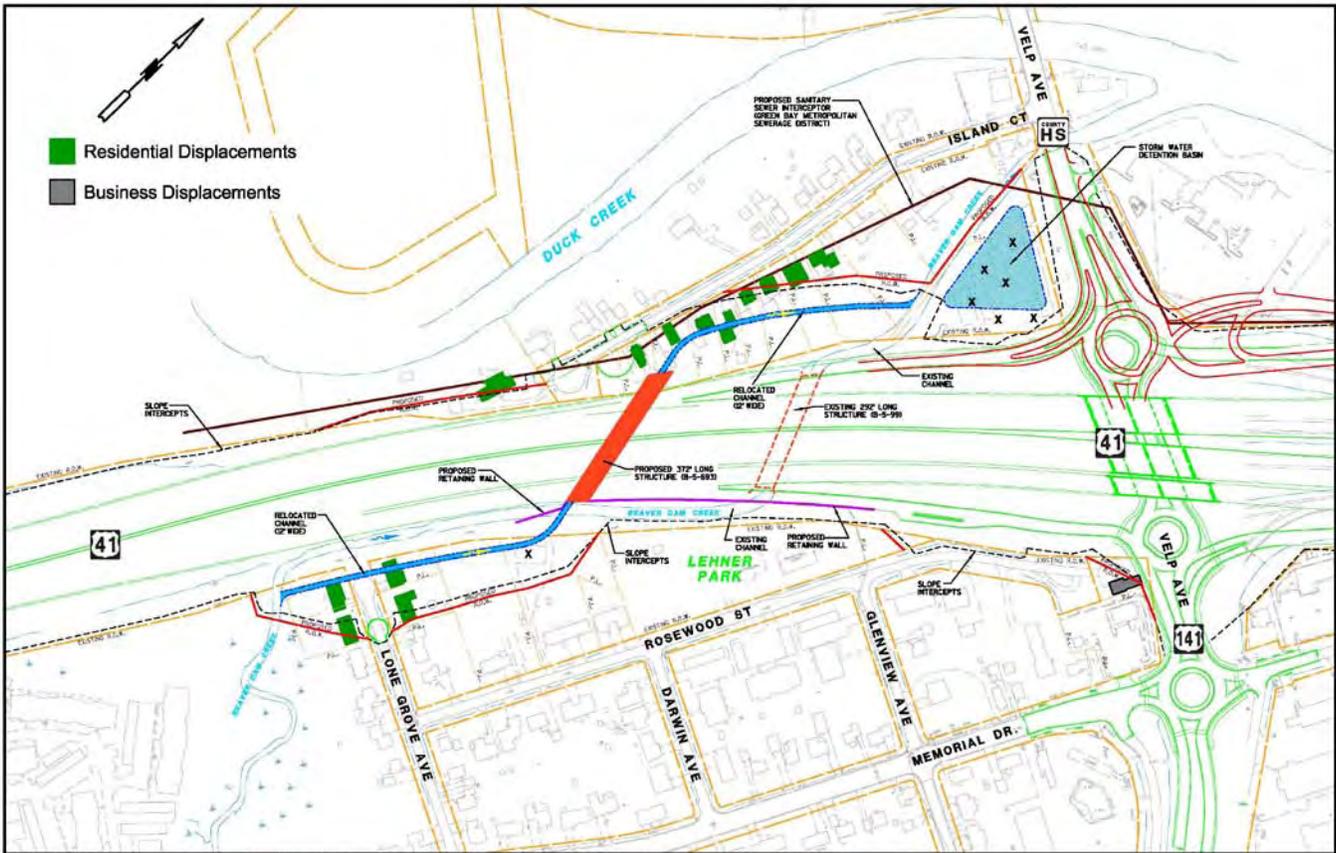
As shown on Figure 3-3, the residential displacements are located in the Island Court neighborhood west of US 41 and in the Lone Grove Avenue/Rosewood Street neighborhood east of US 41. The Island Court neighborhood is bordered by Duck Creek, US141/Velp Avenue and US 41. Beaver Dam Creek, a tributary to Duck Creek, flows diagonally through the northeast corner of the neighborhood. Access is off Velp Avenue, and Island Court ends with a cul-de-sac at the south end of the neighborhood. A mix of deciduous and evergreen trees along the lots adjacent to US 41 provides some visual screening from the freeway.

The Lone Grove Avenue/Rosewood Street neighborhood is bordered by US 41, open space to the south (Beaver Dam Creek floodplain), and Lehner Park to the north. Lehner Park is an approximate 2.6-acre neighborhood park with a small shelter, basketball court, playground equipment and picnic facilities. Beaver Dam Creek runs along northbound US 41 and the west side of the neighborhood. Lone Grove Avenue ends with a cul-de-sac near the existing Beaver Dam Creek channel. Access is available from Velp Avenue via Memorial Drive and from the local street network south of Velp Avenue. A mix of deciduous trees and shrubs along Beaver Dam Creek provides some visual screening from the freeway.

Both neighborhoods are shown on the Village of Howard's future land use map as remaining in residential use.

The residential displacements in both neighborhoods are due primarily to the proposed realignment of Beaver Dam Creek (see Figure 3-3).

Figure 3-3: Residential and Business Displacements



Impacts to the Island Court neighborhood involve purchasing/razing homes to accommodate shifting Beaver Dam Creek west of its present location. Similarly, the 4 homes at the Lone Grove Avenue cul-de-sac will be purchased and razed to accommodate shifting Beaver Dam Creek to the east at this location. The acquired homes presently provide a buffer between other adjacent homes and US 41. Their removal will result in remaining homes becoming the “first row” homes adjacent to US 41.

Residents on the west side of Island Court expressed concern at the August 18, 2010 public information meeting about becoming “first row” homes adjacent to US 41 when the homes on the east side of Island Court are removed. Concerns included increased traffic noise and changes in the visual character of the neighborhood. Other general concerns about the proposed US 41 improvements included proximity effects of wider roadways, changes in travel patterns, and concern about having to move from homes and neighborhoods they have occupied for a long time.

Detailed information on the residential displacements (type, size, occupancy, assessed value) is provided in the Conceptual Stage Relocation Plan in Appendix B. There are no known special occupant characteristics (minority, elderly, disabled, low income) that would require special relocation assistance. Sufficient relocation housing is expected to be available and the number of residential displacements will not cause an undue hardship to the local real estate market. See Conceptual Stage Relocation Plan in Appendix B for more information.

3.5.2 Measures to Mitigate Adverse Effects

Acquisitions and relocations resulting from the US 41 Memorial Drive to County M project will be done in accordance with the Uniform Relocation Act of 1972. This law ensures landowners and tenants are treated fairly when the public interest requires acquisition and relocation of homes and businesses. Eligible persons relocated from their home or business will receive “Just Compensation for Property Acquired.” Other relocation assistance benefits include relocation advisory services, reimbursement of moving expenses, replacement housing payments, down payment assistance, replacement business

payments, and business reestablishment expenses. Under State law, no person or business will be displaced unless a comparable replacement home or business is provided.

3.6 Commercial and Industrial Development

Commercial and industrial development adjacent to the US 41 Memorial Drive to County M project lies mostly within the Village of Howard. The main area of commercial development is at the US 141/Velp Avenue interchange. This area is part of a series of strip developments along US 141/Velp Avenue, Military Avenue, and a portion of Glendale Avenue. These developments are a mixture of highway-oriented uses and neighborhood businesses that include small suburban strip malls, gas stations/convenience stores, taverns and restaurants, small office complexes, and various retail stores. US 141/Velp Avenue has historically been the commercial heart of the Village, with much of the activity existing for decades. In recent years, this area has seen considerable redevelopment as older buildings and uses have been replaced or upgraded.

The Village of Howard is well-positioned to compete with larger communities in attracting businesses and industries. The village has 3 large industrial/business parks:

- Howard Industrial Park (575 acres) located in the northeast portion of the Village near US 141/Velp Avenue with access to US 41 from County M (Lineville Road). According to the village's Comprehensive Plan, approximately 260 acres of undeveloped land east of the existing industrial park is available for future development.
- AMS and Lancaster Creek Business Parks (100 acres) located on the village's south side. According to the village's Comprehensive Plan, approximately 154 acres of additional land is available for possible future development in the vicinity of this business park.
- US 41/WIS 29 Retail Center (100 acres) located in the northwest quadrant of the US 41/WIS 29 interchange. A Woodman's grocery store has recently been constructed in this business park.

Industrial development is not prominent in the US 41 Memorial Drive to County M project area. Several small industrial sites are located along the corridor, including one at the US 41 crossing of Memorial Drive, a small site south of the Lakeview Drive overpass, and a small site south of the County M interchange.

3.6.1 Business Displacements

The No Build Alternative would have no business displacements.

Build Alternatives D and E would displace one business located in the southeast quadrant of the US 141/Velp Avenue interchange (See Figure 3-3). The business included scuba and snorkeling equipment sales and diving instruction. The business displacement estimate is based on preliminary engineering concept plans and is subject to change when more detailed engineering plans are developed. Detailed information on the business displacement (type, occupancy, estimated number of employees, assessed value) is provided in the Conceptual Stage Relocation Plan in Appendix B.

No special relocation assistance is required with respect to this business.

3.6.2 Measures to Mitigate Adverse Effects

Acquisitions and relocations resulting from the proposed improvements are done in accordance with the Uniform Relocation Act of 1972. This law ensures landowners and tenants are treated fairly when the public interest requires acquisition and relocation of homes and businesses. Eligible persons relocated from their home or business will receive "Just Compensation for Property Acquired." Other relocation assistance benefits include relocation advisory services, reimbursement of moving expenses, replacement housing payments, down payment assistance, replacement business payments, and business reestablishment expenses. Under State law, no person or business will be displaced unless a comparable replacement home or business is provided.

3.7 Wetlands

There are numerous wetlands along US 41 and within the interchange areas in the Memorial Drive to County M project corridor. Boundary determinations for wetlands in the project's area of potential effect were completed by WisDOT in consultation with DNR in 2006. Updated boundary determinations may be needed at some locations prior to applying for future permits under the Clean Water Act.

Approximately six main types of wetland were identified in the project area (See Table 3-11). The wetland types are based on WisDOT's *Wetland Mitigation Banking Technical Guideline* (as revised in March 2002). Some of the wetlands are currently being infested with invasive Phragmites while others still contain an abundance of diverse vegetation. Depending on their position in the landscape (including proximity to major highways), size, surrounding land use, connectivity to other habitat areas, and proximity to waterways, wetlands in the project area provide benefits such as fish and wildlife habitat, flood storage, groundwater recharge and water quality protection.

Wildlife species living, breeding, and foraging in the area include whitetail deer, raccoons, opossum, turtles, skunks, rabbits, muskrats, other small mammals, frogs, numerous song birds, swallows, Canadian geese, and other waterfowl (mallards, blue-winged teal, woodducks). Other birds seasonally migrate through the area. Waterfowl also nest and raise young in the vicinity of the Duck Creek crossing and the DNR land. The presence of the wetlands and their proximity to Lake Michigan serve as habitat for both regional and migrating species.

Green Bay West Shore Wildlife Area—Peats Lake Unit is a 317 acre wildlife unit located along both sides of US 41. The area consists of a mixture of low density aspen and mixed oaks in the upland areas and ash, tag alder, and open grass in the wetlands.

The Suamico Lacustrine Flats are a large wetland complex located between Velp Avenue and US 41/141. This area has been identified in the Brown County Open Space and Outdoor Recreation Plan as a natural area of local significance. This is a critical area for northern pike spawning habitat.

