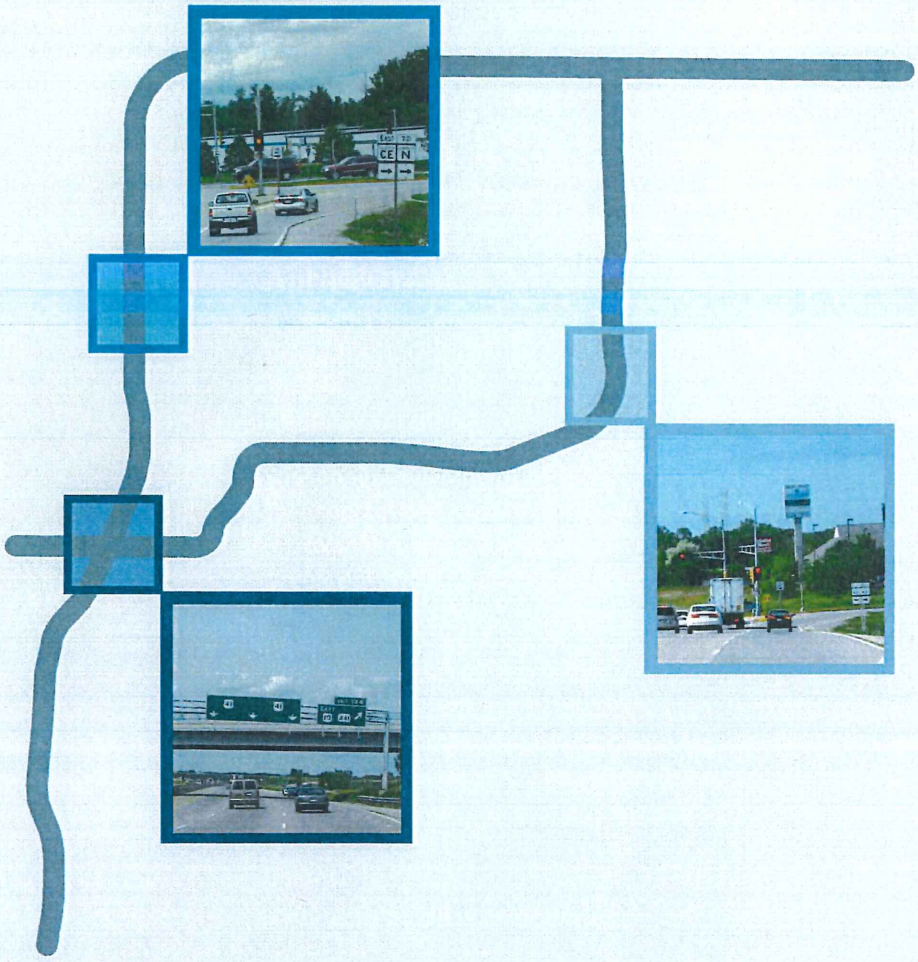
Prepared using
2011 traffic data -
2013 traffic data at US 41 & WIS 96 interchange -
and 2005-2007 crash data.

US 41–WIS 441 OPERATIONAL NEEDS STUDY

US 41 (North of Breezewood Lane to Orange Lane) *and* WIS 441 (East of US 10 to North System Interchange)



PHASE II REPORT

April 2014

PROJ ID: 1130-31-00

PREPARED FOR

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WISCONSIN DEPARTMENT OF TRANSPORTATION

HNTB

EXECUTIVE SUMMARY

ES.1 Study Purpose and Location

This report has been compiled for the use by Wisconsin Department of Transportation staff to evaluate potential costs associated with a potential program of short to long term projects aimed at expanding US 41 in the Fox Valley area. The study limits starts just north of Breezewood Lane in Neenah, Winnebago County and ends at Orange Lane in De Pere, Brown County (refer to Figure ES1-1 on page ES-2). For this study, the US 41 (31.567 miles) and WIS 441(4.253 miles) study corridors have been broken into eight (8) individual segments (refer to Figure ES1-2 on page ES-3). The segment concepts developed in this report are intended to provide a conservative footprint and cost estimate with a planning level understanding for subsequent environmental assessment and public review during a future National Environmental Policy Act (NEPA) study. The planning study seeks to identify the potential layout, obstacles and costs to expand US 41 by one lane each direction through the majority of the corridor. The planning study is evaluating operational needs through year 2038. The 2038 horizon year was selected for this study due to the overlapping efforts for the WIS 441 Tri-County Freeway Project, which was programmed for completion by year 2018 at the time of traffic forecast development, requiring a 2038 horizon year forecast to provide a 20-year design life.

