SEGMENT 5 - US 41: WEST OF COUNTY E TO WEST OF COUNTY N (INCLUDES US 41/WIS 441 NORTH SYSTEM INTERCHANGE) (4.011 MILES)

5.1 Existing Conditions

Traffic and Operations Summary

Mainline traffic forecasts were developed for each section of segment 5 through consultation with WisDOT Traffic Forecasting section. The K30 hourly volume projections developed using the Northeast Region travel demand model for year 2038 indicate three lanes each direction, with residual hourly capacities of over 500 vehicles per hour for all sections. Traffic Analysis Forecasting Information System (TAFIS) generated K30 projections indicate a need for three lanes, with residual capacity of over 800 vehicles per hour. This segment is identified to include a collector-distributor system for southbound US 41, and an auxiliary lane for northbound US 41, which should increase operational efficiency in the segment. The WIS 441 section in segment 5 is projected to require three lanes each direction south of County OO. To address the impacts of merging and weaving associated with the system interchange between US 41 and WIS 441, additional capacity will be provided than mainline traffic forecasts may require. Additional detail concerning the traffic forecasts is available in the Traffic Forecasting Methodology memo in Appendix 1.

Safety Summary

The US 41 Interstate Conversion project has assessed crash data for a three year period along this segment of US 41. Table 5-1 below identifies the segments that exceed statewide averages for the same three year period.

Table 5-1: Segment 5 – US 41 Crash Data

SECTION	CRITERIA	3-YEAR AVERAGE RATE*	SEGMENT RATE*
US 41/WIS 441 to West of Holland Road (MM 145.0 to 146.0)	Total fatal and incapacitating crashes	1.7 (Urban)	4.3
West of Holland Road to West of County N (MM 146.0 to 147.0)	Total fatal and incapacitating crashes	1.7 (Urban)	13.0

** 3-Year Average Rate (2005-2007) represents the Wisconsin statewide average number of crashes per 100 million vehicle miles traveled for urban and rural facilities. The Segment Rate represents the actual number of crashes per 100 million vehicle miles traveled for the mainline section listed.*

Roadway Summary

The US 41 Interstate Conversion project has quantified existing geometric deficiencies that require action. Table 5-2 below identifies the deficiencies.

Table 5-2: Segment 5 – Roadway Geometric Deficiencies

SECTION	MILE MARKER	CRITERIA	ACTUAL VALUE
County E to 3600' East of French Road (MM 144.0 to MM 145.8)	144.0 to 144.2	Min. Vertical Grade = 0.5% Desired = 0.3% min.	0.10%
	144.3 NB	Min. K Crest = 401	Grade change = 0.30%
	144.8 to 145.0	Min. Vertical Grade = 0.5% Desired = 0.3% min.	0.25%
	145.1 to 145.3	Min. Vertical Grade = 0.5% Desired = 0.3% min.	0.10%
	145.3 to 145.7	Min. Vertical Grade = 0.5% Desired = 0.3% min.	0.10%
3600' East of French Road to Vandenbroek Road (MM 146.0 to MM 146.7)	146.1 to 146.3	Min. Vertical Grade = 0.5% Desired = 0.3% min.	0.10%
	146.3	Min. K Crest = 401	Grade change = 0.30%
	146.3 to 146.6	Min. Vertical Grade = 0.5% Desired = 0.3% min.	0.15%

Structures Summary

Bridges

Summary of existing bridge conditions from Highway Structure Information are shown in Table 5-3 (page 5-3) and include bridge number, mile marker, bridge name, girder type, year built, year widened or raised, overlay or new deck year, current deck state, national bridge index values for deck, superstructure and substructure, sufficiency rating and inventory ratings as of October 31, 2012.

Summary of existing bridge geometry is shown in Table 5-4 (page 5-4) and includes bridge number, mile marker, bridge name, girder type, girder depth in inches, vertical clearance, superelevation and direction of super, clear bridge width, bridge length, number of spans, span configuration, bridge skew and cross road typical section.

Table 5-3: Segment 5 – Summary of Existing Bridge Conditions

BRIDGE NUMBER	MILE MARKER (MM)	BRIDGE NAME	GIRDER TYPE	YEAR BUILT	YEAR WIDENED OR RAISED	YEAR OVERLAY OR NEW DECK	CURRENT DECK STATE	NBI [1] DECK	NBI [1] SUPER	NBI [1] SUB	SUFFICIENCY RATING [2]	INVENTORY RATING [3]
B-44-0172	144.0	County E Bridge Over US 41	Prestressed Concrete Deck Girder	1995	N/A	N/A	Original	8	8	8	95.6	22
B-44-0129	144.95	WIS 441 NB Bridge Over US 41	Continuous Steel Deck Girder	1993	N/A	N/A	Original	7	6	8	100	27
B-44-0130	144.95	WIS 441 SB Bridge Over US 41	Continuous Steel Deck Girder	1993	N/A	N/A	Original	8	6	8	99	28
B-44-0132	145.1	French Road Bridge Over US 41	Continuous Steel Deck Girder	1992	N/A	N/A	Original	8	8	8	91.7	27
B-44-0033	146.1	Holland Road Bridge Over US 41	Prestressed Concrete Deck Girder	1960	2008	N/A	Original and Raised	8	7	7	87.4	17
B-44-0034	146.6	VandenBroek Road Bridge Over US 41	Prestressed Concrete Deck Girder	1960	2009	1983	Original, Concrete Overlay, and Raised	8	6	7	81.8	15
B-44-0127	-	WIS 441 NB Over County OO	Prestressed Concrete Deck Girder	1993	N/A	N/A	Original	7	7	7	100	34
B-44-0128	-	WIS 441 SB Over County OO	Prestressed Concrete Deck Girder	1993	N/A	N/A	Original	7	8	7	100	34

1 The Federal Highway Administration (FHWA) Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (Coding Guide) is the basis for the National Bridge Inventory (NBI) Inspection. Each bridge component, i.e. deck, superstructure, or substructure, is assigned a numeric rating code ranging from 9 to 0, with 9 being "excellent condition" and 0 being "failed condition". A bridge becomes structurally deficient when the condition of the deck, superstructure, or substructure condition is 4 or less.

2 Following a thorough review of the deck, superstructure and substructure, bridges are assigned a "sufficiency rating" number between one and 100. The rating takes into account some 75 factors reviewed during a bridge inspection and also considers a bridge's age, length and width, and the average amount of traffic the bridge handles. WisDOT uses the sufficiency ratings to help prioritize bridge improvements. A bridge with a sufficiency rating of 80 or less is eligible for bridge rehabilitation funding. A bridge with a sufficiency rating of 50 or less is eligible for replacement funding. Each year, all states including Wisconsin are required to submit a report to the FHWA that reviews the condition of its bridges.

3 The FHWA currently requires that two capacity ratings, referred to as the Inventory Rating and Operating Rating be submitted with the NBI file. The Inventory Rating is the load level that a structure can safely sustain for an indefinite period. The Operating Rating is the absolute maximum permissible load level to which a structure may be subjected. The FHWA requires that the standard AASHTO HS truck or lane loading be used as the vehicle when load rating with the Load Factor Rating method (LFR) and that the AASHTO HL-93 loading be utilized as the vehicle when load rating with the Load and Resistance Factor method (LRFR). The above table is shown in LFR using the AASHTO HS truck standard. Bridges are not eligible for replacement unless the Inventory Rating is HS10 or less.

Table 5-4: Segment 5 – Summary of Existing Bridge Geometry

BRIDGE NO.	MILE MARKER (MM)	BRIDGE NAME	GIRDER TYPE	GIRDER DEPTH (INCHES)	VERTICAL CLEARANCE (FEET)	SUPER-ELEVATION %	BRIDGE CLEAR WIDTH (FEET)	BRIDGE LENGTH (FEET)	NUMBER OF SPANS	SPAN CONFIGURATION (FEET)	BRIDGE SKEW	LOCAL ROAD TYPICAL SECTION
B-44-0172	144.0	County E Bridge Over US 41	Prestressed Concrete Deck Girder	54	17.09	NC	101.5	209.83	2	105.0/101.0	No Skew	1 - 5' sidewalk west side, 3 - 12' lanes with c&g each direction, 6' median, 1 - 10' sidewalk east side
B-44-0129	144.95	WIS 441 NB Bridge Over US 41	Continuous Steel Deck Girder	54	16.80	Super Transition	40	239.33	2	106.0/128.0	No Skew	2 - 12' lanes, 1 - 6' inside shoulder, 1 - 10' outside shoulder
B-44-0130	144.95	WIS 441 SB Bridge Over US 41	Continuous Steel Deck Girder	54	16.50	Super Transition	40	233.33	2	106.0/122.0	No Skew	2 - 12' lanes, 1 - 6' inside shoulder, 1 - 10' outside shoulder
B-44-0132	145.1	French Road Bridge Over US 41	Continuous Steel Deck Girder	48	16.28	NC	32	313.33	3	103.0/94.0/111.0	No Skew	1 - 11' lane and 1 - 6' shoulder in each direction
B-44-0033	146.1	Holland Road Bridge Over US 41	Prestressed Concrete Deck Girder	36	16.40	NC	26	209.33	4	34.0/68.0/68.0/34.0	No Skew	1 - 11' lane and 1 - 3' shoulder in each direction
B-44-0034	146.6	VandenBroek Road Bridge Over US 41	Prestressed Concrete Deck Girder	36	16.31	NC	26	209.33	4	34.0/68.0/68.0/34.0	No Skew	1 - 11' lane and 1 - 3' shoulder in each direction
B-44-0127	-	WIS 441 NB Over County OO	Prestressed Concrete Deck Girder	54	16.75	NC	43	186.83	2	94.5/90.5	6º 31' LF	12 median with C&G, 3 - 12' lanes, 1 - 10' outside shoulder
B-44-0128	-	WIS 441 SB Over County OO	Prestressed Concrete Deck Girder	54	17.00	NC	43	186.83	2	94.5/90.5	6º 31' LF	12 median with C&G, 3 - 12' lanes, 1 - 10' outside shoulder

Legend:
RT = Superelevation Right
NC = Normal Crown
LT = Superelevation Left
LF = Left Forward
RF = Right Forward
N/A = Not Applicable
c&g = Curb and Gutter

Pre-NEPA Environmental Screening Summary

Impacts within Segment 5 mainly consist of “medium” and some “low” impact items. Low impact items generally include potential impacts on upland habitat, aesthetics, and airports.

Medium impact items generally include potential impacts on economic resources, community and residential resources, economic development and business, agriculture, environmental justice, wetlands, open water, air quality, noise, and the ever present potential for erosion, storm water, historic, and archaeological impacts. Even though the perceived risk of impact is considered medium, further consideration will be needed to gain a better understanding of any imminent impacts, their severity, and mitigation or avoidance measures.

High impact items included impacts on streams and Section 4(f) resources. General discussion about these impacts can be seen below. Further information on environmental impacts can be seen in the Pre-NEPA Environmental Screening located in Appendix 4.

US 41 between County E and County N and WIS 441 between Fox River Bridge and US 41

Streams

One unnamed stream crosses under the US 41 mainline five separate times between County E and County N. (WDNR Surface Water Data Viewer, 2012) Conceptual design of the US 41 and WIS 441 interchange indicates the need to realign the stream bed of this unnamed stream which currently flows just north of the interchange. One other unnamed stream crosses under WIS 441 between County OO and US 41. Future expansion of US 41 may require improvements to or replacement of existing stream crossings.

Migratory bird nests may exist on bridges and fish habitat may be present in the stream. Impacts to streams, floodplains, and habitat should be assessed in coordination with the WDNR, USACE, and the U.S. Fish & Wildlife Service.

Section 4(f)

Conceptual design plans indicate the need realign French Road at County OO to maintain adequate intersection spacing, however the current design for the realignment of the roadway would encroach on the Outagamie Pet Exercise Area. The Outagamie Pet Exercise Area is a designated park that may require Section 4(f) consultation and coordination with Outagamie County.

5.2 Expansion Design Concept

Introduction

The US 41/WIS 441 North System Interchange is analyzed as part of the mainline of Segment 5. The interchange contains geometric deficiencies for all associated loop and directional ramps within the trumpet interchange layout. A low cost alternative would be modifying the existing ramps to the extent possible without major changes to the overall footprint of the interchange. For cost estimating purposes, and to better address documented geometric deficiencies, the planning study has evaluated directional ramp improvements including a WIS 441 Northbound

Flyover Ramp combined with a US 41 Southbound collector-distributor (C-D) Road System. The C-D Road System runs from east of French Road through the North System Interchange to the County E Interchange. The ensuing discussion reviews impacts and resulting costs associated with implementing these improvements. It is anticipated that the future study will further review this alternative discussed along with other options such as “Do Nothing”, or alternatives that may improve operations without incorporating said WIS 441 Northbound Flyover Ramp and C-D Road System. Appendix 22 includes additional alternatives investigated at the North System Interchange.

Mainline Segment 5

For ease in discussion, Segment 5 –West of County E to West of County N (Includes US 41/WIS 441 North System Interchange) was broken into three mainline sections, two along US 41 (West of County E to 3500’ East of French Road and 3500’ East of French Road to West of County N) and one along WIS 441 (North of the Fox River Bridges to North System Interchange).

Section 1: US 41 - West of County E (Ballard Road) to 3500’ East of French Road

US 41 Alignment

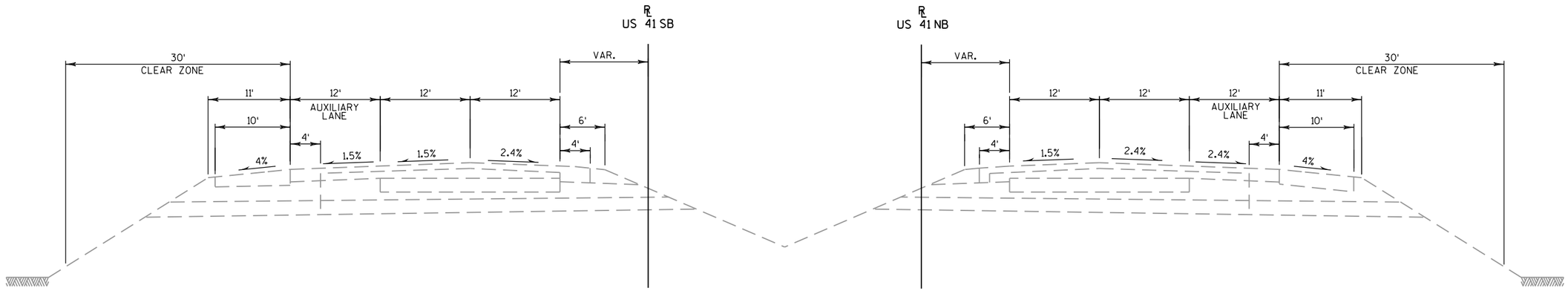
The US 41 section from County E to west of the North System Interchange is shown on the existing alignment.

Refer to Exhibit 5-2 (page 5-12) and Exhibit 5-4 (page 5-14) for further discussion on the US 41 alignment within the interchange area (5-1-A, 5-1-B, and 5-1-C).

US 41 Typical Section

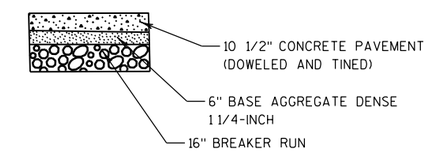
A constrained US 41 typical section exists between County E and the north system interchange. See Figure 5-1 (page 5-7).

Refer to Exhibit 5-1 (page 5-11) for further discussion on the constrained typical section (5-1-D).

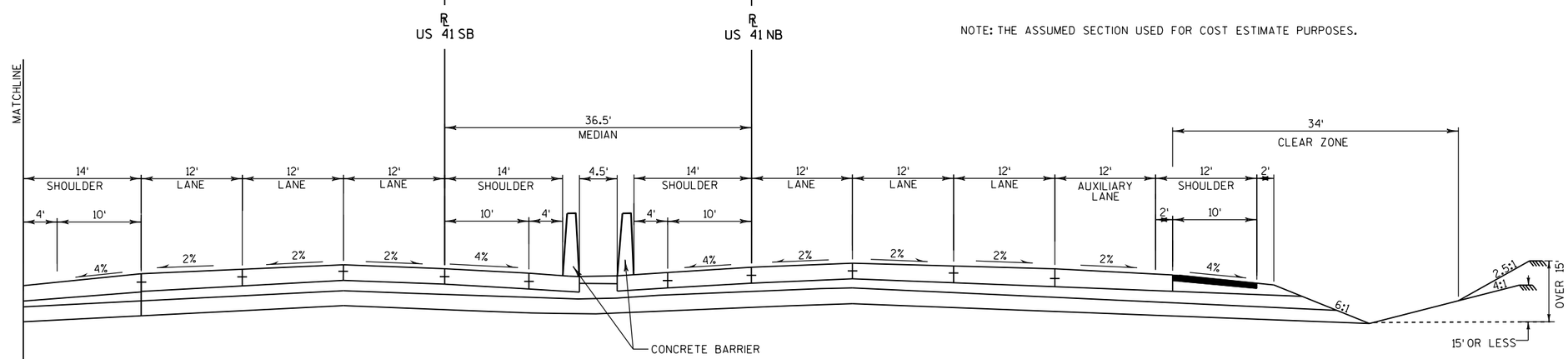


TYPICAL EXISTING SECTION

US 41 (CTH E INTERCHANGE TO WIS 441 INTERCHANGE)

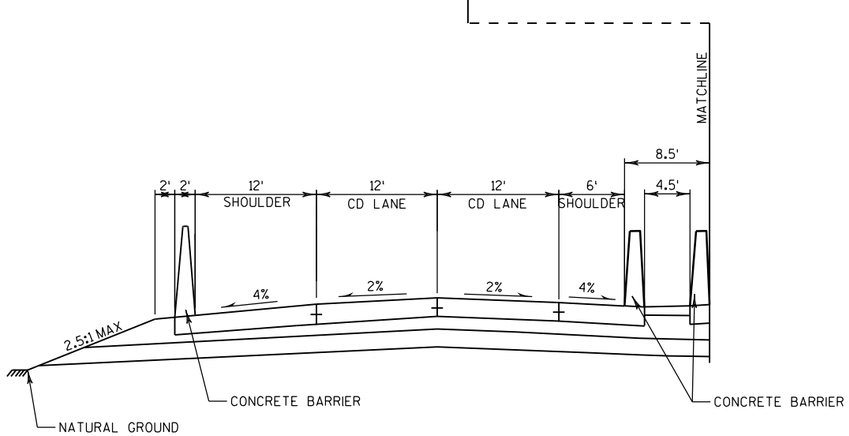


NOTE: THE ASSUMED SECTION USED FOR COST ESTIMATE PURPOSES.



DESIRABLE PROPOSED SECTION

US 41 (CTH E INTERCHANGE TO WIS 441 INTERCHANGE)



PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	FIGURE 5-1: US 41 (CTH E INTERCHANGE TO WIS 441 INTERCHANGE) TYPICAL EXISTING SECTION AND DESIRABLE PROPOSED SECTION	PAGE 5-7	E

US 41 Ramps, C-D Roads and Auxiliary Lanes

Review all exit ramp configurations for single or dual lane needs.

Refer to Exhibit 5-1 (page 5-11) for further discussion on County E northbound on-ramp (5-1-E).

Refer to Exhibit 5-2 (page 5-12) for description of the US 41 northbound to WIS 441 southbound ramp (5-1-F). In addition, refer to the “Right-of-way impacts” and “Further Analysis Recommendations” sections for more ramp information.

Refer to Exhibit 5-4 (page 5-14) for description of the WIS 441 northbound to US 41 northbound ramp (5-1-G). In addition, refer to the “Right-of-way impacts” and “Further Analysis Recommendations” sections for more ramp information. Also see “WIS 441: North of Fox River Bridges to North System Interchange”, Section 2 below, for further information on the south end approach to the ramp configuration.

