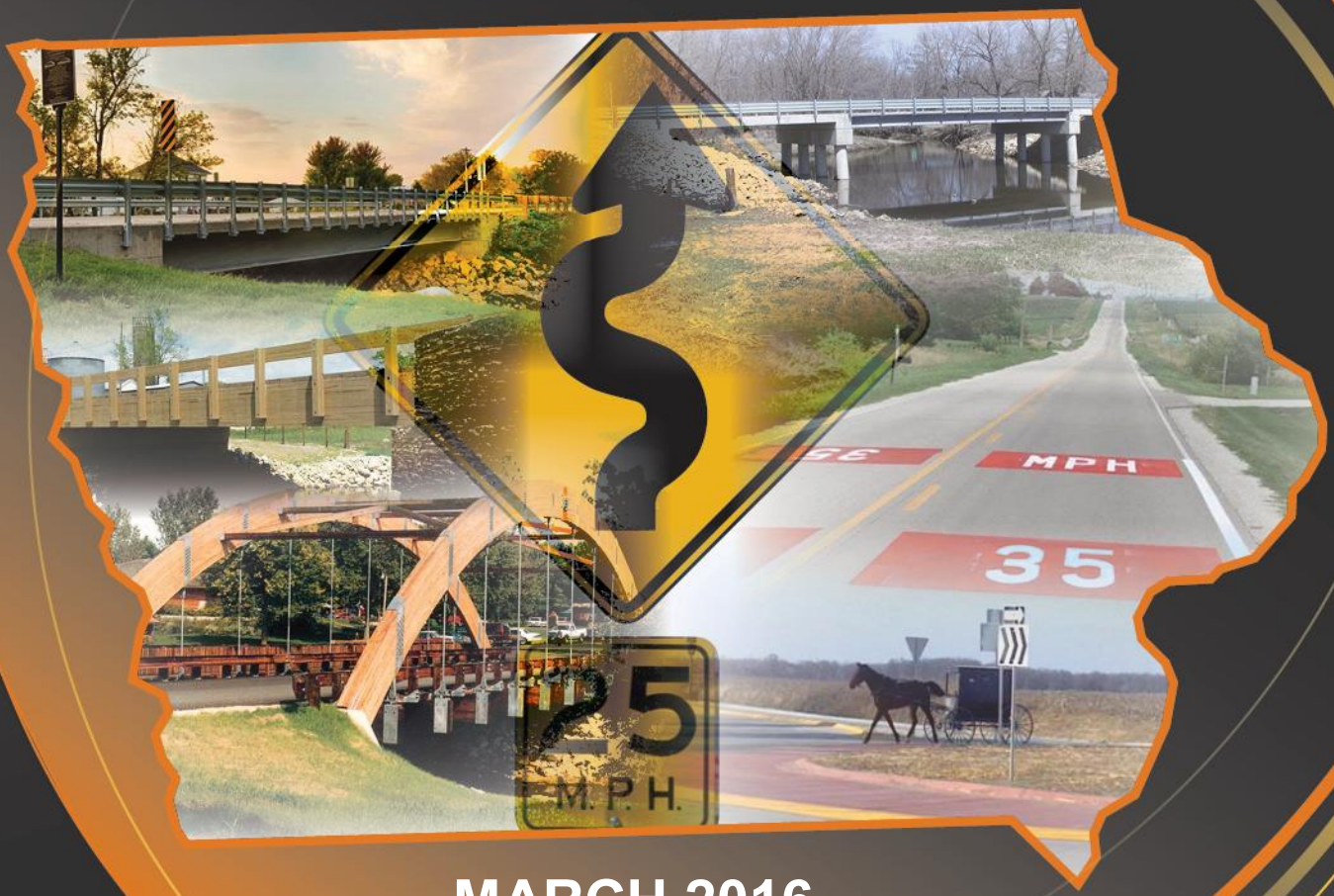
Buchanan County



MARCH 2016

Local Road Safety Plan

Kimley»Horn

BUCHANAN COUNTY

LOCAL ROAD SAFETY PLAN
BUCHANAN COUNTY

Prepared for:
Buchanan County
1511 1st Street E
Independence, Iowa 50644
319-334-6031

Prepared by:

Kimley-Horn and Associates, Inc.
2550 University Avenue West
Suite 238N
Saint Paul, Minnesota 55114
651-645-4197

This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.

© March 2016
092791000
2016-02-26 LRSP - Buchanan.docx

Acknowledgements

The Iowa Department of Transportation employees and partners were instrumental in the development, review and refinement of this Local Road Safety Plan. The Iowa Department of Transportation and Kimley-Horn and Associates, Inc. would like to express their appreciation to the supporting staff and partners for their participation and contributions.

Partners
Brian Keierleber (Buchanan County Engineer)
George Lake (BCEDC)
Richard Lehs (Buchanan County)
James Quinn (Buchanan County)
Bill Wolfgram (Buchanan County Sheriff's Office)

Iowa Department of Transportation
Chris Poole (Project Manager)
Nicole Fox
Vanessa Goetz
Jan Laaser-Webb
Donna Matulac
Tim Miner
Terry Ostendorf
Sam Sturtz

Federal Highway Administration
Tom Parham
Paul LaFleur

Consultant Team
Molly O'Brien (Kimley-Horn, Project Manager)
Mike Colety (Kimley-Horn)
David Giacomin (Kimley-Horn)
Zach Hans (InTrans)
Skylar Knickerbocker (InTrans)
JoNette Kuhnau (Kimley-Horn)
Devin Moore (Kimley-Horn)
Inya Nlenanya (InTrans)
Lindsay Saner (Kimley-Horn)

Statutory Notice

23 U.S.C. § 409: US Code - Section 409: Discovery and admission as evidence of certain reports and surveys

Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway- highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

EXECUTIVE SUMMARY

In the United States over 30,000 people lose their lives in motor vehicle crashes every year. According to the Federal Highway Administration (FHWA), rural road safety is a concern throughout the United States because a majority of fatalities take place on rural roads. Rural fatalities account for over 50% of all fatalities across the United States, yet less than 20% of the population lives in rural areas. In addition, the fatality rate on rural roads is 2.4 times higher than the fatality rate in urban areas.

> ***"In 2012, 19% of the US population lived in rural areas but rural road fatalities accounted for 54% of all fatalities. Even with reductions in the number of fatalities on the roadways, the fatality rate in rural areas is 2.4 times higher than the fatality rate in urban areas."***
>
> ***FHWA – Office of Traffic Safety***

In Iowa, more than 50% of fatal and serious injury crashes occurred on rural roads from 2004 to 2013, resulting in crash rates on rural roads that are more than twice that of state-maintained roads. There was an average of 7.3 fatal and serious injury crashes per year on county roads in Buchanan County from 2004 to 2013, resulting in a county road crash rate 1.7 times larger than the statewide average crash rate over the same period.

In the past, many efforts have focused on safety for higher volume roads and reactionary or "black spot" analysis of high crash locations. However, there is a growing trend across the United States to focus on proactive safety improvements for rural roads.

