

**Proposed Improvements at Deming Way**

- Add northbound right turn lane
- Add an additional southbound left turn lane
- Improve alignment as shown to reduce offset between opposing left turns
- Channelize all right turn lanes and lengthen to WisDOT standards



**Proposed Improvements at US 12/14 Eastbound Ramps**

- Add an additional eastbound left-turn lane
- Widen eastbound US 12/14 on ramp to two lanes



## ***Unsignalized Intersections***

There are numerous intersections with public roads along US 14 located between the villages of Mazomanie and Middleton, many of which are addressed in this section. Most rural intersections are examined, but only a few intersections within the urbanized areas are included here. Intersections that are candidates for signalization are addressed first. This is followed by a discussion of design concerns for other unsignalized public road intersections in the study corridor. Finally, design recommendations for some selected intersections are presented.

### ***Intersections that are candidates for signalization***

Installing traffic signals is one possible solution to provide adequate time to turn onto US 14 from the side road. Because of the effect that signals have on traffic flow along a highway, there are a number of factors that must be evaluated to determine if they are candidates.

The WisDOT FDM Procedure 11-50-50 cites some minimum threshold values to consider in the initial screening of intersections for signal potential. Of the intersections evaluated according to the criteria, only three unsignalized intersections will meet the minimum screening criteria for signals prior to 2038:

- WIS 19/78 (west)
- Brewery Road
- Pinehurst Drive

Meeting the minimum criteria established in the FDM does not automatically approve an intersection for signals. It does, however, identify signals as one possible solution to address low levels of service. A detailed signal warrant analysis would ultimately need to be completed to determine if an intersection is a candidate for a future signal.

### **WIS 19/78 (west)**

WIS 19/78 is classified as a minor arterial in the *Village of Mazomanie Comprehensive Plan*. WIS 78 is a restricted truck route between Mount Horeb and Black Earth, and is a designated long truck route between US 14 and Sauk City. As such, it is a widely used north-south route for truck traffic travelling between US 18/151 (Mount Horeb and points west) and US 12 in Sauk City. The route takes travelers through the village of Black Earth, follows US 14 west for a short distance, then proceeds northward just east of the village of Mazomanie.

This intersection could benefit from signals in the future coupled with a potential reduction of the existing 55 mph posted speed. It meets the minimum screening criteria for signals and is an intersection of two state highways.

In 2008, 108 vehicles were turning left from WIS 78 onto US 14 during the AM peak hour. This number is expected to grow to 146 vehicles by the year 2038. With heavy US 14 eastbound traffic in the AM, these left-turning drivers will have difficulty finding sufficient gaps in traffic to make their maneuver. Table 46 compares intersection LOS with and without signals.

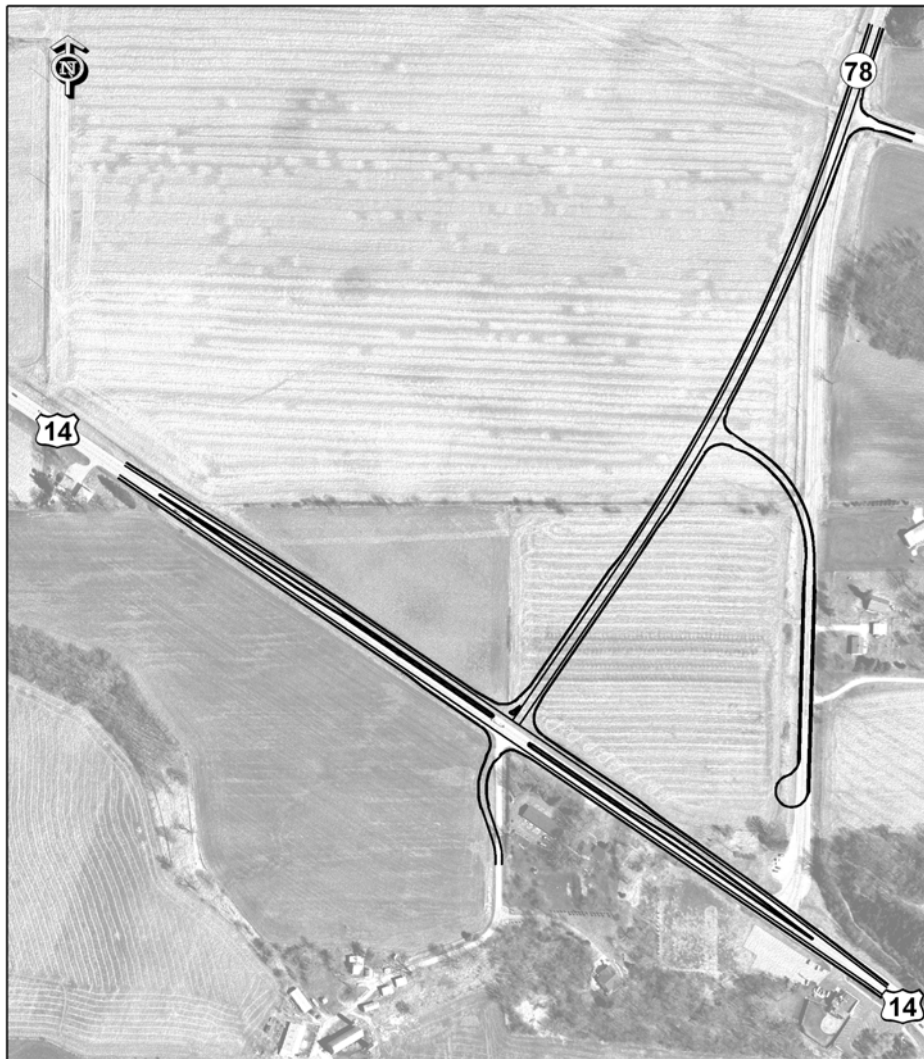
Table 46 WIS 78 intersection LOS, delay, and queue lengths, with and without signals