**Table 3-11
Wetland Types in Project Area**

Wetland Type	Community Type Examples
Aquatic Bed AB	Submergent aquatics (depth less than 3 meters)
Riparian Forested RPF	Wooded floodplain forests, shrub carr and alder thickets in riverine or lacustrine system
Shallow Marsh SM	Emergent aquatics
Shrub Scrub SS	Shrub carr, Alder thicket (deciduous shrubs in wet soil)
Wet Meadow M	Sedge meadows, wet/wet mesic prairie, vernal pools
Wooded Swamp WS	Wet/wet mesic deciduous forests, cedar swamps

3.7.1 Wetland Impacts

There would be no wetland impacts under the No Build Alternative. Wetland impacts for Build Alternatives D and E are summarized in Table 3-12. Affected wetlands are shown on Exhibit 3-3 (common to Alternatives D & E - Memorial Drive to US 141/Velp Avenue, page 3-54), Exhibit 3-4 (common to Alternatives D & E - Lakeview Drive to Lineville Road, page 3-55), Exhibit 3-5 (Alternative D - US 141/Velp Avenue to Lakeview Drive, page 3-56), and Exhibit 3-6 (Alternative E - US 141/Velp Avenue to Lakeview Drive, page 3-57).

The wetland impact totals for Alternatives D and E include 1.1 acres of wetland impacts associated with the construction of the 5-legged roundabout with a local access frontage road at the US 141/Velp Avenue interchange and thus represents a worst-case impact scenario. The impact totals also include all wetlands directly beneath the lengthened structures to represent a worst-case impact scenario.

Alternative D would impact a total of 55.38 acres of wetland. Affected wetland types include:

- AB (0.46 acres)
- RPF (0.00 acres)
- SM (13.06 acres)
- SS (7.53 acres)
- M (22.21 acres)
- WS (12.12 acres)

Alternative E would impact a total of 54.05 acres of wetland. Affected wetland types include:

- AB (0.46 acres)
- RPF (0.17 acres)
- SM (13.11 acres)
- SS (7.13 acres)
- M (20.73 acres)
- WS (12.45 acres)

**Table 3-12
Wetland Impacts for Build Alternatives**

Identification Number ¹	Description (Type) ²	Impacts (acres) Alternative D	Impacts (acres) Alternative E
NRC-1	WM	0.21	0.21
NRC-2	WM	0.31	0.31
NRC-3	WS	0.25	0.25
NRC-4	WM	0.23	0.23
NRC-5	WM	0.03	0.03
W-145	SS	0.12	0.12
W-146	WS	0.62	0.62
W-147	WS	0.43	0.43
W-148	SM	0.29	0.29
W-149	WS	1.26	1.26
W-150	SS	0.47	0.47
W-151	AB	0.46	0.46
W-152	WS	0.39	0.39
W-153	SM	0.34	0.34
W-154	SM	1.15	1.15
W-155	SM	0.02	0.02
W-156	SS	0.08	0.08
W-157	SM	0.26	0.26
W-158	SS	0.01	0.01
W-160	SS	0.68	0.68
W-161	SS	0.09	0.09
W-162	SM	0.52	0.52

Identification Number ¹	Description (Type) ²	Impacts (acres) Alternative D	Impacts (acres) Alternative E
W-163	SM	1.53	1.53
W-164	WS	0.74	0.74
W-165	SS	0.05	0.05
W-166	WS	1.82	1.64
W-167	SM	0.68	0.68
W-168	SS	0.27	0.27
W-170	SM	0.25	0.29
W-171	SM	0.81	0.81
W-172	SM	1.23	1.23
W-173	WS	1.64	1.64
W-174	SS	1.89	1.89
W-175	SM	1.16	1.16
W-176	WS	2.04	2.04
W-177	SM	2.66	2.66
W-178	SM	0.52	0.52
W-179	WS	0.77	0.77
W-180	SM	1.37	1.37
W-181	WS	1.80	2.14
W-184	WM	1.25	0.64
W-186	RPF	0.00	0.01
W-188	WM	0.00	0.06
W-190	WM	0.00	0.13
W-191	SS	0.00	0.10
W-202	RPF	0.00	0.16
W-203	WM	7.46	6.44
W-204	WS	0.07	0.07
W-205	SS	0.38	0.62
W-206	SS	0.75	0.37
W-208	SS	0.91	0.41
W-209	WM	3.40	2.80
W-210	WS	0.15	0.32
W-211	SS	0.30	0.44
W-212	WM	1.32	1.32
W-214	WM	2.66	2.66
W-215	WM	0.84	0.84
W-216	WS	0.15	0.15
W-217	WM	0.99	0.99
W-218	SM	0.01	0.01
W-219	WM	1.03	1.03
W-220	SS	0.58	0.58
W-221	WM	0.39	0.39
W-222	SS	0.38	0.38
W-223	WM	0.94	0.94
W-224	WM	0.55	0.55
W-225	SM	0.28	0.28
W-226	WM	0.59	0.59
W-227	SS	0.58	0.58
W-229	WM	0.00	0.46
W-232	WM	0.00	0.11
Totals (acres):		55.38	54.05
Notes: ¹ Wetland identification numbers are based on WisDOT's numbering system for wetlands along the US 41 corridor in Brown County. Skipped numbers are wetlands outside the project's area of effect. ² Wetland types are based on WisDOT's <i>Wetland Mitigation Banking Technical Guideline</i> .			

Wetlands located in the County M interchange area are classified as Aquatic Beds (AB), Wet Meadow (M) and Shrub Scrub (SS), with some Wooded Swamp (WS) and Shallow Marsh (SM). These wetlands are part of a larger wetland complex that provides wildlife habitat, shoreline protection, and water quality protection.

Wetlands located adjacent to US 41 between County M and Lakeview Drive, are primarily Wet Meadow (M) with some Wooded Swamp (WS) within the US 41/Lakeview Drive interchange. These wetlands are located adjacent to a ditch and provide water quality protection.

Wetlands located in the US 41/I 43 interchange area are associated with and adjacent to Duck Creek which drains into the Bay of Green Bay. The wetland classification for this area includes Aquatic Bed (AB), Wet Meadow (M), Shrub Scrub (SS), Wooded Swamp (WS) and Shallow Marsh (SM). These wetlands provide water quality protection, shoreline protection, ground water recharge, and wildlife habitat.

The wetlands adjacent to US 41 south of US 141/Velp Avenue, are associated with Beaver Dam Creek. Wetland types include Shallow Marsh (SM), Shrub Scrub (SS), Aquatic Bed (AB), and Wooded Swamp (WS). These wetlands provide water quality protection and ground water recharge.

Wetland impacts associated with the construction of the 5-legged roundabout and new local access frontage road located in the northwest quadrant of US 141/Velp Avenue (See Section 2.1.2 (a)), will total approximately 1.1 acres of wetland impacts. Wetland types include Shallow Marsh (SM), Shrub Scrub (SS), and Wooded Swamp (WS). These wetlands provide water quality protection, shoreline protection, and ground water recharge.

Wetland impacts associated with the major utility relocations for the Green Bay Metropolitan Sewerage District and American Transmission Company are discussed in Section 3.18.7.

3.7.2 Measures to Minimize Adverse Effects

Presidential Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, to the extent practicable, long term and short term adverse impacts associated with the destruction or modification of wetlands. More specifically, the order directs federal agencies to avoid new construction in wetlands unless there is no practicable alternative. The order states that where wetlands cannot be avoided, the proposed action must include all practicable measures to minimize harm to wetlands. The Clean Water Act's Section 404(b)1 Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230) are administered by EPA and the USACE. The guidelines state that dredged or fill material should not be discharged into aquatic ecosystems (including wetlands), unless it can be demonstrated that there are no practicable alternatives to such discharge; that such discharge will not have unacceptable adverse impacts; and that all practicable measures to mitigate adverse effects are undertaken.

Wetland Avoidance

Due to the scattered location of wetlands in the US 41 corridor, proximity to the existing highway, and locations within the interchange areas, it isn't possible to completely avoid wetland impacts for the Build Alternatives.

Specific measures taken to avoid wetland impacts for Build Alternatives D and E include the following.

- Access to Wietor Wharf Park – Access to this park is currently provided along Wietor Drive, which intersects Military Avenue. This is a fairly long road and requires a lengthy route for residents of the Village of Howard traveling to and from the park. Coordination with local officials indicated a preference for an alternate route off Velp Avenue or Memorial Drive. Neither of those options were selected, because construction of a new access road, either from Velp Avenue or Memorial Drive, would have included additional wetland impacts west of US 41 as well as an additional railroad crossing.
- Another option considered was to reroute Wietor Drive to the south to parallel the railroad tracks and extend it under the proposed new US 41 bridges over the railroad. This option would have involved adding an extra span to those bridges. Keeping Wietor Drive in its existing location would require

adding two bridges under US 41 with Alternative E and adding additional spans to proposed bridges under Alternative D. However, because of the wetland impacts that would result from the rerouting of this road, the decision was to maintain Wietor Drive in its current location and construct the additional bridges as necessary.

- East and West Deerfield Avenue frontage roads – These frontage roads parallel US 41 between Duck Creek and County M. While the existing separation distance between the frontage roads and US 41 does not meet minimum design standards (see Section 1), WisDOT determined that moving the frontage roads up to 35 feet farther away from US 41 to meet minimum standards would cause substantial impacts to wetlands and abutting development. Therefore, the existing separation distance will be maintained, resulting in wetland avoidance and minimization of environmental impacts.

Minimization of Wetland Impacts

Specific measures taken to minimize wetland impacts for Build Alternatives D and E are summarized below:

Alternative D

- Utilizing minimum design speeds and maintaining the loop ramp configuration at the I-43 interchange
- Shifting the proposed ramp alignments at the I-43 interchange as close as possible to the existing interchange to minimize impacts to undisturbed wetlands
- Utilizing a bridge instead of fill embankment for the northbound I-43 to northbound US 41 ramp
- Use of retaining walls along southbound US 41 adjacent to Duck Creek and northbound US 41 near Beaver Dam Creek
- Use of beamguard in high fill areas to allow for steeper slopes

Alternative E

- Utilizing 60 mph design speeds instead of the desirable 70 mph design speed for the ramps connecting I-43 to southbound US 41
- Lengthening the following structures to span over wetland areas instead of using embankment fill
 - Northbound I-43 to southbound US 41
 - Northbound US 41 to southbound I-43
 - Northbound I-43 to northbound US 41
 - Southbound US 41 off-ramp to Velp Avenue
- Use of retaining walls along southbound US 41 adjacent to Duck Creek and northbound US 41 near Beaver Dam Creek
- Use of beamguard in high fill areas to allow for steeper slopes

Compensation for Unavoidable Wetland Impacts

Compensation for unavoidable wetland loss will be done in accordance with WisDOT's Wetland Mitigation Banking Technical Guideline developed as part of the WisDOT-DNR Cooperative Agreement on Compensatory Wetland Mitigation. The guideline was developed by WisDOT in 1993 and updated it in 1997 and 2002 in cooperation with the DNR, USACE, EPA, Fish and Wildlife Service, and FHWA.

The guideline states that preference should be given for compensatory mitigation in the vicinity of the impacted area (on-site). Where such opportunities are not present or practical, mitigation within the same watershed as the impacted wetlands (near-site) should be explored. If on-site or near-site mitigation is not available, WisDOT would debit the wetland loss at the closest established wetland mitigation bank.

The guideline also recommends compensation ratios for wetland debits from an established wetland mitigation bank. The wetland compensation ratios reflect the types of impacted wetlands versus types available at the established wetland bank and whether the wetland bank is in the same watershed as the impacted wetlands. In addition, there was discussion with the DNR and USACE about mitigation ratios for wetland impacts underneath bridges. These ratios will be determined as further detailed design is completed for the project.

WisDOT has purchased approximately 212 acres of land for construction of the Resort Road wetland mitigation site which will be used to compensate wetland loss in the overall US 41 corridor in Brown County. The Resort Road site is located approximately 3.5 miles to north of this project, in the township of Suamico, T25N, R20E, Sections 11, 12, 13 and 14 (see Figure 3-4), and it lies within the same watershed as wetlands affected by the US 41 project. Final design of the mitigation site is underway and construction will begin in 2011. The site will ultimately be owned and maintained by DNR.