The Iowa Department of Transportation (DOT) developed a Strategic Highway Safety Plan (SHSP) to provide technical assistance in prioritization and deployment of safety countermeasures within various jurisdictions throughout the state. The Local Road Safety Plan (LRSP) concept is designed to build on the foundation established by the SHSP. The LRSP provides the basis for proactive implementation of safety countermeasures specific to individual counties across Iowa. This allows the County to leverage the road safety planning process to meet County-specific needs.

E.1. What is an LRSP?

An LRSP is a document that provides a basis for systemic safety improvements along local roads. Rather than addressing "black spots," the LRSP identifies proactive safety based on a risk factor analysis of the roadway. LRSPs not only assist locals in understanding the types of crashes occurring on local roadways, but they also define a locally focused plan for practitioners to make informed, prioritized safety decisions. Additional benefits of LRSPs include:

- Coordination between various agencies within the County
- Use of the results of the analysis to leverage and apply for funding
- Focus on all the five E's of safety (Engineering, Emergency response, Education, Enforcement, and Everyone)

The LRSP process has been successfully initiated in several states including Minnesota and North Dakota.

E.1.1. Five E's of Safety

The Minnesota and North Dakota LRSPs generally focused on engineering improvements to mitigate crashes at the county level. In Iowa, LRSPs are also assessing what is being conducted at the county level to address all of the five E's of safety (Engineering, Emergency response, Education, Enforcement, and Everyone).

While engineering improvements can make the roadways safer, engineering improvements alone cannot prevent all motor vehicle crashes. According to the National Highway Traffic Safety Administration (NHTSA), 90% of all crashes are a result of driver-related factors. Because such a high percentage of crashes are a result of driver-related factors, making roadways safer requires all of the five E's to be involved.

Working together with all of the E's at the county level will help make the roads safer in Buchanan County.

E.2. Purpose of the LRSP

The LRSP identifies a prioritized list of safety improvement projects that can be implemented within the County to address specific crash characteristics identified during the data collection portion of the project. The recommendations in this plan focus on transportation improvements with a high benefit of crash reductions by applying the principles established in the SHSP and through a systemic data analysis performed specifically for Buchanan County. The recommended improvements take into consideration constraints within the local county network and incorporate feedback from the County Engineer and local stakeholders.

Buchanan County is part of Phase 1 of the Iowa DOT LRSP project, which included 12 counties. The following counties were included in Phase 1 of the project, and **Figure E-1** illustrates the counties with respect to the State of Iowa.

- **Buchanan**
- Cerro Gordo
- Clinton
- Hamilton
- Keokuk
- Marshall
- Mills
- Monona
- Montgomery
- Plymouth
- Wapello
- Winneshiek

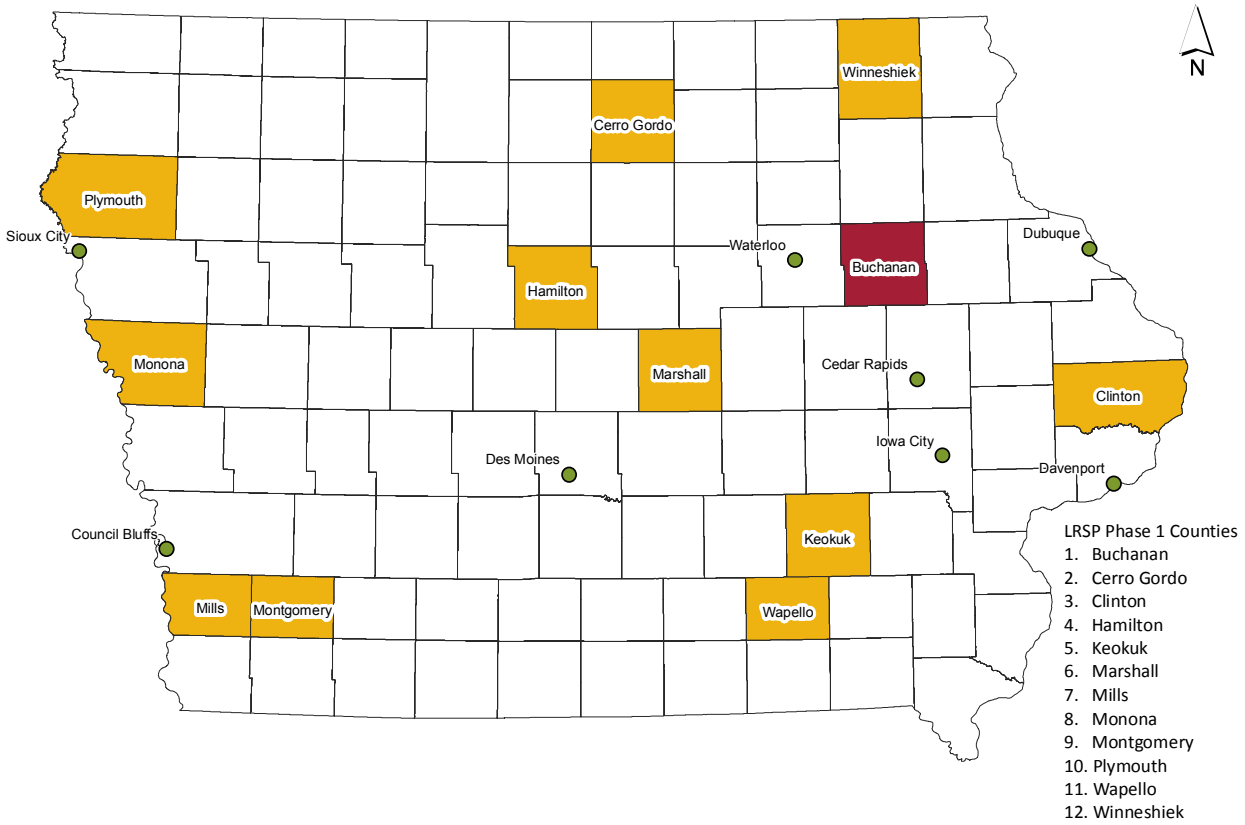


Figure E-1 – Location of Phase 1 LRSP Counties with Respect to Iowa

E.3. Buchanan County

Buchanan County is located in eastern Iowa and is named after the then United State Senator, James Buchanan, who later served as the 15th President of the United States. According to the 2010 census, the population of Buchanan County was 20,958. Independence, the County seat, is also the County's most populous city at 5,966.

Buchanan County maintains approximately 950 miles of County roads, of which approximately 200 are paved. There were 1,109 crashes resulting in 73 fatal and serious injury crashes on county roads in Buchanan County from 2004 to 2013.

E.4. LRSP Project Overview

The LRSP project includes six primary task assignments. The following is a brief description of the tasks associated with this project, with a more detailed description of each task in subsequent sections of this document. **Figure E-2** illustrates the LRSP project process and timeline.

E.4.1. Gather Background Information

Under this task, relevant documents provided by the counties were reviewed as well as the Iowa SHSP, and potential funding sources. In addition, a questionnaire was developed and distributed to the counties to gather input on current safety measure implementation within their jurisdictions. Technical Memorandum #1 summarizing the background phase of the project was prepared, and relevant information from Technical Memorandum #1 pertaining to Buchanan County is included in this document.

