

# **US 8 Crandon to Laona Forest County Corridor Study Report**

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# 1 Executive Summary

## 1.1 Purpose

The Wisconsin Department of Transportation (WisDOT) hired Bloom Companies, LLC (Bloom) to study a section of US 8 in Forest County, Wisconsin. The study area is located between the City of Crandon and the Town of Laona in Forest County, Wisconsin. It also includes the communities of the Town of Crandon and the Town of Lincoln. The corridor begins at WIS 55 / 32 in Crandon and continues 11.4 miles east to WIS 32 (Oak Street) in Laona. Figure 1.1 shows the study corridor.

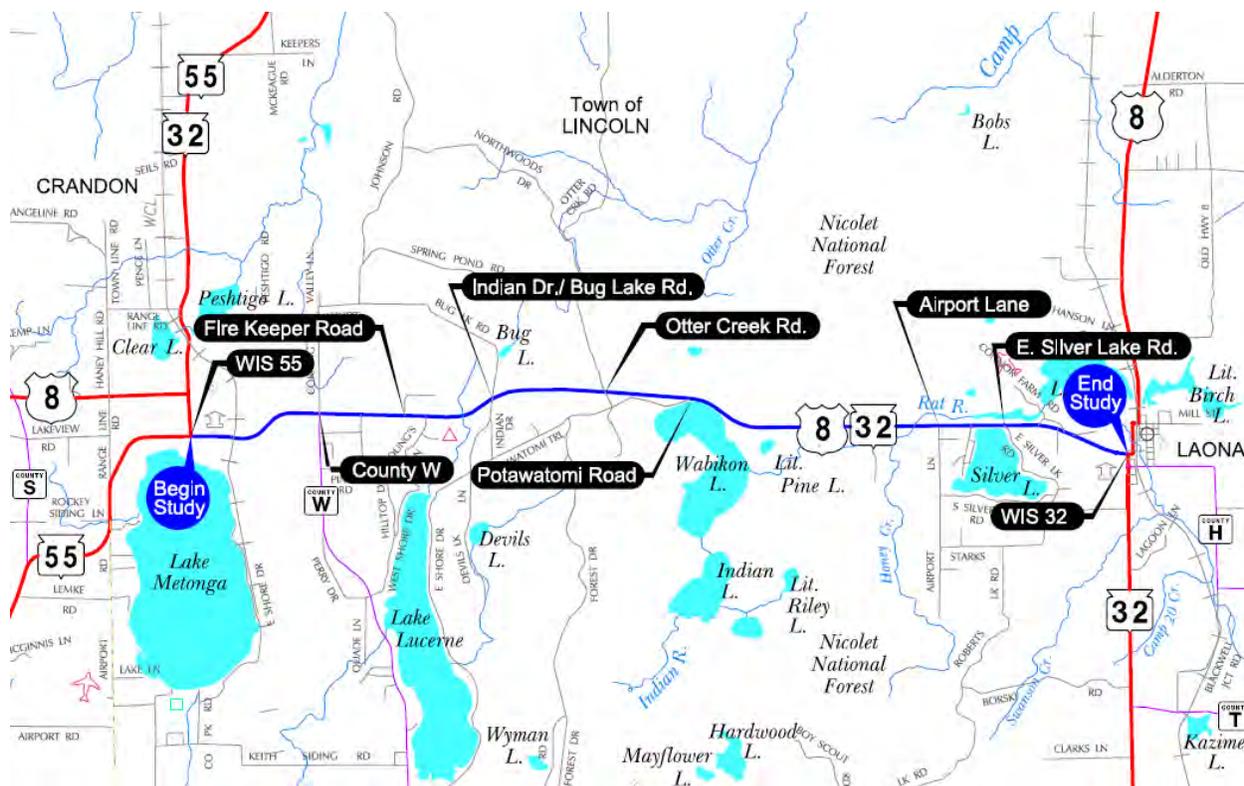


Figure 1.1 Study Corridor

The study's purpose is to identify existing and future corridor needs and identify both short term and long term solutions to satisfy the corridor's needs. The needs of this project are generated from system linkage and route importance, multimodal connections, and safety. The short term and long term corridor alternatives address the needs of this project by:

- Maintaining system linkage
- Accommodating existing and future traffic volumes in a safe and efficient manner
- Managing corridor access
- Providing a safe facility for all users

- Identifying and enhancing multimodal transportation opportunities
- Providing a transportation facility compatible with local uses and community planning

## 1.2 Findings

This report investigated the existing conditions, conducted an environment scan, and coordinated with agencies and communities that may be impacted by the proposed improvements.

### 1.2.1 Existing Conditions

Bloom gathered data on the US 8 corridor from the WisDOT NC Region, local communities, Forest County GIS data, survey, and through on-site visits.

Community plans were reviewed to determine existing and planned land uses throughout the US 8 corridor. Numerous community plans mention the need for passing lanes on US 8.

US 8 is classified as an arterial. The majority of the study section is rural. In Crandon, US 8 is a transitional roadway, and in Laona, US 8 is an urban roadway. US 8 is a NHS Route and is on the federal long truck route system. US 8 is an important route in Wisconsin as it is included as a connector in WisDOT's *Connections 2030 Transportation Plan*.

An alignment for US 8 was generated based on the as-built plans provided by the WisDOT NC Region, which was then used to document the existing data, including: posted speeds, geometrics, side roads and intersections, cross section elements, right of way, structures, utilities, access, and railroads. Based on the design speeds throughout the corridor, the following items were found to be deficient:

- Thirty-one vertical curves
- Twelve deficient profile grades
- Seven intersections with substandard intersection angles
- Nine intersections with substandard intersection sight distance

Next, multimodal facilities surrounding the US 8 corridor were documented. There are four documented trails near this project: 100 Mile Snow Safari Trail, Lumberjack Memorial Trail, Nicolet State Trail, and Wolf River State Trail. In addition to these trails, Potawatomi Road and Airport Lane are documented as ATV trails. US 8 is also designated to include an off-road bike trail from Rhinelander to County W. With the existing cross sectional elements, US 8 is considered to have undesirable conditions for bicycling and there are no pedestrian facilities.

Finally an analysis of the existing roadway was conducted. The analysis included documentation of access points, a crash analysis, a speed study, and a traffic analysis. Throughout the corridor there are 27 cross streets, 83 driveways, and 6 trail crossings. The spacing of access points varies throughout the corridor, with the majority of driveways located in Crandon and Laona.

The crash analysis followed the NC Region Spot Safety Data Review. Only one location was flagged as a crash hot spot, the intersection of US 8 with WIS 32 (Oak Street) in Laona. With a review of the crash reports there were seven crashes at this intersection and there was no apparent pattern or cause for the crashes.

Spot speed studies were conducted at three locations on US 8. The speed data was collected over a week’s time period. The posted speed throughout the project is 55 mph. Findings included the 85<sup>th</sup> percentile speed to be 60 mph to 65 mph and the average speed to vary between 57 mph and 61 mph. Therefore, the majority of drivers speed on US 8.

US 8 between Crandon and Laona has 2010 seasonal two-way daily traffic ranging from 3,500 to 4,100 vehicles per day (vpd). The seasonal traffic is approximately 30 percent higher than the actual average annual daily traffic. By 2035, the WisDOT seasonal forecast will increase from 4,500 to 5,300 vpd.

The Existing and Future No-Build traffic analysis included a segment analysis and intersection analysis. Table 1.1 summarizes the percent time spent following, average travel speed, and level of service (LOS) for the existing traffic volume for various percents of no passing zones seen throughout the US 8 segment. The existing LOS is indifferent to the percent of no passing zones based on the current traffic volume. A threshold analysis was complete based on the highest 2035 daily traffic projected in the corridor, 6,000 vpd. A LOS D will not be reached in 2035, regardless of the percent of no passing zones.

**Table 1.1 2010 Highway Segment Level of Service**

| Two-Way Volume (vph) | Percent No Passing | Average Travel Speed (mph) | Percent Time Spent Following | Level of Service |
|----------------------|--------------------|----------------------------|------------------------------|------------------|
| 390                  | 46                 | 59.5                       | 52.3                         | C                |
| 390                  | 73                 | 59.5                       | 55.7                         | C                |
| 390                  | 100                | 59.5                       | 56.8                         | C                |

Using the peak hour counts, the existing geometrics at the intersections, and Highway Capacity Software (HCS), the existing weekday peak hour operations were analyzed for five intersections, County W, Indian Drive/Bug Lake Road, Airport Road, East Silver Lake Road, and WIS 32 (Oak Street). The all of the intersections for existing 2010 analysis had a LOS of B or better during the peak hour.

After the 2010 existing conditions analysis, the projected 2035 volumes were used to determine the no build traffic operations. During the 2035 no build peak hour, the intersections all had levels of service of C or better and there was no significant queuing. The findings are shown in Table 1.2.

**Table 1.2 2035 No Build LOS at US 8 intersections, peak hour (1-2 p.m.)**

| Intersection                 | Cross Street Level of Service (NB / SB) | Cross Street Delay (seconds) (NB / SB) | Cross Street 95 <sup>th</sup> percentile <sup>1</sup> queue (feet) (NB / SB) |
|------------------------------|---|--|--|
| County W                     | C / B                                   | 16 / 13                                | 20 / 10  |
| Indian Drive / Bug Lake Road | B / B                                   | 11 / 12                                | 5 / 0  |
| Airport Road                 | B / NA                                  | 11 / NA                                | 0 / NA   |
| E. Silver Lake Road          | B / NA                                  | 11 / NA                                | 5 / NA   |
| WIS 32 (Oak Street)          | C / C                                   | 20 / 16                                | 50 / 15  |

<sup>1</sup> 95th percentile queue: 95 percent of the time during the peak hour, the queue is less than the length listed.

### 1.2.2 Environmental Scan

The environmental scan included review of the existing and future land use plans, archaeological resources, historical resources, hazardous materials, streams and lakes, floodplains, wetlands, and 4(f) resources.

In general, the majority of lands in Forest County are currently designated as woodlands. The majority of properties abutting US 8 are currently designated as woodlands except a few areas which are designated as residential, industrial, recreational, governmental, and commercial. Each community in Forest County, as well as Forest County itself, has developed a future land use plan based on projected needs in 2030. In general, the majority of lands in Forest County are designated as forestry, preservation, and open space areas.

Great Lakes Archaeological Research Center, Inc. performed an archival and literature search of the US 8 corridor from WIS 55/32 (S. Lake Drive) to WIS 32 (Oak Street), Forest County, Wisconsin. Nineteen archaeological and burial sites are located within one mile of US 8 and four sites are located within or immediately adjacent to the project corridor. Three historic properties are located immediately adjacent to the project corridor. Of these properties, one may be eligible for the National Register of Historic Places; however, none are currently listed on the Register.

The project team completed a Hazardous Materials Database Search (HMDS) for US 8. The purpose of the HMDS was to identify sites with potential hazardous materials that may be present in environmental media located within or immediately adjacent to the potential proposed improvements of the study corridor. Nineteen sites were located within 150 feet of the project corridor and should be evaluated further in any future design projects.

There are seven bodies of water near US 8. There are four areas with potential floodplains. Floodplains are located near Surprise Lake, Kabikon Lake, Rat River, and Scattered Rice Lake. Near Rat River, floodplains extend on US 8 from the river crossing to Airport Road. Five wetlands cross or are directly adjacent to US 8.

There are six potential 4(f) lands near the project location.

### 1.2.3 Agency and Community Coordination

Bloom coordinated with agencies in the project area through the duration of the study. In addition, numerous agencies were invited to participate in the Project Advisory Committee (PAC). The PAC met twice throughout the study to discuss the existing deficiencies and recommendations. Individuals that were invited but did not participate in the PAC meetings were sent the meeting minutes.

### 1.3 Recommendations

Both corridor wide and intersection improvements were developed. The improvements provide the starting point for future design projects. The conceptual improvements were developed without detail survey information so additional study is needed to determine the impacts of these proposed improvement options. The potential intersection improvements are summarized in the Table 1.3.

**Table 1.3 Summary of Intersection Improvement Alternatives (1 of 2)**

| Intersection                | Existing Deficiencies   | Improvement Options   |   |
|-----------------------------|---|---|---|
|                             |   | Short Term  | Long Term   |
| High View Drive             | Intersection sight distance.<br>Intersection angle.<br>Lack of turn lanes.<br>Vertical curve.<br>Shoulder width.  | Install LED warning lights.   | Realign intersection to 90 degrees.<br>Add eastbound right turn lane.   |
| Young's Lane                | Intersection sight distance.<br>Vertical curve.<br>Lack of turn lanes.<br>Profile grade.<br>Shoulder width.   | Install LED warning lights.   | Reconstruct US 8 to improve intersection sight distance.<br>Install WB left turn bypass lane.<br>Install EB right turn lane.  |
| Kwe Da Kik Lane             | Intersection sight distance.<br>Shoulder width.   | Install LED warning lights  | Install a 560-foot retaining wall to improve intersection sight distance.   |
| Indian Drive/ Bug Lake Road | Intersection sight distance.<br>Intersection angle.<br>Lack of turn lanes.<br>Intersection offset.<br>Lack of pedestrian crossing.<br>Profile grade.<br>Shoulder width. | Remove vegetation in intersection sight distance triangle.<br>Install LED warning lights. | Add connections from Bug Lake Road to Love Knot Lane and Kak Yot Lane.<br>Cul-de-sac Love Knot Lane.<br>Install EB and WB left and right turn lanes.<br>Alternative A:<br>Realign to two 90° T intersections.<br>Alternative B:<br>Realign to a 90° four-legged intersection.   |
| Otter Creek Road            | Intersection sight distance.<br>Intersection angle.<br>Lack of turn lanes.<br>Vertical curve.<br>Profile grade.<br>Shoulder width.                                      | Install LED warning lights.   | Realign snowmobile trail to the new alignment.<br>Construct right turn lanes.<br>Reconstruct US 8 to improve the intersection sight distance.<br><br>Alternative A:<br>Realign to 90° at the existing intersection using a design speed of 30 mph.<br>Alternative B:<br>Realign to 90° using a design speed of 40 mph for the south leg and 30 mph for the north leg. |

**Table 1.3 Summary of Intersection Improvement Alternatives (2 of 2)**

| Intersection     | Existing Deficiencies   | Improvement Options   |  |
|------------------|---|---|--|
|                  |   | Short Term  | Long Term  |
| Airport Lane     | Intersection sight distance.<br>Lack of turn lanes.<br>Vertical curve.<br>Profile grade.<br>Shoulder width. | Install LED warning lights.   | Reconstruct US 8 to improve intersection sight distance.<br>Maintain WB left turn bypass lane.<br>Install EB right turn lane.  |
| W Silver Lake Rd | Intersection sight distance.<br>Lack of turn lanes.<br>Vertical curve.<br>Access points.                    | Install LED warning lights.   | Reconstruct US 8 to improve intersection sight distance.<br>Maintain WB left turn bypass lane.<br>Install EB right turn lane.  |
| Fairway Court    | Intersection sight distance.<br>Location of stop.<br>Profile grade.   | Add a stop line.<br>Remove vegetation to improve intersection sight distance.   | Grade ridge west of Fairway Court to provide proper intersection sight distance.   |
| Mill Road        | Intersection angle.<br>Truck traffic.   | Alternative A:<br>Realign to 90° with a design speed of 30 mph.<br>Construct an eastbound left turn bypass lane.<br>Alternative B:<br>Realign to 90° with a design speed of 25 mph. | Realign 90° with a design speed of 30 mph.<br>Add bicycle lanes and sidewalk to US 8.<br>Construct eastbound left turn lane.   |
| WIS 32           | Intersection sight distance.<br>Access points.<br>Lack of multimodal accommodations.<br>Operations.         | Install curb and gutter on WIS 32.<br>Obtain vision corner in SW quadrant.<br>Install stop sign at driveway.  | Reconstruct the intersection to a 4-legged intersection.<br>Add bicycle lanes and sidewalk to US 8 and WIS 32.<br>Construct westbound left turn lane and eastbound right and left turn lanes.<br>Relocate snowmobile trail to WIS 32 intersection.<br>Restrict access within intersection influence areas. |

Long term improvements were developed that can be applied throughout the corridor. The recommended long term improvements include:

- Improve shoulder width to 10 feet with a 5-foot paved shoulder
- Provide centerline rumble strips
- Improve the existing eastbound climbing/passing lane
- Build an additional eastbound passing lane between Otter Creek Road and Shoemaker Lane
- Improve the westbound passing lane in Crandon
- Build a westbound passing lane between Otter Creek Road and Shoemaker Lane
- Install a median on US 8 throughout the Forest County Potawatomi Community
- Build an off alignment connection between Kwe Da Kik Lane and Everybody’s Road

- Improve multimodal connections throughout the corridor
- Add a speed transition from 55 mph to 25 mph eastbound approaching Laona

## **1.4 Conclusions**

The intersections improvement options and the corridor wide improvement options meet the purpose and need of the US 8 corridor. All of the short term and long term improvement options developed in this report require additional study to determine the impacts and are the recommended starting point for the next study or design project.

## 2 Purpose and Need

WisDOT is conducting a corridor study to outline the long-range needs of US 8, as shown in Appendix A, Exhibit A-1. The study area is located between the City of Crandon and the Town of Laona in Forest County, Wisconsin. It also includes the communities of Town of Crandon and the Town of Lincoln. The entire length of US 8 considered in this study is also designated as WIS 32. The corridor begins at WIS 55 / 32 in Crandon and continues 11.4 miles east to WIS 32 (Oak Street) in Laona. The study will address mobility and route functionality of the rural route between the two urban centers.

### 2.1 Project Purpose

US 8 provides a vital east–west link in northern Wisconsin and is the main route between Crandon and Laona. Further, US 8 continues west to the Wisconsin-Minnesota border and east to US 141 which continues north to the Wisconsin-Michigan border. The only growth expected between these two cities is by the Forest County Potawatomi Community; the majority of land between the cities is part of the Nicolet National Forest. Transportation between these communities is important as this area is largely recreational and links users to many lakes and recreational trails. In addition, the route serves the logging communities in the area. The study of long-range improvements is necessary to determine the best methods to maintain the functionality of the transportation system and protect the public investment in the existing infrastructure.

The purpose of the study is to identify short term and long term corridor needs and evaluate alternatives that will:

- Maintain system linkage
- Accommodate existing and future traffic volumes in a safe and efficient manner
- Manage corridor access
- Provide a safe facility for all users
- Identify and enhance multimodal transportation opportunities
- Provide a transportation facility compatible with local uses and community planning

### 2.2 Project Need

The need for this project stems from the importance of:

***System linkage and route importance:*** As part of the National Highway System (NHS), US 8 needs to provide a high level of mobility. US 8 has been identified in the Connections 2030 plan as a passing lane corridor.

***Multimodal Connections:*** US 8 provides many connections to state recreational trails, including snowmobile trails, ATV trails, and pedestrian and bicycle trails. Currently, many trails lack connectivity leaving users unable to use the existing trails to their full capacity. In addition, new multimodal connections are needed to link the Potawatomi Community to the City of Crandon.

***Safety:*** Although the crash rates along US 8 are below the statewide average, numerous other features of US 8 are substandard and need to be addressed to improve the safety of the highway.

The topography of the corridor has created intersection sight distance concerns. In addition, there are no passing lanes between Crandon and Laona and there are many areas with substandard passing zones. A project need is to address these existing and potential safety concerns.

### 2.2.1 System Linkage and Route Importance

US 8 is a critical link in the transportation system for northern Wisconsin providing efficient access for local industry, agriculture, and tourism in Forest County. US 8 extends from US 141 to the Wisconsin-Minnesota border, as shown in Figure 2.1. US 141 continues north to the Michigan-Wisconsin border.



Figure 2.1 US 8 Location

**National Importance:** US 8 has been designated as part of the National Highway System (NHS). The NHS, which was created by *The National Highway System Designation Act of 1995*, was developed by the U.S. Department of Transportation in cooperation with the states, local officials, and metropolitan planning organizations. The 1995 legislation designated about 161,000 miles of roads throughout the country as the NHS. The system includes the interstate system as well as rural and urban principal arterial highways serving major population centers, international border crossings, intermodal transportation facilities, and major travel destinations. Principal arterial highways (like US 8) on the NHS account for 57 percent of the system's total miles.

Although the NHS includes only 4 percent of the nation's roads, it carries more than 40 percent of all highway traffic, 75 percent of heavy truck traffic, and 90 percent of tourist traffic. About 90 percent of the country's population lives within 5 miles of a NHS road. Counties that contain NHS highways also host 99 percent of all jobs in the country, including 99 percent of the manufacturing jobs, 97 percent of mining jobs, and 93 percent of agricultural jobs ("The National Highway System: A Commitment to America's Future," *Public Roads*, Spring 1996).

**State Importance:** US 8 has been designated a connector route in WisDOT's *Connections 2030 Plan*. The purpose of the connector system is to link significant economic and tourism centers to the backbone system to integrate them into the entire transportation system. The backbone system is a network of multilane highways connecting all major population and economic regions of the state.

In general, the *Connections 2030 Plan* selected connector routes to:

- Serve critical sectors of the state's economy or major population centers
- Generate/serve significant activity for both passenger and freight traffic
- Show significant growth in travel or economic development
- Serve important multimodal functions
- Connect to other regions within Wisconsin, as well as other states

Further, in WisDOT's *Statewide Access Management Plan*, US 8 has a Tier 2B access designation to maximize interregional traffic movement. The Statewide Access Management Plan identifies roadways that need to maintain high levels of service for through traffic while providing limited local road and property access. WisDOT has not yet purchased access rights along US 8 between WIS 32/55 and WIS 32 (Oak Street). WisDOT encourages limiting access to Tier 2 routes to improve safety, reduce congestion, facilitate planned access to developing land, and potentially delay roadway improvements or expansion.

**Functionality:** US 8 is classified as a principal arterial. Principal arterials are intended to serve movements having trip length and travel density characteristics of an interregional nature. Functional classification is the process by which streets and highways are grouped into classes of highways, according to the character of service they provide. Principal arterial highways serve regional economic centers, important recreational areas, and multimodal terminals. They provide access commensurate with local service needs while maintaining a high level of through traffic mobility. According to FHWA's publication, *Highway Functional Classification—Concepts, Criteria and Procedures* (March 1989), "the concept of *principal arterial highways* serving abutting land should be subordinate to the provision of travel service to major traffic movements."

**Long Truck Route:** US 8 is designated as a federal Long Truck Route. On these Wisconsin highways, the overall vehicle length cannot be limited. Highways and Transportation, Laws and Rules, Chapter Trans. 276 clarifies statutory provisions on federal rules affecting the weight, width, and length of vehicles and combinations of vehicles and the number of vehicles in combinations.

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## 2.2.2 Multimodal Connections

Although US 8 itself is not a multimodal facility, the US 8 corridor accommodates many other modes of transportation outside of the main roadway. There are shared use paths that are located parallel and perpendicular to US 8. A rails-to-trails corridor crosses US 8 in Crandon. The need for multi-modal connections is increasing as there are an increasing number of users. In addition, many ATV users currently travel along US 8 even though it is not legal and not safe. The main multi-modal connections the study is considering include:

- Connecting the Wolf River State Trail in Crandon to the Nicolet State Trail in Laona
- Connecting the Forest County Potawatomi Community to Crandon by both pedestrian/bicycle trails and ATV/snowmobile trails
- Analyzing the existing US 8 trail crossings and improving the visibility and safety of the crossings

## 2.2.3 Safety

Safety is an important aspect on all roadways. Safety needs on US 8 relate to crashes, intersection sight distance, and passing opportunities.

