U.S. Highway 14 Corridor Study

New Ulm to North Mankato

Interchange Workshop Report (August 2004)

Table of Contents

1. Introduction and Next Steps

This report summarizes the results of interchange concept studies for the US 14 corridor from North Mankato to New Ulm. The work represented within this report was primarily based on interchange workshop, held o0n June 17th, 2004 (see more information below about this workshop). This initial milestone in the process was a "brainstorming" exercise led by the Minnesota Department of Transportation (Mn/DOT) and its consultant team, represented by the firms CH2M HILL and Bolton & Menk.

The primary purpose of the interchange concept work was to look more closely at highway design features and develop and refine the reasonable range of highway alignment and geometric alternatives for further detailed study in the Environmental Impact Statement (EIS). As such, this interchange report should also be reviewed in conjunction with an anticipated alternatives screening technical memorandum, which will focus on the *alignments*, or corridor routes, to be considered for further study.

In general, an improved U.S. 14 is proposed to be a four-lane divided expressway with at-grade stop-controlled intersections at crossroads where necessary, safe, and feasible. In developing the preliminary design, Mn/DOT also wishes to avoid the potential for future traffic signals. Therefore, the design team is planning ahead to ultimately add interchanges at appropriate locations. The specific objectives of the conceptual interchange work were to:

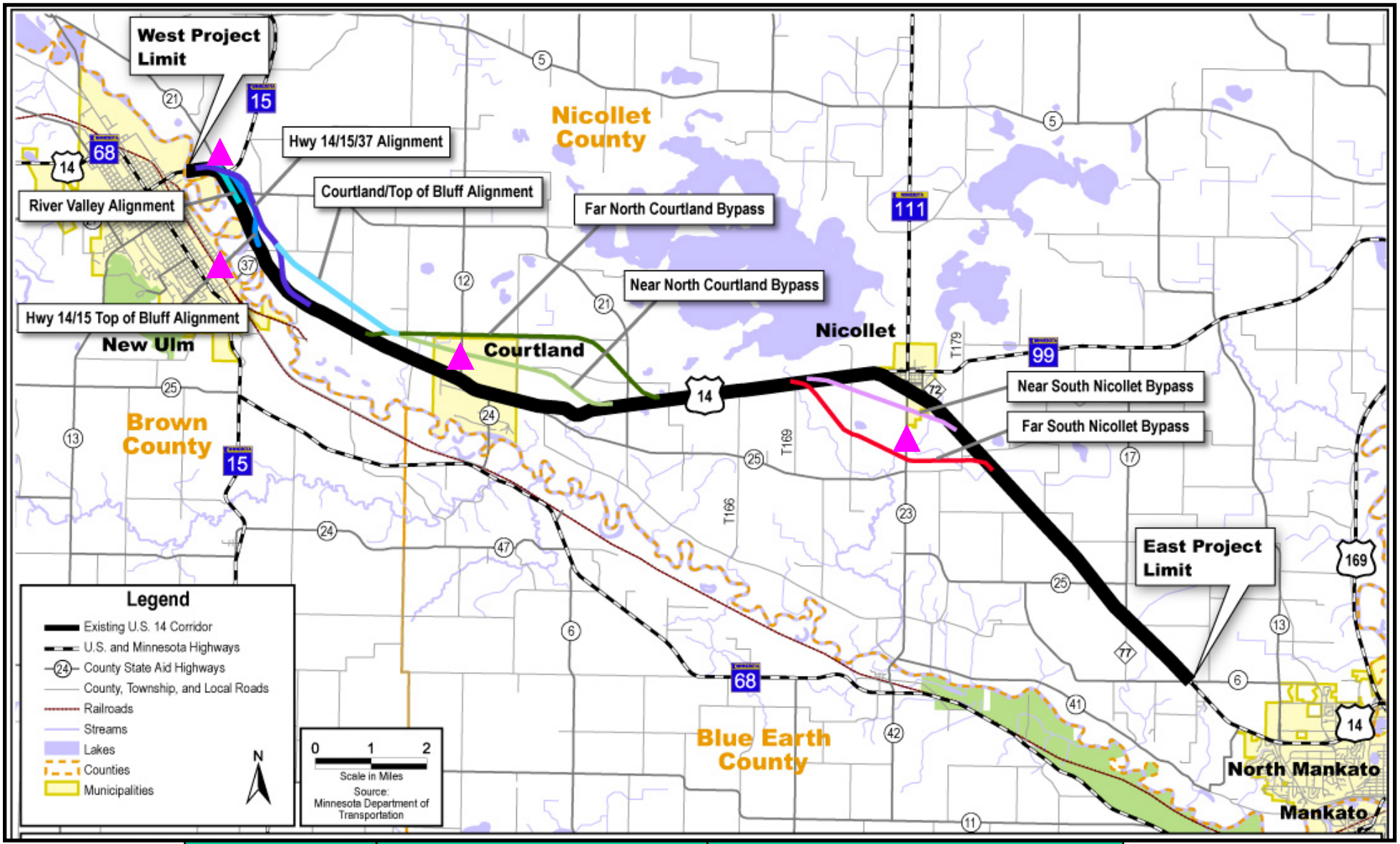
1) Identify the most promising interchange locations/configurations
2) Consider interchange influence on alignments/alternatives
3) Identify environmental and screening considerations