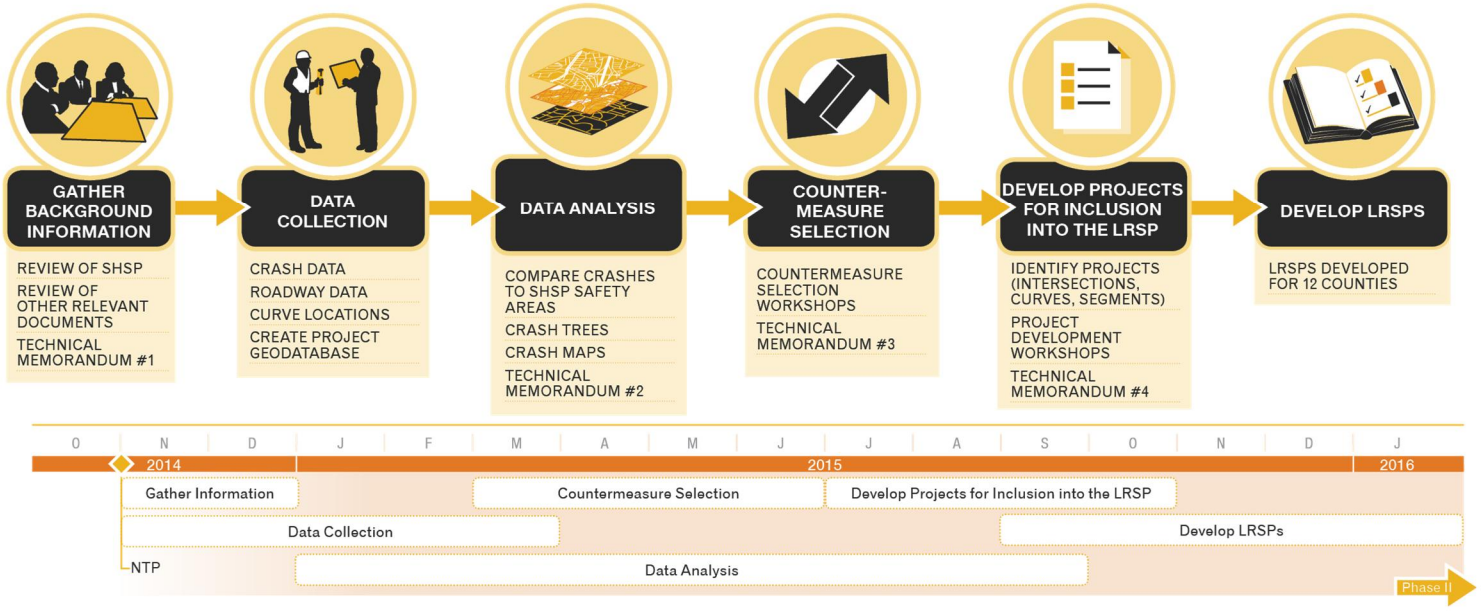


Figure E-2 – LRSP Project Process

E.4.2. Data Collection

A comprehensive Geographic Information Systems (GIS) project database was developed utilizing crash data, roadway data, horizontal curve data, and the intersection database obtained from the Iowa DOT. The County also provided their 911 address database and locations of stop signs along their paved roadway system.

E.4.3. Data Analysis

After development of the comprehensive GIS project database, the crash data was analyzed for the County. Crashes were compared to the Key Safety Emphasis Areas for the State of Iowa (as defined in the SHSP), and crash trees and maps were prepared. Technical Memorandum #2 summarizing the data analysis for all 12 counties, as well as Buchanan County, was prepared. Relevant information from Technical Memorandum #2 pertaining to the County is included within this document.

E.4.4. Countermeasure Selection

Following completion of the data analysis, a Countermeasure Selection Workshop was held with the safety stakeholders of Buchanan County. During these workshops the following items were discussed:

- The background and purpose of the LRSP
- The five E's of safety
- Crash data
- Risk factors and ranking of risk factors
- Countermeasures

Technical Memorandum #3 summarizing the discussions at the workshops with each of the 12 counties was prepared. Relevant information from Technical Memorandum #3 pertaining to Buchanan County is included within this document.

E.4.5. Develop Projects for Inclusion into the LRSP

A risk factor ranking process was developed for intersections, curves, and segments. Risk factors were calculated for all paved intersections, curves, and segments within the County. Risk factors included roadway features such as curve radius, shoulder width, and traffic volumes. After conducting the risk factor analysis, recommended safety improvements were developed for the feature types based on the project selection decision trees. Improvements included items such as additional signage, pavement markings, and rumble strips. After developing project sheets detailing the recommended safety improvements at specific locations, a Project Selection Workshop was conducted with the County to review the results. Technical Memorandum #4 summarizing the workshops conducted with the 12 counties was prepared, and relevant information from Technical Memorandum #4 for Buchanan County is included within this document.

E.4.6. Develop LRSPs

An LRSP was developed for Buchanan County. This LRSP includes a summary of the LRSP process along with recommended safety projects for implementation by Buchanan County.

E.5. Recommendations

This LRSP identified both driver- and engineering-related countermeasures. The following sections summarize the recommended countermeasures and improvements for the County.

E.5.1. Driver-Related Countermeasures

The Iowa SHSP has 10 Key Safety Emphasis Areas, of which six are driver-related emphasis areas:

- Speed-related
- Unprotected persons
- Younger drivers
- Impaired driving
- Inattentive/distracted driving
- Older drivers

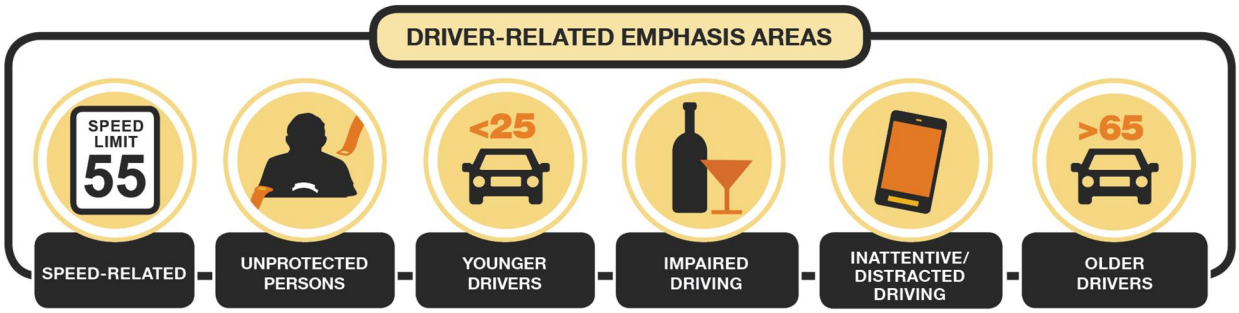


Figure E-3 – Iowa SHSP Driver-Related Emphasis Areas

During the Buchanan County Countermeasure Selection Workshop, attendees were provided information regarding fatal and serious injury crashes within the County and how that data aligned with the Iowa SHSP Key Safety Emphasis Areas. Potential countermeasures from the *National Cooperative Highway Research Program* (*NCHRP) Report 500 Series* and the *Toward Zero*

Deaths documents were provided to stakeholders to facilitate discussion on what action items were currently underway in the County with respect to driver-related crashes. Workshop participants agreed upon a status of implementation of the countermeasures. The following statuses of implementation for the various driver-related countermeasures were considered by workshop attendees:

- Underway/Ongoing (currently being done);
- Area for Improvement (ongoing, but could be enhanced);
- Opportunity (not being done, but could be implemented); or
- Completed in the Past (has been completed in the past, but not planned to be implemented in the future).