	2008			2018			2028			2038		
	LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue
<b>AM, no signal*</b>	A/D	32 sec	50 ft	A/F	76 sec	125 ft	A/F	214 sec	225 ft	A/F	500 sec	350 ft
<b>AM, with signal#</b>	---	---	---	A	9 sec	318 ft	B	11 sec	592 ft	B	16 sec	844 ft
<b>PM, no signal*</b>	A/C	24 sec	25 ft	A/E	44 sec	75 ft	A/F	98 sec	125 ft	A/F	249 sec	200 ft
<b>PM, with signal+</b>	---	---	---	A	7 sec	217 ft	A	8 sec	322 ft	B	12 sec	597 ft

A/F: overall intersection LOS/worst movement for intersection displayed. \*Worst movement LOS & queue (displayed) is southbound left. #Longest queue (displayed) is for eastbound thru traffic. +Longest queue (displayed) is for westbound thru traffic.

In 2009, the US 14/WIS 78 intersection was reconstructed on a new alignment further west of the previous location. The new alignment improved sight distances at the intersection and revised its approach angle to 90 degrees. As part of the project, a median with channelized left-turn lanes was added on US 14 to remove turning vehicles from mainline traffic on US 14. In addition, driveways near the intersection on the south side of US 14 were relocated, and a cul-de-sac of the old WIS 78 roadway was created to provide access to properties. A new park-and-ride lot was also constructed northwest of the intersection. Figure 17 shows the improvements that were made. Even though the improvements are anticipated to address future traffic needs for some time, recommendations for a future signal are still applicable when safety/operations warrant.

Figure 17 WisDOT improvements at the US 14/WIS 78 intersection in 2009



### Brewery Road

Brewery Road is a local road that provides a short-cut between US 14 and the five-point intersection of County P/Church Street/Military Road to the north. It is used to access the commercial area along the north side of US 14 between Church Street (County P) and Brewery Road. In addition, it serves as a link to residential neighborhoods on the north side of the village.

The US 14/Brewery Road intersection is a T-type intersection located on the north side of US 14 and within the influence of the US 14/County P/Church Street intersection located further west. Proposed improvements at that intersection will likely influence potential improvement scenarios at the US 14/Brewery Road intersection as well. In addition, the County P/Church Street/Brewery Road/Military Road intersection to the north is a five-point intersection near the village hall, residential areas, and a school. It has been identified as a future location for improvements in the village comprehensive plan. This intersection

would also likely need to be considered with proposed improvements at the US 14/Brewery Road intersection.

The US 14/Brewery Road intersection could benefit from signals in the future. It meets the minimum screening criteria for signals and has a high number of southbound vehicles turning left in the AM peak hour (129 in 2008, expected to grow to 336 by 2038). Without traffic signals, these vehicles will have difficulty finding gaps in heavy US 14 eastbound AM peak-hour traffic. An average delay of almost five minutes and a queue of over 300 feet on Brewery Road are expected by 2018.

Pinehurst Drive

Pinehurst Drive is a local street that serves several light industrial and commercial businesses on the north side of US 14. It connects to Pleasant View Road (a north-south connector between US 14 and Airport Road) via Montclair Drive.

Pinehurst Drive has only a small number of vehicles turning left onto US 14 in the AM peak hour (16 in 2008, 22 expected in 2038), but during the PM peak hour there are many more (73 in 2008, 103 expected in 2038). These vehicles will have difficulty finding gaps in heavy westbound US 14 traffic during the PM peak hour. Without signals, these drivers would experience average delays of nearly five minutes by 2028 and nine minutes by 2038. Table 47 compares levels of service with and without signals.