See Exhibit 5-5 (page 5-15), Exhibit 5-4 (page 5-14), and Exhibit 5-2 (page 5-12) for C-D Road information (5-1-H, 5-1-I, and 5-1-J respectively).

Refer to Exhibit 5-2 (page 5-12) for information on the WIS 441 northbound flyover ramp (5-1-K). Refer to the “Structures” section below for more information on the anticipated bridge geometry layout. Critical abutment and pier foundation placement was considered within the US 41 mainline layout shown.

Refer to Exhibit 5-2 (page 5-12) for further discussion of the WIS 441 northbound flyover ramp west abutment, retaining wall and ramp embankment (5-1-L). See “Right-of-way Impacts” section for further information on impacts.

Refer to Exhibit 5-2 (page 5-12) for information on the C-D Road between WIS 441 northbound flyover ramp and the County E off-ramp (5-1-M).

Refer to Exhibit 5-1 (page 5-11) for alternative location to County E southbound off-ramp currently shown (5-1-N).

Frontage Roads

There are no significant frontage roads along this stretch of US 41. The Guardian Life Insurance Company does have a perimeter road that runs close to the property line within the southeast quadrant of the County E and US 41 Interchange.

Addressing Geometric Deficiencies

All geometric deficiencies are anticipated to be corrected during the long-term improvement expansion project. Refer to Exhibit 5-1 thru Exhibit 5-5 (pages 5-11 thru 5-15 respectively) for discussion on deficient vertical grades (5-1-O) located along US 41 mainline (MM 144.0 to 144.2, MM 144.3 NB, MM 144.8 to 145.0, MM 145.1 to 145.3, and MM 145.3 to 145.8).

Right-of-Way Impacts

Refer to Exhibit 5-3 (page 5-13) for discussion on right-of-way impacts along the US 41 northbound to WIS 441 southbound system ramp (5-1-P).

Refer to Exhibit 5-4 (page 5-14) for discussion on right-of-way impacts along the WIS 441 northbound to US 41 northbound system ramp (5-1-Q).

Refer to Exhibit 5-4 (page 5-14) for discussion on right-of-way impacts along the C-D Road system east of the US 41 southbound to WIS 441 southbound loop ramp (5-1-R).

Refer to Exhibit 5-4 (page 5-14) for discussion on minimizing adjacent right-of-way impacts along the US 41 southbound to WIS 441 southbound loop ramp (5-1-S).

Refer to Exhibit 5-3 (page 5-13) for discussion on right-of-way impacts along the C-D Road system west of the US 41 southbound to WIS 441 southbound loop ramp (5-1-T).

Utilities

The following utilities are shown on Exhibit 5-1 (page 5-11) through Exhibit 5-5 (page 5-15):

- TDS. Metrocom buried fiber optic facility located along the southerly R/W line between County E and the north system interchange (5-1-U). The TDS. Metrocom buried fiber optic line also goes under the US 41 northbound to WIS 441 southbound system ramp and WIS 441 northbound to US 41 northbound system ramp.

The following utilities are shown on Exhibit 5-1 (page 5-11):

- WE Energies buried gas main under US 41 approximately 120 feet east of County E. (5-1-W).

The following utilities are shown on Exhibit 5-3 (page 5-13):

- WE Energies buried electric line under the NW quadrant ramps of the US 41 & WIS 441 interchange (5-1-V).

The following utilities are shown on Exhibit 5-4 (page 5-14):

- ANR Pipeline buried 12-inch gas facility crossing and abandoned 6-inch line approximately 2040 feet east of French Road. (5-1-X).
- US Signal overhead fiber optic line located approximately 100 feet east of the French Road (5-1-Y).
- WE Energies two overhead electric lines approximately 150 feet east of French Road (5-1-Z).

The following utilities are shown on Exhibit 5-5 (page 5-15):

- WE Energies 138 kV overhead electric line approximately 2600 feet east of French Road and about 2600 feet west of Holland Road (5-1-AA).

Further Analysis Recommendations

Appendix 22 includes additional interchange concepts developed for the North System Interchange.

Refer to Exhibit 5-3 (page 5-13) for recommendations of further analysis to minimize property impacts along the north right-of-way line between County E and the north system interchange (5-1-AB).

Refer to Exhibit 5-3 (page 5-13) for recommendations of further analysis to minimize impacts along the US 41 northbound to WIS 441 southbound system ramp (5-1-AC).

Refer to Exhibit 5-4 (page 5-14) for recommendations of further analysis to minimize impacts along the WIS 441 northbound to US 41 northbound system ramp (5-1-AD). Refer below to further discussion that impacts the WIS 441 northbound to US 41 northbound system ramp alternatives.

The current US 41 southbound off-ramp and C-D Road system is shown as having a 6’ inside shoulder, 12’ lane, and 12’ outside shoulder as a minimum section. Since the current C-D Road has portions of the roadway as one lane segments, further consideration should be given to account for incident management along the C-D Road or along US 41southbound within the C-D-Road segment. These modifications may have additional impacts to right-of-way and would increase costs. The following are some C-D Road modifications to consider:

a) Provide a two-lane southbound off-ramp in lieu of a single-lane off-ramp. Refer to Exhibit 5-5 (page 5-15). This off-ramp would be developed with the inside lane being a choice lane of continuing on US 41 Southbound or taking the C-D Road with the outside lane being the parallel off-ramp configuration directly to C-D Road. This would be more of a permanent geometric change incorporated that would help both operations and incident management up to the loop ramp.

b) In addition to (a) above, continue the second lane west of the loop ramp similar to an auxiliary lane extension and merge in prior to the tangent section adjacent to the flyover ramp. Refer to Exhibit 5-3 (page 5-13). This should further improve the C-D Road operations as a permanent geometric change and will improve incident management through the loop, but will not address incident management past this point to the west.

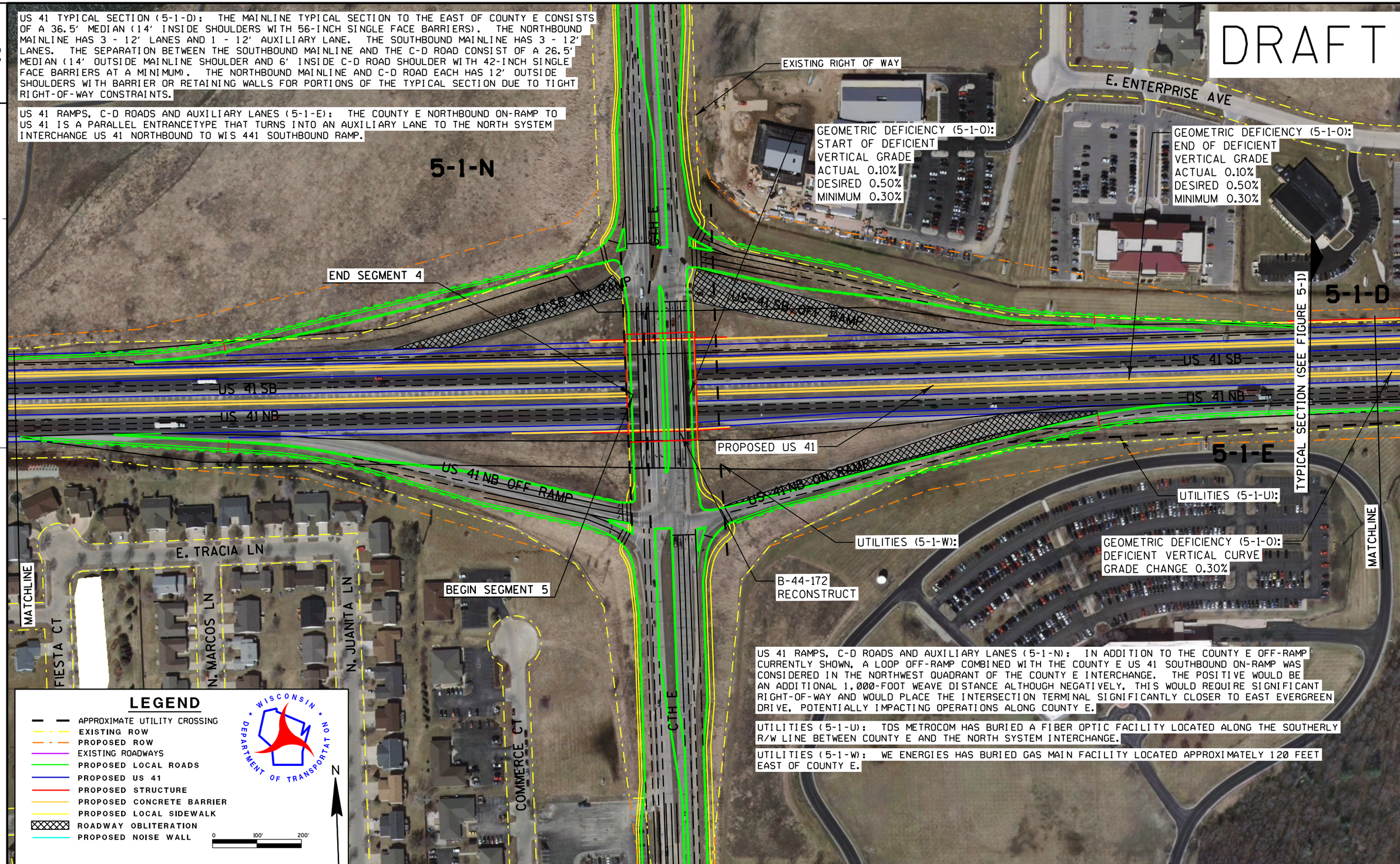
c) In lieu of the above auxiliary lane termination point as stated in (b) above, continue the auxiliary lane past the flyover ramp/C-D Road profile match point, then merge from two lanes down to one. Refer to Exhibit 5-3 (page 5-13). This option would help with incident management but would complicate the C-D Road/Flyover Ramp merge and weave distance between the north system interchange and the County E Interchange.

d) In lieu of (c) above, provide additional pavement width for the C-D Road single lane segments by either increasing lane width, the outside shoulder width, or some combination of these to provide for two lanes of incident management traffic on the C-D Road system. This could be used with or without (a) and (b) above.

The inside shoulder throughout the C-D Road system could be increased from 6-foot to a 12-foot shoulder acting as a thru lane for the entire system during a traffic incident. This could also be implemented with any combination (a), (b), (c) or (d) above as desired.

US 41 TYPICAL SECTION (5-1-D): THE MAINLINE TYPICAL SECTION TO THE EAST OF COUNTY E CONSISTS OF A 36.5' MEDIAN (14' INSIDE SHOULDERS WITH 56-INCH SINGLE FACE BARRIERS). THE NORTHBOUND MAINLINE HAS 3 - 12' LANES AND 1 - 12' AUXILIARY LANE. THE SOUTHBOUND MAINLINE HAS 3 - 12' LANES. THE SEPARATION BETWEEN THE SOUTHBOUND MAINLINE AND THE C-D ROAD CONSIST OF A 26.5' MEDIAN (14' OUTSIDE MAINLINE SHOULDER AND 6' INSIDE C-D ROAD SHOULDER WITH 42-INCH SINGLE FACE BARRIERS AT A MINIMUM). THE NORTHBOUND MAINLINE AND C-D ROAD EACH HAS 12' OUTSIDE SHOULDERS WITH BARRIER OR RETAINING WALLS FOR PORTIONS OF THE TYPICAL SECTION DUE TO TIGHT RIGHT-OF-WAY CONSTRAINTS.

US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-E): THE COUNTY E NORTHBOUND ON-RAMP TO US 41 IS A PARALLEL ENTRANCETYPE THAT TURNS INTO AN AUXILIARY LANE TO THE NORTH SYSTEM INTERCHANGE US 41 NORTHBOUND TO WIS 441 SOUTHBOUND RAMP.



US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-N): IN ADDITION TO THE COUNTY E OFF-RAMP CURRENTLY SHOWN, A LOOP OFF-RAMP COMBINED WITH THE COUNTY E US 41 SOUTHBOUND ON-RAMP WAS CONSIDERED IN THE NORTHWEST QUADRANT OF THE COUNTY E INTERCHANGE. THE POSITIVE WOULD BE AN ADDITIONAL 1,000-FOOT WEAVE DISTANCE ALTHOUGH NEGATIVELY, THIS WOULD REQUIRE SIGNIFICANT RIGHT-OF-WAY AND WOULD PLACE THE INTERSECTION TERMINAL SIGNIFICANTLY CLOSER TO EAST EVERGREEN DRIVE, POTENTIALLY IMPACTING OPERATIONS ALONG COUNTY E.

UTILITIES (5-1-U): TDS METROCOM HAS BURIED A FIBER OPTIC FACILITY LOCATED ALONG THE SOUTHERLY R/W LINE BETWEEN COUNTY E AND THE NORTH SYSTEM INTERCHANGE.

UTILITIES (5-1-W): WE ENERGIES HAS BURIED GAS MAIN FACILITY LOCATED APPROXIMATELY 120 FEET EAST OF COUNTY E.

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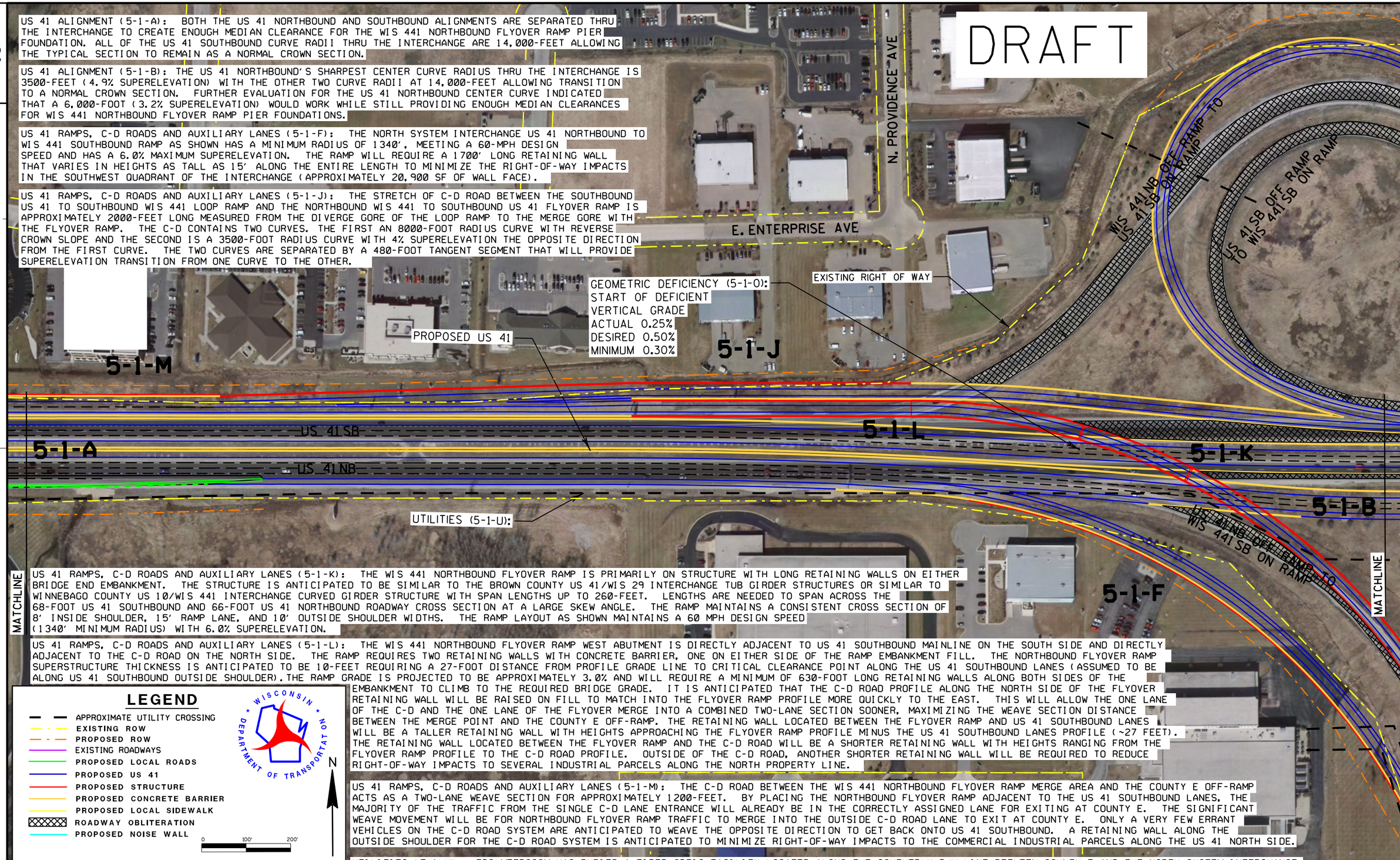
US 41 ALIGNMENT (5-1-A): BOTH THE US 41 NORTHBOUND AND SOUTHBOUND ALIGNMENTS ARE SEPARATED THRU THE INTERCHANGE TO CREATE ENOUGH MEDIAN CLEARANCE FOR THE WIS 441 NORTHBOUND FLYOVER RAMP PIER FOUNDATION. ALL OF THE US 41 SOUTHBOUND CURVE RADII THRU THE INTERCHANGE ARE 14,000-FEET ALLOWING THE TYPICAL SECTION TO REMAIN AS A NORMAL CROWN SECTION.

US 41 ALIGNMENT (5-1-B): THE US 41 NORTHBOUND'S SHARPEST CENTER CURVE RADIUS THRU THE INTERCHANGE IS 3500-FEET (4.9% SUPERELEVATION) WITH THE OTHER TWO CURVE RADII AT 14,000-FEET ALLOWING TRANSITION TO A NORMAL CROWN SECTION. FURTHER EVALUATION FOR THE US 41 NORTHBOUND CENTER CURVE INDICATED THAT A 6,000-FOOT (3.2% SUPERELEVATION) WOULD WORK WHILE STILL PROVIDING ENOUGH MEDIAN CLEARANCES FOR WIS 441 NORTHBOUND FLYOVER RAMP PIER FOUNDATIONS.

US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-F): THE NORTH SYSTEM INTERCHANGE US 41 NORTHBOUND TO WIS 441 SOUTHBOUND RAMP AS SHOWN HAS A MINIMUM RADIUS OF 1340', MEETING A 60-MPH DESIGN SPEED AND HAS A 6.0% MAXIMUM SUPERELEVATION. THE RAMP WILL REQUIRE A 1700' LONG RETAINING WALL THAT VARIES IN HEIGHTS AS TALL AS 15' ALONG THE ENTIRE LENGTH TO MINIMIZE THE RIGHT-OF-WAY IMPACTS IN THE SOUTHWEST QUADRANT OF THE INTERCHANGE (APPROXIMATELY 20,900 SF OF WALL FACE).

US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-J): THE STRETCH OF C-D ROAD BETWEEN THE SOUTHBOUND US 41 TO SOUTHBOUND WIS 441 LOOP RAMP AND THE NORTHBOUND WIS 441 TO SOUTHBOUND US 41 FLYOVER RAMP IS APPROXIMATELY 2000-FEET LONG MEASURED FROM THE DIVERGE GORE OF THE LOOP RAMP TO THE MERGE GORE WITH THE FLYOVER RAMP. THE C-D CONTAINS TWO CURVES. THE FIRST AN 8000-FOOT RADIUS CURVE WITH REVERSE CROWN SLOPE AND THE SECOND IS A 3500-FOOT RADIUS CURVE WITH 4% SUPERELEVATION THE OPPOSITE DIRECTION FROM THE FIRST CURVE. THE TWO CURVES ARE SEPARATED BY A 480-FOOT TANGENT SEGMENT THAT WILL PROVIDE SUPERELEVATION TRANSITION FROM ONE CURVE TO THE OTHER.