Table E-1 provides a summary of the status of implementation of the driver-related countermeasures within Buchanan County. It is recommended that the County continue to implement countermeasures that are currently underway/ongoing, and look for opportunities to implement countermeasures that are not currently being implemented within the County. This will require input from and coordination with all of the five E's of safety.

Table E-1 – County Driver-Related Countermeasure Summary

Countermeasure	Status
Speed-Related	
Conduct speed enforcement - Dynamic speed signs have been used to record speeds at various locations throughout the day. The Sheriff's department then passes this information to the deputies to let them know what time of day the speeding occurs (for directed enforcement). - County has eight contracted cities for Sheriff/law enforcement services, so speed enforcement is part of these contracts.	Underway/Ongoing
Implement rigorous aggressive driving and speeding-related enforcement programs	Opportunity
Education campaigns relative to locations with high-risk of speed-related crashes, potentially in schools	Opportunity

Table E-1 – County Driver-Related Countermeasure Summary (Continued)

Countermeasure	Status
Unprotected Persons	
Conduct publicized enforcement campaigns	Underway/Ongoing
Community locations for instruction in proper child restraint use	Underway/Ongoing
Conduct high-profile "child restraint inspection and/or installation" events at community locations - Sheriff Department currently holds a yearly safety fair to provide training for proper child seat installation.	Underway/Ongoing
Train law enforcement to check for proper child restraint use in all motorist encounters	Underway/Ongoing
Education campaigns in grade schools	Underway/Ongoing
Hand out ice cream gift certificates for children wearing bicycle helmets (law enforcement, EMS, and/or fire department) - Need local businesses to step forward to donate ice cream gift certificates.	Opportunity
Younger Drivers	
Improve content and delivery of driver education/training - School districts no longer teach Drivers Education (DE) during the school year, so this is no longer a built-in opportunity for school-based strategies. - The sheriff's department uses "drunk goggles" in local DE programs for a hands-on demonstration of the effects of drunk driving.	Underway/Ongoing, Completed in the Past
Review transportation plans for new/expanded/existing high school sites - New high school - could be opportunity	Opportunity
Conduct additional training in schools ("drunk goggles"; "don't veer for deer"; what to do when on an edge drop-off; training in health class; etc.) - The County Sheriff's department currently participates in some in school training. They go whenever asked.	Underway/Ongoing
"Operation Prom" mock disaster - Mock crash events (every 4 years) have been used by the Sheriff's department to more effectively present the messages of don't text/drive, obey the speed limits, and don't drink/drive.	Underway/Ongoing
Prosecute and impose sanctions on drivers not obeying school bus stop bars	Underway/Ongoing
Enforcement of graduated driver's license laws	Underway/Ongoing

Table E-1 – County Driver-Related Countermeasure Summary (Continued)

Countermeasure	Status
Impaired Driving	
Conduct regular well-publicized safety checkpoints - The County Sheriff's Department does conduct random checkpoints for OWI enforcement (approximately once per year). They use grant money to conduct these checkpoints.	Underway/Ongoing
Proactively conduct OWI enforcement - County is proactive in looking for impaired drivers, and has used grant funding for additional enforcement. - County does not have specific locations where they focus their OWI enforcement.	Underway/Ongoing
Conduct regular well-publicized compliance checks of alcohol retailers to reduce sales to underage drivers - The County Sheriff's department currently conducts compliance checks 1 to 2 times per year (using grant money for these checks).	Opportunity
Prosecute, impose sanctions on, and treat operating while intoxicated (OWI) offenders - First offense OWI penalties are pretty standard. Deferred judgements are at the discretion of the County Attorney. While State Laws may require the removal of driver's license for third offense, there is considerable discretion given to the county attorneys for plea bargains and diversion programs in order reduce penalties.	Underway/Ongoing, Area for Improvement
Inattentive/Distracted Driving	
Incorporate information on distracted driving into education programs for young drivers - Give texting presentations in the high schools.	Underway/Ongoing Opportunity
Conduct education and awareness campaigns - Local news stations have PSAs regarding inattentive/distracted driving.	Underway/Ongoing
Visibly enforce existing statutes to deter distracted and drowsy driving	Opportunity
County policy for "hands free" devices while driving county vehicle	Opportunity
Mobile simulator for distracted driving at community events or schools	Opportunity
Older Drivers	
Establish resource centers within communities to promote safe mobility choices	Underway/Ongoing
Paratransit for older drivers - County does have some limited para-transit/dial-a-ride service for the elderly.	Underway/Ongoing
Provide materials on paratransit information at community centers - Could advertise this service at the local senior centers.	Opportunity
Recommend re-testing of older drivers involved in crashes and citations - County does not require retesting for the elderly involved in crashes (there has been concern from the county attorney's office regarding profiling of older drivers if they issued retesting as a general rule-of-thumb).	Opportunity

E.5.2. Engineering Countermeasures

In addition to driver-related countermeasures, a list of safety engineering projects was developed for high-risk locations along county paved roads. Projects were developed for high-priority county paved intersections, curves, and segments. Intersection projects included improvements such as destination lighting, upgrading signs and pavement markings, and transverse rumble strips on stop controlled approaches. Curve and segment projects included improvements such as enhanced signing and striping, rumble strips, and shoulders with safety edges. **Table E-2** provides a consolidated cost summary of the recommended safety improvements developed for the County. **Section 6** of the LRSP and the **Appendices** include detailed project information.

Table E-2 – Engineering Countermeasures Cost Summary

Facility Type	Number of Locations	Estimated Project Cost
Intersections	13	$278,000
Curves	16	$385,000
Segments	23	$8,156,000
Total Improvement Costs	**52**	**$8,819,000**

Due to the limited amount of available data, low traffic volumes, and limitations on the types of safety improvement projects that can be implemented on unpaved roads, location specific recommendations were not developed for unpaved roadways. However, this LRSP includes safety recommendations that can be considered for implementation on the unpaved roadway system by the County Engineer.

E.6. Next Steps

Project sheets with the prioritized list of safety improvement projects for intersections, curves, and segments have been provided to help the County Engineer obtain funding for safety improvements and/or for incorporating recommendations into planned roadway improvement projects. These sheets may require updating for funding applications in future years. The County Engineer may also make changes to the project recommendations based on their local knowledge of the site, available funding, and/or specific needs.