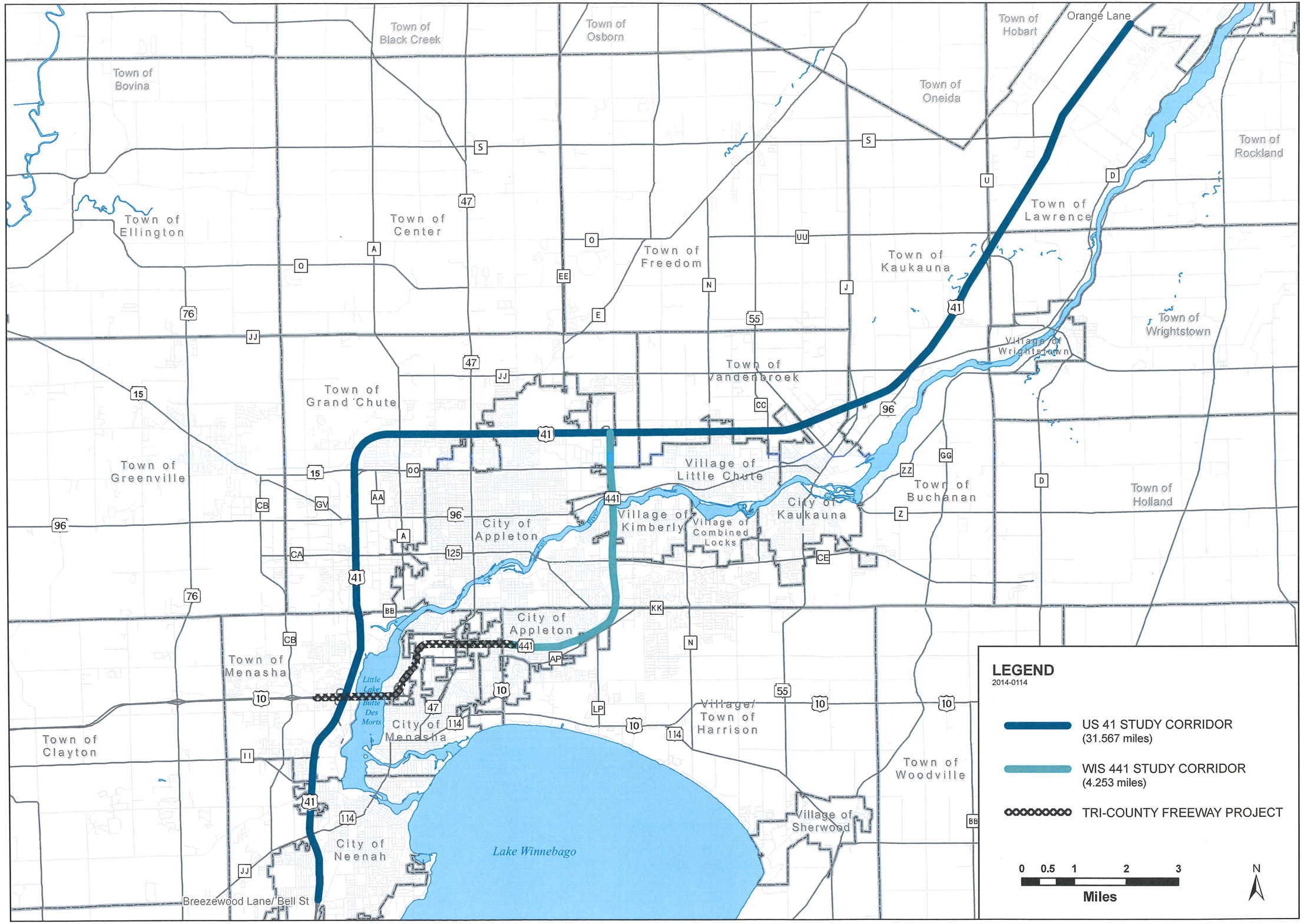

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FIGURE ES-1

US 41 AND WIS 441 STUDY AREA MAP

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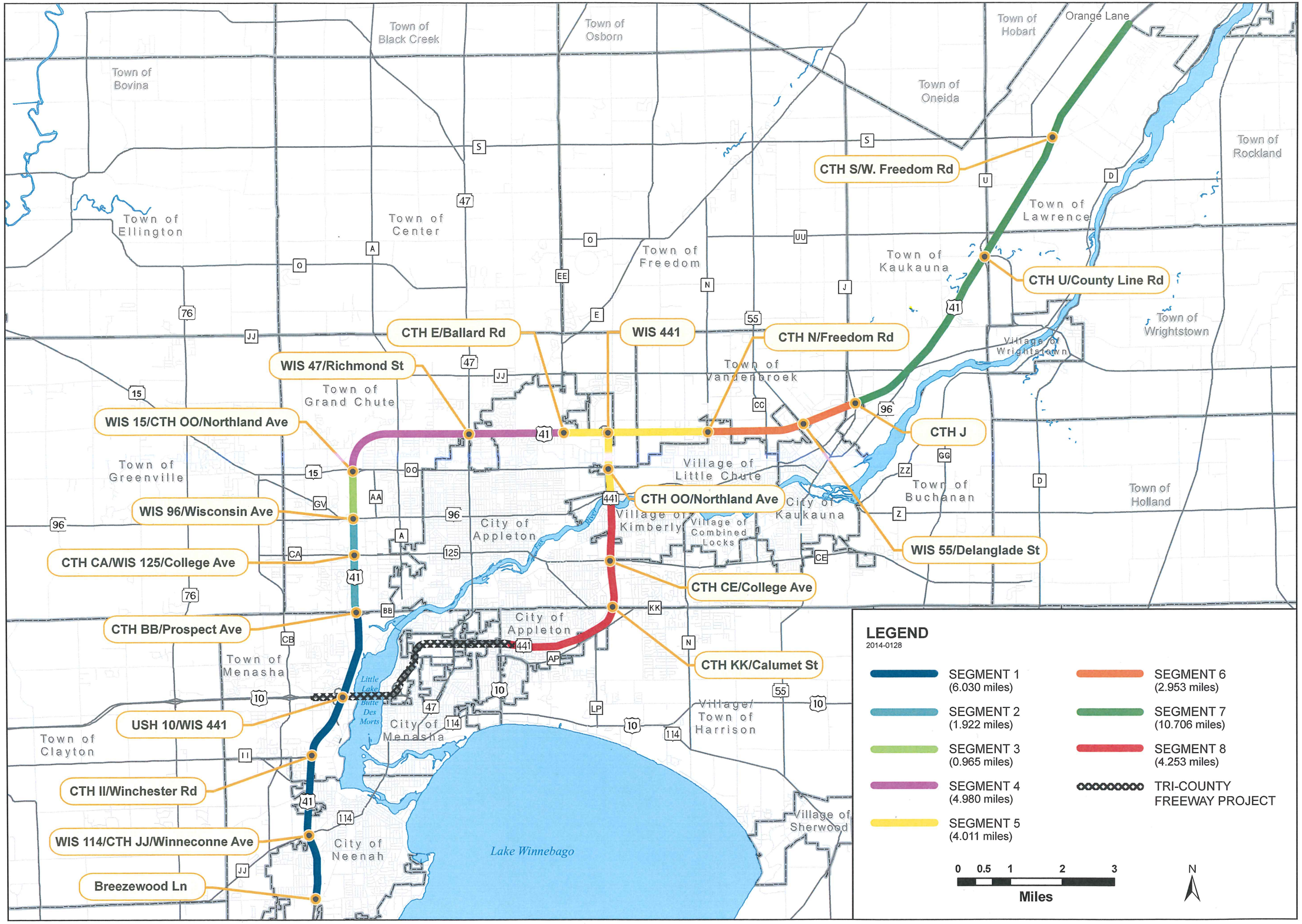
US 41/WIS 441 CORRIDOR

FIGURE ES-2

MAP OF US 41 AND WIS 441 SEGMENTS



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US 41/WIS 441 CORRIDOR

ES.2 Recent and Ongoing Construction

The segments of US 41 just south of Breezewood Lane, Neenah, Winnebago County and north of Orange Lane, De Pere, Brown County are currently under reconstruction to six (6) lanes. Winnebago County mainline work is complete with on-going side-road expected to be complete by 2014 whereas for Brown County, construction completion is scheduled for 2017.

ES.3 Recent and Ongoing Studies

The following recent and ongoing studies address certain sections of the study area and have been used as appropriate in development of this report at the request of the Wisconsin Department of Transportation.

US 41 (Wisconsin State Line – Green Bay) Interstate Conversion, Ongoing

The federal Safe, Accountable, Flexible, Efficient Transportation Equity Act, A legacy for Users (SAFETEA-LU) was enacted in 2005 and designated US 41 as a future Interstate route. WisDOT is currently preparing final environmental documents for the US 41 Interstate Conversion scheduled for completion in spring 2014. The documents pull together community and agency interests and recommends a future course of action. Interstate design standards developed in the Interstate Conversion project have been utilized for this report.

WIS 441 Tri-County Project, County CB – Oneida Street Project, Ongoing

WisDOT is currently preparing design plans and draft PS&E documents to add mainline capacity to US 10/WIS 441, constructing a new parallel bridge crossing for Little Lake Butte des Morts, redecking the existing bridge, reconstructing the US 41 and US 10/WIS 441 system interchange, realigning WIS 441 deficient geometrics, reconstructing County P (Racine Street) interchange, WIS 47 (Appleton Road) interchange, US 10 (Oneida Street) interchange and addressing freeway lighting and Intelligent Transportation Systems (ITS). Construction is currently scheduled to begin in 2014 and extend through 2019.

Operational Needs Assessment, US 41 (CTH JJ/WIS 114 – CTH S) and WIS 441, November 2011

WisDOT completed the Phase 1 Operational Needs Study to identify geometric and safety deficiencies primarily at the interchange locations within the study area. A set of recommendations were developed to address these deficiencies prior to capacity expansion of the mainline. These short- to medium-term improvements have been reevaluated in this report based on the updated traffic operational analysis.

WisDOT Backbone Needs and Improvement Study for WIS 125 Interchange, March 2007

WisDOT prepared a study report analyzing existing conditions and future needs, and identifying improvement alternatives to address needs for the WIS 47/US 41 Interchange. The study assisted the WisDOT Backbone Programming Committee in determining future interchange programming needs and prioritization for interchange improvement projects. Based on that

report, improvements were constructed at the ramp terminals and long term recommendations were brought into this report.

College Avenue Traffic Safety and Operational Study, October 28, 2002

WisDOT prepared this report working with Outagamie County, City of Appleton, and the Town of Grand Chute. The College Avenue study area included intersections from Casaloma Drive through Perkins Street including frontage road intersections on north and south sides. This study provided short-, medium-, and long-term recommendations that address safety and operational issues along the corridor. Based on that report, improvements were constructed at the ramp terminals.

WisDOT Backbone Needs and Improvement Study for WIS 96 Interchange, April 2007

WisDOT prepared a study report analyzing existing conditions and future needs, and identifying improvement alternatives to address needs for the WIS 47/US 41 Interchange. The study assisted the WisDOT Backbone Programming Committee in determining future interchange programming needs and prioritization for interchange improvement projects. Based on that report, improvements were constructed at the ramp terminals.