With reference to ***Figure 1***, These objectives were applied to four general locations: (1) West end—U.S. 14 at MN 15; (2) West end—U.S. 14 at Co. Highway 37; (3) North bypass of Courtland, with a focus on U.S. 14 at Co. Highway 24; and (4) South bypass of Nicollet with a focus on connections to Highway 23 & MN 99. Still, as this report is finished, it is important to note that any of the interchange concepts could be subject to further refinement.

AS THIS REPORT IS FINISHED, IT IS IMPORTANT TO NOTE THAT ANY OF THE INTERCHANGE CONCEPTS COULD BE SUBJECT TO FURTHER REFINEMENT. THEREFORE, THE INFORMATION PRESENTED HERE IS EVIDENCE OF THE VALUE OF EARLY BRAINSTORMING—EFFORTS THAT WILL LATER MAKE IT EASIER TO IDENTIFY AND SELECT THE BEST DESIGN SOLUTIONS.

Mn/DOT has presented the wide range of corridor alignment alternatives and interchange concepts to a wide audience—including the US 14 Corridor Study Project Advisory Committee (PAC), the general public (through a series of informal open houses in July 2004), and to agencies (through an workshop emphasizing environmental agency input held on July 21, 2004). Completion of this work and coordination will allow Mn/DOT to focus more closely on the most promising alignments and interchange design concepts, ensuring better quality design and environmental study than would be possible with analysis of many more alternatives.

As the process goes forward from here, the design team will periodically re-visit the details of this initial interchange concept work, and no final design decisions will be made until a preferred roadway alignment has been identified (anticipated by approximately mid 2005). This is evidence of the value of this early brainstorming—efforts that will later make it possible to identify and select the best design solutions.



U.S. 14 Draft Environmental Impact Statement
New Ulm to North Mankato

FIGURE 1: Corridor Study Sections and Interchange Study Areas

2. Interchange Workshop Participants & Format

The US 14 Interchange Workshop was conducted as an all-day meeting on June 17th, 2004, at the New Ulm City Hall, first floor conference room, from 9:00 AM to 4:30 PM. The main purpose of the workshop was to refine the engineering design concepts for the US 14 corridor from New Ulm to North Mankato. Mn/DOT, along with its consultant team, would like to thank everyone who participated in the US 14 Interchange Concept Workshop. Below is a list of individuals who participated.