**Crashes:** Highway safety is measured by the number of crashes (frequency), the crash rate, and the severity of crashes. An important objective of any transportation improvement is to minimize the overall crash potential through roadway and intersection design features, and access management. Crashes are typically studied along the mainline and at intersections within the project corridor. This study followed the NC Region Spot Safety Review Process to determine potential spot crash locations.

Midblock crashes are studied to evaluate mainline conditions including existing and proposed access. Roadways with access control (limited driveways and local street connections) have better safety records than those without. Crash frequency for the study area was derived from WisDOT data for 2005 through 2009 and is summarized in Table 3.17. No midblock locations were flagged as problem locations in the data provided by WisDOT.

Intersections are of primary concern on arterial highways due to conflicting movements. Intersections generally have more crashes and more severe crashes than mid-block areas. Crashes at intersections are related to total traffic, traffic mix, level of congestion, and intersection design features. The intersection crashes from 2005 to 2009 are also summarized in Table 3.17. WisDOT flagged potential spot crash locations including WIS 32 (Oak Street) and East Silver Lake Road. Upon further investigation of the crash details, WIS 32 was identified as the only location with a crash problem.

**Intersection Sight Distance:** Many intersections have been identified as having less than desirable intersection sight distance. These locations were investigated to determine if a sight distance issue exists and how the issue can be mitigated.

**Passing Opportunities:** US 8 is a two-lane rural highway between Crandon and Laona. Passing lanes do not exist between Crandon and Laona. There is an existing eastbound climbing lane just east of Crandon. With the existing geometry, the number of passing zones on the remaining

highway is limited and many of the passing zones are substandard. Due to the topography, the ability to improve the geometrics is limited; therefore passing lanes are needed to improve the operations and safety of the roadway.

### 3 Existing Conditions

This section covers the existing conditions of the US 8 corridor from WIS 55/32 in Crandon to WIS 32 (Oak Street) in Laona. Sources of information included WisDOT NC Region, local communities, Forest County GIS data, and on-site visits. The topics covered include:

- Community Plans
- Functional Classification / Access Control
- Present Facility, including:
  - Methodologies and base mapping
  - Posted speeds
  - Geometrics
  - Side roads and intersections
  - Cross section elements
  - Right of way
  - Structures
  - Utilities
  - Railroads
- Multimodal Facilities, including:
  - Snowmobile
  - ATV
  - Bicycle
  - Pedestrian
- Analysis of Existing Conditions, including:
  - Access
  - Safety
  - Speed
  - Existing and future travel demand
  - Existing and future no-build traffic analysis

Various aspects of the existing conditions are shown in Appendix A, Exhibit A-2: Existing Conditions Diagrams.

#### 3.1 Community Plans

There are various community plans that discuss this section of US 8, including:

- Connections 2030: Wisconsin's Long-Range Transportation Plan
- Forest County Comprehensive Plan
- Town of Laona Comprehensive Plan
- Town of Lincoln Comprehensive Plan
- City of Crandon Comprehensive Plan
- Potawatomi Community Comprehensive Plan

- Forest County Outdoor Recreation Plan 2007-2011
- North Central Wisconsin Regional Bicycle Facilities Network Plan

These plans discuss the goals and objectives for US 8 and the communities that depend on it. The plans are discussed in the following sections based on the specific topic. Important aspects from the plans considered in this report include: land use planning, multimodal needs, and transportation plans. A goal identified in Connections 2030, the Forest County Comprehensive Plan, and the Town of Lincoln Comprehensive Plan includes providing passing lanes on US 8 between Crandon and Laona.

### 3.2 Functional Classification / Access Control

US 8 is classified as a principal arterial. Based on the typical section, the majority of the study section is rural where the posted speed is 55 mph. In Crandon, US 8 is a transitional roadway where the posted speed is 45 mph, and in Laona, US 8 is an urban roadway where the posted speed is 25 mph. US 8 is a NHS Route and is on the federal long truck route system. US 8 is an important route in Wisconsin as it is included as a connector in WisDOT’s *Connections 2030 Transportation Plan*. The characteristics of US 8 are shown in Table 3.1.

In WisDOT’s *Connections 2030 Plan and Statewide Access Management Plan*, US 8 has a Tier 2B access designation to maximize interregional traffic movement. The Statewide Access Management Plan identifies roadways that need to maintain high levels of service for through traffic while providing limited local road and property access.

Cross street characteristics are shown in Table 3.1. For this segment, only one county road, County W, intersects with US 8 and WIS 32 intersects with US 8 twice. The remaining cross streets are local roadways. The cross streets are also shown on the Existing Conditions Diagrams in Appendix A, Exhibit A-2.

**Table 3.1 Functional Classification/Access Control (1 of 2)**

| Roadway Name           | Funct. Class | Rural, Urban, or Transitional                  | Corridors 2030           | NHS Route | Long Truck Route | Access Control Tier | On Ped Plan      | On Bike Plan     |
|------------------------|--------------|--|--------------------------|-----------|------------------|---------------------|------------------|------------------|
| US 8                   | Arterial     | Rural<br>Urban-Laona<br>Transitional - Crandon | Corridors 2030 Connector | Yes       | Federal          | Tier 2B             | Yes <sup>1</sup> | Yes <sup>1</sup> |
| WIS 55/32 (S Lake Ave) | Collector    | Rural  | No                       | No        | No               | No                  | No               | No               |
| S Forest Ave           | Local        | Rural  | No                       | No        | No               | No                  | No               | No               |
| S Park Ave             | Local        | Rural  | No                       | No        | No               | No                  | No               | No               |
| S Wildwood Ave         | Local        | Rural  | No                       | No        | No               | No                  | No               | No               |

<sup>1</sup> Connections 2030 Transportation Plan indicates future continued and enhanced accommodations, linkages, and accessibility along and across facilities.

**Table 3.1 Functional Classification/Access Control (2 of 2)**

| Roadway Name                              | Funct. Class       | Rural, Urban or Transitional | Corridors 2030 | NHS Route | Long Truck Route | Access Control Tier | On Ped Plan | On Bike Plan |
|---|--------------------|------------------------------|----------------|-----------|------------------|---------------------|-------------|--------------|
| S Prospect Ave                            | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Railroad Ave                              | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| E Pioneer St                              | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| S Grandview Ave                           | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| High View Dr                              | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Corning Road / County W (MacArthur Trail) | Local<br>Collector | Rural<br>Rural               | No<br>No       | No<br>No  | No<br>No         | No<br>No            | No<br>No    | No<br>No     |
| Bear Rd                                   | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Fire Keeper Rd                            | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Young's Ln                                | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Kwe Da Kik Ln / Wayside                   | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Indian Dr / Bug Lake Rd                   | Collector<br>Local | Rural<br>Rural               | No<br>No       | No<br>No  | No<br>No         | No<br>No            | No<br>No    | No<br>No     |
| Love Knot Ln                              | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Otter Creek Rd / NF 2376                  | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Potawatomi Rd                             | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Shoemaker Ln                              | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Airport Lane                              | Collector          | Rural                        | No             | No        | No               | No                  | No          | No           |
| W Silver Lake Rd                          | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| E Silver Lake Rd                          | Collector          | Rural                        | No             | No        | No               | No                  | No          | No           |
| Connor Farm Rd                            | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Fairway Ct / Tower Ln                     | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Connor Farm Rd                            | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Scattered Lake Rd                         | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| Mill Rd                                   | Local              | Rural                        | No             | No        | No               | No                  | No          | No           |
| WIS 32 (Oak St)                           | Arterial           | Rural                        | No             | No        | State            | No                  | No          | No           |

### 3.3 Present Facility

This section covers methodologies and base mapping, posted speeds, geometrics, side roads and intersections, cross section elements, right of way, structures, utilities, and railroads and was developed by reviewing information provided by WisDOT.

#### 3.3.1 Methodologies and Base Mapping

Existing as-built plans were reviewed to collect information on the US 8 corridor. The roadway was reconstructed in 1950 and most recently resurfaced in 2003 with spot improvements. The 1950 and 2003 as-built plans did not have the same horizontal alignment. 41,375.59 feet was added to the beginning of the alignment from the 1950 as-built and the following station equations from the 1950 as-built were used to convert the stationing from the 1950 as-built to the stationing in the 2003 as-built, as shown in Table 3.2.

**Table 3.2 1950 As-Built Station Equations**

| Back Station | Ahead Station |
|--------------|---------------|
| 48+41.20     | 48+30.20      |
| 77+50.00     | 77+00.00      |
| 243+26.70    | 244+50.20     |
| 417+40.00    | 418+00.00     |

The alignment from the 2003 as-built plan did not overlay on the aerial photo and a best fit alignment was created using the same horizontal radii. The vertical curve data location from the 1950 as-built is accurate to the nearest 80 feet. All stations used throughout this report reference the base map alignment.

#### 3.3.2 Posted Speed

The posted speed limit throughout the project is 55 mph, as shown in Table 3.3. In Crandon and Laona, the speed reduces to 30 mph and 25 mph, respectively. When traveling to and from Laona, there are no incremental speed changes between 55 mph and 25 mph.

**Table 3.3 Posted Speed**

| Roadway or Roadway Segment                                    | Posted Speed | Advisory Speed |
|---|--------------|----------------|
| US 8<br>S Lake Avenue to Railroad Avenue                      | 30 mph       | None           |
| US 8<br>Railroad Avenue to Grandview Avenue                   | 45 mph       | None           |
| US 8<br>Grandview Avenue to 1,000 feet west of Mill Street    | 55 mph       | None           |
| US 8<br>1,000 feet west of Mill Street to WIS 32 (Oak Street) | 25 mph       | None           |

The design speed for each section is 5 mph above the speed limit. The design speeds are shown on the Existing Conditions Diagrams in Appendix A, Exhibit A-2.

### 3.3.3 Geometrics

There are no horizontal curves that are outside of the desirable standards. The standards used to determine these include:

- The maximum deflection without a horizontal curve is 1° 00' 00" for 60 mph design speed (FDM 11-10-5 Table 5.4, revised July 22, 2009).
- The minimum radius is 1330' and maximum super elevation is 6.0% for 60 mph design speed (FDM 11-10-5 Attachment 5.9, revised July 22, 2009).

Table 3.4 shows the vertical alignment outside of desirable or minimum design standards for 60 mph design speed. There are 31 vertical curves which do not meet the desirable or minimum design standards. The standards used to determine these include:

- The minimum K value for 60 mph design speed is 151 for a crest curve and the desirable K value is 245 for a crest curve (FDM 11-10-5 Attachment 5.4, revised July 22, 2009).
- The minimum and desirable K value for 60 mph design speed is 136 for a sag curve (FDM 11-10-5 Attachment 5.6, revised July 22, 2009).
- The minimum and desirable stopping sight distance (SSD) for 60 mph design speed is 570 for a crest curve (FDM 11-10-5 Attachment 5.4, revised July 22, 2009).
- The minimum and desirable stopping sight distance (SSD) for 60 mph design speed is 570 for a sag curve (FDM 11-10-5 Attachment 5.6, revised July 22, 2009).

**Table 3.4 Deficient Vertical Curves (1 of 2)**

| Curve Number | Location (Station) | Sag or Crest | K Value/ Grade Deflection | Speed Rating (Desirable/Minimum) | SSD Met (Yes or No) |
|--------------|--------------------|--------------|---------------------------|----------------------------------|---------------------|
| 1            | 478+92.58          | CREST        | 148.5                     | 50/55                            | No                  |
| 2            | 500+62.59          | SAG          | 96.2                      | 50                               | No                  |
| 3            | 522+36.59          | CREST        | 140.4                     | 50/55                            | Yes                 |
| 4            | 538+36.59          | CREST        | 144.9                     | 50/55                            | No                  |
| 5            | 555+36.59          | SAG          | 132.5                     | 55                               | Yes                 |
| 6            | 566+48.59          | CREST        | 140.9                     | 50/55                            | No                  |
| 7            | 587+35.59          | SAG          | 117.6                     | 55                               | No                  |
| 8            | 595+61.59          | CREST        | 146.4                     | 50/55                            | Yes                 |
| 9            | 622+96.59          | CREST        | 139.4                     | 50/55                            | No                  |
| 10           | 634+09.59          | SAG          | 98.1                      | 50                               | No                  |
| 11           | 655+58.59          | CREST        | 152.1                     | 50/60                            | Yes                 |
| 12           | 671+49.09          | SAG          | 66.3                      | 40                               | No                  |
| 13           | 677+63.09          | CREST        | 135.7                     | 45/55                            | No                  |
| 14           | 682+58.09          | SAG          | 47.2                      | 30                               | No                  |

**Table 3.4 Deficient Vertical Curves (2 of 2)**

| Curve Number | Location (Station) | Sag or Crest | K Value/ Grade Deflection | Speed Rating (Desirable/Minimum) | SSD Met (Yes or No) |
|--------------|--------------------|--------------|---------------------------|----------------------------------|---------------------|
| 15           | 690+63.09          | CREST        | 151.9                     | 50/60                            | Yes                 |
| 16           | 696+28.09          | SAG          | 76.6                      | 40                               | No                  |
| 17           | 702+83.09          | CREST        | 142.0                     | 50/55                            | No                  |
| 18           | 709+13.09          | SAG          | 83.5                      | 45                               | No                  |
| 19           | 723+13.09          | CREST        | 140.3                     | 50/55                            | No                  |
| 20           | 733+88.09          | SAG          | 122.5                     | 55                               | No                  |
| 21           | 804+63.09          | CREST        | 162.6                     | 50/60                            | Yes                 |
| 22           | 815+63.09          | SAG          | 100.0                     | 50                               | No                  |
| 23           | 824+63.09          | CREST        | 157.5                     | 50/60                            | Yes                 |
| 24           | 888+03.09          | SAG          | 110.6                     | 50                               | No                  |
| 25           | 897+03.09          | CREST        | 150.4                     | 50/55                            | No                  |
| 26           | 911+03.09          | SAG          | 125.2                     | 55                               | Yes                 |
| 27           | 918+53.09          | CREST        | 141.4                     | 50/55                            | No                  |
| 28           | 924+53.09          | SAG          | 132.7                     | 55                               | Yes                 |
| 29           | 951+53.09          | SAG          | 73.7                      | 45                               | No                  |
| 30           | 964+53.09          | CREST        | 156.9                     | 50/60                            | Yes                 |
| 31           | 976+03.09          | SAG          | 134.0                     | 55                               | Yes                 |

Table 3.5 shows the grades that are outside of desirable or minimum design standards for 60 mph design speed. There are 12 grades that are greater than the maximum grade. The maximum percent grade for a rural arterial with a 60 mph design speed and rolling terrain is 4% (FDM 11-10-5 Attachment 5.3, revised July 22, 2009).

**Table 3.5 Deficient Grades**

| Location (From Station to Station) | % Grade |
|------------------------------------|---------|
| 441+80.59 to 456+12.59             | 4.99    |
| 500+62.59 to 522+36.59             | 5.00    |
| 527+06.59 to 538+36.59             | 5.00    |
| 566+48.59 to 587+36.59             | -5.22   |
| 595+61.59 to 609+56.59             | -4.21   |
| 634+09.59 to 655+58.59             | 5.40    |
| 655+58.59 to 671+49.09             | -5.45   |
| 677+63.09 to 682+58.09             | -5.00   |
| 723+13.09 to 733+88.09             | -5.38   |
| 888+03.09 to 897+03.09             | 4.56    |
| 951+53.09 to 964+53.09             | 5.26    |
| 964+53.09 to 976+03.09             | -4.94   |

The location of the vertical curves and the deficient vertical grades are shown on the Existing Conditions Diagrams in Appendix A, Exhibit A-2.

There are no structures over US 8. Therefore, there is no vertical clearance outside of the desirable or minimum standards.

### 3.3.4 Side-Roads and Intersections

There are 27 side streets, as shown in Table 3.6. In Crandon, there are 10 side streets. There are 15 side streets in Lincoln and two side streets in Laona. The side streets include five collectors and one arterial. Only three side streets have traffic greater than 1,000 vehicles per day. There are no existing pedestrian or bicycle facilities on any cross streets within the study limits.

Fire Keeper Road was constructed in 2010 to replace the north leg (Everybody’s Road) at Young’s Lane. Everybody’s Road now runs parallel to US 8 and connects to US 8 at Fire Keeper Road.

**Table 3.6 Side-Roads (1 of 2)**

| Roadway Name                                  | Functional Class   | Posted Speed (MPH) | Existing Traffic* (AADT) | Existing Pedestrian Facilities | Existing Bicycle Facilities |
|---|--------------------|--------------------|--------------------------|--------------------------------|-----------------------------|
| WIS 55/32 (S Lake Ave)                        | Collector          | 25                 | 1100                     | No                             | No                          |
| S Forest Ave                                  | Local              | 25                 | <100                     | No                             | No                          |
| S Park Ave                                    | Local              | 25                 | <100                     | No                             | No                          |
| S Wildwood Ave                                | Local              | 25                 | 990                      | No                             | No                          |
| S Prospect Ave                                | Local              | 25                 | <100                     | No                             | No                          |
| Railroad Ave                                  | Local              | Not Posted         | <100                     | No                             | No                          |
| Pioneer St                                    | Local              | Not Posted         | <100                     | No                             | No                          |
| S Grandview Ave                               | Local              | 25                 | <100                     | No                             | No                          |
| High View Dr                                  | Local              | 25                 | >100                     | No                             | No                          |
| Corning Rd /<br>County W<br>(MacArthur Trail) | Local<br>Collector | 35<br>55           | >100<br>1530             | No                             | No                          |
| Bear Rd                                       | Local              | Not Posted         | <100                     | No                             | No                          |
| Fire Keeper Rd                                | Local              | Not Posted         | <100                     | No                             | No                          |
| Young’s Ln                                    | Local              | Not Posted         | <100                     | No                             | No                          |
| Kwe Da Kik Ln                                 | Local              | Not Posted         | <100                     | No                             | No                          |
| Indian Dr                                     | Collector          | Not Posted         | 500                      | No                             | No                          |
| Bug Lake Rd                                   | Local              | Not Posted         | >100                     | No                             | No                          |
| Love Knot Ln                                  | Local              | Not Posted         | <100                     | No                             | No                          |
| Otter Creek Rd / NF 2376                      | Local              | Not Posted         | <100                     | No                             | No                          |
| Potawatomi Rd                                 | Local              | Not Posted         | >100                     | No                             | No                          |

\*If Existing Traffic volumes were not available, the AADT was assumed to be <100 or >100.

**Table 3.6 Side-Roads (2 of 2)**

| Roadway Name      | Functional Class | Posted Speed (MPH) | Existing Traffic* (AADT) | Existing Pedestrian Facilities | Existing Bicycle Facilities |
|-------------------|------------------|--------------------|--------------------------|--------------------------------|-----------------------------|
| Shoemaker Ln      | Local            | Not Posted         | <100                     | No                             | No                          |
| Airport Ln        | Collector        | 35                 | 510                      | No                             | No                          |
| W Silver Lake Rd  | Local            | 25                 | <100                     | No                             | No                          |
| E Silver Lake Rd  | Collector        | 25                 | 690                      | No                             | No                          |
| Connor Farm Rd    | Local            | Not Posted         | <100                     | No                             | No                          |
| Fairway Ct        | Local            | 15                 | <100                     | No                             | No                          |
| Connor Farm Rd    | Local            | Not Posted         | <100                     | No                             | No                          |
| Scattered Lake Rd | Local            | Not Posted         | <100                     | No                             | No                          |
| Mill Rd           | Local            | Not Posted         | <100                     | No                             | No                          |
| Oak St (WIS 32)   | Arterial         | 25                 | 2900                     | No                             | No                          |

\*If Existing Traffic volumes were not available, the AADT was assumed to be <100 or >100.

The intersection type is shown in Table 3.7. Twenty-five intersections are stop-controlled on the side street. Two intersections do not have stop signs. One intersection, US 8 with WIS 55/32 (S. Lake Ave) is three way stop-controlled. Deficient intersection angles are highlighted in the table.

**Table 3.7 Intersections (1 of 2)**

| Intersecting Roadway Name(s)                 | Intersection Type | Intersection Angle | Traffic Control |
|--|-------------------|--------------------|-----------------|
| WIS 55/32 (S Lake Avenue)                    | Type B            | 90°                | Stop Sign       |
| S Forest Avenue                              | Type D            | 90°                | Stop Sign       |
| S Park Avenue                                | Type D            | 90°                | Stop Sign       |
| S Wildwood Avenue                            | Type D            | 90°                | Stop Sign       |
| S Prospect Avenue                            | Type D            | 90°                | Stop Sign       |
| Railroad Avenue                              | None              | 90°                | None            |
| E Pioneer Street                             | None              | 125°               | Stop Sign       |
| S Grandview Avenue                           | Type D            | 90°                | Stop Sign       |
| High View Drive                              | Type C            | 60°                | Stop Sign       |
| Corning Road /<br>County W (MacArthur Trail) | Type D            | 90°                | Stop Sign       |
| Bear Road                                    | Type D            | 90°                | Stop Sign       |
| Fire Keeper Road                             | Type D            | 90°                | Stop Sign       |
| Young's Lane                                 | Type D            | 90°                | Stop Sign       |

**Table 3.7 Intersections (2 of 2)**

| Intersecting Roadway Name(s) | Intersection Type | Intersection Angle | Traffic Control |
|------------------------------|-------------------|--------------------|-----------------|
| Kwe Da Kik Lane              | Type B            | 90°                | Stop Sign       |
| Indian Drive                 | Type B            | 125°               | Stop Sign       |
| Bug Lake Road                | Type C            | 125°               | Stop Sign       |
| Love Knot Lane               | Type C            | 90°                | Stop Sign       |
| Otter Creek Road / NF 2376   | Type C / D        | 60°                | Stop Sign       |
| Potawatomi Road              | Type C            | 140°               | Stop Sign       |
| Shoemaker Lane               | Type C            | 90°                | Stop Sign       |
| Airport Lane                 | Type D            | 90°                | Stop Sign       |
| W Silver Lake Road           | Type D            | 100°               | Stop Sign       |
| E Silver Lake Road           | Type D            | 65°                | Stop Sign       |
| Connor Farm Road             | Type C            | 90°                | Stop Sign       |
| Fairway Court                | Type D            | 90°                | Stop Sign       |
| Connor Farm Road             | Type D            | 70°                | Stop Sign       |
| Scattered Lake Road          | None              | 35°                | None            |
| Mill Road                    | Type D            | 50°                | Stop Sign       |
| WIS 32 (Oak Street)          | Type D            | 90°                | Stop Sign       |

Intersection sight distance (ISD) was evaluated at fourteen intersections. The design vehicles and existing intersection sight distance is shown in Table 3.8. Deficient ISD is highlighted.

