

US 30 Cedar and Clinton Counties PLANNING AND ENVIRONMENTAL LINKAGES (PEL) STUDY

Existing Conditions Memorandum

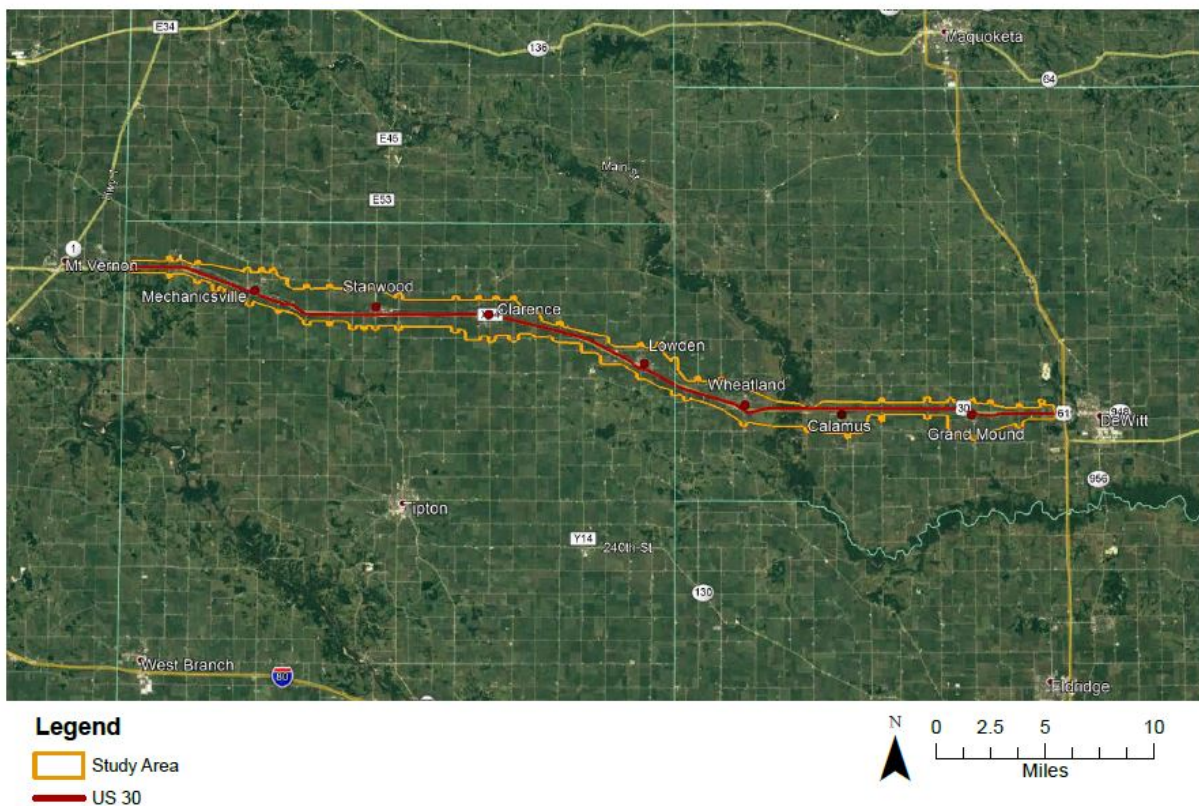
Office of Location and Environment | March 2019



EXECUTIVE SUMMARY

The Iowa Department of Transportation (DOT) is performing a transportation planning study, referred to as the Study hereafter, for a portion of the U.S. Highway 30 (US 30) corridor in Cedar and Clinton Counties in eastern Iowa. The Study is being executed following the Federal Highway Administration Planning and Environmental Linkages (PEL) format. The purpose of the US 30 PEL Study is to gain an understanding of the corridor’s ability to meet current and future travel and mobility needs, and to identify any potential improvement projects that may be necessary. The Study area begins just east of Lisbon, Iowa, near Charles Avenue, and ends just west of DeWitt, near 260th Avenue; it is approximately 40 miles in length and is shown in Figure ES-1. This section of US 30 is primarily rural, but passes through the communities of Mechanicsville, Stanwood, Clarence, Lowden, Wheatland, Calamus, and Grand Mound.

Figure ES-1. US 30 PEL Study Area



This memorandum documents the methodology and findings of an existing conditions analysis performed on the Study area. The existing conditions analysis compared current Iowa DOT design criteria, policies, and guidance, as well as industry-best design practices to the existing features of the US 30 PEL Study corridor. Existing corridor features were reviewed using historic roadway construction plans and engineering drawings (as-built plans), aerial photography, and observations from an onsite field review of the corridor. The purpose of the

comparisons was to identify any systemic (widespread) or isolated design concerns related to the existing roadway corridor and to assess whether the condition and functionality of the existing infrastructure can sufficiently handle current and future travel demands.

The existing conditions analysis considered the following:

- Horizontal roadway curvature
- Vertical roadway grades and curvature
- Decision Sight Distance (DSD)
- Roadway cross-section and roadside features
- Intersection design and access
- Existing infrastructure condition
- At-grade railroad crossings
- Opportunities to pass slower moving vehicles
- Existing traffic operational performance and mobility

Table ES-1 summarizes the findings of the existing conditions analysis. Appendix A includes a series of corridor maps that also summarizes the key findings of the existing conditions analysis.

Table ES-1. Summary of Existing Conditions Analysis Findings

Existing Features and Conditions	Summary of Findings
Horizontal Roadway Curvature	<ul style="list-style-type: none"> • All horizontal curves in the study corridor meet minimum acceptable criteria for new roadway construction or minimum criteria acceptable for 3R projects. • 7 locations noted with a combination of roadway curvature and adjacent roadside features that could result in a visual trap; crash data inconclusive on whether a visual trap contributes to any crashes at these locations. • Stopping sight distance (SSD) around horizontal curves consistent with current design practices.
Vertical Roadway Grade and Curvature	<ul style="list-style-type: none"> • Some locations identified with roadway grades greater than preferred maximum of 3% but less than acceptable maximum of 5%; all sections greater than 3% are not expected to result in a significant reduction in travel speeds (<5 miles per hour [mph]).

Table ES-1. Summary of Existing Conditions Analysis Findings

Existing Features and Conditions	Summary of Findings
	<ul style="list-style-type: none"> • Several locations are present where flat longitudinal roadway grades may coincide with flat pavement transverse slopes; it is recommended that these locations be monitored with future engineering studies to assure ponding of water does not occur. • All vertical curves in the study corridor meet the criteria for new roadway construction or 3R projects.
Decision Sight Distance (DSD)	<ul style="list-style-type: none"> • Onsite field review observations did not identify any locations where there is a lack of DSD approaching an intersection or roadway curve.
Roadway Cross-Section and Roadside	<ul style="list-style-type: none"> • Typical roadway section has 12-foot travel lanes and 10-foot shoulders. • Centerline and shoulder rumble strips are present east of Clarence. • Curb and gutter present in Clarence; effective curb height is minimal and likely due to pavement surface elevation increases from past pavement overlay projects. • On-street parking lanes present in both directions between 5th Avenue and 7th Avenue in Clarence. • Dedicated turn lanes provided at the following intersection locations: X-40/Madison Avenue, Cherry Street, Forest Street, IA 38/Monroe Avenue, and Y-14/Y-24/Hoover Highway. • Sidewalk is provided in some locations in Clarence.
Intersection Design and Access	<ul style="list-style-type: none"> • Currently, there is an estimated 160 points of access along US 30 in the Study corridor, including 63 intersections; greatest density of access points is in or near the communities along the corridor. • 6 intersections have skew angles below the minimum acceptable angle of 60 degrees and are considered highly skewed; the last 5 full years of available Iowa DOT crash data do not suggest notable crash trends exist at these intersections • Limited intersection sight distance was noted at 11 intersections in the Study corridor during the onsite field review; at these locations, features obstructing the desired sight triangles from the stop sign/stop bar location include embankments, buildings, billboards, roadway curvature, trees, crops, and other vegetative growth. In general, no notable crash trends were observed while reviewing the last 5 full years of Iowa DOT crash data.
Infrastructure Condition	<ul style="list-style-type: none"> • Approximately 15.5 miles of US 30 have roadway pavements considered to be in poor condition.

Table ES-1. Summary of Existing Conditions Analysis Findings

Existing Features and Conditions	Summary of Findings
	<ul style="list-style-type: none"> • Approximately 15.8 miles of US 30 has pavements considered to be in fair condition. • Approximately 10 miles of US 30 has pavements considered to be in good condition. • 8 existing bridges are within the Study corridor; none of the existing bridges are considered deficient or are load rated. Inspection reports noted that one bridge over the Wapsipinicon River may be a candidate for replacement in the next 5 to 10 years.
UP Railroad Crossings	<ul style="list-style-type: none"> • The UP Railroad corridor (with two sets of tracks) runs parallel to US 30 for most of the Study corridor with one grade separated crossing with US 30 (US 30 spans over the railroad) east of Wheatland. • There are 41 at-grade railroad crossings with local sideroads located within 0.5 mile of US 30; of these, 19 are within 150 feet of the local roadway intersection with US 30.
Passing Opportunities and Zones	<ul style="list-style-type: none"> • Approximately 32 miles (80%) of the corridor allows for passing in at least one direction of travel. • Some passing zones are minimal in length, particularly near the western and eastern areas of the Study corridor and would provide limited passing opportunities if oncoming traffic was present.
Traffic Operations and Mobility	<ul style="list-style-type: none"> • Existing two-way stop-controlled intersections operate at Level of Service (LOS) B or better during peak hours. • Two-lane rural highway segments are estimated to operate within current preferred criteria but along the more heavily travelled segments (from near Mechanicsville to just east of Stanwood) begin to fall below LOS B to LOS C. • Between Mechanicsville and Stanwood, percent time spent following (PTSF) is the critical performance measure during peak periods and consistent with the anticipated commuter travel patterns during peak times. • INRIX data suggests consistent average travel speeds through the Study corridor with little variance and average speeds within a few mph of the posted speed limit; during 1-hour peaks in the morning and evening, the variance in average travel speeds increases to as much as 10 mph.

Four key findings of this existing conditions study are:

- The existing US 30 roadway meets current design practices and policies with only isolated locations that may be considered less than ideal. These areas tended to involve intersection alignment and geometrics and sight distance needs; no notable crash history at these locations were noted when reviewing the last 5 full years of available Iowa DOT crash data.
- The UP Railroad parallels US 30 for the majority of the US 30 PEL Study corridor with a number of at-grade railroad crossings on local side roads within 150 feet of the side road intersections with US 30. The minimal distance between US 30 and the railroad crossings limits the space available for vehicle queues and storage while the tracks are in use.
- Operationally, traffic generally flows through the corridor at acceptable levels and in a reliable manner. All intersections currently operate at an acceptable LOS. The two-lane highway segments also tend to operate at an acceptable LOS, but the most heavily traveled sections of US 30, notably the section between Mechanicsville and Stanwood, does begin to show some degradation in flow with performance measures dipping into the LOS C range. The PTSF appears to be a major influence on the operations of this section of US 30, especially in peak periods.
- The existing infrastructure is aging with poor pavement conditions noted in the Study corridor, especially between Lisbon and Clarence. All existing bridges appear to be in reasonable condition, and none are currently posted for weight restrictions or considered deficient. Bridge inspection reports suggest that replacement of one of the bridges over the Wapsipinicon River be considered in the next 5 to 10 years.

The findings of this existing conditions analysis will aid in the next phase of the US 30 PEL Study, development and evaluation of possible improvement alternatives. Areas noted in this report as being below acceptable conditions will be a focus of the alternative development process and considered throughout the Study.

TABLE OF CONTENTS

Executive Summary.....	i
ACRONYMS AND ABBREVIATIONS	xi
1 Introduction	1
2 Study Area	1
3 Existing Crash and Safety Performance	3
4 Design Criteria.....	4
5 Roadway Geometric Design.....	8
5.1 Introduction	8
5.2 Horizontal Alignment	8
5.3 Vertical Alignment	12
5.4 Decision Sight Distance.....	17
5.5 Roadway Cross Section	18
5.6 Intersections	21
6 Infrastructure Condition	26
6.1 Existing Pavement Conditions.....	26
6.2 Existing Bridge Conditions	26
7 At-Grade Railroad Crossings	27
8 No-Passing Zones	29
9 Traffic Operations and Mobility.....	32
9.1 Existing Traffic Data	32
9.2 Existing Traffic Operations Performance	33
10 Conclusions	41
11 References	42

LIST OF TABLES

Table ES-1. Summary of Existing Conditions Analysis Findings	ii
Table 1. US 30 Roadway Sections with Above Average Crash Rates or Greater Frequency of Crashes between 2013-2017.....	3

Table 2. Current Posted Speed Limits and Assumed Design Speeds for New Roadway Construction.....	6
Table 3. Selected Design Criteria for Comparison Against Existing US 30 Roadway Design Features	7
Table 4. Summary of Existing Horizontal Curve Radius and Superelevation	9
Table 5. Summary of Locations with Potential for Creating a Visual Trap	11
Table 6. Summary of Vertical Grades Greater than Preferred 3% Maximum	13
Table 7. Summary of Existing Crest Vertical Curves Rated as Fair for SSD	15
Table 8. Summary of Existing Sag Vertical Curves At or Below Acceptable Values	16
Table 9. Summary of Existing US 30 Turn Lane and Thru Lane Shift Locations	19
Table 10. Summary of Intersection Alignments with Skew Angles Less than 60°	23
Table 11. Locations Identified During the Onsite Field Review with Possible Intersection Sight Distance Obstructions.....	25
Table 12. Summary of Existing Pavement ICE Ratings.....	26
Table 13. Summary of Existing US 30 Bridges within the Study Corridor	27
Table 14. Summary of At-Grade Railroad Crossings Near US 30	28
Table 15. Summary of Existing US 30 No Passing Zones.....	29
Table 16. TWSC LOS CRITERIA.....	35
Table 17. Existing 2017 AM TWSC Intersection Approach LOS	36
Table 18. Existing 2017 PM TWSC Intersection Approach LOS.....	36
Table 19. LOS Criteria for Two-Lane Highways	38
Table 20. ANALYSIS RESULTS - TWO-LANE HIGHWAY LOS	39

LIST OF FIGURES

Figure ES-1. US 30 PEL Study Area	i
Figure 1. US 30 PEL Study Area	2
Figure 2. Examples of the Roadway Categories Considered When Identifying Design Criteria for the Existing Conditions Analysis.....	5
Figure 3. Stopping Sight Distance Line of Sight at a Horizontal Curve.....	10
Figure 4. Example of a Visual Trap at a Horizontal Roadway Curve	11
Figure 5. AASHTO Suggested Travel Speed Impacts of Steep Roadway Grades.....	13
Figure 6. Schematic of a Typical Crest Vertical Curve and Line of Sight Needs for SSD	15

Figure 7. Schematic of a Typical Sag Vertical Curve and Line of Sight Needs for SSD	16
Figure 8. Typical Sidewalk along US 30 in Residential Areas of Clarence	20
Figure 9. Sidewalk and Parking Lanes along US 30 in the Clarence Business District.....	21
Figure 10. Example of Intersection Skew	22
Figure 11. Schematic of Intersection Sight Distance Needs	24
Figure 12. Existing Operational Analysis Study Intersections	33
Figure 13. Representative Comparison of Various LOS Conditions	34
Figure 14. Graphical Representation of Control Delay	35
Figure 15. Average Travel Speeds Between Lisbon and DeWitt per INRIX Data	41

ACRONYMS AND ABBREVIATIONS

3R	Resurfacing, Rehabilitation, and Restoration
AADT	Average Annual Daily Traffic
ATS	average travel speed
CH2M	CH2M HILL
DSD	decision sight distance
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
Iowa DOT	Iowa Department of Transportation
LiDAR	Light Detection and Ranging
LOS	level of service
mph	miles per hour
PEL	Planning and Environmental Linkages
PFFS	percent of time at free-flow speed
PTSF	percent time spent following
SSD	stopping sight distance
SUDAS	Statewide Urban Design and Specifications
TWSC	two-way stop-controlled
UP	Union Pacific
US 30	US Highway 30

1 INTRODUCTION

The Iowa Department of Transportation (DOT) is performing a transportation planning study, referred hereafter as the Study, for a portion of the US Highway 30 (US 30) corridor in Cedar and Clinton Counties in eastern Iowa. The purpose of the planning study is to gain an understanding of the corridor's ability to meet current and future travel and mobility needs and to identify any potential improvement projects that may help meet those future needs.

The overarching goals of this Study are to:

- Identify the future roadway cross-section(s) and develop a range of potential improvement alternatives for the US 30 corridor to be considered for further project development (environmental planning and preliminary engineering studies).
- Analyze and provide recommendations for either bypassing or maintaining US 30 on its current alignment at some or all of the communities along the Study corridor.
- Provide a recommended prioritization of potential corridor improvement projects.

The Study is being developed following the Federal Highway Administration's Planning and Environmental Linkages (PEL) Study model that considers environmental, community, and economic goals when making planning level decisions and then carrying these decisions and considerations throughout the project development, design, and construction process. The PEL model is intended to be an efficient decision-making model that:

- Minimizes duplication of effort.
- Promotes efficient and cost-effective solutions and environmental stewardship.
- Reduces delays in project implementation.