The Resort Road mitigation site is being constructed on land that historically has been primarily in agricultural use. Based on wetland delineations done in summer of 2010, the mitigation site also contains approximately 38 acres of existing wetland and there are two drainage channels that flow through the site. Key design features include the following:

- Modify existing drainageways to create, restore and enhance wetland on land that is currently being farmed.
- Construct weirs and install culvert pipes in the modified drainageways to maintain water levels beneficial to Northern Pike spawning and waterfowl habitat.
- Excavate at select locations to provide sustained water pools and deep marsh pockets beneficial to waterfowl and other wildlife.
- Construct berms at select locations to restrict fish passage and eliminate off-site water backup.

At this time, it is anticipated that approximately 121.55 acres of wetland will be created, restored or enhanced at the Resort Road site. Estimated wetland types include the following:

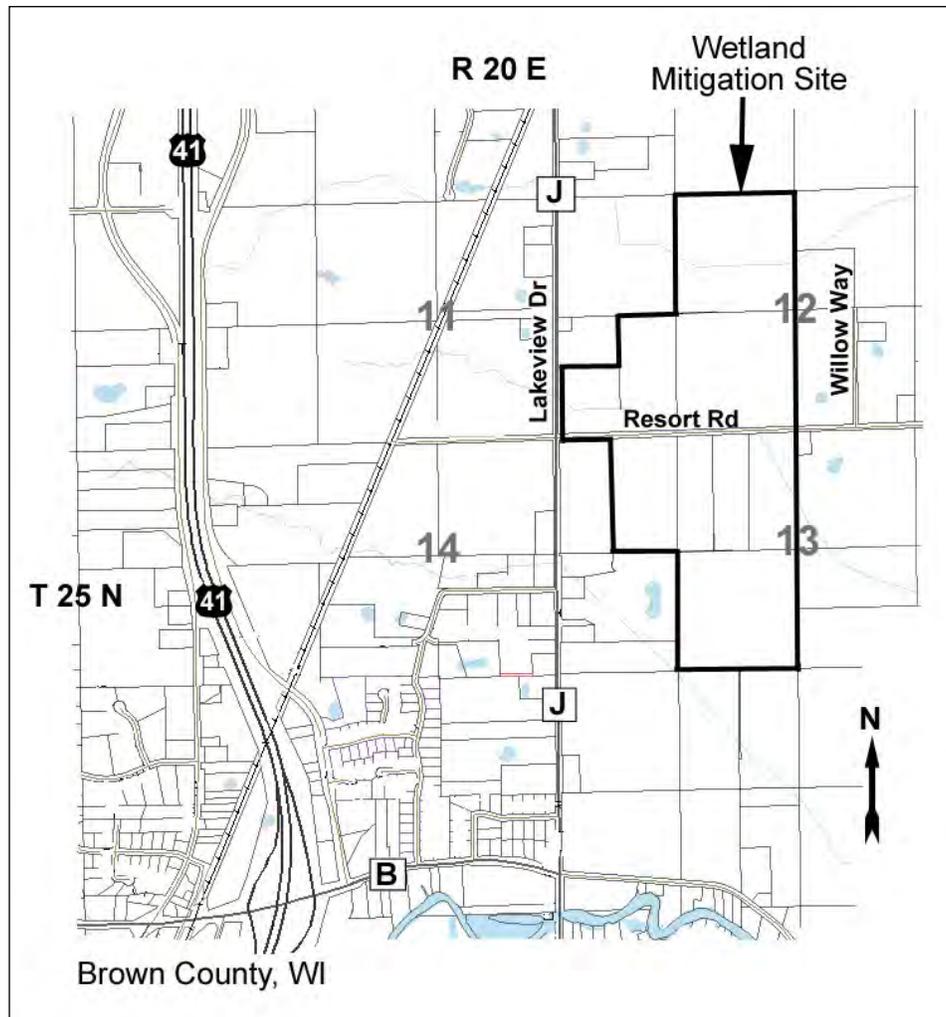
- Wet Meadow (M)—60.11 acres
- Riparian Forested (RPE)—33.06 acres
- Shallow Marsh (SM)—18.09 acres
- Deep Marsh (DM)—10.29 acres

Based on the September, 2010 Clean Water Act Section 404 permit application for the Orange Lane to Memorial Drive portion of the US 41 corridor, approximately 46 acres of affected wetland will be compensated at the Resort Road mitigation site. With debit adjustments per the Wetland Banking Technical Guideline, approximately 69 acres will be debited to the Resort Road site. This leaves approximately 63 acres of available compensation for the US 41 Memorial Drive to County M project section, which may not be sufficient to fully compensate wetland loss for this project section.

Therefore, WisDOT will continue to search for additional near-site mitigation parcels. Depending on whether or not additional near-site parcels are located, some of the wetland impacts for the US 41 Memorial Drive to County M project could ultimately be mitigated at WisDOT's established Hope Marsh wetland mitigation bank in southeastern Marquette County. The Hope Marsh wetland mitigation bank is approximately 558 acres in size with over 300 acres currently remaining for wetland mitigation debits. Wetlands impacted by the Memorial Drive to County M project are located in the Northern Fox/Lake Michigan watershed and the Hope Marsh wetland bank is located in the Southern Fox/Lake Michigan watershed.

All wetland loss for the Memorial Drive to County M project will be fully compensated and there will be no net loss of wetlands due to this project. A final wetland finding will be included in the Final EIS.

Figure 3-4: Resort Road Wetland Mitigation Site Location



3.8 Streams and Floodplains

There are two streams in the US 41 Memorial Drive to County M project corridor, Duck Creek and Beaver Dam Creek. Stream conditions and characteristics are summarized below.

Duck Creek

Duck Creek is a 42-mile hard water stream that originates in Burma Swamp, located in central Outagamie County, and winds northeast until it empties into the bay of Green Bay, just north of the City of Green Bay. Tributaries to Duck Creek include; Beaver Dam Creek, Lancaster Creek, Thornberry Creek, and Trout Creek. There are 5-point source dischargers (municipal and industrial) in the watershed, but none in the US 41 Memorial Drive to County M project area.

The drainage area of the Duck Creek watershed encompasses 152 square miles with land use in the upper portion being primarily agricultural and the lower portion being predominantly residential and urban. According to the DNR watershed detail, Duck Creek is adversely affected by agricultural practices, ditching, and lack of stream bank buffer areas resulting in erosion, turbidity, warmer temperatures and lower dissolved oxygen levels. There are also dramatic water level fluctuations. Duck Creek's overall water quality and stream habitat is rated poor to fair, with documented problems of sedimentation, phosphorous, filamentous algae, and heavy metals.

The Oneida Nation Conservation Field Office has a Duck Creek monitoring station in Pamperin Park, which is located on the south side of WIS 29, west of the US 41/WIS 29 interchange. Based on electro shocking conducted by the Oneida Nation field office in 2005, common fish species in Duck Creek include yellow perch, carp, white sucker, rock bass, gizzard shad, Johnny darter, creek chub, log perch, common shiner, bluntnose minnow, longnose dace, and blackside darter. Invertebrate species indicate good water quality conditions. Potential pollution sources include sediment, nutrients, pesticides, and PCB's due to agricultural and construction practices, and past paper mill discharges. While pollution occurs in different locations of Duck Creek, it is not anticipated to be encountered during construction of this project.

Duck Creek is on EPA's 2010 impaired waterway list under Section 303(d) of the Clean Water Act due to low Dissolved Oxygen (DO) levels caused by nonpoint source runoff. Impaired waters are those not meeting state water quality standards or those for which designated uses are not being achieved. Depending on the impairment, restrictions could be placed on discharges to protect aquatic life, and on fish consumption and recreational contact to protect public health.

No restrictions are noted on Duck Creek, except for a general advisory regarding Total Maximum Daily Load (TMDL), which is a calculation of the maximum amount of pollutant that a waterbody can receive and still safely meet water quality standards. Duck Creek was on DNR's 2006 impaired waterway list but was deleted from the 2008 list because portions of the creek are on Oneida Nation Reservation land. A Priority Watershed Plan for Duck, Apple, and Ashwaubenon Creeks was completed in 1997 as a joint effort among DNR, Brown County, Outagamie County, and the Oneida Nation. Nonpoint source control measures are being planned and implemented throughout the watershed.

Beaver Dam Creek

Beaver Dam Creek is a small, shallow stream originating near Green Bay Southwest High School, approximately two miles southwest of the project's US 41 southern terminus, and discharging about 4 miles downstream to Duck Creek near US 141/Velp Avenue.

According to DNR watershed detail, Beaver Dam Creek has a water quality rating of fairly poor. Land use along Beaver Dam Creek is predominately residential and industrial, and the stream has a history of fish kills every 2-3 years, mostly because of industrial discharges to the stream.

The Oneida Nation Conservation Field Office has a Beaver Dam Creek monitoring station in the southwest quadrant of the US 41/WIS 29 interchange. Based on electro shocking conducted by the Oneida Nation field office in 2005, common fish species in Beaver Dam Creek include creek chub, Johnny darter and blunt nose minnows. Invertebrate species indicated fair to poor water quality. Potential pollution sources include nutrients and trash due to urban and highway runoff and land use practices. Beaver Dam Creek is not listed as an impaired waterway under Section 303(d) of the Clean Water Act.

Floodplains

Floodplains are natural extensions of waterways that provide important natural and beneficial values such as open space, wetlands, and wildlife habitat/movement corridors. Floodplains also store floodwaters, reduce flood peaks and velocities, and protect water quality by serving as a runoff buffer for adjacent waterways.

The 100-year floodplain elevation also known as the base flood elevation, is used for regulatory purposes and represents land adjacent to a waterway that has a 1% percent chance of being flooded in any given year. Based on Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), the largest floodplain in the US 41 Memorial Drive to County M project corridor is associated with the bay of Green Bay. Most of the land located south and east of Lakeview Drive is within the bay of Green Bay's 100-year floodplain. The designated 100-year floodplains for Duck Creek and Beaver Dam Creek also encompass the existing freeway and its interchanges.

The extent of 100-year floodplains in the US 41 Memorial Drive to County M corridor is illustrated on Figures 3-5 and 3-6.