**Table 3.8 Intersection Sight Distance (1 of 2)**

| Intersection                              | Approach | US 8 Design Speed (mph) | Design Vehicle | Looking Left         |                   | Looking Right        |                   |
|---|----------|-------------------------|----------------|----------------------|-------------------|----------------------|-------------------|
|   |          |                         |                | Desirable ISD (feet) | Actual ISD (feet) | Desirable ISD (feet) | Actual ISD (feet) |
| High View Drive                           | NB       | 60                      | SU             | 885                  | 550               | 1060                 | 1060              |
|   |          |                         | PC             | 710                  | 550               | 885                  | 885               |
| Corning Road / County W (MacArthur Trail) | NB       | 60                      | WB             | 1060                 | 1060              | 1150                 | 1150              |
|   |          |                         | PC             | 710                  | 710               | 885                  | 885               |
|   | SB       | 60                      | WB             | 1060                 | 1060              | 1150                 | 1150              |
|   |          |                         | PC             | 710                  | 710               | 885                  | 885               |
| Bear Road                                 | NB       | 60                      | SU             | 885                  | 885               | 1060                 | 1060              |
|   |          |                         | PC             | 710                  | 710               | 885                  | 885               |

**Table 3.8 Intersection Sight Distance (2 of 2)**

| Intersection          | Approach | US 8 Design Speed (mph) | Design Vehicle | Looking Left         |                   | Looking Right        |                   |
|-----------------------|----------|-------------------------|----------------|----------------------|-------------------|----------------------|-------------------|
|                       |          |                         |                | Desirable ISD (feet) | Actual ISD (feet) | Desirable ISD (feet) | Actual ISD (feet) |
| Fire Keeper Road      | SB       | 60                      | SU             | 885                  | 885               | 1060                 | 1060              |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 885               |
| Young's Lane          | NB       | 60                      | SU             | 885                  | 885               | 1060                 | 700               |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 600               |
| Kwe Da Kik            | SB       | 60                      | SU             | 885                  | 700               | 1060                 | 900               |
|                       |          |                         | PC             | 710                  | 600               | 885                  | 885               |
| Indian Drive          | NB       | 60                      | SU             | 885                  | 885               | 1060                 | 800               |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 885               |
| Bug Lake Road         | SB       | 60                      | SU             | 885                  | 885               | 1060                 | 1060              |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 885               |
| Otter Creek Road      | NB       | 60                      | SU             | 885                  | 885               | 1060                 | 1060              |
|                       |          |                         | PC             | 710                  | 600               | 885                  | 885               |
|                       | SB       | 60                      | SU             | 885                  | 885               | 1060                 | 1060              |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 550               |
| Airport Lane          | NB       | 60                      | SU             | 885                  | 885               | 1060                 | 700               |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 600               |
| West Silver Lake Road | NB       | 60                      | SU             | 885                  | 885               | 1060                 | 750               |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 600               |
| East Silver Lake Road | NB       | 60                      | SU             | 885                  | 885               | 1060                 | 1060              |
|                       |          |                         | PC             | 710                  | 710               | 885                  | 885               |
| Fairway Court         | NB       | 60                      | SU             | 885                  | 700               | 1060                 | 1060              |
|                       |          |                         | PC             | 710                  | 600               | 885                  | 885               |
| WIS 32 (Oak Street)   | NB       | 30                      | WB             | 530                  | 530               | 575                  | 575               |
|                       |          |                         | PC             | 355                  | 355               | 445                  | 445               |

For intersections with ISD not meeting the desirable criteria, the restriction was determined and is listed in Table 3.9.

**Table 3.9 Current ISD Restriction**

| Intersection          | East of Intersection | West of Intersection                           |
|-----------------------|----------------------|--|
| High View Drive       | None                 | Horizontal Curve, Vertical Curve and Tree Line |
| Young's Lane          | None                 | Vertical Curve                                 |
| Kwe Da Kik            | Ridge                | Tree line                                      |
| Indian Drive          | Tree Line            | None   |
| Otter Creek Road      | None                 | Vertical Curve                                 |
| Airport Lane          | Vertical curve       | None   |
| West Silver Lake Road | Vertical Curve       | None   |
| Fairway Court         | None                 | Ridge  |

### 3.3.5 Cross Section

The standards shown in Table 3.10 are required for US 8 and include: lane width, shoulder width, paved shoulder width, pavement cross slope, and shoulder cross slope. These standards are applicable when reconstructing the roadway.

**Table 3.10 Cross Section Standards**

| Item                                   | Reference  | Criterion |
|--|--|-----------|
| Lane width                             | FDM 11-15-1 Attachment 1.1, revised March 27, 2008 | 12'       |
| Shoulder Width (Total)                 | FDM 11-15-1 Attachment 1.1, revised March 27, 2008 | 10'       |
| Paved Shoulder Width (Right/Left)      | FDM 11-15-1 Attachment 1.5, revised April 26, 2007 | 3'        |
| Pavement Cross-Slope (Tangent Section) | FDM 11-15-1.3, revised July 28, 2011               | 2%        |
| Shoulder Cross-Slope (Tangent Section) | FDM 11-15-1.4, revised July 28, 2011               | 4%        |

The existing typical section is shown in Appendix A, Exhibit A-3. The majority of the corridor has 8-foot shoulders with 3-foot paved. The total existing shoulder width is substandard.

The total and paved shoulder widths are shown on the Existing Conditions Diagrams in Appendix A, Exhibit A-2.

### 3.3.6 Right of Way

There is predominately 200 feet of right of way throughout the corridor, 100 feet to each side of the reference line. There are some areas in the rural portion where the right of way is different than this. In Crandon and Laona, the right of way is less.

### 3.3.7 Structures

There is only one structure within the study limits, as show in Table 3.11.

**Table 3.11 Structures**

| Structure I.D. # | Feature Crossed | Structure Type | Suff. Rating | Clear Width | Railing Type | Structurally Deficient or Functionally Obsolete | Inventory Load Rating |
|------------------|-----------------|----------------|--------------|-------------|--------------|---|-----------------------|
| B-21-0014        | Rat River       | Pipe Culverts  | 79.8         | 42'         | None         | No  | HS20                  |

### 3.3.8 Utilities

There are various utilities along the 11.4 mile corridor, as shown in Table 3.12. None of the utilities have any major facilities along the corridor. Facility maps were not provided by Crandon Water and Sewer Utility, Laona Sanitary District, and Forest County Potawatomi Utility Department. In addition, Charter Communications and Northern Lakes Cable TV did not respond to the initial request and they were contacted to gain additional information.

**Table 3.12 Utilities**

| Utility Name                        | Type of Utility | General Location   | Underground/Overhead/Both |
|-------------------------------------|-----------------|--|---------------------------|
| Charter Communications              |                 | No information available   |                           |
| Century Link                        | Fiber           | Along US 8 (from Otter Creek Rd. to Oak Street)  | Underground               |
| Century Link                        | Telephone       | Along US 8 (from Potawatomi Rd. to Oak Street)   | Underground               |
| Frontier                            | Telephone       | Along US 8 (from Lake Ave. to Otter Creek Rd.)   | Underground               |
| Northern Lakes Cable TV             |                 | No information available   |                           |
| Packerland Broadband                | Fiber           | Along US 8 (from Otter Creek Rd. to Oak Street)  | Underground               |
| Wisconsin Public Service - Electric | Electric        | Along US 8 (from project limit to project limit)                                       | Both                      |
| Wisconsin Public Service - Gas      | Gas             | Along US 8 (From Lake Street to Bear Road and from Airport Lane. to Oak Street/WIS 32) | Underground               |

### 3.3.9 Railroad Crossings

There was one railroad crossing on US 8. The crossing was located just east of Crandon at Railroad Avenue, STA 440+40. The railroad is owned by Canadian National. South of US 8, the railroad line has been converted to the Wolf River State Trail through a rails-to-trails project. North of US 8 the railroad still exists, however it is no longer in use.

## 3.4 Multimodal Facilities

This section covers snowmobiles, ATVs, bicycles, and pedestrian trails along the US 8 corridor.

### 3.4.1 Snowmobile

Snowmobiles are a popular recreational activity in Forest County. Various trails run throughout the county. There are four trails that intersect US 8 within the study corridor, including:

- 100 Mile Snow Safari: This trail extends throughout the southern half of Forest County. This trail crosses US 8 in three locations: Otter Creek Road, Potawatomi Road, and West Silver Lake Road. This trail is solely for snowmobile use. ATVs are allowed on certain portions of the trail.
- Lumberjack Memorial Trail: This trail is south of US 8. This trail crosses US 8 at one location, the old railroad crossing in Crandon. This trail is solely for snowmobile use.
- Nicolet State Trail: This trail runs north-south through Laona. The trail intersects US 8 just east of the project limits. The trail also connects to the 100 Mile Snow Safari. Trail use is permitted for snowmobiles, ATVs, walking, bicycling, cross-country skiing, and snowshoeing.
- Wolf River State Trail: This trail runs north-south to Crandon and is south of US 8. This trail was built using a rails-to-trails project and intersects US 8 at the old railroad crossing in Crandon, coinciding with the Lumberjack Memorial Trail. Trail use is permitted for snowmobiles, ATVs, walking, bicycling, cross-country skiing, and snowshoeing.

The snowmobile trails are shown in Appendix A, Exhibit A-4.

### 3.4.2 ATV

Currently, there are three ATV routes that intersect US 8, including:

- Wolf River State Trail: As described in Section 3.4.1; ATVs are allowed on this trail in Forest County all year long.
- Potawatomi Road: This trail extends north and south of US 8. Portions of the ATV trail follow the 100 Mile Snow Safari Trail.
- Airport Lane: This trail extends from US 8 south on Airport Lane. This trail is not shared with snowmobiles.
- Nicolet State Trail: This trail is located in Laona, just east of the study limits. In Forest County, ATVs are allowed on this trail all year long.

Two of these routes, Airport Lane and the Wolf River State Trail, end on US 8, which is problematic since the use of ATVs is illegal on US 8.

The ATV trails are shown in Appendix A, Exhibit A-5.

### 3.4.3 Bicycle

US 8 is designated to include an off-road bike trail from Rhinelander to County W by the North Central Wisconsin Regional Planning Commission (NCWRPC). At County W, the off road trail would become an on-road trail extending south on County W. This trail is proposed to link Crandon to Rhinelander with off-street trails. With the existing cross sectional elements, US 8 is considered to have undesirable conditions for bicycling according to the NCWRPC. The NCWRPC bicycle plan is shown in Appendix A, Exhibit A-6.

Bicycles are allowed on the Nicolet State Trail and the Wolf River State Trail. However, bicycling is not recommended by the DNR due to rough and soft sections in the trail. In addition, these trails are shared by motorized vehicles year round.

### 3.4.4 Pedestrian

Currently, there are no pedestrian facilities on US 8. Two hunter walking trails intersect US 8: east of County W and east of Otter Creek Road. The hunter walking trails extend through Forest County property and may be used by any non-motorized equipment. The hunter walking trails are shown in is shown in Appendix A, Exhibit A-7.

Pedestrians are allowed on the Nicolet State Trail and the Wolf River State Trail.

## 3.5 Analysis of Existing Conditions

### 3.5.1 Access

Existing access locations were field verified and are shown in the tables below. The tables are shown by municipality: City of Crandon, Town of Lincoln, and Town of Laona.

**Table 3.13 City of Crandon Access (1 of 2)**

| Station | Side of Road | Access Type | Notes                                     |
|---------|--------------|-------------|---|
| 413+75  |              | Lake Avenue |   |
| 414+50  | RT           | Commercial  | very wide                                 |
| 414+90  | LT           | Commercial  |   |
| 416+00  | LT           | Commercial  |   |
| 416+00  | RT           | Commercial  | very wide                                 |
| 417+00  | LT           | Residential |   |
| 417+00  | RT           | Forest Ave  |   |
| 420+20  | RT           | Park Ave    |   |
| 420+20  | LT           | Commercial  |   |
| 421+95  | LT           | Commercial  | very wide, additional access off Wildwood |

**Table 3.13 City of Crandon Access (2 of 2)**

| Station | Side of Road | Access Type              | Notes  |
|---------|--------------|--------------------------|--|
| 422+00  | RT           | Commercial               |  |
| 423+80  | LT           | Wildwood Avenue          |  |
| 425+00  | RT           | Commercial               |  |
| 426+10  | LT           | Commercial               |  |
| 426+90  | LT           | Commercial               |  |
| 426+85  | RT           | ATV Trail                |  |
| 426+95  | RT           | Prospect Avenue          |  |
| 430+50  | RT           | Commercial               |  |
| 433+00  | RT           | Commercial               |  |
| 433+00  | LT           | Commercial               |  |
| 437+00  | LT           | Commercial               |  |
| 439+50  | LT           | Railroad Avenue          | Gravel Trail                                 |
| 440+00  | RT           | Wolf River State Trail   |  |
| 440+00  | LT           | Rail Tracks              |  |
| 441+60  | LT           | Pioneer Street           |  |
| 443+40  | RT           | Commercial               |  |
| 447+50  | RT           | Residential / Commercial |  |
| 447+50  | LT           | Grandview Avenue         | Provides access to residential frontage road |
| 455+40  | RT           | Residential              |  |
| 458+00  | LT           | Residential              |  |
| 460+00  | LT           | Residential              |  |
| 460+90  | RT           | Residential / Commercial |  |
| 462+00  | RT           | Residential              |  |
| 464+10  | LT           | Residential              | Loop Driveway                                |
| 465+30  | LT           | Residential              | Loop Driveway                                |
| 467+20  | RT           | Residential              |  |
| 473+10  | LT           | Residential              | Loop Driveway                                |
| 482+00  | LT           | Residential              | Loop Driveway                                |
| 482+50  | RT           | High View Drive          |  |
| 483+60  | LT           | Residential              | Loop Driveway                                |
| 484+80  | RT           | Residential              | Grass, Additional access off High View Drive |
| 485+00  | LT           | Residential              | Loop Driveway                                |
| 486+10  | LT           | Residential              | Loop Driveway                                |
| 487+00  | LT           | Residential              | Loop Driveway                                |
| 498+50  | RT           | County W                 |  |
| 498+50  | LT           | Corning Road             |  |

In Crandon, there are 43 access points: 9 cross streets, 32 driveways, and 2 trail crossings. Access point spacing is approximately one access every 200 feet or 31.7 access points per mile.

Closest to Lake Avenue, the cross streets are spaced at about 330 feet. Once in the rural portion of Crandon cross street spacing increases to over 2000 feet. The driveways follow the same trend with spacing nearly every 120 feet in the urban area to 340 feet in the rural area.

**Table 3.14 Town of Lincoln Access**

| Station | Side of Road | Access Type              | Notes                              |
|---------|--------------|--------------------------|------------------------------------|
| 500+20  | RT           | Commercial               | Additional access off County W     |
| 500+95  | LT           | Commercial               | Additional access off Corning Road |
| 513+00  | LT           | Residential              |                                    |
| 524+25  | RT           | Bear Road                |                                    |
| 524+50  | LT           | Residential / Commercial |                                    |
| 543+20  | LT           | Commercial               | Gated                              |
| 552+50  | LT           | Fire Keeper Road         |                                    |
| 564+50  | RT           | Young's Lane             |                                    |
| 575+40  | RT           | Jeep Trail               |                                    |
| 590+00  | RT           | Wayside                  | Loop Driveway                      |
| 590+00  | LT           | Kwe Da Kik Lane          |                                    |
| 594+50  | RT           | Wayside                  | Loop Driveway                      |
| 608+00  | RT           | Indian Drive             |                                    |
| 609+00  | LT           | Bug Lake Road            |                                    |
| 613+80  | LT           | Commercial / Trail       | Trail to Love Knot Lane            |
| 621+10  | LT           | Love Knot Lane           |                                    |
| 621+10  | RT           | Residential              |                                    |
| 634+20  | RT           | Residential              |                                    |
| 677+10  | RT           | Commercial               | Quarry                             |
| 680+20  |              | Otter Creek Road         |                                    |

In Lincoln, there are 20 access points: 8 cross streets, 11 driveways, and 1 trail crossing. Access point spacing is approximately one access point for every 900 feet or 5.8 access points per mile. Cross street spacing varies from 100 feet between Indian Drive and Bug Lake Road to 2825 feet between Bear Road and Fire Keeper Road. Driveways are scattered throughout the segment and are both residential and commercial.

In Laona, there are 53 access points: 10 cross streets, 40 driveways, and 3 trail crossings. Access point spacing is approximately one access point for every 630 feet or 8.4 access points per mile. Cross street spacing varies from 350 feet between Fairway Court and Connor Farm Road to 12,070 feet between Potawatomi Trail and Shoemaker Lane. Driveways are scattered throughout the segment and are mostly residential on the west side of Laona and commercial on the east side of Laona.

**Table 3.15 Town of Laona Access (1 of 2)**

| Station | Side of Road | Access Type           | Notes  |
|---------|--------------|-----------------------|--|
| 732+50  | RT           | Potawatomi Trail      |  |
| 736+80  | LT           | Residential           |  |
| 749+10  | RT           | Residential           |  |
| 800+40  | RT           | Residential           |  |
| 800+40  | LT           | Residential           |  |
| 841+10  | RT           | Residential           |  |
| 850+00  | RT           | Residential           |  |
| 853+20  | RT           | Shoemaker Lane        |  |
| 871+30  | RT           | Residential           |  |
| 880+95  | RT           | Residential           |  |
| 892+80  | RT           | Airport Lane          |  |
| 896+80  | RT           | Residential           |  |
| 898+80  | RT           | Residential           |  |
| 899+80  | RT           | Residential           |  |
| 900+10  | RT           | Residential           |  |
| 907+90  | RT           | Residential           |  |
| 909+10  |              | Snowmobile Crossing   |  |
| 912+00  | RT           | Residential           | Additional access off West Silver Lake Road                |
| 913+50  | RT           | West Silver Lake Road |  |
| 919+50  | LT           | Commercial            | Loop Driveway  |
| 920+90  | LT           | Commercial            | Loop Driveway  |
| 921+95  | LT           | Residential           |  |
| 924+80  | RT           | Residential           |  |
| 924+00  | LT           | Residential           |  |
| 928+00  | RT           | Residential           | Loop Driveway  |
| 929+10  | RT           | Residential           | Loop Driveway  |
| 932+40  | RT           | Residential           |  |
| 933+30  | RT           | Residential           |  |
| 934+10  | RT           | East Silver Lake Road |  |
| 935+20  | RT           | Commercial            | Loop Driveway, Additional access off East Silver Lake Road |
| 937+10  | RT           | Commercial            | Loop Driveway, Additional access off East Silver Lake Road |
| 943+20  | LT           | Residential           |  |
| 947+40  | RT           | Commercial            |  |
| 955+20  | LT           | Connor Farm Road      | Loop Road  |
| 963+00  | RT           | Commercial            | Water tower  |
| 967+30  | RT           | Fairway Court         |  |
| 970+80  | LT           | Connor Farm Road      | Loop Road  |
| 977+30  |              | Snowmobile Trail      |  |

**Table 3.15 Town of Laona Access (2 of 2)**

| Station | Side of Road | Access Type         | Notes         |
|---------|--------------|---------------------|---------------|
| 977+30  | LT           | Scattered Lake Road |               |
| 982+00  | LT           | Commercial          |               |
| 986+00  | RT           | Residential         |               |
| 991+50  | LT           | Commercial          |               |
| 995+95  | LT           | Commercial          |               |
| 1001+95 | LT           | Commercial          | Loop Driveway |
| 1003+50 | LT           | Commercial          | Loop Driveway |
| 1006+80 | LT           | Mill Road           |               |
| 1007+00 | RT           | Commercial          |               |
| 1009+80 | LT           | Commercial          | Loop Driveway |
| 1009+90 | RT           | Commercial          |               |
| 1011+30 | RT           | Trail               |               |
| 1011+60 | LT           | Commercial          | Loop Driveway |
| 1012+50 | RT           | Commercial          | very wide     |
| 1013+50 | LT           | Commercial          | Loop Driveway |
| 1013+50 | RT           | Oak Street (WIS 32) |               |

### 3.5.2 Safety

This safety analysis follows the NC Region Spot Safety Data Review.

#### 3.5.2.1 Safety Study Location

This safety study is located on US 8 from WIS 32/55 (Lake Street) to WIS 32 (Oak Street) in the municipalities of Crandon, Lincoln, and Laona in Forest County, Wisconsin. See Appendix A, Exhibit A-1 for a project location map. The study segment is 11.4 miles in length. US 8 is a rural two-lane highway with a posted speed of 55 mph. In Crandon, US 8 is urban with additional travel lanes and a posted speed of 30 mph. In Laona, the posted speed is 25 mph.

#### 3.5.2.2 Safety Study Need

The MetaData provided by WisDOT, flagged two locations as potential crash locations. Within the MetaData, US 8 was divided into 39 segments. Of the 39 segments, two segments were flagged as having a higher crash rate than comparable facilities. The locations included two intersections, US 8 with West Silver Lake Road and US 8 with WIS 32 (Oak Street).

#### 3.5.2.3 Existing Roadway

**Cross section:** US 8 is a two-lane undivided highway. The travel lanes are 12-foot with 8-foot shoulders (3-foot paved). See Appendix A, Exhibit A-3 for the typical existing cross section.

West Silver Lake Road has 10-foot travel lanes with a narrow gravel shoulder. On US 8, a left turn bypass lane is provided for westbound traffic.

WIS 32 has 12-foot travel lanes. Short right turn tapers are provided on WIS 32 for northbound traffic and for eastbound traffic on US 8.

**Alignment:** The segments have both vertical and horizontal curvature. At the intersections of US 8 with West Silver Lake Road, there are two deficient vertical curves. All horizontal curves are adequate for the design speed of the roadway. A detailed description is given in Section 3.3.3 of this report.

**Traffic:** On US 8, the seasonal daily traffic is 3,500 vpd. In Crandon, the seasonal daily traffic increases to 6,400 vpd, as shown in Appendix B, Exhibit B-1. Side road daily traffic is highest on WIS 32 (Oak Street) with 3,400 vpd. The other cross streets, except County W, have daily traffic lower than 1,000 vpd.

### 3.5.2.4 Crash Analysis

**MetaData:** The first step in the spot safety data review process included reviewing the Spot MetaData provided by WisDOT, as shown in Appendix C, Table C-1. Within the MetaData, two locations were flagged as Tier 1 and Tier 2 crash spots. The number of crashes, daily traffic, Upper Control Limits (UCL), and crash rate flags are shown in Table 3.16.

The crash tier is determined by the crash rate flags calculated by WisDOT. Four crash rate flags are determined, including total crashes, injury crashes, fatal crashes, and run off the road crashes. Using these four crash rate flags, WisDOT assigns one of three tiers to a location. Tier 3 is given to a location with a total crash rate flag of less than one. Tier 2 is given to a location with a total crash rate flag of one or more and injury, fatal, and run off the road crash rate flags of less than one. Tier 1 is given to a location with a total crash rate flag of one or more and an injury, fatal, or run off the road crash rate flag of one or more.

**Table 3.16 MetaData**

| Intersection    | West Silver Lake Road              | WIS 32 (Oak Street) |
|-----------------|------------------------------------|---------------------|
| Crashes         | 4                                  | 6                   |
| Daily Traffic   | 3,416                              | 2,429               |
| UCL             | 0.374                              | 0.575               |
| Crash Rate Flag | Total Crashes,<br>Run off the Road | Total Crashes       |
| Tier            | 1                                  | 2                   |

**MV4000 Reports:** The MV4000 crash reports from January 1, 2005 to December 31, 2009 were requested from the TOPS lab after reviewing the MetaData. The reports included the entire segment being investigated. Five reports were unable to be retrieved by the TOPS lab. For these reports, engineering judgment was used to determine the location and type of crash with the MetaData. The crashes were plotted by location based on the MV4000s to verify the crash spots determined by the MetaData. The number of crashes by location and year are shown in Table 3.17. If there were no midblock crashes between two intersections, the row was excluded from the table below. There were a total of 109 crashes. Forty-seven percent of crashes were deer

related. Of the non-deer crashes, thirty-three percent resulted in injury and there were no fatal crashes.