US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-K): THE WIS 441 NORTHBOUND FLYOVER RAMP IS PRIMARILY ON STRUCTURE WITH LONG RETAINING WALLS ON EITHER BRIDGE END EMBANKMENT. THE STRUCTURE IS ANTICIPATED TO BE SIMILAR TO THE BROWN COUNTY US 41/WIS 29 INTERCHANGE TUB GIRDER STRUCTURES OR SIMILAR TO WINNEBAGO COUNTY US 10/WIS 441 INTERCHANGE CURVED GIRDER STRUCTURE WITH SPAN LENGTHS UP TO 260-FEET. LENGTHS ARE NEEDED TO SPAN ACROSS THE 68-FOOT US 41 SOUTHBOUND AND 66-FOOT US 41 NORTHBOUND ROADWAY CROSS SECTION AT A LARGE SKEW ANGLE. THE RAMP MAINTAINS A CONSISTENT CROSS SECTION OF 8' INSIDE SHOULDER, 15' RAMP LANE, AND 10' OUTSIDE SHOULDER WIDTHS. THE RAMP LAYOUT AS SHOWN MAINTAINS A 60 MPH DESIGN SPEED (1340' MINIMUM RADIUS) WITH 6.0% SUPERELEVATION.

US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-L): THE WIS 441 NORTHBOUND FLYOVER RAMP WEST ABUTMENT IS DIRECTLY ADJACENT TO US 41 SOUTHBOUND MAINLINE ON THE SOUTH SIDE AND DIRECTLY ADJACENT TO THE C-D ROAD ON THE NORTH SIDE. THE RAMP REQUIRES TWO RETAINING WALLS WITH CONCRETE BARRIER, ONE ON EITHER SIDE OF THE RAMP EMBANKMENT FILL. THE NORTHBOUND FLYOVER RAMP SUPERSTRUCTURE THICKNESS IS ANTICIPATED TO BE 10-FEET REQUIRING A 27-FOOT DISTANCE FROM PROFILE GRADE LINE TO CRITICAL CLEARANCE POINT ALONG THE US 41 SOUTHBOUND LANES (ASSUMED TO BE ALONG US 41 SOUTHBOUND OUTSIDE SHOULDER). THE RAMP GRADE IS PROJECTED TO BE APPROXIMATELY 3.0% AND WILL REQUIRE A MINIMUM OF 630-FOOT LONG RETAINING WALLS ALONG BOTH SIDES OF THE EMBANKMENT TO CLIMB TO THE REQUIRED BRIDGE GRADE. IT IS ANTICIPATED THAT THE C-D ROAD PROFILE ALONG THE NORTH SIDE OF THE FLYOVER RETAINING WALL WILL BE RAISED ON FILL TO MATCH INTO THE FLYOVER RAMP PROFILE MORE QUICKLY TO THE EAST. THIS WILL ALLOW THE ONE LANE OF THE C-D AND THE ONE LANE OF THE FLYOVER MERGE INTO A COMBINED TWO-LANE SECTION SOONER, MAXIMIZING THE WEAVE SECTION DISTANCE BETWEEN THE MERGE POINT AND THE COUNTY E OFF-RAMP. THE RETAINING WALL LOCATED BETWEEN THE FLYOVER RAMP AND US 41 SOUTHBOUND LANES WILL BE A TALLER RETAINING WALL WITH HEIGHTS APPROACHING THE FLYOVER RAMP PROFILE MINUS THE US 41 SOUTHBOUND LANES PROFILE (~27 FEET). THE RETAINING WALL LOCATED BETWEEN THE FLYOVER RAMP AND THE C-D ROAD WILL BE A SHORTER RETAINING WALL WITH HEIGHTS RANGING FROM THE FLYOVER RAMP PROFILE TO THE C-D ROAD PROFILE. OUTSIDE OF THE C-D ROAD, ANOTHER SHORTER RETAINING WALL WILL BE REQUIRED TO REDUCE RIGHT-OF-WAY IMPACTS TO SEVERAL INDUSTRIAL PARCELS ALONG THE NORTH PROPERTY LINE.

US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-M): THE C-D ROAD BETWEEN THE WIS 441 NORTHBOUND FLYOVER RAMP MERGE AREA AND THE COUNTY E OFF-RAMP ACTS AS A TWO-LANE WEAVE SECTION FOR APPROXIMATELY 1200-FEET. BY PLACING THE NORTHBOUND FLYOVER RAMP ADJACENT TO THE US 41 SOUTHBOUND LANES, THE MAJORITY OF THE TRAFFIC FROM THE SINGLE C-D LANE ENTRANCE WILL ALREADY BE IN THE CORRECTLY ASSIGNED LANE FOR EXITING AT COUNTY E. THE SIGNIFICANT WEAVE MOVEMENT WILL BE FOR NORTHBOUND FLYOVER RAMP TRAFFIC TO MERGE INTO THE OUTSIDE C-D ROAD LANE TO EXIT AT COUNTY E. ONLY A VERY FEW ERRANT VEHICLES ON THE C-D ROAD SYSTEM ARE ANTICIPATED TO WEAVE THE OPPOSITE DIRECTION TO GET BACK ONTO US 41 SOUTHBOUND. A RETAINING WALL ALONG THE OUTSIDE SHOULDER FOR THE C-D ROAD SYSTEM IS ANTICIPATED TO MINIMIZE RIGHT-OF-WAY IMPACTS TO THE COMMERCIAL INDUSTRIAL PARCELS ALONG THE US 41 NORTH SIDE.

UTILITIES (5-1-U): TDS METROCOM HAS BURIED A FIBER OPTIC FACILITY LOCATED ALONG THE SOUTHERLY R/W LINE BETWEEN COUNTY E AND THE NORTH SYSTEM INTERCHANGE.

LEGEND

- APPROXIMATE UTILITY CROSSING
- EXISTING ROW
- PROPOSED ROW
- EXISTING ROADWAYS
- PROPOSED LOCAL ROADS
- PROPOSED US 41
- PROPOSED STRUCTURE
- PROPOSED CONCRETE BARRIER
- PROPOSED LOCAL SIDEWALK
- ROADWAY OBLITERATION
- PROPOSED NOISE WALL

WISCONSIN DEPARTMENT OF TRANSPORTATION

N

0 100' 200'

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RIGHT-OF-WAY IMPACTS (5-1-P): THE US 41 NORTHBOUND TO WIS 441 SOUTHBOUND SYSTEM RAMP IMPACTS MULTIPLE BUSINESSES WITHIN THE SOUTHWEST QUADRANT OF THE INTERCHANGE. STRIP ACQUISITIONS TOTALING APPROXIMATELY 1.8 ACRES FROM LAMINATIONS, C3 CORPORATION, AND GANNETT WISCONSIN NEWSPAPERS ARE REQUIRED FOR CONSTRUCTION OF THE RAMP AND ASSOCIATED RETAINING WALL STRUCTURES. IN ADDITION TO STRIP ACQUISITION, THE PARKING LOT AND CIRCULATION AREA FOR GANNETT WISCONSIN NEWSPAPERS IS IMPACTED BY THE RAMP AND RETAINING WALL.

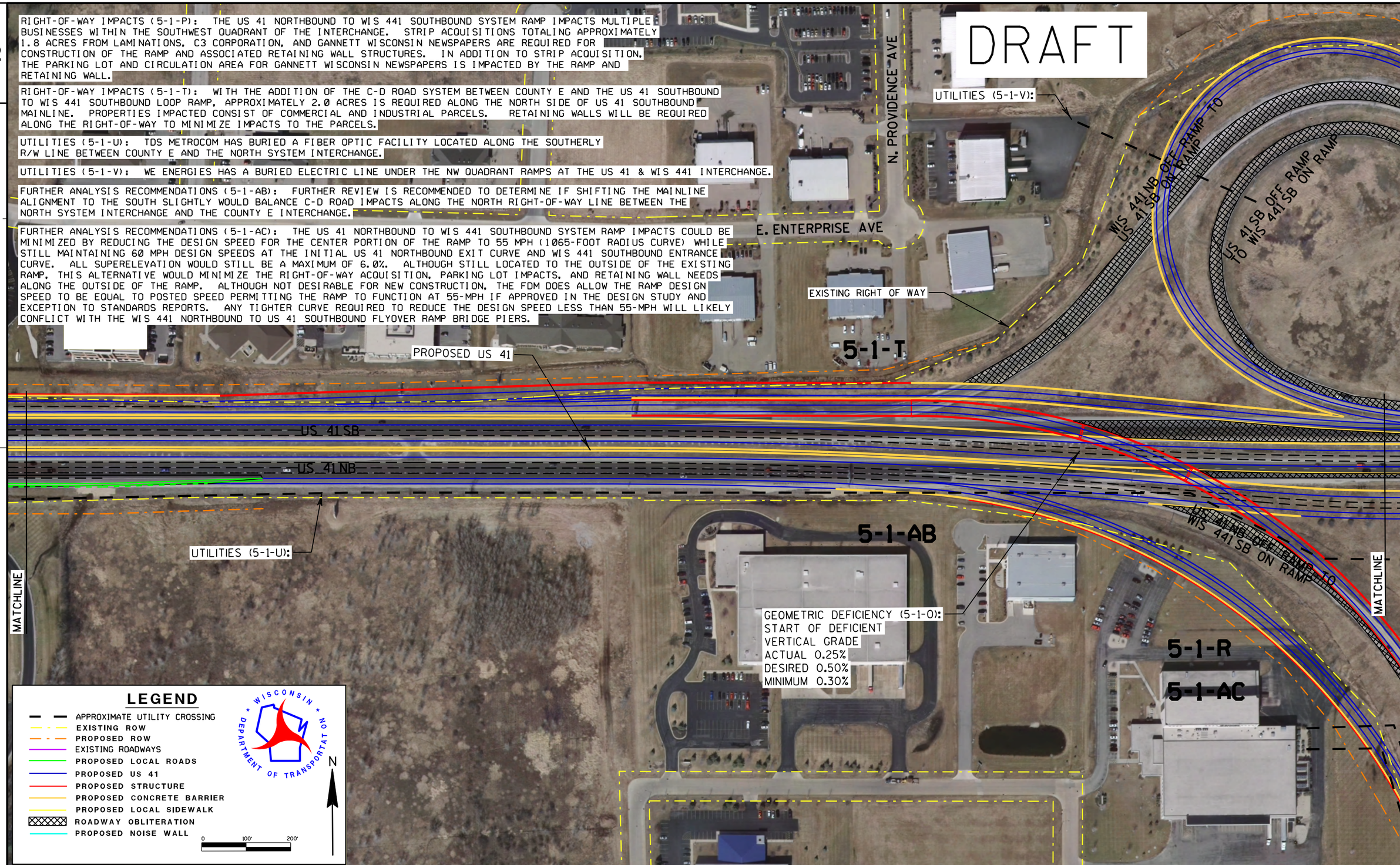
RIGHT-OF-WAY IMPACTS (5-1-T): WITH THE ADDITION OF THE C-D ROAD SYSTEM BETWEEN COUNTY E AND THE US 41 SOUTHBOUND TO WIS 441 SOUTHBOUND LOOP RAMP, APPROXIMATELY 2.0 ACRES IS REQUIRED ALONG THE NORTH SIDE OF US 41 SOUTHBOUND MAINLINE. PROPERTIES IMPACTED CONSIST OF COMMERCIAL AND INDUSTRIAL PARCELS. RETAINING WALLS WILL BE REQUIRED ALONG THE RIGHT-OF-WAY TO MINIMIZE IMPACTS TO THE PARCELS.

UTILITIES (5-1-U): TDS METROCOM HAS BURIED A FIBER OPTIC FACILITY LOCATED ALONG THE SOUTHERLY R/W LINE BETWEEN COUNTY E AND THE NORTH SYSTEM INTERCHANGE.

UTILITIES (5-1-V): WE ENERGIES HAS A BURIED ELECTRIC LINE UNDER THE NW QUADRANT RAMPS AT THE US 41 & WIS 441 INTERCHANGE.

FURTHER ANALYSIS RECOMMENDATIONS (5-1-AB): FURTHER REVIEW IS RECOMMENDED TO DETERMINE IF SHIFTING THE MAINLINE ALIGNMENT TO THE SOUTH SLIGHTLY WOULD BALANCE C-D ROAD IMPACTS ALONG THE NORTH RIGHT-OF-WAY LINE BETWEEN THE NORTH SYSTEM INTERCHANGE AND THE COUNTY E INTERCHANGE.

FURTHER ANALYSIS RECOMMENDATIONS (5-1-AC): THE US 41 NORTHBOUND TO WIS 441 SOUTHBOUND SYSTEM RAMP IMPACTS COULD BE MINIMIZED BY REDUCING THE DESIGN SPEED FOR THE CENTER PORTION OF THE RAMP TO 55 MPH (1065-FOOT RADIUS CURVE) WHILE STILL MAINTAINING 60 MPH DESIGN SPEEDS AT THE INITIAL US 41 NORTHBOUND EXIT CURVE AND WIS 441 SOUTHBOUND ENTRANCE CURVE. ALL SUPERELEVATION WOULD STILL BE A MAXIMUM OF 6.0%. ALTHOUGH STILL LOCATED TO THE OUTSIDE OF THE EXISTING RAMP, THIS ALTERNATIVE WOULD MINIMIZE THE RIGHT-OF-WAY ACQUISITION, PARKING LOT IMPACTS, AND RETAINING WALL NEEDS ALONG THE OUTSIDE OF THE RAMP. ALTHOUGH NOT DESIRABLE FOR NEW CONSTRUCTION, THE FDM DOES ALLOW THE RAMP DESIGN SPEED TO BE EQUAL TO POSTED SPEED PERMITTING THE RAMP TO FUNCTION AT 55-MPH IF APPROVED IN THE DESIGN STUDY AND EXCEPTION TO STANDARDS REPORTS. ANY TIGHTER CURVE REQUIRED TO REDUCE THE DESIGN SPEED LESS THAN 55-MPH WILL LIKELY CONFLICT WITH THE WIS 441 NORTHBOUND TO US 41 SOUTHBOUND FLYOVER RAMP BRIDGE PIERS.



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FILE NAME : J:\44386\t1\Short Term Solutions\Amendment #5\CDS\0242A_PO.dgn PLOT DATE : 12/19/2013 PLOT BY : lzidek PLOT NAME : PLOT SCALE : 200:1

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US 41 ALIGNMENT (5-1-C): THE SHIFTING OF THE US 41 NORTHBOUND AND SOUTHBOUND ALIGNMENTS TO THE SOUTH ALLOWS THE C-D ROAD SYSTEM TO ALSO SHIFT TO THE SOUTH, MINIMIZING THE IMPACT TO THE DETENTION POND LOCATED ON THE NORTH SIDE OF US 41 BETWEEN THE SYSTEM LOOP RAMP AND FRENCH ROAD.

US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-G): THE NORTH SYSTEM INTERCHANGE WIS 441 NORTHBOUND TO US 41 NORTHBOUND RAMP AS SHOWN HAS A MINIMUM RADIUS OF 1340', MEETING A 60-MPH DESIGN SPEED, AND HAVING A 6.0% MAXIMUM SUPERELEVATION. THE RAMP HAS A PARALLEL TYPE ENTRANCE ONTO US 41. THE RAMP WILL REQUIRE A 1300' LONG RETAINING WALL THAT VARIES IN HEIGHTS AS TALL AS 34' ALONG THE ENTIRE LENGTH TO MINIMIZE THE RIGHT-OF-WAY IMPACTS IN THE SOUTHEAST QUADRANT OF THE INTERCHANGE (APPROXIMATELY 34,500 SF OF WALL FACE). THE RAMP AS SHOWN DOES GO THROUGH A LOW LYING WETLAND AREA ADJACENT TO LOCAL BUSINESSES THAT WILL REQUIRE ADDITIONAL CONSTRUCTION CONSIDERATION.

US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-I): AS THE C-D ROAD APPROACHES FRENCH ROAD, A SECOND LANE IS DEVELOPED TO SEPARATE THE US 41 SOUTHBOUND TO WIS 441 SOUTHBOUND MOVEMENT FROM THE US 41 SOUTHBOUND TO COUNTY E OFF-RAMP MOVEMENT. THE SECOND LANE IS APPROXIMATELY 1500' PRIOR TO THE LOOP RAMP TO WIS 441 SOUTHBOUND. THE LOOP RAMP HAS A MINIMUM DESIGN SPEED OF 35-MPH (380' RADIUS CURVE).IT REDUCES DESIGN SPEED STARTING AT THE C-D ROAD GORE AREA FROM 60-MPH DESIGN SPEED TO 50-MPH, THEN TO 40-MPH, AND FINALLY TO 35-MPH FOR APPROXIMATELY HALF OF THE RAMP LENGTH PRIOR TO ACCELERATING THROUGH THE SAME INCREMENTS BACK TO 60-MPH FOR THE WIS 441 SOUTHBOUND ENTRANCE APPROXIMATELY AT THE BRIDGE OVER US 41.

RIGHT-OF-WAY IMPACTS (5-1-Q): THE WIS 441 NORTHBOUND TO US 41 NORTHBOUND SYSTEM RAMP IMPACTS MULTIPLE BUSINESSES (1.35 ACRES), SOME FARM LAND (0.50 ACRES) AND INCLUDES A TEMPORARY STORAGE BUILDING BUSINESS WITHIN THE SOUTHEAST QUADRANT OF THE INTERCHANGE. NO RELOCATIONS ARE REQUIRED BUT SOME IMPACTS TO THE STORAGE BUSINESS PARKING LOT CIRCULATION ARE SHOWN FOR THE RAMP RELOCATION WITH RETAINING WALL. REDUCING THE HEIGHT OF THE RETAINING WALL WOULD CAUSE ADDITIONAL RIGHT-OF-WAY IMPACTS.

RIGHT-OF-WAY IMPACTS (5-1-R): WITH THE ADDITION OF THE C-D ROAD SYSTEM TO THE EAST OF THE US 41 SOUTHBOUND TO WIS 441 SOUTHBOUND LOOP RAMP, APPROXIMATELY 3.5 ACRES IS REQUIRED ALONG THE NORTH SIDE OF US 41 SOUTHBOUND MAINLINE. PROPERTIES IMPACTED CONSIST OF FARMLAND AND LIGHT MANUFACTURING USES. RETAINING WALLS MAY BE REQUIRED ALONG INDUSTRIAL PARCEL RETENTION PONDS BUT ARE NOT INCLUDED WITH THE COST ESTIMATE AT THIS TIME.

RIGHT-OF-WAY IMPACTS (5-1-S): SIMILAR TO THE EXISTING LOOP RAMP, OUTSIDE CONCRETE BARRIER IS SHOWN ALLOWING STEEPER SIDE SLOPES FOR REDUCED RIGHT-OF-WAY IMPACTS. THE CONCRETE BARRIER ALSO PROVIDES GLARE REDUCTION FOR SURROUNDING PROPERTIES, ALTHOUGH WITH THE NEW RAMP GEOMETRY, APPROXIMATELY 1.0 ACRE OF IMPACTS IS ANTICIPATED.