Figure 3-5: Fill Encroachment into 100-year Floodplain Alternative D

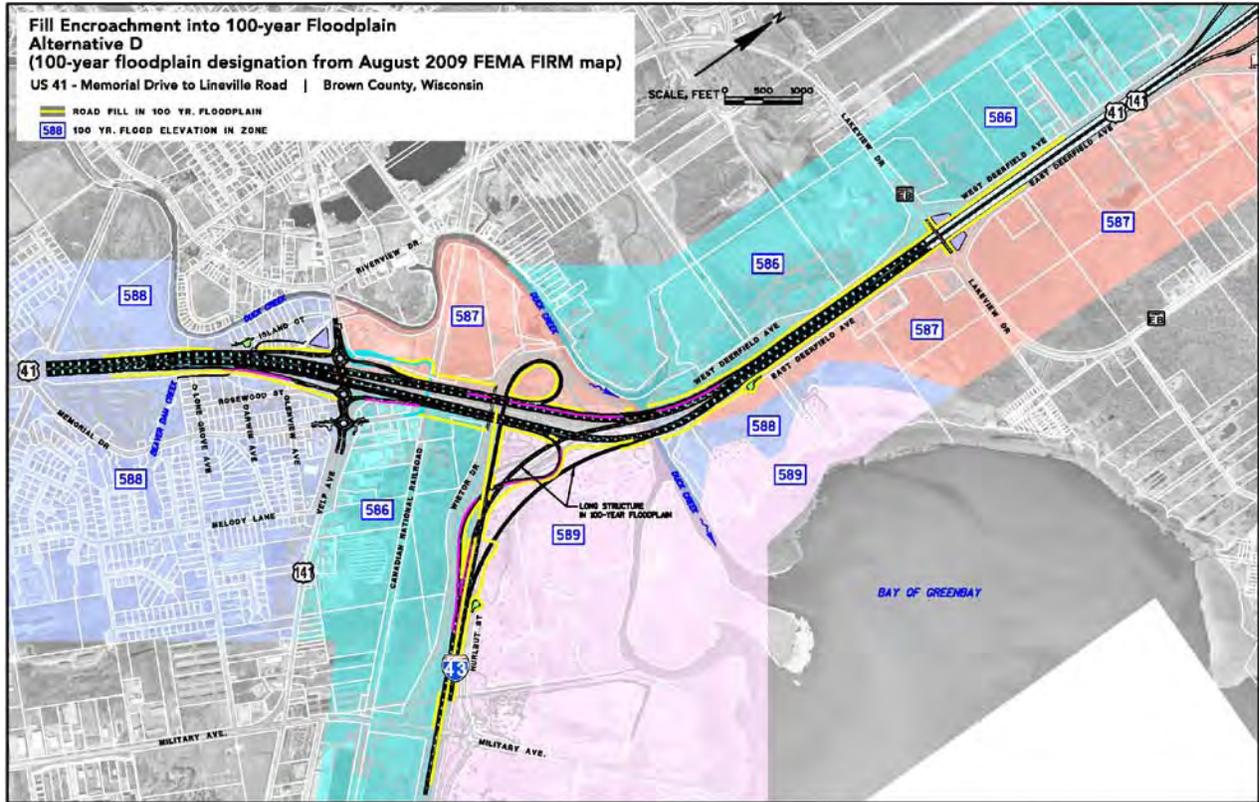
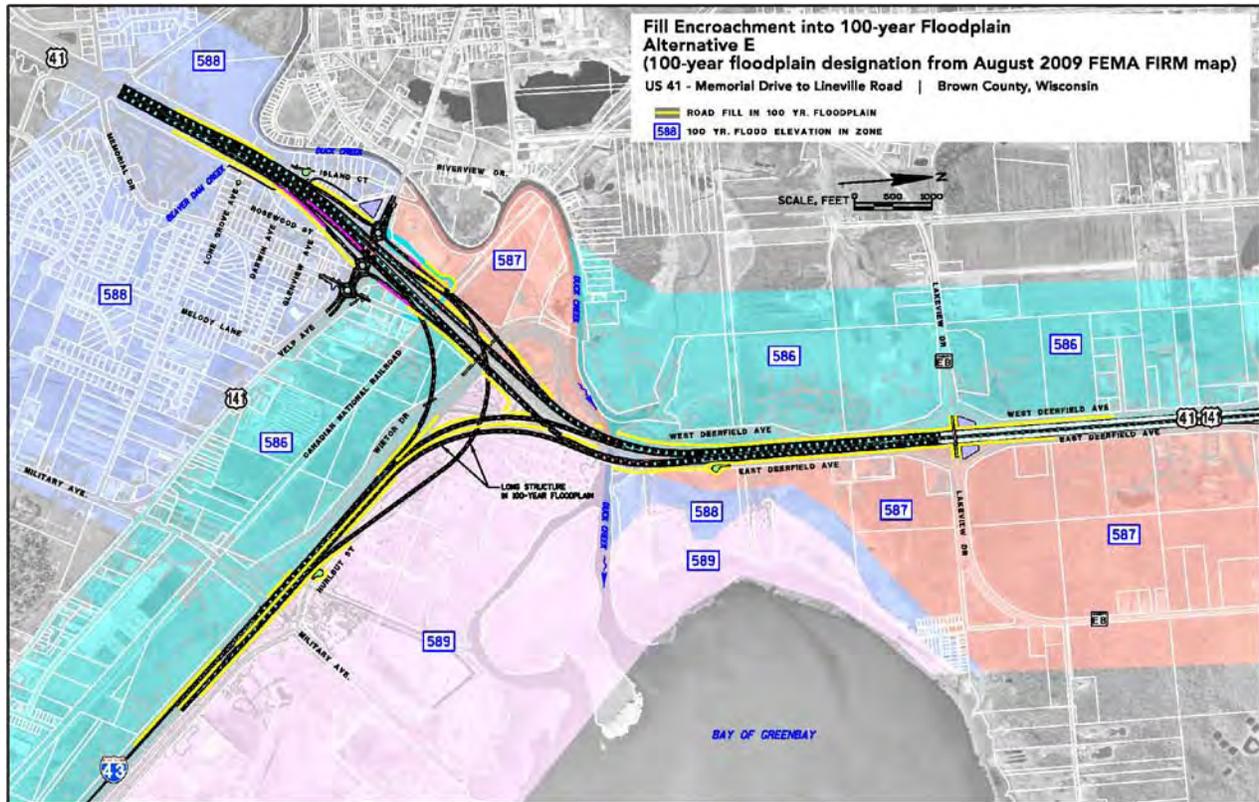


Figure 3-6: Fill Encroachment into 100-year Floodplain Alternative E



3.8.1 Stream/Water Quality Impacts

The No Build Alternative could result in minor water quality impacts due to erosion and sedimentation during pavement and structure maintenance activities over time. There would also be impacts associated with highway runoff and de-icing.

The Build Alternatives have the potential for water quality impacts due to erosion and sedimentation during construction, and due to stormwater runoff and highway deicing after construction.

The existing bridges carrying the northbound and southbound US 41 roadways over Duck Creek were constructed in 1971. Each bridge is a three-span concrete deck girder bridge with two in-stream piers. The Duck Creek channel at this location is 140 feet wide, 7 feet deep, and the navigational clearance is approximately 9 feet. The navigational channel width between the existing piers is approximately 75 feet.

Under Alternatives D and E, it is proposed to replace the existing three-span bridges over Duck Creek with two-span bridges (one in-stream pier). Reducing the number of in-stream piers will have a positive effect on Duck Creek by providing additional substratum for aquatic habitat.

The existing box culvert carrying the northbound and southbound US 41 roadways over Beaver Dam Creek was constructed in 1966. It is a four-cell concrete box with an overall barrel length of 297 feet. Each cell is 10 feet wide by 8 feet high. The existing box culvert is on a 25-degree skew angle.

Under Alternatives D and E, it is proposed to realign Beaver Dam Creek on both sides of US 41, south of the US 141/Velp Avenue interchange. See Section 2.1.2(b) and Exhibit 2-2 (Page 2-17) for additional information. The new stream channel will be approximately 400 feet south of its present location. The length of the existing channel through the realignment area is approximately 1900 feet, and the new channel will be approximately 1850 feet in length. A new four-cell box culvert will be constructed and will have approximately the same dimensions as the existing box culvert except for its length, which will be increased by about 60 feet to accommodate the wider roadway.

The new stream will have a wider cross section than the existing channel and the realignment will provide a wider buffer area between the stream and US 41. These design features provide an opportunity for enhancing water quality and fishery habitat.

Final structure types for the Duck Creek and Beaver Dam Creek crossings will be determined in a future engineering phase in consultation with DNR. WisDOT will also coordinate with DNR on design of the new Beaver Dam Creek channel.

WisDOT prepared a stormwater management concept plan in 2007 for the overall US 41 corridor in Brown County. The purpose of the concept plan was to assist in designing stormwater management measures that meet post-construction performance standards for total suspended solids (TSS) as specified in Wisconsin Administrative Code Chapter TRANS 401—*Construction Site Erosion Control and Stormwater Management Procedures for Department Actions*. For highway reconstruction projects like the US 41 Memorial Drive to County M project, TRANS 401 requires best management practices that reduce post construction TSS by 40% when compared to conditions with no runoff management.

During the US 41 design phase, WisDOT has continued to refine the stormwater management plan based on more detailed engineering, drainage information, and stormwater quality modeling using the USGS Source Loading and Management Model (SLAMM) program. This effort will continue for the US 41 Memorial Drive to County M project section. At this time, based on preliminary information, stormwater ponds are proposed at the southwest quadrant of the US 141/Velp Avenue interchange and just north of the County EB/Lakeview Drive bridge over US 41. Additional analysis will be completed as WisDOT moves forward in a more detailed design phase to identify other locations for potential stormwater detention.

The most common deicing agent used in Wisconsin is sodium chloride, commonly referred to as road salt. According to TRB Special Report 235, *Highway Deicing: Comparing Salt and Calcium Magnesium Acetate* (1991), impacts of road salt can adversely affect roadside vegetation, streams, and groundwater, but the impacts depend on a wide range of factors. Traffic levels, wind direction, and intensity and

frequency of salt application affect the extent of vegetation damage. Threshold levels vary based on the species, temperature, light, humidity, wind, soil type, drainage patterns, precipitation, plant size, and water availability.

Highest concentrations of road salt are typically within 5-10 feet of the pavement, but some studies have found sodium chloride in soils up to 30 feet away from the pavement. Upon entering streams and rivers, road salt usually has little or no effect because concentrations are quickly diluted. In general, only shallow wells near highways are susceptible to road salt infiltration. Wells most likely to be affected are those within 100 feet down gradient of the roadway in the direction of groundwater movement.

Road salt is applied to Wisconsin's highways during winter weather conditions through contracts with the counties. WisDOT sets limits on when and how much salt is applied and the county submits records indicating the type and amount used for each application. Salt storage sites must have an impermeable base and cover, and a holding basin must be constructed to contain runoff. These requirements help minimize the impact to groundwater from salt storage facilities.

3.8.2 Floodplain Impacts

Executive Order 11988 on Floodplain Management and 23 CFR 650 Subpart A, directs federal agencies to take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. The executive order also requires agencies to elevate structures above the flood base whenever possible. The objective of the order is to avoid the long term and short-term adverse impacts associated with the occupancy and modification of floodplain, and to avoid direct and indirect support of floodplain development wherever practical.

As shown on Figure 3-5 (Alternative D) and Figure 3-6 (Alternative E), the existing US 41 freeway is located within the mapped 100-year floodplains of the bay of Green Bay, Duck Creek and Beaver Dam Creek. Proposed capacity expansion on US 41 will result in wider embankment fills that will extend farther into the 100-year floodplain. There isn't sufficient engineering design detail at this time to quantify the amount of additional fill embankment in the floodplain. However, it is assumed that the additional embankment fill will not be substantive enough to cause a change in the 100-year floodplain elevation compared to existing conditions. The proposed improvements include the following measures that will provide replacement floodplain storage to compensate for the expanded embankment fill:

- Removal of portions of the existing I-43 interchange ramps
- Lengthening of existing structures and use of new structures instead of embankment fill as described in Section 2
- Use of beamguard to allow steeper fill slopes
- Construction of stormwater ponds
- Removal of portions of several local roadways (Lone Grove Avenue, Island Court, Hurlbut Street, East Deerfield Avenue)
- Design of new roadways with elevations at or above existing elevations to minimize the potential for overtopping during heavy precipitation events

A detailed hydraulic analysis for the proposed structures will be completed in the engineering design phase, then coordinated with DNR, and local government agencies to ensure that flood insurance rate maps (FIRM) can be updated as required by the Federal Emergency Management Agency (FEMA). To the extent possible and practicable, the waterway structures will be sized for consistency with Wisconsin Administrative Code Chapter NR 116 (*Wisconsin's Floodplain Management Program*), which allows an increase of 0.01 foot in the height of the regional (100-year) flood elevation without property notifications and/or other appropriate legal arrangements. Based on preliminary hydraulic calculations for proposed new structures at Duck Creek and Beaver Dam Creek, it is anticipated that any change in floodplain elevation will not exceed 0.01 foot for either creek. If there is an increase greater than 0.01 foot, WisDOT will make notifications and/or other appropriate legal arrangements in accordance with NR 116 and the WisDOT/DNR Cooperative Agreement regarding floodplain management.