It is recommended that the County continue to foster cooperation with other stakeholders and look for opportunities to improve and expand implementation of driver-related countermeasures. The County should continue its past history of annually implementing a number of safety improvement projects. Based on current funding levels, it is anticipated that many of the recommended engineering improvements could be implemented within 5 to 10 years, or sooner. Additionally, it is recommended that this LRSP should be updated within 5 to 10 years to reflect improvements that have been implemented, additional availability of roadway feature data, and changes in crash types and patterns.

Table of Contents

1. Introduction 1
- **1.1.** What is an LRSP? 1
  - **1.1.1.** Five E's of Safety 2
- **1.2.** Purpose of the LRSP 2
- **1.3.** Buchanan County 3
- **1.4.** LRSP Project Overview 3
  - **1.4.1.** Gather Background Information 3
  - **1.4.2.** Data Collection 4
  - **1.4.3.** Data Analysis 4
  - **1.4.4.** Countermeasure Selection 4
  - **1.4.5.** Develop Projects for Inclusion into the LRSP 5
  - **1.4.6.** Develop LRSPs 5
- **1.5.** Document Organization 5

2. Background 6
- **2.1.** Iowa SHSP 6
- **2.2.** Iowa DOT Safety Programs 8
- **2.3.** Buchanan County Safety Questionnaire 8
- **2.4.** Five-Year Secondary Road Construction Program 9

3. Data Collection 10
- **3.1.** Crash Data 10
- **3.2.** Roadway Data 10
- **3.3.** 911 Address Database 11
- **3.4.** Stop Sign Locations 11
- **3.5.** Existing Condition Updates to the Database 11
- **3.6.** Crash Tree Development 11
  - **3.6.1.** County Roadways 11
  - **3.6.2.** City Streets 12
  - **3.6.3.** Major Cause and Manner of Crash 12

4. Data Analysis 13
- **4.1.** Crash Maps 13
- **4.2.** Total Crashes 16
- **4.3.** Fatal and Serious Injury Crashes 17
- **4.4.** Comparison of County Crashes to SHSP Key Safety Emphasis Areas 18
- **4.5.** Crash Trees 20
  - **4.5.1.** County Paved Road Crashes 25
    - **4.5.1.1.** Intersection Crashes 25
    - **4.5.1.2.** Non-Intersection Crashes (On Curve) 25
    - **4.5.1.3.** Non-Intersection Crashes (Off Curve) 26
    - **4.5.1.4.** Other/Unknown Location Crashes 26
  - **4.5.2.** County Unpaved Road Crashes 26
    - **4.5.2.1.** Intersection Crashes 26

4.5.2.2. Non-Intersection Crashes 26
4.5.2.3. Other/Unknown Location Crashes 27
4.5.3. City Street Crashes 27
4.5.3.1. Intersection Crashes 27
4.5.3.2. Non-Intersection Crashes 27
4.5.3.3. Other/Unknown location 27
4.6. High Crash Locations 27
4.7. Additional Data Analysis 30
5. COUNTERMEASURE SELECTION 34
5.1. Potential Systemic Safety Improvement Countermeasures 34
5.2. Risk Factors 34
5.3. Crash Modification Factors 35
5.4. Potential Countermeasures 36
5.5. Countermeasure Selection Workshop 38
5.5.1. Driver-Related Crash Countermeasures 38
5.5.1.1. Speed-Related 39
5.5.1.2. Unprotected Persons 40
5.5.1.3. Younger Drivers 41
5.5.1.4. Impaired Driving 42
5.5.1.5. Inattentive/Distracted Driving 44
5.5.1.6. Older Drivers 45
5.5.2. Engineering Countermeasures 46
5.5.2.1. County Paved Intersection Countermeasures 46
5.5.2.2. County Paved Curve Countermeasures 46
5.5.2.3. County Paved Roadway Segment Countermeasures 46
6. SAFETY PROJECT DEVELOPMENT 48
6.1. Methodology 48
6.1.1. GIS Data 49
6.1.2. Risk Factor Ranking 49
6.1.3. Project Selection Decision Tree 49
6.1.4. Project Sheets 49
6.1.5. Project Selection Workshop 49
6.1.5.1. Project Recommendations Disclaimer 50
6.2. Intersections 51
6.2.1. Risk Factor Summary 51
6.2.2. Risk Factor Rankings 53
6.2.3. Intersection Countermeasures 55
6.2.3.1. Roundabout 55
6.2.3.2. Destination Lighting 56
6.2.3.3. All-Way Stop Warrant Analysis 58
6.2.3.4. Upgrade Signs and Pavement Markings 58
6.2.3.5. Install Second Stop Sign and Stop Ahead Signs 59
6.2.3.6. Flashing Beacon on All Stop Signs 59

6.2.3.7. Transverse Rumble Strips on All or Minor Approaches 59
6.2.3.8. Clear and Grub 59
6.2.4. Project Selection Decision Tree 61
6.2.5. Prioritized Intersection Recommendations 62
6.2.6. Other Intersection Countermeasures.....64
6.2.6.1. Construction of Turn Lanes..... 64
6.2.6.2. Realignment of Intersection to Increase Angles to 90-degrees 64
6.2.6.3. Stop Signs with LED Flashing Lights 64
6.2.6.4. Through Route Activated Warning System 64
6.2.6.5. Access Management 65
6.3. Horizontal Curves 66
6.3.1. Risk Factor Summary.....66
6.3.2. Risk Factor Rankings 68
6.3.3. Curve Countermeasures 70
6.3.3.1. Curve Chevrons..... 70
6.3.3.2. Advance Warning Signs and Speed Advisory Plaques 70
6.3.3.3. New Pavement Markings 70
6.3.3.4. Clear and Grub 70
6.3.3.5. Edgeline Rumble Strips 71
6.3.3.6. Pave Shoulder with Safety Edge..... 71
6.3.3.7. Centerline Rumble Strips 71
6.3.4. Project Selection Decision Tree 73
6.3.5. Prioritized Curve Recommendations 74
6.3.6. Other Curve Countermeasures 76
6.3.6.1. Additional Curve Signage 76
6.3.6.2. Retroreflective Strips on Chevron Sign Posts 76
6.3.6.3. Transverse Rumble Strips Prior to Curve..... 76
6.3.6.4. Superelevation Correction 76
6.3.6.5. High Friction Surface Treatment 76
6.3.6.6. Speed Activated Flashers on Chevron Signs..... 77
6.3.6.7. Delineate Roadside Hazards with Retroreflective Markers..... 77
6.3.6.8. Flattening and Widening Foreslopes..... 77
6.3.6.9. Guardrail..... 77
6.4. Segments 77
6.4.1. Risk Factor Summary.....77
6.4.2. Risk Factor Rankings 80
6.4.3. Segment Countermeasures.....82
6.4.3.1. New Pavement Markings 82
6.4.3.2. Clear and Grub 82
6.4.3.3. Edgeline Rumble Strips 82
6.4.3.4. Pave Shoulder with Safety Edge..... 82
6.4.3.5. Centerline Rumble Strips 83
6.4.4. Project Selection Decision Tree 84
6.4.5. Prioritized Segment Recommendations 85