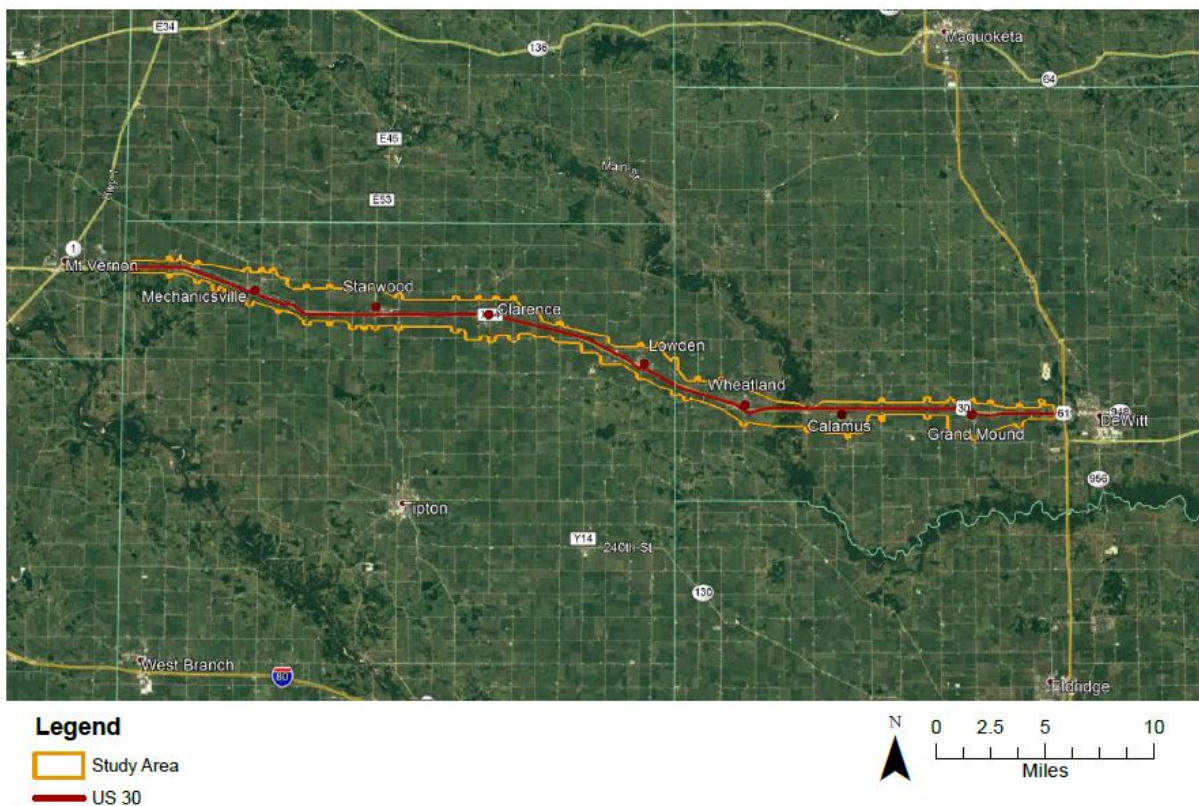
This memorandum summarizes the Study area features, notes the design criteria assumed for comparison to existing US 30 roadway features, and summarizes the various findings of the existing conditions analysis of the Study corridor. The existing conditions analysis considered existing roadway geometry and features, roadway and bridge condition, and traffic operations and travel mobility in the corridor. The purpose of the existing conditions study is to compare the existing US 30 roadway to current engineering and transportation practices and to gain an understanding on the current condition and functionality of the US 30 infrastructure within the Study corridor.

2 STUDY AREA

In Iowa, US 30 was originally constructed as part of the Lincoln Highway; the first transcontinental highway in the United States connecting New York and San Francisco. Over the years, there have been numerous realignments of the Lincoln Highway with portions of the historic roadway still present in Cedar and Clinton Counties in Iowa.

Today, US 30 is part of the Iowa Primary Road System and extends across the State providing a key transportation link for the inter- and intra-state movement of people and goods. The PEL Study area begins just east of Lisbon, Iowa, near Charles Avenue, and ends just west of DeWitt, Iowa, near 260th Avenue; it is approximately 40 miles in length and is shown in Figure 1. This section of US 30 is currently a two-lane rural highway that passes through or near the Iowa communities of Mechanicsville, Stanwood, Clarence, Lowden, Wheatland, Calamus, and Grand Mound. It is predominately rural in nature with roadway ditches and frequent points of access. In general, the existing US 30 rural roadway features remain through the various communities in the Study corridor, except in Clarence, where US 30 becomes more of an urban roadway through town with sections of curb and gutter, on-street parking, and sidewalks. Existing US 30 transitions to a four-lane divided roadway at the eastern limits of the Study corridor, just west of DeWitt. At the western limits of the Study area, US 30 will connect to the four-lane section of US 30 currently in construction that will bypass the Cities of Mt. Vernon and Lisbon.

Figure 1. US 30 PEL Study Area



US 30 crosses the Wapsipinicon River just east of Wheatland and passes through and near the Syracuse Wildlife Management Area and the Wheatland Wildlife Area. The existing terrain along the US 30 Study corridor is generally flat with more frequent elevation changes west of Clarence and east of Grand Mound. The existing land use in the area is primarily rural and agricultural with some existing farmsteads along the corridor. In and near the Iowa communities along the Study corridor, land use is a mix of residential, commercial, and industrial.

3 EXISTING CRASH AND SAFETY PERFORMANCE

A crash and safety performance evaluation of the US 30 PEL Study corridor was performed using the latest 5 full years (2013–2017) of Iowa DOT crash data available at the time of this study. The findings of the crash and safety evaluation are documented in the US 30 PEL Report titled, *US 30 Cedar and Clinton Counties Planning and Environmental Linkages (PEL) Study: Existing Crash and Safety Performance Report* (CH2M, 2019).

The crash and safety analysis identified four sections of existing US 30 in the study corridor where crashes occurred at a higher rate (crashes per miles of travel) when compared to other similar Iowa roadways over a five-year period. Another six roadway sections were identified as having below average crash rates compared to other similar Iowa roadways but experienced a greater number of crashes compared to other roadway sections in the US 30 Study corridor. Table 1 summarizes the crash and safety analysis findings at these 10 locations.

Table 1. US 30 Roadway Sections with Above Average Crash Rates or Greater Frequency of Crashes between 2013-2017

Roadway Segment	Crash Characteristics
US 30 MP 270.9 to MP 271.9	<ul style="list-style-type: none"> • 12 total crashes (4 injury crashes); below average crash rates • 4 of the crashes involved either animal collisions or were alcohol-related • 3 crashes were intersection-related, all of which were at the intersection with Delta Avenue • All injury crashes were either minor or possible injury
US 30 MP 273.9 to MP 274.9 at Mechanicsville	<ul style="list-style-type: none"> • 9 total crashes (no injury crashes); below average crash rates • 6 of the crashes were multi-vehicle and 3 were intersection-related • Stakeholder input identified minor crashes commonly occur in this area when trains are present on the adjacent UP Railroad corridor
Mechanicsville municipal limits to approximately 1,500 feet east of Grant Avenue (MP 275.0 to MP 275.9)	<ul style="list-style-type: none"> • 8 total crashes (5 injury crashes); above average injury crash rate • Majority of the crashes were a combination of cross-centerline, sideswipe, and run-off-the-road crashes • 3 crashes were animal-related and one involved alcohol • 3 crashes were located near roadway curves
US 30 MP 279.9 to MP 280.9 at Stanwood	<ul style="list-style-type: none"> • 10 total crashes (2 possible injury crashes); below average crash rate • 6 of the 10 crashes were intersection-related in Stanwood; 3 were at the IA 38/Ash Street intersection
Stanwood City limit(east) to 4,400 feet east of IA 38 (MP 280.9 to MP 281.9)	<ul style="list-style-type: none"> • 9 total crashes (8 injury crashes); above average injury crash rate • All intersection crashes were at the US 30 intersection with IA 38/Monroe Avenue and commonly resulted from a vehicle failing to yield right-of-way

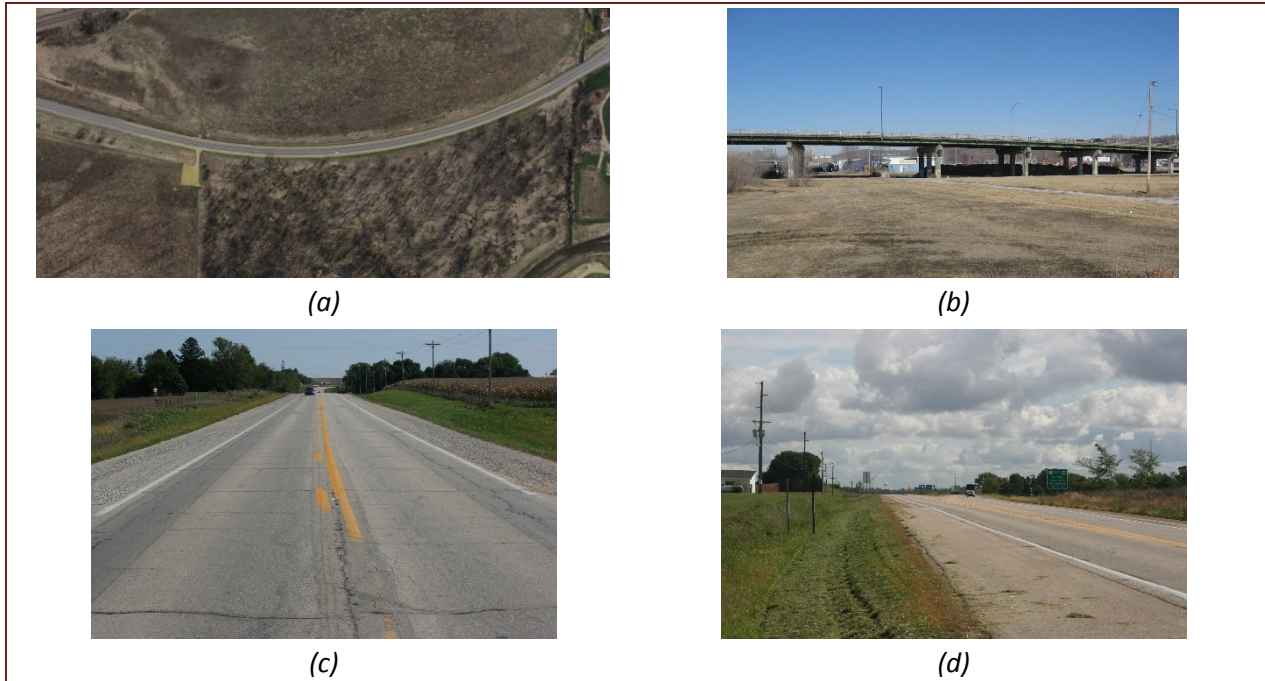
Table 1. US 30 Roadway Sections with Above Average Crash Rates or Greater Frequency of Crashes between 2013-2017

Roadway Segment	Crash Characteristics
US 30 MP 283.9 to 284.9 in Clarence	<ul style="list-style-type: none"> • 9 total crashes (6 injury crashes); below average crash rates • 3 crashes were at intersections in Clarence and were broadside collisions
2.6 miles west of western Lowden City limits, to 0.25 mile east of Hoover Highway (MP 288.9 to MP 292.6)	<ul style="list-style-type: none"> • 27 total crashes (6 injury crashes); above average fatal crash rate (one fatal crash) • 7 intersection-related crashes, all at the US 30/Herbert Hoover Highway intersection; all resulted from a vehicle failing to yield right-of-way • 3 injury and one fatal crash resulted from a cross-centerline head-on collision • 8 animal-related crashes and 2 crashes involved alcohol
In Wheatland, 500 feet west of 130 th Avenue to approximately 700 feet east of 158 th Avenue (MP 296.9 to MP 299.9)	<ul style="list-style-type: none"> • 32 total crashes (3 injury crashes); above average total crash rate • 13 crashes were intersection-related, 7 of which occurred at the US 30/130th Ave/County Road Y4E intersection • 14 of the crashes were animal-related
US 30 MP 306.9 to MP 307.9 in Grand Mound	<ul style="list-style-type: none"> • 10 total crashes (3 injury crashes); below average crash rates • 4 crashes were single-vehicle run-off-the-road crashes • 5 crashes were intersection-related; majority of crashes at the Smith Street and East Street intersections in Grand Mound
US 30 MP 308.9 to MP 310.1	<ul style="list-style-type: none"> • 13 total crashes (4 injury crashes); below average crash rate • 4 crashes were intersection-related, most at the 260th Avenue intersection • 2 crashes were cross-centerline collisions, and 4 crashes involved animals • Iowa DOT has a current project, planned for 2019 construction to improve the US 30/260th Avenue intersection that includes adding right- and left-turn lanes along US 30

4 DESIGN CRITERIA

For the purposes of evaluating the existing roadway geometry within the Study corridor, a set of design criteria for two-lane rural and urban highways were developed per guidance in the *Iowa DOT Design Manual*, the Iowa Statewide Urban Design and Specifications (SUDAS) *Design Manual* (2013), and *A Policy on Geometric Design of Highways and Streets* (AASHTO, 2011). The criteria developed focus on four categories – horizontal alignment geometry, vertical alignment geometry, typical roadway cross-section, and roadside features. Figure 2 provides graphical representation and definitions for these four categories.

Figure 2. Examples of the Roadway Categories Considered When Identifying Design Criteria for the Existing Conditions Analysis



- (a): Horizontal Alignment = geometry and curvature of the roadway centerline from the perspective of looking at the roadway from an airplane.
- (b): Vertical Alignment = roadway elevation grade (slope) of the roadway in the uphill or downhill direction with curvature at points where roadway grade changes from the perspective of standing in the roadway ditch and looking towards the roadway centerline.
- (c): Typical Roadway Section = roadway travel lanes, shoulders, medians, curb and gutter, and sidewalks from the perspective of standing in the middle of the road and looking along the roadway centerline.
- (d): Roadside = area outside of roadway travel lanes and shoulders including graded slopes and ditch sections.

Design criteria and practices evolve over time as new technologies emerge and transportation needs and the volume and mix of traffic change. As such, this existing conditions evaluation considers two tiers of design criteria. The first tier considers criteria that would be applied to new roadway construction. New construction criteria are based on a range of design speeds with associated criterion values; a preferred design speed is generally 5 mph greater than the posted speed limit, but lower design speeds are still considered acceptable in most cases. In urban areas, preferred design speed can be equal to the posted speed limit depending on factors such as the jurisdiction responsible for the roadway, the context of the roadway, and the vehicle mix. The second tier of criteria are applicable to resurfacing, rehabilitation, and restoration (3R) roadway projects. 3R project criteria are based on posted speed limits. The first-tier criteria evaluation is intended to identify locations where roadway design improvements would likely be considered in the case where the corridor, or portions of the corridor, are fully reconstructed. The second-tier criteria evaluation identifies locations in the corridor where some roadway design improvements could be justified as part of regular maintenance and preservation projects.

Table 2 summarizes the current posted speed limits within the Study corridor along with the preferred design speed for new construction.

Table 2. Current Posted Speed Limits and Assumed Design Speeds for New Roadway Construction

Location	Posted Speed, mph	New Construction Preferred Design Speed, mph
Charles Ave to Mechanicsville	55	60
Near/Within Mechanicsville Corporate Limits	45	50
Mechanicsville to Stanwood	55	60
Near/Within Stanwood Corporate Limits	40	45
Stanwood to Clarence	55	60
Near/Within Clarence Corporate Limits	45-35-25	50-40-30
Clarence to Lowden	55	60
Near/Within Lowden Corporate Limits	50	55
Lowden to Wheatland	55	60
Near/Within Wheatland Corporate Limits	50	55
Wheatland to Calamus	55	60
Near/Within Calamus Corporate Limits	45	50
Calamus to Grand Mound	55	60
Near/Within Grand Mound Corporate Limits	50	55
Grand Mound to 260th Ave.	55	60

Table 3 summarizes the criteria established for the US 30 PEL Study existing conditions evaluation. Locations identified as part of this Study that do not meet the design criteria shown in Table 3 are not necessarily areas of concern or indicative of an unsafe condition. These design criteria will be defined in more detail in following sections of this report.

Table 3. Selected Design Criteria for Comparison Against Existing US 30 Roadway Design Features

Criteria	Rural					
	Preferred	Acceptable	3R Projects	Urban (Minimum Acceptable)		
Design Speed or Posted Speed (mph)	60	50	55	45	40	30
Horizontal Curve Radius (ft)	1,330	758	955	1,039**	762**	333**
Maximum Horizontal Curve Superelevation	6%	8%	8%	Optional in Urban Areas		
Crest Vertical Curve Rate of Curvature	151	84	29	61	44	19
Sag Vertical Curve Rate of Curvature	136	96	49	79	64	37
Minimum Roadway Grade	0.50%	0.00%*	--	0.00%*	0.00%*	0.00%*
Maximum Roadway Grade	3%	5%	6%	7%	8%	9%
Stopping Sight Distance (ft)	570	425	250-495	360	305	200
Intersection Sight Distance (ft)	840	700	--	630	560	420
Decision Sight Distance (ft)	990	750	--	710	630	475
Lane Width (ft)	12	12	12	11	11	11
Shoulder Width (ft)	10	8	6	8	8	8
Auxiliary Lane Width (ft)	12	10	--	10	10	10
Lane Add Taper Rate	15:1	15:1	--	15:1	15:1	15:1
Lane Drop Taper Rate	60:1	50:1	--	45:1	30:1	15:1
Lane Shift Rate	Reverse Curves		--	45:1	30:1	15:1
Vertical Clearance (ft)	16.5	16.0	16.5	16.0	16.0	16.0
Vertical Clearance - Railroad (ft)	23.3	23.3	--	23.3	23.3	23.3
Horizontal Clear Zone (ft)	32	22	--	20	14	14
Level of Service	B	B	--	C	C	C

*0.30% if roadway curbs are present.

**Assumes no roadway superelevation; smaller curve radii with superelevation are acceptable.

5 ROADWAY GEOMETRIC DESIGN

5.1 INTRODUCTION

Existing roadway construction plans and engineering drawings (as-built plans), available Light Detection and Ranging (LiDAR) information provided by Iowa DOT, and observations from an onsite field corridor review were used to evaluate the existing horizontal, vertical, and typical roadway cross-section characteristics for this Study. The following sections summarize the various geometric characteristics of the existing roadway and how those features compare to the selected Study design criteria. Maps of the corridor in Appendix A of this report graphically depict the findings of the existing US 30 roadway geometric review.

5.2 HORIZONTAL ALIGNMENT

The US 30 roadway is comprised of a series of horizontal tangents (sections of straight roadway) and curves through the Study corridor. Within the PEL Study corridor, US 30 has a total of 20 horizontal roadway curves; 17 of which are superelevated (banked) around the curve. On average, this equates to one superelevated horizontal curve approximately every 2 miles.

HORIZONTAL CURVATURE

The radius, and the superelevation, or banking of a horizontal curve are important factors in assuring drivers navigate a curve safely, comfortably, and at a reasonable speed. Current Iowa DOT design policy adopts AASHTO guidance for minimum curve radii and superelevation rates for a given speed. The design guidance states a maximum superelevation rate of 6 percent is preferred, while roadway banking of up to 8 percent is acceptable. AASHTO's guidance is founded in studies that not only consider the roadway banking needed to physically prevent a vehicle from exiting the roadway while traveling around a curve but also the comfort of the driver while traveling through a roadway curve.