Based on the above information, proposed improvements in the US 41 Memorial Drive to County M corridor are not anticipated to have a significant encroachment on the 100-year floodplain (base floodplain) as defined

in 23 CFR 650 (FHWA's policies and procedures for the location and hydraulic design of highway encroachment on floodplains).

A significant encroachment is defined as a highway encroachment and any direct support of likely base floodplain development that would involve one or more of the following construction related or flood related impacts:

(1) Significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route

The proposed improvements will not cause interruption or termination of a transportation route needed for emergency vehicles or that serve as the area's only evacuation route.

(2) Significant risk (probability of flooding, potential for property loss and hazard to life during service life of the highway)

The proposed improvements will not increase the probability of flooding and will not cause potential property loss or a hazard to life

(3) Significant adverse impact on natural and beneficial floodplain values

The most notable natural and beneficial floodplain value in the project corridor is wetlands. Although wetland impacts will occur, these will be fully mitigated and there will ultimately be no net loss of wetlands due to the proposed improvements.

Support of base floodplain development means to directly or indirectly encourage, allow, serve, or otherwise facilitate additional base floodplain development.

As discussed in Section 3.2, the ICE analysis for the proposed improvements did not identify any substantive indirect effects for Alternatives D or E. An actual or perceived travel time savings could cause communities outside the project area to experience an increase in population/employment growth thereby accelerating conversion of farmland and woodland to urban development. The proposed improvements could also accelerate the rate of infill and redevelopment in the immediate project area. Local land use regulations and guidance such as comprehensive planning, floodplain and shoreland zoning, and official mapping are in place to minimize the potential for undesirable base floodplain development.

3.8.3 Measures to Minimize Adverse Effects

Potential wetland and water quality impacts will be minimized by constructing the project in accordance with the following guidelines and regulations:

- WisDOT Facilities Development Manual, Chapter 10—*Erosion Control and Storm Water Quality*
- Wisconsin Administrative Code Chapter TRANS 401—*Construction Site Erosion Control and Storm Water Management Procedures for Department Actions*
- WisDOT/DNR Cooperative Agreement Amendment—*Memorandum of Understanding on Erosion Control and Storm Water Management*
- WisDOT's *Standard Specifications for Road and Bridge Construction* (Section 107.18, Protection of Lakes and Streams, Section 107.20, Erosion Control, and Section 205.311, Disposal of Unsuitable Material).

Key concepts of the above guidelines and regulations are summarized as follows:

Basic Principles and Best Management Practices

- The proposed improvements will be planned to fit topography, soils, drainage patterns, and natural vegetation to the maximum extent practicable.
- The size of exposed areas at any one time and the duration of exposure will be minimized.

- Control measures will be used to prevent erosion and sedimentation in sensitive areas (proper design of drainage channels with respect to width, depth, gradient, side slopes, and energy dissipation); protective groundcover (vegetation, mulch, erosion mat, or riprap); diversion dikes and intercepting embankments to divert sheet flow away from disturbed areas; and sediment control devices (retention/detention basins, ditch checks, erosion bales, and silt fence).
- Disturbed areas will be protected from off-site runoff and sediment will be prevented from leaving the construction site.
- Runoff velocities will be kept low by maintaining short slope lengths, low gradients, and vegetative cover.
- Disturbed areas will be stabilized as soon as practicable (temporary vegetation, mulch, stabilizing emulsions).

Geometric Design Features and Erosion Control Facilities

- Smooth grade lines with gradual changes will be used.
- Natural and existing drainage patterns will be preserved to the extent possible.
- Stabilized slopes, soil, and stream banks will be left undisturbed where possible.
- Trees and shrubs will be preserved, and over-clearing will be prevented or minimized.
- Irregular ditch profiles and steep gradients will be avoided where possible.
- Vegetated ditches and drainage channels with wide, rounded cross sections will be used where applicable.
- Culverts will be located and aligned to avoid erosion at the outlet and inlet.
- An undisturbed buffer will be left between disturbed soil and sensitive areas where possible.
- The soil surface will be protected by using permanent and temporary erosion control measures such as seeding and sodding, mulch, erosion mat, and riprap.
- Sediment will be removed and velocities reduced by using erosion bales, silt fence, stone or rock ditch checks, sediment traps, and basins.

Erosion Control Implementation Plan

The construction contractor is required to prepare an Erosion Control Implementation Plan that includes all erosion control commitments made in the project's engineering design phase. The construction plans and contract special provisions must include the specific erosion control measures agreed on by WisDOT in consultation with DNR who reviews the Erosion Control Implementation Plan.

Stormwater Management Plan

The objective of the stormwater management plan is to control the quantity of runoff and enhance water quality by removing TSS. To accomplish this, roadway runoff will be directed to vegetated swales where possible and stormwater ponds will be constructed at or near intersections to reduce peak runoff from the increased pavement areas. Where possible, the ponds will be designed as wet ponds for maximum TSS removal. Stormwater facilities will also be designed to preserve existing drainage patterns to the maximum extent practicable.

3.9 Groundwater and Drinking Water Supply

Groundwater sustains lake levels, provides the base flows for regional streams, and comprises a major source of water supply for domestic, municipal, and industrial users. Like surface water, groundwater is susceptible to depletion in quantity and deterioration in quality.

Groundwater has long been the source of all drinking water and other water uses within Brown County, except for the City of Green Bay, which obtains its water supply from Lake Michigan. This groundwater is located within two shallow aquifers, as well as two deeper aquifers. Most private wells in Brown County obtain water from the two shallow aquifers, while most public wells obtain water from the deeper St. Peter Sandstone aquifer.

The location of existing water supply wells in the US 41 Memorial Drive to County M project corridor are shown in Figure 3-7.

Figure 3-7: Water Supply Well Locations



3.9.1 Groundwater and Drinking Water Supply Impacts

There would be no groundwater or drinking water supply impacts under the No Build Alternative.

The Build Alternatives are not expected to adversely affect drinking water supply or localized groundwater at or near the surface. Since sizable dewatering or depressurizing activities are not anticipated during construction, temporary impacts on the groundwater system are not expected or would be minimal in isolated locations such as creeks/stream beds and other low lying areas. No noteworthy changes in chemical characteristics of the surface material are anticipated and no degradation of water quality entering the aquifer is expected.

The Safe Drinking Water Act gives EPA the authority to designate aquifers which are the sole or principal drinking water source for an area, and which if contaminated, would create a significant hazard to public health. The EPA defines a sole source aquifer as one, which supplies at least 50% of the drinking water consumed in the area overlying the aquifer. According to EPA's list of designated sole source aquifers, there are none Wisconsin.

As noted under section 3.8.1, the potential for any water supply wells being contaminated by road salt runoff is minimal.

3.10 Threatened and Endangered Species

The DNR Bureau of Endangered Resources maintains data on the locations and status of rare species, natural communities, and natural features in Wisconsin under the Natural Heritage Inventory (NHI) program established in 1985 by the Wisconsin Legislature. The NHI is a dynamic working list with species added and deleted as determined by NHI staff. Information on the NHI working list is verified/supplemented through field inventories conducted by NHI biologists, other scientific professionals

and volunteers. The list includes plants and animals considered by DNR and/or the U.S. Fish & Wildlife service as threatened, endangered, or of special concern.

Endangered species means any species whose continued existence as a viable component of this state's wild animals or wild plants is determined by DNR to be in jeopardy on the basis of scientific evidence.

Threatened species means any species, which appear likely to become endangered in the foreseeable future on the basis of scientific evidence. Special concern species are those species about which some problem of abundance or distribution is suspected but not yet proven. The main purpose of this category is to focus attention on certain species before they become threatened or endangered.

DNR has identified the following threatened, endangered or special concern species that could be present in the area of potential effect for proposed improvements in the US 41 Memorial Drive to County M project corridor (see letter in Appendix C, page C9):

- Blanding's turtle (*Emydoidea blandingii*)—threatened
- Wood turtle (*Clemmys insulpta*)—threatened
- Common tern (*Sterna hirundo*)—endangered
- Black crowned night heron (*Nycticorax nycticorax*)—special concern
- Cattle egret (*Bulbulcus ibis*)—special concern

DNR also identified additional endangered, threatened or special concern species as listed below that could be present in project area wetlands. Although much of the wetland habitat is now dominated by Phragmites, some habitat may still be suitable for protected plant species.

Endangered Species

Peregrine Falcon (*Falco peregrinus*)

Snowy Egret (*Egretta thula*)

Forster's Tern (*Sterna forsteri*)

Caspian Tern (*Sterna caspia*)

Common Tern (*Sterna hirundo*)

Purple False Oats (*Trisetum melicoides*)

Threatened Species

Great Egret (*Ardea alba*)

Yellow Gentian (*Gentiana alba*)

Seaside Crowfoot (*Ranunculus cymbalaria*)

Special Concern Species

Common Moorhen (*Gallinula chloropus*)

Bald Eagle (*Haliaeetus leucocephalus*)

American White Pelican (*Pelecanus erythrorhynchos*)

Mulberry Wing (*Poanes Massasoit*)

Broad-winged Skipper (*Poanes viator*)

Bullfrog (*Rana catesbeiana*)

Crinkled Hairgrass (*Deschampsia flexuosa*)

Northern Bog Sedge (*Carex gynocrates*)

Marsh Bedstraw (*Galium palustre*)

Information from the U.S. Fish and Wildlife Service (see letter in Appendix C, page C4) indicates there are no known federally listed threatened or endangered species in the project's area of potential effect. Due to changes that could occur in their species lists over time, Fish and Wildlife recommends that the latest list be consulted if there is a lag time of more than 12 months between the project's planning and construction phases.

Swallows, which are protected under the Migratory Bird Treaty Act, are also likely to nest under existing structures in the project area. An inventory will need to be conducted prior to the construction year to determine the presence or absence of swallows.

3.10.1 Threatened or Endangered Species Impacts

There would be no impacts to protected species under the No Build Alternative.

The wetland impacts for the Build Alternatives have the potential for affecting threatened or endangered species habitat and structure replacements have the potential for affecting swallow nests.

As noted below, DNR assumes that habitat for the Blanding's turtle and Wood turtle may be present in the project's area of potential effect. For other protected species, DNR recommends a field survey prior to construction to confirm suitable habitat, presence or absence of protected species, and a survey of nesting birds.

3.10.2 Measures to Minimize Adverse Effects

DNR provided the following guidance for minimizing potential adverse effects to endangered, threatened and other protected species:

1. Wood turtles and Blanding's turtles (threatened species) are known to inhabit areas near the project boundary; therefore it is reasonable to assume that these turtles may be present at the project site. If project construction will start in the spring, the perimeter of the area to be disturbed should be protected with "turtle fence" which consists of properly trenched-in silt fence with turtle turnarounds at the ends, constructed prior to March 15 to discourage turtles from entering the work area. If the construction area cannot be fenced by March 15, the turtle fence must be installed prior to construction activities and the area behind the turtle fence must be surveyed so that any turtles within the fenced area can be removed prior to any site disturbance and throughout the construction period.
2. A survey of the project area should be conducted for nesting birds, particularly the common tern, black-crowned night heron, and cattle egret during the nesting season the year prior to construction to determine if a nesting date restriction will be necessary. The survey technique for these birds should include a ground count of the project area once a week from May 15th to June 30th to determine presence or absence (counts of adults will suffice) or the number of nests per breeding species.
3. To ensure that endangered resource impacts are adequately addressed as project design is better defined another review of endangered resources should be conducted before final design is completed. This will ensure any new information on the species (presence or absence) and their proximity to the proposed construction limits are considered in the final design.
4. Although a number of wetland plants have been found within the project area, much of those wetlands are now dominated by Phragmites. Some of these plant species may still occur within the project area if suitable habitat still occurs. A habitat assessment for the species should be conducted as part of the wetland assessment (cover type) for the project area.