6.4.6. Other Segment Countermeasures....88
6.4.6.1. On-pavement Markings for Speed Control.... 88
6.4.6.2. Delineate Roadside Hazards with Retroreflective Markers.... 88
6.4.6.3. Flattening and Widening Foreslopes.... 88
6.4.6.4. Guardrail.... 88
6.4.6.5. Post-Mounted Delineators 88
6.5. Unpaved Roadways....89
6.5.1.1. Upgrade Signs.... 89
6.5.1.2. Realign Intersection.... 89
6.5.1.3. Improve/Increase Shoulder/Lane Width.... 89
6.5.1.4. Delineate Roadside Hazards with Retroreflective Markers.... 89
6.5.1.5. Curve Chevrons.... 89
6.5.1.6. Advance Curve Warning Signs and Speed Advisory Plaques.... 89
6.5.1.7. Maintenance of Gravel.... 89
6.5.1.8. Clear and Grub.... 90
6.5.1.9. Winter Maintenance.... 90
7. SUMMARY....91
7.1. Recommended Improvements....91
7.1.1. Driver-Related Countermeasures....91
7.1.2. Engineering Countermeasures....95
7.2. Next Steps....95

LIST OF APPENDICES

A Intersection Project Sheets

B Intersection Risk Factor Ranking Results

C Curve Project Sheets

D Curve Risk Factor Ranking Results

E Segment Project Sheets

F Segment Risk Factor Ranking Results

List of Figures

Figure 1 – Location of Phase 1 LRSP Counties with Respect to Iowa 3
Figure 2 – LRSP Project Process 4
Figure 3 – All Crashes County Roads 14
Figure 4 – Fatal and Serious Injury Crashes County Roads 15
Figure 5 – Total Crashes per MVMT 16
Figure 6 – Total Crashes by Roadway Type per MVMT 16
Figure 7 – Crash Rate (Fatal and Serious Injury Crashes) 17
Figure 8 – Crash Rate by Roadway Type (Fatal and Serious Injury Crashes) 17
Figure 9 – County Paved Road Crash Tree 21
Figure 10 – County Unpaved Road Crash Tree 22
Figure 11 – City Street Crash Tree 23
Figure 12 – County Crashes by Roadway Type 25
Figure 13 – Speed-Related Crashes 31
Figure 14 – Impaired Driver-Related Crashes 32
Figure 15 – Crashes by Light Conditions 33
Figure 16 – CMF Calculation 35
Figure 17 – CMF Method Sample Calculation 36
Figure 18 – CRF Calculation 36
Figure 19 – Iowa SHSP Driver-Related Emphasis Areas 38
Figure 20 – Project Analysis Methodology 48
Figure 21 – Project Sheet Summary 50
Figure 22 – County Paved Intersections Risk Factor Ranking Summary 53
Figure 23 – County Paved Intersection Risk Factor Score Map 54
Figure 24 – Conflict Points at Intersections 56
Figure 25 – Examples of Destination Lighting 57
Figure 26 – Destination Lighting Installation Options 58
Figure 27 – County Paved Intersection Safety Improvements 60
Figure 28 – County Paved Intersection Project Decision Tree 61
Figure 29 – County Paved Intersection Prioritized Project Location 63
Figure 30 – Intersection Functional Area 65
Figure 31 – County Paved Horizontal Curves Risk Factor Ranking Summary 68
Figure 32 – Horizontal Curve Risk Factor Score Map 69
Figure 33 – County Paved Horizontal Curve Safety Improvements 72
Figure 34 – County Paved Horizontal Curve Project Decision Tree 73
Figure 35 – County Paved Horizontal Curve Prioritized Project Locations 75
Figure 36 – County Paved Roadway Segments Risk Factor Ranking Summary 80
Figure 37 – County Roadway Segment Risk Factor Score Map 81
Figure 38 – County Paved Roadway Segment Safety Improvements 83
Figure 39 – County Paved Roadway Segment Project Decision Tree 84
Figure 40 – County Paved Roadway Segment Prioritized Project Locations 87
Figure 41 – Iowa SHSP Driver-Related Emphasis Areas 92

List of Tables

Table 1 – Iowa Fatal and Serious Injuries by Safety Emphasis Area 7
Table 2 – Five-Year Secondary Road Construction Program Summary 9
Table 3 – County Serious Injuries by Safety Emphasis Area 19
Table 4 – County Serious Injuries Rank by Safety Emphasis Area 20
Table 5 – County Crashes by Roadway Type 24
Table 6 – County Paved Road Horizontal Curves with Crashes 26
Table 7 – County High Crash Intersections 28
Table 8 – County High Crash Curves 29
Table 9 – County High Crash Segments 30
Table 10 – Potential Risk Factors and Countermeasures by Crash Type 37
Table 11 – Speed-Related Countermeasure Implementation Status 39
Table 12 – Unprotected Persons Countermeasure Implementation Status 40
Table 13 – Younger Drivers Countermeasure Implementation Status 41
Table 14 – Impaired Driving Countermeasure Implementation Status 43
Table 15 – Inattentive/Distracted Driving Countermeasure Implementation Status 44
Table 16 – Older Driver Countermeasure Implementation Status 45
Table 17 – County Paved Intersections – Risk Factor Ranking 52
Table 18 – County Paved Intersection Safety Countermeasure Summary 55
Table 19 – County Paved Intersection Prioritized Project Cost Summary 62
Table 20 – County Paved Horizontal Curves – Risk Factor Ranking 67
Table 21 – County Paved Horizontal Curve Safety Countermeasure Summary 70
Table 22 – County Paved Horizontal Curve Prioritized Project Cost Summary 74
Table 23 – County Paved Roadway Segments – Risk Factor Ranking 79
Table 24 – County Paved Roadway Segment Safety Countermeasure Summary 82
Table 25 – County Paved Roadway Segment Prioritized Project Cost Summary 85
Table 26 – County Driver-Related Countermeasure Summary 92
Table 27 – Engineering Countermeasures Cost Summary 95

List of Abbreviations

A	Serious Injury
AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
CMF	Crash Modification Factor
CRF	Crash Reduction Factor
C-STEP	County-State Traffic Engineering Program
DARE	Drug Abuse Resistance Education
DE	Driver's Education
DEV	Daily Entering Vehicles
DOT	Department of Transportation
DRE	Drug Recognition Expert
FHWA	Federal Highway Administration
FTYROW	Failure to Yield to Right-of-Way
GIMS	Geographic Information Management System
GIS	Geographic Information Systems
GTSB	Governors Traffic Safety Bureau
HCSP	Horizontal Curve Sign Program
HFST	High Friction Surface Treatment
HPS	High Pressure Sodium
HSIP-S	Highway Safety Improvement Program – Secondary
HSM	Highway Safety Manual
InTrans	Institute for Transportation at Iowa State University
K	Fatality
Kadyn's Law	Keep Aware Driving – Youth Need School Safety Act
LED	Light Emitting Diode
LRSP	Local Road Safety Plan
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
MEV	Million Entering Vehicles
MVMT	Million Vehicle Miles Traveled
OWI	Operating While Intoxicated
PDO	Property Damage Only
PSA	Public Service Announcement
ROR	Run off Road
SALT	Seniors and Law Enforcement Together
SHSP	Strategic Highway Safety Plan
SRPFC	Sign Replacement Program for Cities
SRTS	Safe Routes to School
SUDAS	Statewide Urban Design and Specifications
TEAP	Traffic Engineering Assistance Program
TSIP	Traffic Safety Improvement Program
VMT	Vehicle Miles Traveled

1. INTRODUCTION

In the United States over 30,000 people lose their lives in motor vehicle crashes every year. According to the Federal Highway Administration (FHWA), rural road safety is a concern throughout the United States because a majority of fatalities take place on rural roads. Rural fatalities account for over 50% of all fatalities across the United States, yet less than 20% of the population lives in rural areas. In addition, the fatality rate on rural roads is 2.4 times higher than the fatality rate in urban areas.