Existing roadway information suggests that along the rural sections of US 30, curves have been constructed with radii ranging between 1,348 and 114,600 feet. Information obtained from as-built plans and estimated pavement slopes using LiDAR data suggest the majority of the existing rural curves have a combination of curve radius and roadway superelevation that fall within the range of current acceptable design practices and criteria for new construction. Table 4 summarizes the existing horizontal curves in the Study corridor. Locations where the existing curvature is below new construction values, 3R criteria is maintained and the geometry is considered acceptable. In the lower speed urban areas, all horizontal curves are within the current suggested parameters for an urban environment. No existing horizontal curves were rated as poor.

Table 4. Summary of Existing Horizontal Curve Radius and Superelevation

Milepost	Design Speed (mph)	Radius (feet)*	Existing Superelevation	Minimum Acceptable Superelevation (New Construction)	Rating
289.6	60	5,730.0	2.12%**	2.20%	Fair
297.4	60	2,292.0	4.50%**	4.80%	Fair

Rating:

Good = Horizontal curve meets minimum acceptable criteria for new highway construction

Fair = Horizontal curve below acceptable criteria for new construction but meets or exceeds 3R criteria

Poor = Horizontal curve does not meet minimum acceptable 3R criteria

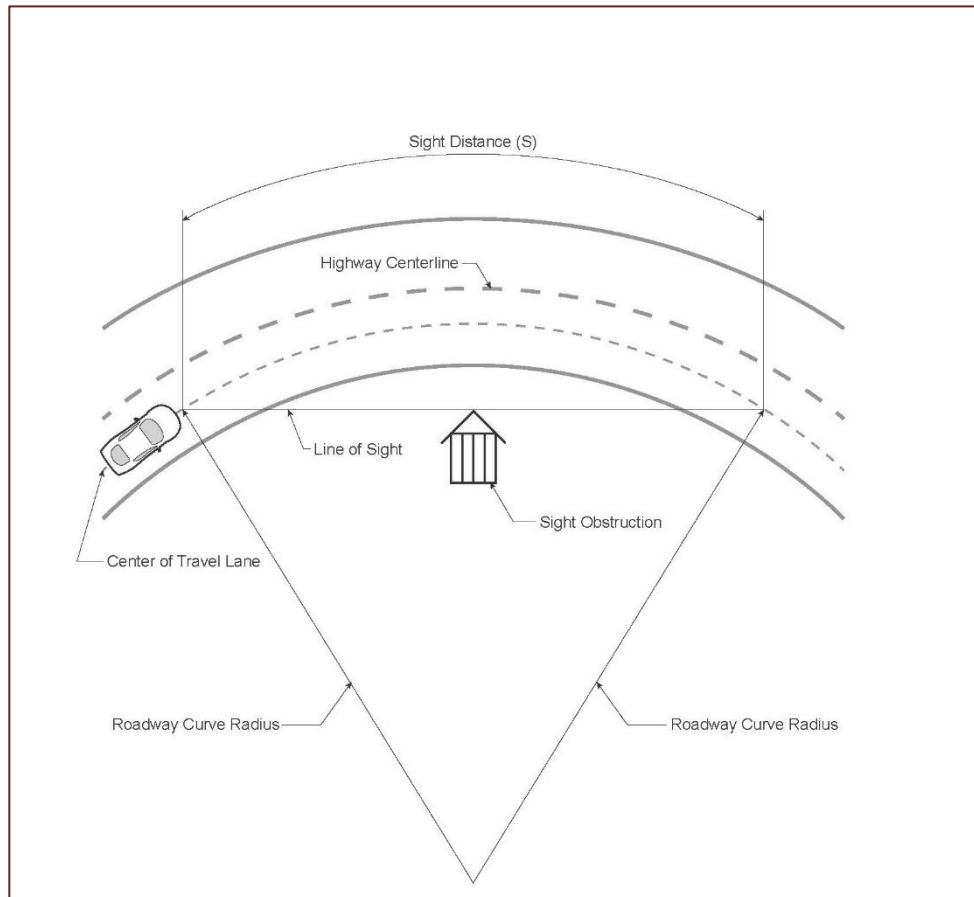
HORIZONTAL TANGENTS AND SUCCESSIVE CURVES

The length of horizontal tangent roadway sections between superelevated curves range from approximately 0.25 mile to as much as 8 miles. There are some locations that have a series of three or more curves in succession. These tightly spaced series of curves are found between Mechanicsville and Stanwood, through Lowden, through Wheatland, and near Grand Mound. Most of these series of successive curves are reverse curves, meaning each successive curve deflects, or turns, in the direction opposite that of the previous curve. Where successive curves are present, the rate of change as the pavement banking transitions from one direction to another needs to be considered and needs to occur over a length that is comfortable to vehicle occupants. With the existing information available and observations driving the corridor as part of the onsite field review, no locations were identified as uncomfortable to drive while traveling at the posted speed limit.

STOPPING SIGHT DISTANCE AROUND HORIZONTAL CURVES

Stopping sight distance (SSD) is the distance required for a driver to detect an object or hazard within the traveled way and react, brake, and stop the vehicle prior to coming into conflict with the object or hazard. When considering SSD in relation to a roadway’s horizontal geometry, the ability of a driver to see around the roadway curve is the critical consideration. Figure 3 depicts a driver’s line of sight around a roadway curve; the line of sight depicted would provide the distance needed to meet SSD criteria and should remain free of obstacles that could block a driver’s view. Lines of sight at horizontal curves were estimated and compared to aerial photography and observed during the onsite field review; no locations with SSD concerns related to horizontal geometry were identified. Rows of trees, crops, buildings, billboards, and all other possible sight obstructions appear to be at a sufficient distance away from the roadway as to not obstruct a driver’s line of sight around the curve.

Figure 3. Stopping Sight Distance Line of Sight at a Horizontal Curve



VISUAL TRAPS

A visual trap is a term used to describe a situation where a feature that is separate from the roadway creates the appearance that the roadway continues straight when, in fact, there is an approaching curve in the road. To an inattentive driver or during periods where visibility may be limited, a visual trap could lead to potential run-off-the-road or cross-centerline crashes. Roadside features that can create such an appearance may include other roadways, tree lines, railroads, utility poles (power poles), or other objects that parallel a roadway and continue at the same bearing as the roadway curves away. An example of a visual trap is shown in Figure 4; in this example, the local roadway and tree line may create an appearance of the roadway continuing straight rather than curving to the left. Often such areas can be mitigated by providing advanced curve-warning signs, chevrons, or other visual features that break the linear appearance of the roadside feature.

Figure 4. Example of a Visual Trap at a Horizontal Roadway Curve



Local sideroad and tree line create the appearance that the highway continues straight.

A review of aerial photography and observations during the onsite field review identified a few locations (see Table 5) along the US 30 Study corridor where a visual trap may be present and identified the traffic signs and devices in place to identify the US 30 roadway curve, mitigating the risk of an approaching driver missing the curve in the roadway.

Single-vehicle crashes have occurred at some of the horizontal curve locations noted in Table 5. Crash data studied as part of the US 30 PEL Study are not conclusive of the degree to which, if any, the potential visual trap contributed to the individual crash events. For additional details regarding the US 30 PEL crash data analysis, see the *US 30 Cedar and Clinton Counties Planning and Environmental Linkages (PEL) Study: Existing Crash and Safety Performance Report* (CH2M, 2019).

Table 5. Summary of Locations with Potential for Creating a Visual Trap

Milepost	Direction of Travel	Feature Creating Visual Trap	Existing Curve Warning/ Delineation Signs
271.2	Westbound	Union Pacific Railroad	CURVE AHEAD Signage and Delineators
276.3	Westbound	Lincoln Highway	CURVE AHEAD Signage
291.8	Eastbound	Tree line	CURVE AHEAD Signage
292.3	Westbound	Union Pacific Railroad	CURVE AHEAD Signage

Table 5. Summary of Locations with Potential for Creating a Visual Trap

Milepost	Direction of Travel	Feature Creating Visual Trap	Existing Curve Warning/ Delineation Signs
296.5	Eastbound	Union Pacific Railroad	None
307.4	Westbound	Union Pacific Railroad and Prairie Lane/ Clinton Street	CURVE AHEAD Signage
308.0	Eastbound	Union Pacific Railroad	CURVE AHEAD Signage and Delineators

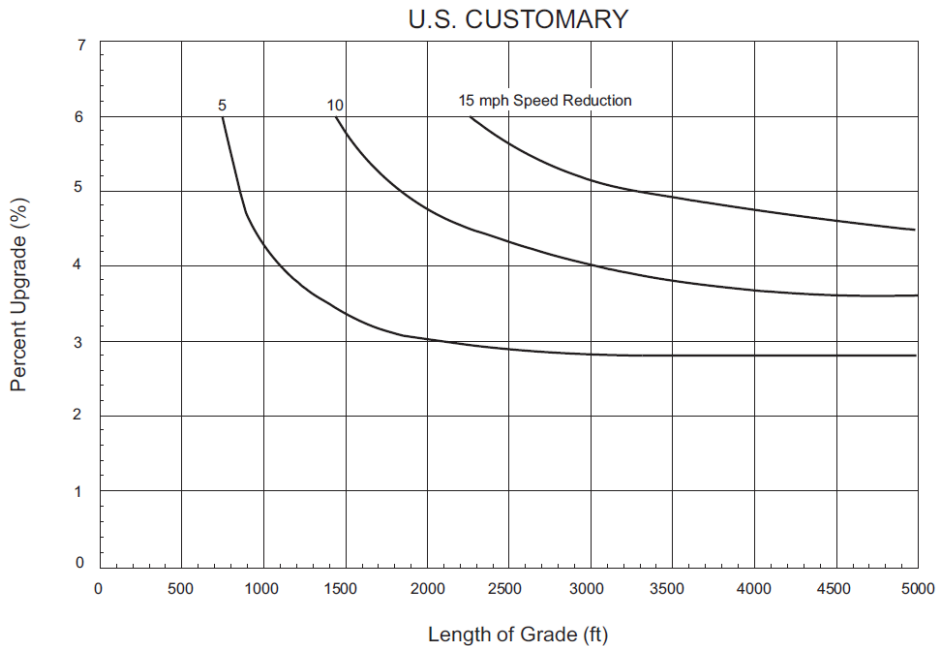
5.3 VERTICAL ALIGNMENT

When considering the vertical alignment of a roadway, the rate of elevation change, or roadway grade, and SSD at the locations where the roadway grade changes are the two main areas of focus from an engineering standpoint. The existing US 30 roadway has approximately 200 changes in roadway grade within the Study corridor. At locations where the grade changes, the change is gradually made via parabolic curves, resulting in a smooth transition in the roadway driving surface between the adjacent roadway grades. The parabolic curves are referred to as crest vertical curves or sag vertical curves, depending on the orientation of the intersecting roadway grades. The type of vertical curve and the length of the rate of vertical curvature (a relationship between the change in roadway grade and vertical curve length) are the controlling factors when considering SSD along the vertical alignment. Roadway grade considerations and SSD factors are discussed further in the following subsections.

ROADWAY GRADES

Roadway grade can influence the free-flow travel speeds along a roadway and is important when considering pavement drainage needs during rain events. For two-lane highways, Iowa DOT design guidance suggests a preferred maximum grade of 3 percent, but grades of up to 5 percent are acceptable and not uncommon. Maintaining steep grades over an extended length of roadway can result in a degradation of travel speeds and overall operational performance of the highway, particularly if there is a high percentage of heavy trucks in the vehicle mix. This degradation can result in added travel delay, formation of vehicle queues, and potentially a reduction in passing opportunities. AASHTO's *A Policy on Geometric Design of Highways and Streets* (2011) provides guidance on what reduction in travel speeds can be expected for steeper grades over a given length of roadway (Figure 5). AASHTO guidance suggests that maintaining a 3 percent roadway grade should not result in travel-speed reduction of more than 5 mph for heavy vehicles. Grades above 3 percent, maintained over longer distances, can cause a more significant drop in speed.

Figure 5. AASHTO Suggested Travel Speed Impacts of Steep Roadway Grades



Source: AASHTO. 2011. *A Policy on Geometric Design of Highways and Streets*. Figure 3-29.

There are several locations within the corridor where the maximum roadway grade is greater than 3 percent, but no roadway grade in the Study area exceeds the maximum acceptable grade of 5 percent for new construction specified in current Iowa DOT design policy. Table 6 summarizes the locations of roadway grades that exceed the preferred maximum for new roadway construction (greater than 3%), including the length at which that grade is maintained and what reduction in travel speed for heavy trucks would be expected per AASHTO guidance. As shown in Table 6, these relatively short grades that exceed 3 percent are expected to result in minimal, if any, reduction in travel speed; existing roadway grades are not expected to contribute to any degradation of travel efficiency within the corridor by reducing travel speed of heavy trucks and other large vehicles.

Table 6. Summary of Vertical Grades Greater than Preferred 3% Maximum

Beginning Milepost	Length (feet)	Grade	Expected Reduction in Speed (see Figure 5)
278.1	400	3.6%	< 5 mph
278.2	525	3.5%	< 5 mph
278.4	450	3.5%	< 5 mph
278.7	600	3.1%	< 5 mph

Table 6. Summary of Vertical Grades Greater than Preferred 3% Maximum

Beginning Milepost	Length (feet)	Grade	Expected Reduction in Speed (see Figure 5)
278.9	360	3.3%	< 5 mph
279.6	100	4.0%	< 5 mph
279.8	500	3.8%	< 5 mph
297.5	242	3.0%	< 5 mph
297.9	233	3.0%	< 5 mph
308.3	457	3.5%	< 5 mph
308.8	175	3.3%	< 5 mph
309.5	225	4.0%	< 5 mph

A minimum roadway grade of 0.5 percent is desired, but flatter grades are also considered in current design practices as acceptable, as long as adequate pavement cross-slopes (the slope of the pavement from the roadway centerline towards the roadway shoulders) are present to assure water drains freely from the travel surface. Flat roadway grades combined with flat pavement cross-slopes, may lead to ponding of water on the roadway surface during rain events.

Flat pavement cross-slopes may be present at locations where the roadway pavement is transitioning between a superelevated horizontal curve and sections of roadway with a typical crowned pavement surface and in areas near intersections where warping of the pavement surface may occur to smoothly connect intersecting roadway pavements. In urban areas, where curb and gutter are present, minimum grades of 0.3% are recommended to maintain water flowing along the roadway gutter without ponding and encroaching too far into adjacent travel lanes.

There are areas along US 30 within the Study corridor where the longitudinal grade of the roadway dips below the 0.5 percent desirable grade. For most of these locations, the flat grades are not a concern because adequate pavement cross-slopes are maintained with the crowned roadway surface. However, some of the flatter longitudinal grades are located near areas of superelevated curves and at-grade intersections with local side roads. It is recommended that these areas be reviewed as part of future engineering studies to verify adequate pavement drainage is maintained.

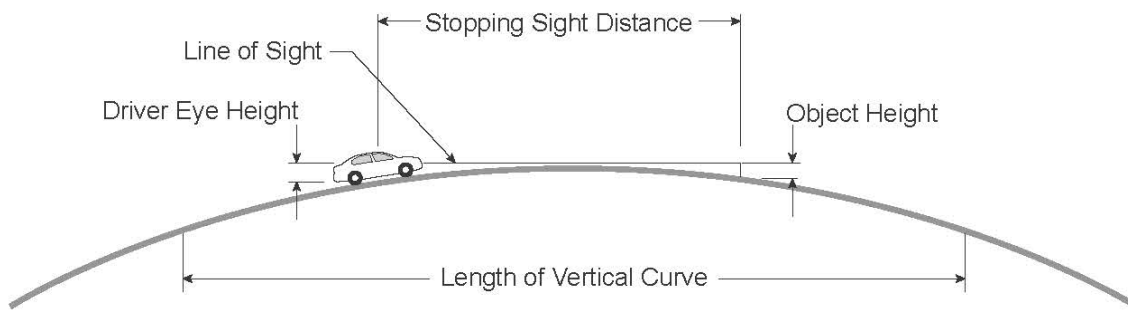
STOPPING SIGHT DISTANCE

SSD evaluations for the vertical alignment is a function of the change in roadway grades and the length of the parabolic curve over which the change in grade is smoothly transitioned. The design criterion derived from these parameters is the rate of curvature. Different rates of curvature standards are used to evaluate SSD, depending on the characteristics of a given location where a change in vertical grade occurs.

Crest Vertical Curves

A crest vertical curve, depicted in Figure 6, is a parabolic curve used to smoothly transition a change in roadway grade. SSD at a crest vertical curve is based on the distance a driver is able to see over the highest point of the parabolic curve. The length of the vertical curve must create a flat enough transition between roadway grades to allow for a line of sight from the driver's eye, past the high point of the pavement surface, to an object in the traveled lane that is at least 2 feet high.

Figure 6. Schematic of a Typical Crest Vertical Curve and Line of Sight Needs for SSD



Of the 103 crest vertical curves within the Study corridor, the majority meet minimum acceptable criteria for new construction and are rated as good. The remaining crest curves, listed in Table 7, are below new construction criteria but still meet 3R criteria and are rated as fair. No existing crest vertical curves were identified as poor.