If future inventories indicate that swallow nests are present at locations that would be affected by the project, nests with eggs and/or young cannot be disturbed between May 1 and August 30 of a given year. If construction will conflict with the swallow nesting period, measures for avoiding impacts or preventing swallows from nesting on the structures would be implemented. Typical measures include the following:

- Demolition of the existing structures would occur outside the nesting season (May 1 to August 30) of the construction year) or would take place during the nesting season if a deprecation permit is obtained from the U.S. Fish and Wildlife Service.
- Removal of nests before the nesting season or other means to prevent nesting such as placement of netting on the structure prior to nests being established.

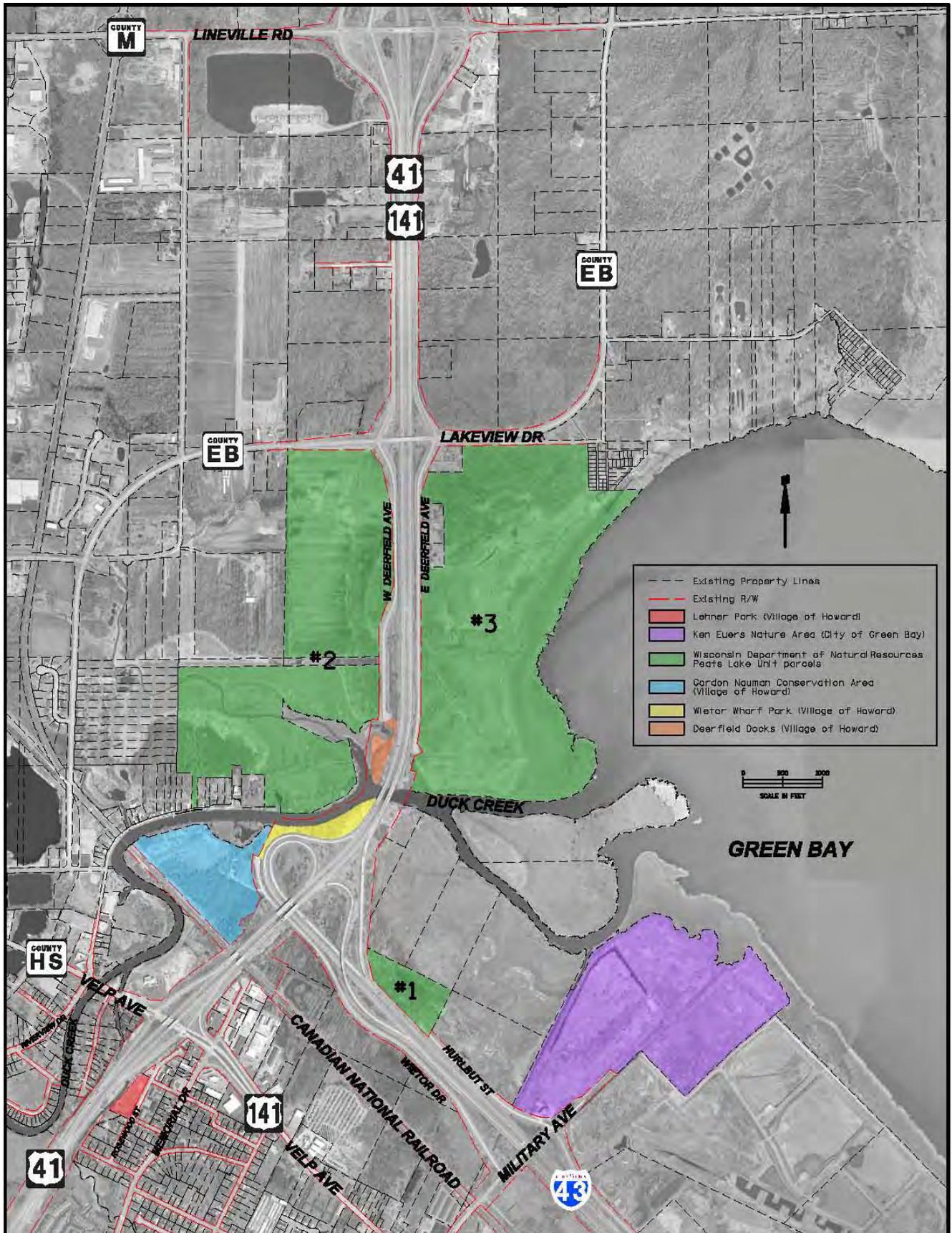
3.11 Recreational Resources / Public Use Lands

Public use lands in the Memorial Drive to County M project corridor are summarized in Table 3-13 and locations are illustrated on Figure 3-8. To minimize duplication, information on impacts to applicable resources and measures to minimize adverse effects is provided in Section 4—Section 4(f) and Section 6(f) Evaluation.

**Table 3-13
Public Use Land Summary**

Name/Description	Ownership and Administration	Funding Sources	Alternatives Impacting Resource
Lehner Park 2.6 acres; active and passive recreational facilities	Village of Howard	Local; no state or federal funds	None
Ken Euers Nature Area 69 acres; preservation of wetland and waterfowl habitat; passive recreational uses	City of Green Bay	Local/other; no state or federal funds	None
Gordon Nauman Conservation Area 30 acres; wildlife/waterfowl preserve and protection of Duck Creek floodplain; passive recreational uses; listed as parkland by Village of Howard Parks Department	Village of Howard	Local/other; no state or federal funds	Alternatives D and E
Wietor Wharf Park 3 acres; passive recreation and fishing access to Duck Creek; listed as parkland by Village of Howard Parks Department	Property owned by WisDOT and leased to Village of Howard under revocable lease	Dingell-Johnson ¹ funds used for park enhancements (boardwalks)	Alternatives D and E
Deerfield Docks 3 acres; passive recreation and fishing access to Duck Creek; listed as parkland by Village of Howard Parks Department	Property owned by WisDOT and leased to Village of Howard under revocable lease	Dingell-Johnson ¹ funds used for park enhancements (boardwalks and fishing pier)	Alternatives D and E
Green Bay West Shores Wildlife Area (Peats Lake Unit) 925 acres; wildlife/waterfowl preservation and management; compatible recreational uses	DNR and Brown County	Parcel #1 (along I-43) LWCF ² and ORAP ³ funds	Alternatives D and E
		Parcel #2 (west of US 41) Local; no state or federal funds	None
		Parcel #3 (east of US 41) ORAP ³ and Pittman-Robertson ⁴ funds	Alternatives D and E
Notes: 1. Dingell-Johnson Act; federal funding program for restoration, rehabilitation and improvement of fishery resources. 2. Land and Water Conservation Fund Act; federal funding program for purchase, development, and enhancement of public use recreational resources. 3. Outdoor Recreation Act Program; state funding program for acquisition of conservation and recreational land; replaced in 1989 by the current Stewardship Program. 4. Pittman-Robertson Act; federal funding program for restoration, rehabilitation and improvement of wildlife habitat, and for wildlife management research.			

Figure 3-8: Public Use Lands in Project Area



3.12 Soils

The 1974 Brown County Soil Survey prepared by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) shows three main soil associations within the US 41 Memorial Drive to County M project corridor:

- The Shawano-Boyer-Sisson Association consists of deep, excessively drained to well drained, nearly level to steep soils found on outwash plains and ridges and glacial lake plains that have sandy and loamy subsoil.
- The Tedrow-Roscommon Association consists of deep, somewhat poorly drained and poorly drained, nearly level soils found on glacial lakes and outwash plains that have a sandy subsoil.
- The Carbondale-Cathro-Marsh Association consists of very deep, very poorly drained, nearly level organic soils found on glacial lake and outwash plains and ridges that have a sandy subsoil.

Specific soil types in the US 41 Memorial Drive to County M project corridor include the following:

I-43

South Project Termini to I-43/US 41 Interchange

Mk (Markey muck; hydric; slight erosion potential)

US 41/US141

Memorial Drive to Velp Ave

Aw (Alluvial land wet; hydric; slight erosion potential)

MfB (Manistee fine sandy loam; not hydric; moderate erosion potential)

Fd (Fill land; not hydric; severe erosion potential)

SfB (Shawano loamy fine sand; not hydric; slight erosion potential)

Velp Ave to I-43/US 41 Interchange

TeA (Tedrow loamy fine sand; partially hydric; slight erosion potential)

Rs (Roscommon much; partially hydric; slight erosion potential)

Mr (Marsh; hydric; slight erosion potential)

I-43/US 41 Interchange to Lakeview Drive

Mr (Marsh; hydric; slight erosion potential)

Rs (Roscommon much; partially hydric; slight erosion potential)

Mk (Markey muck; hydric; slight erosion potential)

Ke (Keowns silt loam; partially hydric; slight erosion potential)

Lakeview Drive to County M

Ke (Keowns silt loam; partially hydric; slight erosion potential)

TeA (Tedrow loamy fine sand; partially hydric; slight erosion potential)

US 41/County M Interchange area

TeA (Tedrow loamy fine sand; partially hydric; slight erosion potential)

Rs (Roscommon much; partially hydric; slight erosion potential)

Existing roadway side slopes vary from 6:1 to a maximum of approximately 2.5:1. Existing longitudinal slopes vary from nearly flat to 3.5%. The proposed roadway side slopes would vary from 6:1 to a maximum of 2.5:1 and the proposed longitudinal slopes would vary from nearly flat to 3.8%.

3.13 Air Quality

Air pollution is the contamination of the atmosphere with gases or particulate matter that are harmful to the human environment. The USEPA, through the 1970 Clean Air Act, has established National Ambient Air Quality Standards (NAAQS) for seven Criteria Air Pollutants that are regulated by USEPA on the basis of information on health and environmental effects. The seven pollutants are ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide inhalable particulate matter, hydrocarbons, and airborne lead. The 1977 and 1990 Clean Air Act Amendments reinforced attainment and maintenance of these standards. These standards have been adopted by the State of Wisconsin through Wisconsin Administrative Code Chapter NR 404, *Ambient Air Quality*. The project is also subject to Wisconsin Administrative Code Chapter NR 411 Construction and Operation Permits for Indirect Sources. NR 411 has established traffic volume thresholds for new highways and modified highways. The goal of the air quality regulations is to ensure that various levels of pollutants do not exceed set standards, and where pollution levels are presently less than standards, to prevent the substantial deterioration of the ambient air quality.

3.13.1 Air Quality Impacts

Brown County was designated non-attainment for Particulate Matter (PM 2.5 standard) in December 2008. Based on DNR monitoring data indicating the PM 2.5 standard is no longer being exceeded, Brown County has been removed from EPA's list of non-attainment areas for PM 2.5. Brown County also meets attainment for 8-hour ozone standards.

In accordance with the requirements of NR 411, a screening analysis for the US 41 Memorial to County M project predicted that carbon monoxide levels would not exceed 75% of the National Ambient Air Quality Standards. Therefore, no substantial impacts to air quality are expected. A construction permit is not anticipated to be required. The air quality receptor locations are shown on Exhibit 3-7 (Page 3-58); Table 3-14 provides a summary of the air quality analysis. The letter of concurrence from WDNR's Air Management Bureau is shown on Exhibit 3-8 (Page 3-59).