"In 2012, 19% of the US population lived in rural areas but rural road fatalities accounted for 54% of all fatalities. Even with reductions in the number of fatalities on the roadways, the fatality rate in rural areas is 2.4 times higher than the fatality rate in urban areas."

FHWA – Office of Traffic Safety

In Iowa, more than 50% of fatal and serious injury crashes occurred on rural roads from 2004 to 2013, resulting in crash rates on rural roads that are more than twice that of state-maintained roads. There was an average of 7.3 fatal and serious injury crashes per year on county roads in Buchanan County from 2004 to 2013, resulting in a county road crash rate 1.7 times larger than the statewide average crash rate over the same period.

In the past, many efforts have focused on safety for higher volume roads and reactionary or "black spot" analysis of high crash locations. However, there is a growing trend across the United States to focus on proactive safety improvements for rural roads.

The Iowa Department of Transportation (DOT) developed a Strategic Highway Safety Plan (SHSP) to provide technical assistance in prioritization and deployment of safety countermeasures within various jurisdictions throughout the state. The Local Road Safety Plan (LRSP) concept is designed to build on the foundation established by the SHSP. The LRSP provides the basis for proactive implementation of safety countermeasures specific to individual counties across Iowa. This allows the County to leverage the road safety planning process to meet County-specific needs.

1.1. What is an LRSP?

An LRSP is a document that provides a basis for systemic safety improvements along local roads. Rather than addressing "black spots," the LRSP identifies systemic safety improvements along the roadway based on a risk factor analysis of the roadway. LRSPs not only assist local practitioners in understanding the types of crashes occurring on local roadways, but they also define a locally focused plan for practitioners to make informed, prioritized safety decisions. Additional benefits of LRSPs include:

- Coordination between various agencies within the County
- Use of the results of the analysis to leverage and apply for funding
- Focus on all the five E's of safety (Engineering, Emergency response, Education, Enforcement, and Everyone)

The LRSP process has been successfully initiated in several states including Minnesota and North Dakota.

1.1.1. Five E's of Safety

The Minnesota and North Dakota LRSPs generally focused on engineering improvements to mitigate crashes at the county level. In Iowa, LRSPs are also assessing what is being conducted at the county level to address all of the five E's of safety (Engineering, Emergency response, Education, Enforcement, and Everyone).

While engineering improvements can make the roadways safer, engineering improvements alone cannot prevent all motor vehicle crashes. According to the National Highway Traffic Safety Administration (NHTSA), 90% of all crashes are a result of driver-related factors. Because such a high percentage of crashes are a result of driver-related factors, making roadways safer requires all of the five E's to be involved.

Working together with all of the E's at the county level will help make the roads safer in Buchanan County.

1.2. Purpose of the LRSP

The LRSP identifies a prioritized list of safety improvement projects that can be implemented within the County to address specific crash characteristics identified during the data collection portion of the project. The recommendations in this plan focus on transportation improvements with a high benefit of crash reductions by applying the principles established in the SHSP and through a systemic data analysis performed specifically for Buchanan County. The recommended improvements take into consideration constraints within the local county network and incorporate feedback from the County Engineer and local stakeholders.

Buchanan County is part of Phase 1 of the Iowa DOT LRSP project, which included 12 counties. The following counties were included in Phase 1 of the project, and **Figure 1** illustrates the counties with respect to the State of Iowa.

- **Buchanan**
- Cerro Gordo
- Clinton
- Hamilton
- Keokuk
- Marshall
- Mills
- Monona
- Montgomery
- Plymouth
- Wapello
- Winneshiek

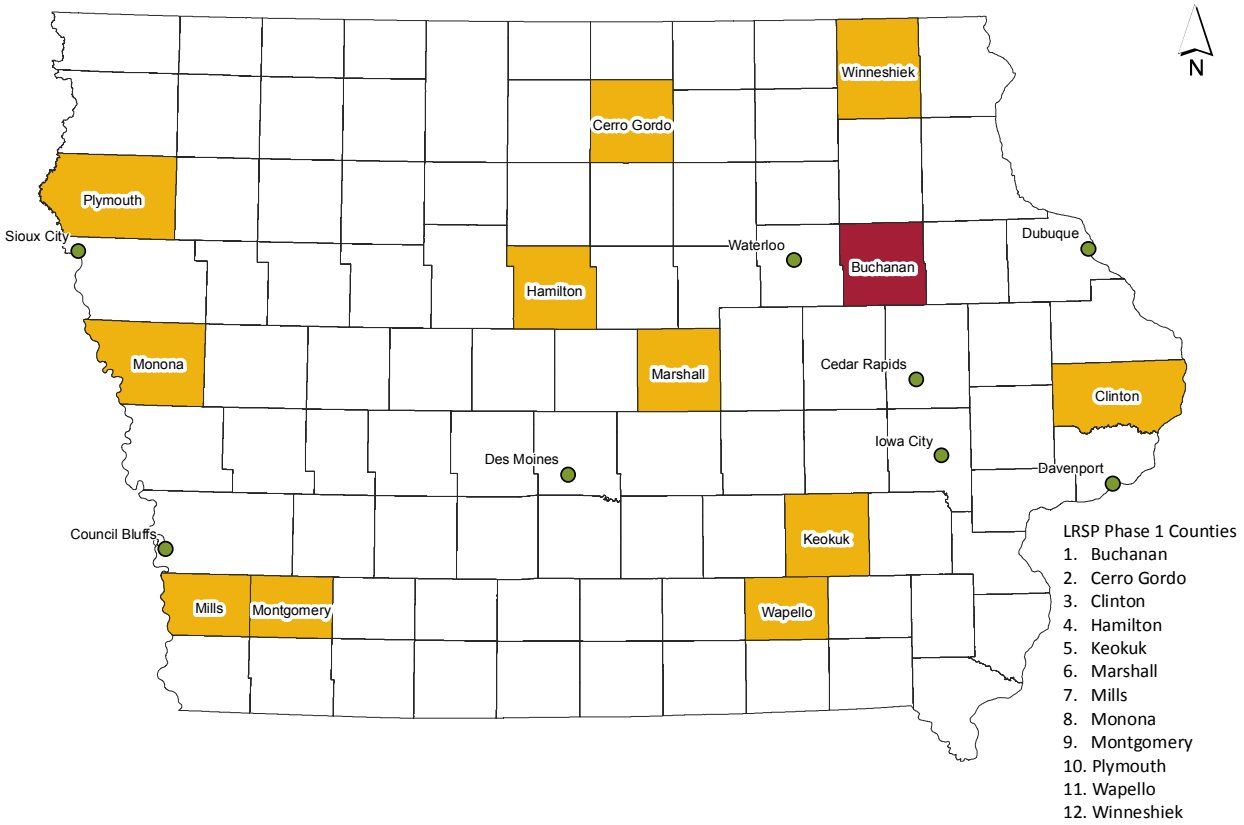


Figure 1 – Location of Phase 1 LRSP Counties with Respect to Iowa

1.3. Buchanan County

Buchanan County is located in eastern Iowa and is named after the then United State Senator, James Buchanan, who later served as the 15th President of the United States. According to the 2010 census, the population of Buchanan County was 20,958. Independence, the County seat, is also the County's most populous city at 5,966.