Representatives from Local Communities

- Brown County—Wayne Stevens
- Nicollet County—Mike Wagner
- City of New Ulm—Steve Koehler
- Cities of Courtland & Nicollet—Dan Wietecha

Mn/DOT

- Peter Harff—Project Manager
- Mary Dieken
- Giles Abbe
- Jim Rosenow
- Ed Idzorek
- Lynn Bode
- David Larson

Consultant team included representatives of:

CH2M HILL

- Howard Preston—Project Manager
- Doug Abere
- Cheng Soong
- Nikki Farrington

Bolton & Menk

- Brett Benzkofer

The workshop began in the morning with a review the project background—the Scoping Study, which included development and screening of several corridor alternatives. The group then discussed the four interchange study areas (in the vicinity of MN 15 and CR 37 near New Ulm, and Courtland and Nicollet) and potential interchange design types. Based on the morning discussions, CH2M HILL worked with Mn/DOT to prepare refined interchange concepts during the middle portion of the workshop. All workshop participants then reconvened later in the day to discuss the concept sketch designs.

3. US 14 Project Background

The US 14 Interchange Workshop was held as part of the US 14 Corridor Study/Environmental Impact Statement (EIS) between New Ulm and North Mankato (see **Figure 1** for an overview of the study area). The purpose of the improvements being studied for the US 14 Corridor is to address documented mobility and safety deficiencies in a manner that will be compatible with local communities and the area's natural resources as traffic volumes increase.

Preliminary EIS Alternatives Screening Process

In general, proposed improvements to US 14 include expanding the roadway to a four-lane divided expressway with at-grade stop-controlled intersections at crossroads where necessary, safe, and feasible. Mn/DOT is examining a variety of expanded four-lane alignment alternatives—including reconstruction of the existing roadway plus bypasses of Courtland and Nicollet and a new approach to the intersection with MN 15 (see **Figure 1**).

Mn/DOT is in the process of developing a range of alternatives to carry forward into detailed analysis in the Draft EIS. Mn/DOT is adjusting these alignments based on preliminary engineering and environmental considerations. The goal is to develop alignment alternatives that:

- are consistent with local land use plans,
- minimize impacts to environmental resources whenever possible, and
- are consistent with Mn/DOT's corridor performance goals and design guidelines.

Potential Interchange Locations

Mn/DOT is attempting to avoid the potential for future traffic signals in preliminary designs for US 14. This is being done in order to avoid increases in crash frequencies that have been documented in other high speed expressway corridors and to meet the established performance measure of maintaining average peak hour speeds along designated Interregional Corridors— US 14 is designated as an Interregional Corridor. Signal proliferation, as well as access proliferation, negatively impacts average peak hour speeds. One way to avoid additional signals along US 14 is to plan for possible interchanges at intersections considered at risk of meeting the minimum traffic volume thresholds for installation of a traffic signal in the future.

4. Purpose of Interchange Workshop and Report

The purpose of the Interchange Design Workshop held on June 17, 2004, was to study the limited number of intersection locations along US 14 considered to be at risk (see **Figure 1**). The specific workshop objectives included:

- Identifying the most promising interchange locations/configurations
- Considering interchange influence on alignments
- Identifying environmental and screening considerations

This document discusses the interchange concepts developed during the workshop, primarily focusing on functional characteristics and balancing preliminary highway designs with potential impacts and consistency with local government comprehensive plans.

In addition to this report, key products from the workshop include a set of concept sketch designs for the US 14 corridor addressing potential interchanges at the following four general locations which are attached to the back of this report:

1) West end—US 14 at MN 15 (see **Figures 2, 3, 4, 5, and 6**);
2) West end—US 14 at County Road (CR) 37 (see **Figures 2, 3, 4, 5, and 6**);
3) North bypass of Courtland, with a focus on US 14 at CR 24 (see **Figure 7**); and
4) South bypass of Nicollet with a focus on connections to CR 23 & MN 99 (see **Figures 8, 9, 10, and 11**).

5. Considerations at General Interchange Study Locations

The following provides a summary of the issues addressed by the design team during the workshop. More detailed summaries of the design concepts developed will be prepared as part of the EIS process.