**Table 3.17 Crash Summary (1 of 2)**

| Location                        | Year |    |    |    |    | Total Crashes* | Deer Crashes | Crash Severity |        |       |
|---------------------------------|------|----|----|----|----|----------------|--------------|----------------|--------|-------|
|                                 | 05   | 06 | 07 | 08 | 09 |                |              | PDO            | Injury | Fatal |
| S. Lake Avenue                  | 0    | 1  | 0  | 3  | 1  | 5              | 0            | 5              | 0      | 0     |
| S. Forest Avenue                | 0    | 0  | 0  | 0  | 0  | 0              | 0            | 0              | 0      | 0     |
| S Park Avenue                   | 0    | 0  | 0  | 0  | 0  | 0              | 0            | 0              | 0      | 0     |
| S Wildwood Ave                  | 0    | 1  | 1  | 0  | 0  | 2              | 0            | 1              | 1      | 0     |
| S Prospect Avenue               | 0    | 0  | 0  | 2  | 0  | 2              | 0            | 1              | 1      | 0     |
| MIDBLOCK                        | 1    | 0  | 0  | 0  | 0  | 1              | 0            | 1              | 0      | 0     |
| Railroad Avenue                 | 0    | 0  | 0  | 0  | 0  | 0              | 0            | 0              | 0      | 0     |
| E. Pioneer Street               | 0    | 0  | 0  | 0  | 0  | 0              | 0            | 0              | 0      | 0     |
| S. Grandview Avenue             | 2    | 0  | 0  | 0  | 1  | 3              | 0            | 2              | 1      | 0     |
| MIDBLOCK                        | 0    | 0  | 0  | 0  | 0  | 0              | 3            | 0              | 0      | 0     |
| High View Drive                 | 0    | 1  | 1  | 1  | 0  | 3              | 0            | 2              | 1      | 0     |
| MIDBLOCK                        | 0    | 0  | 0  | 0  | 0  | 0              | 4            | 0              | 0      | 0     |
| Corning Road / County W         | 0    | 0  | 1  | 0  | 0  | 1              | 0            | 0              | 1      | 0     |
| Bear Road                       | 0    | 0  | 0  | 0  | 0  | 0              | 0            | 0              | 0      | 0     |
| MIDBLOCK                        | 1    | 3  | 1  | 0  | 0  | 5              | 0            | 3              | 2      | 0     |
| Young's Lane / Everybody's Road | 0    | 0  | 0  | 2  | 0  | 2              | 1            | 2              | 0      | 0     |
| MIDBLOCK                        | 2    | 0  | 0  | 0  | 0  | 2              | 2            | 1              | 1      | 0     |
| Kwe Da Kik Lane                 | 0    | 0  | 0  | 1  | 0  | 1              | 0            | 0              | 1      | 0     |
| MIDBLOCK                        | 0    | 1  | 0  | 0  | 0  | 1              | 0            | 1              | 0      | 0     |
| Indian Dr / Bug Lake Road       | 0    | 1  | 1  | 0  | 0  | 2              | 2            | 2              | 0      | 0     |
| MIDBLOCK                        | 0    | 1  | 0  | 0  | 0  | 1              | 0            | 1              | 0      | 0     |
| Love Knot Lane                  | 0    | 0  | 0  | 1  | 0  | 1              | 0            | 0              | 1      | 0     |
| MIDBLOCK                        | 1    | 2  | 1  | 0  | 0  | 4              | 1            | 2              | 2      | 0     |
| Otter Creek Road                | 0    | 0  | 0  | 1  | 0  | 1              | 0            | 0              | 1      | 0     |
| MIDBLOCK                        | 0    | 0  | 0  | 0  | 1  | 1              | 5            | 1              | 0      | 0     |
| Potawatomi Road                 | 0    | 0  | 0  | 0  | 1  | 1              | 2            | 0              | 1      | 0     |
| MIDBLOCK                        | 1    | 1  | 0  | 0  | 0  | 2              | 11           | 2              | 0      | 0     |
| Shoemaker Lane                  | 0    | 0  | 0  | 0  | 0  | 0              | 4            | 0              | 0      | 0     |
| MIDBLOCK                        | 0    | 1  | 0  | 0  | 0  | 1              | 2            | 0              | 1      | 0     |
| Airport Lane                    | 0    | 0  | 0  | 0  | 0  | 0              | 5            | 0              | 0      | 0     |
| MIDBLOCK                        | 0    | 0  | 1  | 0  | 0  | 1              | 0            | 0              | 1      | 0     |
| W. Silver Lake Road             | 0    | 0  | 0  | 1  | 0  | 1              | 3            | 1              | 0      | 0     |
| E. Silver Lake Road             | 1    | 1  | 0  | 1  | 0  | 3              | 0            | 3              | 0      | 0     |

\*Does not include deer crashes

**Table 3.17 Crash Summary (2 of 2)**

| Location                   | Year |    |    |    |    | Total Crashes* | Deer Crashes | Crash Severity |        |       |
|----------------------------|------|----|----|----|----|----------------|--------------|----------------|--------|-------|
|                            | 05   | 06 | 07 | 08 | 09 |                |              | PDO            | Injury | Fatal |
| Connor Farm Road           | 0    | 0  | 0  | 0  | 0  | 0              | 0            | 0              | 0      | 0     |
| MIDBLOCK                   | 0    | 1  | 0  | 0  | 0  | 1              | 2            | 1              | 0      | 0     |
| Fairway Court / Tower Lane | 1    | 0  | 0  | 1  | 0  | 2              | 0            | 1              | 1      | 0     |
| Connor Farm Road           | 0    | 0  | 0  | 0  | 0  | 0              | 1            | 0              | 0      | 0     |
| Scattered Lake Road        | 0    | 0  | 0  | 0  | 0  | 0              | 0            | 0              | 0      | 0     |
| Mill Road                  | 0    | 0  | 1  | 0  | 0  | 1              | 0            | 1              | 0      | 0     |
| WIS 32 (Oak Street)        | 4    | 1  | 0  | 2  | 0  | 7              | 0            | 5              | 2      | 0     |
| TOTALS                     | 14   | 16 | 8  | 16 | 4  | 58             | 51           | 39             | 19     | 0     |

\*Does not include deer crashes

A review of the crash reports ensured crashes were coded in the correct location. After determining which crashes occurred at the Tier 1 and Tier 2 locations, the data was compared to the MetaData provided. With the review of the MV4000 crash reports, one crash occurred at US 8 with West Silver Lake Road and seven crashes occurred at US 8 with WIS 32 (Oak Street). See Appendix C, Exhibit C-1 for the MV4000 crash reports.

For US 8 with West Silver Lake Road, one crash coded in the MetaData actually occurred at US 8 with East Silver Lake Road and two crashes were animal crashes, which were excluded from the analysis. For US 8 with WIS 32 (Oak Street), one additional crash was provided by the TOPS lab that was not included in the MetaData.

### 3.5.2.5 Recalculation of Crash Flags

The crash flags were recalculated with the updated crashes, daily traffic, and UCLs. The updated daily traffic for the intersections was calculated by adding the traffic on each approach entering the intersection. Table 3.18 shows the updated crashes, daily traffic, and UCLs for each intersection. The calculations are shown in Appendix C, Tables C-2 and C-3.

**Table 3.18 Updated Daily Traffic and UCLs**

| Intersection    | West Silver Lake Road | WIS 32 (Oak Street)                     |
|-----------------|-----------------------|---|
| Crashes         | 1                     | 7                                       |
| Daily Traffic   | 4025                  | 6300                                    |
| UCL             | 0.360                 | 0.327                                   |
| Crash Rate Flag | None                  | Total Crashes,<br>Incapacitating Injury |
| Tier            | 3                     | 1                                       |

After recalculation, US 8 with West Silver Lake Road no longer met the criteria to be a Tier 1 or a Tier 2 crash spot. This location was removed from further analysis. US 8 with WIS 32 (Oak

Street) was determined to be Tier 1 crash spot. US 8 with WIS 32 (Oak Street) had a total spot crash rate flag of 1.9 and an incapacitating injury spot crash flag of 1.8.

### 3.5.2.6 Intersection Analysis: US 8 with WIS 32 (Oak Street)

After the recalculation of the crash flags, US 8 with WIS 32 (Oak Street) qualified as Tier 1 crash spot.

The intersection of US 8 and WIS 32 (Oak Street) is a three-legged intersection with WIS 32 on the south leg. In addition, there is a business driveway on the north side of the intersection. There are additional driveways located within 250 feet of the intersection on all approaches, as shown in Appendix C, Exhibit C-2. WIS 32 is a two-lane undivided facility and is stop controlled. Tapers for the right turn movements are provided on eastbound US 8 and northbound WIS 32 however, no storage for right turns is provided. The speed limit on US 8 and WIS 32 (Oak Street) is 25 mph.

Appendix C, Figures C-1 through and C-6 show pictures of the approaches on US 8 to WIS 32, Figures C-7, C-8, and C-9 show the approach on WIS 32, and Figures C-10 and C-11 show the approach from the driveway.

At this intersection, there were seven crashes over the five-year period. A list of the crashes is shown in Appendix C, Table C-4. Appendix C, Exhibit C-2 shows a collision diagram and Exhibit C-3 summarizes the crash data. There is no apparent pattern to the crashes based on the collision diagram. There were four angle crashes, two side swipe crashes, and one out of control crash. Two of the angle crashes and one sideswipe crash involved northbound vehicles failing to yield. The remaining two angle crashes involved vehicles exiting the business driveways. The remaining sideswipe crash involved a vehicle illegally passing on the left. Five crashes involved property damage, one crash had a potential injury, and one crash included an incapacitating injury.

Four crashes occurred between 2 PM and 10 PM and three crashes occurred between 2 AM and 10 AM. Four of the crashes occurred in daylight and four crashes occurred under dry road conditions.

Out of the seven crashes, six crashes involved two vehicles. Seven of the vehicles received moderate damage. Three vehicles had severe damage and the remaining two vehicles had very severe and very minor damage. Driver age varied from 26 to 81 years old.

One MV4000s noted the stopped driver did not see the turn signal of the left-turning vehicle and pulled out too soon, hitting the rear of the turning vehicle.

To conclude, there were seven crashes at the intersection of US 8 and WIS 32 (Oak Street) and there was no apparent pattern or cause for the crashes. The recommendations for this intersection are shown in Appendix H, Exhibits H-20b and H-21.

### 3.5.3 Speed

Spot speed studies were conducted at three locations on US 8. The studies were completed using tube counters that grouped the speed data into 5 mph increments for each hour of analysis. The

speed data was collected over a week’s time period. The posted speed throughout the project is 55 mph.

The average speed, pace speed, and 85<sup>th</sup> percentile speed were calculated for each location. The results are shown in Tables 3.19 and 3.20 below. Eastbound US 8 had a constant 85<sup>th</sup> percentile speed (63 mph), average speed (58 mph), and pace speed (56 – 65 mph) at the locations studied. Westbound US 8 had variable 85<sup>th</sup> percentile speeds (60 - 65 mph), average speeds (57 - 61 mph), and pace speeds (53 – 62 mph and 56 – 65 mph) at the locations studied.

**Table 3.19 US 8 Eastbound Speed Summary**

| Location                      | 85 <sup>th</sup> Percentile | Average Speed | Pace Speed |
|-------------------------------|-----------------------------|---------------|------------|
| East of West Silver Lake Road | 63 mph                      | 58 mph        | 56-65 mph  |
| East of Potawatomi Road       | 63 mph                      | 58 mph        | 56-65 mph  |
| East of Indian Road           | 63 mph                      | 58 mph        | 56-65 mph  |

**Table 3.20 US 8 Westbound Speed Summary**

| Location                      | 85 <sup>th</sup> Percentile | Average Speed | Pace Speed |
|-------------------------------|-----------------------------|---------------|------------|
| East of West Silver Lake Road | 60 mph                      | 57 mph        | 53-62 mph  |
| East of Potawatomi Road       | 65 mph                      | 61 mph        | 56-65 mph  |
| East of Indian Road           | 63 mph                      | 58 mph        | 56-65 mph  |

The westbound variations may be explained by the geometric features at each location. Westbound vehicles at two locations, east of Indian Road and east of Potawatomi Road, were traveling downhill, while east of West Silver Lake Road, the westbound vehicles were traveling at the top of a crest curve. There are no geometric deficiencies east of Indian Road. East of Potawatomi Road and east of West Silver Lake Road, traffic is traveling through deficient vertical curves. In conclusion, speeding is apparent on US 8 at the locations studied.

### 3.5.4 Existing and Future Travel Demand

Traffic counts were completed at four locations on US 8 and four cross streets in July and August 2010. WisDOT projected future daily and peak hour traffic based on the existing hourly and intersection turning movement counts, as shown in Appendix B, Exhibit B-1. US 8 between Crandon and Laona has 2010 two-way daily traffic ranging from 3,500 to 4,100 vpd. These volumes represent the seasonal traffic expected in July and August to account for the peaking characteristic that’s associated with the recreational summer traffic. The recreational summer traffic is approximately 30 percent higher than the actual average annual daily traffic, which varied from 2,600 to 3,500 vpd in 2009. By 2035, WisDOT seasonal forecast increase from 4,500 to 5,300 vpd.

### 3.5.5 Existing and Future No Build Traffic Analysis

The Existing and Future No-Build traffic analysis included a segment analysis and intersection analysis. Five intersections were analyzed including County W, Indian Drive / Bug Lake Road, Airport Lane, West Silver Lake Road, and WIS 32 (Oak Street).

#### 3.5.5.1 Segment Analysis

The level of service (LOS) was computed for the entire length of US 8 using the Highway Capacity Software (HCS) and the peak hour traffic projections. Since the segment LOS is not dependant on the length of the segment, the LOS provided in this section can be used for various segments along the US 8 corridor based on the percent of no passing zones. The analysis was conducted for rural segments where the speed limit is 55 mph.

All traffic capacity and operational analyses were performed using HCS in accordance with the WisDOT Facilities Development Manual (FDM Procedure 11-5-3, revised March 27, 2008). Performance of a rural two-lane highway segment is measured in terms of LOS based on the percent time spent following and average travel speed. The percent time spent following and average travel speed are the model outputs and are determined from the highway characteristics including the percent of no passing zones, free flow travel speed and hourly traffic volume. The average speed from the speed study was used as a model input to determine the free flow speed using HCS methodology. The LOS is a letter grade assigned to designate the quality of operations. The grades range from A (best) to E (worst) and are listed below (Source: 2010 HCM).

| Level of Service | Percent Time Spent Following | Average Travel Speed |
|------------------|------------------------------|----------------------|
| A                | <35                          | >55 mph              |
| B                | >35-50                       | >50-55 mph           |
| C                | >50-65                       | >45-50 mph           |
| D                | >65-80                       | >40-45 mph           |
| E                | >80                          | <40 mph              |

Highway segment LOS fluctuates throughout the day, the week, and the year, as the daily traffic volumes fluctuate depending on the season. Therefore, it is reasonable to expect some delays on a segment during the times with the highest hourly traffic volumes. WisDOT has established LOS guidelines for the acceptable functioning of highway segments in urban and rural areas (FDM 11-5-3, Table 3.1 revised March 27, 2008). For a rural highway designated as a Connections 2030 Connector Route, the acceptable LOS is C.

Table 3.21 summarizes the percent time spent following, average travel speed, and LOS for the existing traffic volume for various percents of no passing zones seen throughout the US 8 segment. The two-way traffic volume shown is the highest hour recorded from the intersection turning movement counts in 2010 to present a worst case condition. For the existing traffic volume, the LOS is C for the entire length of US 8. As shown in Table 3.21, the LOS is indifferent to the percent of no passing zones with the current traffic volume.

**Table 3.21 2010 Highway Segment Level of Service**

| Two-Way Volume (vph) | Percent No Passing | Average Travel Speed (mph) | Percent Time Spent Following | Level of Service |
|----------------------|--------------------|----------------------------|------------------------------|------------------|
| 390                  | 46                 | 59.5                       | 52.3                         | C                |
| 390                  | 73                 | 59.5                       | 55.7                         | C                |
| 390                  | 100                | 59.5                       | 56.8                         | C                |

With indifference to the percent no passing, the volume was varied in Table 3.22 to determine the threshold to reach LOS D for the different percents of no passing zones. This approach was used since the percent no passing varies significantly throughout the segment. Overall, there is 70 percent no passing zones, but the percent no passing zones varies based on the length of the segment and the passing zones within that segment. The percent of no passing varies between 42 percent and 82 percent on a segment by segment basis. The LOS D peak hour volume threshold results are shown in Table 3.22. The seasonal daily traffic identified in Table 3.22 was calculated based on the peak hour volume and K30(s) value. K30(s) is the seasonal K30 determined from the seasonal daily traffic and 30<sup>th</sup> highest traffic hour.

**Table 3.22 Level of Service D Thresholds**

| Two-Way Volume (vph) | Percent No Passing | Average Travel Speed (mph) | Percent Time Spent Following | Level of Service | Seasonal Daily Traffic (vpd) |
|----------------------|--------------------|----------------------------|------------------------------|------------------|------------------------------|
| 720                  | 46                 | 56.1                       | 65.3%                        | D                | 7,750                        |
| 660                  | 73                 | 56.7                       | 65.2%                        | D                | 7,100                        |
| 640                  | 100                | 56.9                       | 65.3%                        | D                | 6,890                        |

The highest 2035 daily traffic projected in the corridor is 6,000 vpd. With daily traffic calculated from the LOS D thresholds, LOS D will not be reached in 2035 for US 8, regardless of the percent of no passing zones. Therefore, US 8 is expected to operate at a LOS C or better in 2035

### 3.5.5.2 Intersection Analysis

Intersection turning movement counts were completed for the following five intersections on US 8 in July and August 2010:

- County W is the only major collector in the rural portion of US 8.
- Indian Road / Bug Lake Road was identified as a potential crash hot spot.
- Airport Drive is classified as a minor collector.
- East Silver Lake Road is classified as a minor collector.
- WIS 32 (Oak Street) was flagged as a potential crash hot spot and is a major collector.

The peak hour turning movement counts are shown in Appendix B, Exhibit B-2. Using these counts, the existing geometrics at the intersections, and HCS, the existing weekday peak hour operations were analyzed for the five intersections. The existing geometrics are shown in Appendix A, Exhibit A-8. All of the side streets are stop-controlled. The findings are summarized herein.

Only the one peak hour from 1:00 p.m. to 2:00 p.m. was considered. No AM peak hour was considered because the AM peak hour volume was significantly less than the PM peak hour. For the AM peak hour, traffic is about 45 percent less than the PM peak hour traffic.

Performance of an intersection is measured in terms of peak hour LOS, delay or average wait time, and length of queue. LOS is a letter grade assigned to designate the quality of operations. The grades range from A (best) to F (worst) and are listed below (Source: 2010 HCM).

| Level of Service | Unsignalized Intersection Delay (sec) |
|------------------|---------------------------------------|
| A                | <10                                   |
| B                | >10-15                                |
| C                | >15-25                                |
| D                | >25-35                                |
| E                | >35-50                                |
| F                | >50                                   |

Table 3.23 summarizes the LOS, delay, and queues at the following five unsignalized intersections along US 8 during the 2010 Peak Hour. The existing intersection LOS is also shown in Appendix D, Exhibit D-1.

**Table 3.23 2010 LOS at US 8 intersections, peak hour (1-2 p.m.)**

| Intersection                 | Cross Street Level of Service (NB / SB) | Cross Street Delay (seconds) (NB / SB) | Cross Street 95 <sup>th</sup> percentile <sup>1</sup> queue (feet) (NB / SB) |
|------------------------------|---|--|--|
| County W                     | B / A                                   | 13 / 10                                | 15 / 0   |
| Indian Drive / Bug Lake Road | A / B                                   | 10 / 11                                | 5 / 0  |
| Airport Road                 | B / NA                                  | 10 / NA                                | 0 / NA   |
| E. Silver Lake Road          | B / NA                                  | 10 / NA                                | 0 / NA   |
| WIS 32 (Oak Street)          | B / B                                   | 15 / 13                                | 25 / 10  |

<sup>1</sup> 95th percentile queue: 95 percent of the time during the peak hour, the queue is less than length listed.

During the 2010 peak hour, the intersections all had levels of service of B or better and there was no significant queuing. Due to low volumes, the queue is less than one car length during the

peak hour at all intersections. The most significant queuing occurs for northbound WIS 32 (Oak Street), 25 feet for the northbound through movement.

WisDOT produced traffic forecasts for 2015, 2025 and 2035 for peak hour for the same five intersections on US 8. The forecasts are shown in Appendix B, Exhibit B-3. Using the peak hour forecast for 2035 and HCS, the future no-build weekday peak hour operations were analyzed for the intersections. The findings are summarized in the Table 3.24 and in Appendix D, Exhibit D-2.

**Table 3.24 Future (2035) No-Build LOS at US 8 intersections, peak hour (1-2 p.m.)**

| Intersection                 | Cross Street Level of Service (NB / SB) | Cross Street Delay (seconds) (NB / SB) | Cross Street 95th percentile <sup>1</sup> queue (feet) (NB / SB) |
|------------------------------|---|--|--|
| County W                     | C / B                                   | 16 / 13                                | 20 / 10  |
| Indian Drive / Bug Lake Road | B / B                                   | 11 / 12                                | 5 / 0  |
| Airport Road                 | B / NA                                  | 11 / NA                                | 0 / NA   |
| E. Silver Lake Road          | B / NA                                  | 11 / NA                                | 5 / NA   |
| WIS 32 (Oak Street)          | C / C                                   | 20 / 16                                | 50 / 15  |

<sup>1</sup> 95th percentile queue: 95 percent of the time during the peak hour, the queue is less than length listed.

During the 2035 peak hour, the intersections all had levels of service of C or better and there was no significant queuing. Due to low volumes, the queue is less than one car length during the peak hour at all intersections except WIS 32 (Oak Street). WIS 32 (Oak Street) had a 50-foot queue for the northbound through movement.

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## 4 Environmental Scan

The environmental scan considers archaeological and historic resources, hazardous material sites, existing and future land use, streams, floodplains, wetlands, and potential 4(f) resources.

### 4.1 Land Use

#### 4.1.1 Existing

In general, the majority of lands in Forest County are designated as woodlands. See Appendix E for existing land use maps. In the City of Crandon, the properties abutting US 8 are currently designated as residential, commercial, and woodlands. In the Town of Lincoln, the majority of land abutting US 8 is designated as woodlands. There are two small areas of commercial land at the intersections of US 8 with County W and US 8 with Bug Lake Road. In addition, there is residential land and land for governmental purposes within the Potawatomi Community. In the Town of Laona, the land use adjacent to US 8 includes residential, industrial, recreational, governmental, commercial, and woodland.

#### 4.1.2 Future

Each community in Forest County, as well as Forest County itself, has developed a future land use plan based on projected needs in 2030. In general, the majority of lands in Forest County are designated as forestry areas and preservation and open space areas. See Appendix E for future land use maps. In the City of Crandon, the properties abutting US 8 are planned to be commercial. In the Town of Lincoln, the land adjacent to US 8 from the Crandon city limit to Bear Road is planned to be commercial and governmental. There is a small amount of residential and governmental lands planned in the Potawatomi Community adjacent to US 8. In the Town of Laona, the land use adjacent to US 8 includes residential, rural residential, industrial, recreational, governmental, and commercial.

## 4.2 Archaeological

Great Lakes Archaeological Research Center, Inc. performed an archival and literature search of the US 8 corridor from WIS 55/32 (S. Lake Drive) to WIS 32 (Oak Street), Forest County, Wisconsin. Based on the search of the Wisconsin Historical Society's Archaeological Site Index and the Bibliography of Archaeological Reports, 19 archaeological and burial sites are located within one mile of US 8. Of these, 4 sites are located within or immediately adjacent to the project corridor. A description of the 4 archaeological and burial sites coincident or adjacent to US 8 follows:

- Site 47FR0173, the Johnnies Resort Site, consisted of a reported projectile point found on the north shore of Lake Wabikon. The point was reported to be found 1 to 2 meters from the water's edge.
- Site 47FR0011, FS 09-06-05-003, is a campsite and workshop site located on the north shore of Silver Lake.

- Site 47FR0357, The Laona Administrative Site, is the historic location of the original administrative complex. All of the original buildings were removed. The site is north and adjacent to US 8.
- Site 47FR0374, Connor Camps 1, 2, and 3 site, is a historic Euroamerican logging camp. The site was reported based on the report of informant John Irish.