WisDOT Backbone Needs and Improvement Study for WIS 47 Interchange, May 2007

WisDOT prepared a study report analyzing existing conditions and future needs, and identifying improvement alternatives to address needs for the WIS 47/US 41 Interchange. The study assisted the WisDOT Backbone Programming Committee in determining future interchange programming needs and prioritization for interchange improvement projects including Project ID 1130-33 to be constructed in year 2014.

WisDOT Backbone Needs and Improvement Study for WIS 55 Interchange, May 2008

WisDOT prepared a study report backbone study methodology, analyzing existing conditions and future needs, and identifying improvement alternatives to address needs for the WIS 55/US 41 Interchange. Project ID 4650-08-71 is a WisDOT design project for the WIS 55 interchange roundabout alternative improvements to be constructed in year 2017.

WIS 441/ CTH KK Interchange Evaluation, August 2008

WisDOT prepared a study report using backbone study methodology, analyzing existing conditions and future needs, and identifying improvement alternatives to address needs for the WIS 441/County KK Interchange. Short-term and long-term alternatives were evaluated.

WIS 441/ CTH KK Corridor Expansion Study, June 2012

WisDOT prepared this study report in collaboration with Calumet County, Outagamie County, City of Appleton, Town of Buchanan, Town of Harrison, and ECWRPC to aid in updating the vision for the CTH KK corridor to be shared and implemented by the local stakeholders. The

corridor expansion study area covered several intersections including CTH KK, CTH CE, CTH AP, Kensington Drive, Eisenhower Drive, CTH LP and US 10. Several alternatives were investigated including signalized intersections, roundabout intersections, and high efficiency interchanges such as a single point urban interchange (SPUI) and a diverging diamond interchange (DDI).

STH 441/ CTH KK Area Traffic Study Summary Report, September 2000

The East Central Wisconsin Regional Planning Commission (ECWRPC) worked with local jurisdictions to prepare this study for the southeast portion of the Fox Cities. A technical advisory committee with representatives from Outagamie County, Calumet County, City of Appleton, Town of Buchanan, Town of Harrison, WisDOT NE Region, WisDOT forecast section, UW Extension and ECWRPC convened throughout the study. The purpose of the study was to assess the traffic impact to the STH 441 and CTH KK interchange and adjacent street and highway system.

Brown County Southern Crossing EIS, Ongoing

Brown County, Wisconsin, in cooperation with the Wisconsin Department of Transportation (WisDOT) and Federal Highway Administration (FHWA), is developing an Environmental Impact Statement (EIS) for a new Fox River bridge and connecting arterial street system. The EIS is being completed for the three project alternatives:

- Alternative 1: A new Fox River bridge and connecting arterial street system along Scheuring Road and Heritage Road
- Alternative 2: A new Fox River bridge and connecting arterial street system along Rockland Road and Red Maple/Southbridge Road with a full-service interchange at US 41
- Alternative 3: A new Fox River bridge and connecting arterial street system along Rockland Road and Red Maple/Southbridge Road with an overpass at US 41.

The Record of Decision for the EIS is anticipated in 2015.

ES.4 Traffic Counts and Forecasts

Updated traffic counts were collected in 2011 at each interchange throughout the study area. These updated counts were used in conjunction with the previously collected 2008 traffic counts to re-establish a base condition for year 2011. The 2011 counts were then used to forecast traffic volumes for 2038 using the Northeast Region travel demand model and the US 41/WIS 441 corridor Paramics model. See Appendix 1 for Traffic Forecasting Methodology, which provides further details on the development of traffic projections.

The Traffic Forecasting Methodology includes estimates of K30, K100 and K250 values for each segment of US 41 and WIS 441. This assessment of future traffic volumes indicates the need for 8 lanes along US 41 between the Breezewood/Bell interchange at the southern end of the project to WIS 125 (College Avenue). Traffic operations along US 41 between WIS 125 and WIS 96 (Wisconsin Avenue) currently require an auxiliary lane connecting the two interchanges,

bringing the effective cross section to 8 lanes, as constructed in 2013. The future traffic volumes indicate the need for 6 lanes along the remainder of US 41 from WIS 96 to Orange Lane in Brown County. Expansion of WIS 441 from US 10 (Oneida Street) to the northern system interchange with US 41 is less clearly indicated by the future traffic volumes, with a mix of 4 and 6 lane requirements. The WIS 441 corridor was reviewed for expansion to 6 lanes within this report as detailed in Segment 8.

Traffic projections for the US 41 interchange with WIS 96 were updated in early 2013 based on concerns that the traffic count collected on December 1, 2011 was impacted by the holiday shopping activities of the Fox Valley Mall to the west. A subsequent count collected on January 16, 2013 was used to reestablish the 2038 traffic projections along WIS 96. See Appendix 18 for more details.

ES.5 Interchange Traffic Operational Analysis

Traffic operations for each interchange intersection, and most immediately adjacent cross-street intersections were evaluated for design year 2038 peak hour volumes. For this planning-level study, the desire is to establish a conservative but reasonable footprint which results in mostly traditional signalized intersections with a few modern roundabouts at select interchanges.

The recommended analysis procedures for predicting traffic operations at modern roundabouts were updated during the course of this study. WisDOT currently recommends the use of Highway Capacity Software for Roundabout analysis, in lieu of the previously recommended RODEL software. The change in software was accompanied by recommended model parameters for gap acceptance. These changes to the analysis procedure required a review of previous roundabout operational analysis. See Appendix 2 for further discussion on changes to the analysis procedures and corresponding impacts to the operational analysis of roundabouts within the study area.

Several intersections throughout the study area have 2038 traffic projections that result in unacceptable traffic operations when evaluated as a 3 lane roundabout. These locations were reevaluated as traditional signalized interchanges. In keeping with this study's goal of establishing a conservative footprint, innovative solutions such as Diverging Diamond Interchanges (DDI), Single Point Urban Interchange (SPUI) or Echelon interchanges were not evaluated. These interchange types may provide significant increases in traffic operational efficiency along with reduced footprints and costs, and should be evaluated during subsequent NEPA studies and through the Intersection Control Evaluation (ICE) phase of design.

ES.6 Interchange Design Standards

US 41 is currently under study for conversion to an Interstate throughout this project's study limits. The conversion to an Interstate requires any future mainline reconstruction or expansion to utilize Interstate design standards. The concepts displayed in this report follow the standards developed for the current US 41 and WIS 441 design projects. See Appendix 3 for a listing of the US 41 Interstate design standards and WIS 441 design standards used within this report

US 41 and WIS 441 expansion conceptual layouts presented in the segment exhibits were developed in schematic line work form only using Interstate design criteria, without detailed

engineering of the concepts. Horizontal alignments were not developed for any roadway element including mainline, service or system interchange ramps, cross roads or frontage roads.

Two foot county topography contours were obtained to determine crude dimensions for structural bridge and retaining wall needs, new system interchange mainline and ramp slopes. Vertical alignments were not developed for any roadway element using Interstate criteria.

Assumptions for real estate needs along the corridor were developed using right-of-way mapping obtained from the GRAEF ftp site with US 41 project right-of-way data. Areas shown indicate possible impact locations that should be further reviewed during the future NEPA project. These designated areas may increase in size and severity of impact based upon preliminary horizontal and vertical alignments to be generated.

For the majority of the corridor, the suggested US 41 mainline median is generally a 36.5-foot median that has 14-foot inside shoulders and two single face 52-inch barriers. The future NEPA study and preliminary design may determine that a single 52-inch median barrier with 16.75-foot inside shoulders similar to Brown County's typical section is desirable allowing for future conversion of the inside shoulder to HOV lane use. The two barrier layout was used for cost estimating purposes as the conservative option.

The expansion conceptual layouts generally used parallel type entrance ramps and tapered type exit ramps unless geometric needs deemed otherwise. Future study should consider alternative exit ramp configurations, including the use of auxiliary lanes that facilitate dual lane exits with a choice lane configuration. Entrance ramp acceleration length was typically shown as 1200-feet plus a 360-foot end taper to provide a conservative length for cost estimates and pre-NEPA environmental screening reviews. Entrance and exit ramp curve R_1 was set as 1350-feet for a 60 mile-per-hour (mph) design speed with increasing (entrance) or decreasing (exit) design speeds of 10 mph increments.