West End – US 14 at MN 15 (and CR 21) and at CR 37 (see Figures 2, 3, 4, 5 and 6)

- Mn/DOT has identified the potential re-designation MN 15 to follow a common portion of US 14 on the north side of the Minnesota River, crossing on the existing CR 37 bridge. This will be reflected in some of the redesign concepts.
- The main corridor options are to: (a) follow the existing US 14 corridor along side the river, or to (b) re-route the highway to the area along the top of the bluff, partially along a power line corridor.
- Design challenges in this area include roadway horizontal curvature and grades (vertical curvature), and locating potential interchanges to minimize residential and natural resource impacts (the Minnesota River floodplain and woodlands).
- The key features of designs considered at the workshop included maintenance of local roadway access, especially at CR 21, and re-joining US 14 at the existing bridge across the Minnesota River.

Courtland – US 14 North Bypass, with Emphasis on Connections to CR 12 and CR 24 (see Figure 7)

- A diamond interchange on the near-north side of Courtland was selected as the emphasis for concept design at the workshop.
- The diamond interchange concept includes the potential to tie CR 12 and CR 24 together.
- There is potential to generally follow the "top of bluff" alignment from just east of Courtland all the way to the west extent of the corridor (at MN 15) or to re-join US 14 along the river (see the discussion on interchange concept considerations in the West End of the Study area above).

Nicollet – US 14 South Bypass, with Emphasis on Connections to CR 23 and to MN 99 (see Figures 8, 9, 10, and 11)

- Four southern bypass corridors of Nicollet are being studied—three of the bypasses are located north of the wastewater treatment ponds; and one is located south of the ponds.

- Most future residential growth and development of Nicollet is expected toward the north; however, the near south bypass with the interchange at CR 23 is already very close to current land development extending toward south.
- While a far-south diamond interchange location may have less potential conflict with the City's future development, it would create some potential for inconvenient access to and from US 14—especially as no other access to the new highway would be desirable within 1.5 to 2 miles from the interchange.
- Discussion at the workshop yielded a potential new geometric and functional concept—a "split diamond" access approach, with an interchange at each end of a proposed Nicollet south bypass corridor. Such a design concept can also consider modified access to county roads and re-routing of MN 99. This might result, for example, in a ½ - diamond interchange at MN 99 extended south of town. It would also likely involve a signing, or route designation, approach that would convert existing US 14 to "Business 14."
- Workshop participants also considered a full access interchange just east of Nicollet, very close to the existing US 14 alignment, but also connecting with a southern bypass alignment. This concept provides access to both CR 23 and MN 99. MN 99 would be re-routed to bypass Nicollet immediately east of town.

6. Interchange Concepts—Advantages & Disadvantages

The following discussion provides a comparison of the interchange concepts developed during the interchange workshop. The criteria used for comparing the interchange concepts include: highway continuity, access locations, environmental impacts (wetlands, upland forest, agriculture lands, floodplains), and potential residential displacements. The analysis was based on the concept level designs completed for the interchange workshop. The impacts of the potential interchanges will be confirmed once interchange concepts have been modified and Mn/DOT has selected the range of alternatives to carry forward into detailed environmental analysis.

Segment 1 - New Ulm - US 14/MN 15

Interchange Concept 1A.1: US 14/MN 15 Existing Alignment. This concept would include a system interchange at the existing intersection of US 14 and MN 15. The system interchange would contain directional ramps for southbound MN 15 to eastbound US 14 and for westbound US 14 to northbound MN 15. A loop ramp is used for the movement between eastbound US 14 to northbound MN 15.

Interchange Concept 1A.2: US 14/CR 37 Existing Alignment. The interchange at CR 37 includes a directional ramp for the movement from northbound CR 37 to eastbound US 14 and for westbound US 14 to southbound CR 37. A loop ramp accommodates the movement of northbound CR 37 to westbound US 14.