Table 7. Summary of Existing Crest Vertical Curves Rated as Fair for SSD

Milepost	Desired Rate of Curvature for New/3R Construction	Existing Rate of Curvature	Rating
277.9	151/29	63	Fair
278.2	151/29	50	Fair
279.0	151/29	63	Fair
279.6	151/29	63	Fair
308.5	151/29	54	Fair
309.1	151/29	62	Fair
309.4	151/29	76	Fair

Rating:

Good = Curve SSD meets minimum acceptable criteria for new construction

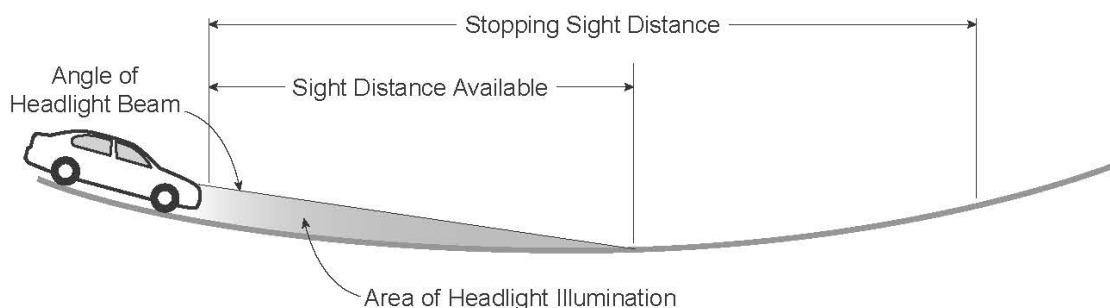
Fair = Curve SSD below minimum acceptable criteria for new construction, but meets or exceeds 3R criteria

Poor = Curve SSD provides design speed less than acceptable 3R criteria

Sag Vertical Curves

A sag vertical curve is also a parabolic curve used to smoothly transition the roadway grade as depicted in Figure 7. SSD needs at a sag vertical curve are based on the distance a vehicle's headlight beams can illuminate the roadway in dark conditions. If the length of vertical curve is too short, a vehicle's headlights may not illuminate the sag vertical curve for sufficient distance to allow for a driver to react, brake, and stop if an obstacle is in the vehicle's path. If roadway lighting is present to illuminate the pavement surface through the sag vertical curve in lieu of relying on a vehicle's headlights, a shorter sag curve with a more abrupt transition in roadway grade is acceptable. In general, existing roadway lighting is not present in the Study corridor.

Figure 7. Schematic of a Typical Sag Vertical Curve and Line of Sight Needs for SSD



Of the 99 sag vertical curves in the Study area, the majority meet the minimum acceptable criteria for new roadway construction and are considered good. Like the crest vertical curves, the sag vertical curves that do not meet criteria for new construction still meet the acceptable 3R parameters and are rated as fair. No existing sag vertical curves were identified as poor. Table 8 summarizes the locations where sag vertical curves meet 3R criteria and are rated as fair.

Table 8. Summary of Existing Sag Vertical Curves At or Below Acceptable Values

Milepost	Rate of Curvature for New/3R Construction	Existing Rate of Curvature	Rating
271.1	136/49	79	Fair
271.7	136/49	50	Fair
277.7	136/49	94	Fair
278.0	136/49	52	Fair
278.3	136/49	72	Fair

**Table 8. Summary of Existing Sag Vertical Curves At or Below
 Acceptable Values**

Milepost	Rate of Curvature for New/3R Construction	Existing Rate of Curvature	Rating
278.8	136/49	62	Fair
279.5	136/49	71	Fair
279.6	136/49	51	Fair
308.8	136/49	90	Fair
309.6	136/49	62	Fair

Rating:

Good = Curve SSD meets minimum acceptable criteria for new construction

Fair = Curve SSD below minimum acceptable criteria for new construction, but meets or exceeds 3R criteria

Poor = Curve SSD provides design speed less than acceptable 3R criteria

5.4 DECISION SIGHT DISTANCE

Decision sight distance (DSD) is the distance a driver needs to be able to identify a possible change in travel path and decide which travel path to take. Decision points can include horizontal curves, intersections, exit ramps at interchanges, and lane shifts. For example, approaching an intersection, a driver needs enough distance to identify the intersection location, determine which direction they will travel at the intersection (turn or continue through the intersection), and then react appropriately. DSD is a consideration with both horizontal and vertical roadway alignments. When considering horizontal alignments, DSD needs are considered similarly to those shown in Figure 3. For vertical alignments, DSD needs are considered similar to SSD (Figure 6).

Suggested DSD values assume that an approaching driver is able to see the pavement surface and painted pavement markings at the decision point. This conservative estimate does not account for other visual cues that may be available to a driver approaching a decision point, such as advanced signing, delineators or chevrons, flashing beacons, and other roadside features.

Review of as-built plans identified a handful of locations where intersections are near crest vertical curves or changes in horizontal curvature could be hidden behind roadside features along a preceding horizontal curve limiting the potential line of sight of an approaching driver to the pavement surface. These locations were specifically reviewed during the onsite field visit; at all locations, additional visual cues are present and an approaching driver would not need to rely solely on roadway painted markings to identify an intersection or change in roadway curvature is approaching. No specific locations were noted while driving the Study corridor at the posted speed limit that would suggest a DSD concern exists.

5.5 ROADWAY CROSS SECTION

The roadway cross-section analysis consisted of reviewing travel lane widths, shoulder type and width, presence of turn lanes (also called auxiliary lanes), roadside hazards for an errant vehicle, and pedestrian accommodations in urban areas.

TRAVEL LANES AND SHOULDERS

For the clear majority of the Study corridor, 12-foot travel lanes with 10-foot shoulders are present. Ten-foot granular shoulders are predominantly found from the start of the project Study corridor to just west of Clarence and account for just over 1/3 of the corridor. Composite, or partially paved shoulders, which make up a little more than 1/2 of the corridor, typically include a 4-foot paved shoulder adjacent to the travel lane with the remaining 6 feet of shoulder being granular. This shoulder condition is present over the majority of the Study corridor east of Clarence. The remainder of the Study corridor has paved shoulders for the full shoulder width, a composite shoulder with varying widths of the paved and granular surfaces, shoulders adjacent to turn lanes that vary in overall width and/or type, or some other non-typical shoulder conditions.

Centerline rumble strips and shoulder rumble strips are present from just east of Clarence to the eastern limits of the Study corridor. The rumble strips were constructed as part of a pavement overlay project in the 2014/2015 timeframe; review of crash data suggests that the rumble strips were effective in reducing the number of cross-centerline crashes (see the *US 30 Cedar and Clinton Counties Planning and Environmental Linkages [PEL] Study: Existing Crash and Safety Performance Report* [CH2M, 2019] for additional crash analysis details).

US 30 through Clarence is the only section of the Study corridor that has curb and gutter. In Clarence, the existing roadway width is generally 30 feet measured between curb lines. In some areas, an additional 20 feet of width is present in the form of on-street parallel parking lanes; when present, parking lanes are generally provided in both directions of travel along US 30. These dimensions are consistent with current Iowa DOT design practices and Iowa SUDAS criteria for a two-lane urban highways and roadways. On-street parking is permitted and marked on both sides of US 30 between 5th and 7th Avenues in Clarence. The existing parking lane width is approximately 9 feet in the eastbound direction and approximately 10 feet in the westbound direction. The on-street parking is located near the existing business fronts along US 30 and important to the success of existing businesses along US 30 according to early public and stakeholder feedback.

In Clarence, the existing curb is of minimal height, or has completely deteriorated, and has a slightly sloped curb face. The minimal curb height may be the result of weathering and past pavement overlay projects, which would essentially raise the roadway surface at the curb face without changing the height of the existing curb. The low curb height may minimize the curb's ability to convey stormwater, but more detailed study would be required to fully understand the existing roadway drainage conveyance.

TURN LANES

Dedicated right- and left-turn lanes at intersection locations that remove turning traffic from the US 30 through movement are scattered throughout the corridor and are primarily located in or near the small communities along the Study corridor. Table 9 lists the locations where turn lanes are present.

The existing turn lanes measure between 10 and 12 feet wide, with a 12-foot width being the most common. Shoulders adjacent to the dedicated right-turn lanes typically maintain the shoulder width of the approaching roadway, but at locations in Mechanicsville and Stanwood, minimal, if any, shoulder is maintained next to the turn lanes. Right-turn lanes are developed with widening of the roadway pavement approaching the intersection. At locations dedicated left-turn lanes are present, a painted median ranging in width from 4 to 20 feet is present to channelize the left-turning and through traffic flows at the intersection.

Pavement tapers and shifts in travel lanes are needed to develop the turn lanes and median sections at the intersections noted in Table 9. The existing lane shifts and taper rates were estimated using aerial photography and compared to preferred and acceptable rates documented in current Iowa DOT Design Manual Policies. As shown, most of the locations have taper rates greater than those currently desired per Iowa DOT policies but fall within the range of acceptable rates defined in AASHTO guidance.

Table 9. Summary of Existing US 30 Turn Lane and Thru Lane Shift Locations

Intersection (Location)	Direction of Travel	Existing Turn Lane Present	Existing Taper	Desired Taper
X-40/Madison St. (Mechanicsville)	Westbound	Right	12:1	15:1
X-40/Madison St. (Mechanicsville)	Eastbound	Right	12:1	15:1
Cherry St. (Mechanicsville)	Westbound	Right	10:1	15:1
Forest St. (Stanwood)	Westbound	Right	11:1	15:1
IA 38/Monroe Ave (Stanwood)	Westbound	Right	24:1	15:1
IA 38/Monroe Ave (Stanwood)	Westbound	Left	12:1	10:1
IA 38/Monroe Ave (Stanwood)	Westbound	Lane Shift		
IA 38/Monroe Ave (Stanwood)	Eastbound	Right	22:1	15:1
IA 38/Monroe Ave (Stanwood)	Eastbound	Left	12:1	10:1
IA 38/Monroe Ave (Stanwood)	Eastbound	Lane Shift		
Y-14/Y-24/Hoover Hwy (Lowden)	Eastbound	Left	7:1	10:1
Y-14/Y-24/Hoover Hwy (Lowden)	Westbound	Left	7:1	10:1

ROADSIDE

Evaluation of the roadside is based on clear zone requirements of a roadway. The clear zone is the theoretical area needed along the roadside necessary for the driver of an errant vehicle to regain control or come to a safe stop after exiting the roadway. The desire is to maintain a clear zone with graded slopes that are traversable and free of obstacles (steep drop offs, trees, utility poles, etc.) that would pose a risk to an errant vehicle and driver.

Existing roadside features and potential obstacles were evaluated as part of the onsite windshield survey, Google Earth, and as-built plans. Generally, the roadside appears to be free of fixed objects that could pose a hazard to an errant vehicle. Graded foreslopes are generally flat and ditch sections, when closely located to US 30, appear traversable. Guardrail protection is provided at locations where objects are located near the US 30 travel way and could pose a risk to an errant vehicle such as bridge barrier rails and drainage culvert structures.

PEDESTRIAN ACCOMMODATIONS

US 30 in Clarence is the only location within the Study corridor that provides specific pedestrian accommodations in the form of sidewalk. In the residential areas of Clarence, there is generally a grassy buffer area of about 13 feet between the curb and sidewalk. Existing sidewalk widths are typically a minimum of 4 feet wide and are considered to be in fair condition with some signs of deterioration, cracking, and heaving. Figure 8 is a picture from the onsite windshield survey and depicts a typical section of sidewalk along residential sections of US 30 in Clarence.

Figure 8. Typical Sidewalk along US 30 in Residential Areas of Clarence



Through the business district of the US 30 corridor in Clarence, the sidewalk widens and extends to the back of curb. In some areas, two levels of existing sidewalk are present, one adjacent to the parking lanes along US 30, and the second along existing store and business fronts (Figure 9). In these areas, pedestrians need to make a vertical step, up or down, between the two levels of sidewalk or to walk along the parking and travel lane until a location where steps or a pedestrian ramp/curb transition is present at a cross-street location.

Figure 9. Sidewalk and Parking Lanes along US 30 in the Clarence Business District



Portions of the sidewalk are discontinuous and end abruptly throughout Clarence. In some locations, sidewalk is present on both the north and south sides of US 30, while in other locations, it is only present on one side of US 30.

All intersections with US 30 through Clarence have stop signs on the local roadways. Painted crosswalks, pedestrian signals, or mid-block pedestrian crossings observed are generally not provided. Breaks in the curb line with sidewalk ramps are present at some locations, while at other locations, a ramp is not present and requires a pedestrian to step up or down at the curb line. Where present, the sidewalk ramps were not checked for compliance with current Americans with Disabilities Act requirements.

5.6 INTERSECTIONS

Currently, there are 25 at-grade intersections between US 30 and local rural county roadways and another 38 with local roadways in the urban communities along the Study corridor. Of these 63 total US 30 intersections, 45 are with paved local roadways and 18 with gravel roads. At all the intersections, US 30 traffic maintains the right-of-way, and all traffic on the intersecting roadway approaches is required to stop. In addition to the public roadway intersections, there are currently an estimated 160 points of access within the Study corridor that include commercial and residential driveways, alleyways, and farm field entrances. Considering all access points, there is, on average, five access points to US 30 every mile. The density of access points fluctuates along the Study corridor, with the highest density found in the various communities compared to rural areas.

This existing conditions analysis focuses on the US 30 intersections with other public roadways. The following subsections discuss the review of existing intersection geometry and sight distance needs in the Study corridor.

INTERSECTION ALIGNMENT AND SKEW

The acute angle formed by two intersecting roadways, referred to as the intersection skew, is shown in Figure 10 and is a key geometric feature of an intersection. Preferred intersection geometry would limit the skew of an intersection to between 75 and 90 degrees but skews as low as 60 degrees are considered acceptable by current design practices and guidance. Skewed intersections can create difficulties for drivers stopped on the intersecting roadway to see oncoming traffic on the primary roadway and to judge the oncoming traffic's speed to identify a sufficient gap in traffic to safely maneuver through the intersection. When skew angles are below 60 degrees, drivers stopped on the intersecting roadway must look back over their shoulders to see oncoming traffic. When skewed intersections are on or near horizontal curves, it can further complicate the perception of oncoming traffic and maintenance of sight lines to safely navigate through the intersection.

Figure 10. Example of Intersection Skew



Source: Aerials provided by Iowa DOT: CAD format

Most of the intersections within the Study corridor have intersecting roadways that are nearly perpendicular, or 90 degrees, to each other. However, there are some intersections that have skew angles below 75 degrees and some with angles less than 60 degrees. Table 10 summarizes the intersections with skew angles of less than 60 degrees and notes whether any horizontal roadway curves are at or near the skewed intersection. Table 10 also summarizes the intersection-related crash history at these locations between 2013 and 2017; in general, the crashes that did occur were relatively minor, with a few resulting in reported minor injuries.

Table 10. Summary of Intersection Alignments with Skew Angles Less than 60°

Intersection (Minor Leg)	Approximate Skew Angle (degrees)	Horizontal Roadway Curves at or Near Intersection	Intersection-Related Crash History (2013-2017)
Old Lincoln Hwy (just east of Mechanicsville)	15°	US 30	No Notable Crash History
150th St.	43°	Both US 30 and 150th	No Notable Crash History
Williams St.	56°	US 30	No Notable Crash History
240th St./Buchanan St.	34°	US 30	No Notable Crash History
Y-4E/Y-32	56°	US 30	6 total crashes, one minor injury crash
Y-54/230th Ave.	40°	US 30	4 total crashes, 2 minor injury crashes

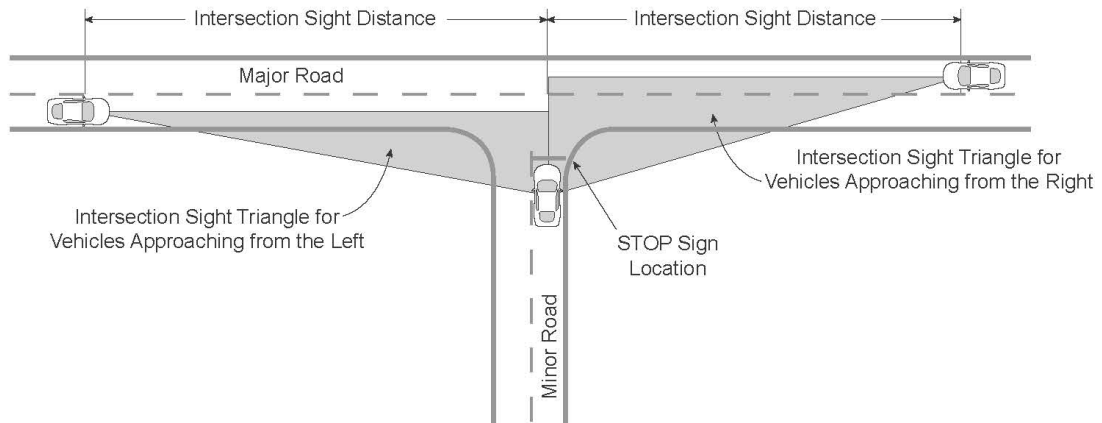
Most of the intersections in the Study corridor have four legs of approach, two on US 30 and two on the local intersecting roadway. At the 4-legged intersections, opposite approach roadways are generally oriented directly across the intersection from one another, especially in the rural areas of the Study corridor. A few intersections in the urban areas were noted as having the opposite minor leg intersection approaches slightly offset from one another requiring a through movement on the local roadway to make a slight jog through the intersection or to turn onto US 30 and follow US 30 for a short distance before making another turn to continue on the minor local roadway. Intersection orientation such as this is known as an offset intersection.

In addition to the four-legged intersections, there are a number of intersections with only three approaches, commonly referred to as T-intersections. Each T-intersection in the Study corridor consists of two US 30 approaches and one local side road approach. Additional signing at the T-intersections, particularly at rural intersections, is present, alerting drivers that a through movement on the local minor road is not possible.

INTERSECTION SIGHT DISTANCE

Roadside areas adjacent to an intersection should be kept free of sight obstructions so drivers are able to clearly see approaching traffic to pick an appropriate gap in traffic prior to proceeding into the intersection. Figure 11 depicts the concept of intersection sight triangles; the sight triangle is the roadside area that should be kept free of visual barriers to provide drivers the needed sight lines to assess oncoming traffic conditions.

Figure 11. Schematic of Intersection Sight Distance Needs



Review of aerial photography and as-built plan information did not identify any intersection locations of great concern; however, during the onsite field review, some intersections were noted as having a potential sight triangle obstruction(s), assuming a vehicle is stopped at the current location of the painted stop bar and/or stop sign on the minor roadway approach(s). Possible sight-distance obstructions include adjacent embankments, trees, crops, or other vegetative growth, railroad equipment, and billboards/signs. Table 11 lists the locations identified during the onsite field review with possible sight-distance limitations from the existing stop sign location. Table 11 also lists other characteristics of these intersections that may also influence the ability of a driver to see oncoming traffic and pick a safe gap to maneuver through the intersection from a minor approach roadway, including intersection skew and roadway curvature. Appendix B contains photographs taken during the onsite windshield survey at these locations. Overall, no notable crash histories were noted at these intersections; crashes that did occur were relatively minor, with only a few minor injuries reported.