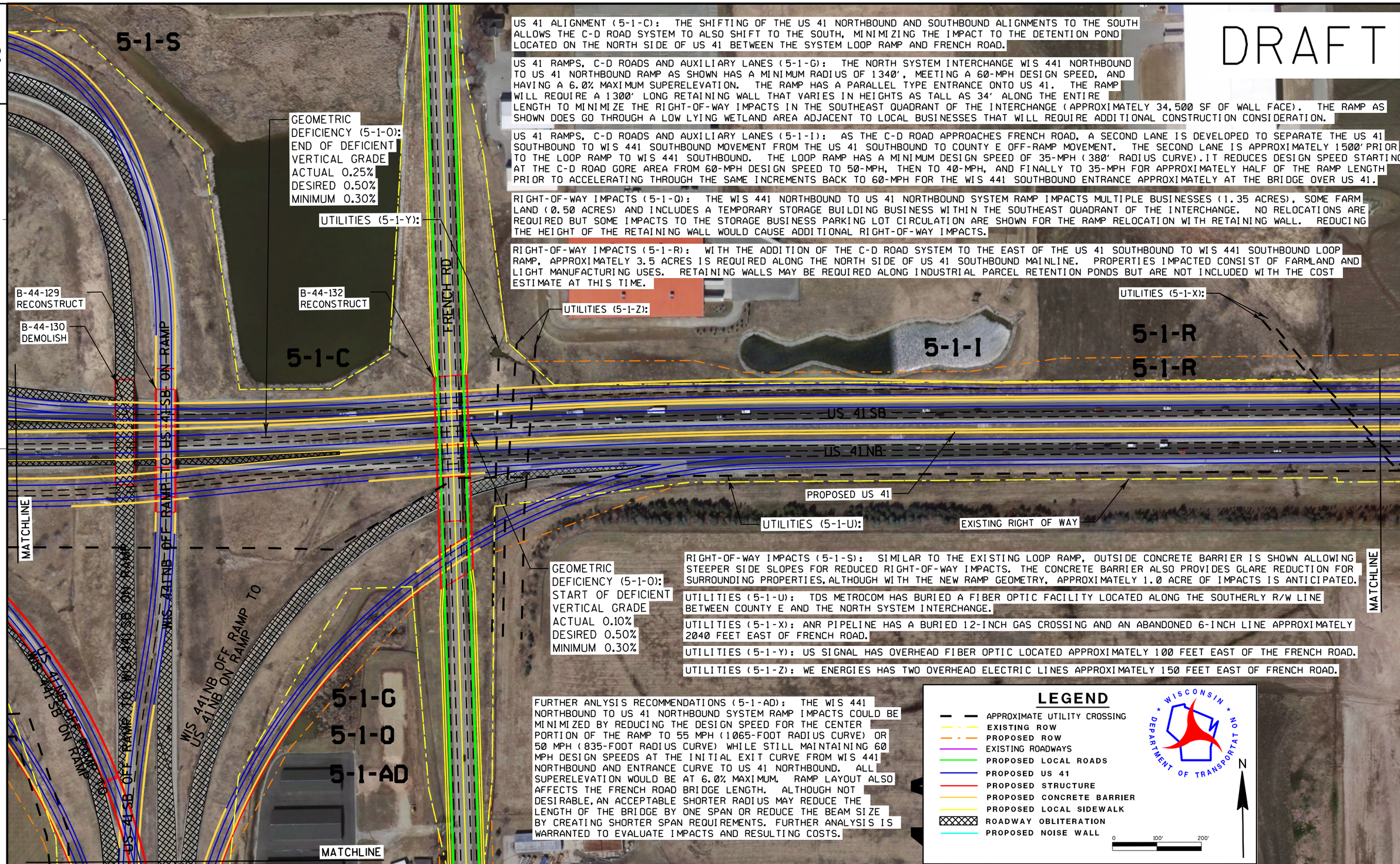
UTILITIES (5-1-U): TDS METROCOM HAS BURIED A FIBER OPTIC FACILITY LOCATED ALONG THE SOUTHERLY R/W LINE BETWEEN COUNTY E AND THE NORTH SYSTEM INTERCHANGE.

UTILITIES (5-1-X): ANR PIPELINE HAS A BURIED 12-INCH GAS CROSSING AND AN ABANDONED 6-INCH LINE APPROXIMATELY 2040 FEET EAST OF FRENCH ROAD.

UTILITIES (5-1-Y): US SIGNAL HAS OVERHEAD FIBER OPTIC LOCATED APPROXIMATELY 100 FEET EAST OF THE FRENCH ROAD.

UTILITIES (5-1-Z): WE ENERGIES HAS TWO OVERHEAD ELECTRIC LINES APPROXIMATELY 150 FEET EAST OF FRENCH ROAD.

FURTHER ANLYSIS RECOMMENDATIONS (5-1-AD): THE WIS 441 NORTHBOUND TO US 41 NORTHBOUND SYSTEM RAMP IMPACTS COULD BE MINIMIZED BY REDUCING THE DESIGN SPEED FOR THE CENTER PORTION OF THE RAMP TO 55 MPH (1065-FOOT RADIUS CURVE) OR 50 MPH (835-FOOT RADIUS CURVE) WHILE STILL MAINTAINING 60 MPH DESIGN SPEEDS AT THE INITIAL EXIT CURVE FROM WIS 441 NORTHBOUND AND ENTRANCE CURVE TO US 41 NORTHBOUND. ALL SUPERELEVATION WOULD BE AT 6.0% MAXIMUM. RAMP LAYOUT ALSO AFFECTS THE FRENCH ROAD BRIDGE LENGTH. ALTHOUGH NOT DESIRABLE, AN ACCEPTABLE SHORTER RADIUS MAY REDUCE THE LENGTH OF THE BRIDGE BY ONE SPAN OR REDUCE THE BEAM SIZE BY CREATING SHORTER SPAN REQUIREMENTS. FURTHER ANALYSIS IS WARRANTED TO EVALUATE IMPACTS AND RESULTING COSTS.



PROJECT NO:1130-31-00	HWY: US 41	COUNTY:OUTAGAMIE	EXHIBIT 5-4: US 41 SEGMENT 5 / SECTION 1 / SHEET 3	PAGE 5-14	E

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US 41 RAMPS, C-D ROADS AND AUXILIARY LANES (5-1-H): APPROXIMATELY 3500' EAST OF THE NORTH SYSTEM INTERCHANGE ALONG US 41 SOUTHBOUND LANES, A SINGLE LANE TAPERED OFF-RAMP STARTS A C-D ROAD WITH A 60 MPH DESIGN SPEED. ACCESS TO BOTH WIS 441 SOUTHBOUND AND COUNTY E WILL BE PROVIDED FROM SOUTHBOUND US 41 VIA THE C-D SYSTEM. IN TOTAL, THE C-D SYSTEM CONNECTS THE FOLLOWING FIVE MOVEMENTS:

(1) US 41 SOUTHBOUND TO WIS 441 SOUTHBOUND
(2) WIS 441 NORTHBOUND TO US 41 SOUTHBOUND
(3) US 41 SOUTHBOUND TO COUNTY E OFF-RAMP
(4) WIS 441 NORTHBOUND TO COUNTY E OFF-RAMP
(5) COUNTY E ON-RAMP TO US 41 SOUTHBOUND

UTILITIES (5-1-U): TDS METROCOM HAS BURIED A FIBER OPTIC FACILITY LOCATED ALONG THE SOUTHERLY R/W LINE BETWEEN COUNTY E AND THE NORTH SYSTEM INTERCHANGE.

UTILITIES (5-1-AA): WE ENERGIES HAS A 138 KV OVERHEAD ELECTRIC LINE APPROXIMATELY 2600 FEET EAST OF FRENCH ROAD AND ABOUT 2600 FEET WEST OF HOLLAND ROAD.

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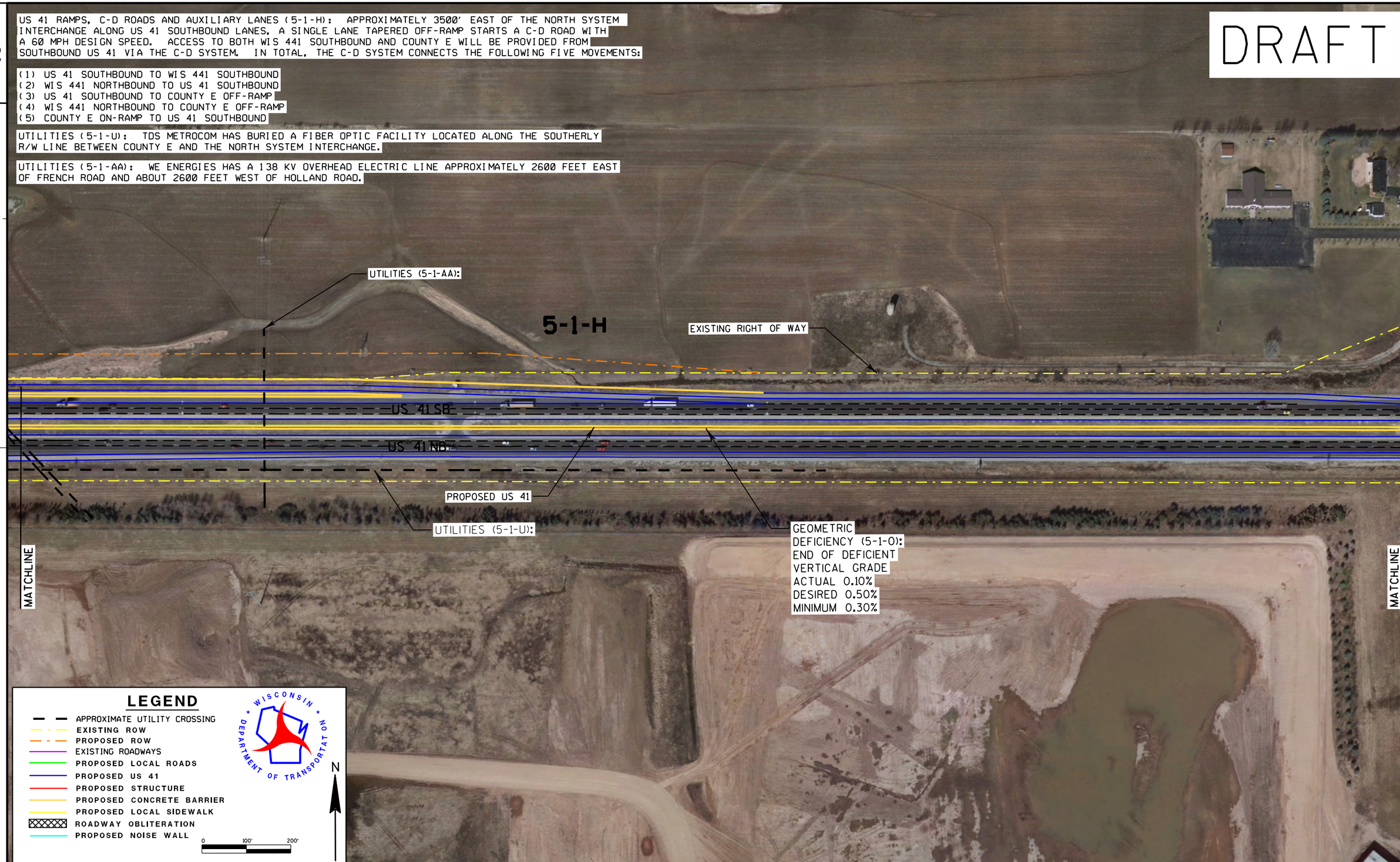


PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	EXHIBIT 5-5: US 41 SEGMENT 5 / SECTION 1 / SHEET 4	PAGE 5-15	E

FILE NAME : \\madw00\ingrproj\44386\t1\Short Term Solutions\Amendment #5\CDS\0244_P0.dgn PLOT DATE : 5/7/2013 PLOT BY : Jgallamore PLOT NAME : PLOT SCALE : 200:1

Section 2: US 41 - 3500' East of French Road to West of County N (Freedom Road)

US 41 Alignment

The section of US 41 from 3500' East of French Road to West of County N is shown on existing alignment.

US 41 Typical Section

The mainline typical section to from 3500' East of French Road to West of County N consists of a 36.5' median (14' inside shoulders with 56-inch single face barriers). The Northbound and Southbound mainline has 3 – 12' lanes and have 12' outside shoulders. See Figure 5-2 for Typical Section.

US 41 Ramps and Auxiliary Lanes

Refer to Exhibit 5-8 (page 5-20) for further discussion on County N northbound off-ramp (5-2-A).

Refer to Exhibit 5-8 (page 5-20) for further discussion on County N southbound on-ramp (5-2-B).

Frontage Roads

Refer to Exhibit 5-6 (page 5-18) for further discussion on frontage road Pogrant Road (5-2-C).

Addressing Geometric Deficiencies

All geometric deficiencies are anticipated to be corrected during the long-term improvement expansion project. Refer to Exhibit 5-7 (page 5-19) for deficient vertical curves (5-2-D) located along US 41 mainline (MM146.1 to 146.3, MM 146.3 and MM146.3 to 146.6).

Right-of-Way Impacts

No right-of-way impacts are anticipated within this section of US 41.

Utilities

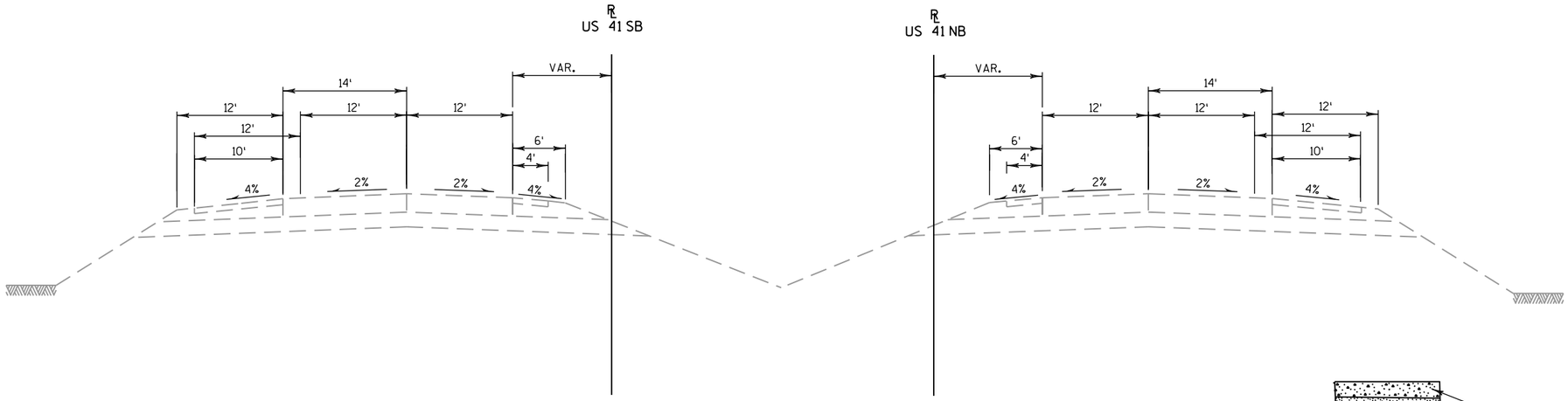
The following utilities are shown on Exhibit 5-7 (page 5-19):

- Refer to Exhibit 5-7 (page 5-19) for the ATT Legacy buried fiber optic line located approximately 100 feet east of Holland Road (5-2-E).
- Refer to Exhibit 5-7 (page 5-19) for the WE Energies buried gas facility approximately 120 feet east of Holland Road (5-2-F).

Further Analysis Recommendations

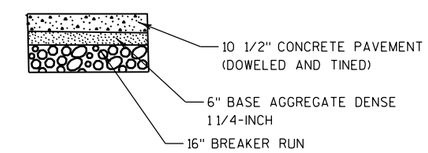
Appendix 22 includes additional interchange concepts developed for the North System Interchange.

Refer to Exhibit 5-7 (page 5-19) for further discussion on Pogrant Road right-of-way (5-2-G).

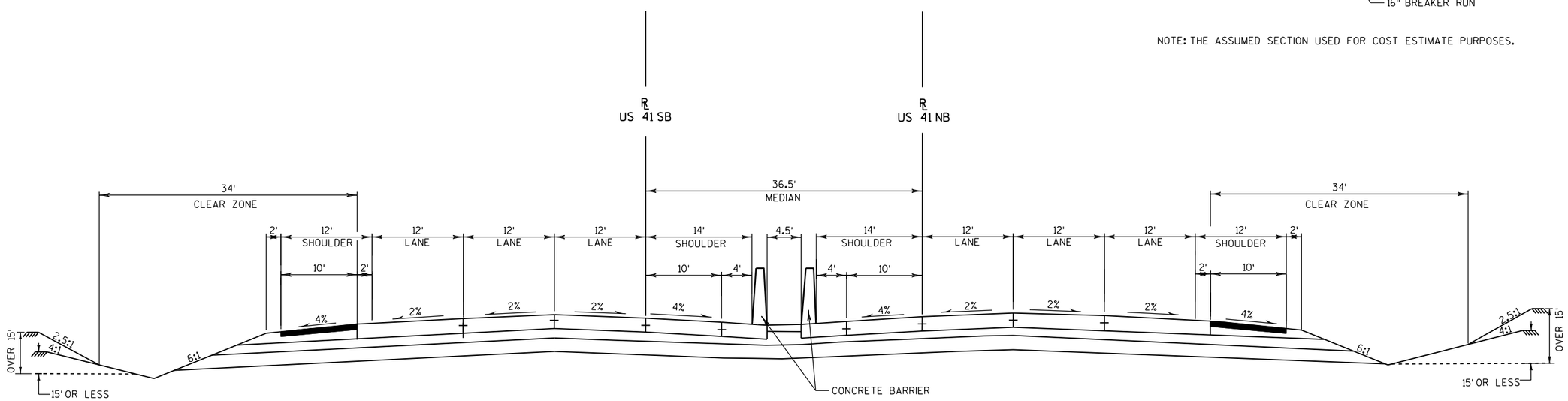


TYPICAL EXISTING SECTION

US 41 (EAST OF NORTH SYSTEM INTERCHANGE TO CTH N)



NOTE: THE ASSUMED SECTION USED FOR COST ESTIMATE PURPOSES.



DESIRABLE PROPOSED SECTION

US 41 (EAST OF NORTH SYSTEM INTERCHANGE TO CTH N)

PROJECT NO:1130-31-00	HWY:US 41	COUNTY:OUTAGAMIE	FIGURE 5-2: US 41 (EAST OF NORTH SYSTEM INTERCHANGE TO CTH N) TYPICAL EXISTING SECTION AND DESIRABLE PROPOSED SECTION	PAGE 5-17	E

FILE NAME : \\madw00\ingrproj\44386\t1\Short Term Solutions\Amendment #5\TYICAL SECTIONS2.dgn PLOT DATE : 3/13/2014 2:55:59 PM PLOT BY : lzidek PLOT NAME : $FILE$ PLOT SCALE : 15:1

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FRONTAGE ROADS (5-2-C): POGRANT ROAD IS A SMALL ACCESS ROAD OFF OF HOLLAND DRIVE THAT SERVICES A SILO AND FIELD ALONG THE NORTH SIDE OF US 41. THE ROADWAY PARALLELS US 41 AND APPEARS TO BE IN THE RIGHT-OF-WAY FOR THE PORTIONS ALONG HOLLAND DRIVE AND A 300' STRETCH OF US 41 PRIOR TO BEING ON PRIVATE PROPERTY.

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PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	EXHIBIT 5-6: US 41 SEGMENT 5 / SECTION 2 / SHEET 1	PAGE 5-18	E

FILE NAME : \\madw00\ingrproj\44386\t1\Short Term Solutions\Amendment #5\CDS\0244A_P0.dgn PLOT DATE : 5/7/2013 PLOT BY : Jgallamore PLOT NAME : PLOT SCALE : 200:1

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UTILITIES (5-2-E): ATT LEGACY HAS BURIED FIBER OPTIC LOCATED APPROXIMATELY 100 FEET EAST OF HOLLAND ROAD.

UTILITIES (5-2-F): WE ENERGIES HAS A BURIED GAS FACILITY APPROXIMATELY 120 FEET EAST OF HOLLAND ROAD.

FURTHER ANALYSIS RECOMMENDATIONS (5-2-G): IF THE SMALL ACCESS ROAD OFF HOLLAND DRIVE IS STILL REQUIRED, IT IS RECOMMENDED TO RELOCATE THE ACCESS ROAD FURTHER TO THE NORTH OUT OF THE EXISTING US 41 RIGHT-OF-WAY.

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PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	EXHIBIT 5-7: US 41 SEGMENT 5 / SECTION 2 / SHEET 2	PAGE 5-19	E

FILE NAME : \\madw00\ingrproj\44386\t1\Short Term Solutions\Amendment #5\CDS\0245_P0.dgn PLOT DATE : 3/17/2014 2:25:07 PM PLOT BY : lzidek PLOT NAME : PLOT SCALE : 200:1

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US 41 RAMPS AND AUXILIARY LANES (5-2-A): THE US 41 NORTHBOUND OFF-RAMP AT COUNTY N IS A TAPERED RAMP TYPE. RAMP TERMINAL INTERSECTION IMPROVEMENTS ARE REQUIRED. DUAL LEFT TURN LANES FROM THE RAMP TO NORTHBOUND COUNTY N AND SINGLE RIGHT TURN LANE TO SOUTHBOUND COUNTY N ARE REQUIRED.