The expansion conceptual auxiliary lane layout at exit ramps extends the auxiliary lane from the exit ramp to merge in just prior to the entrance ramp location. This provides a conservative roadway length and structure width for cost estimates and pre-NEPA environmental screening.

Within the expansion concept, outside concrete barrier (42-inch) was used for locations where the clear zone or lateral clearance was not met and where slopes were estimated to be too steep. These locations may be converted to beam guard or averted through providing traversable side slopes within the future preliminary design.

ES.7 Pre-NEPA Environmental Screening

A pre-NEPA environmental screening was conducted to provide early insight about identifiable environmental constraints and potential impacts that may result from implementing improvements under consideration for the US 41 mainline between Breezewood Lane in Winnebago County and Orange Lane in Brown County and the WIS 441 mainline from east of US 10 in Calumet County to the north system interchange with US 41 in Outagamie County.

This assessment does not fulfill the requirements of a NEPA study, rather it is a preliminary screening that flags potential issues that would likely need further NEPA level environmental

review. Environmental analysis that would require considerable coordination effort, such as impacts to threatened and endangered species, Native American resources and indirect and cumulative effects are not addressed in this document. Future coordination with the appropriate state and local agencies, Native American Tribes and public stakeholders should start during project scoping and should be continued throughout the NEPA process.

Impacts to the surrounding environment that are recorded in this screening are based on conceptual design of a potential US 41 and WIS 441 mainline expansion and configuration of the US 41/WIS 441 north system interchange. The environmental corridor analyzed for this screening was based on 50 feet from the edge of designed pavement on either side of the highway, except along WIS 441 between the Canadian National Railway crossing north of County CE and the south Fox River bridge abutment where a higher level of engineering was done to help identify potential right-of-way acquisition needs. This more detailed analysis of right-of-way was needed to develop bridge alternatives and better understand the impacts of the WIS 441 and Fox River bridge expansion on a large number of adjacent residential properties south of the Fox River.

Table ES1-1 (page ES-10) provides an environmental overview for each mainline section of US 41. The full Pre-NEPA environmental screening for each mainline section is located in Appendix 4. Although the review was a Pre-NEPA environmental screening, similar screening worksheets were used to document the environmental issues.

The likelihood of impacts for each alternative is rated by the following Impact Rating:

- Low: No impact is expected.
- Medium: Potential for impacts, but impacts can likely be avoided or mitigated. Examples include wetland, noise, and some Section 4(f) impacts, all of which can likely be adequately mitigated or avoided by coordinating with appropriate agencies and public stakeholders, but would not preclude the ability to construct the project.
- High: Potentially severe impact is expected. Further review should be done to determine severity and significance and to develop avoidance and/or mitigation measures. Examples include impacts to cemeteries and other federally protected resources that would halt the completion of the project without significant redesign.

A Pre-NEPA summary of each individual impact is listed in Table ES1-1 (page ES-10).

Table ES1-1: Pre-NEPA Summary of Qualitative Environmental Impacts

	MAINLINE SEGMENT 1			MAINLINE SEGMENT 2		MAINLINE SEGMENT 3	MAINLINE SEGMENT 4		MAINLINE SEGMENT 5	MAINLINE SEGMENT 6		MAINLINE SEGMENT 7		MAINLINE SEGMENT 8		
	North of Breezewood Ln to Winneconne Ave	Winneconne Ave to Oakridge Rd/ Main St	Oakridge Rd/ Main St to North of County II	South of County BB to WIS 125	WIS 125 to WIS 96	WIS 96 to WIS 15	WIS 15 to WIS 47	WIS 47 to County E	US 41 and WIS 441 North System	County N to WIS 55	WIS 55 to County J	County J to County U	County U to County S	East of US 10 to County KK	County KK to County CE	County CE to North End of Fox River Bridge
SOCIO-ECONOMIC FACTORS																
A. General economics	○	◌	◌	◌	○	◌	◌	◌	◌	◌	◌	○	○	◌	◌	◌
B. Community and residential	○	○	●	◌	○	◌	◌	◌	◌	◌	○	○	◌	◌	◌	●
C. Economic development	○	◌	◌	◌	○	○	○	◌	◌	◌	◌	○	◌	○	◌	◌
D. Agriculture	○	○	○	○	○	○	○	○	◌	◌	○	○	◌	○	○	○
E. Environmental justice	◌	◌	●	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
NATURAL ENVIRONMENTAL FACTORS																
F. Wetlands	◌	○	○	◌	○	○	◌	○	◌	○	○	○	◌	◌	◌	●
G. Streams and floodplains	◌	◌	◌	●	●	◌	◌	◌	●	◌	◌	○	●	◌	◌	●
H. Lakes or other open water	●	●	○	○	○	○	○	◌	◌	◌	○	◌	○	◌	◌	○
I. Upland habitat	○	○	○	○	○	◌	○	◌	○	○	○	○	○	○	○	●
J. Erosion control	◌	◌	◌	◌	○	◌	◌	◌	◌	◌	◌	◌	○	◌	◌	◌
K. Storm water management	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
PHYSICAL ENVIRONMENTAL FACTORS																
L. Air quality	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
M. Construction noise	◌	◌	◌	◌	○	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
N. Traffic noise	◌	◌	◌	◌	○	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
CULTURAL ENVIRONMENTAL FACTORS																
O. Section 4(f) and 6 (f)	○	○	●	○	○	◌	◌	●	●	○	○	●	●	◌	◌	◌
P. Historic resources	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
Q. Archaeological resources	◌	◌	●	◌	◌	◌	◌	◌	◌	◌	◌	●	●	○	◌	◌
R. Hazardous substances/USTs	○	◌	◌	◌	○	◌	◌	○	◌	◌	◌	◌	◌	○	◌	◌
S. Aesthetics	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●
T. Coastal Zone	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
U. Airport	○	○	◌	◌	◌	◌	◌	○	○	○	○	○	◌	○	○	○

LEGEND: High Impact ● Medium Impact ◌ Low Impact ○

ES.8 Consideration of Traffic Operations Infrastructure Plan (TOIP)

WisDOT maintains a Traffic Operations Infrastructure Plan (TOIP), which identifies intelligent transportation system (ITS) recommendations for major corridors throughout the state. The TOIP identifies ITS improvements along the US 41 corridor, including both Appleton and Green Bay areas. Most improvements are focused at interchange locations, specifically traffic detection, traffic signal improvements, crash investigation sites, law enforcement pads and ramp closure gates. A lump sum cost of $150,000 for these improvements has been included in the cost estimates for each interchange. The TOIP maps for both Appleton and Green Bay metropolitan areas are located in Appendix 5. In addition, 1% of the overall segment or interchange costs were assumed for Corridor ITS.

ES.9 Structures

Bridges

Existing bridge plan, typical sections, and latest inspection reports were downloaded from the Wisconsin Department of Transportation Highway Structure Information (HIS) system. The expansion design concept reviewed the bridges to develop a conservative construction cost estimate. Bridge structures were reviewed to determine if their age currently exceeds 50-years old. Bridges that exceed 50-years old are shown as “Reconstruction” within the design recommendations. Interchange bridges were reviewed for new interchange configuration. If the existing bridge configuration does not allow for rehabilitation to desired geometry, the bridges are shown as “Reconstruction” within the design recommendations. If bridges were shown as “Reconstruction” in the design recommendations, the bridge geometry considered local road future expansion needs and complete streets requirements including outside bicycle lanes and wide terrace areas with sidewalks. If bridges were shown as “Rehabilitation” in the design recommendations, the bridge geometry considered local road future expansion needs including complete street requirements and makes recommendations for the retrofit to incorporate these needs. Bridges were reviewed using FDM 11-35 Attachments 1.8 and 1.9 (July 22, 2009) to meet minimum vertical clearance requirements and aim for desired vertical clearances. Design recommendations including elevation adjustments should be reviewed further within the future NEPA study.