Table 11. Locations Identified During the Onsite Field Review with Possible Intersection Sight Distance Obstructions

Intersection	Quadrant(s)	Possible Obstruction	Intersection-Related Crash History (2013-2017)	Other Limiting Factors	Photo Log Reference*
X-40/Madison St	Southeast	Billboard/Sign	3 total crashes, no injuries	Intersection Skew	41
Grant Ave	Northwest, Northeast, Southeast	Railroad Control Cabinet, Railroad Embankment and Trees/Bushes	1 crash with minor injury	US 30 Horizontal Curve	50, 51, 55
Indian Ave	Northwest, Northeast	Crops	1 crash with minor injury	US 30 Horizontal Curve	70, 71
X-46/Jackson Ave	Southwest, Southeast, Northwest	Crops and Embankment	1 crash with no injury	US 30 Vertical Curve	73, 74, 75, 77, 80
Kelly Ave	Southwest, Southeast	Crops and Embankment	No crash history	US 30 Vertical Curve	81, 82, 84
160th St	Southeast	Trees	No crash history	US 30 Horizontal Curve	192
Y-44/Davenport St	Northwest, Southwest, Southeast	Building, Gas Station, Embankment, Trees	1 crash with no injury		262, 263, 264
Y-52/190th Ave	Northeast, Southeast	Embankment, bushes, other roadside features	No crash history		269, 274
210th Avenue	Northwest	Embankment, vegetation, utility poles	No crash history	US 30 Vertical Curve	281
237th Avenue	Northwest	House, vegetation	No crash history		312
260th Avenue	Northwest, Southwest, Southeast	Embankment, crops/vegetation	4 total crashes, 2 minor injury crashes	US 30 vertical curves, US 30 transition area between 2- and 4-lanes	329, 330, 332, 333

*See Appendix B

6 INFRASTRUCTURE CONDITION

Iowa DOT routinely reviews the condition of existing roadway pavements, bridges, and other related infrastructure on its system. Condition reports available at the time of this existing conditions analysis were reviewed to rate the current condition of the existing roadway and bridge infrastructure along the corridor.

6.1 EXISTING PAVEMENT CONDITIONS

Existing pavement conditions noted in this Study are based on an Infrastructure Condition Evaluation (ICE) interactive map prepared by Iowa DOT.¹ The ICE is a function of Pavement Condition Index, International Roughness Index, structure sufficiency ratings, traffic mix (percentage of vehicles by type), and congestion index. The ICE normalizes the criteria listed above, and each criterion contributes a different percentage to the total composite score. The percentage each criterion contributes is based on the impact each will typically have on the pavement. The resultant composite rating is a number between 0 (worst) and 100 (best). For additional details regarding the ICE, including a more detailed description and summary of the composite rating criteria, see the Iowa DOT Iowa *Infrastructure Condition Evaluation: 2017-2018 Highway Planning Report*.²

Table 12 summarizes the ICE ratings for the existing pavement in the corridor. Observations in the field were generally noted to be consistent with the ICE ratings observed on the Iowa DOT website. The worst pavement conditions (ICE < 60) are found in the western third of the corridor. Pavement conditions improve east of Clarence, with the most favorable conditions (70 < ICE < 80) located between Clarence and Wheatland, as well as just west of Calamus to the eastern edge of the Study corridor. Areas with fair and poor pavement conditions are depicted on the maps provided in Appendix A of this memorandum.

Table 12. Summary of Existing Pavement ICE Ratings

ICE Composite Rating	Approximate Length in Miles	Rating
ICE < 60	15.5	Poor
60 < ICE < 70	4.25	Fair
70 < ICE < 80	11.5	
ICE 80+	10.0	Good

6.2 EXISTING BRIDGE CONDITIONS

There are currently eight US 30 bridges (Table 13), in the Study corridor and all but one cross a creek or river feature; the remaining bridge is a crossing of the Union Pacific (UP) Railroad. Review of prior Iowa DOT bridge inspection and maintenance reports suggest that all eight structures are in fair condition and meet current structural and functional parameters necessary to

¹ <http://iowadot.maps.arcgis.com/apps/webappviewer/index.html?id=23c9e6c132c8498bab6cb2e85b21ec7e>

² https://iowadot.gov/systems_planning/pr_guide/Plans%20and%20Studies/ICE%202017-2018%20Highway%20Planning%20Report.pdf

serve traffic. All the bridges in the corridor are capable of carrying legal highway loads; none of the bridges have posted weight restrictions at the time this existing conditions analysis was prepared.

Most of the bridges were constructed in the 1950s and have had regular maintenance and some rehabilitation work over the years. Iowa DOT inspection reports have noted that the US 30 bridge over the Wapsipinicon River, near mile post 298.5, may be considered for replacement sometime in the next 5 to 10 years. No other bridges have been identified as needing replacement at the time this analysis was prepared.

Overall, the width of the existing bridges measured between bridge rails is less than the width of the approach roadways (travel lanes plus shoulders). The exceptions are the bridges over Rock Creek (mile post 279.4) and Mill Creek (mile post 283.3); these two bridges have widths slightly larger than the approach roadway width. The narrower bridge widths are acceptable, but typically it is desired to maintain the approach roadway width across the bridge.

Table 13. Summary of Existing US 30 Bridges within the Study Corridor

FHWA No.	Mile Post	Feature Crossed	Bridge Width (ft)	Overall Condition	Year Built
18261	279.5	Rock Creek	48	Fair	1973
18271	283.3	Mill Creek	48	Fair	1974
18300	289.7	Yankee Run Creek	35	Fair	1955
20720	297.6	UP Railroad	34	Fair	1955
20730	297.9	Wapsipinicon River	35	Fair	1955
20740	298.5	Wapsipinicon River	34	Fair	1955
20750	299.3	East Channel of Wapsipinicon River	34	Fair	1955
20760	299.5	Calamus Creek	34	Fair	1955

7 AT-GRADE RAILROAD CROSSINGS

The UP Railroad corridor runs nearly parallel to US 30 for the majority of the Study corridor. US 30 provides a grade-separated crossing over the railroad southeast of Wheatland; this is the only location that US 30 and the UP Railroad currently cross within the Study corridor. West of the grade-separated crossing, the UP Railroad is north of the existing US 30 alignment; east of the crossing, the UP Railroad is located south of existing US 30. The UP Railroad corridor consists of two tracks, and available information suggests upwards of 60 trains per day on average pass through the area.

Because the UP Railroad runs parallel to US 30, there are at-grade railroad crossings on most of the minor roads that intersect US 30 within the Study area. This Study identified a total of 41 at-grade railroad crossings on local roadways that are within 0.5 mile of the local roadway's

intersection with US 30. Of these, 19 are within 150 feet of the local side road intersection with US 30. Table 14 summarizes the existing railroad crossing locations that are within 150 feet of the local roadway’s intersection with US 30.

Table 14. Summary of At-Grade Railroad Crossings Near US 30

Sideroad (US 30 Mile Post)	Crossing Control	Advanced Signing	Approximate Crossing Distance from US 30 (feet)
Unnamed Road (271.3)	Crossing gates and lights	Yes	60
Delta Ave (271.8)	Crossing gates and lights	Yes	65
Echo Ave (273.2)	Crossing gates and lights	Yes	60
Franklin Ave (273.7)	Crossing gates and lights	Yes	60
X-40/Madison St (274.3)	Crossing gates and lights	Yes	60
Cherry St (274.5)	Crossing gates and lights	Yes	60
Grant Ave (275.6)	Crossing gates and lights	Yes	60
8th Ave (285.3)	None	No	110
X-64/Oxford Junction (285.5)	Crossing gates and lights	Yes	95
River Valley Co-op Entrance East of Clarence (285.8)	Crossing gates and lights	Yes	95
Rose Ave (286.3)	Crossing gates and lights	Yes	95
Spicer Ave (287.3)	Yield Sign	Yes	95
Taylor Ave (288.4)	Crossing gates and lights	Yes	95
150th St (289.4)	Stop Sign	No	100
155th/Vermont Ave (290.5)	Crossing gates and lights	Yes	95
160th St (291.6)	Crossing gates and lights	Yes	95
105th Ave (294.5)	Stop Sign	Yes	95
122nd Ave (296.3)	Stop Sign	Yes	80
237th Ave (307.6)	Crossing gates and lights	Yes	70

Observations during the onsite windshield survey support input received from local stakeholders, including a lack of adequate storage for vehicle queues between the railroad crossings and US 30 at a number of locations, which results in cars stopping on the US 30 shoulders, vehicles making U-turns in traffic, and vehicles stopped within the US 30 travel way. Stakeholders in Mechanicsville and Stanwood specifically noted these traffic actions and indicated that they have resulted in traffic crashes in the past.

At the locations where the railroad crossings are near US 30, the vast majority have crossing gates and lights already in place. At some of the more rural crossings or those with private property entrances, crossing gates or lights are not always present, and in such cases, traffic control at the railroad crossing consists of the typical crossbucks and stop or yield signs.

8 NO-PASSING ZONES

Aerial photography and observations during the onsite windshield survey were used to estimate the total number and length of posted passing zones in the Study corridor. Table 15 summarizes the locations where passing is prohibited.

Approximately 32 miles, or 80 percent of the corridor, allows for passing in at least one direction of travel. Observations during the windshield survey and driving the corridor suggest that in the areas where passing is allowed, opportunities exist where gaps in oncoming traffic are sufficient to allow for a safe passing maneuver. This is especially true through the central section of the corridor where roadway grades are generally flat and available sight distance is the greatest. However, on the east and west ends of the corridor, individual passing zones are shorter in length due to more frequent changes in the roadway grade and curvature. In the areas with the short passing zones, any opposing traffic can greatly limit the number of available passing opportunities.

Table 15. Summary of Existing US 30 No Passing Zones

Eastbound			Westbound		
Mile Post Start	Mile Post End	Description	Mile Post Start	Mile Post End	Description
		0.4-Mile Passing Zone	269.2	269.4	No Passing
270.5	270.7	No Passing			0.1 Mile Passing Zone
		0.4-Mile Passing Zone	269.5	269.8	No Passing
271.1	271.4	No Passing			0.2 Mile Passing Zone
		0.2-Mile Passing Zone	269.9	270.3	No Passing
271.6	271.8	No Passing			0.4 Mile Passing Zone
		4.2-Mile Passing Zone	270.7	270.9	No Passing

Table 15. Summary of Existing US 30 No Passing Zones

Eastbound			Westbound		
Mile Post Start	Mile Post End	Description	Mile Post Start	Mile Post End	Description
276.0	276.2	No Passing	0.4-Mile Passing Zone		
0.5-Mile Passing Zone			271.2	271.6	No Passing
276.7	276.9	No Passing	0.2-Mile Passing Zone		
0.3-Mile Passing Zone			271.8	272.0	No Passing
277.2	277.3	No Passing	4.3-Mile Passing Zone		
0.3-Mile Passing Zone			276.2	276.5	No Passing
277.5	278.0	No Passing	0.4-Mile Passing Zone		
0.2-Mile Passing Zone			276.9	277.1	No Passing
278.1	278.4	No Passing	0.3-Mile Passing Zone		
0.2-Mile Passing Zone			277.4	277.5	No Passing
278.6	278.8	No Passing	0.2-Mile Passing Zone		
0.7-Mile Passing Zone			277.7	278.2	No Passing
279.4	279.7	No Passing	0.2-Mile Passing Zone		
0.8-Mile Passing Zone			278.3	279.0	No Passing
280.5	281.3	No Passing	0.6-Mile Passing Zone		
2.5-Mile Passing Zone			279.6	279.9	No Passing
283.7	283.9	No Passing	0.9-Mile Passing Zone		
0.6-Mile Passing Zone			280.7	281.3	No Passing
284.5	284.7	No Passing	2.7-Mile Passing Zone		
4.7-Mile Passing Zone			283.9	284.1	No Passing
289.4	289.6	No Passing	0.5-Mile Passing Zone		
2.3-Mile Passing Zone			284.7	284.8	No Passing
291.8	292.5	No Passing	4.8-Mile Passing Zone		

Table 15. Summary of Existing US 30 No Passing Zones

Eastbound			Westbound		
Mile Post Start	Mile Post End	Description	Mile Post Start	Mile Post End	Description
		19.7-Mile Passing Zone	289.7	289.8	No Passing
297.0	297.8	No Passing			2.2-Mile Passing Zone
		4.3-Mile Passing Zone	292.0	292.5	No Passing
302.1	302.3	No Passing			4.6-Mile Passing Zone
		0.3-Mile Passing Zone	297.1	298.2	No Passing
302.6	302.8	No Passing			4.4-Mile Passing Zone
		1.7-Mile Passing Zone	302.6	302.7	No Passing
304.5	304.6	No Passing			0.3-Mile Passing Zone
		0.3-Mile Passing Zone	303.0	303.2	No Passing
304.9	305.0	No Passing			1.7-Mile Passing Zone
		1.3-Mile Passing Zone	304.9	305.1	No Passing
306.3	307.1	No Passing			0.2-Mile Passing Zone
		0.5-Mile Passing Zone	305.3	305.5	No Passing
307.6	307.7	No Passing			1.4-Mile Passing Zone
		0.1 Mile Passing Zone	306.9	307.5	No Passing
307.9	308.0	No Passing			0.4-Mile Passing Zone
		0.3-Mile Passing Zone	307.9	308.2	No Passing
308.2	309.6	No Passing			0.1-Mile Passing Zone
		0.2 Mile Passing Zone	308.3	308.5	No Passing
					0.3-Mile Passing Zone
			308.8	309.2	No Passing
					0.2-Mile Passing Zone
			309.4	310.1	No Passing

9 TRAFFIC OPERATIONS AND MOBILITY

Existing traffic counts and volume data sources were used to study current traffic operations and mobility within the Study corridor. Traffic operations considers how well traffic flow is maintained throughout the corridor by comparing the volume of traffic on a section of roadway to the roadway's theoretical capacity (the maximum number of vehicles the roadway or intersection can accommodate). Mobility considers the accessibility, reliability, and ease of travel along a section of roadway.

9.1 EXISTING TRAFFIC DATA

Readily available existing traffic data was gathered for this Study from the following Iowa DOT sources:

- 2014 Average Annual Daily Traffic (AADT) maps³
- 2014 hourly turning movement diagrams and hourly counts¹
- 2017 AADT mainline volume counts (by vehicle type)

The 2014 AADT and hourly turning movement diagrams are the basis for the existing traffic operations analysis and provide insight on the volume of traffic in the corridor daily, including turning patterns at individual intersections. The turning movement traffic data also includes the volume of traffic broken down by time of day on an hourly basis. The hourly breakdown can be used to identify the times of day, or peak hours, when traffic volumes are the greatest and most critical to the ability of a roadway to maintain an efficient flow of traffic. Often, peak periods coincide with the times of day when commuter traffic is the greatest; generally, in the morning (AM peak) and late afternoon or evening (PM peak).

The 2017 AADT mainline volume information collected and provided by Iowa DOT includes traffic counts by vehicle type. This data is useful to understand the composition of the vehicle mix currently using US 30, particularly the volume of heavy or large trucks, including single-unit trucks (like a UPS or FedEx delivery truck), vehicles with three or more axles (semitrucks, grain trucks, etc.), and large agricultural equipment. The 2017 count data was also used to study changes in daily traffic characteristics compared to the 2014 data sources. Comparison of the 2014 and 2017 count information provided details on any notable growth or decline in daily volumes within the Study corridor.

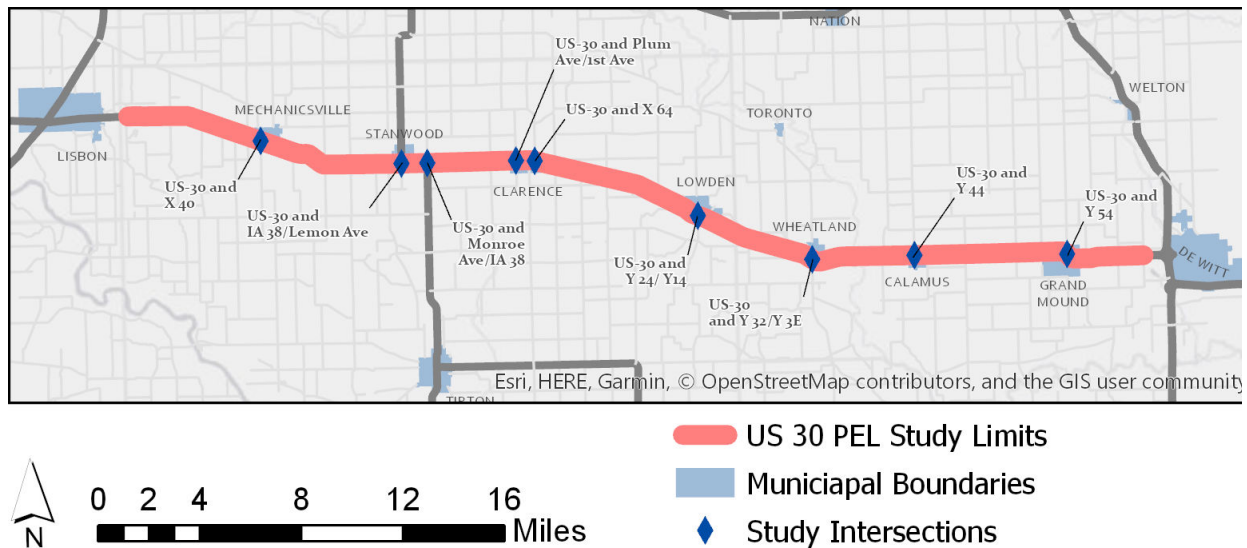
For this Study, the peak-hour characteristics, percentage of heavy and large vehicles in the daily traffic mix, and changes in daily traffic volumes between 2014 and 2017 were applied to the available count data with commonly used industry best practices and methodologies to create a set of traffic volumes to evaluate the existing traffic operations within the corridor. Within the Study corridor, there are several access points and sideroads intersecting US 30, many of which are gravel or paved local and residential roads that do not carry large volumes of daily traffic. This Study focused on the local roadways that have readily available existing traffic-count information and those that carry higher volumes of traffic daily compared to other

³ <http://iowadot.maps.arcgis.com/apps/Viewer/index.html?appid=a29e44be6e314799b612335342a13f62>

intersecting sideroads in the Study corridor. Focusing on the locations with the higher volumes focuses the analysis on the most critical locations in regard to the operational performance.