US 41 RAMPS AND AUXILIARY LANES (5-2-B): THE US 41 SOUTHBOUND ON-RAMP AT COUNTY N IS A PARALLEL RAMP TYPE. THE PARALLEL PORTION OF THE RAMP IS APPROXIMATELY 1000-FEET IN LENGTH.

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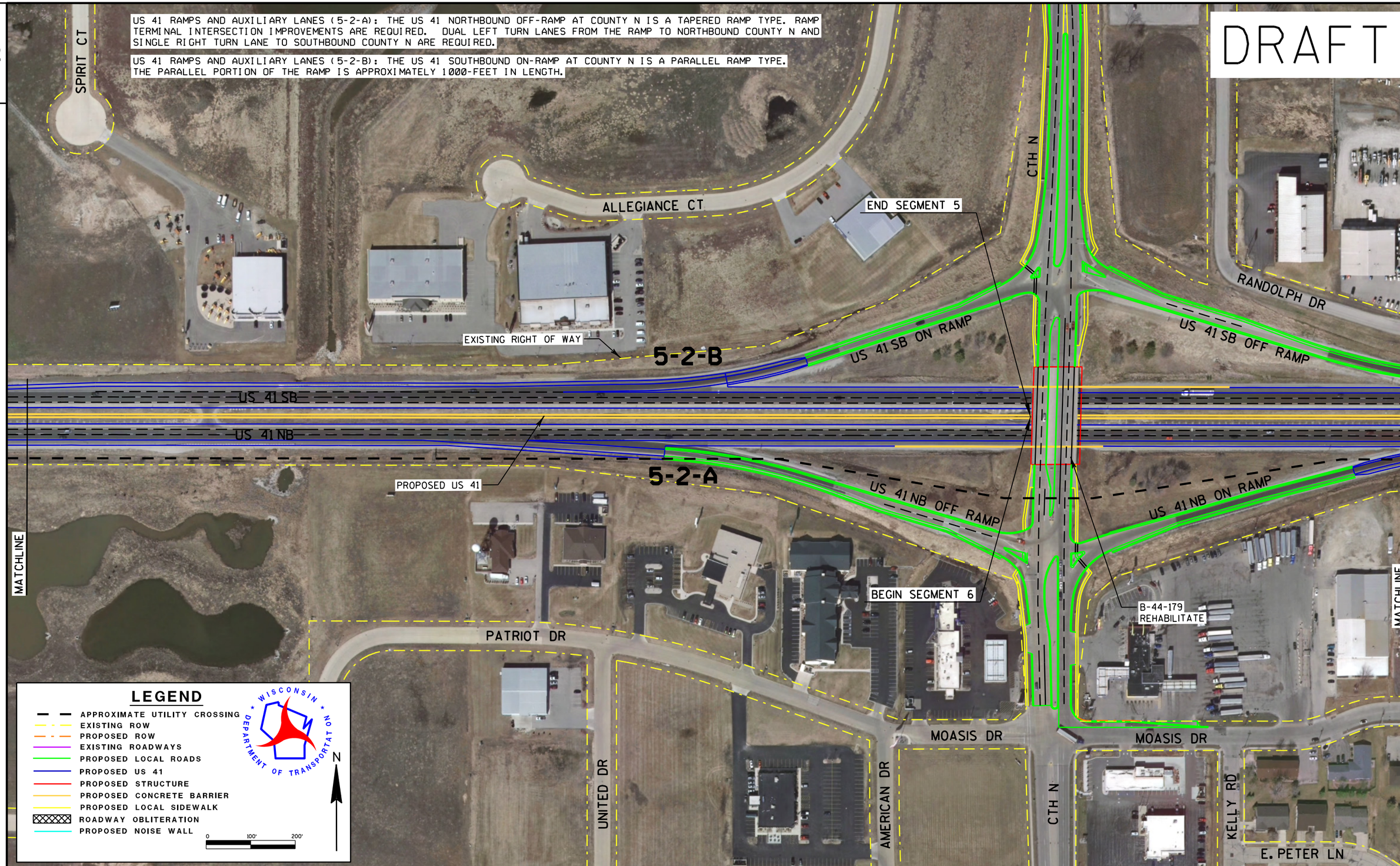


PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	EXHIBIT 5-8: US 41 SEGMENT 5 / SECTION 2 / SHEET 3	PAGE 5-20	E

FILE NAME : J:\44386\t1\Short Term Solutions\Amendment #5\CDS\0246_PO.dgn PLOT DATE : 5/23/2013 PLOT BY : arosemeyer PLOT NAME : PLOT SCALE : 200:1

Section 3: WIS 441 - North of Fox River Bridges to North System Interchange

WIS 441 Alignment

If the current footprint of the north system interchange between US 41 and WIS 441 is maintained, with minor improvements to ramps, minimal work in this segment is required.

However, the implementation of the C-D roadway within the system interchange will require modifications along WIS 441. Specifically, the development of the northbound WIS 441 to southbound US 41 flyover ramp and the northbound WIS 441 to northbound US 41 ramp requires the diverge point to be pushed farther south to account for isolating traffic movements and providing lane reductions prior to the flyover bridge. It is not desirable or cost effective to reduce lanes on the bridge within the curve. This essentially eliminates any weave distance between County OO entering traffic and the WIS 441 decision point requiring relocation of the County OO service ramps. This study presents a few alternatives for revising the County OO interchange access due to north system interchange C-D roadway modifications.

For the exhibit layout shown, the design speed is assumed to be reduced to 60-MPH for the roadway stretch between the Fox River bridge to the north system interchange. As discussed in the above section of US 41, both north system interchange ramps have 60-MPH design speeds. The northbound flyover ramp connects into the C-D Road system that has a 60-MPH design speed. Both the C-D Road system and the WIS 441 northbound to US 41 northbound ramp has a 10-MPH lower speed than the US 41 mainline design speed of 70-MPH.

Refer to Exhibit 5-9 (page 5-26) for further discussion on WIS 441 alignment (5-3-A).

Refer to Exhibit 5-10 (page 5-27) for further discussion on WIS 441 southbound alignment north of County OO (5-3-B).

Refer to Exhibit 5-10 (page 5-27) for further discussion on WIS 441 northbound alignment north of County OO (5-3-C).

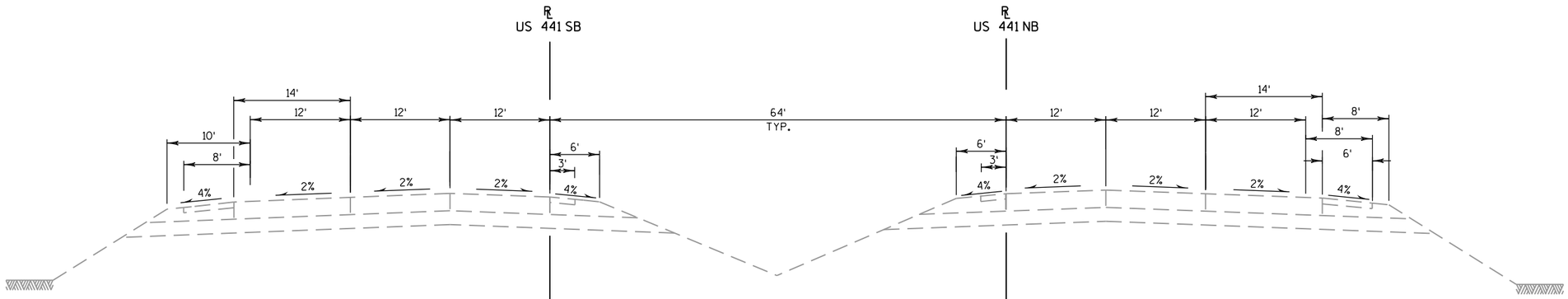
WIS 441 Typical Section

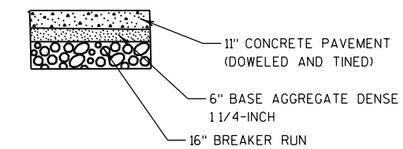
The mainline typical section consists of a 31.0’ median (12’ inside shoulders with 56-inch single-face barriers and 3’ between the back of the barriers). The northbound and southbound are comprised of three 12’ lanes and 12’ outside shoulders with 42-inch single-face barrier or retaining walls for portions of the section with tight right-of-way constraints. The northbound roadway has an auxiliary lane between the CTH OO interchange and the north system interchange. Refer to Figure 5-3 (page 5-22) for the typical section.

Refer to Exhibit 5-9 (page 5-26) for further WIS 441 mainline typical section north of the Fox River bridge (5-3-D and 5-3-E).

Refer to Exhibit 5-10 (page 5-27) for further WIS 441 northbound mainline typical section (5-3-F). See “Further Analysis Recommendations” (page 5-24).

Refer to Exhibit 5-10 (page 5-27) for further WIS 441 southbound mainline typical section (5-3-G).

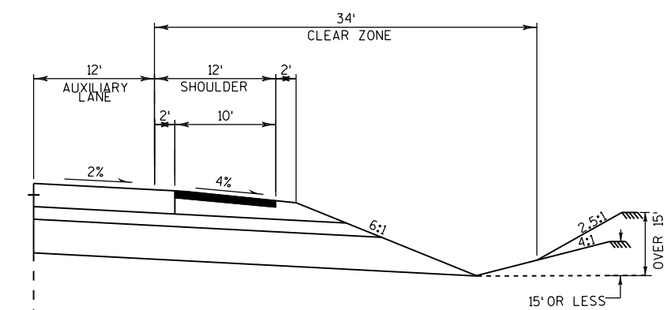




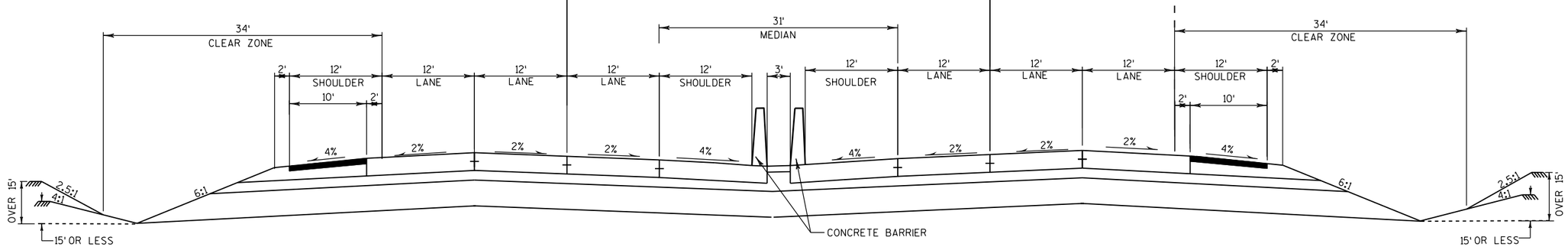
TYPICAL EXISTING SECTION

WIS 441 (NORTH OF FOX RIVER BRIDGE TO NORTH SYSTEM INTERCHANGE)

NOTE: THE ASSUMED SECTION USED FOR COST ESTIMATE PURPOSES.



WIS 441 (FROM CTH OO INTERCHANGE
TO NORTH SYSTEM INTERCHANGE)



DESIRABLE PROPOSED SECTION

WIS 441 (NORTH OF FOX RIVER BRIDGE TO NORTH SYSTEM INTERCHANGE)

PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	FIGURE 5-3: WIS 441 (NORTH OF FOX RIVER BRIDGE TO NORTH SYSTEM INTERCHANGE), TYPICAL EXISTING SECTION AND DESIRABLE PROPOSED SECTION	PAGE 5-22	E

Frontage Roads

There are no frontage roads directly abutting WIS 441 mainline, although French Road to the east is a nearby major north-south two-lane roadway of significant interaction with WIS 441 and the County OO (Northland Avenue) Interchange.

French Road connects WIS 96 (East Wisconsin Avenue) just north of the Fox River to County OO (Northland Avenue) and Evergreen Drive north of US 41. This roadway from WIS 96 to the south side of County OO is within the Village of Little Chute. North of County OO through Evergreen Drive is within the town of Grand Chute. By 2038, this roadway is anticipated to be a major 4-lane arterial connecting these three roadways as a major north-south route on the east side of WIS 441. The roadway cross section is currently shown as a combined 4-lane roadway (12' lanes) with 4' bike lanes and 120-foot right-of-way for terrace and sidewalk accommodations.

See further discussion below in the "WIS 441 Ramps" section, "Further Analysis Recommendations" section, as well as the "Interchange" report portion of Segment 5 for the County OO (Northland Avenue) Interchange.

WIS 441 Ramps

Review all exit ramp configurations for single or dual lane needs.

Refer to Exhibit 5-10 (page 5-27) for further discussion on County OO southbound off-ramp (5-3-H).

Refer to Exhibit 5-9 (page 5-26) for further discussion on County OO southbound on-ramp (5-3-I).

Refer to Exhibit 5-9 and Exhibit 5-10 (page 5-26 and page 5-27) for further discussion on County OO northbound on-ramp (5-3-J). See further discussions in above section "Frontage Roads", below section "Further Analysis Recommendations", and the "Interchange" report portion of Segment 5 for the County OO (Northland Avenue) Interchange.

Refer to Exhibit 5-9 (page 5-26) for further discussion on County OO northbound off-ramp (5-3-K). See further discussions in above section "Frontage Roads", below section "Further Analysis Recommendations", and the "Interchange" report portion of Segment 5 for the County OO (Northland Avenue) Interchange.

Addressing Geometric Deficiencies

All geometric deficiencies for WIS 441 mainline and ramps are anticipated to be corrected during the long-term improvement expansion project (5-3-L). Refer to Exhibit 5-9 and Exhibit 5-10 (page 5-26 and page 5-27 respectively).

Right-of-Way Impacts

Refer to Exhibit 5-9 (page 5-26) for discussion on right-of-way impacts along the County OO southbound on-ramp (5-3-M).

Refer to Exhibit 5-10 (page 5-27) for discussion on right-of-way impacts along the County OO southbound on-ramp (5-3-N).

Refer to Exhibit 5-9 (page 5-26) for further information on County OO northbound ramp right-of-way needs (5-3-O).

Refer to Exhibit 5-9 and Exhibit 5-11 (page 5-26 and page 5-28 respectively) for further information on French Road right-of-way needs
(5-3-P).

Utilities

The following utilities are shown on Exhibit 5-9 (page 5-26):

- ATT Legacy has buried fiber optic cable at the RR tracks north of WIS 96 (5-3-Q).
- WE Energies has a buried electric facility near the RR tracks approximately 330 feet north of STH 96 (5-3-R).
- WE Energies has a buried electric facility approximately 1060 feet north of STH 96 (5-3-S).
- WE Energies has a buried gas main facility approximately 960 feet north of STH 96 (5-3-T).

The following utilities are shown on Exhibit 5-11 (page 5-28):

- US signal has an overhead fiber optic cable approximately 100 feet north of County OO (5-3-U).
- Time Warner has overhead facilities approximately 100’ north of County OO (5-3-V).
- WE Energies has an overhead electric facility (2 lines) at County OO (5-3-W).
- WE Energies has buried electric at 1850 feet south of the US 41 & 441 interchange (5-3-X).

Further Analysis Recommendations

Appendix 22 includes additional interchange concepts developed for the North System Interchange.

Refer to Exhibit 5-11 (page 5-28) for further recommendations on retaining wall applications to ramp approaches (5-3-Y).

Other WIS 441 northbound ramp alternatives were deliberated but much additional traffic operational analysis and modeling within the future study is required for definitive alternative analysis. The following is a bullet list of those considered, and recommended for further study within the future NEPA study as it relates to the north system interchange, WIS 441, and County OO Interchange desired outcomes:

1 - A “Do Nothing” alternative at the north system interchange would not impact the County OO Interchange as significantly as shown by implementing the C-D Road System. These improvements should be evaluated together since they are directly related.

2 - Similar to (1) above, minimal operational improvements at the north system interchange may not impact the County OO Interchange as significantly as shown allowing other County OO Interchange options to be further considered.

3 - Connecting the County OO off-ramp and County OO loop on-ramp to French Road is another option but would still impact the existing French Road alignment requiring French Road to be relocated. This would also create further jurisdictional issues with the County.

4 - Limiting access could be considered at the County OO Interchange. Again, the significant ramp geometric issue is for the vehicle movement going to the WIS 441 Northbound Flyover Ramp since the North System Interchange approach pushes the on-ramp further to the south. As a consideration, if only providing access from County OO for the WIS 441 Northbound to US 41 Northbound movement, the existing County OO ramps could remain almost in their current configuration. Users desiring to make the westward movement to County E could either continued down County OO to County E and go north or use the improved French Road corridor north to Evergreen Avenue then eastward to County E. This alternative would require significant public involvement and may have significant opposition.

5 - Another alternative as a variation of (4) above would keep the current County OO ramp configuration, eliminate the WIS 441 northbound flyover movement from the existing on-ramp location, and then provide additional on-ramp access from French Road. French Road would need to be relocated for intersection spacing along County OO. The northbound on-ramp from French Road and the northbound off-ramp to County OO would conflict requiring another bridge, significant embankment, and additional right-of-way strip acquisition along WIS 441 for the northbound off-ramp. The northbound off-ramp could also double as a choice ramp to French Road.

6 - Eliminating northbound off-ramp and/or on-ramp access could be considered at the County OO Interchange but would require significant public involvement and would likely have significant opposition.

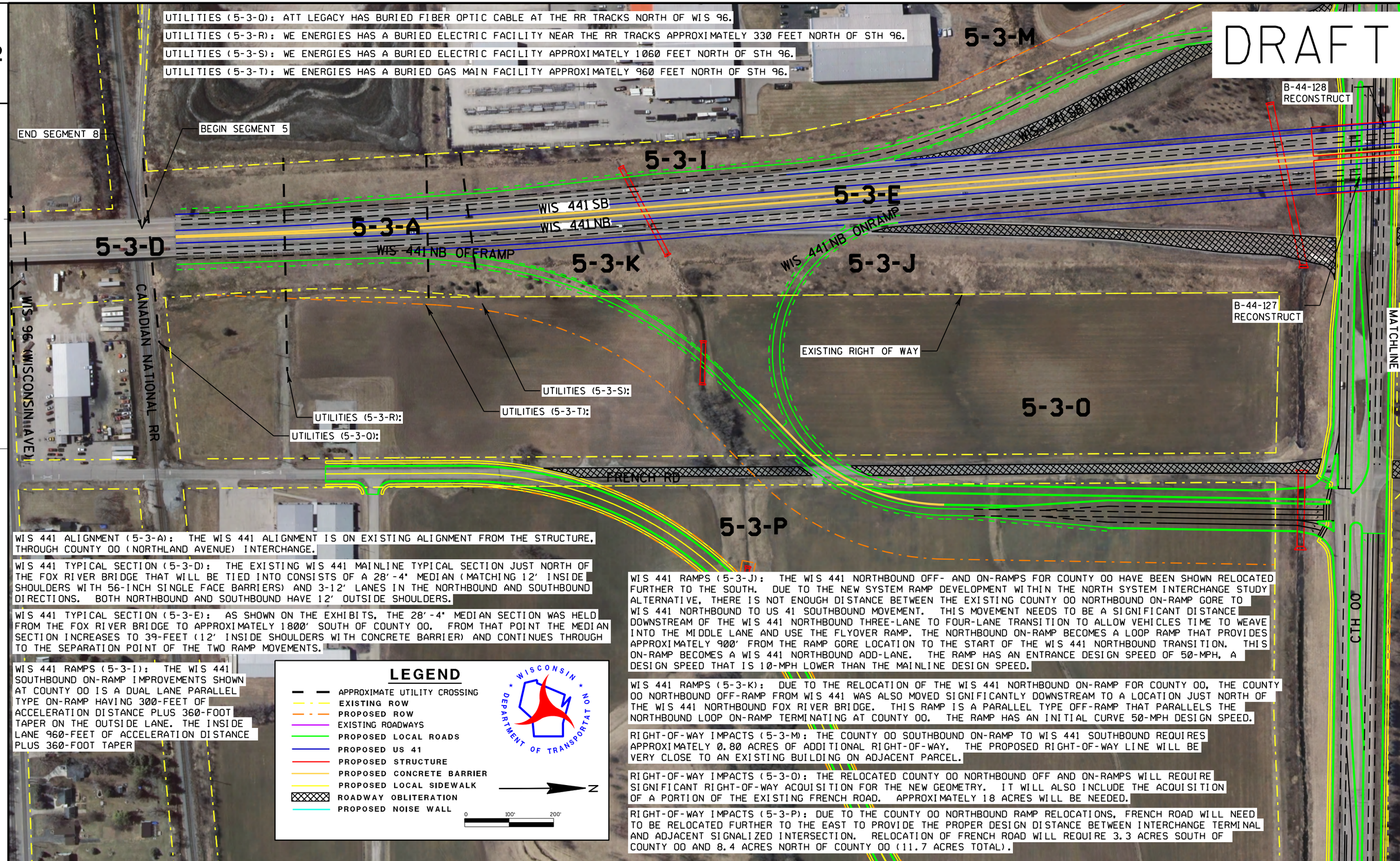
None of the costs associated with items (1) thru (6) mentioned above are included within the cost estimate as presented.