Table 47 Pinehurst Drive intersection LOS, delays, and queue lengths, with and without signals

	2008			2018			2028			2038		
	LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue
<b>AM, no signal*</b>	A/E	44 sec	25 ft	A/F	68 sec	25 ft	A/F	112 sec	50 ft	A/F	197 sec	75 ft
<b>AM, with signal#</b>	---	---	---	B	12 sec	864 ft	B	15 sec	1214 ft	C	21 sec	1840 ft
<b>PM, no signal*</b>	A/F	57 sec	75 ft	A/F	124 sec	150 ft	A/F	282 sec	225 ft	A/F	548 sec	300 ft
<b>PM, with signal+</b>	---	---	---	B	13 sec	558 ft	B	15 sec	774 ft	B	18 sec	987 ft

A/F: overall intersection LOS/worst movement for intersection displayed. \*Worst movement LOS & queue (displayed) is southbound left. #Longest queue (displayed) is for eastbound thru traffic. +Longest queue (displayed) is for westbound thru traffic.

Other considerations for the intersection include the proximity of other roads such as Pleasant View Road, Capitol Court, and Schwartz Road in addition to the location of the four- to two-lane taper of US 14. Improvements to other intersections in the vicinity of Pinehurst Drive could influence the appropriate treatment at the intersection. Strategies from a long-term system perspective are addressed in the Access Management Plan (section II).

*Intersections that are not candidates for signalization*

This section reviews the numerous local road intersections that will likely not meet criteria for signals within the study plan horizon of 2038. The majority of these intersections are located along the rural portions of US 14. These intersections were evaluated for both existing and anticipated levels of service, as well as for

existing deficiencies that can be addressed through minor design changes or other enhancements.

### *Design deficiencies at rural intersections*

Several intersections in the corridor do not meet WisDOT design standards. This section is intended to catalogue the design deficiencies of the unsignalized intersections. Deficiencies found include skew angles, curves, pavement cross-slope rollover, gradients, needed turn-lanes and passing lanes, spacing from railroads, and right of way. Each particular design deficiency is described, followed by a list of intersections that suffer from that deficiency. Corrective measures at the intersections could improve intersection safety and operations or delay costly mitigation measures at these locations.

#### Intersection on tangent segments

Intersections located on tangent segments of US 14, or on the outside of a horizontal curve may be a concern if the skew angle is sharper than 75 degrees. Rural public crossroads that do not meet this criteria are (skew angles are approximate): County F (60 degrees), Kahl Road-south (30 degrees), Kahl Road-north (50 degrees), Schultz Road (55 degrees), South Valley Road (65 degrees), Scherbel Road-south (68 degrees), and Cleveland Road (74 degrees).

Intersections located on the inside of a horizontal curve of US 14 may be a concern if the skew angle is sharper than:

- 75 degrees where the radius along US 14 exceeds 6,000 feet.
- 80 degrees where the radius along US 14 is between 4,000 and 6,000 feet.
- 85 degrees where the radius on US 14 is less than 4,000 feet.

The one rural public crossroad which does not meet this criterion is the north leg of Scherbel Road (approximately 73 degree skew at a radius of 5,730 feet).

#### Intersections on horizontal curve

Intersections located on a horizontal curve are undesirable because it is difficult for stopped traffic to correctly judge the speed of approaching vehicles. Areas of concern along the US 14 corridor include: Olson Road (1,432-foot radius on US 14), County F (1,910-foot radius), Scherbel Road (5,730-foot radius), and Westview Court (955-foot radius).

#### Pavement cross-slope rollover

Some intersections have a pavement cross-slope rollover that exceeds the desirable maximum of five percent. This is a concern at (rollovers are approximate): Olson Road (9%), Schultz Road (10%), Scherbel Road-south (13%), and Westview Court (7%).

#### Pavement gradient

Pavement gradient in areas where vehicles are required to stop at intersections should not exceed three percent. Rural public crossroads where pavement gradient is a concern are (gradients are approximate): Olson Road (4%), Schultz Road (8%), Scherbel Road-north (9.9%), Scherbel Road-south (15.4%), and Cleveland Road (9%).

### Right-turn lanes

Right-turn lanes from a mainline onto a crossroad are warranted for intersections where the crossroad has an ADT of at least 100, and may also be advisable for some locations not meeting the 100 ADT criteria. Most intersections along US 14 do not have right-turn lanes. Intersections now lacking a right-turn lane where it may be desirable to add one include:

- eastbound at Olson Road
- eastbound at Kahl Road
- eastbound and westbound at South Valley Road
- westbound at County KP (north) (a westbound right-turn lane would likely require improvement of a nearby bridge over Black Earth Creek)
- westbound at Westview Court
- east and westbound at Stagecoach Road
- westbound at Rocky Dell Road
- eastbound at Cleveland Road

### Spacing between roadway and railroad

The current standard of roadway and railroad spacing of at least 200 feet is not met in all areas where US 14 borders the railroad corridor (see FDM Procedure 17-60-1, page 1). At crossroads, close proximity of a railroad paralleling the roadway results in gradients far steeper than the desirable maximum of three percent wherever the profiles of the railroad and US 14 significantly differ, such as at Scherbel Road and Cleveland Road. In addition, at all crossroads, the spacing between successive at-grade crossings of the railroad and US 14 is undesirably small.