Table ES1-2: Summary of US 41/WIS 441 Bridge Structure Recommendations

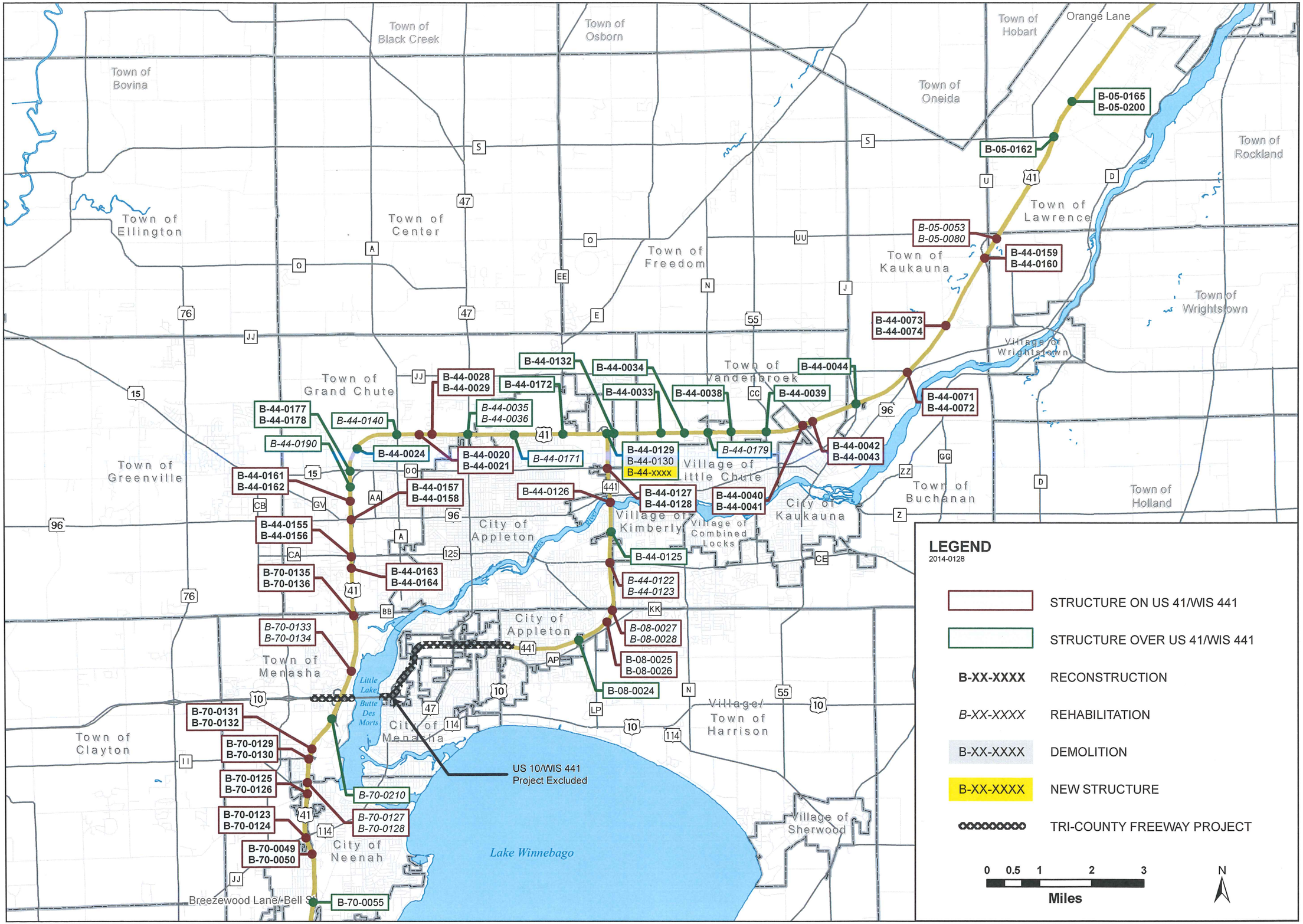
BRIDGE NUMBER	BRIDGE LOCATION	YEAR BUILT	RECOMMENDATION
	SEGMENT 1		
B-70-0049	US 41 SB over Cecil Street	1969	Reconstruction
B-70-0050	US 41 NB over Cecil Street	1969	Reconstruction
B-70-0123	US 41 SB over WIS 114	1993	Reconstruction
B-70-0124	US 41 NB over IWS 114	1994	Reconstruction
B-70-0125	US 41 SB over Main Street	1994	Reconstruction
B-70-0126	US 41 NB over Main Street	1994	Reconstruction
B-70-0127	US 41 SB over North Street	1994	Rehabilitation
B-70-0128	US 41 NB over North Street	1994	Rehabilitation
B-70-0129	US 41 SB over County II	1994	Reconstruction
B70-0130	US 41 NB over County II	1994	Reconstruction
B-70-0131	US 41 SB over American Drive/North Green Bay Road/CNRR	1994	Reconstruction
B-70-0132	US 41 NB over American Drive/North Green Bay Road/CNRR	1994	Reconstruction
B-70-0210	North Lake Street/Jacobsen Road over US 41	2001	Rehabilitation
B-70-133	US 41 SB over Menasha Creek	1992	Rehabilitation
B-70-134	US 41 NB over Menasha Creek	1992	Rehabilitation
	SEGMENT 2		
B-70-0135	US 41 SB over County BB	1992	Reconstruction
B-70-0136	US 41 NB over County BB	1992	Reconstruction
B-44-0163	US 41 SB over Spencer Street	1992	Reconstruction
B-44-0164	US 41 NB over Spencer Street	1992	Reconstruction
B-44-0155	US 41 SB over WIS 125	1992	Reconstruction
B-44-0156	US 41 NB over WIS 125	1992	Reconstruction
B-44-0157	US 41 SB over WIS 96	1992	Reconstruction
B-44-0158	US 41 NB over WIS 96	1992	Reconstruction
	SEGMENT 3		
B-44-0162	US 41 SB over Fox Valley Railroad	1992	Reconstruction
B-44-0161	US 41 NB over Fox Valley Railroad	1992	Reconstruction
B-44-0190	Bicycle/Pedestrian over US 41	2002	Rehabilitation

BRIDGE NUMBER	BRIDGE LOCATION	YEAR BUILT	RECOMMENDATION
	SEGMENT 4		
B-44-0177	WIS 15 EB over US 41	1997	Reconstruction
B-44-0178	WIS 15 WB over US 41	1997	Reconstruction
B-44-0024	Capital Drive over US 41	1960	Reconstruction
B-44-0140	County A over US 41	2005	Rehabilitation
B-44-0020	US 41 SB over Soo Line	1960	Reconstruction
B-44-0021	US 41 NB over Soo Line	1960	Reconstruction
B-44-0028	US 41 SB over Gillett Street	1961	Reconstruction
B-44-0029	US 41 NB over Gillett Street	1961	Reconstruction
B-44-0035	WIS 47 SB over US 41	1961	Rehabilitation
B-44-0036	WIS 47 NB over US 41	1961	Rehabilitation
B-44-0171	Meade Street over US 41	1996	Rehabilitation
	SEGMENT 5		
B-44-0172	County E over US 41	1995	Reconstruction
B-44-0129	US 41 SB over WIS 441 SB Ramp	1993	Reconstruction
B-44-0130	WIS 441 SB over US 41	1993	Demolition
B-44-xxxx	WIS 441 NB over US 41		New Structure
B-44-0132	French Road over US 41	1992	Reconstruction
B-44-0033	Holland Road over US 41	1960	Reconstruction
B-44-0034	VendenBroek Road over US 41	1960	Reconstruction
B-44-0127	WIS 441 NB over County OO	1993	Reconstruction
B-44-0128	WIS 441 SB over County OO	1993	Reconstruction
	SEGMENT 6		
B-44-0179	County N over US 41	2002	Rehabilitation
B-44-0038	Buchanan Street over US 41	1961	Reconstruction
B-44-0039	County CC over US 41	1961	Reconstruction
B-44-0040	US 41 SB over WIS 55	1961	Reconstruction
B-44-0041	US 41 NB over WIS 55	1961	Reconstruction
B-44-0042	US 41 SB over Maloney Road	1961	Reconstruction
B-44-0043	US 41 NB over Maloney Road	1961	Reconstruction