UTILITIES (5-3-Q): ATT LEGACY HAS BURIED FIBER OPTIC CABLE AT THE RR TRACKS NORTH OF WIS 96.

UTILITIES (5-3-R): WE ENERGIES HAS A BURIED ELECTRIC FACILITY NEAR THE RR TRACKS APPROXIMATELY 330 FEET NORTH OF STH 96.

UTILITIES (5-3-S): WE ENERGIES HAS A BURIED ELECTRIC FACILITY APPROXIMATELY 1060 FEET NORTH OF STH 96.

UTILITIES (5-3-T): WE ENERGIES HAS A BURIED GAS MAIN FACILITY APPROXIMATELY 960 FEET NORTH OF STH 96.



WIS 441 ALIGNMENT (5-3-A): THE WIS 441 ALIGNMENT IS ON EXISTING ALIGNMENT FROM THE STRUCTURE, THROUGH COUNTY OO (NORTHLAND AVENUE) INTERCHANGE.

WIS 441 TYPICAL SECTION (5-3-D): THE EXISTING WIS 441 MAINLINE TYPICAL SECTION JUST NORTH OF THE FOX RIVER BRIDGE THAT WILL BE TIED INTO CONSISTS OF A 28'-4" MEDIAN (MATCHING 12' INSIDE SHOULDERS WITH 56-INCH SINGLE FACE BARRIERS) AND 3-12' LANES IN THE NORTHBOUND AND SOUTHBOUND DIRECTIONS. BOTH NORTHBOUND AND SOUTHBOUND HAVE 12' OUTSIDE SHOULDERS.

WIS 441 TYPICAL SECTION (5-3-E): AS SHOWN ON THE EXHIBITS, THE 28'-4" MEDIAN SECTION WAS HELD FROM THE FOX RIVER BRIDGE TO APPROXIMATELY 1800' SOUTH OF COUNTY OO. FROM THAT POINT THE MEDIAN SECTION INCREASES TO 39-FEET (12' INSIDE SHOULDERS WITH CONCRETE BARRIER) AND CONTINUES THROUGH TO THE SEPARATION POINT OF THE TWO RAMP MOVEMENTS.

WIS 441 RAMPS (5-3-I): THE WIS 441 SOUTHBOUND ON-RAMP IMPROVEMENTS SHOWN AT COUNTY OO IS A DUAL LANE PARALLEL TYPE ON-RAMP HAVING 300-FEET OF ACCELERATION DISTANCE PLUS 360-FOOT TAPER ON THE OUTSIDE LANE. THE INSIDE LANE 960-FEET OF ACCELERATION DISTANCE PLUS 360-FOOT TAPER

LEGEND

- APPROXIMATE UTILITY CROSSING
- EXISTING ROW
- PROPOSED ROW
- EXISTING ROADWAYS
- PROPOSED LOCAL ROADS
- PROPOSED US 41
- PROPOSED STRUCTURE
- PROPOSED CONCRETE BARRIER
- PROPOSED LOCAL SIDEWALK
- ROADWAY OBLITERATION
- PROPOSED NOISE WALL

WISCONSIN DEPARTMENT OF TRANSPORTATION

N

0 100' 200'

WIS 441 RAMPS (5-3-J): THE WIS 441 NORTHBOUND OFF- AND ON-RAMPS FOR COUNTY OO HAVE BEEN SHOWN RELOCATED FURTHER TO THE SOUTH. DUE TO THE NEW SYSTEM RAMP DEVELOPMENT WITHIN THE NORTH SYSTEM INTERCHANGE STUDY ALTERNATIVE, THERE IS NOT ENOUGH DISTANCE BETWEEN THE EXISTING COUNTY OO NORTHBOUND ON-RAMP GORE TO WIS 441 NORTHBOUND TO US 41 SOUTHBOUND MOVEMENT. THIS MOVEMENT NEEDS TO BE A SIGNIFICANT DISTANCE DOWNSTREAM OF THE WIS 441 NORTHBOUND THREE-LANE TO FOUR-LANE TRANSITION TO ALLOW VEHICLES TIME TO WEAVE INTO THE MIDDLE LANE AND USE THE FLYOVER RAMP. THE NORTHBOUND ON-RAMP BECOMES A LOOP RAMP THAT PROVIDES APPROXIMATELY 900' FROM THE RAMP GORE LOCATION TO THE START OF THE WIS 441 NORTHBOUND TRANSITION. THIS ON-RAMP BECOMES A WIS 441 NORTHBOUND ADD-LANE. THE RAMP HAS AN ENTRANCE DESIGN SPEED OF 50-MPH, A DESIGN SPEED THAT IS 10-MPH LOWER THAN THE MAINLINE DESIGN SPEED.

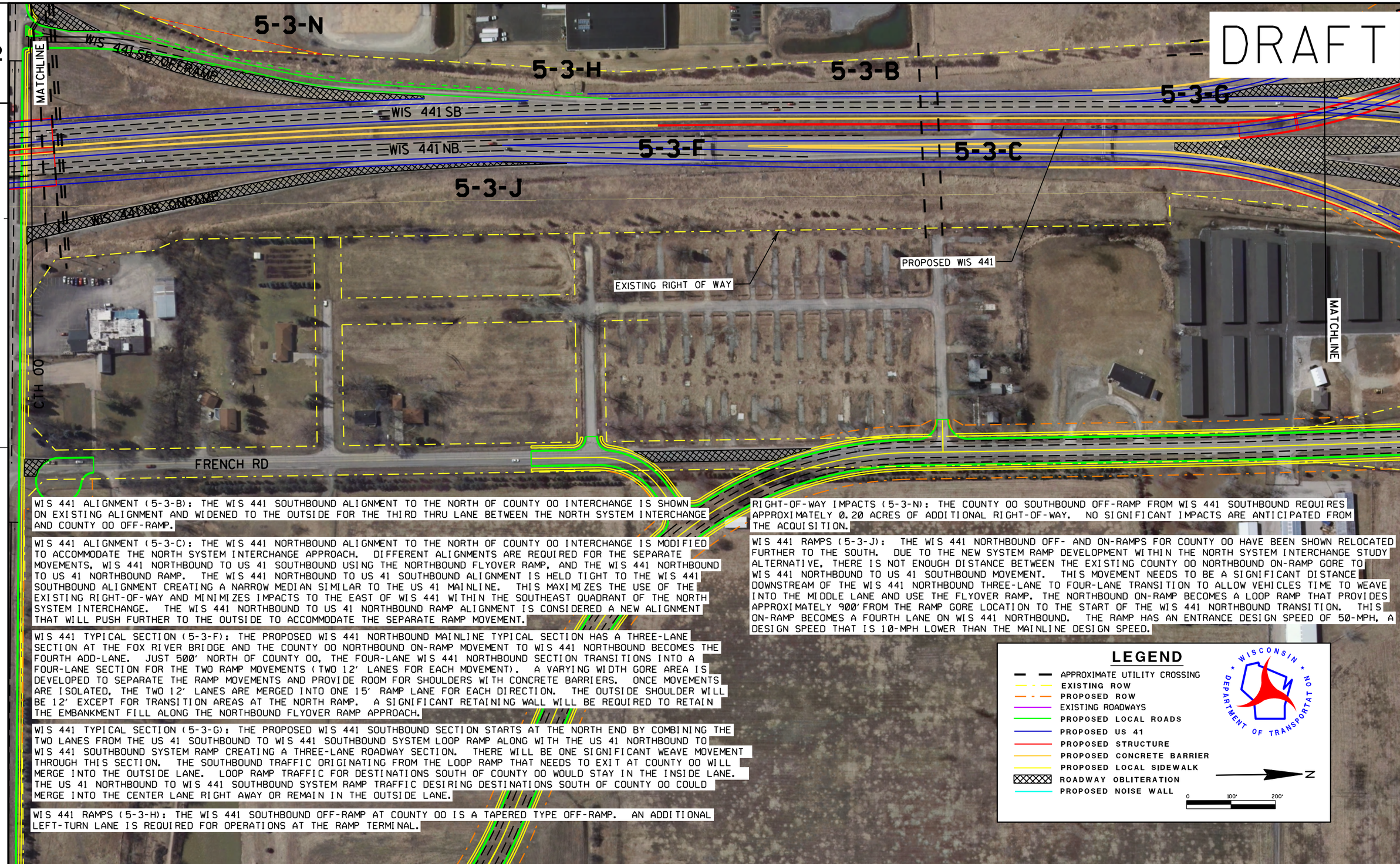
WIS 441 RAMPS (5-3-K): DUE TO THE RELOCATION OF THE WIS 441 NORTHBOUND ON-RAMP FOR COUNTY OO, THE COUNTY OO NORTHBOUND OFF-RAMP FROM WIS 441 WAS ALSO MOVED SIGNIFICANTLY DOWNSTREAM TO A LOCATION JUST NORTH OF THE WIS 441 NORTHBOUND FOX RIVER BRIDGE. THIS RAMP IS A PARALLEL TYPE OFF-RAMP THAT PARALLELS THE NORTHBOUND LOOP ON-RAMP TERMINATING AT COUNTY OO. THE RAMP HAS AN INITIAL CURVE 50-MPH DESIGN SPEED.

RIGHT-OF-WAY IMPACTS (5-3-M): THE COUNTY OO SOUTHBOUND ON-RAMP TO WIS 441 SOUTHBOUND REQUIRES APPROXIMATELY 0.80 ACRES OF ADDITIONAL RIGHT-OF-WAY. THE PROPOSED RIGHT-OF-WAY LINE WILL BE VERY CLOSE TO AN EXISTING BUILDING ON ADJACENT PARCEL.

RIGHT-OF-WAY IMPACTS (5-3-O): THE RELOCATED COUNTY OO NORTHBOUND OFF AND ON-RAMPS WILL REQUIRE SIGNIFICANT RIGHT-OF-WAY ACQUISITION FOR THE NEW GEOMETRY. IT WILL ALSO INCLUDE THE ACQUISITION OF A PORTION OF THE EXISTING FRENCH ROAD. APPROXIMATELY 18 ACRES WILL BE NEEDED.

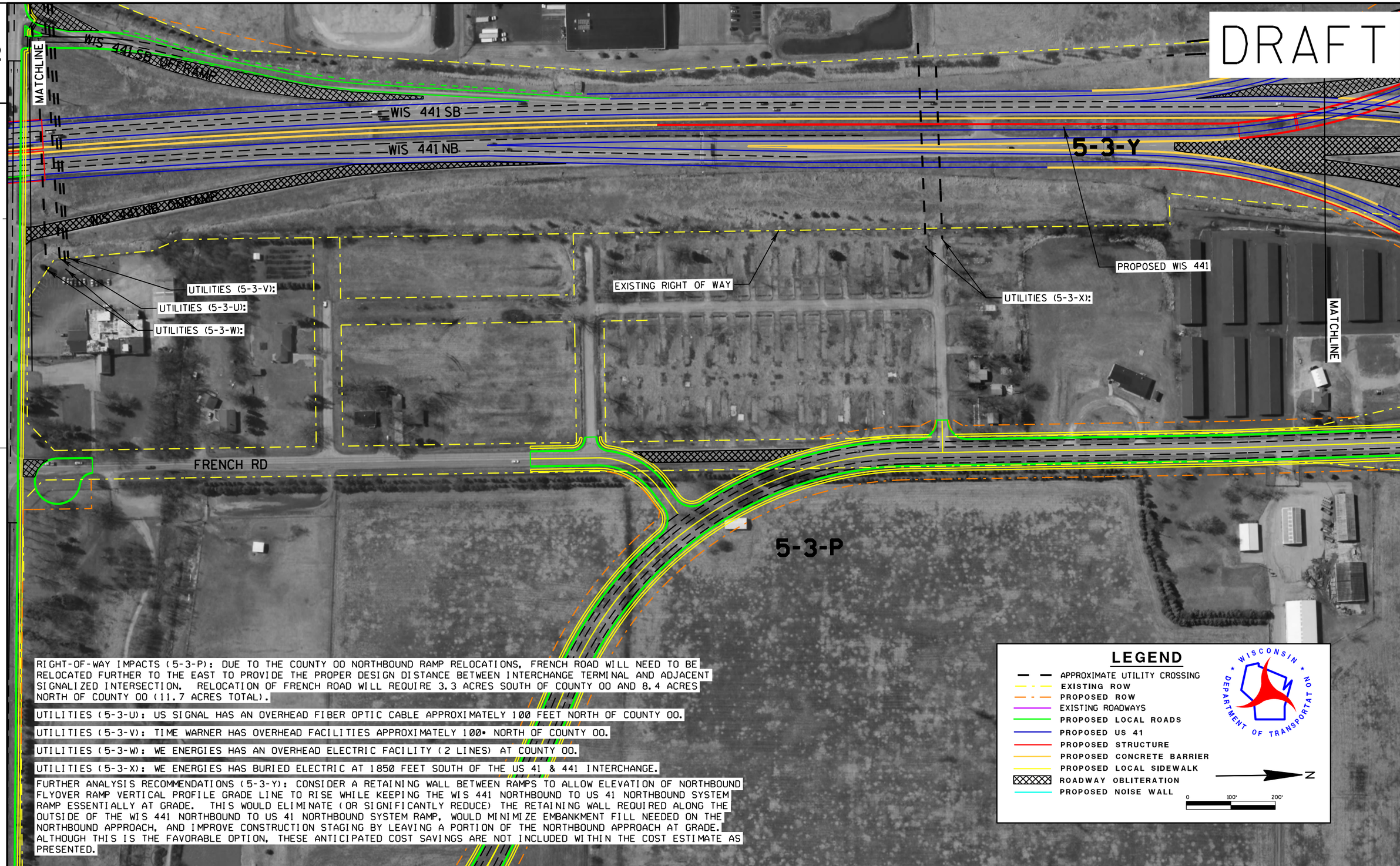
RIGHT-OF-WAY IMPACTS (5-3-P): DUE TO THE COUNTY OO NORTHBOUND RAMP RELOCATIONS, FRENCH ROAD WILL NEED TO BE RELOCATED FURTHER TO THE EAST TO PROVIDE THE PROPER DESIGN DISTANCE BETWEEN INTERCHANGE TERMINAL AND ADJACENT SIGNALIZED INTERSECTION. RELOCATION OF FRENCH ROAD WILL REQUIRE 3.3 ACRES SOUTH OF COUNTY OO AND 8.4 ACRES NORTH OF COUNTY OO (11.7 ACRES TOTAL).

PROJECT NO:1130-31-00	HWY: US 41	COUNTY:OUTAGAMIE	EXHIBIT 5-9: US 41 SEGMENT 5 / SECTION 3 / SHEET 1	PAGE 5-26	E



PROJECT NO:1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	EXHIBIT 5-10: US 41 SEGMENT 5 / SECTION 3 / SHEET 2	PAGE 5-27	E

FILE NAME : A:\44386\t1\Short Term Solutions\Amendment #5\CDS\0252A_P0.dgn PLOT DATE : 10/10/2013 PLOT BY : lzidek PLOT NAME : PLOT SCALE : 200:1



RIGHT-OF-WAY IMPACTS (5-3-P): DUE TO THE COUNTY OO NORTHBOUND RAMP RELOCATIONS, FRENCH ROAD WILL NEED TO BE RELOCATED FURTHER TO THE EAST TO PROVIDE THE PROPER DESIGN DISTANCE BETWEEN INTERCHANGE TERMINAL AND ADJACENT SIGNALIZED INTERSECTION. RELOCATION OF FRENCH ROAD WILL REQUIRE 3.3 ACRES SOUTH OF COUNTY OO AND 8.4 ACRES NORTH OF COUNTY OO (11.7 ACRES TOTAL).

UTILITIES (5-3-U): US SIGNAL HAS AN OVERHEAD FIBER OPTIC CABLE APPROXIMATELY 100 FEET NORTH OF COUNTY OO.

UTILITIES (5-3-V): TIME WARNER HAS OVERHEAD FACILITIES APPROXIMATELY 100• NORTH OF COUNTY OO.

UTILITIES (5-3-W): WE ENERGIES HAS AN OVERHEAD ELECTRIC FACILITY (2 LINES) AT COUNTY OO.

UTILITIES (5-3-X): WE ENERGIES HAS BURIED ELECTRIC AT 1850 FEET SOUTH OF THE US 41 & 441 INTERCHANGE.

FURTHER ANALYSIS RECOMMENDATIONS (5-3-Y): CONSIDER A RETAINING WALL BETWEEN RAMPS TO ALLOW ELEVATION OF NORTHBOUND FLYOVER RAMP VERTICAL PROFILE GRADE LINE TO RISE WHILE KEEPING THE WIS 441 NORTHBOUND TO US 41 NORTHBOUND SYSTEM RAMP ESSENTIALLY AT GRADE. THIS WOULD ELIMINATE (OR SIGNIFICANTLY REDUCE) THE RETAINING WALL REQUIRED ALONG THE OUTSIDE OF THE WIS 441 NORTHBOUND TO US 41 NORTHBOUND SYSTEM RAMP, WOULD MINIMIZE EMBANKMENT FILL NEEDED ON THE NORTHBOUND APPROACH, AND IMPROVE CONSTRUCTION STAGING BY LEAVING A PORTION OF THE NORTHBOUND APPROACH AT GRADE. ALTHOUGH THIS IS THE FAVORABLE OPTION, THESE ANTICIPATED COST SAVINGS ARE NOT INCLUDED WITHIN THE COST ESTIMATE AS PRESENTED.

PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	EXHIBIT 5-11: US 41 SEGMENT 5 / SECTION 3 / SHEET 2	PAGE 5-28	E

FILE NAME : \\madw00\ingrproj\44386\t1\Short Term Solutions\Amendment #5\CDS\0253_P0.dgn PLOT DATE : 5/7/2013 PLOT BY : Jgallamore PLOT NAME : PLOT SCALE : 200:1

Structures

Bridges

Summary of potential bridge geometry is shown in Table 5-5 and include bridge number, mile marker, bridge name, existing bridge age in 2013, girder type, girder depth, desired vertical clearance, minimum vertical clearance, potential vertical clearance, superelevation and direction of curve, clear bridge width, bridge length, number of spans, span configuration, bridge skew, local road typical section, and design recommendations.