Nine intersections in the Study corridor were identified for operational study and are depicted in Figure 12. The developed existing peak-hour traffic volumes used for the existing operations analysis at these nine intersections and the segments of US 30 between these intersections are presented in Appendix C.

Figure 12. Existing Operational Analysis Study Intersections

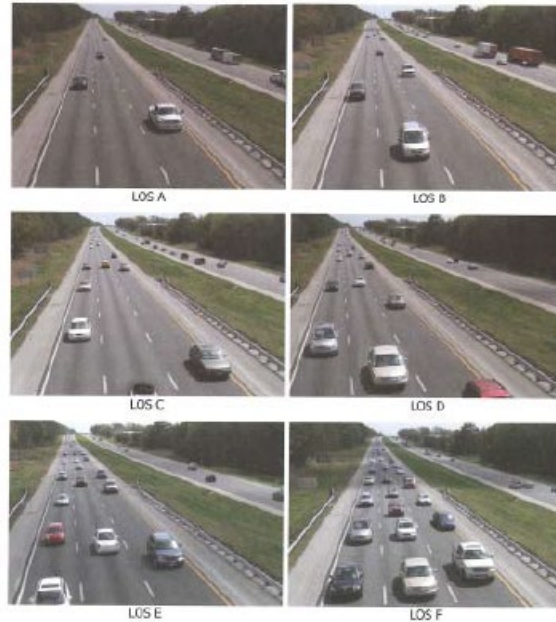


9.2 EXISTING TRAFFIC OPERATIONS PERFORMANCE

The operational performance of roadways and intersections is based on a measure of effectiveness known as level of service (LOS). LOS is a performance measure that represents quality of service for traffic operations. The Highway Capacity Manual (HCM) defines six levels of LOS, ranging from A to F. LOS A represents the best operating conditions from the traveler's perspective and LOS F, the worst. LOS values in the range of LOS A to LOS C are generally considered acceptable and preferred conditions, whereas LOS D to LOS E indicate rising levels of congestion and less stable traffic flow. LOS F indicates fully congested conditions with total breakdown in traffic flow. Current Iowa DOT practice is to achieve an LOS B or better on rural two-lane highway corridors, and LOS C or better is preferred on urban two-lane highways (however, LOS D is considered acceptable on two-lane urban roads).

Figure 13 provides a graphical representation of what conditions could be expected at the various LOS levels. While Figure 13 depicts a rural six-lane divided highway, it is provided to give the reader a perspective of what LOS A looks like compared to LOS F. LOS is determined using several different metrics and performance measures depending on what operational and roadway characteristics are present. The LOS performance measures for rural two-lane highway segments and two-way stop-controlled (TWSC) intersections are presented and discussed in the following subsections.

Figure 13. Representative Comparison of Various LOS Conditions



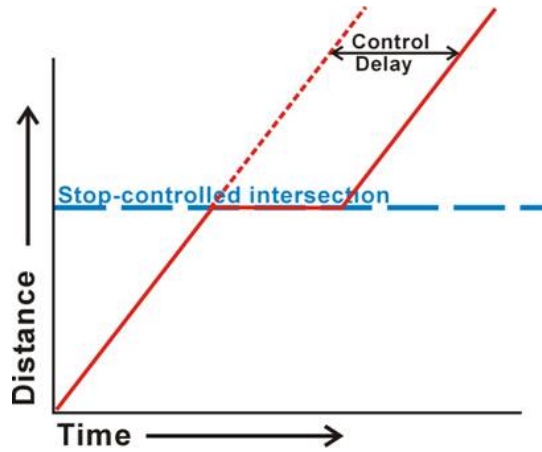
Source: Transportation Research Board of the National Academies. 2010. *Highway Capacity Manual (HCM)*. Washington DC.

INTERSECTIONS

The performance measure for LOS of a TWSC intersection is control delay. Control delay is the travel delay that results from the type of traffic control (stop sign, traffic signal, yield sign, etc.) present at an intersection and is measured by comparison with an uncontrolled (no traffic control present) condition. This is depicted in Figure 14 where the dashed line represents the time traveled along a path as if no traffic control is present. The horizontal shift in the travel time line represents the amount of delay experienced because of the traffic control in place.

For a TWSC intersection, control delay and LOS are measured for each individual movement at the intersection that encounters a stop sign. Since US 30 traffic is not required to stop at the various intersections, no control delay is experienced on the US 30 intersection approach roadway segments; with no control delay experienced, US 30 approaches to the various intersections can be considered to operate at LOS A. Control delay thresholds for each LOS stratification, as defined by the HCM, are presented in Table 16.

Figure 14. Graphical Representation of Control Delay



Source: https://www.hcmguide.com/Case1/popup_terms/control_delay_popup.htm

Table 16. TWSC LOS CRITERIA

Control Delay (seconds/vehicle)	LOS
0-10	A
>10-15	B
>15-25	C
>25-35	D
>35-50	E
>50	F

To calculate control delay and LOS for the nine study intersections, the Synchro traffic analysis tool was used. Synchro uses a combination of internal algorithms and industry-accepted methodologies documented in the HCM to simulate traffic conditions and report out the performance measures and LOS for the various traffic movements at an intersection.

Tables 16 and 17 summarize the Synchro analysis results for AM and PM peak hours for each approach at each of the nine intersections shown in Figure 12. The results suggest that all these intersections with US 30 operate at LOS B or better today. The suggested operational performance of these intersections is consistent with current Iowa DOT policy.

Table 17. Existing 2017 AM TWSC Intersection Approach LOS

TWSC Intersection	Intersection Location	Minor Road Intersection Approach			
		NB LOS	Control Delay (s/veh)	SB LOS	Control Delay (s/veh)
US-30 and X-40/Madison Ave.	Mechanicsville	B	13.5	B	11.8
US-30 and IA-38/Lemon Ave	Stanwood	B	11.3	B	12.7
US-30 and Monroe Ave/IA-38	East of Stanwood	B	10.6	B	11.2
US-30 and Plum Ave/1st Ave	Clarence	B	11.6	B	11.3
US-30 and X-64/Oxford Junction Rd.	East of Clarence	B	10.6	B	10.9
US-30 and Y-14/Y-24/Herbert Hoover Hwy	Lowden	A	9	A	9
US-30 and Y-32/Y-4E	Wheatland	A	9.4	A	9.8
US-30 and Y-44	Calamus	B	10.4	B	10.6
US-30 and Y-54	Grand Mound	A	9.1	A	9

*Free flow movement with no control delay with a default LOS A.
s/veh = seconds per vehicle

Table 18. Existing 2017 PM TWSC Intersection Approach LOS

TWSC Intersection	Intersection Location	Minor Road Intersection Approach			
		NB LOS	Control Delay (s/veh)	SB LOS	Control Delay (s/veh)
US-30 and X-40/Madison Ave.	Mechanicsville	B	14	B	13
US-30 and IA-38/Lemon Ave	Stanwood	B	13.9	B	14
US-30 and Monroe Ave/IA-38	East of Stanwood	B	11.5	B	11.4
US-30 and Plum Ave/1st Ave	Clarence	B	12.2	B	11.6
US-30 and X-64/Oxford Junction Rd.	East of Clarence	B	12.4	B	11.3
US-30 and Y-14/Y-24/Herbert Hoover Hwy	Lowden	B	11.6	A	9.8
US-30 and Y-32/Y-4E	Wheatland	B	10.8	B	10.6
US-30 and Y-44	Calamus	B	10.9	B	11.5
US-30 and Y-54	Ground Mound	B	10	A	9.5

*Free flow movement with no control delay with a default LOS A.
s/veh = seconds per vehicle

TWO-LANE HIGHWAY SEGMENTS

The operational performance of the two-lane highway segments between the nine key intersections discussed above was also evaluated. To study the operational performance of the rural highway segments, Highway Capacity Software (HCS) and industry-adopted HCM methodologies were used. The HCM notes multiple performance measures to consider when evaluating two-lane highways, depending on the type of two-lane facility being evaluated; the HCM (HCM 2010 Chapter 15, page 15-3, December 2010) classifies two-lane highways into three groups depending on their expected travel speeds and frequency of access points (side roads, entrances, alleyways, etc.) as:

- Class I – rural two-lane highways where motorists expect to travel at relatively high speeds; these are major intercity routes, connectors of major traffic generators, daily commuter routes, or major links in the state or national highway networks – serving mostly long-distance trips.
- Class II – rural two-lane highways where motorists do not expect to travel at relatively high speeds; these function as access routes to Class I facilities, scenic or recreational routes, or routes that pass through rugged terrain—serving relatively short trips, the beginning or end of longer trips, or trips for which sightseeing is the primary purpose.
- Class III – two-lane highways serving moderately developed areas and may be portions of Class I or II facilities passing through small towns or developed recreational areas; common features include the mixing of local traffic with through traffic, a higher density of unsignalized access points compared to rural areas, and reduced speed limits that reflect a higher activity level and lower travel speeds.

For this analysis, sections of US 30 in rural areas with a posted speed limit of 55 mph were assumed as Class I highways, while the sections of US 30 within the corporate limits of the communities along the corridor and with reduced posted speed limits were assumed to be Class III roadways.

Table 19 summarizes the performance measures and LOS levels for two-lane highways as defined in the HCM. For Class I roadways, two metrics are considered, average travel speed (ATS) and percent time spent following (PTSF). ATS is the average speed at which a vehicle travels the corridor. PTSF is the estimated time spent following slower-moving vehicles compared to the overall time it takes to make a trip between points A and B. LOS is assigned to a Class I roadway segment depending on which metric, ATS or PTSF, is shown to be most critical. For Class III roadways, the performance measure is percent of time at free-flow speed (PFFS); PFFS is the portion of the time a vehicle is able to travel at an assumed free flow, or unimpeded, travel speed when traveling between points A and B. Free-flow speed is commonly assumed to be equal to the posted speed limit.

Table 19. LOS Criteria for Two-Lane Highways

LOS	Class I Highways		Class III Highways
	ATS (mph)	PTSF (%)	PFFS (%)
A	>55	<35	>91.7
B	>50-55	>35-50	>83.8-91.7
C	>45-50	>50-65	>75.0-83.3
D	>40-45	>65-80	>66.7-75.0
E	<40	>80	<66.7

The two-lane highway operational analysis focused on the sections of US 30 with the highest and lowest existing traffic volumes and resulted in a range of LOS values that reflect how the current corridor operates overall. Within the Study corridor today, the section of US 30 from Mechanicsville to just east of Stanwood carries the most traffic, while the section from Lowden to Wheatland carries the least amount of traffic. The Mechanicsville to east of Stanwood segment includes both rural high-speed and urban reduced-speed sections of US 30, thus it was divided into two sections for analysis with the rural high-speed section following a Class I designation and the section through Stanwood designated as a Class III roadway. The lowest volume segment is high speed and rural throughout its entirety and was considered a Class I roadway for analysis.

Table 20 summarizes the results of the HCS two-lane highway analysis; bolded values indicate the critical performance measure that determined the existing LOS designation. As shown, traffic along the individual sections of US 30 are expected to operate between LOS B and LOS C.

Table 20. ANALYSIS RESULTS - TWO-LANE HIGHWAY LOS

Peak	Segment	Class	Eastbound					Westbound				
			Volume to Capacity (v/c)	ATS (mph)	PTSF (%)	PFFS (%)	LOS	Volume to Capacity (v/c)	ATS (mph)	PTSF (%)	PFFS (%)	LOS
AM	Mechanicsville to Stanwood	I	0.09	49.4	33.1	89.9	C	0.16	49.3	53.5	89.7	C
	Stanwood to East Stanwood	III	0.14	38.1	55.4	85.9	B	0.12	40.1	45.9	89.1	B
	Lowden to Wheatland	I	0.06	52.4	21.6	95.2	B	0.06	52.4	21.6	95.2	B
PM	Mechanicsville to Stanwood	I	0.17	49.0	54.7	89.1	C	0.10	49.4	37.1	89.9	C
	Stanwood to East Stanwood	III	0.17	38.1	60.9	84.6	B	0.14	39.5	47.3	87.8	B
	Lowden to Wheatland	I	0.09	50.6	29.8	92.0	B	0.08	51.0	26.3	92.7	B

Bolded volumes are controlling criteria. For Class I, where LOS differs for ATS and PTSF, the lower LOS governs.

The most critical two-lane highway section is the rural section between Mechanicsville and Stanwood. While the ATS speed is consistent between eastbound and westbound traffic during the peak periods on this section of US 30, the PTSF values show a distinctive travel direction pattern between the AM and PM peak periods. In the AM period, PTSF is notably higher in the westbound direction and likely the result of a heavier westbound traffic flow towards the Mt. Vernon/Lisbon and Cedar Rapids areas; this pattern reverses in the PM peak with the PTSF suggesting higher flows in the eastbound direction. During the AM peak, eastbound traffic operates at a borderline LOS B/C using the ATS performance measure, while the westbound direction of travel operates at a mid-range LOS C with PTSF as the critical metric. The same performance measurement and LOS observations are also true in the PM peak, only the directions of travel are reversed compared to the AM period.

The section of US 30 between Lowden and Wheatland operate at a LOS B during both peak periods, with the ATS slightly higher in the AM peak period compared to the PM peak.

Based on the rural highway LOS analysis, generally the existing highway segments meet current LOS design policies, but the operational performance measures suggest that on the more heavily traveled segments of the corridor, LOS performance measures near the lower range of desired values with some isolated locations falling below LOS B to LOS C.

MOBILITY

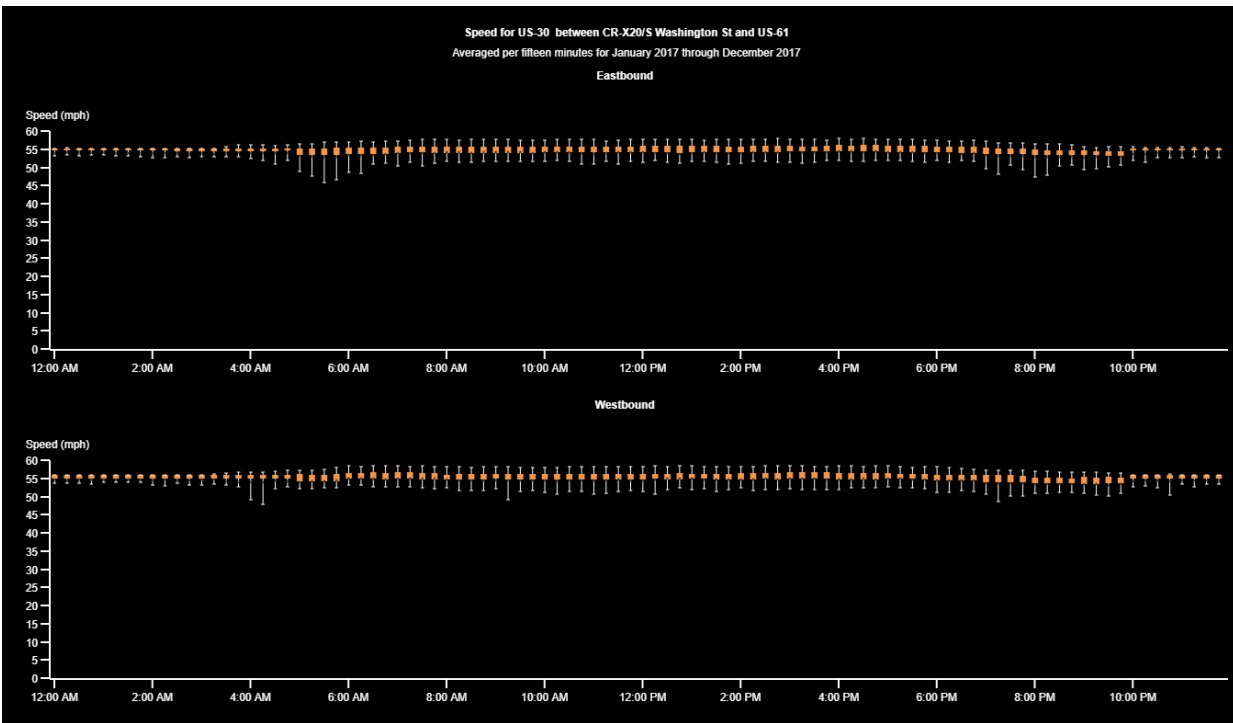
To evaluate mobility, this Study considers average travel times across the corridor as a metric to determine how reliable and consistent the flow of traffic is throughout the day. A wide range of average travel speeds would suggest that traffic does not flow freely, and the time it takes to travel through the corridor will be less reliable and tend to vary. In contrast, average travel speeds with limited fluctuation would suggest that less speed differential exists among the flow of traffic, and traffic should be able to move more freely and reliably along the corridor.

INRIX speed data was obtained for the corridor to evaluate general travel speeds and gauge existing mobility patterns and trends. INRIX provides crowd-sourced data that can be used for understanding real-time traffic flow. INRIX data is collected and compiled by a third-party vendor and made available to Iowa DOT through a subscription service.

Figures 15 illustrates average speed data collected from vehicles traveling along the corridor during 2017. This data considers the US 30 PEL Study corridor as a whole, with the data representing travel between Cedar County Road X-20/Washington Street in Lisbon and US 61 in DeWitt. As shown, the average vehicle speeds along the corridor are fairly consistent throughout the day and generally align with the posted speed limit of 55 mph. Except for two peak periods, centered loosely around 6 AM and 8 PM where the deviation of travel speeds widens, average speeds remain within a few miles per hour of the posted 55 mph speed limit. During the peak periods, the range of travel speeds widens, with the lower end of the range at about 10 mph below the posted speed limit. The INRIX travel speed data during the more heavily traveled peak periods appears to be generally consistent with the travel speeds suggested with the HCS analysis of the highway segments confirming both the INRIX data and HCS analysis credibility in the representation of existing travel characteristics of US 30.

The travel-speed trends and range of values shown in the INRIX data suggest that travel along the two-lane section of US 30 between Lisbon and DeWitt is relatively consistent and reliable; the variance in travel times when the range of travel speeds is the greatest would be about 5 minutes or less. The window in which this variance in travel time exists exceeds no more than 1 hour in the morning and 1 hour in the evening; very consistent travel times can be expected throughout the remainder of a 24-hour period.