### **4.3 Historical**

Great Lakes Archaeological Research Center, Inc. performed an archival and literature search of the US 8 corridor from WIS 55/32 (S. Lake Drive) to WIS 32 (Oak Street), Forest County, Wisconsin. Based on the search of the Wisconsin Historical Preservation Database and the National Register of Historic Places, 3 properties are located immediately adjacent to the project corridor. Of these properties, one may be eligible for the National Register of Historic Places; however, none are currently listed on the Register.

US 8, Laona Township: This property originally included five buildings constructed by the Forest Service in 1935. By 1990, only two buildings (a dwelling house and a one-car garage) remained. Both buildings were determined eligible for the NRHP. In 1989, the Forest Service wanted to construct a new engineering facility at the site. In consultation with the State Historic Preservation Office, the dwelling and garage were documented for the Historic American Buildings Survey (HABS). The dwelling was subsequently razed. The garage is still extant.

### **4.4 Hazardous Materials**

The project team completed a Hazardous Materials Database Search (HMDS) for the US 8 corridor located in Forest County, Wisconsin. The purpose of the HMDS was to identify sites with potential hazardous materials that may be present in environmental media located within or immediately adjacent to the potential proposed improvements of the study corridor. The HMDS is performed in general accordance with the applicable portions of WisDOT FDM 21-35-5 (revised February 10, 2006) and included a review of state and federal [United States Environmental Protection Agency (USEPA)] databases in order to identify the sites/parcels with potential hazardous materials concerns.

Seventy-two potential hazardous materials sites were identified within 1-mile of the project corridor. However, considering the distance of these sites from the project corridor and their potential to impact the future improvements, the project team recommends that 19 of these sites, located within 150 feet of the project corridor, should be evaluated further in any future design projects. See Table 4.1. These activities should be completed in accordance with local, state, and federal regulations.

**Table 4.1 Potential Hazardous Materials Sites**

| Site #  | Site Address   | City    | Databases   |
|---|--|---------|---|
| 1   | 100 E Pioneer Street                                     | Crandon | CERC-NFRAP  |
| 2   | 305 E Pioneer Street                                     | Crandon | UST, LUST, FINDS, RCRA-NonGen, CRS, AUL, WRRSER, SHWIMS |
| 3   | 100 E Pioneer Street                                     | Crandon | WI ERP, LUST, CRS, AUL, WRRSER                          |
| 4   | 502 S Forest Avenue                                      | Crandon | LUST, UST   |
| 5   | 100 W Pioneer Street                                     | Crandon | LUST, UST, SPILLS, WI WRRSER                            |
| 6   | 500 S Lake Avenue  | Crandon | LUST, UST   |
| 7   | 403 S Lake Avenue  | Crandon | LUST, UST, CRS, AUL                                     |
| 8   | US 8 and Beech Street / Hwy 32                           | Laona   | LUST, LAST, UST, WI SPILLS, WRRSER, CRS, AUL            |
| 9   | 600 E Pioneer Street                                     | Crandon | UST   |
| 10  | 409 E Pioneer Street                                     | Crandon | UST   |
| 11  | 105 W Pioneer Street                                     | Crandon | UST   |
| 12  | 401 S Wildwood Avenue                                    | Crandon | UST   |
| 13  | US 8 & CTH W   | Crandon | UST   |
| 14  | 1501 E Pioneer Street                                    | Crandon | UST   |
| 15  | 5308 Beech Street  | Laona   | UST   |
| 16  | 4826 Beech Street  | Laona   | UST, AST  |
| 17  | Jaeger and Indian Road                                   | Crandon | SPILLS  |
| 18  | 4834 Birch Street / Intersection of Beech & Birch Street | Laona   | LUST, AUL, CRS, SHWIMS, WRRSER                          |
| 19  | N/A  | Crandon | INDIAN RESERV   |
| <p>Notes: AST = Aboveground Storage Tank; LAST = Leaking AST; AUL = Activity and Use Limitation; SPILLS = Spills; UST = Underground Storage Tank; LUST = Leaking UST; SHWIMS = Solid and Hazardous Waste Information System; AUL = Activity Use Limitation; CRS = Closed Remediation System; WRRSER = Wisconsin Remedial Response Site Evaluation Report; FTTS = FIFRA/TSCA Tracking System</p> |  |         |   |

## 4.5 Streams and Lakes

There are numerous bodies of water that are near US 8, including:

- Surprise Lake, north of US 8 in Crandon.
- Peterson Creek runs parallel to Corning Road and crosses US 8 near Bear Road.
- Otter Creek runs perpendicular to US 8 just west of Kwe Da Kik Lane. This is an area of special natural resource interest (ASNRI).
- Wabikon Lake, south of US 8 just east of Potawatomi Road. This is an ASNRI.
- Rat River, runs parallel to US 8 on the north side near Silver Lake, crosses US 8 west of Airport Lane. This is an ASNRI.
- Silver Lake, south of US 8 between East and West Silver Lake Road. This is an ASNRI.

- Scattered Rice Lake, north of US 8 at the east project limit. This is an ASNRI.

## 4.6 Floodplains

There are four areas with potential floodplains in the study vicinity. Floodplains surround Surprise Lake in Crandon and cross US 8 near Prospect Avenue. Floodplains extend to the south of Kabikon Lake. In Laona, floodplains surround Rat River and Scattered Rice Lake. Near Rat River, floodplains extend on US 8 from the river crossing to Airport Road.

## 4.7 Wetlands

Forest County has 161,056 acres of wetlands according to the Wisconsin Department of Natural Resources. This accounts for 24.8 percent of the land area in Forest County. Near US 8 there are 21 different wetlands which extend within  $\frac{1}{4}$  mile of the study corridor and cover 443 acres. Of these wetlands, five areas cross or are directly adjacent to US 8. Most of the wetlands surround existing bodies of water including: Peterson Creek, Otter Creek, Wabikon Lake, Honey Creek Rat River, and Scattered Rice Lake.

## 4.8 Section 4(f) Resources

There are six potential 4(f) lands near the project location. The potential 4(f) lands include:

- Forest County Hunter Walking Trails: located along US 8 between Bear Road and Otter Creek Road including:
  - Section 27, Township 36N, Range 13E, NW-SW, SW-SW, NE-NW, NW-NW, SW-NW, NW-NE and SW-NE
  - Section 25, Township 36N, Range 13E, NW  $\frac{1}{4}$ , NE-SW, NW-SW, SW-SW, NE-SE, SW-SE, NE-SE, and SW-SE
- Park: located on Indian Drive just south of US 8
- Nicolet National Forest
- Heritage Hunt Club: located north of US 8 at Connor Farm Road
- Nicolet County Club: located on US 8 between East Silver Lake Road and Fairway Court, owned by the Town of Laona
- Laona Ranger Station: located on US 8, just west of Mill Road

## **5 Agency and Community Coordination**

Bloom coordinated with agencies in the project area through the length of the study. In addition, numerous agencies were invited to participate in the Project Advisory Committee. This section summarizes the agency and community coordination which took place. Correspondence is located in Appendix F.

### **5.1 Agency Coordination**

Numerous governmental agencies were contacted regarding the US 8 corridor study. A summary of the agency correspondence is below.

#### **5.1.1 Corps of Engineers**

The Corps of Engineers was contacted on December 7, 2010 requesting wetland information. No response was received.

#### **5.1.2 Department of Agriculture, Trade & Consumer Protection**

The Department of Agriculture, Trade & Consumer Protection was contacted on December 7, 2010 requesting any farmland information available in the area. No response was received.

#### **5.1.3 North Central Wisconsin Regional Planning Commission**

The North Central Wisconsin Regional Planning Commission was contacted on December 7, 2010 requesting wetland information. No response was received.

#### **5.1.4 US Fish & Wildlife Service**

The US Fish & Wildlife Service was contacted on December 7, 2010 requesting information on any threatened or endangered species in the corridor. No response was received.

#### **5.1.5 Wisconsin Department of Natural Resources**

The Wisconsin Department of Natural Resources was contacted on December 7, 2010 requesting wetland information and on any threatened or endangered species in the corridor. No response was received.

#### **5.1.6 Native American Tribes**

The following Native American Tribes were contacted on December 9, 2010 requesting any comments about the study:

- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
- Bad River Band of Lake Superior Chippewa Indians of Wisconsin
- Sokaogon Chippewa Community Mole Lake Band
- Prairie Band Potawatomi Nation
- Forest County Potawatomi Community of Wisconsin
- Menominee Indian Tribe of Wisconsin

- Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
- Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin
- Prairie Island Indian Community
- Sac and Fox Nation of Oklahoma
- Lac Vieux Desert Band of Lake Superior Chippewa Indians

In addition, the Forest County Potawatomi Community of Wisconsin and the Sokaogon Chippewa Community Mole Lake Band were invited to the Project Advisory Committee meetings due to their presence in the US 8 corridor.

Communications have been ongoing between WisDOT and the Forest County Potawatomi Community. Some recommendations made by the Forest County Potawatomi Community include:

- Installing a traffic signal at Fire Keeper's Road and US 8
- Constructing an underground multi-use path near Bug Lake Road for pedestrian and ATV use
- Providing a gated emergency egress for the development off Everybody's Road

In addition, extensive coordination will be needed between WisDOT and the Forest County Potawatomi Community once a design project starts. With sensitive tribal lands, it has been suggested purchasing temporary easements where needed and restoring the disturbed lands with wild flowers or other landscaping.

The Forest County Potawatomi Community of Wisconsin provided their community plan which directly relates to US 8.

## 5.2 Utility Coordination

The following utilities were contacted about their facilities located within the study limits:

- Charter Communications
- CenturyLink
- Frontier
- Crandon Water and Sewer Utility
- Northern Lakes Cable TV
- Wisconsin Public Service - Electric
- Wisconsin Public Service - Gas
- Laona Sanitary District
- Forest County Potawatomi Utility Dept.
- United States Forest Service
- Packerland Broadband

See Section 3.3.9, Utilities for more information.

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## 5.3 Project Advisory Committee

The following communities and community groups were presented the opportunity to be involved with the Project Advisory Committee (PAC):

- Forest County Chamber of Commerce
- Forest County (Zoning & Land Use, Highway Department, Land Conservation, Forestry/Parks, Emergency Management, and Sheriff's Department)
- Forest County ATV Association
- North Central Wisconsin Regional Planning Commission
- City of Crandon
- Town of Crandon
- Town of Laona
- Town of Lincoln
- Wisconsin Timber Association
- Snowmobile Club
- US Forest Service
- Forest County Potawatomi Community of Wisconsin
- Sokaogon Chippewa Community Mole Lake Band

The PAC met twice throughout the study to discuss the existing deficiencies and recommendations. The two meetings are discussed below.

### 5.3.1 PAC Meeting #1

The first PAC meeting was held on Tuesday, March 29, 2011 at 3:00 p.m. at the Crandon School, located on US 8, west of the study area. This meeting provided an overview of the project goals and presented a summary of the initial existing condition findings. The meeting minutes, attendee list, and presentation are shown in Appendix G.

The main focus of this meeting was discussing the existing roadway and deficiencies. Main concerns the communities shared about the US 8 corridor included sight distance at intersections, trail crossings visibility, and multimodal connections. These issues are detailed in the meeting minutes shown in Appendix G.

After the PAC meeting, meeting minutes were sent out to all those invited to the meeting. In addition, those that did not attend were sent the presentation handout and agenda.

### 5.3.2 PAC Meeting #2

The second PAC meeting was held on Wednesday, October 24, 2012 at 3:00 p.m. at the Crandon School. This meeting provided an overview of the project purpose and need and described potential improvements that can be considered throughout the corridor. Both long term and short term intersection improvement options and corridor improvement options were discussed. The meeting minutes, attendee list, presentation, and City of Crandon comments are shown in Appendix G.

Additional concerns were voiced at this meeting including the abrupt ending of the second westbound lane in Crandon and development which will add truck traffic to Mill Road in Laona. These two areas are addressed in this report from the comments received. These issues, as well as other discussions, are detailed in the meeting minutes shown in Appendix G.

After the second PAC meeting, meeting minutes were sent out to who attended the first or second PAC meeting.

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## 6 Alternative Development

Both corridor wide and intersection improvements were developed. The potential improvements are summarized with one improvement location per page. For each improvement area, the following items are included in the summaries: the existing deficiencies, a short term improvement option (if one exists), and a long term improvement option. The improvements should be the starting point when a future design project begins, as additional study is needed to determine the impacts of these proposed improvement options. Improvement exhibits can be found in Appendix H.

The following intersections are included in the one page summaries after Section 6.1 Intersection Improvement Options:

- High View Drive
- Young's Lane
- Kwe Da Kik Lane
- Indian Drive/Bug Lake Road
- Otter Creek Road
- Airport Lane
- West Silver Lake Road
- Fairway Court
- Mill Road
- WIS 32 (Oak Street)

The following corridor wide improvements are included in the one page summaries after Section 6.2 Corridor Wide Improvement Options:

- Passing Lane Improvement
- Passing Lane Alternatives
- Median Alternative A and B
- Off-Alignment Alternatives
- Trail Connections
- Speed Transition

### 6.1 Intersection Improvement Options

Short term improvements were developed that can be applied to intersections on a corridor wide scale. These improvements are low cost measures that can be implemented relatively quickly. The list of improvements can be taken and applied to any intersection in the corridor where the need is met. Short term improvements were typically developed at intersections with ISD concerns. Only two intersections, WIS 32 (Oak Street) and Mill Road with US 8, had a short term improvement due to safety concerns and access control. The recommended short term improvements include:

- Clear and grub to provide improved ISD

- Provide stop lines on side roads closer to US 8
- Install intersection warning signs where there are ISD concerns

Numerous types of intersection warning signs are in use throughout the US. A description of these are summarized in *Stop-Controlled Intersection Safety: Through Route Activated Warning Systems* (<http://safety.fhwa.dot.gov/intersection/resources/fhwasal1015/traws.pdf>). These technologies are low cost infrastructure based on ITE technologies that can be installed at stop-controlled intersections.

Most recently, intersection warning signs were developed by the Minnesota Department of Transportation (MnDOT) to help mitigate crashes at rural high-speed intersections. The report *Advanced LED Warning Signs for Rural Intersections Powered by Renewable Energy* was published in December 2010 by the University of Minnesota Duluth. In this study, a new Advanced Light-Emitting Diode (LED) Warning System was developed and deployed at a rural, through/stop intersection with limited intersection sight distance. The warning system actively detects vehicles on all approaches and activates LED blinker warning signs for the conflicting movements. After this initial study, MnDOT plans to install the “Rural Intersection Conflict Warning System” at intersections throughout Minnesota. The project website is: <http://www.dot.state.mn.us/guidestar/2012/rural-intersect-conflict-warn-system/index.html>.

In addition, the WisDOT Bureau of Traffic Operations (BTO) along with the UW TOPS Lab completed a study in 2011 in the Northwest Region with similar concepts. Information about the study can be found at <http://www.topslab.wisc.edu/workgroups/rsip.html>.

Long term improvements were developed that can be applied to intersections on a corridor wide scale. Long term intersection improvements were generally considered in areas with inadequate ISD and inadequate intersection angles. In general, the recommended long term improvements included:

- Design intersections to a type “B1” which includes a 200-foot right turn lane
- Improve vertical profile to obtain desirable ISD
- Add left turn bypass lanes at “T” intersections
- Align intersections to be 90 degrees

In addition to the intersection improvements provided in this report, Forest County Potawatomi Community has suggested the following improvements:

- Installing a traffic signal at Fire Keeper’s Road and US 8
- Constructing a multi-modal tunnel at the intersection of US 8 with Bug Lake Road
- Providing a gated emergency egress for the development off Everybody’s Road

### 6.1.1 High View Drive

High View Drive is a local road with an estimated AADT of more than 100 vehicles per day. The posted speed is 25 mph. High View Drive is being considered for improvement options because the existing climbing lane ends at this intersection, the intersection angle is 60°, and the

ISD for vehicles traveling NB is substandard at 550 feet. The guidance in the FDM 11-15-10, revised December 30, 2002 states a passing lane should not end within 500 feet of an intersection. In addition, a quarry is located on this road and trucks use High View Drive to access US 8.

A short term option is to install the intersection warning signs alerting driver of vehicles; see Appendix H, Exhibit H-1. The long term option involves extending the passing lane through the intersection in addition to providing an eastbound right turn lane. See Section 6.2.1 for a further decision of the passing lane alternative. Due to the substandard intersection angle, High View Drive is proposed to be realigned to 90° east of its current location. This realignment will also improve the intersection sight distance therefore no vertical alignment changes on US 8 are anticipated. See Appendix H, Exhibit H-21a for the long term improvement option.

### **6.1.2 Young's Lane**

Young's Lane is a local road with an estimated AADT of less than 100 vehicles per day. The speed is not posted. Young's Lane is being considered for improvement options because the existing intersection has a deficient vertical crest curve on US 8 with a K value of 140.9 and the ISD for vehicles traveling NB is substandard at 600 feet.

A short term option is to install the intersection warning signs alerting driver of vehicles; see Appendix H, Exhibit H-2. The long term option includes reconstructing US 8 from STA 556+00 to STA 577+50 to improve the vertical curve and the ISD. In addition, a westbound bypass lane and a eastbound right turn lane are proposed at this intersection. See Appendix H, Exhibit H-3 for the long term improvement option.

### **6.1.3 Kwe Da Kik Lane**

Kwe Da Kik Lane is a local road with an estimated AADT of less than 100 vehicles per day. The speed is not posted. Kwe Da Kik Lane is being considered for improvement options because the ISD for vehicles traveling SB is substandard at 600 feet.

A short term option is to install the intersection warning signs alerting driver of vehicles; see Appendix H, Exhibit H-4. The long term option suggests grading the ridge and installing a retaining wall on US 8 east of the Kwe Da Kik Lane intersection improve the ISD. See Appendix H, Exhibit H-5 for the long term improvement option.

### **6.1.4 Indian Drive/Bug Lake Road**

Indian Drive and Bug Lake Road are two intersections offset by approximately 60 feet. Indian Drive is a collector with an AADT of 500 vehicles per day. Bug Lake Road is a local road with an estimated AADT of greater than 100 vehicles per day. The speeds are not posted. Indian Drive and Bug Lake Road are being considered for improvement options because the existing intersections have an offset, the intersection angle is substandard at 125°, the ISD for vehicles traveling NB is substandard at 800 feet, and there are inadequate pedestrian accommodations. On the north side of the street, there is a store and on the south side of the street, there is a park. Users of the park frequently cross US 8 to access the store. The Forest County Potawatomi Community has suggested installing a tunnel at this location.

A short term option is to install the intersection warning signs alerting driver of vehicles and to remove the vegetation to the east of the intersection; see Appendix H, Exhibit H-6.

Two long term options were developed for this set of intersections. In both alternatives, a 30-foot median is proposed. This median will allow for the development of left turn lanes and provide pedestrian refuge when crossing US 8. Right and left turn lanes are proposed for both alternatives. For a further description of the median see Section 6.2.2.

Alternative A involves realigning Indian Drive and Bug Lake Road to two 90° t-intersections. The placement of the intersections was determined by minimizing the impacts to the park in the southeast quadrant, the store on the north side of US 8, and the residence in the southwest quadrant. In addition, local connections to Love Knot Lane and Kak Yot Lane are proposed. These connections would help alleviate the Potawatomi Community local traffic from US 8. See Appendix H, Exhibit H-23f for Alternative A and Exhibit H-24 for the local connection alternatives.

Alternative B involves realigning Indian Drive and Bug Lake Road to one 90° intersection. The placement of the intersections was determined by minimizing the impacts to the park in the southeast quadrant, the store on the north side of US 8, and the residence in the southwest quadrant. In addition, local connections to Love Knot Lane and Kak Yot Lane are proposed. These connections would help alleviate the Potawatomi Community local traffic from US 8. See Appendix H, Exhibit H-25c for Alternative B and Exhibit H-26 for the local connection alternatives.

The tunnel suggested by the Forest County Potawatomi Community should be studied further. At this time, a tunnel would be difficult to build due to the potential impacts to the park. In addition, safety within the tunnel is a concern as there is potential for it to become a multi-modal tunnel.

### **6.1.5 Otter Creek Road**

Otter Creek Road is a local road with an estimated AADT of less than 100 vehicles per day. The speed is not posted. Otter Creek Road is being considered for improvement options because the existing intersection has a deficient vertical sag curve on US 8 with a K value of 66.3 and a deficient vertical crest curve on US 8 with a K value of 135.7, the intersection angle is substandard at 60°, the ISD for vehicles traveling NB is substandard at 600 feet, and the ISD for vehicles traveling SB is substandard at 550 feet.

A short term option is to install the intersection warning signs alerting driver of vehicles; see Appendix H, Exhibit H-7.

Two long term options were developed for Otter Creek Road. In both alternatives, the vertical alignment on US 8 would be reconstructed to improve the vertical curves and to improve the ISD. In addition, right turn lanes are recommended on US 8.

Alternative A involves realigning Otter Creek Road to a 90° intersection at the same location. This alternative uses a design speed of 30 mph for both the north and south legs. In addition, the north alignment was designed to avoid impacts to the hunter walking trails, as shown in

Appendix A, Exhibit A-7b. For this alternative, US 8 would be reconstructed from STA 672+50 to STA 681+50 to improve the vertical crest curve and the ISD. See Appendix H, Exhibit H-8 for Alternative A.

Alternative B involves realigning Otter Creek Road to a 90° intersection east of the current location. This alternative uses a design speed of 30 mph for the north leg and 40 mph for the south leg. The north alignment was designed to minimize impacts to the hunter walking trails, as shown in Appendix A, Exhibit A-7b. In addition, US 8 would also be reconstructed to improve the vertical crest curve and the ISD. See Appendix H, Exhibit H-9 for Alternative B.

### **6.1.6 Airport Lane**

Airport Lane is a collector with an AADT of 510 vehicles per day. The posted speed is 35 mph. Airport Lane is being considered for improvement options because the existing intersection has a deficient vertical crest curve on US 8 with a K value of 150.4 and the ISD for vehicles traveling NB is substandard at 600 feet.

A short term option is to install the intersection warning signs alerting driver of vehicles; see Appendix H, Exhibit H-10. The long term option includes reconstructing US 8 from STA 889+00 to STA 906+00 to improve the vertical curve and the ISD. In addition, an eastbound right turn lane is proposed at this intersection. See Appendix H, Exhibit H-11 for the long term improvement option.

### **6.1.7 West Silver Lake Road**

West Silver Lake Road is a local road with an AADT less than 100 vehicles per day. The posted speed is 25 mph. West Silver Lake Road is being considered for improvement options because the existing intersection has a deficient vertical crest curve on US 8 with a K value of 141.4, the ISD for vehicles traveling NB is substandard at 600 feet, and there are a large number of access points near the intersection.

A short term option is to install the intersection warning signs alerting driver of vehicles; see Appendix H, Exhibit H-12. The long term option includes reconstructing US 8 from STA 912+50 to STA 923+50 to improve the vertical curve and the ISD. In addition, an eastbound right turn lane is proposed at this intersection and driveways are proposed to be removed. See Appendix H, Exhibit H-13 for the long term improvement option.

### **6.1.8 Fairway Court**

Fairway Court is a local road with an estimated AADT of less than 100 vehicles per day. The posted speed is 15 mph. Fairway Court is being considered for improvement options because the ISD for vehicles traveling SB is substandard at 600 feet.

A short term option is to remove the vegetation on the west side of the intersection; see Appendix H, Exhibit H-14. The long term option suggests grading the ridge on US 8 west of the Fairway Court intersection improve the ISD. See Appendix H, Exhibit H-15 for the long term improvement option.