Table 1. Interchange Concept 1A - US 14/MN 15 Existing Alignment & Interchange Concept 1A.2 – US 14/CR 37 Existing Alignment

Advantages	Disadvantages
- Good continuity of both US 14 and MN 15 - Potential impacts confined to existing corridor by keeping the mainline on the existing alignment - Minimizes impacts to agricultural lands - Minimizes impacts to upland forests	- Difficult to provide access from CR 21 to US 14 due to close spacing - Local roadway changes and limited access to US 14 - Impacts to structures (similar to 1A, 1B, and 1C) - Potential impacts to wetlands (similar to 1C)

Interchange Concept 1B: US 14/MN 15 New Alignment Above Bluff. This concept considers the relocation of the US 14/MN 15 corridor, shifting the alignment east, on the bluff. A diamond interchange provides access to MN 15 from US 14. MN 15 then continues west to CR 21. This concept minimizes floodplain impacts by moving north of the Minnesota River floodplain. While the floodplain impact is minimized, there are additional impacts to agricultural land, residences and upland forests.

Interchange Concept 1B.2: US 14/CR 37 Existing Alignment. The same interchange used for Interchange Concept 1A at the intersection of US 14 and CR 37 is used for this concept.

Table 2. Interchange Concept 1B - US 14/MN 15 New Alignment Above Bluff & Interchange Concept 1B.2 – US 14/CR 37 Existing Alignment

Advantages	Disadvantages
- Good continuity of US 14 - Interchange spacing - the distance between the US 14/MN 15 and US 14/CR 37 interchanges provides adequate spacing - Local Access - this configuration allows for more accommodation of local roadway access (CR 21) - Potentially minimizes wetland impacts	- Bluff causes high grades for mainline traffic - Discontinuity of MN 15 - Induce impacts to other locations in addition to the existing corridor (residential area above bluff, agricultural lands above bluff) (similar to 1C), and structures (similar to 1A, 1B, and 1C) - Impacts to contiguous upland forest

Interchange Concept 1C.1: US 14 Above Bluff, MN 15 Below Bluff. This split diamond concept separates US 14 and MN 15. US 14 shifts east and above the bluff while MN 15 stays on the existing US 14/MN 15 alignment. The floodplain impacts are still minimized since MN 15 would be on the existing US 14 alignment without the need for widening, but this concept results in additional impacts above the bluff. Westbound traffic on US 14 is provided access to westbound MN 15 at CR 37 only.

Interchange Concept 1C.2: US 14/CR 37 Below Bluff. As noted above, the 1C interchange concepts involve a split diamond that separates US 14 and MN 15. The interchange at US 14/CR 37 includes a direction ramp for movement of westbound US 14 to southbound CR 37 and westbound MN 15. Eastbound US 14 would not be able to access MN 15 or CR 37 east of the US 14/MN 15 interchange in New Ulm. Northbound 37 would continue to provide access to MN 15.

Table 3. Interchange Concept 1C.1 - US 14 Above Bluff, MN 15 Below Bluff & Interchange Concept 1C.2 – US 14/CR 37 Below Bluff

Advantages	Disadvantages
- Good continuity of US 14 - Minimizes impact to the floodplains along existing US 14	- US 14 and MN 15 diamond interchange is on a curve and a slope - Provides two parallel highways close together - Bluff causes high grades for mainline traffic - Induce impacts to other locations in addition to the existing corridor (residential area above bluff, agricultural lands above bluff (similar to 1C), and structures (similar to 1A, 1B, and 1C) - Impacts to contiguous upland forest - Potential impacts to wetlands (similar to 1A) - US 14 goes up and then down the bluff

Interchange Concept 1D.1: US 14 Below Bluff, MN 15 Below Bluff. The tight diamond interchange requires shifting US 14 slightly to the north at the existing intersection location and shifting MN 15 slightly to the west. This tight diamond concept minimizes the need for new right-of-way and provides free-flow movement and good continuity for US 14. MN 15 traffic would have a stop condition at the ramp terminals.