**Table 3-14
Air Quality Analysis Summary**

Analysis Period	CO Levels (ppm)						% of NAAQS (*)					
	AQ-1	AQ-2	AQ-3	AQ-4	AQ-5	AQ-6	AQ-1	AQ-2	AQ-3	AQ-4	AQ-5	AQ-6
2014 1 Hour	4.8	6.0	7.0	5.8	6.8	6.5	13.7	17.1	20.0	16.6	19.4	18.6
2014 8 Hour	2.9	3.6	4.3	3.4	3.9	4.1	32.2	40.0	47.8	37.8	43.3	45.6
2024 1 Hour	4.8	6.2	7.2	5.8	6.9	6.5	13.7	17.7	20.6	16.6	19.7	18.6
2024 8 Hour	2.9	3.6	4.3	3.5	4.1	4.1	32.2	40.0	47.8	38.9	45.6	45.6
NAAQS – National Ambient Air Quality Standard (*) 1 Hour NAAQS = 35 ppm; 8 Hour NAAQS = 9 ppm												

A qualitative analysis of Mobile Source Air Toxics (MSATs) was done in accordance with FHWA's *Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*, September 30, 2009. The proposed US 41 improvements will move some traffic closer to adjacent development, which could result in localized areas having MSAT concentrations higher than what would occur under the No Build Alternative. However, on a corridor-wide and regional basis, with implementation of EPA's vehicle and fuel regulations, there is not expected to be a substantial decrease in MSAT emissions over time. The Qualitative MSAT analysis is provided in Appendix B.

3.14 Noise

Noise is defined as unwanted sound. In an urban environment, noise is made up of ambient or background sounds that vary throughout the day, and intermittent or louder noise generated by sources such as highway traffic and construction. Facilities that would likely be sensitive to noise include residential development, schools, office buildings, churches, and others that require a quiet environment to carry out their daily activities. Commercial and industrial land uses would generally be less sensitive to noise.

Sound levels are measured in units called decibels. Since the human ear does not respond equally to all frequencies (or pitches), measured sound levels are often adjusted or weighted to correspond to the frequency response of human hearing and perception of loudness. The weighted sound level is expressed in units called A-weighted decibels (dBA) and is measured with a calibrated sound level meter. Table 3-15 provides an illustration of typical sound levels in dBA. Sound levels are also expressed with the descriptor L_{eq} defined as the equivalent steady-state sound level that in a stated period of time contains the same acoustical energy as the time-varying sound level during the same period.

**Table 3-15
Typical Sound Levels**

Sound Source	Sound Level	Subjective Response
Military Jet Takeoff with after-burner at 50'	130 dBA	
Rock and Roll Band	120 dBA	Uncomfortably Loud
Jet Fly-Over at 1,000'	110 dBA	
Power Lawn Mower at Operator	100 dBA	Very Loud
Diesel Truck (55 mph) at 50'	90 dBA	
High Urban Ambient Sound; Automobile (55 mph) at 50'	80 dBA	Moderately Loud
TV-Audio, Vacuum Cleaner	70 dBA	
Normal Conversation at 4' to 6'	60 dBA	
	50 dBA	Quiet
Lower Limit Urban Ambient Sound	40 dBA	
	30 dBA	Very Quiet
Unoccupied Broadcast Studio	20 dBA	
	10 dBA	
	0 dBA	Threshold of Hearing

Sources: *Noise Assessment Guidelines* Technical Background, HUD Report No. TE/NA 172; *Handbook of Noise Control*, C. M. Harris, 1979; FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, 1978.

3.14.1 Noise Impacts

Noise impacts for highway projects are evaluated in accordance with FHWA procedures (23, CFR, Part 772—*Procedures for Abatement of Highway Traffic Noise and Construction Noise*), and Wisconsin Administrative Code Chapter TRANS 405—*Siting Noise Barriers*.

Table 3-16 lists land use/activity categories and associated noise levels considered to be acceptable for such categories. As defined in 23 CFR 771 and TRANS 405, a noise impact occurs when predicted noise levels approach or exceed the values in Table 3-16. "Approach" is defined as being 1dBA less than the indicated values. For example, in activity category B, a noise impact would occur if future noise is at 66 dBA. Under TRANS 405, a noise impact would also occur if predicted noise levels are substantially higher than existing noise levels (15 dBA increase over existing levels).

If noise impacts are identified, noise abatement must be considered in accordance with the following criteria in TRANS 405:

- Noise abatement is done only to protect lower level first row buildings (closest to the highway)
- Noise abatement must reduce future predicted noise levels by at least 8 dBA
- The total cost of noise abatement may not exceed \$30,000 per benefitted residence

**Table 3-16
Noise Abatement Criteria**

Activity Category	L_{eq}(1h) (dBA)	Description of Activity Category / Land Uses
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the lands are to continue to serve their intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	—	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: 23 CFR Part 772

The No Build Alternative would continue to have noise impacts at several locations along the US Memorial drive to County M corridor due to proximity of homes and other noise receptors to the existing highway, and increases in traffic volumes over time.

Existing and future traffic noise for Build Alternatives D and E at potentially sensitive noise receptor locations (homes and public use lands) was modeled using FHWA's Traffic Noise Model (TNM 2.5). The noise receptor locations are shown on Exhibit 3-9 (Page 3-60). The noise receptor locations are the same for Alternatives D and E and were chosen based on close proximity to the existing highway and proposed improvements. The noise receptors (homes) in the Island Court and Lone Grove neighborhoods will become "first row homes" when the adjacent homes closer to US 41 are purchased.

The results of noise modeling for existing and future noise for Alternatives D and E are shown in Table 3-17. Existing noise was modeled using (2005) traffic volumes and future noise was modeled using design year (2035) traffic volumes. See Section 1 for more information on existing and forecast traffic in the project corridor.

**Table 3-17
Noise Impact Summary
(Build Alternatives D and E)**

Noise Receptor Information			Sound Level Leq (dBA)			Impact Evaluation		
Noise receptor numbers and locations (See Fig. 10)	Distance from nearest roadway lane to receptor (feet)	Type and number of representative receptors	Noise abatement criteria (NAC)	Future noise (2035)	Existing noise (2005)	Difference between existing and future noise	Difference between future noise and NAC	Impact (I) No Impact (N)
R1 Memorial Drive	257	4 Apartment buildings ¹	67	68	66	2	1	I
R2 Lone Grove Avenue	361	4 single family homes	67	69	64	5	2	I
R3 Rosewood Street	371	3 single family homes	67	67	64	3	0	I
R4 Rosewood Street	541	3 Apartment buildings ²	67	65	62	3	-2	N
R5 Lehner Park	270	Park	67	68	66	2	1	I
R6	189	2 single family	67	73	68	5	6	I

Noise Receptor Information			Sound Level Leq (dBA)			Impact Evaluation		
Noise receptor numbers and locations (See Fig. 10)	Distance from nearest roadway lane to receptor (feet)	Type and number of representative receptors	Noise abatement criteria (NAC)	Future noise (2035)	Existing noise (2005)	Difference between existing and future noise	Difference between future noise and NAC	Impact (I) No Impact (N)
Island Court		homes						
R7 Island Court	242	2 single family homes	67	69	66	3	2	I
R8 Island Court	451	3 single family homes	67	64	62	2	-3	N
R9 Island Court	483	2 single family homes	67	65	63	2	-2	N
R10 Island Court	654	2 single family homes	67	63	60	3	-4	N
R11 Memorial Drive	169	Commercial	72	69	68	1	-3	N
R12 Wietor Wharf Park	105	Park	67	73	72	1	5	I
R13 Deerfield Docks Park	175	Park	67	71	70	1	4	I
R14 East Deerfield Avenue	157	2 single family homes	67	71	70	1	4	I
R15 East Deerfield Avenue	260	1 single family home	67	70	69	1	3	I
R16 West Deerfield Avenue	168	1 single family home	67	75	70	5	8	I
R17 West Deerfield Avenue	515	1 single family home	67	66	65	1	-1	I

1: R-1 represents 4 apartment buildings, each with approximately 12 living units. 24 living units are first-floor, front facing units.
2: R-2 represents 3 apartment buildings, each with approximately 6 to 8 living units. 4 living units are first-floor, front facing units.

3.14.2 Measures to Mitigate Noise Impacts

Noise abatement measures are not proposed with this project.

Some residences in the Island Court and Lone Grove Avenue/Rosewood Street neighborhoods are already impacted by existing traffic noise that exceeds the Noise Abatement Criteria (NAC). Future traffic conditions will also cause the NAC to be exceeded at these locations. Therefore, a preliminary review was conducted to determine the feasibility of constructing noise barriers in these neighborhoods in accordance with the following criteria:

FHWA's noise regulation (23 CFR part 772.9) states that federal funds may be used for noise abatement measures when:

- The noise abatement measures will reduce the traffic noise impact, and
- The overall noise abatement benefits are determined to outweigh the overall adverse social, economic, and environmental effects and the costs of the noise abatement measures.

WisDOT's noise regulation (Wisconsin Administrative Code Chapter TRANS 405) states that noise abatement (noise barriers) is feasible and reasonable when:

- The cost of a noise barrier does not exceed \$30,000 dollars per abutting residence.
- The noise barrier would reduce noise levels by 8 dBA.
- Noise barrier cost estimates are based on \$18.00 per square foot of barrier (height x length x \$18).

Using the above criteria, it was determined that noise barriers would cost more than \$30,000 per benefited receptor in the Island Court and Lone Grove Avenue/Rosewood Street neighborhoods. In the Island Court neighborhood, six receptors were identified as benefited receptors. To achieve an 8 dBA noise reduction, a noise barrier (noise wall) 800 feet long by 15 feet high would be needed at a cost of approximately \$216,000, or \$36,000 per benefited receptor. In the Lone Grove Avenue/Rosewood Street neighborhood, three receptors were identified as benefited receptors. To achieve an 8 dBA noise reduction, a noise wall 800 feet long by 6 feet high would be required at a cost of approximately \$230,400, or \$78,000 per benefited receptor. Similarly, the distance between impacted noise receptors along East and West Deerfield Avenue makes the construction of noise barriers in this area is cost prohibitive as the cost for each benefited receptor would exceed \$30,000.

Wietor Wharf Park and Deerfield Docks Park will experience a minor increase in noise (1 dBA) under Alternatives D and E. To be perceptible by the human ear, noise must either increase or decrease by 3 dBA. Existing noise already exceeds the 67 NAC (72 dBA at Wietor Wharf Park and 70 dBA at Deerfield Docks Park). Future noise is predicted to be 73 dBA at Wietor Wharf Park and 71 dBA at Deerfield Docks Park. Because each park is treated as a single receptor, construction of noise barriers at each park is cost prohibitive, as the cost for each benefited receptor would exceed \$30,000.

3.15 Cultural Resources

Cultural resource investigations (archaeological sites and historic structures) in the overall Brown County US 41 corridor have been ongoing since the original US 41 corridor study completed in 2003. Updated investigations have been done to account for refinements made to the Area of Potential Effects (APE) that was identified for the original corridor study.

Investigations relevant to the US 41 Memorial Drive to County M project are summarized below. No archaeological sites or historic structures have been identified and all investigations have been concurred in by the Wisconsin Historical Society State Historic Preservation Office (SHPO).

June 21, 2002—The SHPO concurred in the original Section 106 review, which included archaeological and historic structure investigations for the original US 41 corridor study. At the time the initial archaeological investigations were conducted, only minimal improvements were being proposed at I-43 interchange and the County M interchange was not part of the original corridor study. No archaeological or historic sites were identified.

June 17, 2008—The SHPO concurred in a Section 106 addendum for the Memorial Drive to County M project section under WisDOT Project I.D. 1133-10-00/01. The main reason for this addendum was more extensive reconfiguration of the I-43/US 41 interchange to provide an interstate to interstate connection due to designation of US 41 as an Interstate Highway. Reconfiguration of the I-43/US 41 interchange also resulted in improvements extending farther along I-43 than originally planned. In addition, minor design refinements at the US 141/Velp Avenue interchange required additional ground disturbance at this interchange. No archaeological or historic sites were identified. SHPO concurrence in this Section 106 addendum is provided in Appendix C, page C10.