BRIDGE NUMBER	BRIDGE LOCATION	YEAR BUILT	RECOMMENDATION
	SEGMENT 7		
B-44-0044	County J over US 41	1961	Reconstruction
B-44-0071	US 41 SB over County JJ	2000	Reconstruction
B-44-0072	US 41 NB over County JJ	1999	Reconstruction
B-44-0073	US 41 SB over Wrightstown Road	2000	Reconstruction
B-44-0074	US 41 NB over Wrightstown Road	2000	Reconstruction
B-44-0159	US 41 SB over County U	1999	Reconstruction
B-44-0160	US 41 NB over County U	1999	Reconstruction
B-05-0080	US 41 SB over Apple Creek	1987	Rehabilitation
B-05-0053	US 41 NB over Apple Creek	1963	Rehabilitation
B-05-0162	County S over US 41	1999	Reconstruction
B-05-0165	US 41 SB over Little Rapids Road	2000	Reconstruction
B-05-0200	US 41 NB over Little Rapids Road	2000	Reconstruction
	SEGMENT 8		
B-08-024	Telulah Ave over STH 441	1992	Rehabilitation
B-08-025	STH 441 NB over Lake Park Road	1993	Rehabilitation
B-08-026	STH 441 SB over Lake Park Road	1993	Rehabilitation
B-08-027	WIS 441 NB Over County KK	1993	Rehabilitation
B-08-028	WIS 441 SB Over County KK	1993	Rehabilitation
B-44-137	WIS 441 over Drainage Way	1991	Reconstruction
B-44-122	WIS 441 NB Over County CE	1992	Reconstruction
B-44-123	WIS 441 NB Over County CE	1992	Reconstruction
B-44-124	Fox River Valley Railroad over WIS 441	1992	Reconstruction
B-44-125	Newberry Street over STH 441	1992	Reconstruction
B-44-126	WIS 441 Over STH 96 – Fox River – CNW Railroad	1992	Parallel Structure

FIGURE ES-3

SUMMARY OF US 41/WIS 441 BRIDGE STRUCTURE RECOMMENDATIONS



LEGEND

2014-0128

- STRUCTURE ON US 41/WIS 441
- STRUCTURE OVER US 41/WIS 441
- **B-XX-XXXX** RECONSTRUCTION
- *B-XX-XXXX* REHABILITATION
- B-XX-XXXX DEMOLITION
- B-XX-XXXX NEW STRUCTURE
- TRI-COUNTY FREEWAY PROJECT

0 0.5 1 2 3

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US 41/WIS 441 CORRIDOR

Retaining Walls

Existing retaining wall plans, typical sections and latest inspection reports were downloaded from the Wisconsin Department of Transportation Highway Structure Information (HIS) system and reviewed. The expansion design concepts assumed that all existing retaining walls will need to be reconstructed. In addition, mainline or interchange locations that have tight right-of-way locations assumed that retaining walls would be needed. The potential retaining wall area was calculated by using 2-foot topographic contour data obtained from County websites. Mechanically Stabilized Earth (MSE) walls were assumed for this study.

Noise Walls

Existing noise wall plans, typical sections and latest inspection reports were downloaded from the Wisconsin Department of Transportation Highway Structure Information (HIS) system and reviewed. The expansion design concepts reviewed noise walls for conflicts and only minor impacts were assumed for noise wall removal and reconstruction. Additionally, noise walls were added along the mainline in locations that have high residential use adjacent to the mainline corridor. The potential noise wall height was assumed to be 18-feet tall.

Sign Bridges

Existing sign bridge structure information was downloaded from the Wisconsin Department of Transportation Highway Structure Information (HIS) system and reviewed. All existing sign bridges were assumed to be replaced with new sign bridge structures. New sign bridges were added along auxiliary lanes and at reconstructed interchanges.

Box Culverts (classified as bridges)

Existing box culvert information was downloaded from the Wisconsin Department of Transportation Highway Structure Information (HIS) system and major culverts were reviewed. Box culverts shown on the exhibits are assumed to be reconstructed for the long term expansion design concepts.

ES.10 Complete Streets

Wisconsin's Pedestrian and Bicycle Accommodations law addressing Complete Streets was codified in 2009. It was incorporated as State Statute SS 84.01(35) and later into administrative rule as Transportation 75. For each interchange and grade separated crossing, accommodations have been included to provide for Complete Streets, including 4-foot bicycle lanes with integral curb and gutter and 5-foot sidewalks with 6-foot minimum terrace. The specific accommodations will need to be refined during the NEPA and design processes, including coordination with surrounding local government and public stakeholder.

ES.11 Utilities

Utility companies were contacted by letter, and were asked to provide locations of their facilities within the study area. The contact list for the utilities was provided by the Department. A copy of the letter, project location map, distribution list and a correspondence log are attached in

Appendix 19. Utility locations shown on the displays are approximate and will need to be verified as part of the future preliminary and final design. Most of the responses showed facilities on hard copy system maps, which were then transferred to electronic files and combined with aerial photography and potential geometrics to create roll plot exhibits. These exhibits are included within Appendix 19. In addition, approximate locations of utilities crossing the corridor were included on the segment exhibits.

ES.12 Cost Estimating Assumptions

US 41 is currently being reconstructed and expanded in both Brown County to the north and Winnebago County to the south. These construction projects are very similar in scope to the expansion being considered as part of this study, and provide a robust data set for cost estimating purposes. The University of Wisconsin-Madison Construction and Materials Support Center has created a Majors Program Cost Estimating Software for developing reliable and accurate cost estimates. Version 2 of the Microsoft Excel based spreadsheet was used for estimating the corridor by segment and interchange. The spreadsheet program summary tab was slightly modified to include pavement, base, and subbase mainline and ramp shoulder costs as separate items. Likewise, bridge re-decking and bridge widening were added as separate structural cost line items. The following quantity items are detailed within separate worksheet tabs and summarized in a Program cost summary page.

- Removing Removing pavement
- Barrier wall
- Curb & gutter
- Earthwork
- Signalized intersections
- Pavement, base, and subbase
- Bridge removal
- Bridge (new)
- Bridge (rehabilitation)
- New retaining wall
- Noise wall removal
- New noise wall
- New box culvert
- Sign bridge – cantilever
- Sign bridge – single span

The Program Cost summary page includes the items listed in Table ES1-3.

Table ES1-3: Project Cost Summary Items

Project information, scope, location and site characteristics
Items such as project ID, highway, project title and limits, project type, duration, current year, design start year, construction start year, construction end year, topography and soil type are included.
Construction costs estimate (CCE)
Major Roadway Quantity items include removing pavement, barrier wall, curb and gutter, earthwork, signalized intersections, pavement, base, and subbase.
Allowance Items include drainage, erosion control & restoration, lighting, roadway incidentals, signing and marking, traffic control & staging, and ITS/FTMS are based upon percentages of major roadway quantities.
Structure costs include bridge removal, new bridges, bridge re-decking, bridge widening, retaining walls, noise wall removal, noise walls, box culvert/extension, cantilever sign bridge or single span sign bridge and structural incidentals.