### **6.1.9 Mill Road**

Mill Road is a local road with an AADT less than 100 vehicles per day. The speed is not posted. Mill Road is being considered for improvement options because concerns were discussed at the second PAC meeting about additional truck traffic on this road due to the opening of a mill. In addition, the intersection angle is substandard.

Two short term improvements were developed at this location. Alternative A realigns Mill Road to 90° west of the existing intersection location with a design speed of 30 mph avoiding impacts to the Nicolet National Forest Buildings. An eastbound bypass lane is provided in this alternative. Alternative B realigns Mill Road to 90° at the existing intersection location with a design speed of 25 mph; this is considered the low-build alternative. See Appendix H, Exhibit H-16 and H-17 for the short term improvement options. One long term alternative was developed for this intersection and is combined with the WIS 32 long term alternative, described next. Mill Road would be realigned to 90° at the existing intersection location with a design speed of 30 mph and an eastbound left turn lane on US 8 would be provided. Pedestrian and bicycle accommodations would also be added. See Appendix H, Exhibit H-18a for the long term improvement option.

### **6.1.10 WIS 32 (Oak Street)**

WIS 32 (Oak Street) is an arterial with an AADT of 2,900 vehicles per day. The posted speed is 25 mph. WIS 32 is being considered for improvement options because there is restricted vision due to vehicles and buildings in the southwest quadrant, unrestricted access on WIS 32, and lack of multi modal accommodations.

A short term option is to install curb and gutter on WIS 32 to improve access points, add a stop sign at the driveway entrance on the north leg, and buy a vision corner in the southwest quadrant; see Appendix H, Exhibit H-19. The long term option suggests reconstructing the intersection to a four-legged intersection. In addition, bicycle and pedestrian accommodations would be constructed and redundant access points would be eliminated. The existing snowmobile trail would be relocated to the intersection. See Appendix H, Exhibit H-18b for the long term improvement option.

# US 8 with High View Drive

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Intersection angle
- Lack of dedicated turn lanes
- Shoulder width
- Vertical Curve

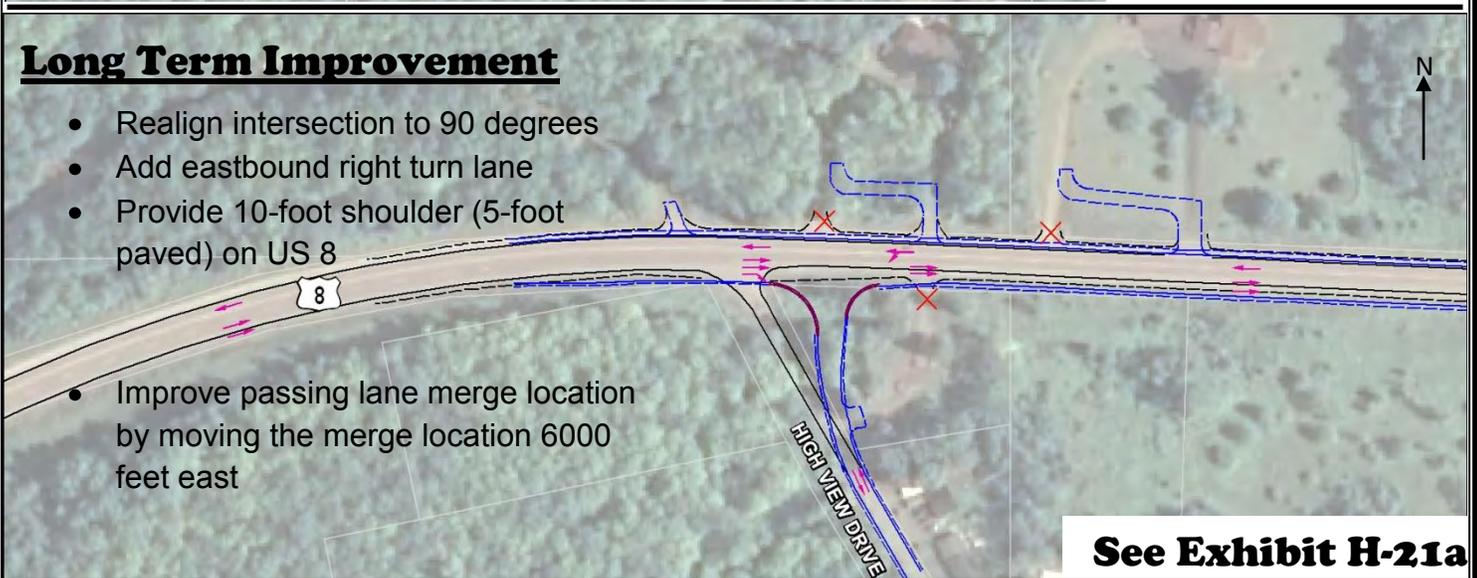
### Short Term Improvement

- Install LED intersection and cross street warning lights (approval required)



### Long Term Improvement

- Realign intersection to 90 degrees
- Add eastbound right turn lane
- Provide 10-foot shoulder (5-foot paved) on US 8
- Improve passing lane merge location by moving the merge location 6000 feet east



# US 8 with Young's Lane

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Vertical curve
- Lack of dedicated turn lanes
- Shoulder width
- Profile grade

### Short Term Improvement

- Install LED intersection and cross street warning lights (approval required)



### Long Term Improvement

- Reconstruct 2150 feet of US 8 to improve intersection sight distance at Young's Lane
- Install WB bypass lane at Young's Lane
- Install EB right turn lane at Young's Lane



# US 8 with Kwe Da Kik Lane

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Shoulder width

### Short Term Improvement

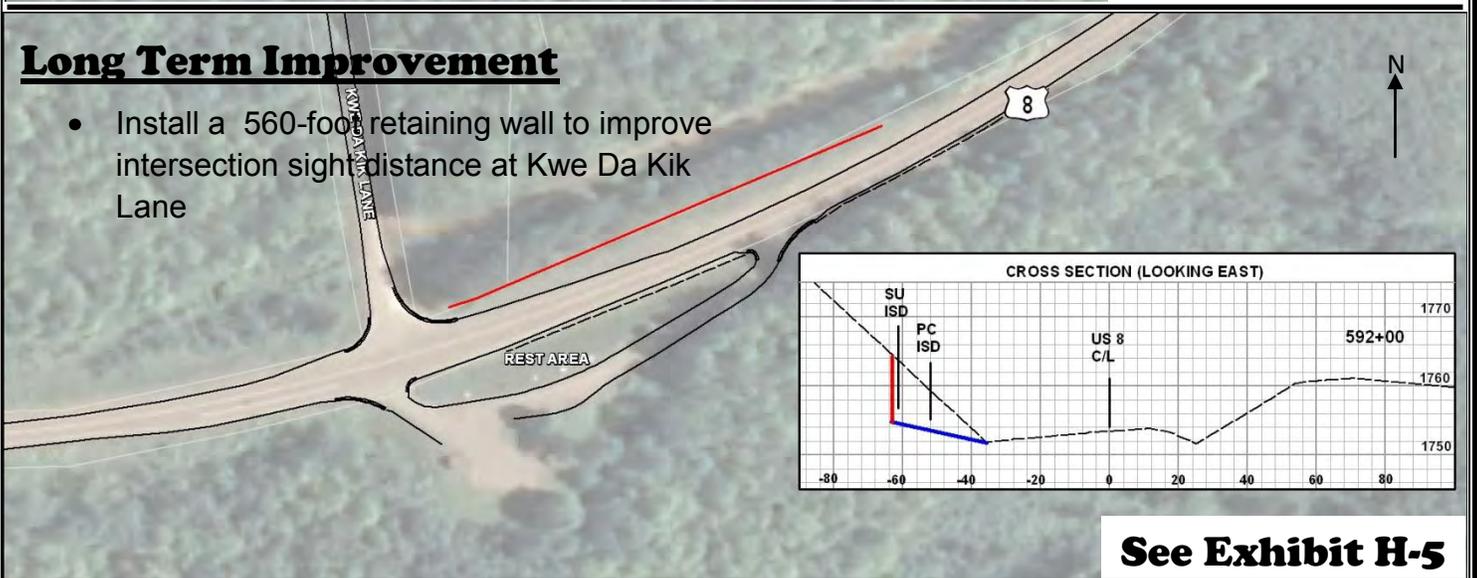
- Install LED intersection and cross street warning lights (approval required)



**See Exhibit H-4**

### Long Term Improvement

- Install a 560-foot retaining wall to improve intersection sight distance at Kwe Da Kik Lane



**See Exhibit H-5**

# US 8 with Indian Dr/Bug Lake Rd

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Intersection angle
- Lack of dedicated turn lanes
- Shoulder width
- Distance between intersections
- Inadequate Pedestrian Crossing
- Profile grade

### Short Term Improvement

- Remove vegetation in intersection sight distance triangle
- Install LED intersection and cross street warning lights (approval required)



**See Exhibit H-6**

# US 8 with Indian Dr/Bug Lake Rd

## Intersection Improvement Options



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### Long Term Improvement – Alternative A

- Construct a 30-foot median on US 8 for approximately 2 miles through the Forest County Potawatomi Community
- Realign Indian Drive and Bug Lake Road to two 90° T intersections
- Provide 10-foot right shoulders (5-foot paved) and 6-foot left shoulders (3-foot paved) on US 8
- Install EB and WB left and right turn lanes at Indian Drive and Bug Lake Road
- Add connections from Bug Lake Road to Love Knot Lane and Kak Yot Lane
- Cul-de-sac Love Knot Lane



**See Exhibits H-23f & H-24**

### Long Term Improvement – Alternative B

- Construct a 30-foot median on US 8 for approximately 1.2 miles through the Forest County Potawatomi Community
- Realign Indian Drive and Bug Lake Road to a single 90° four-legged intersection
- Provide 10-foot (5-foot paved) right shoulders and 6-foot (3-foot paved) left shoulders on US 8
- Install EB and WB left and right turn lanes at Indian Drive and Bug Lake Road
- Add connections from Bug Lake Road to Love Knot Lane and Kak Yot Lane
- Cul-de-sac Love Knot Lane



**See Exhibits H-25c & H-26**

# US 8 with Otter Creek Road

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Intersection angle
- Lack of dedicated turn lanes
- Vertical curve
- Shoulder width
- Profile grade

### Short Term Improvement

- Install LED intersection and cross street warning lights (approval required)



**See Exhibit H-7**

# US 8 with Otter Creek Road

## Intersection Improvement Options



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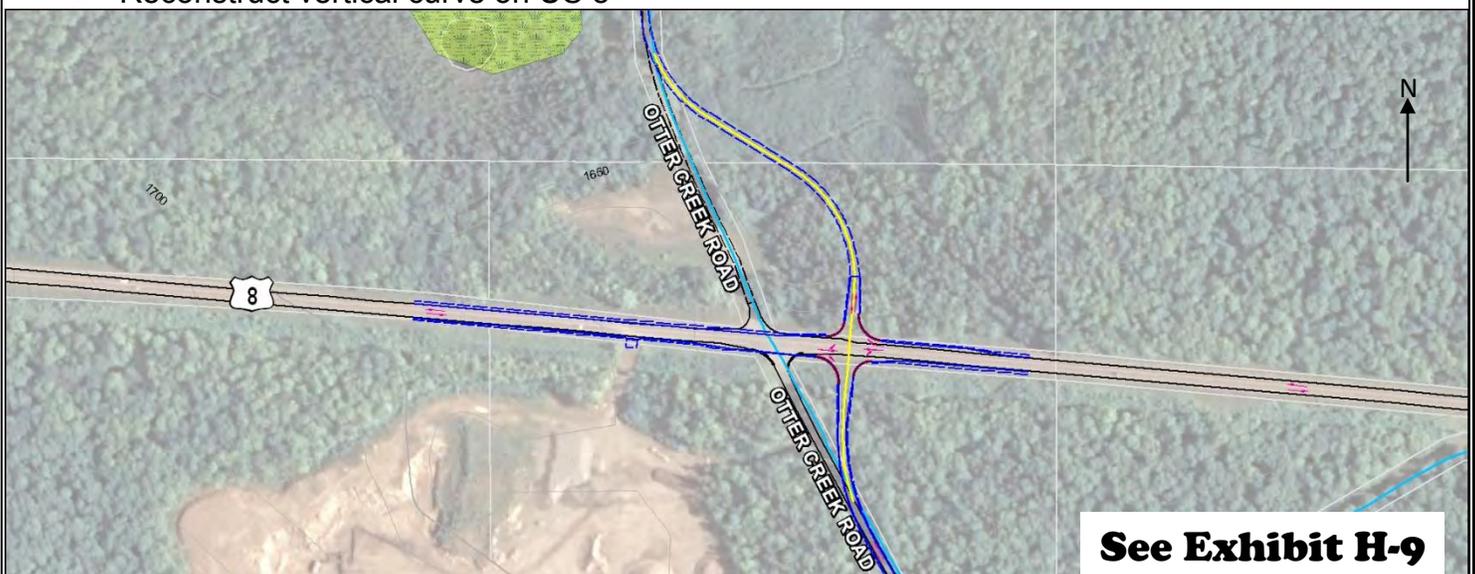
### **Long Term Improvement – Alternative A**

- Realign Otter Creek Road to 90° at the existing intersection (using a design speed of 30 mph)
- Realign snowmobile trail to the new Otter Creek alignment
- Construct right turn lanes on US 8
- Add 10-foot shoulders (5-foot paved) on US 8
- Reconstruct 900 feet of US 8 to improve the intersection sight distance on Otter Creek Road



### **Long Term Improvement – Alternative B**

- Realign Otter Creek Road to 90° using a design speed of 40 mph for the south leg and 30 mph for the north leg
- Realign snowmobile trail to the new Otter Creek alignment
- Construct right turn lanes on US 8
- Add 10-foot shoulders (5-foot paved) on US 8
- Reconstruct vertical curve on US 8



# US 8 with Airport Lane

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Lack of dedicated turn lanes
- Vertical curve
- Shoulder width
- Profile grade

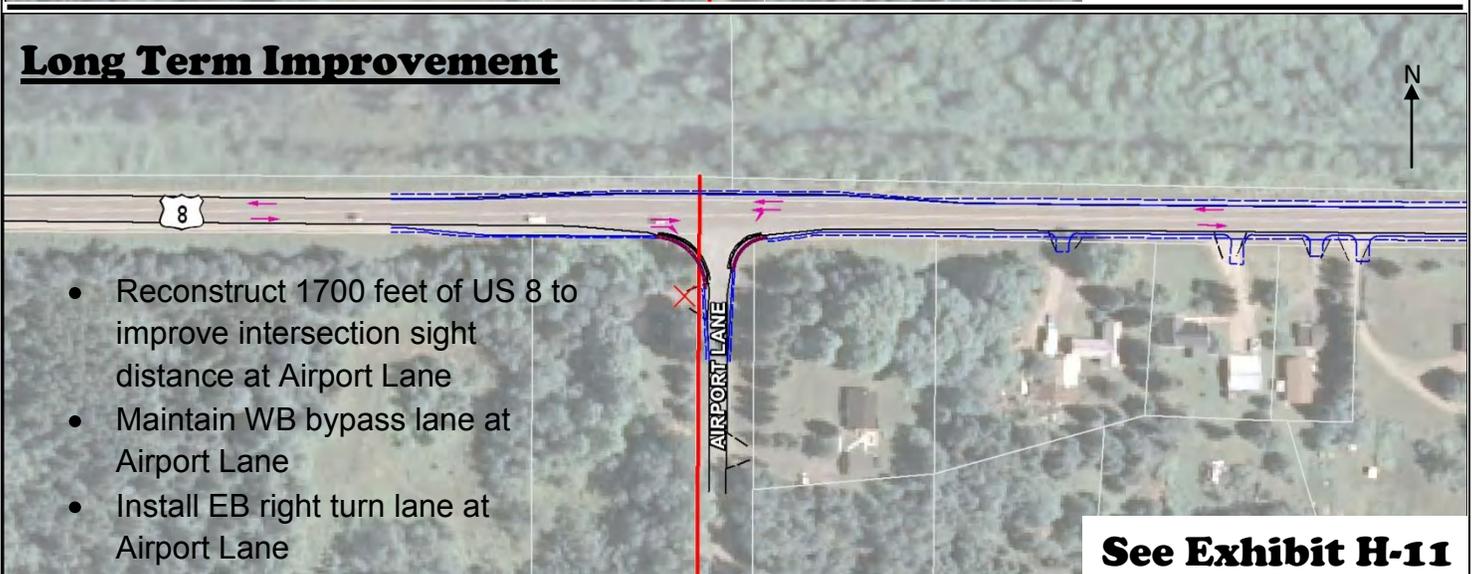
### Short Term Improvement

- Install LED intersection and cross street warning lights (approval required)



### Long Term Improvement

- Reconstruct 1700 feet of US 8 to improve intersection sight distance at Airport Lane
- Maintain WB bypass lane at Airport Lane
- Install EB right turn lane at Airport Lane



# US 8 with West Silver Lake Road

## Intersection Improvement Options



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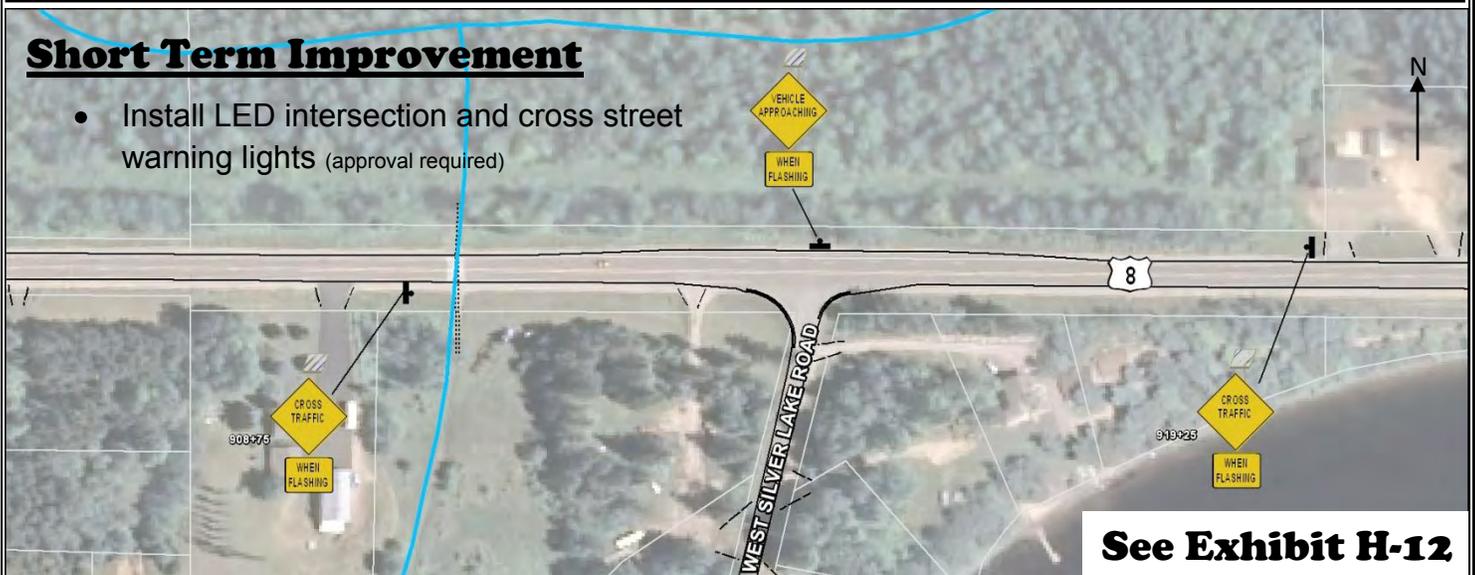


### Existing Deficiencies

- Intersection sight distance
- Lack of dedicated turn lanes
- Vertical curve
- Access points too close to intersection
- Shoulder width

### Short Term Improvement

- Install LED intersection and cross street warning lights (approval required)



### Long Term Improvement

- Reconstruct 1100 feet of US 8 to improve intersection sight distance at West Silver Lake Road
- Maintain WB bypass lane at West Silver Lake Road
- Install EB right turn lane at West Silver Lake Road



# US 8 with Fairway Court

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Location of stop
- Profile grade

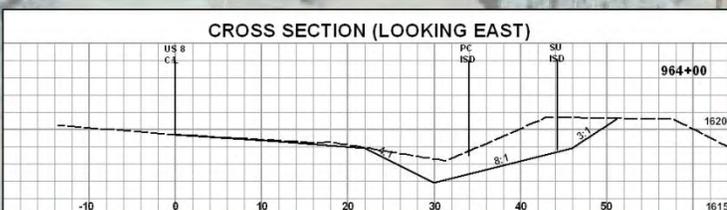
### Short Term Improvement

- Add a stop line to encourage drivers to pull forward
- Remove 225 feet of vegetation to improve intersection sight distance

See Exhibit H-14

### Long Term Improvement

- Grade ridge west of Fairway Court to provide proper intersection sight distance



See Exhibit H-15

# US 8 with Mill Road

## Intersection Improvement Options



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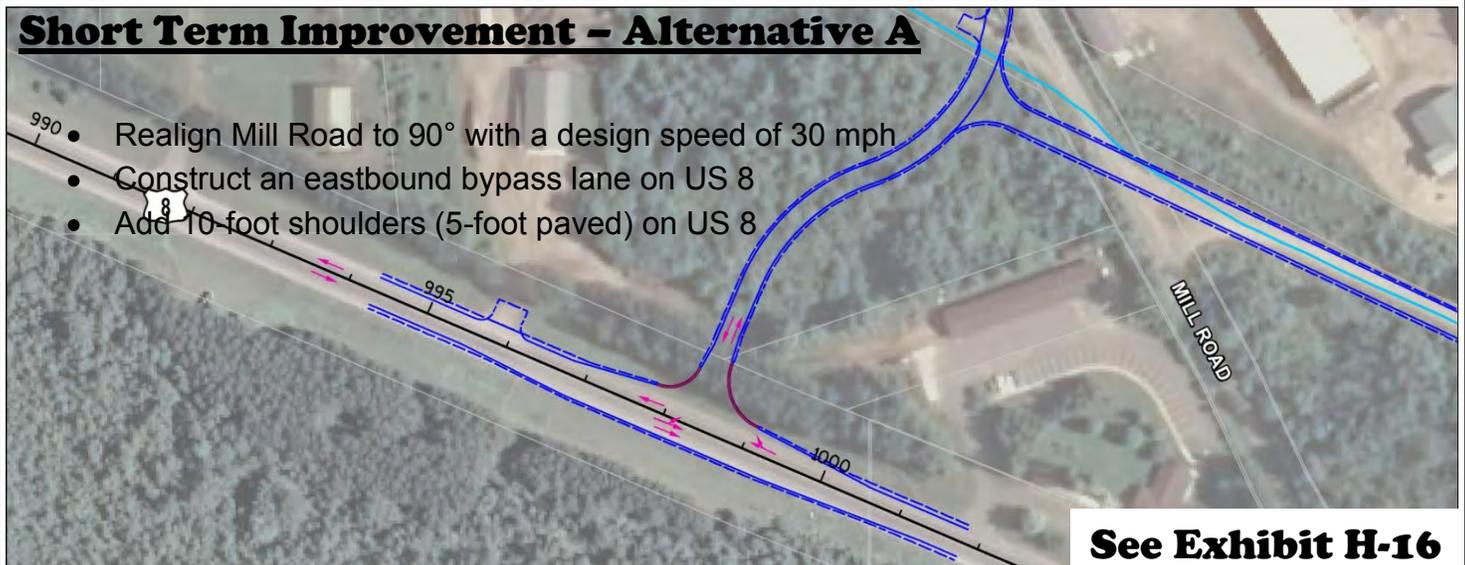
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### Existing Deficiencies