August 2008—Archaeological and historic structure investigations at the County M interchange
Initial Archaeological and historic structure investigations for the County M interchange were conducted by Commonwealth Cultural Resources Group Inc. (CCRG) when this interchange was part of the US 41 Green Bay to Abrams corridor study (WisDOT Project I.D. 1150-46-00). No archaeological sites or historic structures were identified. The Archaeological Field Survey Report documenting CCRG's 2008 archaeological investigations was part of the Section 106 addendum submitted to the SHPO in November 2010 along with a memo documenting CCRG's historic structure survey at the County M interchange.

June 2009—Archaeological resurvey at the US 141/Velp Avenue interchange

This resurvey was conducted by Archaeological Research Inc. (ARI) to account for advanced acquisition of residential parcels in the southwest quadrant of the US 141/Velp Avenue interchange (Island Court area) and commercial parcels in the northeast and southeast quadrants of the interchange. Previous investigations within the proposed right-of-way limits at this interchange were reported in the June 17, 2008 Section 106 addendum. Subsequent to that investigation, WisDOT determined that several small parcels would be acquired in their entirety. Therefore, updated investigation was done in 2009 to allow WisDOT to move forward with any razing activities at these locations. No archaeological sites were identified. The archaeological survey report documenting ARI's 2009 archaeological investigations was part of the Section 106 addendum submitted to the SHPO in November 2010. Additional historic structure investigations were not necessary because the advanced acquisition parcels are within the original APE for historic structures.

June 2010—Archaeological resurvey at the County M interchange

The County M interchange was added to the current US 41 Memorial Drive to County M project (WisDOT Project I.D. 1133-10-01) in 2009. As part of the alternatives refinement for this interchange, WisDOT considered a potential shift of the County M structure to the north which was outside the limits of the 2008 survey conducted by CCRG. Therefore, CCRG resurveyed this interchange in 2010 to account for the potential alignment shift. No archaeological sites were identified. Because there were no structures within the alignment shift area, an updated historic structure investigation was not needed. It should be noted that the County M alignment shift is no longer being considered at this time. The Archaeological Field Survey Report documenting CCRG's archaeological resurvey was part of the Section 106 addendum submitted to the SHPO in November 2010.

October 2010—Additional archaeological resurvey at the US 141/Velp Avenue and I-43 interchanges

This resurvey was conducted by ARI to account for the following design refinements which expanded the footprint of the previous resurvey covered in the June 17, 2008 Section 106 addendum:

- Beaver Dam Creek/box culvert realignment required to accommodate proposed improvements in the area of the US 141/Velp Avenue interchange.
- Design refinements at the I-43 interchange related to expansion of the Alternative C footprint (Alternative C was still under consideration at that time).
- Proposed 5-legged roundabout and associated local access frontage road on the west side of the US 141/Velp Avenue interchange

No archaeological sites were identified. The archaeological survey report documenting ARI's 2010 resurvey was part of the Section 106 addendum submitted to the SHPO in November 2010. Additional historic structure investigations were not necessary because the proposed design refinements are within the original APE for historic structures.

December 29, 2010—The SHPO concurred with the November 2010 Section 106 addendum for the Memorial Drive to County M project (see Appendix C, page C25).

3.16 Hazardous Materials

Potentially contaminated soil and contaminated localized groundwater adjacent to the US 41/141 study area is an important environmental factor in the alternatives screening process. It is WisDOT's policy to avoid acquiring potentially contaminated properties to the extent practical. Where such properties cannot be avoided for the selected improvement alternative, public and private funds are required for additional investigations and if needed, remediation.

3.16.1 Hazardous Materials Impacts

A Phase 1 hazardous materials screening inventory was done within the area of potential effect for improvements in the US 41 Memorial Drive to County M project corridor. The purpose was to review past land use, identify apparent sources of hazardous materials, and assess the potential for affecting sites that may contain environmental contaminants. The screening assessment consisted of a records search, windshield survey of residential properties, and site visits/owner interviews for commercial properties.

The records review included the DNR Leaking Underground Storage Tank (LUST) lists, Wisconsin Department of Commerce Underground Storage Tank (UST) lists, and DNR Spill lists, as well as other sources such as topographic, soil, and plat maps together with regional geologic and hydrogeologic data. Other federal and state regulatory databases were also searched.

The No Build Alternative would not affect any potential environmental contamination sites. The initial records search identified 21 potentially contaminated sites in the project's area of potential effect. Refinement of the build alternatives resulted in 7 of the 21 sites being directly impacted through right-of-way acquisition and/or construction activities. Of the 7 remaining directly impacted sites, 3 were identified as requiring no further action if right-of-way is not acquired from them; two sites were identified as requiring contract special provisions to let construction contractors know about potential contamination, one site underwent a Phase 2 investigation (WisDOT's Phase 2 Subsurface Assessment, April, 2007) and no contaminants warranting further investigation were found, and one site is currently undergoing investigation. The sediment along Duck Creek that will be disturbed as part of this project is not anticipated to contain hazardous materials.

All of the existing bridges to be replaced/removed in the US 41 Memorial Drive to County M project corridor have Asbestos Containing Materials (ACM):

- NB & SB US 41 over Velp Avenue (B-5-0064 & B-5-0065)
- NB & SB US 41 over the CN Railroad (B-5-0066 & B-5-0067)
- NB & SB US 41 over I-43 (B-5-0068 & B-5-0069)
- NB & SB US 41 over Duck Creek (B-5-0070 & B-5-0071)
- Lakeview Drive over US 41 (B-5-0129)
- Lineville Road over US 41 (B-5-0130)
- Ramp from NB US 41 to SB I-43 over I-43 (B-5-0133)

3.16.2 Measures to Mitigate Adverse Effects

If further investigation is deemed necessary during a subsequent engineering phase, the DNR and other affected parties would be notified of the results. WisDOT would work with concerned parties to ensure disposition of any petroleum contamination to the satisfaction of the DNR, the WisDOT Bureau of Environment, and FHWA before acquisition of any questionable site, and before advertising the project for construction.

For removal of structures with ACM, the construction contract special provisions will include Standard Special Provision (STSP) 203-005 requiring ACM abatement under contract bid item 203.0210s.

3.17 Aesthetics

The visual character and aesthetic quality of an area is influenced by the composition of landscape features including landforms, streams/other water bodies, wetlands, woodlands, parks and other open space, and the extent of existing commercial, residential and industrial development.

The visual character of the US 41 Memorial Drive to County M project corridor includes primarily commercial and residential development in the US 141/Velp Avenue interchange area. The remainder of the corridor from the I-43 interchange to the County M interchange is characterized primarily by open space with scattered residential and commercial development. Notable environmental and open space features in the corridor include Duck Creek, Beaver Dam Creek, parkland, and wetland/wildlife conservation areas. In general, the visual quality of the viewshed is considered low in the US 141/Velp Avenue interchange area due to the density of residential and commercial development. The quality of the viewshed is considered medium in the remainder of the corridor from I-43 to County M, which offers a rural/open space viewshed. The Duck Creek crossing north of the I-43 interchange does offer a diverse vista of open water, floodplain, wetland, and open space. Depending on the time of day and season, waterfowl and other wildlife may also be present in wetlands and other open areas adjacent to the highway.

Area residents having a view of the existing highway and proposed improvements include those living close to the existing highway in the US 141/Velp Avenue interchange area, particularly in the Island Court and Lone Grove Avenue neighborhoods, those living in homes adjacent to US 41 in the remainder of the corridor, and persons working in commercial buildings adjacent to the existing highway. The relative number of persons with a view of the existing highway and proposed improvements is considered relatively low.

Those having a view from the existing/improved highway include travelers who use US 41 and its interchanges for local destinations or destinations outside the Memorial Drive to County M corridor. Motorists on US 41 would have short duration views of the surrounding area as they pass through the corridor. In general, peak viewing time would occur in daylight hours, coinciding with the AM and PM peak travel periods. Because of the high traffic volumes in the Memorial Drive to County M corridor, the number of people with a view from the highway is considered medium to high.

The wider US 41 mainline, flyover ramps, new structures, and other roadway components will increase the visual scale of the highway for both travelers and occupants of adjacent homes and businesses. However, since US 41 is already a dominant feature in the landscape, the increased scale would not cause a substantial change over existing conditions in the overall viewshed. Construction of a bicycle/pedestrian bridge over Duck Creek north of the I-43 interchange would provide an opportunity for a more leisurely view of the creek and its floodplain.

WisDOT is using a Community Sensitive Design (CSD) process to enhance visual aesthetics in the overall Brown County US 41 corridor. During the project's design phase, WisDOT will develop specific recommendations for the Memorial Drive to County M project section such as providing aesthetic treatments on bridges and retaining walls.

3.18 Construction

Construction related impacts for the No Build Alternative would be relatively minor and would be associated with maintaining the existing highway over time, including the cost of repairing/rehabilitating the existing pavement and structures. The remainder of this section discusses construction related impacts for Build Alternatives D and E.

3.18.1 Construction Costs

Construction costs for purposes of this EIS have been calculated to account for inflation between 2010 and the end of the multi-year construction that is currently envisioned to occur between 2013 and 2017. WisDOT and FHWA assume a 4% annual inflation rate.

The immediate economic impact of the Build Alternatives would be expenditure of state and federal funds to reconstruct the project area freeway system. The estimated construction cost estimate for Alternative D is \$220 million and the estimated construction cost for Alternative E is \$230 million. These estimates include costs for new roadways and structures, wetland mitigation, and costs for community sensitive design measures.

3.18.2 Construction Noise

Noise will be generated by construction equipment during the construction period for the proposed improvements. Typical construction equipment would include dump trucks, graders, cranes, bulldozers, pile-driving equipment and pavement construction equipment. The noise generated during construction will vary greatly depending on the equipment type and model, mode and duration of operation, and specific type of work effort. Typical noise levels would be in the 75 to 95 dBA range at 50 feet. Additional noise/distance information is listed in Table 3-18.

**Table 3-18
Construction Noise/Distance Relationships**

Distance From Construction Site (feet)	Range of Typical Noise Levels (dBA)
25	82-102
50	75-95
100	63-89
200	63-83
300	59-79
400	57-77
500	55-75
1000	49-69

Sources: U.S. EPA and WisDOT

Variations in building setbacks and land use, local intensity of specific construction activities, and sequencing and timing of construction will result in varying degrees of exposure to construction noise and thus varying levels of impact. Adverse effects related to construction noise are anticipated to be of a localized, temporary, and transient nature.

To reduce the potential impact of construction noise, the construction contract special provisions will require operation of motorized equipment in compliance with all applicable local, state and federal laws and regulations relating to noise levels permissible within and adjacent to the project construction site. All motorized construction equipment would be required to have mufflers constructed in accordance with the equipment manufactures specifications or a system of equivalent noise reducing capacity. The special provisions would also require that mufflers and exhaust systems be maintained in good operating condition, free of leaks and holes.

3.18.3 Air Quality (Emissions and Dust)

Demolition and construction activities can result in short-term increases in dust and equipment-related particulate emissions in and around the project area. Equipment-related particulate emissions would be minimized if the equipment is well maintained. The potential air quality impacts will be short-term, occurring only while demolition and construction work is in progress. Air quality impacts during construction would be generated by motor vehicle, machinery and particulate emissions resulting from earthwork and other construction activities. Construction vehicle activity and the disruption of normal traffic flows may result in increased motor vehicle emissions within certain areas. Construction vehicle emission impacts would be mitigated through implementing and maintaining a comprehensive traffic control plan, enforcing emission standards for gasoline and diesel construction equipment and stipulating that unnecessary idling and equipment operation should be avoided.

Off-road diesel engines can contribute to the levels of particulate matter and nitrogen oxides in the air. Several air quality construction mitigation best practices are available for reducing diesel emission impacts from construction equipment.

In recent years, U.S. EPA has set emissions standards for engines used in most new construction equipment. Pollutant emissions from older off-road diesel engines can be reduced through measures such as reducing idling, properly maintaining equipment, using cleaner fuel, and retrofitting diesel engines