### Skew angle at railroad

The skew angle is undesirably sharp (exceeds 75 degrees) at the following railroad crossings (skew angles are approximate): Olson Road (70 degrees), Kahl Road (30 degrees), South Valley Road (65 degrees), Scherbel Road (68 degrees), and Cleveland Road (74 degrees). The skew angle concern is high at Olson Road and at Kahl Road where the roadway parallels the south side of the tracks from 50 to 60 feet away; it then curves sharply to cross the railroad tracks and intersect US 14.

### Curb and gutter at turning radii

Curb and gutter at turning radii are often desired by the maintaining authority. Most of the major crossroads already have curb and gutter at the turning radii where they intersect with US 14. There are some intersections, however, where it may be desirable to add curb and gutter. These intersections potentially include: Schultz Road, South Valley Road, County KP-north (northeast radius only), Rocky Dell Road-north, Twin Valley Road, Wayside Road-west, and Wayside Road-east.

### Right of way

At almost all of the existing intersections, the right of way is inadequate per current standards for intersection sight distance and vision triangles at US 14, or sight triangles at the railroad. (The summary of the areas enveloped by these three standards is hereafter referred to as “window.”) Two locations that may have adequate right of way for the window include WIS 78 (west), and the north leg of

the US 14/Stagecoach Road intersection. This assessment assumes that the intersections remain stop-controlled, and depend upon the speed of the crossroad. Even though existing right of way may not cover the window at a particular location, where the crossing includes fairly high fill, vegetation may be low enough to not encroach into the sight distance within the window, such as at County F. However, where fill is minimal, or there is cut, vegetation and/or embankments restrict the vision within the window. Also, in some locations, there are other restrictions within the window to block sight, such as buildings or utilities.

#### Passing lanes

A passing lane at a rural crossroad is warranted if the ADT of the crossroad exceeds 1,000 and the intersection has only three legs (T-intersection). All T-intersections having crossroad traffic meeting this warrant already have a bypass lane. However, a passing lane may also be advisable at T-intersection crossroads not meeting the 1,000 ADT criteria. Such locations on US 14 where it may be desirable to add a bypass lane include the westbound direction at Rookie's Restaurant, just east of WIS 78 (west), and the eastbound direction at County KP (north). At County KP, an eastbound passing lane would likely require improvements to a nearby bridge over Black Earth Creek.

#### Medians with a protected left-turn lane

It may be desirable to add raised medians with a protected left-turn lane on US 14 at the following locations:

- Wisconsin Heights High School
- County F
- Westbound US 14 at Kahl Road
- Scherbel Road
- County KP (north)
- Stagecoach Road

At both County F and County KP (north), placing a median on US 14 would require improvements to a nearby bridge over Black Earth Creek. The tight spacing between US 14 and the railroad complicates the potential addition of a median at Kahl Road, Scherbel Road, and Stagecoach Road. At Kahl Road, the sharp skew would probably make it difficult to line up the opposing legs of the crossroad if US 14 was widened to add a median. At Scherbel Road, the steep crossroad profile immediately north and south of US 14 presents an obstacle to the widening of the mainline for a median.

The County KP (north) intersection abuts the west end of a bridge over Black Earth Creek, resulting in an undesirable radius of the existing beam guard. Moving County KP (north) away from the bridge would allow for a standard beam guard transition, and would facilitate the potential intersection improvements that are noted above.



## *Recommended design improvements at selected rural intersections*

### County F

The existing intersection at County F is located on the outer tangent of a curve, and has a skew angle of 60 degrees. The proposed intersection at County F is intended to improve its safety by increasing the skew angle to nearly 90 degrees, and adding a protected left-turn lane and a channelized right-turn lane. Figure 18 shows proposed improvements at the US 14/County F intersection.

Figure 18 Proposed intersection improvements at County F



### Heidi's Lane/Kahl Road/Schultz Road

The existing intersections at Heidi's Lane, Kahl Road, and Schultz Road have numerous design deficiencies — such as acute skew angles, steep gradients, and insufficient spacing — that pose safety and operational challenges. Two new intersections having improved approaches and sightlines are recommended to replace them. Exhibit 18, on the following page, shows how these new intersections would provide more direct and safer connections to Kahl Road and nearby properties.