- Intersection angle
- Truck traffic

### Short Term Improvement – Alternative A

- Realign Mill Road to 90° with a design speed of 30 mph
- Construct an eastbound bypass lane on US 8
- Add 10-foot shoulders (5-foot paved) on US 8



**See Exhibit H-16**

### Short Term Improvement – Alternative B

- Realign Mill Road to 90° with a design speed of 25 mph
- Add 10-foot shoulders (5-foot paved) on US 8



**See Exhibit H-17**

### Long Term Improvement – with WIS 32

- Realign Mill Road to 90° with a design speed of 30 mph
- Add bicycle lanes and sidewalk to US 8
- Construct eastbound left turn lane



**See Exhibit H-18a**

# US 8 with WIS 32 (Oak Street)

## Intersection Improvement Options



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### Existing Deficiencies

- Intersection sight distance
- Access points too close to intersection
- Lack of multimodal use
- Operations
- Shoulder width

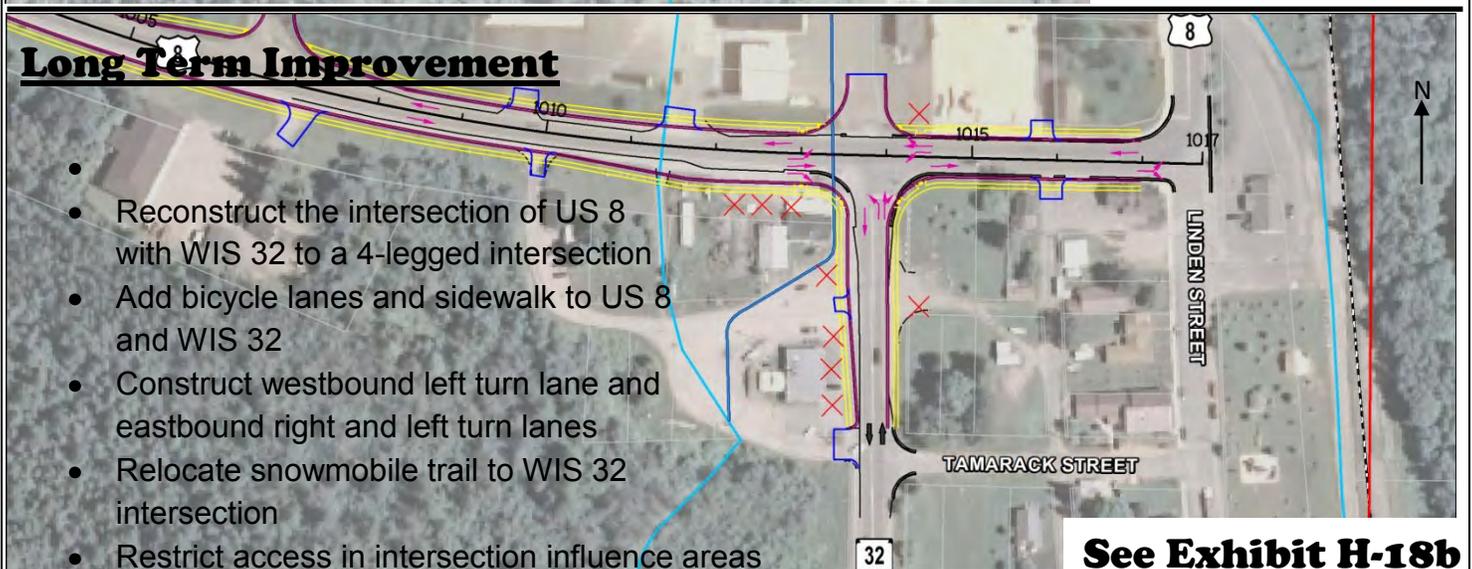
### Short Term Improvement

- Install curb and gutter on WIS 32 to improve access
- Obtain vision corner in southwest quadrant
- Install stop sign at driveway approach



### Long Term Improvement

- Reconstruct the intersection of US 8 with WIS 32 to a 4-legged intersection
- Add bicycle lanes and sidewalk to US 8 and WIS 32
- Construct westbound left turn lane and eastbound right and left turn lanes
- Relocate snowmobile trail to WIS 32 intersection
- Restrict access in intersection influence areas



## 6.2 Corridor Wide Improvement Options

Long term improvements were developed that can be applied throughout the corridor. The recommended long term improvements include:

- Improve shoulder width to 10 feet with a 5-foot paved shoulder (Appendix H, Exhibit H-20)
- Provide centerline rumble strips
- Improve the existing eastbound climbing/passing lane (Appendix H, Exhibit H-21)
- Provide an additional eastbound passing lane (Appendix H, Exhibit H-22)
- Improve the westbound passing lane in Crandon
- Build a westbound passing lane (Appendix H, Exhibit H-22)
- Install a median on US 8 throughout the Forest County Potawatomi Community (Appendix H, Exhibits H-23 to H-26)
- Build a connection off alignment connection between Kwe Da Kik Lane and Everybody's Road (Appendix H, Exhibit H-27)
- Provide multimodal connections throughout the corridor (Appendix H, Exhibit H-28)
- Add a speed transition from 55 mph to 25 mph eastbound approaching Laona (Appendix H, Exhibit H-29)

### 6.2.1 Passing Lanes

#### 6.2.1.1 Eastbound Passing Lanes

One existing eastbound climbing/passing lane is located east of Crandon from STA 445+00 to 482+00. The existing merge taper is located at the intersection of High View Drive, which does not meet current WisDOT standards. This passing lane is recommended to be improved to meet current standards in WisDOT FDM 11-15-10, revised December 30, 2002. Following the FDM guidance, the proposed merge taper will be 700 feet and will not be within 500 feet of an intersection or driveway. Using this criteria, the merge taper could not be located between High View Drive and County W. The merge taper could be placed between County W and Bear Road, but it was decided the merge point should be east of Bear Road after the 5.0% vertical grade was passed. The new merging taper is recommended to occur east of Bear Road at STA 540+00, as shown in Appendix H, Exhibit H-21.

Additional FDM guidance was used to determine the optimal location for the additional eastbound passing lane. The FDM guidance states 3 to 8-mile spacing between passing lanes in the same direction is preferred. Using these guidelines, the eastbound passing lane should be located between STA 765+00 and 836+00. See Appendix H, Exhibit H-22.

#### 6.2.1.2 Westbound Passing Lanes

Two existing westbound lanes are present just east of Crandon. The length of the two lane section is 0.2 miles and it is not considered a passing lane using FDM guidance. The outside lane ends after the shopping center entrance, like a bypass lane would, and causes confusion for

unfamiliar drivers. Since the lane end follows FDM guidance for a bypass lane design, no short term option was developed. A long term option is to extend the right lane to the US 8 with Lake Avenue intersection, as suggested by Crandon. The right lane would become a right turn only lane to continue north onto US 8.

FDM guidance was used to determine the location for the westbound passing lane. The westbound passing lane should be located between STA 687+00 and 836+00 and it should not overlap with the eastbound passing lane. The minimum length of the proposed passing lanes should be ½ mile. Within the limits suggested, the maximum potential length of each new passing lane is approximately 1 mile with 1000 feet between them. See Appendix H, Exhibit H-22.

### **6.2.2 Median Improvements**

A median is recommended to be installed on US 8 throughout the Potawatomi Community. Two median alternatives are shown in Appendix H, Exhibits H-23 to H-26. Median Alternative A begins at STA 529+00, between Bear Road and Fire Keeper Road and ends at STA 638+00, east of Love Knot Lane. Median Alternative A shifts the median to the north to avoid impacts to the potential 4(f) property and to allow for the existing road to remain while the north half of the new road is constructed. Median Alternative A would result in the reconstruction of the US 8 intersections with Fire Keeper Road, Young's Lane, Kwe Da Kik Lane, Indian Drive, Bug Lake Road, and Love Knot Lane. This median alternative is shown in Exhibits H-23 and H-24.

Median Alternative B begins at STA 572+00, between Young's Lane and Kwe Da Kik Lane and ends at STA 636+25, east of Love Knot Lane. Median Alternative B keeps the centerline of the roadway constant and has similar impacts to the north and south sides of US 8. Median Alternative B would result in the reconstruction of the US 8 intersections with Young's Lane, Kwe Da Kik Lane, Indian Drive, Bug Lake Road, and Love Knot Lane. This median alternative is shown in Exhibits H-25 and H-26.

For both alternatives, the median will allow for the development of left turn lanes, create separation between oncoming directions of travel, and provide pedestrian refuge for pedestrians crossing US 8. The median is proposed to be 30 feet and the proposed cross section is shown in Appendix H, Exhibit H-20.

### **6.2.3 Off Alignment Connection Options**

Within the Forest County Potawatomi Community, many trips are made between the residential area off Kwe Da Kik Lane and the commercial/community area off Everybody's Road. To improve safety between these locations, a local road connection is suggested. The local road will allow for these short trips to be taken on a low-speed road without interfering with high-speed through traffic on US 8. Two potential locations for this connection are shown in Appendix H, Exhibit H-27.

### **6.2.4 Long Term Trail Connections**

Existing snowmobile and ATV trails are shown in Appendix A, Exhibits A4 and A5. The existing snowmobile trails run over 2 miles north of US 8 and do not connect to the Potawatomi

Community. In addition, there are no existing ATV trails to connect Crandon to Laona. A proposed trail is shown in Appendix H, Exhibit H-28 to link the Forest County Potawatomi Community to Crandon. The existing snowmobile trails between Otter Creek Road and Laona could be made available for ATV use, which would enhance the connectivity of ATV trails in this area. See the existing snowmobile trails in Appendix A, Exhibit A-4.

### **6.2.5 Speed Transition**

A short term improvement is to add a transition for the speed change heading eastbound approaching Laona. Currently approaching Laona, the speed limit is 55 mph and the speed drops to 25 mph with one advance warning sign. Adding a transition area with an additional speed drop will allow people to more slowly adjust to the reduced speed. The speed transition is shown in Appendix H, Exhibit H-29.

# US 8 Proposed Typical Sections

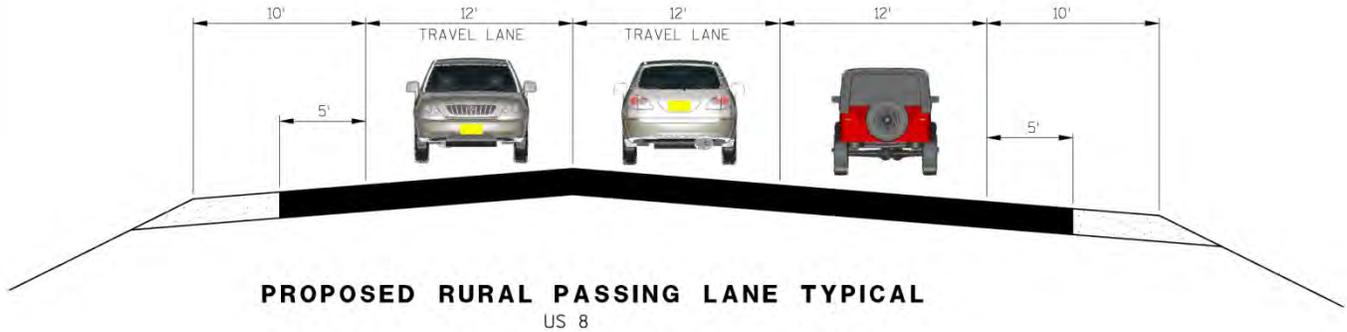


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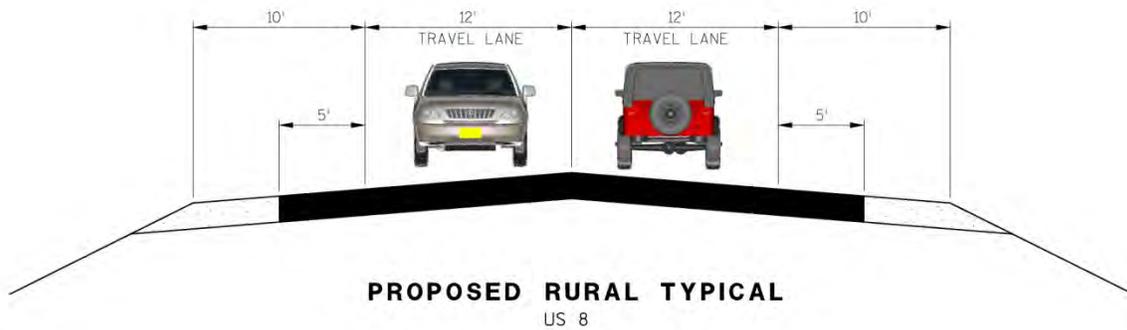
## Proposed Rural Passing Lane Typical



Note: Install centerline rumble strips

**See Exhibit H-20**

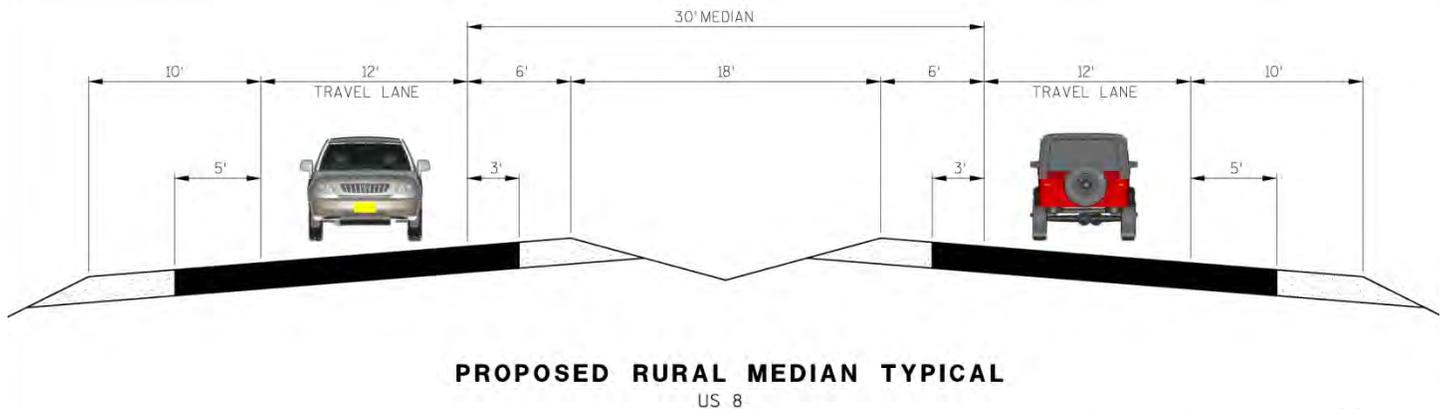
## Proposed Rural Typical



Note: Install centerline rumble strips

**See Exhibit H-20**

## Proposed Rural Median Typical



**See Exhibit H-20**

# US 8 Proposed Typical Sections

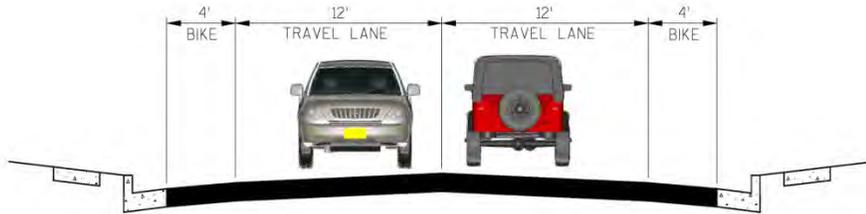


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## Proposed Urban Typical



**PROPOSED URBAN TYPICAL**  
US 8

**See Exhibit H-20**

# US 8 Passing Lane Improvement Option

See Exhibits H-21



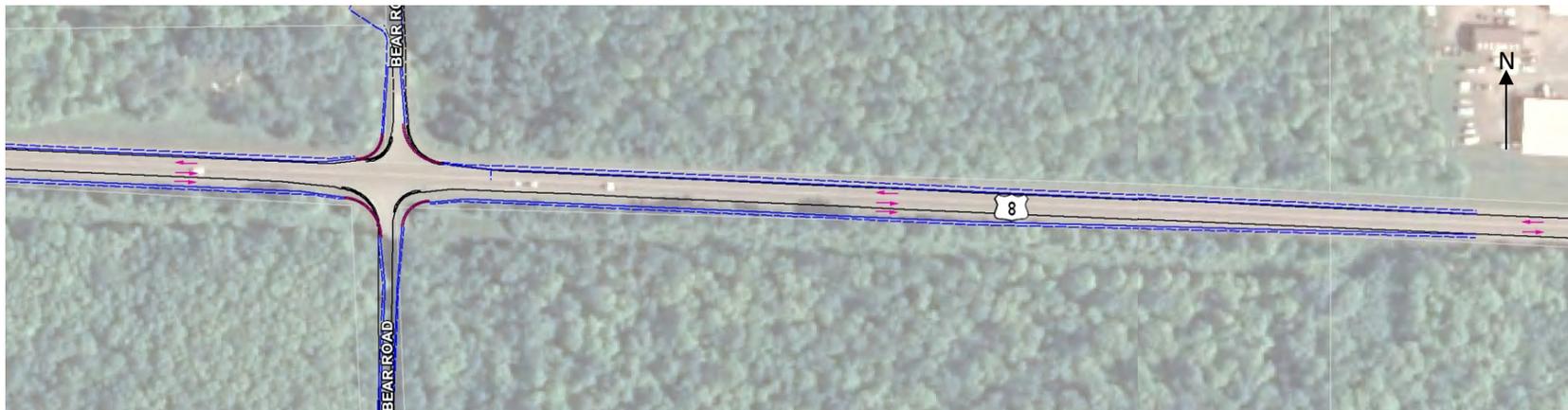
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## Proposed Improvements

- Improve passing lane merge location by moving the merge location 6000 feet east
- Realign High View Drive to 90°
- Install EB right turn lanes at High View Drive and County W
- Install NB left turn lane on County W
- Provide bicycle accommodations on County W and Corning Road
- Provide 10-foot (5-foot paved) shoulders on US 8
- Reconstruct 850 feet of US 8 near Bear Road to improve the vertical curve



# US 8 Passing Lane Alternatives

## See Exhibit H-22



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### Need

- Only one eastbound passing lane exists between Crandon and Laona located just east of Crandon

### Proposed Improvements

- Add eastbound and westbound passing lanes with a minimum length of 1/2 mile
- Passing lanes have a maximum potential length of 1 mile in each direction with 1000 feet between passing lane locations



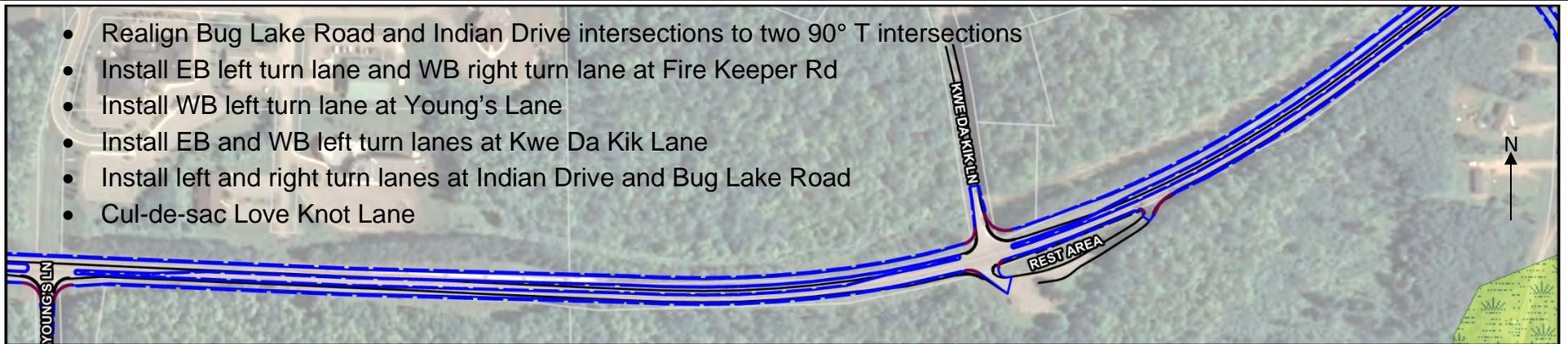
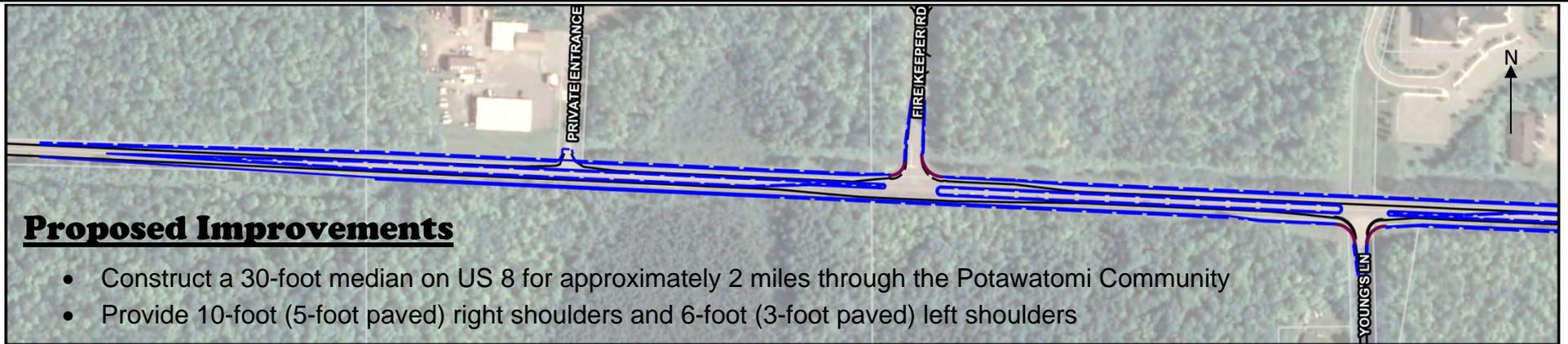
# US 8 Median Improvement Alternatives

## Alternative A – See Exhibits H-23 and H-24



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# US 8 Median Improvement Alternatives

## Alternative B – See Exhibits H-25 and H-26



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### Proposed Improvements

- Construct a 30-foot median on US 8 for approximately 1.2 miles through the Potawatomi Community
- Provide 10-foot (5-foot paved) right shoulders and 6-foot (3-foot paved) left shoulders
- Install EB and WB left turn lanes at Kwe Da Kik Lane
- Install EB and WB left and right turn lanes at Indian Drive and Bug Lake Road
- Realign Indian Drive and Bug Lake Road to a 90° four-legged intersection
- Cul-de-sac Love Knot Lane



# US 8 Off Alignment Alternative Options

See Exhibit H-27



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## Need

- Many trips are made within the Forest County Potawatomi Community
- Short trips utilize US 8 which may cause a traffic disruption due to slow speeds
- Inadequate intersection sight distance makes turning onto US 8 difficult