Special Construction Elements such as temporary bridges, temporary roadways, environment mitigation, community sensitive design, hazardous materials and bypass/alternative routes are included.
Community sensitive solutions (CSS)
Item is based upon a percentage of CCE items above. The maximum percentage allowed is: • 3% of roadway, mobilization, and design contingency costs • 7% of new bridge costs (per bridge) • 5% of retaining wall costs • 4% of noise wall costs
Base construction costs estimate (BCCE)
Represents summation of CCE and CSS cost items.
Scope change allowance items
Items are figured based upon a percentage of BCCE. Some scope change items to consider are construction methods, community interests, sight conditions or design changes.
Project delivery allowance items
Includes items such as 7.2% preliminary engineering, 5.4% final engineering, 9.2% construction engineering, 10.4% construction change orders & claims, 1.5% traffic mitigation and 1.0% public involvement estimated based upon a percentage of BCCE.
External costs
External costs such as real estate (6% mainline/10% interchange), compensable utilities (3% mainline/5% Interchange), and jurisdictional transfers (none included for this segment cost estimates) are estimated based upon a percentage of BCCE since detailed information is not currently available.
Risk adjustment items
Roundabout designs are currently evolving due to updated policies and parameters. These changes may ultimately impact the size and feasibility of roundabout construction in the future. Interchange locations identified as potentially being reconstructed with roundabouts have an additional risk adjustment equaling 10% of BCCE added to account for additional real estate, construction, and operations of future roundabouts.
Estimate uncertainty items
Current year total project cost estimate
Total cost of segment or interchange based upon summation of BCCE, scope change allowance items, project delivery allowance items, external costs, risk adjustments items, and estimate uncertainty items.

A copy of the previous Winnebago and Brown County cost data sets used for unit costs, Cost Estimating Software User Manual, Brown County data set, spreadsheet assumptions and detailed spreadsheet output is included within Appendix 6.

All costs developed for this study are priced in year 2013 dollars and do not include inflation for future year construction or material costs.

ES.13 Potential Phasing of Mainline Improvements

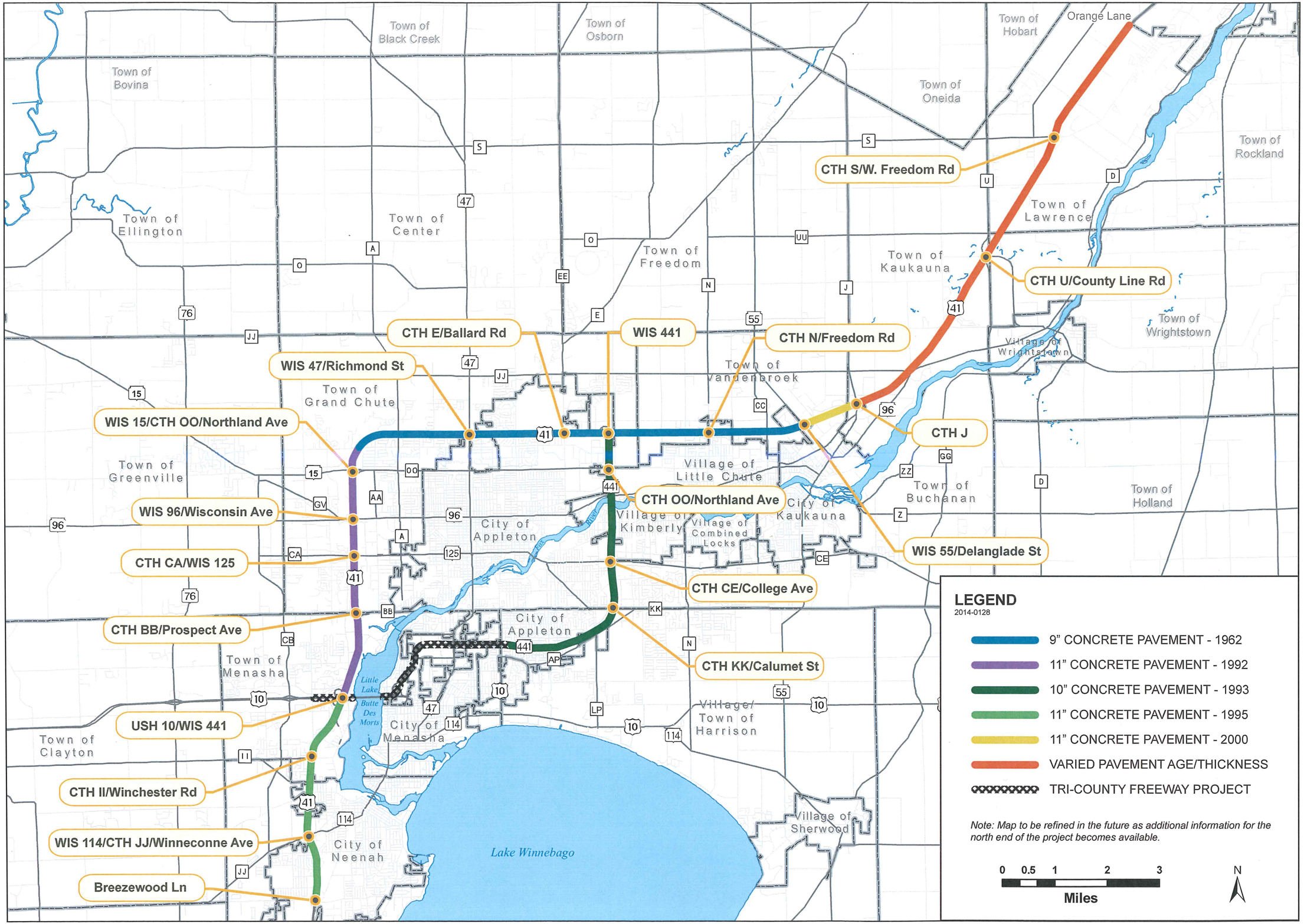
Various combinations of capacity expansion through the study area have previously been tested using the Northeast Region travel demand model. See Appendix 7 for the full technical memorandum. The results of that analysis indicated the following priority for capacity expansion. However, this may be subjected to change in the future. Refer to Figure ES1-4 (page ES-18).

- US 41: WIS 96 to WIS 15 operational improvements such as auxiliary lanes. The roadway concrete pavement (11-inch) for this area was constructed in 1992 and is included for reconstruction.

- US 41: WIS 15 to County J capacity expansion to 6 lanes. This segment has been identified in the Appleton MPO long range transportation plan as a candidate for expansion due to projected over capacity conditions by 2035. The majority of this roadway concrete pavement (9-inch) was constructed in 1962, is approaching the end of its useful life, and is included for reconstruction.
- US 41: County J to Orange Lane (South of County F) capacity expansion to 6 lanes. This segment has also been identified in the Appleton MPO long range transportation plan as a candidate for expansion, but is a lower priority than the segment between WIS 15 and County J due to lower traffic demands. Further assessment of phased expansion should consider inclusion of this segment as a priority to provide a continuous 6+ lane cross section along US 41 from WIS 26 south of Oshkosh to County M (Lineville Road) north of Green Bay. The portion of roadway from County J to Orange Lane is a patchwork of pavement ages due to modified alignments during the two to four lane expansion, including concrete pavement (9 inch) that was constructed in 1963 and is approaching the end of its useful life, along with 11 inch pavement constructed in 2000. The portion of roadway concrete pavement (11-inch) between County J and WIS 55 was recently constructed in 2000. For the purpose of this study, this pavement is included for reconstruction when expanded to 6-lanes.
- US 41: Breezewood Lane through the WIS 96 interchange, capacity expansion to 8 lanes. Current design efforts at the US 10/WIS 441/US 41 system interchange are expected to improve operations along this segment of US 41. The portion of roadway concrete pavement (11 inch) from Breezewood Lane to US 10/WIS 441 Interchange was constructed in 1995. The portion of roadway concrete pavement (11-inch) between the US 10/WIS 441 Interchange and WIS 96 was constructed in 1992. For the purpose of this study, these pavement areas are included for reconstruction when expanded to 8-lanes.
- WIS 441: Oneida Street to North System interchange (US 41/WIS 441) capacity expansion to 6 lanes. The portion of WIS 441 roadway concrete pavement (10-inch) was constructed in 1993. For the purposes of this study, this pavement area is included for reconstruction when expanded to 6 lanes.