Table 5-5: Segment 5 – Summary of Potential Bridge Geometry

BRIDGE NO.	MILE MARKER (MM)	BRIDGE NAME	AGE IN 2013	GIRDER TYPE	GIRDER DEPTH (INCH)	DESIRED VERT. CLEAR (FEET)	MIN. VERT. CLEAR (FEET)	VERT. CLEAR (FEET)	SUPER % & DIR.	BRIDGE CLEAR WIDTH (FEET)	BRIDGE LENGTH (FEET)	NO. OF SPANS	SPAN CONFIG. (FEET)	BRIDGE SKEW	LOCAL ROAD TYPICAL SECTION	DESIGN RECOMMENDATIONS
B-44-0172	144.0	County E Over US 41	23	Prestressed Concrete Deck Girder	36	16.75	16.33	16.75	NC	146	275	4	39.5/82	0º 39' 32" LF	1 – 12' Left turn lane, 3 - 12' thru lanes with barrier and 12' multi-use path for NB; 2 – 12' Left turn lanes, 3 - 12' thru lanes with barrier and 8' sidewalk for SB.	Reconstruction to accommodate the conventional bridge width and C-D road layout along north abutment. If 3-span bridge is required, 54W beams are required to accommodate layout (45W may work but at upper end of span length).
B-44-0129	145.0	US 41 SB to WIS 441 SB Ramp	25	Continuous Steel Deck Girder	45	16.75	16.33	16.75	NC	42	297.00	3	72.0/77.5	No Skew	8' inside shoulder, 15' lane, nd 10' outside shoulder	Reconstruction since rehabilitation is not an option due to auxiliary lane and ramp impacts on north abutment. Assume 2-span 45W with retaining walls or vertical abutments to accommodate roundabout layout.
B-44-0130	145.0	WIS 441 SB Over US 41	25	Continuous Steel Deck Girder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	112.0/93.0/88.0	N/A	N/A	Demolition of existing bridge for new interchange configuration.
B-44-XXX	N/A	WIS 441 NB to US 41 SB Flyover Ramp	0	Continuous Steel Tub Girder	90	16.75	16.33	16.75	Super	33	2022.94	9	N/A	Radial Piers	8' inside shoulder, 15' lane, and 10' outside shoulder	New Flyover ramp construction.
B-44-0132	145.1	French Road Over US 41	26	Continuous Steel Deck Girder	45	16.75	16.33	16.75	NC	72	459.30	5	130.41/259.13/4 @ 246.59/259.13/2 @ 193.96	Mainline - No Skew; Ramp - 30º 38' 20" RF	2 - 12' lanes with 4' bike lane in each direction; 8' terrace and 5' sidewalk in each direction.	Reconstruction due to new interchange configuration.
B-44-0033	146.1	Holland Road Over US 41	58	Prestressed Concrete Deck Girder	45	16.75	16.33	16.75	NC	40	223.00	2	105.2/120.0/70.5/72.8/86.5	No Skew	1-12' lane and 1 - 8' shoulder in each direction.	Reconstruction since age of bridge will be over 50-years in 2038.
B-44-0034	146.6	VandenBroek Road Over US 41	58	Prestressed Concrete Deck Girder	45	16.75	16.33	16.75	NC	40	223.00	2	109.5/109.5	No Skew	1-12' lane and 1 - 8' shoulder in each direction.	Reconstruction since age of bridge will be over 50-years in 2038.
B-44-0127	-	WIS 441 NB Over County OO	25	Prestressed Concrete Deck Girder	54	16.75	16.33	16.75	NC	72	254.00	2	109.5/109.5	6º 31' LF	1 - 12' inside shoulder, 3 – 12' lanes, 1 - 12' outside shoulder	Reconstruction since bridge will be longer and on new alignment.
B-44-0128	-	WIS 441 SB Over County OO	25	Prestressed Concrete Deck Girder	54	17.00	16.33	16.75	NC	60	254.00	2	125.0/125.0	6º 31' LF	1 - 12' inside shoulder, 3 – 12' lanes, 1 - 12' outside shoulder	Reconstruction for longer bridge.

Legend:
ES = Exception to Standard
RT = Superelevation Right
NC = Normal Crown
LT = Superelevation Left
LF = Left Forward
RF = Right Forward
N/A = Not Applicable
c&g = Curb and Gutter

Interchanges

County E (Ballard Road) Interchange

Interchange Alternative Summary

Four short-term to intermediate improvement alternatives were analyzed for the County E (Bollard Road) Interchange within the Operational Needs Assessment Final Report prepared for WisDOT on November 2011 (see Appendix 14). Alternative 1 addresses the existing safety and operational issues within the interchange by extending ramp left turn lanes and extending and or adding ramp right turn lanes. Alternative 2 improves the ramps similar to Alternative 1 and additionally adds look ahead left turn lanes along County E north and south interchange approaches. Alternatives 3 and 4 developed roundabout options for the ramp terminals and the intersection of County E and Evergreen Drive to the north. Alternative 5 is a traditional intersection alternative evaluated for 2038 traffic volumes. Refer to Figure 5-4 (page 5-34) for County E interchange layout. Refer to Appendix 15 for operational analysis.

Alternative 1 improves US 41 SB off-ramp by extending the left turn lane from 210’ to 300’ and adding an additional right turn lane and for the US 41 NB off-ramp by extending the left turn lane from 400’ to 500’ and extending the right turn lane from 150’ to 300’ and adding an additional right turn lane to addresses the existing safety and operational issues within the interchange. The US 41 Southbound on-ramp acceleration lane is to be increased from 400’ to 2000’ and the US 41 Northbound off-ramp deceleration lane is to be increased from 300’ to 1400’.

Alternative 2 includes similar Alternative 1 improvements along with adding a 450’ look ahead left turn along County E north of the interchange and adding a 200’ look ahead left turn along County E to the south of the interchange.

Alternative 3 is a roundabout alternative designed for year 2020 traffic volumes. County E maintains a divided four-lane facility with three-lane roundabouts at the ramp terminals and a three-lane roundabout with right turn free flow or bypass lanes at the intersection with Evergreen Drive.

Alternative 4 is a roundabout alternative designed for year 2035 traffic volumes. County E maintains a divided four-lane facility with three-lane roundabouts at the ramp terminals and a three-lane roundabout with right turn free flow or bypass lanes at the intersection with Evergreen Drive. Additionally, Alternative 4 has right turn bypass lanes at the ramp terminals.

Alternative 5 is a full interchange reconstruction alternative evaluated using 2038 traffic volumes for the frontage roads and ramp terminal intersections with County E. Refer to Figure 5-4 on page 5-34 for County E Interchange layout. An additional lane in both the County E northbound and southbound directions are required creating a six-lane arterial from Capitol Drive to Evergreen Drive (two southbound lanes at Evergreen north approach).

In addition, the following intersection improvements are identified:

The County E and Evergreen Drive Intersection improvements include:

- The westbound dual left-turn lanes were increased from 275’ long to 325’ long.

- The southbound single left-turn lane was increased from 125’ long to 250’ long.
- The northbound single right-turn lane was increased from 275’ long to 500’ long and an additional 500’ right-turn lane was added making it a dual right-turn movement.

The County E and US 41 Southbound Ramp Intersection improvements include:

- The US 41 Southbound off-ramp lengthens the right-turn lane from 200’ to 325’ long and incorporates a second 325’ right-turn lane making a dual right-turn movement.
- The existing ramp combined thru and left-turn lane remains. The existing dedicated left-turn lane was increased to 225’ from 200’. An additional 225’ left-turn lane was added creating a triple left-turn movement.
- The County E southbound right-turn lane onto the US 41 Southbound on-ramp was decreased in length from 350’ to 250’.
- Dual 225’ look ahead left turn lanes for were added to southbound County E.

The County E and US 41 Northbound Ramp Intersection improvements include:

- The County E existing southbound continuous left-turn lane was decreased to 375’ and an additional 375’ left-turn lane was added making it a dual left-turn movement.
- The US 41 Northbound off-ramp lengthens the right-turn lane from 125’ to 325’ long and incorporates a second 325’ right-turn lane making a dual right-turn movement.
- The existing off-ramp combined thru and left-turn lane remains. The existing dedicated left-turn lane was decreased to 325’ from 400’. An additional 325’ left-turn lane was added creating a triple left-turn movement.
- The County E existing northbound 250’ single right-turn lane was lengthened to 375’ long.
- A 375’ long look-ahead left-turn lane was added in the northbound direction.

The County E and Capitol Drive Intersection improvements include:

- The existing westbound right-turn lane is increased from 125’ long to 150’ long.
- The existing combined thru and left-turn movement is separated into a dedicated thru lane and a dedicated 150’ long left-turn lane.
- The County E existing southbound 125’ left-turn lane was increased to 275’ and an additional 275’ left-turn lane was added making it a dual left-turn movement.
- The existing southbound combined thru and right-turn movement is separated into a dedicated thru lane and a dedicated 200’ long right-turn lane.
- An additional 250’ westbound left-turn lane was added to the existing 250’ single left-turn lane creating a dual left-turn movement.
- The existing combined eastbound thru and right-turn movement is separated into a dedicated thru lane and a dedicated 200’ long right-turn lane.

- The existing northbound 125' left-turn lane is lengthened to 300' and an additional 300' left-turn lane is added creating a dual left-turn movement.
- The existing northbound combined thru and right-turn movement was separated into a dedicated thru lane and a dedicated 300' right-turn lane.

Alternative Represented in Expansion Design Concept

Alternative 5 is currently represented in the expansion design concept. Figure 5-5 is a line diagram indicating Year 2038 traditional intersection improvements required.

Alternative 2 short-term improvements for the CTH E Interchange as developed in the Operational Needs Assessment Final Report prepared for WisDOT on November 2011 (see Appendix 14) are recommended to be built by year 2014. Alternative 2 includes additional lanes at the ramp terminals and look-ahead lefts, all which appear to mesh within the updated long term recommendation. Costs for the Alternative 2 short-term improvements are included in Table 5-8 below within the cost section. These short-term improvement costs are considered independent from the long-term improvement costs and will likely be encumbered using a separate program funding source. Some of these short-term improvement construction costs such as earthwork and aggregate base are redeemable within the long-term improvement alternative, although are not credited within the long-term improvement costs shown to be conservative.

Traffic Operations

Year 2038 traffic analysis was conducted at the County E interchange intersections using the geometrics presented in Alternative 5. A summary of the Year 2038 intersection operating conditions is provided in Table 5-6.

Table 5-6: County E Interchange Intersection Level of Service (LOS)

County E Intersection	Intersection Type	Peak Hour LOS by Intersection	
		AM	PM
E. Capitol Drive	Traffic Signal	C	C
US 41 Northbound Ramps	Traffic Signal	C	C
US 41 Southbound Ramps	Traffic Signal	B	B
W. Evergreen Drive	Traffic Signal	B	B

US 41 & CTH E (2038)

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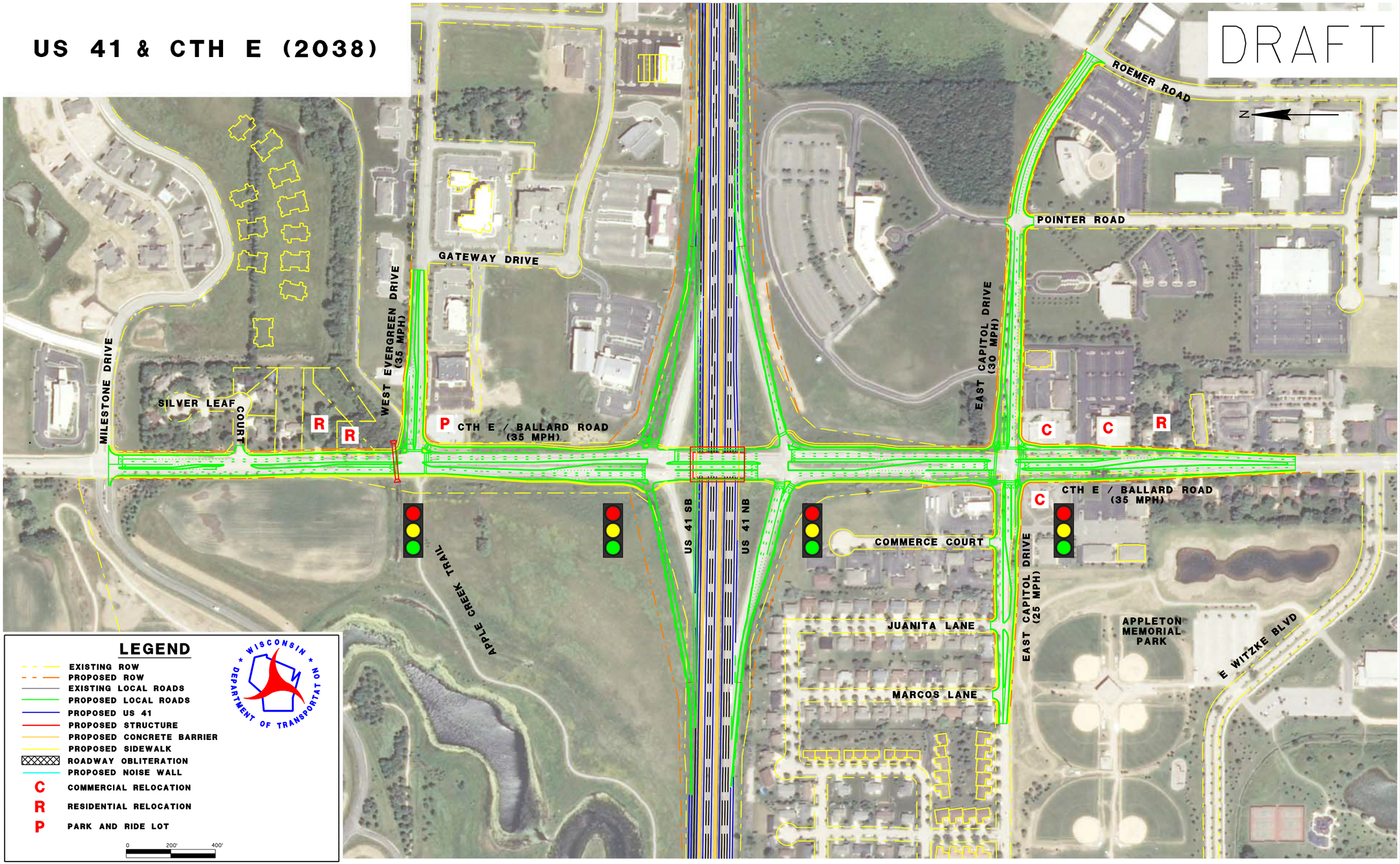

PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	FIGURE 5-4: US 41/COUNTY E INTERCHANGE	PAGE 5-34	E

Right-of-Way Impacts

Alternative 5 would require strip right-of-way acquisition throughout the interchange limits and would also include the potential relocation of 3 commercial properties and 3 residential properties. The potential relocations are:

- Wells Fargo bank branch on the southwest corner of County E and Capitol Drive
- Multi story office building housing several tenants on the east side of County E south of Capitol Drive
- McDonald's restaurant on the southeast corner of County E and Capitol Drive
- A residential parcel on the east side of County E south of Capitol Drive
- Two residential parcels on the east side of County E north of Evergreen Drive

The Hardee's restaurant on the northwest corner of County E and Capitol Drive would have a substantial impact to their parking lot. The combination of extensive parking and access impacts (see below) may result in Hardee's also becoming a relocation parcel.

There is a park and ride lot in the southeast quadrant of the County E/Evergreen Drive intersection that would be impacted by the additional lanes on County E. The row of stalls immediately adjacent to County E would be impacted resulting in a net loss of approximately 35 parking stalls.

Alternative 5 shows strip right-of-way acquisition along the north side of Appleton Memorial Park for widening on the south side of Capitol Drive east of County E. Further investigation will be needed to determine if Federal funds were used to purchase the land for the park and if a section 6(f) evaluation will be needed.

Access

The Hardee's access on County E just north of Capitol Drive would need to be moved north because it would be in the southbound right turn lane taper. This access point would remain a right in driveway. The driveway on Capitol Drive that is closest to County E should be removed. The access point on Capitol Drive that would remain would be converted to right in-right out access point because of the raised median on Capitol Drive. The drive thru line for the restaurant may need to be reconfigured because the driveway on Capitol Drive would be right in-right out only.

Commerce Court would be converted from full access intersection to right in-right out intersection because it would be in the left turn bay taper of Capitol Drive.

All of the commercial and residential parcels that access County E south of Capitol Drive would become right in-right out access points. County E currently has a two way left turn lane that would be replaced by a raised median which would restrict turning movements in and out of driveways along this section of County E.

Complete Streets

Alternative 5 includes sidewalks along both sides of County E, Capitol Drive and Evergreen Drive within the reconstruction limits to provide pedestrian accommodation. A 16’ wide outside lane is identified along both sides of County E, Capitol Drive and Evergreen Drive to provide bicycle accommodation. A connection would be provided to the Apple Creek Trail at the intersection of County E and Evergreen Drive.

Further Analysis Recommendations

Further evaluation for extending Evergreen Drive to the west from County E to Meade Street across the Thrivent property is recommended.

Capitol Drive and Evergreen Drive intersections with County E require further evaluation to address business impacts located at the intersections.

FIGURE 5-5: US 41/CTH E, EXISTING GEOMETRY AND 2038 TRADITIONAL IMPROVEMENTS

PREPARED 3-1-13

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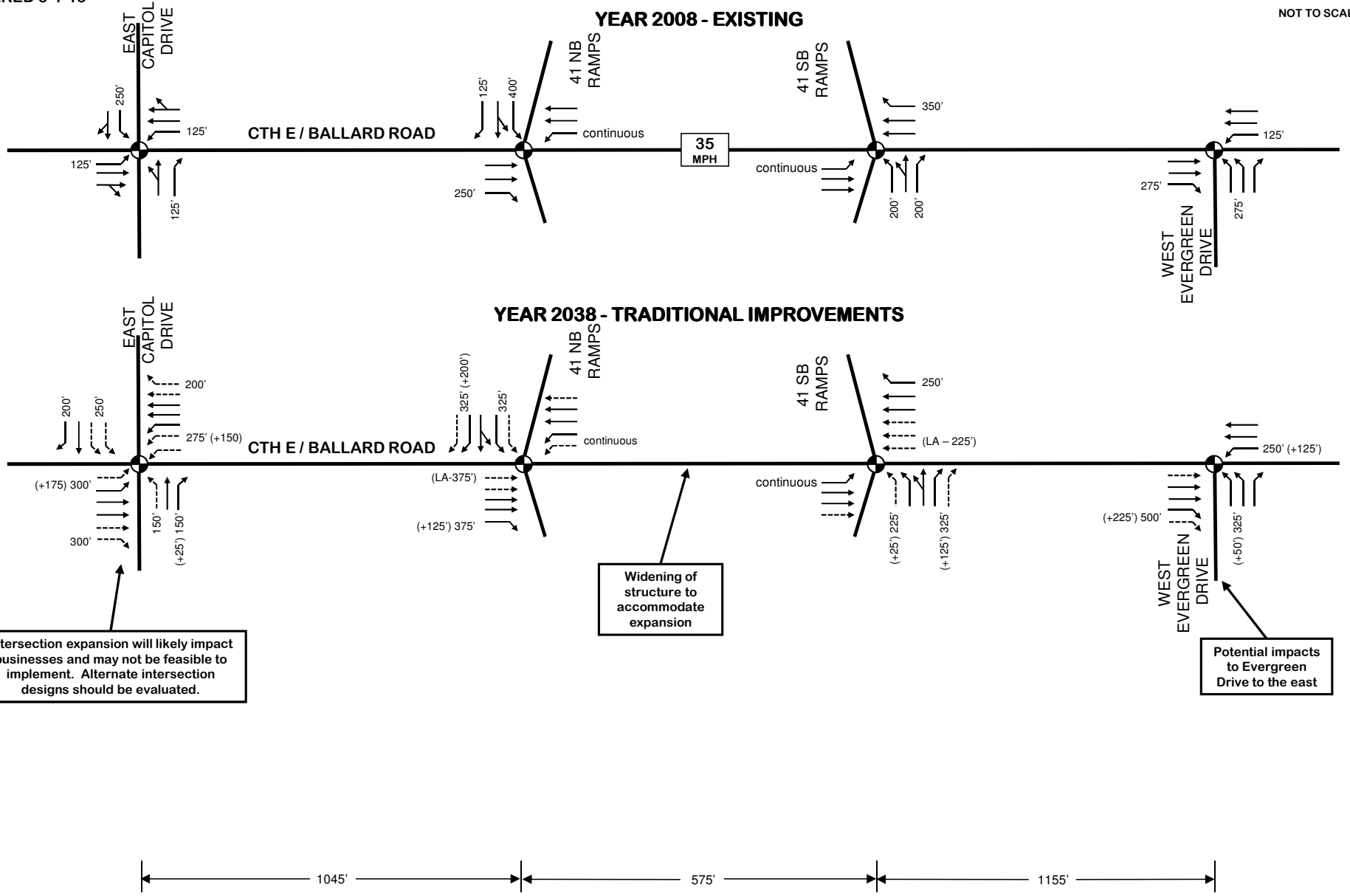
NOT TO SCALE



Legend

XX'	BASE GEOMETRICS PLANNED TURN BAY LENGTH		MEDIAN DIVIDED ROADWAY		TRAFFIC SIGNAL		OPERATIONAL PROBLEMS REMAIN
(+XX')	ADDITIONAL TURN BAY LENGTH RECOMMENED	→	BASE GEOMETRICS		STOP SIGN		
(LA-XX')	LOOK-AHEAD TURN LANE – STORAGE LENGTH	---→	ADDITIONAL IMPROVEMENT RECOMMENDED	R	ROUNDABOUT		

County OO (Northland Avenue) Interchange

Interchange Alternative Summary

Five short-term to intermediate improvement alternatives were analyzed for the County OO (Northland Avenue) Interchange within the Operational Needs Assessment Final Report prepared for WisDOT on November 2011 (see Appendix 14). Alternative 1 addresses the existing safety and operational issues within the interchange by improving the WIS 441 Southbound On-ramp merge, adding auxiliary lanes along WIS 441 between County OO Interchange and the North System Interchange, and County OO Off-ramp improvements including a sign bridge. Alternative 2 in addition to Alternative 1 improvements, further improves the southbound off- and on-ramps, improves County OO east approach to the northbound ramp terminal, and makes intersection improvements including coordinated traffic signal installation at the County OO and French Road intersection. Alternative 3 in addition to Alternative 1 and 2 improvements relocates the French Road/County OO intersection further to the east for better intersection spacing and subsequent operations along County OO. Alternatives 4 and 5 developed roundabout options for the ramp terminals and the intersection of County OO and French Road. Alternative 6 provides a partial cloverleaf interchange at County OO with the northbound on-ramp becoming a loop ramp to WIS 441 northbound. French Road is relocated further to the east providing proper distance from the newly relocated northbound ramp terminal. Refer to Figure 5-6 (page 5-41) for County OO interchange layout. Refer to Appendix 15 for operational analysis.