## Proposed Improvements

- Construct a roadway between Kwe Da Kik Lane and Everybody's Road



# US 8 Trail Connection Options

See Exhibit H-28



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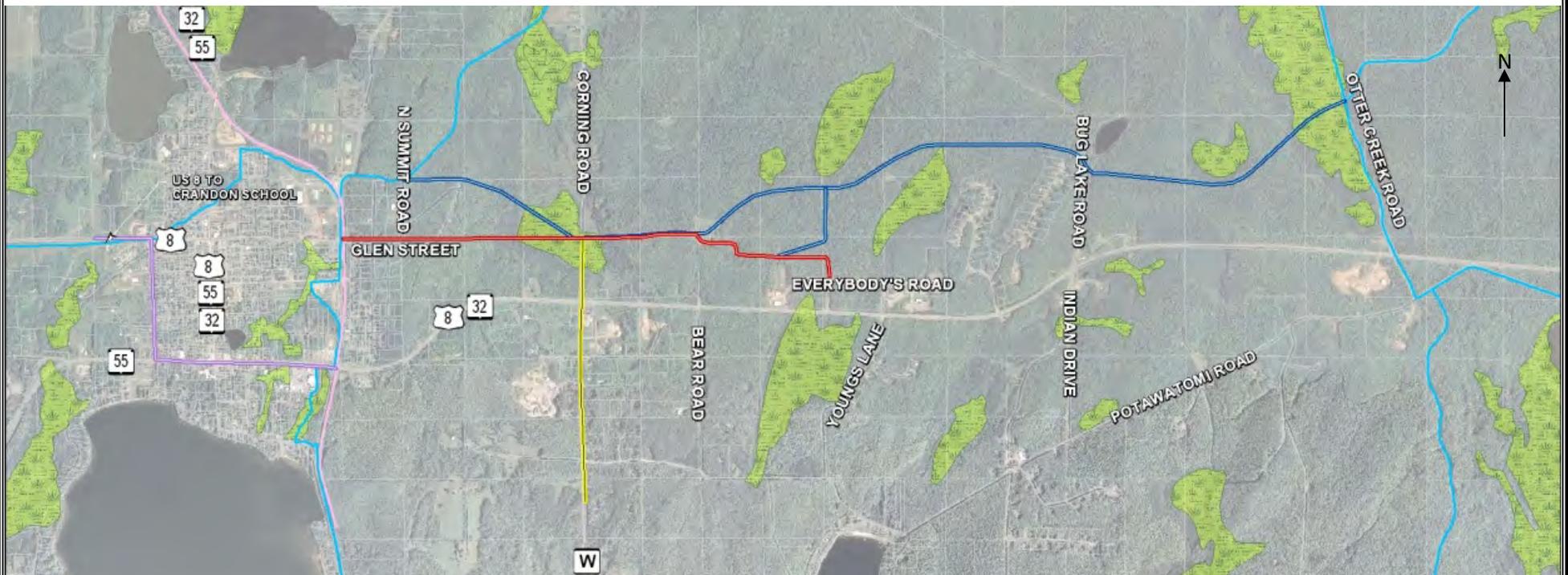


## Need

- There are no existing multimodal connections between Crandon and the Forest County Potawatomi Community

## Proposed Improvements

- Build a snowmobile/ATV trail to connect Everybody's Road to Crandon
- Build a pedestrian/bicycle trail to connect Everybody's Road to Crandon
- Build a snowmobile/ATV trail to connect Crandon to Laona
- Provide a buffer area between pedestrian/bicycle trail and snowmobile/ATV trail when they run parallel



# US 8 Speed Transition

## See Exhibit H-29



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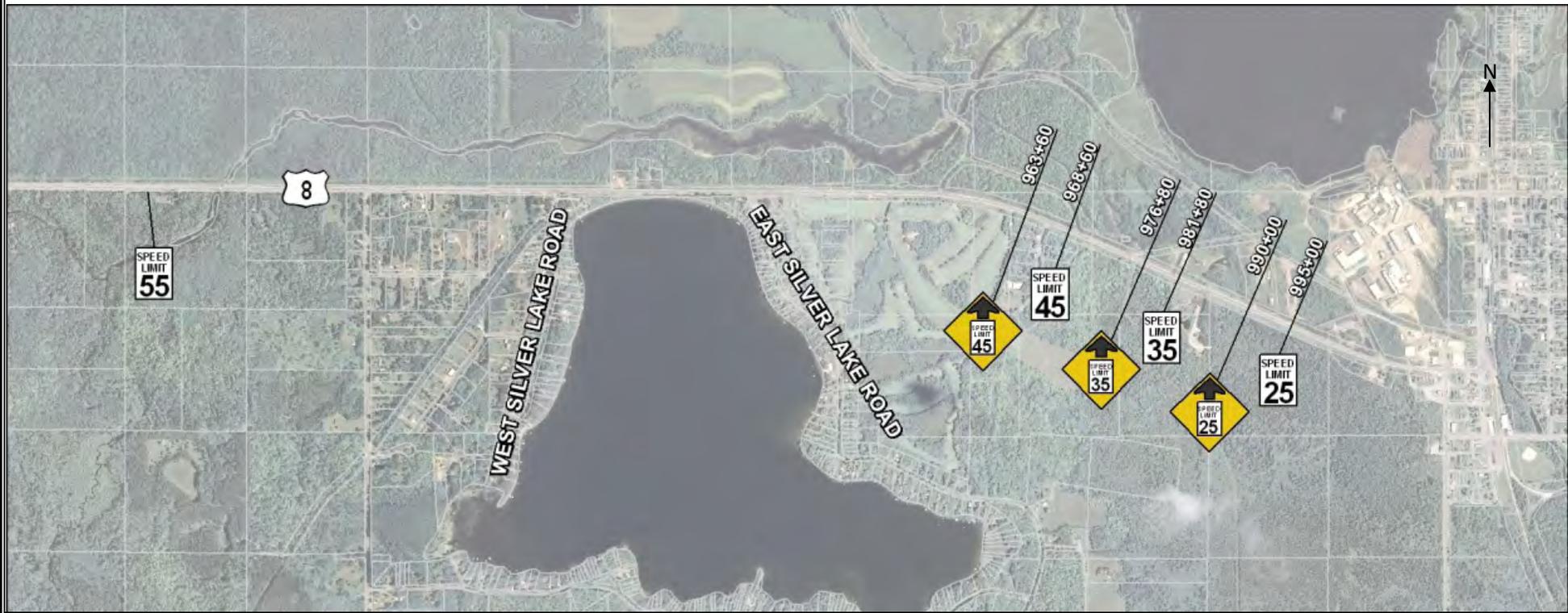


### Need

- Speed drops from 55 mph to 25 mph with only one warning sign

### Proposed Improvements

- Install reduced speed limit signs at ¼ mile spacing to transition for 55 mph to 25 mph



### 6.3 Build Alternative Traffic Analysis

A 2035 build traffic analysis was completed on US 8 at the five intersections in which traffic counts were conducted. These intersections included:

- County W
- Indian Road / Bug Lake Road
- Airport Drive
- East Silver Lake Road
- WIS 32 (Oak Street)

Only the PM peak hour from 1:00 p.m. to 2:00 p.m. was considered. No AM peak hour was considered because the AM peak hour volume was significantly less than the PM peak hour. For the AM peak hour, traffic is about 45 percent less than the PM peak hour traffic.

Performance of an intersection is measured in terms of peak hour LOS, delay or average wait time, and length of queue. LOS is a letter grade assigned to designate the quality of operations. The grades range from A (best) to F (worst) and are listed below (Source: 2010 HCM).

| Level of Service | Unsignalized Intersection Delay (sec) |
|------------------|---------------------------------------|
| A                | <10                                   |
| B                | >10-15                                |
| C                | >15-25                                |
| D                | >25-35                                |
| E                | >35-50                                |
| F                | >50                                   |

The forecasted peak hour turning movement counts are shown in Appendix B, Exhibit B-3. Using these counts, the proposed geometrics at the intersections, and HCS, the projected weekday peak hour operations were analyzed for the five intersections. The proposed geometrics are shown in Appendix H, as follows:

- County W: Exhibit H-21b
- Indian Drive Alternative A: Exhibit H-23f
- Bug Lake Road Alternative A: Exhibit H-23f
- Indian Drive / Bug Lake Road Alternative B: Exhibit H-25c
- Airport Road: Exhibit H-11a
- WIS 32 (Oak Street): Exhibit H-18b

All of side streets are proposed to remain stop-controlled on the side street. The findings are summarized in the table below.

**Table 6.1 Future (2035) Build LOS at US 8 intersections, peak hour (1-2 p.m.)**

| Intersection                               | Cross Street Level of Service (NB / SB) | Cross Street Delay (seconds) (NB / SB) | Cross Street 95th percentile <sup>1</sup> queue (feet) (NB / SB) |
|--|---|--|--|
| County W                                   | C / B                                   | 16 / 12                                | 20 / 0   |
| Indian Drive Alternative A                 | B / NA                                  | 10 / NA                                | 5 / NA   |
| Bug Lake Road Alternative A                | NA / B                                  | NA / 11                                | NA / 0   |
| Indian Drive / Bug Lake Road Alternative B | B / B                                   | 11 / 12                                | 5 / 0  |
| Airport Road                               | B / NA                                  | 11 / NA                                | 0 / NA   |
| E. Silver Lake Road                        | B / NA                                  | 11 / NA                                | 5 / NA   |
| WIS 32 (Oak Street)                        | C / C                                   | 15 / 16                                | 35 / 15  |

<sup>1</sup> 95th percentile queue: 95 percent of the time during the peak hour, the queue is less than length listed.

During the 2035 PM peak hour, the intersections all had levels of service of C or better and there was no significant queuing. Due to low volumes, the queue is less than one car length during the PM peak hour at all intersections except WIS 32 (Oak Street). WIS 32 (Oak Street) had a 35-foot queue for the northbound left turn movement.

## 6.4 Access Management

Access recommendations are shown in the tables below by municipality. The majority of recommendations involve removing duplicate driveway access.

In Crandon, it is recommended to remove seven access points: six driveways and one cross street. All of the driveways proposed to be closed are duplicate driveways. This reduction in access points would increase access point spacing from one access point for every 200 feet to one access point every 240 feet.

**Table 6.2 City of Crandon Access (1 of 2)**

| Station | Side of Road | Access Type              | Notes   | Recommended Action |
|---------|--------------|--------------------------|---|--------------------|
| 413+75  |              | Lake Avenue              |   |                    |
| 414+50  | RT           | Commercial               | very wide                                     | Reduce width       |
| 414+90  | LT           | Commercial               |   |                    |
| 416+00  | LT           | Commercial               |   |                    |
| 416+00  | RT           | Commercial               | very wide                                     | Reduce width       |
| 417+00  | LT           | Residential              |   |                    |
| 417+00  | RT           | Forest Ave               |   |                    |
| 420+20  | RT           | Park Ave                 |   |                    |
| 420+20  | LT           | Commercial               |   |                    |
| 421+95  | LT           | Commercial               | very wide, additional access off Wildwood     | Remove access      |
| 422+00  | RT           | Commercial               |   |                    |
| 423+80  | LT           | Wildwood Avenue          |   |                    |
| 425+00  | RT           | Commercial               |   |                    |
| 426+10  | LT           | Commercial               |   |                    |
| 426+90  | LT           | Commercial               |   |                    |
| 426+85  | RT           | ATV Trail                |   |                    |
| 426+95  | RT           | Prospect Avenue          |   |                    |
| 430+50  | RT           | Commercial               |   |                    |
| 433+00  | RT           | Commercial               |   |                    |
| 433+00  | LT           | Commercial               |   |                    |
| 437+00  | LT           | Commercial               |   |                    |
| 439+50  | LT           | Railroad Avenue          | Gravel Trail                                  |                    |
| 440+00  | RT           | Wolf River State Trail   |   |                    |
| 440+00  | LT           | Rail Tracks              |   |                    |
| 441+60  | LT           | Pioneer Street           |   | Remove access      |
| 443+40  | RT           | Commercial               |   |                    |
| 447+50  | RT           | Residential / Commercial |   |                    |
| 447+50  | LT           | Grandview Avenue         | Provides access to residential Pioneer Street |                    |
| 455+40  | RT           | Residential              |   |                    |
| 458+00  | LT           | Residential              |   |                    |
| 460+00  | LT           | Residential              |   |                    |

**Table 6.2 City of Crandon Access (2 of 2)**

| Station | Side of Road | Access Type              | Notes  | Recommended Action |
|---------|--------------|--------------------------|--|--------------------|
| 460+90  | RT           | Residential / Commercial |  |                    |
| 462+00  | RT           | Residential              |  |                    |
| 464+10  | LT           | Residential              | Loop Driveway                                | Remove access      |
| 465+30  | LT           | Residential              | Loop Driveway                                |                    |
| 467+20  | RT           | Residential              |  |                    |
| 473+10  | LT           | Residential              | Loop Driveway                                | Remove access      |
| 482+00  | LT           | Residential              | Loop Driveway                                |                    |
| 482+50  | RT           | High View Drive          |  |                    |
| 483+60  | LT           | Residential              | Loop Driveway                                | Remove access      |
| 484+80  | RT           | Residential              | Grass, Additional access off High View Drive | Remove access      |
| 485+00  | LT           | Residential              | Loop Driveway                                |                    |
| 486+10  | LT           | Residential              | Loop Driveway                                | Remove access      |
| 487+00  | LT           | Residential              | Loop Driveway                                |                    |
| 498+50  | RT           | County W                 |  |                    |
| 498+50  | LT           | Corning Road             |  |                    |

In Lincoln, it is recommended to remove three access points and realign Indian Drive and Bug Lake Road to a four-legged intersection. Two driveway access points on US 8 at County W are recommended to be removed as additional access is available from the cross streets and the existing driveways on US 8 are within the intersection influence area. In addition, Love Knot Lane is proposed to be a cul-de-sac since new access is proposed from Bug Lake Road. This will reduce conflict points on US 8. This reduction in access points would increase access point spacing from one access point for every 900 feet to one access point every 1140 feet.

**Table 6.3 Town of Lincoln Access**

| Station | Side of Road | Access Type              | Notes                              | Recommended Action  |
|---------|--------------|--------------------------|------------------------------------|---|
| 500+20  | RT           | Commercial               | Additional access off County W     | Remove access   |
| 500+95  | LT           | Commercial               | Additional access off Corning Road | Remove access   |
| 513+00  | LT           | Residential              |                                    |   |
| 524+25  | RT           | Bear Road                |                                    |   |
| 524+50  | LT           | Residential / Commercial |                                    |   |
| 543+20  | LT           | Commercial               | Gated                              |   |
| 552+50  | LT           | Fire Keeper Road         |                                    |   |
| 564+50  | RT           | Young's Lane             |                                    |   |
| 575+40  | RT           | Jeep Trail               |                                    |   |
| 590+00  | RT           | Wayside                  | Loop Driveway                      |   |
| 590+00  | LT           | Kwe Da Kik Lane          |                                    |   |
| 594+50  | RT           | Wayside                  | Loop Driveway                      |   |
| 608+00  | RT           | Indian Drive             |                                    | Realign to 4-legged intersection                            |
| 609+00  | LT           | Bug Lake Road            |                                    | Realign to 4-legged intersection                            |
| 613+80  | LT           | Commercial / Trail       | Trail to Love Knot Lane            |   |
| 621+10  | LT           | Love Knot Lane           |                                    | Remove access, new access to be provided from Bug Lake Road |
| 621+10  | RT           | Residential              |                                    |   |
| 634+20  | RT           | Residential              |                                    |   |
| 677+10  | RT           | Commercial               | Quarry                             |   |
| 680+20  |              | Otter Creek Road         |                                    |   |

In Laona, it is recommended to remove four access points and reconstruct WIS 32 to a four-legged intersection. The existing driveways are loop driveways or are within the intersection influence area. This reduction in access points would increase access point spacing from one access point for every 630 feet to one access point every 710 feet.

**Table 6.4 Town of Laona Access (1 of 2)**

| Station | Side of Road | Access Type           | Notes  | Recommended Action |
|---------|--------------|-----------------------|--|--------------------|
| 732+50  | RT           | Potawatomi Trail      |  |                    |
| 736+80  | LT           | Residential           |  |                    |
| 749+10  | RT           | Residential           |  |                    |
| 800+40  | RT           | Residential           |  |                    |
| 800+40  | LT           | Residential           |  |                    |
| 841+10  | RT           | Residential           |  |                    |
| 850+00  | RT           | Residential           |  |                    |
| 853+20  | RT           | Shoemaker Lane        |  |                    |
| 871+30  | RT           | Residential           |  |                    |
| 880+95  | RT           | Residential           |  |                    |
| 892+80  | RT           | Airport Lane          |  |                    |
| 896+80  | RT           | Residential           |  |                    |
| 898+80  | RT           | Residential           |  |                    |
| 899+80  | RT           | Residential           |  |                    |
| 900+10  | RT           | Residential           |  |                    |
| 907+90  | RT           | Residential           |  |                    |
| 909+10  |              | Snowmobile Crossing   |  |                    |
| 912+00  | RT           | Residential           | Additional access off West Silver Lake Road                | Remove access      |
| 913+50  | RT           | West Silver Lake Road |  |                    |
| 919+50  | LT           | Commercial            | Loop Driveway  |                    |
| 920+90  | LT           | Commercial            | Loop Driveway  |                    |
| 921+95  | LT           | Residential           |  |                    |
| 924+80  | RT           | Residential           |  |                    |
| 924+00  | LT           | Residential           |  |                    |
| 928+00  | RT           | Residential           | Loop Driveway  | Remove access      |
| 929+10  | RT           | Residential           | Loop Driveway  |                    |
| 932+40  | RT           | Residential           |  |                    |
| 933+30  | RT           | Residential           |  |                    |
| 934+10  | RT           | East Silver Lake Road |  |                    |
| 935+20  | RT           | Commercial            | Loop Driveway, Additional access off East Silver Lake Road | Remove access      |
| 937+10  | RT           | Commercial            | Loop Driveway, Additional access off East Silver Lake Road |                    |
| 943+20  | LT           | Residential           |  |                    |
| 947+40  | RT           | Commercial            |  |                    |

**Table 6.4 Town of Laona Access (2 of 2)**

| Station | Side of Road | Access Type         | Notes         | Recommended Action                        |
|---------|--------------|---------------------|---------------|---|
| 955+20  | LT           | Connor Farm Road    | Loop Road     |   |
| 963+00  | RT           | Commercial          | Water tower   |   |
| 967+30  | RT           | Fairway Court       |               |   |
| 970+80  | LT           | Connor Farm Road    | Loop Road     |   |
| 977+30  |              | Snowmobile Trail    |               |   |
| 977+30  | LT           | Scattered Lake Road |               |   |
| 982+00  | LT           | Commercial          |               |   |
| 986+00  | RT           | Residential         |               |   |
| 991+50  | LT           | Commercial          |               |   |
| 995+95  | LT           | Commercial          |               |   |
| 1001+95 | LT           | Commercial          | Loop Driveway |   |
| 1003+50 | LT           | Commercial          | Loop Driveway |   |
| 1006+80 | LT           | Mill Road           |               |   |
| 1007+00 | RT           | Commercial          |               |   |
| 1009+80 | LT           | Commercial          | Loop Driveway |   |
| 1009+90 | RT           | Commercial          |               |   |
| 1011+30 | RT           | Trail               |               | Move to WIS 32 intersection               |
| 1011+60 | LT           | Commercial          | Loop Driveway |   |
| 1012+50 | RT           | Commercial          | very wide     | Remove access                             |
| 1013+50 | LT           | Commercial          | Loop Driveway | Reconstruct as a four-legged intersection |
| 1013+50 | RT           | Oak Street (WIS 32) |               | Reconstruct as a four-legged intersection |

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## 7 Conclusions and Recommendations

With the improvement options recommended, US 8 will continue to be a vital east–west link in northern Wisconsin. The short term and long term improvement options developed for this report fulfill the purpose and need of the corridor, including:

- Maintain system linkage
- Accommodate future traffic volumes in a safe and efficient manner
- Manage corridor access
- Provide a safe facility for all users
- Enhance multimodal transportation opportunities
- Provide a transportation facility compatible with local uses and community planning

### 7.1 2035 Mobility

As part of the NHS, US 8 needs to provide a high level of mobility. The existing two-lane highway is sufficient to meet this need until 2035 with the aid of the proposed improvements, including additional passing lanes. The area is mostly forested with a few pockets of development including Laona, Crandon, and the Forest County Potawatomi Community. With the Nicolet National Forest throughout the corridor, there is limited potential for future growth. The 2035 seasonal traffic forecast is expected to reach 6,000 vpd, which will result in a LOS C for the roadway users under the existing conditions. There are 13.2 percent trucks using US 8 with a high number of logging trucks which can impact traffic flow; the addition of passing lanes for both eastbound and westbound traffic will improve mobility and LOS along the corridor.

### 7.2 Geometrics

Data was gathered on the US 8 corridor from the WisDOT NC Region, local communities, Forest County GIS data, survey, and through on-site visits. Based on the design speeds throughout the corridor and the review of existing information, the following items were found to be deficient:

- Thirty-one vertical curves
- Twelve profile grades
- Seven intersections with substandard intersection angles
- Nine intersections with substandard intersection sight distance

Short and long term improvements are recommended to improve some of the deficient geometrics even though the crash rates along US 8 are less than the statewide average. Numerous features of US 8 are recommended to be brought to desirable standards to improve the safety of the highway including:

- Centerline rumble strips. Centerline rumble strips are proposed on US 8 to alert drivers if they cross the centerline. Although there is currently not a large number of crossover crashes, rumble strips will help drivers navigate within their travel lane.

- Passing lanes. Safety can also be improved with the addition of eastbound and westbound passing lanes. Advanced signs will notify drivers of the passing lanes ahead; drivers will then be less likely to partake in risky passing opportunities.

The topography of the corridor has created many intersections with inadequate intersection sight distance. Long term improvements include reconstruction of the vertical curves on US 8 to improve the intersection sight distance. Although no intersections currently have major crash problems, local drivers are aware of the limited sight distance and proceed through these intersections with caution. The short term improvement to install LED warning signs will help alert unfamiliar drivers about the restricted sight distance.

### **7.3 Traffic**

The traffic analysis included documentation of access points, a crash analysis, a speed study, and a level of service analysis. Throughout the corridor there are 27 cross streets, 83 driveways, and 6 trail crossings. The spacing of access points varies throughout the corridor, with the majority of driveways located in Crandon and Laona. Loop driveways are recommended to have one access point closed and driveways within the intersection influence area should be relocated to separate turning movement conflicts.

The Existing and Future No-Build traffic analysis included a segment analysis and intersection analysis. The existing LOS is indifferent to the percent of no passing zones based on the current traffic volume. A threshold analysis was completed based on the highest 2035 daily traffic projected in the corridor, 6,000 vpd. A LOS D will not be reached in 2035, regardless of the percent of no passing zones.

Using the peak hour counts, the existing intersection geometrics, and Highway Capacity Software (HCS), the existing weekday peak hour operations were analyzed for five intersections. The projected 2035 volumes were used to determine the no build traffic operations. During the 2035 no build peak hour, the intersections were all LOS C or better and there was no significant queuing. Intersection improvements were recommended to help the flow of through vehicles on US 8 including installing right turn lanes and bypass lanes so through traffic will be able to maneuver around turning vehicles.

### **7.4 Multimodal Connections**

US 8 provides many connections to state recreational trails, including snowmobile trails, ATV trails, and pedestrian/bicycle trails. Access to the trails is recommended to remain. Five-foot paved shoulders are proposed on US 8 to provide bicycle accommodations. In the urban areas, sidewalks and bicycle lanes are proposed. The potential multi-modal connections identified in this study include: connecting the Forest County Potawatomi Community to Crandon by both pedestrian/bicycle and ATV/snowmobile trails and realigning trails as intersections are reconstructed. A separate project has been started to build a bicycle/pedestrian trail between the Crandon School and the Wolf River State Trail.

## 7.5 Recommendations

The short term and long term improvement options are discussed in Section 6 and illustrated in Appendix H. The improvements require additional study to determine the impacts and the costs associated with them. The improvement options are the recommended starting point for the next study or design project along this corridor. The short term improvements developed in this report are a lower cost improvement that could be implemented in the near future either by WisDOT or the local municipality. For example, Forest County could remove vegetation within the highway right-of-way to improve sight distance at intersections. The long term improvements developed in this report are a higher cost improvement that needs additional study to determine the feasibility and the cost of the improvement option.