Figure 15. Average Travel Speeds Between Lisbon and DeWitt per INRIX Data



10 CONCLUSIONS

This existing conditions analysis studied and compared features of the existing US 30 Study corridor to current Iowa DOT design guidance and policy and industry-defined best practices. The existing corridor was compared against criteria for new roadway construction and acceptable criteria for general roadway maintenance and preservation. Overall, the US 30 corridor features are found to be within the today's acceptable design and traffic operational parameters. Only isolated locations were identified where current roadway features do not align with current design practices; no widespread or systemic concerns were identified during the analysis. Review of the existing infrastructure condition did suggest that the corridor is aging, and some maintenance and repair work may be warranted in the future.

Four key take-aways were noted as part of this existing conditions study:

- The existing US 30 roadway meets current design practices and policies with only isolated locations that may be considered less than ideal. These areas tended to involve intersection alignment and geometrics and sight distance needs; no notable crash history at these locations was observed when reviewing the last 5 full years of available Iowa DOT crash data.
- The UP Railroad parallels US 30 for the majority of the US 30 PEL Study corridor with a number of at-grade railroad crossings on local side roads that are within 150 feet of the side road intersections with US 30. The minimal distance between US 30 and the railroad crossings limits the space available for vehicle queues and storage while the tracks are in use, which can lead to vehicle queues extending onto and impeding travel along US 30.
- Operationally, traffic generally flows through the corridor at acceptable levels and in a reliable manner. All intersections currently operate at an acceptable LOS. The two-lane highway segments also tend to operate at an acceptable LOS, but the most heavily traveled sections of US 30, notably the section between Mechanicsville and Stanwood, does begin to show some degradation in flow with performance measures dipping into the LOS C range. The PTSF appears to be a major influence on the operations of this section of US 30, especially in peak periods.
- The existing infrastructure is aging with poor pavement conditions noted in the Study corridor, especially between Lisbon and Clarence. All existing bridges appear to be in reasonable condition, and none are currently posted for weight restrictions or considered deficient. Bridge inspection reports suggest that replacement of one of the bridges over the Wapsipinicon River be considered in the next 5 to 10 years.

The findings of this existing conditions analysis will aid in the next phase of the US 30 PEL Study, development and evaluation of possible improvement alternatives. Areas noted in this report as being below acceptable conditions will be a focus of the alternative development process and considered throughout the Study.

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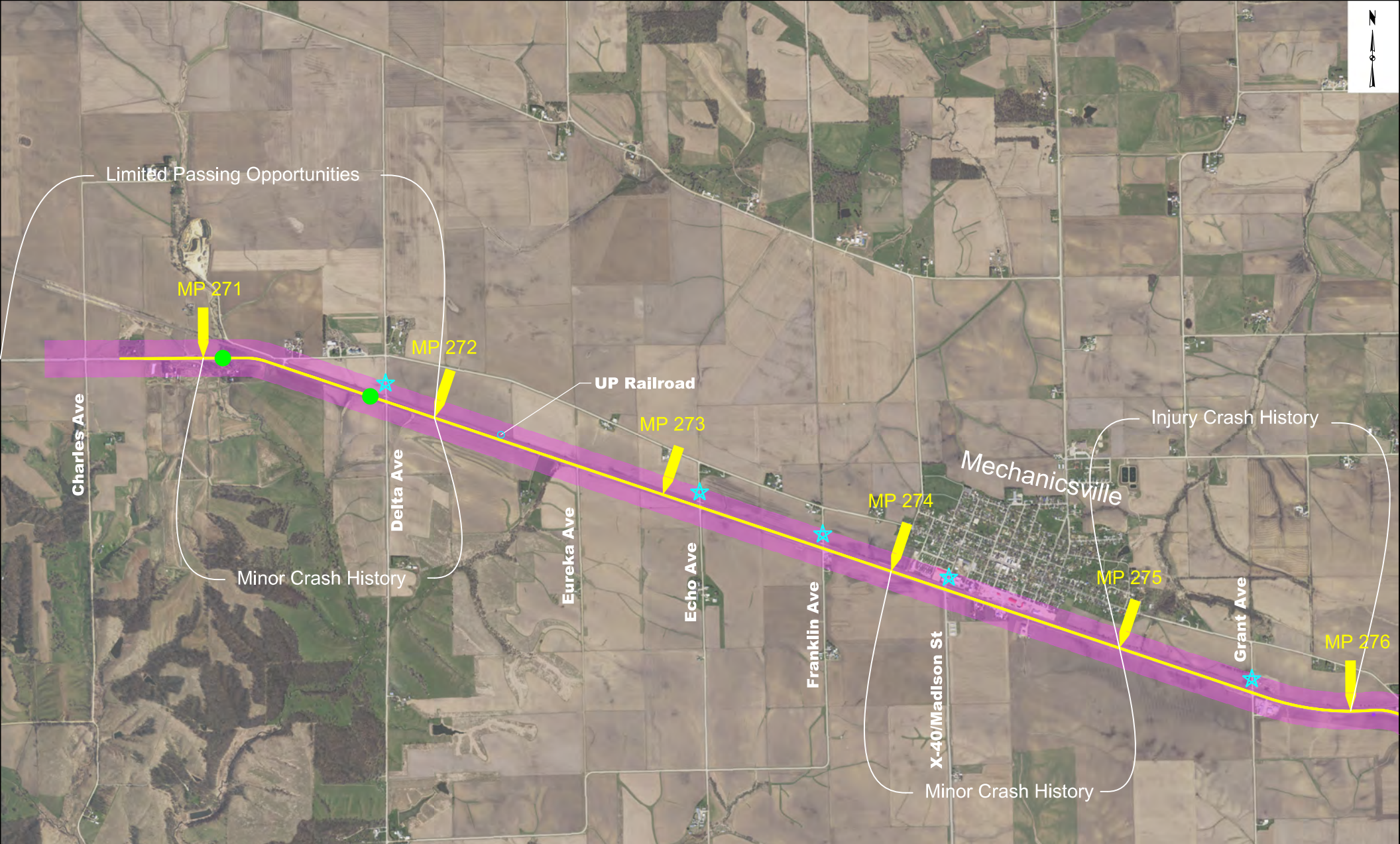
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**APPENDIX A – US 30 STUDY CORRIDOR MAPS WITH SUMMARY OF EXISTING
CONDITIONS EVALUATION FINDINGS**



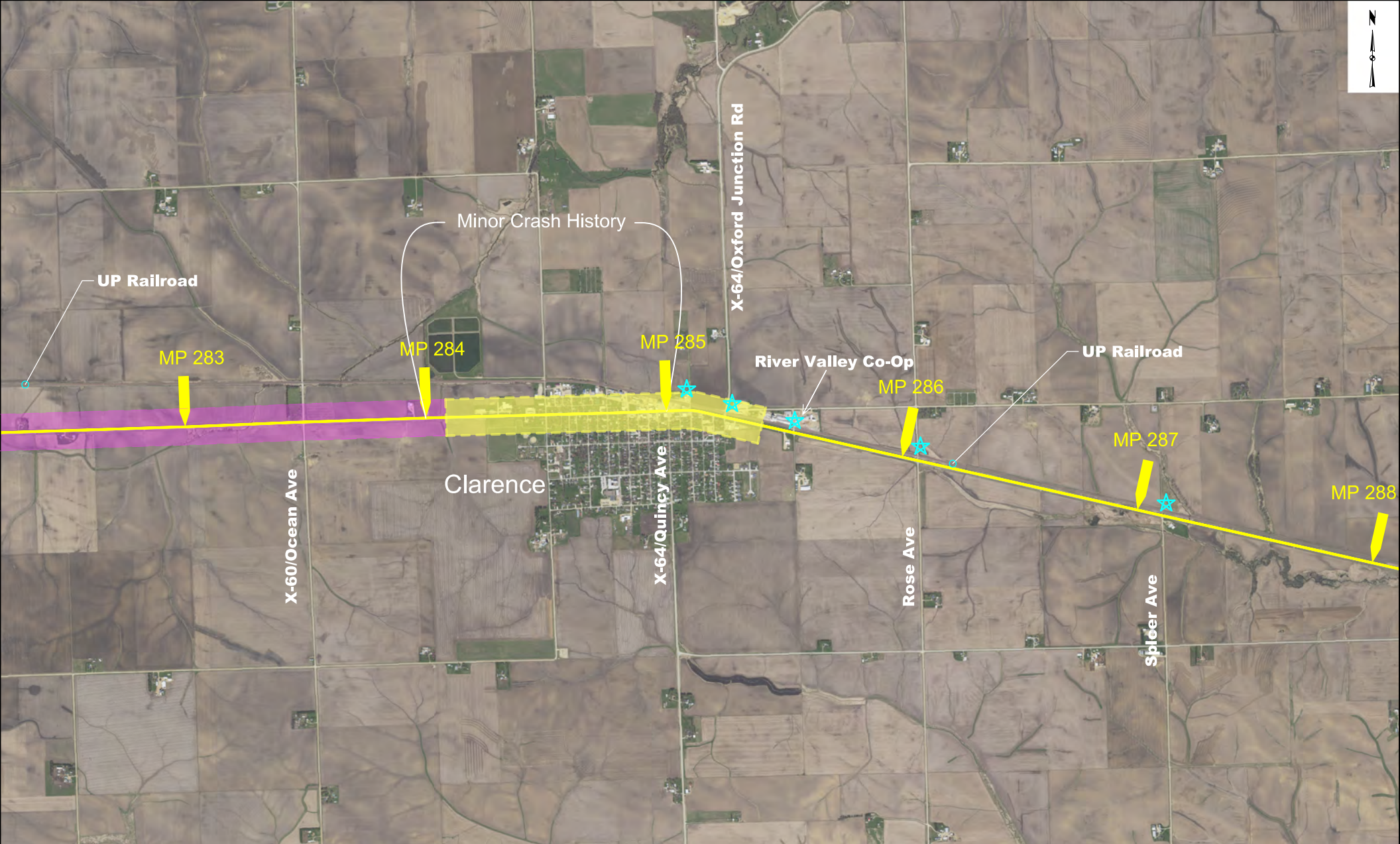
NOTE:
 Limited Passing Opportunities=Passing Zones Generally < 1 Mile in Length
 Minor Crash History=Below Average Crash Rate, but Higher Crash Totals in US 30 Study Corridor*
 Injury Crash History=Above Average Injury Crash Rate*
 Crash History=Above Average Total Crash Rate*
 * Refer to Section 3 for Additional Details

LEGEND	
	Fair Vertical Curve
	RR Crossing Sideroad
	Skewed Intersection
	Skewed Intersection with Crash History
	Poor Pavement Condition (ICE<60)
	Fair Pavement Condition (60<ICE<80)
	Fair Horizontal Curve



NOTE:
 Limited Passing Opportunities=Passing Zones Generally < 1 Mile in Length
 Minor Crash History=Below Average Crash Rate, but Higher Crash Totals in US 30 Study Corridor*
 Injury Crash History=Above Average Injury Crash Rate*
 Crash History=Above Average Total Crash Rate*
 * Refer to Section 3 for Additional Details

LEGEND	
	Fair Vertical Curve
	RR Crossing Sideroad
	Skewed Intersection
	Skewed Intersection with Crash History
	Poor Pavement Condition (ICE<60)
	Fair Pavement Condition (60<ICE<80)
	Fair Horizontal Curve



NOTE:
 Limited Passing Opportunities=Passing Zones Generally < 1 Mile in Length
 Minor Crash History=Below Average Crash Rate, but Higher Crash Totals in US 30 Study Corridor*
 Injury Crash History=Above Average Injury Crash Rate*
 Crash History=Above Average Total Crash Rate*
 * Refer to Section 3 for Additional Details

LEGEND

- Fair Vertical Curve
- ★ RR Crossing Sideroad
- △ Skewed Intersection
- ▲ Skewed Intersection with Crash History
- Poor Pavement Condition (ICE<60)
- Fair Pavement Condition (60<ICE<80)
- Fair Horizontal Curve



NOTE:
 Limited Passing Opportunities=Passing Zones Generally < 1 Mile in Length
 Minor Crash History=Below Average Crash Rate, but Higher Crash Totals in US 30 Study Corridor*
 Injury Crash History=Above Average Injury Crash Rate*
 Crash History=Above Average Total Crash Rate*
 * Refer to Section 3 for Additional Details

LEGEND	
	Fair Vertical Curve
	RR Crossing Sideroad
	Skewed Intersection
	Skewed Intersection with Crash History
	Poor Pavement Condition (ICE<60)
	Fair Pavement Condition (60<ICE<80)
	Fair Horizontal Curve



NOTE:
 Limited Passing Opportunities=Passing Zones Generally < 1 Mile in Length
 Minor Crash History=Below Average Crash Rate, but Higher Crash Totals in US 30 Study Corridor*
 Injury Crash History=Above Average Injury Crash Rate*
 Crash History=Above Average Total Crash Rate*
 * Refer to Section 3 for Additional Details

LEGEND

- Fair Vertical Curve
- ★ RR Crossing Sideroad
- △ Skewed Intersection
- ▲ Skewed Intersection with Crash History
- Poor Pavement Condition (ICE<60)
- Fair Pavement Condition (60<ICE<80)
- Fair Horizontal Curve



NOTE:
 Limited Passing Opportunities=Passing Zones Generally < 1 Mile in Length
 Minor Crash History=Below Average Crash Rate, but Higher Crash Totals in US 30 Study Corridor*
 Injury Crash History=Above Average Injury Crash Rate*
 Crash History=Above Average Total Crash Rate*
 * Refer to Section 3 for Additional Details

LEGEND	
	Fair Vertical Curve
	RR Crossing Sideroad
	Skewed Intersection
	Skewed Intersection with Crash History
	Poor Pavement Condition (ICE<60)
	Fair Pavement Condition (60<ICE<80)
	Fair Horizontal Curve



NOTE:
 Limited Passing Opportunities=Passing Zones Generally < 1 Mile in Length
 Minor Crash History=Below Average Crash Rate, but Higher Crash Totals in US 30 Study Corridor*
 Injury Crash History=Above Average Injury Crash Rate*
 Crash History=Above Average Total Crash Rate*
 * Refer to Section 3 for Additional Details

LEGEND	
	Fair Vertical Curve
	RR Crossing Sideroad
	Skewed Intersection
	Skewed Intersection with Crash History
	Poor Pavement Condition (ICE<60)
	Fair Pavement Condition (60<ICE<80)
	Fair Horizontal Curve

APPENDIX B – ONSITE WINDSHIELD SURVEY PHOTO LOG

Table C.1. Index of Windshield Survey Photographs

Picture No.	Direction Taken	Description
Beginning of the Study Area to Just West of Mechanicsville		
1	East	US 30 at Charles Ave.
2	West	US 30 at Charles Ave.
3	North	Charles Ave
4	South	Charles Ave
5	East	MP 271
6	West	MP 271
7	West	US 30 at Old Lincoln Hwy (near MP 271)
8	East	US 30 at Old Lincoln Hwy (near MP 271)
9	North	Old Lincoln Hwy (near MP 271) & RR Crossing
10	South	Old Lincoln Hwy (near MP 271) & RR Crossing
11	East	Old Lincoln Hwy (north T-Intersection)
12	West	Old Lincoln Hwy (north T-Intersection)
13	South	Delta Avenue
14	East	US 30 at Delta Avenue
15	West	US 30 at Delta Avenue
16	North	Delta Avenue & RR Crossing
17	West	MP 272
18	East	MP 272
19	West	US 30 at Eureka Avenue
20	East	US 30 at Eureka Avenue
21	South	Eureka Avenue
22	West	Westbound ditch at Eureka Avenue
23	East	Westbound ditch at Eureka Avenue
24	East	US 30 at Echo Ave (near MP 273)
25	West	US 30 at Echo Ave (near MP 273)
26	South	Echo Avenue
27	North	Echo Avenue and RR Crossing
28	East	US 30 at Franklin Avenue
29	West	US 30 at Franklin Avenue
30	North	Franklin Avenue
31	North	Franklin Avenue
32	North	Franklin Avenue and RR Crossing
33	South	Franklin Avenue
34	West	MP 274
35	East	MP 274
Mechanicsville		
36	North	X-40/Fox Avenue - Cars queuing at RR Crossing (Mechanicsville)
37	West	US 30 at X-40/Fox Avenue/Madison St. (Mechanicsville)
38	East	US 30 at X-40/Fox Avenue/Madison St. (Mechanicsville)
39	North	X-40/Fox Avenue/Madison St. and RR Crossing (Mechanicsville)
40	South	X-40/Fox Avenue (Mechanicsville)

41	East	From NB Stop Bar Looking East
42	South	Madison St & RR Tracks from Short Street (Mechanicsville)
43	East	Short Street from Madison Street (Mechanicsville)
44	North	Cherry Street and RR Crossing (Mechanicsville)
45	West	US 30 at Cherry Street (Mechanicsville)
46	East	US 30 at Cherry Street (Mechanicsville)

Just East of Mechanicsville to West of Stanwood

47	West	MP 275
48	East	MP 275
49	South	Grant Avenue
50	West	From Grant Ave. SB Stop Sign Looking West
51	East	From Grant Ave. SB Stop Sign Looking East
52	East	US 30 at Grant Avenue
53	West	US 30 at Grant Avenue
54	North	Grant Avenue and RR Crossing
55	East	From Grant Ave. NB STOP sign looking east
56	West	From Grant Ave. NB STOP sign looking west
57	West	MP 276
58	East	MP 276
59	West	Just East of MP 276
60	East	Just East of MP 276
61	Northwest	Old Lincoln Hwy (Near MP 276)
62	South	Old Lincoln Hwy (Near MP 276)
63	West	US 30 at Old Lincoln Hwy (near MP 276)
64	East	US 30 at Old Lincoln Hwy (near MP 276)
65	North	Old Lincoln Hwy (Near MP 276)
66	North	Indian Avenue
67	West	US 30 at Indian Avenue (MP 277)
68	East	US 30 at Indian Avenue (MP 277)
69	South	Indian Avenue
70	East	From STOP sign on Indian Avenue
71	West	From STOP sign on Indian Avenue
72	North	Jackson Avenue
73	East	From STOP sign on Jackson Avenue (NB)
74	West	From STOP sign on Jackson Avenue (NB)
75	West	US 30 at Jackson Avenue
76	East	US 30 at Jackson Avenue
77	West	From STOP sign on Jackson Avenue (SB)
78	East	From STOP sign on Jackson Avenue (SB)
79	South	Jackson Avenue
80	West	From just past SB STOP sign
81	East	From STOP sign on Kelly Ave.
82	West	From STOP sign on Kelly Ave.
83	North	From Kelly Ave.
84	West	US 30 at Kelly Avenue