Alternative 1 improves WIS 441 SB off-ramp by extending the right turn lane from 120’ to 350’ and for the WIS 441 NB off-ramp by extending the right turn lane from 160’ to 350’ and adding an additional 400’ right turn lane and sign bridge for ramp lane designation. The WIS 441 SB ramp acceleration lane was extended from 630’ to 800’ to addresses the interchange’s primary safety need.

Alternative 2 in addition to Alternative 1 improvements, adds an additional left turn lane on the WIS 441 SB Off-ramp. A County OO EB right turn lane was added prior to the WIS 441 SB On-ramp, acceleration lane was extended from 190’ to 385’, new ramp signage and marking was added for safer merge access. Improvements to the County OO/French Road Intersection west and north approaches include extending and adding left turn lanes on the west approach and adding a right turn lane and two northbound receiving lanes on the north approach along with coordinated traffic signal installation.

Alternative 3 closes the existing French Road intersection access and realigns French Road east approximately 1300 feet from the existing ramp terminal intersection. The new French Road alignment will have a design speed of 45 MPH and will require acquisition and relocation of at least two resident dwellings. Stream relocation including three new box culverts will also be required.

Alternatives 4 and 5 are roundabout alternatives designed for year 2020 and 2035 traffic volumes respectively. Both maintain a divided four-lane facility along County OO with two-lane roundabouts at the ramp terminals and a two-lane roundabout at the intersection with French Road. In addition, Alternative 5 has right turn free flow lanes at needed intersection locations.

Alternative 6 would change the interchange configuration from a diamond interchange to a partial cloverleaf interchange. The northbound entrance ramp would become a loop ramp in order to provide adequate weaving distance between the entrance ramp and the US 41/US 441 system interchange. In addition French Road would be realigned to the east to provide appropriate spacing to the northbound US 41 ramps. Improvements would be made to the ramp intersections as well as the intersections with Conkey Street and French Road.

Improvements to the County OO/French Road intersection would include:

- The westbound left turn lane would be lengthened by 225’ from 100’ to 325’
- The northbound combined left-thru-right would be changed to a left-thru lane and a 200’ long dedicated right turn lane
- The eastbound left turn lane would be lengthened by 225’ from 100’ to 325’. An additional 325’ left turn lane would be added creating a dual left turn lane
- The southbound combined left-thru-right would be changed to a left-thru lane and a 300’ long dedicated right turn lane.

Improvements to the County OO/US 441 Northbound ramp intersection would include:

- Changing the intersection configuration from a four-legged intersection to a three-legged intersection because of the addition of the loop ramp
- Adding an additional westbound thru lane
- Removing the 50’ westbound left turn lane and replacing it with a 325’ left turn lane
- The northbound right turn lane would be lengthened by 160’ from 315’ to 475’. An additional 475’ long right turn lane would be added creating a dual right turn lane.
- The northbound left turn lane would be lengthened by 160’ from 315’ to 475’. An additional 475’ long left turn lane would be added creating a dual left turn lane.
- Removing the continuous eastbound left turn lane and replacing it with a 325’ right turn lane

Improvements to the County OO/US 441 Southbound Ramp intersection would include:

- Adding and additional westbound thru lane
- The westbound continuous left turn lane would become a 400’ long dual left turn lane
- The eastbound right turn lane would be lengthened by 175’ from 300’ to 475’
- The southbound right turn lane would be lengthened by 100’ from 100’ to 200’
- A 200’ long southbound left turn lane would be added creating a dual left turn movement with the existing thru-left lane

Improvements to the County OO/Conkey Street intersection would include:

- The westbound right turn lane would be lengthened by 175’ from 150’ to 325’
- The westbound left turn lane would be lengthened by 175’ from 150’ to 325’

- A dedicated 200’ long northbound right turn lane would be added
- The existing northbound left-thru-right lane would become a left-thru lane
- The eastbound right turn lane would be lengthened by 175’ from 150’ to 325’
- The eastbound left turn lane would be lengthened by 175’ from 150’ to 325’
- A dedicated 200’ long southbound right turn lane would be added
- The existing southbound left-thru-right lane would become a left-thru lane

Alternative Represented in Expansion Design Concept

Alternative 6 is represented in the expansion design concept. Figure 5-7 is a line diagram indicating Year 2038 traditional intersection improvements required.

Alternative 1 short-term improvements for the CTH OO Interchange as developed in the Operational Needs Assessment Final Report prepared for WisDOT on November 2011 (see Appendix 14) are recommended to be built by year 2014. Alternative 1 includes additional lanes at the ramp terminals and extended acceleration lane on southbound on-ramp, all which appear to mesh within the updated long term recommendation. Costs for the Alternative 1 short-term improvements are included in Table 5-8 below within the cost section. These short-term improvement costs are considered independent from the long-term improvement costs and will likely be encumbered using a separate program funding source. Some of these short-term improvement construction costs such as earthwork and aggregate base are redeemable within the long-term improvement alternative, although are not credited within the long-term improvement costs shown to be conservative.

Traffic Operations

Year 2038 traffic analysis was conducted at the County OO interchange intersections using the geometrics presented in Alternative 3. A summary of the Year 2038 intersection operating conditions is provided in Table 5-7.

Table 5-7: County OO Interchange Intersection Level of Service (LOS)

County OO Intersection	Intersection Type	Peak Hour LOS by Intersection	
		AM	PM
N. Conkey Street	Traffic Signal	B	C
WIS 441 Southbound Ramps	Traffic Signal	B	B
WIS 441 Northbound Ramps	Traffic Signal	B	B
French Road	Traffic Signal	C	B

2

WIS 441 & COUNTY OO (2038)

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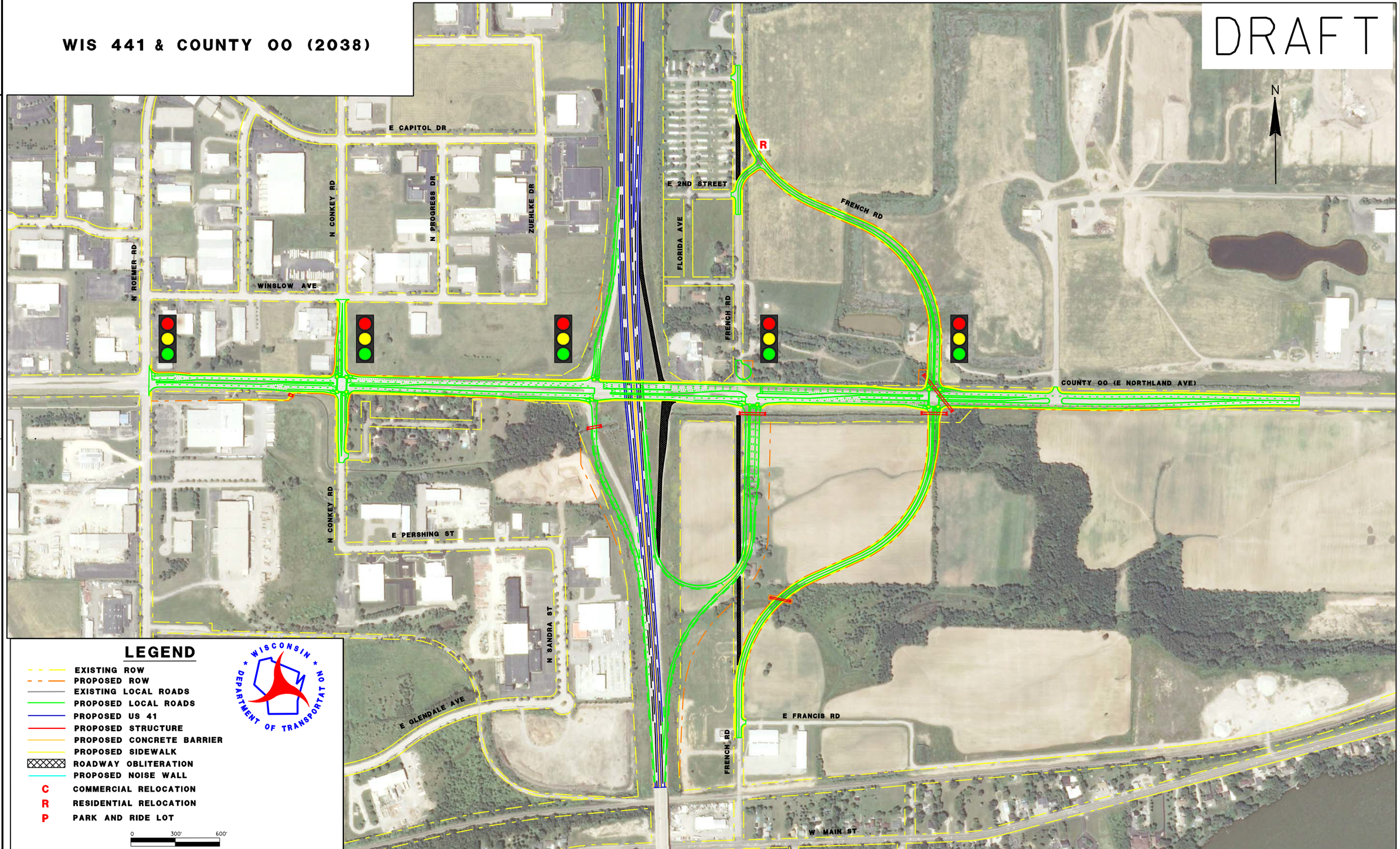
2



PROJECT NO: 1130-31-00	HWY: US 41	COUNTY: OUTAGAMIE	FIGURE 5-6: COUNTY OO INTERCHANGE	PAGE 5-41	E

FILE NAME : $$....designfile....$$ PLOT DATE : $$...plottingdate...$$ PLOT BY : $$...plotuser...$$ PLOT NAME : PLOT SCALE : $$.....plotscale.....$$ WISDOT/CADDS SHEET 42

Right-of-Way Impacts

Likely one residential relocation would be required with Alternative 6. The relocation would be a pole barn along the east side of French Road north of County OO.

The 2008 aerial photo used in the planning study exhibits shows three residential parcels along the east side of French Road south of County OO that would be potentially be impacted by Alternative 6. All three of those residences have been razed since the aerial photo was taken so there would be no relocations required along this section of French Road.

Access

Alternative 6 would require only minor access changes. The existing French Road would become a dead end just north of County OO be adding a cul-de-sac. Residents would access French Road by traveling north along existing French Road to the realigned French Road.

Complete Streets

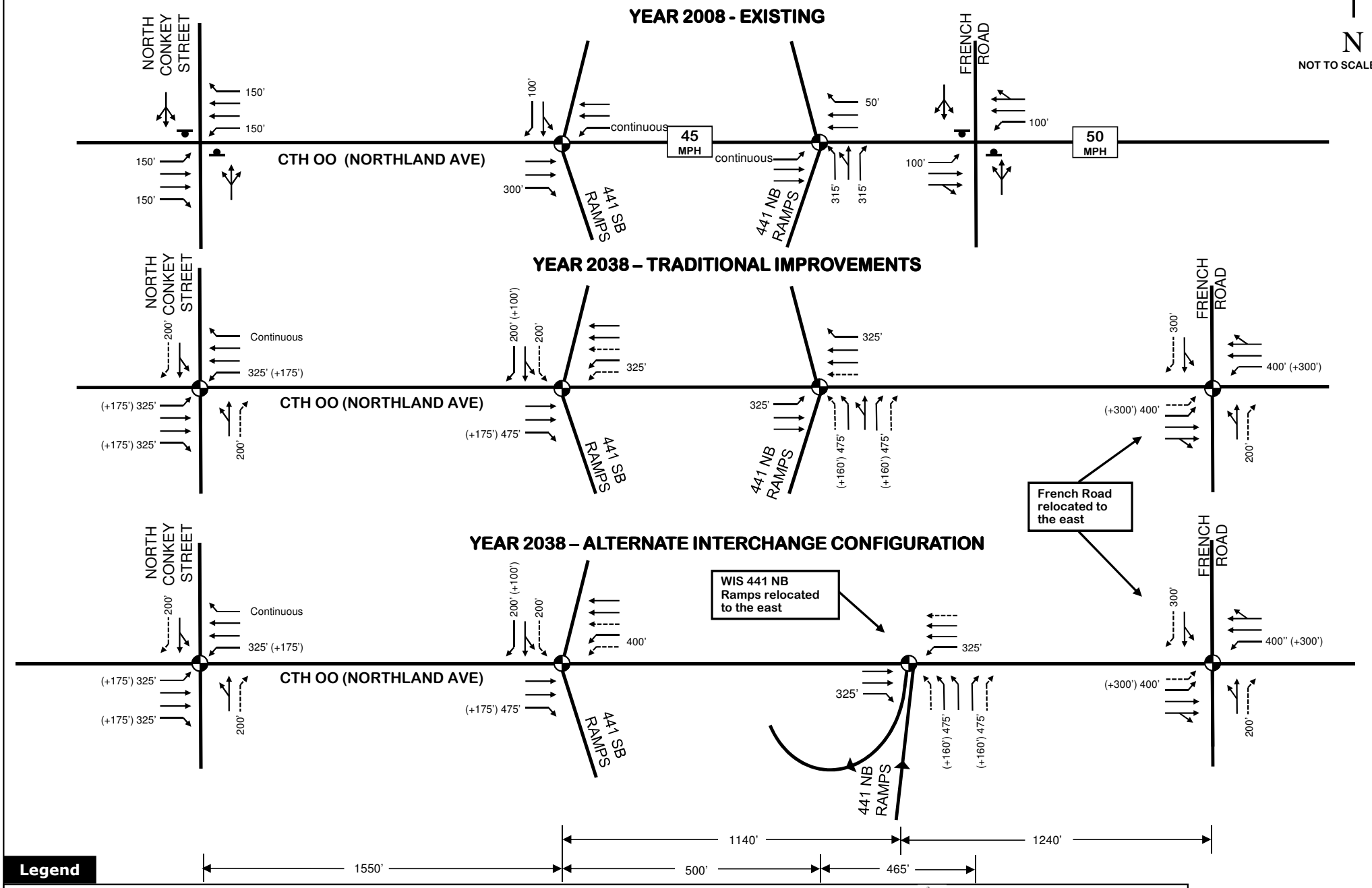
Alternative 6 would include a sidewalk along both sides of County OO, French Road, and Conkey Road to provide pedestrian accommodations. A 16’ wide outside lane would be provided on both sides of County OO, French Road, and Conkey Road to provide bicycle accommodations.

Further Analysis Recommendations

French Road provides a route for traffic traveling between WIS 441 and the area north of US 41 bounded by French Road, Freedom Road, Evergreen Drive and County JJ. Development plans for this area should be reviewed at the time designs for French Road are being developed.

FIGURE 5-7: CTH OO, EXISTING GEOMETRY AND 2038 TRADITIONAL IMPROVEMENTS

PREPARED 3/21/2013



Legend

XX'	BASE GEOMETRICS PLANNED TURN BAY LENGTH		MEDIAN DIVIDED ROADWAY		TRAFFIC SIGNAL		OPERATIONAL PROBLEMS REMAIN
(+XX')	ADDITIONAL TURN BAY LENGTH RECOMMENED	→	BASE GEOMETRICS		STOP SIGN		
(LA-XX')	LOOK-AHEAD TURN LANE – STORAGE LENGTH	---→	ADDITIONAL IMPROVEMENT RECOMMENDED	R	ROUNDABOUT		

5.3 Cost Summary

Table 5-8 below summarizes the short-term and long-term alternative costs for Segment 5. Individual one page cost summaries using the US 41 Majors cost estimating worksheets are included for each US 41 mainline segment and Interchange. See Appendix 6 for a detailed breakdown of these cost estimating worksheets by segment or interchange.

Table 5-8: Segment 5 – Cost Summary

MAINLINE SEGMENT LIMITS/INTERCHANGE	SHORT-TERM COSTS*	LONG-TERM COSTS*	TOTALS
West of County E to West of County N (includes US 41/WIS 441 North System Interchange)			
Major Roadway Items		$28,425,000	
Allowance Items		$16,989,000	
Structures		$33,727,000	
Special Construction Elements		$0	
Context Sensitive Solutions (CSS)		$3,957,000	
Scope Change Allowance Items		$19,944,000	
Project Delivery Allowance Items		$35,755,000	
External Costs and Risk Assessment		$9,141,000	$147,938,000
County E Interchange			
Short-Term Alternative 2	$702,000		$702,000
Long-Term Alternative 5			
Major Roadway Items		$6,698,000	
Allowance Items		$4,004,000	
Structures		$5,028,000	
Special Construction Elements		$0	
Context Sensitive Solutions (CSS)		$787,000	
Scope Change Allowance Items		$3,964,000	
Project Delivery Allowance Items		$7,107,000	
External Costs and Risk Assessment		$1,817,000	$29,405,000
County OO Interchange			
Short-Term Alternative 1	$603,000		$603,000
Long-Term Alternative 6			
Major Roadway Items		$8,294,000	
Allowance Items		$4,957,000	
Structures		$1,878,000	
Special Construction Elements		$0	
Context Sensitive Solutions (CSS)		$756,000	
Scope Change Allowance Items		$3,812,000	
Project Delivery Allowance Items		$6,834,000	
External Costs and Risk Assessment		$1,748,000	$28,279,000
Segment 5 Total	**$1,305,000**	$205,622,000	$206,927,000

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