Interchange Concept 1D.2: US 14/CR 37 Existing Alignment. The same interchange used for Interchange Concept 1A at the intersection of US 14 and CR 37 is used for this concept.

Table 4. Interchange Concept 1D.1 - US 14 Below Bluff, MN 15 Below Bluff & Interchange Concept 1D.2 – US 14/CR 37 Existing Alignment

Advantages	Disadvantages
- Negligible impacts to upland forest	- Would impact probable wetland lying between US 14 and the bluffs - Potential edge impacts to wetlands in the bottoms of the Minnesota River

Interchange Concept 1E.1: US 14 Above Bluff, MN 15 Above Bluff. This concept considers the relocation of the US 14/MN 15 corridor, shifting the alignment east, on the bluff. A diamond interchange provides access to MN 15 from US 14. MN 15 then continues west to CR 21. This concept minimizes floodplain impacts by moving north of the Minnesota River floodplain. While the floodplain impact is minimized, there are additional impacts to agricultural land, residences and upland forests.

Interchange Concept 1E.2: US 14/CR 37 Above Bluff. This concept considers the extension of CR 37 north of US 14 and the relocation of US 14 to the north. A diamond interchange is used to provide access to and from US 14 and CR 37.

Table 5. Interchange Concept 1E.1 - US 14 Below Bluff, MN 15 Below Bluff & Interchange Concept 1E.2 – US 14/CR 37 Existing Alignment

Advantages	Disadvantages
- Avoidance of wetlands in the bottoms of the Minnesota River - Avoidance of wetland located between US 14 and the bluffs	- Relatively high impacts to upland forest - Would introduce a new crossing of the headwaters of Heyman's Creek (near interchange 1E.2)

New Ulm Segment Summary

Interchange Concept 1A confines the impacts to the existing highway and provides good route continuity for both US 14 and MN 15. There is some potential for floodplain impacts to accumulate along this corridor, but more design detail will be needed to resolve this issue.

Concepts 1B and 1C would require cutting into the bluff to achieve optimum grades for the mainline resulting in a lot of earthwork. The ability to accommodate the interchanges on the steep grades needs to be further analyzed.

Concept 1D minimizes the need for new right-of-way at the US 14/MN 15 intersection and provides free-flow movement and good continuity for US 14.

The Concept 1E maintains that US 14 would be moved to the top of the bluff above New Ulm. Both the interchange concepts at US 14/MN 15 and US 14/CR 37 would be located above the bluff. While this minimizes floodplain impacts, there are additional impacts to agricultural land, residences, and upland forests.

Additional design considerations could include a service interchange at the US 14/MN 15 intersection. This may provide better access to US 14 for travelers on CR 21. Other treatments for CR 21 should also be considered including providing continuity of the highway through use of additional structures in the interchange concepts.

Segment 2 - Courtland - CR 24 and CR 12

Interchange Concept 2A: Diamond Interchange North of Courtland. This concept includes a diamond interchange located north of the City of Courtland on CR 24. This would require the realignment of US 14 to the north of the existing alignment. This concept also includes the realignment of CR 24 to connect to the west to CR 12 providing a north-south continuity along the county road system. Only one concept was developed at this location during the interchange workshop. Mn/DOT may also consider locating the interchange further north, on top of the bluff.

Table 6. Interchange Concept 2A - Diamond Interchange North of Courtland

Advantages	Disadvantages
- Consistent with Courtland's Comprehensive Plan - Provides good continuity of CR 12 that provides access across river to the south - Avoids impacts to wetlands	- Side hill location could make it difficult to get local street over (the preferred design) - Impacts to agricultural land

Courtland Segment Summary

The concept developed in Courtland is consistent with Courtland's Comprehensive Plan. This concept provides a bypass alignment and an interchange that are as close to the city as possible, thereby minimizing new right-of-way requirements while still providing

advantages of a bypass. According to Courtland representatives, this concept provides enough developable land between existing development and the interchange to accommodate future growth.