FIGURE ES-4

MAP OF US 41/WIS 441 CONCRETE PAVEMENT AGE



LEGEND

2014-0128

- 9” CONCRETE PAVEMENT - 1962
- 11” CONCRETE PAVEMENT - 1992
- 10” CONCRETE PAVEMENT - 1993
- 11” CONCRETE PAVEMENT - 1995
- 11” CONCRETE PAVEMENT - 2000
- VARIED PAVEMENT AGE/THICKNESS
- TRI-COUNTY FREEWAY PROJECT

Note: Map to be refined in the future as additional information for the north end of the project becomes available.

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Miles

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HNTB

US 41/WIS 441 CORRIDOR

ES.14 Summary of Expansion Concept

Short-Term Interchange Improvements

Phase I of the US 41/WIS 441 Operational Needs Study identified geometric and safety deficiencies primarily at the interchange locations within the study area. A set of recommendations were developed to address these deficiencies prior to capacity expansion of the mainline. These short term improvements have been reevaluated based on the updated traffic operational analysis. Table ES1-4 (page ES-20) identifies the recommended short term improvements and implementation year that would address current operational, geometric or safety issues within the context of the potential long-term mainline expansion. If these short-term improvements are implemented, there is a risk that these improvements would likely need to be reconstructed again with the future long-term improvements. Some minor benefits such as wider pavement for traffic staging at ramps or reuse of placed construction materials would occur.

Long-Term Mainline and Interchange Improvements

Table ES1-4 (page ES-20) shows mainline section and interchange conceptual long-term improvements. Improvement description and cost estimate for each segment and interchange is also included.

Table ES1-4: Summary of Expansion Concept

SEGMENT	MAINLINE SEGMENT LIMITS/INTERCHANGES LOCATIONS	REPRESENTATIVE CONCEPTUAL IMPROVEMENT	SUGGESTED IMPLEMENTATION YEAR	US 41 & WIS 441 SHORT-TERM COST*	US 41 LONG-TERM COST*	WIS 441 LONG-TERM COST*
1	US 41: North of Breezewood Ln to South of County BB	Long-term improvement: Reconstruction to 8 lanes from Breezewood Ln to US 10/IWS 441			$206,400,000	
	WIS 114/County JJ (Winneconne Ave) Interchange	Short-term improvement (Alternative 1): Merge and diverge ramp improvements	2015-2017	$616,000		
		Long-term improvement (Alternative 4): Traditional signalized intersections			$13,583,000	
	Oakridge Rd/Main St Interchange	Short-term improvement (Alternative 5): Partial implementation of ramp terminal intersection improvements	2015-2017	$167,000		
		Long-term improvement (Alternative 5): Reconstruction with wider roadway median			$7,950,000	
	County II (Winchester Rd) Interchange	Long-term improvement (Alternative 4): Reconstruction with roundabout intersection			$11,852,000	
2	US 41: South of County BB to North of WIS 96 Structures	Long-term improvement: Reconstruction to 8 lanes from South of County BB through WIS 96			$91,203,000	
	County BB (West Prospect Ave) Interchange	Short-term improvement (Alternative 1): Extended on-ramp acceleration lanes	2015-2017	$276,000		
		Long-term improvement (Alternative 6): Reconstruction with roundabout intersection improvements			$15,367,000	
	WIS 125 (West College Ave) Interchange	Long-term improvement (Alternative 4): Traditional signalized intersections			$40,127,000	
	WIS 96 (West Wisconsin Ave) Interchange	Long-term improvement (Alternative 4): Traditional signalized intersections			$21,276,000	
3	US 41: North of WIS 96 Structures to South of WIS 15 Structures	Long-term improvement: Reconstruction with transition from 6 to 8 lanes between WIS 96 to WIS 15			$35,502,000	
4	US 41: South of WIS 15 Structures to West of County E	Long-term improvement: Reconstruction to 6 lanes from WIS 15 to County E			$133,582,000	
	WIS 15/County OO (West Northland Avenue) Interchange	Short-term improvement (Alternative 1): On and off-ramp improvements	2012-2014	$321,000		
		Long-term improvement (Alternative 6): Traditional signalized intersections with high efficiency intersection at WIS 15/Casaloma Drive Intersection.			$52,365,000	
	WIS 47 (Richmond Street) Interchange	Long-term improvement: Interchange planned for construction in 2013. Minor lump sum rehabilitation cost included.			$10,000,000	
5	US 41: West of County E to West of County N (Includes US41/WIS 441 North System Interchange) & WIS 441: Fox River Bridge to US 41	Long-term improvement: Reconstruction to 6 lanes from WIS E to County N with new system flyover interchange configuration with US 41 SB C-D Road improvements			$147,938,000	
	County E (Ballard Road) Interchange	Short-term improvement (Alternative 2): Off-ramp improvements with deceleration lanes. Look-ahead left-turn lanes along County E NB and SB.	2012-2014	$702,000		
		Long-term improvement (Alternative 5): Traditional signalized intersections with additional capacity along County E from Capitol Drive to West Evergreen Drive			$29,405,000	
	WIS 441/County OO (East Northland Avenue) Interchange	Short-term improvement (Alternative 1): Improve off-ramps	2012-2014	$603,000		
		Long-term improvement (Alternative 7): Provide WIS 441 NB on-ramp access from County OO as a loop ramp in the SE quadrant and WIS 441 NB off-ramp connection to County OO near French Road. Relocate French Road intersection further to the east on County OO.			$28,279,000	
6	US 41: West of County N to West of County J	Long-term improvement: Reconstruction to 6 lanes from County N to County J			$59,417,000	
	County N (North Freedom Road) Interchange	Short-term improvement (Alternative 1): Improve on-ramp acceleration length	2012-2014	$699,000		
		Long-term improvement (Alternative 4): Traditional signalized intersections.			$14,987,000	
	WIS 55 (Delanglade Street) Interchange	Long-term improvement: Interchange planned for construction in 2013. Minor lump sum rehabilitation cost included.			$10,000,000	

SEGMENT	MAINLINE SEGMENT LIMITS/INTERCHANGES LOCATIONS	REPRESENTATIVE CONCEPTUAL IMPROVEMENT	SUGGESTED IMPLEMENTATION YEAR	US 41 & WIS 441 SHORT-TERM COST*	US 41 LONG-TERM COST*	WIS 441 LONG-TERM COST*
7	US 41: West of County J to Orange Lane	Long-term improvement: Reconstruction to 6 lanes from County J to Orange Lane			$182,717,000	
	County J (Hyland Avenue) Interchange	Long-term improvement: Interchange recently constructed. Minor lump sum rehabilitation cost included.			$4,880,000	
	County U (South County Line Road) Interchange	Long-term improvement (Alternative 2): Add weight in motion interface and other vehicle identification equipment. Add acceleration lane from weigh station on US 41 NB. Complete street improvement along County U.			$3,034,000	
	County S (Freedom Road) Interchange	Short-term improvement (Alternative 2): Improve off-ramps along with County S turn lane improvements	2025	$706,000		
		Long-term improvement (Alternative 4): Relocate frontage roads from ramp locations to improve intersection spacing. Widen County S structures and roadway.			$10,117,000	
8	WIS 441: East of US 10 to South of US41/WIS 441 North System Interchange	Long-term improvement: Reconstruction to 6 lanes from US 10 to US 41/WIS 441 North System Interchange				$198,739,000
	County KK (Calumet Street) Interchange	Long-term improvement (Alternative 7): Traditional signalized intersections.				$27,543,000
	County CE (College Avenue) Interchange	Long-term improvement (Alternative 5): Traditional signalized intersections.				$18,113,000
Total Corridor	US 41 (North of Breezewood Lane to Orange Lane) and WIS 441 (East of US 10 to South of US 41/WIS 441 North System Interchange)			$4,090,000	$1,129,981,000	$244,395,000

** Both Short Term and Long Term Costs are shown in 2013 dollars with no future year construction or material cost increases from inflation included.*