85	East	US 30 at Kelly Avenue
86	South	Kelly Avenue
87	West	US 30 at King Avenue
88	East	US 30 at King Avenue
89	South	King Avenue

Stanwood

90	East	US 30 at IA 38/Ash Street (Stanwood)
91	West	US 30 at IA 38/Ash Street (Stanwood)
92	West	US 30 WB - Power Station South of US 30, West of Ash St.
93	North	IA 38/Ash Street (Stanwood)
94	South	Ash Street (Stanwood)
95	West	US 30 at Main Street (Stanwood)
96	East	US 30 at Main Street (Stanwood)
97	North	Main Street (Stanwood)
98	East	US 30 at E. Front St (Stanwood)
99	West	US 30 at E. Front St (Stanwood)
100	North	Entrance to North Cedar Recycling (near E. Front St.) (Stanwood)
101	West	E. Front St. from North Cedar Recycling Driveway (Stanwood)

East of Stanwood to West of Clarence

102	East	US 30 at IA 38/Monroe Street (near MP 281)
103	West	US 30 at IA 38/Monroe Street (near MP 281)
104	South	IA 38
105	North	Monroe Street and RR Crossing
106	East	MP 282
107	West	MP 282
108	East	MP 283
109	West	MP 283
110	South	Roadside Park Just East of MP 283
111	North	Ocean Avenue and RR Crossing
112	West	US 30 at Ocean Avenue
113	East	US 30 at Ocean Avenue
114	South	Ocean Avenue
115	West	MP 284
116	East	MP 284
117	North	MP 284 - Natural Gas Utility

Clarence

118	West	From Caseys - Sidewalk (Clarence)
119	East	From Caseys - Sidewalk (Clarence)
120	East	US 30 at Caseys (Clarence)
121	West	US 30 at Caseys (Clarence)
122	North	2nd Avenue (Clarence)
123	West	US 30 at 2nd Avenue (Clarence)
124	East	US 30 at 2nd Avenue (Clarence)
125	East	From South Leg of 2nd Avenue - Sidewalk (Clarence)
126	West	From South Leg of 2nd Avenue - Sidewalk (Clarence)

127	West	From South Leg of 5th Avenue - Sidewalk (Clarence)
128	East	From South Leg of 5th Avenue - Sidewalk (Clarence)
129	North	5th Avenue and Clarence PD and FD Entrance (Clarence)
130	West	US 30 at 5th Avenue (Clarence)
131	East	US 30 at 5th Avenue (Clarence)
132	South	5th Avenue
133	West	From North Leg of 5th Avenue - Sidewalk (Clarence)
134	East	From North Leg of 5th Avenue - Sidewalk (Clarence)
135	West	US 30 at 6th Avenue (Clarence)
136	East	US 30 at 6th Avenue (Clarence)
137	South	6th Avenue (Clarence)
137A	North	Clarence Businesses, NE quad of 6th Ave/US 30
137B	North	Clarence Businesses, NW quad of 6th Ave/US 30
137C	South	Clarence Businesses, SW quad of 6th Ave/US 30
137D	South	Clarence Businesses, SE quad of 6th Ave/US 30
138	West	US 30 at 8th Avenue (Clarence)
139	East	US 30 at 8th Avenue (Clarence)
140	North	8th Avenue and RR Crossing (Clarence)
141	South	8th Avenue (Clarence)
142	North	Oxford Junction Rd (Clarence)
143	West	US 30 at Oxford Junction Rd/9 1/2 Ave (Clarence)
144	East	US 30 at Oxford Junction Rd/9 1/2 Ave (Clarence)
145	South	9 1/2 Ave (Clarence)
146	West	Welcome to Clarence Sign from near Oxford Junction Rd. (Clarence)
147	East	US 30 at River Valley Co-Op Entrance
148	West	US 30 at River Valley Co-Op Entrance
149	North	River Valley Co-Op Entrance and RR Crossing

East of Clarence to West of Lowden

150	West	US 30 at Rose Ave (near MP 286)
151	East	US 30 at Rose Ave (near MP 286)
152	South	Rose Ave
153	Northeast	RCB Culvert Under RR east of Rose Ave
154	North	Rose Ave and RR Crossing
155	West	MP 287
156	East	MP 287
157	South	Spicer Avenue
158	North	Looking across US 30 from Spicer Avenue
159	West	US 30 at Spicer Avenue
160	East	US 30 at Spicer Avenue
161	South	Twin RCB headwall south of US 30 just east of Spicer Ave.
162	North	RCB crossing of RR north of US 30 east of Spicer Ave.
163	South	Taylor Avenue
164	South	RCB under US 30 east of north leg of Taylor Ave.
165	East	US 30 at Taylor Ave (near MP 288)
166	West	US 30 at Taylor Ave (near MP 288)

167	North	Taylor Avenue and RR Crossing
168	North	RCB under US 30 east of south leg of Taylor Ave.
169	East	Triple Box RCB under US 30 (south headwall)
170	North	RCB structure under RR
171	North	RCB structure under RR
172	West	MP 289
173	East	MP 289
174	North	150th Street at US 30
175	South	150th Street at US 30
176	South	150th Street at US 30
177	East	US 30 at 150th Street
178	West	US 30 at 150th Street
179	Northeast	US 30 Bridge over Yankee Run Creek
180	East	US 30 at Yankee Run Creek
181	West	US 30 at Yankee Run Creek
182	West	MP 290
183	East	MP 290
184	South	155th Street
185	North	155th Street and RR Crossing
186	West	US 30 at 155th Street
187	East	US 30 at 155th Street
188	East	MP 291
189	West	MP 291
190	South	160th Street
191	North	160th Street and RR Crossing
192	East	South leg of 160th Street from STOP sign
193	West	South leg of 160th Street from STOP sign
Lowden		
194	West	MP 292 (near Lowden)
195	East	MP 292 (near Lowden)
196	South	County Road Y14 (Lowden)
197	North	South leg of Y14/Y24 and US 30 Intersection (Lowden)
198	North	South leg of Y14/Y24 and US 30 Intersection (Lowden)
199	West	US 30 at Y14/Y24 (Lowden)
200	East	US 30 at Y14/Y24 (Lowden)
201	North	County Road Y24 and RR Crossing (Lowden)
202	South	North leg of Y14/Y24 and US 30 Intersection (Lowden)
East of Lowden to West of Wheatland		
203	North	Drainage Structure under US 30 near MP 293
204	South	Drainage Structure under US 30 near MP 293
205	West	MP 293
206	East	MP 293
207	West	MP 294
208	East	MP 294
209	South	105th Street

210	East	US 30 at 105th Street
211	West	US 30 at 105th Street
212	North	105th Street and RR Crossing
213	East	RCB under US 30 just east of 105th Street
214	North	RCB under RR just east of 105th Street
215	West	MP 295
216	East	MP 295
217	South	122nd Street
218	East	US 30 at 122nd Street
219	West	US 30 at 122nd Street
220	North	122nd Street and RR Crossing

Wheatland

221	East	240th Street (Wheatland)
222	Northwest	US 30 at 240th Street (Wheatland)
223	Southeast	US 30 at 240th Street (Wheatland)
224	West	240th Street (Wheatland)
225	East	US 30 at County Road Y4E (Near MP 297) (Wheatland)
226	West	US 30 at County Road Y4E (Near MP 297) (Wheatland)
227	South	County Road Y4E
228	North	County Road Y4E

East of Wheatland to West of Calamus

229	West	US 30 just east of RR Crossing
230	East	US 30 just east of RR Crossing
231	West	MP 298
232	East	MP 298
233	South	142nd Street and US 30 intersection
234	East	US 30 at 142nd Street
235	West	US 30 at 142nd Street
236	South	Wheatland Wildlife Area Sign
237	North	Drainage structure under US 30 at Wheatland Wildlife Area entrance
238	West	US 30 at Wheatland Wildlife Area Entrance
239	East	US 30 at Wheatland Wildlife Area Entrance
240	West	US 30 just east of western Wapsi. River Crossing
241	East	US 30 just east of western Wapsi. River Crossing
242	West	MP 299
243	East	MP 299
244	West	US 30 near 154th Avenue
245	East	US 30 near 154th Avenue
246	East	Iowa Heritage Byway Sign - near 154th Ave Intersection
247	West	US 30 just east of eastern Wapsi. River Crossing
248	East	US 30 just east of eastern Wapsi. River Crossing
249	Southwest	Old Lincoln Highway (Closed) intersection
250	West	Old Lincoln Highway (Closed)
251	West	Old Lincoln Highway river bridge crossing (Closed)
252	West	Us 30 at Old Lincoln Hwy (Closed)

253	East	Us 30 at Old Lincoln Hwy (Closed)
254	South	158th Avenue and RR Crossing
255	West	US 30 at 158th Avenue (near MP 300)
256	East	US 30 at 158th Avenue (near MP 300)
257	North	158th Avenue/Golf Course Entrance

Calamus

258	West	US 30 at County Road Y44/Davenport St. (Calamus)
259	East	US 30 at County Road Y44/Davenport St. (Calamus)
260	North	County Road Y44/Davenport Street (Calamus)
261	South	Davenport St. (Calamus)
262	West	North leg of Y44/US 30 Intersection from STOP sign location (Calamus)
263	West	South leg of Y44/US 30 Intersection from STOP sign (Calamus)
264	East	South leg of Y44/US 30 Intersection from STOP sign (Calamus)
265	West	US 30 at 2nd Avenue (Calamus)
266	East	US 30 at 2nd Avenue (Calamus)

East of Calamus to West of Grand Mound

267	West	MP 302
268	East	MP 302
269	East	South Leg County Road Y52/US 30 intersection from STOP Sign Location
270	North	190th Avenue
271	West	US 30 at 190th Ave/Y52 (near MP 303)
272	East	US 30 at 190th Ave/Y52 (near MP 303)
273	South	County Road Y52
274	East	North Leg 190th Ave/US 30 intersection from STOP Sign Location
275	West	MP 304
276	East	MP 304
277	North	210th Avenue
278	West	US 30 at 210th Avenue (near MP 305)
279	East	US 30 at 210th Avenue (near MP 305)
280	South	210th Avenue
281	West	North leg of 210th Ave/US 30 intersection at STOP sign location
282	West	US 30 at 220th Ave (Near MP 306)
283	East	US 30 at 220th Ave (Near MP 306)
284	South	US 30 and 220th Ave intersection
285	West	US 30 just west of Grand Mound
286	East	US 30 just west of Grand Mound

Grand Mound

287	North	US 30 and Smith St. Intersection (Grand Mound)
288	West	Smith St. at STOP Sign Location (Grand Mound)
289	East	Smith St. at STOP Sign Location (Grand Mound)
290	West	US 30 at Smith St. (Grand Mound)
291	East	US 30 at Smith St. (Grand Mound)
292	North	County Road Y54 (Grand Mound)
293	West	South leg of US 30/Y54 intersection at STOP sign (Grand Mound)
294	East	South leg of US 30/Y54 intersection at STOP sign (Grand Mound)

295	West	US 30 at County Road Y54 (Grand Mound)
296	East	US 30 at County Road Y54 (Grand Mound)
297	South	County Road Y54 (Grand Mound)
298	West	North leg of US 30/Y54 intersection at STOP sign (Grand Mound)
299	East	North leg of US 30/Y54 intersection at STOP sign (Grand Mound)
300	East	DeWitt St. and US 30 intersection (Grand Mound)
301	North	DeWitt St. at STOP sign (Grand Mound)
302	South	DeWitt St. at STOP sign (Grand Mound)
303	North	US 30 at DeWitt St. (Grand Mound)
304	South	US 30 at DeWitt St. (Grand Mound)

East of Grand Mound of End of Study Area

305	North	South side of RR Tracks on 237th Ave.
306	West	243rd Street at 237th Ave.
307	East	243rd Street at 237th Ave.
308	West	US 30 at 237th Ave.
309	East	US 30 at 237th Ave. (near MP 308)
310	North	237th Ave from US 30 centerline
311	South	237th Ave and RR Crossing from US 30 centerline
312	West	North leg of 237th Ave/US 30 intersection at STOP sign
313	West	MP 308
314	East	MP 308
315	West	East of reverse curves near MP 308
316	East	East of reverse curves near MP 308
317	West	MP 309
318	East	MP 309
319	North	250th Avenue
320	West	US 30 at 250th Ave
321	East	US 30 at 250th Ave
322	South	250th Avenue and RR Crossing
323	West	MP 310
324	East	MP 310
325	North	260th Avenue
326	West	US 30 at 260th Avenue
327	East	US 30 at 260th Avenue
328	South	260th Avenue
329	West	North leg of 260th/US 30 intersection at STOP sign
330	West	North leg of 260th/US 30 intersection near STOP sign
331	East	North leg of 260th/US 30 intersection at STOP sign
332	West	South leg of 260th/US 30 intersection at STOP sign
333	East	South leg of 260th/US 30 intersection at STOP sign
334	West	US 30 EB just east of 2- to 4-lane transition
335	West	US 30 median just east of 2- to 4-lane transition
336	East	US 30 median just east of 2- to 4-lane transition
337	East	US 30 WB just east of 4- to 2-lane transition

Beginning of the Study Area to Just West of Mechanicsville



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Mechanicsville



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Just East of Mechanicsville to West of Stanwood



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Stanwood



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East of Stanwood to West of Clarence



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Clarence



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East of Clarence to West of Lowden



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Lowden



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202

East of Lowden to West of Wheatland



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220

Wheatland



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East of Wheatland to West of Calamus



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Calamus



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East of Calamus to West of Grand Mound



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Grand Mound



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East of Grand Mound of End of Study Area



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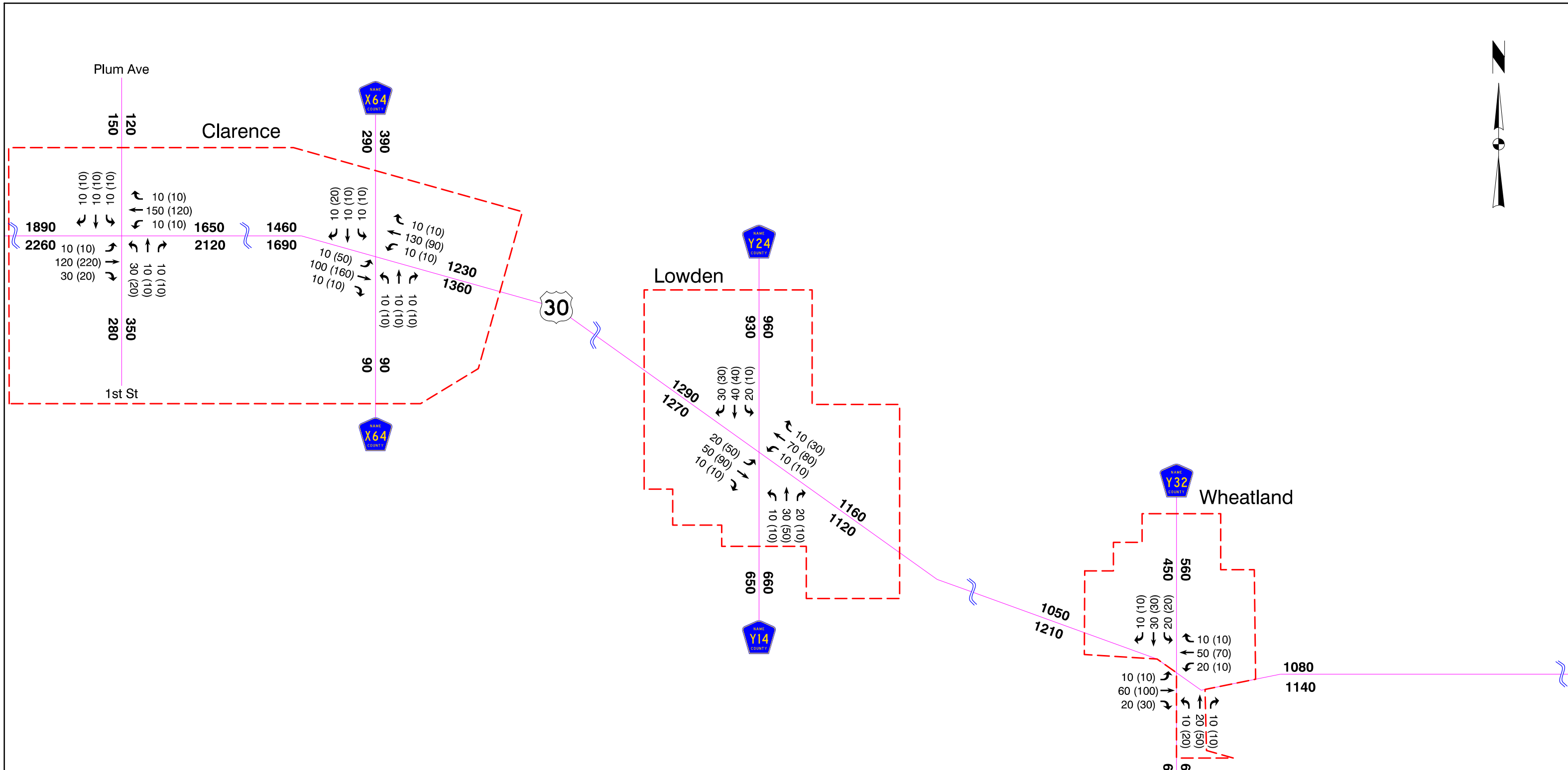
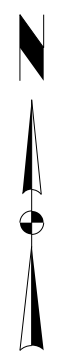


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APPENDIX C – EXISTING DAILY AND PEAK HOUR TRAFFIC VOLUMES



Legend

XXXX AVERAGE DAILY TRAFFIC

XXX (XXX) AM (PM) PEAK HOUR TRAFFIC

--- CORPORATE LIMITS

SHEET 2 OF 3

			DRAWING NOT TO SCALE	LOCATION DESCRIPTION	PROJECT INFO
				US Highway 30 Between Lisbon Bypass and US 61 Interchange, DeWitt	US Highway 30 PEL Study Existing Daily & Peak Hour Traffic

3/23/05 PM 10:06:02 d:\projects\wise.cb\m.com\01\01\01\Documents\1\05748 - US 30 CORRIDOR PEL STUDY\WORK In Progress\05748 - US 30 PEL\101\trafEng\PH TurningMovements