The alignment between New Ulm and Courtland must also be considered when evaluating interchange concepts. Key questions that arise are whether or not it is worthwhile to keep the roadway above the bluff between Courtland and New Ulm; or should Interchange Concept 2A alignment meet back up with the existing US 14 alignment west of Courtland? Additional design considerations primarily relate to the slope of the bluff that the interchange is located on and connection to local roadways.

Segment 3 - Nicollet - MN 99 and CR 23

Interchange Concept 3A: Diamond Interchange south of Nicollet - Near City. This concept provides a diamond interchange less than ½ mile south of the existing intersection of US 14 and CR 23. The interchange is located on the existing alignment of CR 23. US 14 is on a new alignment that is located to the south of its existing alignment.

Table 7. Interchange Concept 3A - Diamond Interchange South of Nicollet - Near City

Advantages	Disadvantages
- Close alignment provides good access to the city	- Potential impact to existing development - Close proximity of realigned US 14 allows small amount of land for city to develop to the south - Potential residential displacement - Potential impacts to wetlands - Crosses agricultural ditch (1 location)

Interchange Concept 3B: Split Diamond at Nicollet. This concept provides a split diamond interchange to accommodate traffic for a Nicollet bypass. The concept includes a new alignment of US 14 to the south of Nicollet and uses the existing alignment as a frontage/business route.

Table 8. Interchange Concept 3B - Split Diamond at Nicollet

Advantages	Disadvantages
- Provides similar operational characteristics as existing US 14 - Minimizes wetland impacts - Minimizes agricultural ditch crossing - Avoids residential displacements	- Disconnect of county road system at CR 23 (unless additional bridge is provided) - Split diamond interchange may cause driver confusion

Interchange Concept 3C: Diamond Interchange South of Nicollet - Realignment of CR 23. A diamond interchange is located south of the city of Nicollet between existing US 14 and the city's wastewater treatment lagoons. This concept includes the realignment of CR 23 providing a direct connection to MN 99 on the east side of the city.

Table 9. Interchange Concept 3C – Diamond Interchange South of Nicollet - Realignment of CR 23

Advantages	Disadvantages

Table 9. Interchange Concept 3C – Diamond Interchange South of Nicollet - Realignment of CR 23	
Advantages	**Disadvantages**
- Good continuity of county road system - Close alignment provides good access to the city - Avoids residential displacement - Bypass for both US 14 and MN 99 (Removes MN 99 traffic from route through town) -	- Potential impacts to wetlands - Potential agricultural ditch crossing (1 location)

Interchange Concept 3D: Diamond Interchange south of Nicollet - Southern-most Location. US 14 is realigned approximately 1 mile south of the existing intersection of CR 23 and US 14. The diamond interchange is located on the existing alignment of CR 23.

Table 10. Interchange Concept 3D - Diamond Interchange South of Nicollet - Southern-Most Location	
Advantages	**Disadvantages**
- Minimal disruption to existing development - Good continuity of county road system	- Distance from the city may impact businesses - Farmland severance due to length of new alignment necessary to accommodate interchange so far south - Impact to upland forest - Potential displacement of residents - Impacts to wetlands - Potential agricultural ditch crossings (2 locations)

Nicollet Segment Summary

Considerations involved in the development of interchange concepts for the Nicollet area included:

- access to MN 99 (a common truck route that currently causes large number of trucks to pass through the City of Nicollet's main street),
- access to CR 23 that provides a river crossing south of the city, and
- local access to US 14.

Interchange Concept 3C appears to balance all factors well and is more conventional than 3B that would be designed and signed as a "Business Loop". Interchange Concepts 3A and 3D are conventional designs, but would not eliminate the through town (MN 99) traffic issues. The key alignment consideration west of Nicollet is whether the alignment should bypass the Swan Lake Wildlife Management Area.

NOTE: FIGURES 2-11 ARE PUBLISHED AS SEPARATE ELECTRONIC (PDF) FILES. SEE THE MN/DOT WEB SITE FOR MORE INFORMATION.