Buchanan County maintains approximately 950 miles of County roads, of which approximately 200 are paved. There were 1,109 crashes resulting in 73 fatal and serious injury crashes on county roads in Buchanan County from 2004 to 2013.

1.4. LRSP Project Overview

The LRSP project includes six primary task assignments. The following is a brief description of the tasks associated with this project, with a more detailed description of each task in subsequent sections of this document. **Figure 2** illustrates the LRSP project process and timeline.

1.4.1. Gather Background Information

Under this task, relevant documents provided by the counties were reviewed as well as the Iowa SHSP, and potential funding sources. In addition, a questionnaire was developed and distributed to the counties to gather input on current safety measure implementation within their jurisdictions. Technical Memorandum #1 summarizing the background phase of the project was prepared, and relevant information from Technical Memorandum #1 pertaining to Buchanan County is included in this document.

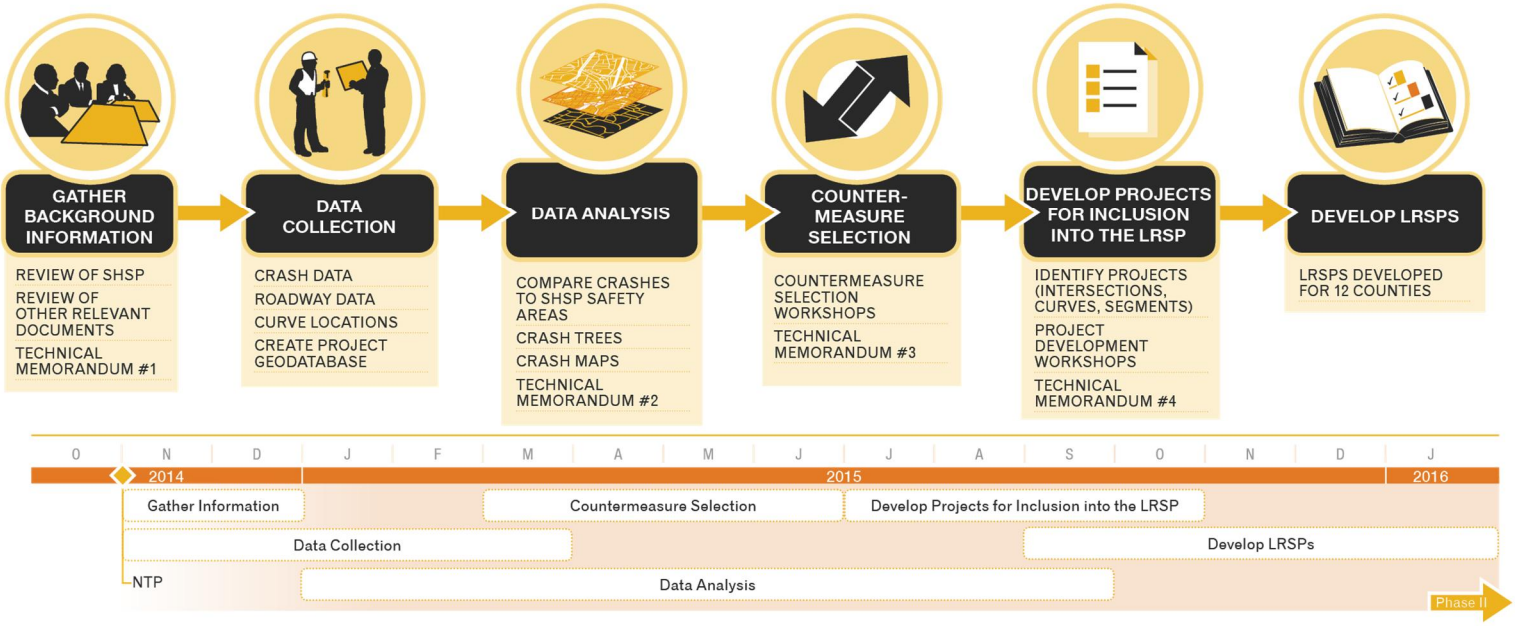


Figure 2 – LRSP Project Process

1.4.2. Data Collection

A comprehensive Geographic Information Systems (GIS) project database was developed utilizing crash data, roadway data, horizontal curve data, and the intersection database obtained from the Iowa DOT. The County also provided their 911 address database and locations of stop signs along their paved roadway system.

1.4.3. Data Analysis

After development of the comprehensive GIS project database, the crash data was analyzed for Buchanan County. Crashes were compared to the Key Safety Emphasis Areas for the State of Iowa (as defined in the SHSP), and crash trees and maps were prepared. Technical Memorandum #2 summarizing the data analysis for all 12 counties, as well as Buchanan County, was prepared. Relevant information from Technical Memorandum #2 pertaining to Buchanan County is included within this document.

1.4.4. Countermeasure Selection

Following completion of the data analysis, a Countermeasure Selection Workshop was held with the safety stakeholders of Buchanan County. During these workshops the following items were discussed:

- The background and purpose of the LRSP
- The five E's of safety
- Crash data
- Risk factors and ranking of risk factors
- Countermeasures

Technical Memorandum #3 summarizing the discussions at the workshops with each of the 12 counties was prepared. Relevant information from Technical Memorandum #3 pertaining to Buchanan County is included within this document.

1.4.5. Develop Projects for Inclusion into the LRSP

A risk factor ranking process was developed for intersections, curves, and segments. Risk factors were calculated for all paved intersections, curves, and segments within Buchanan County. Risk factors included roadway features such as curve radius, shoulder width, and traffic volumes. After conducting the risk factor analysis, recommended safety improvements were developed for the feature types based on the project selection decision trees. Improvements included items such as additional signage, pavement markings, and rumble strips. After developing project sheets detailing the recommended safety improvements at specific locations, a Project Selection Workshop was conducted with the County to review the results. Technical Memorandum #4 summarizing the workshops conducted with the 12 counties was prepared, and relevant information from Technical Memorandum #4 for Buchanan County is included within this document.

1.4.6. Develop LRSPs

An LRSP was developed for Buchanan County. This LRSP includes a summary of the LRSP process along with recommended safety projects for implementation by the County.

1.5. Document Organization

This document is organized into the following sections:

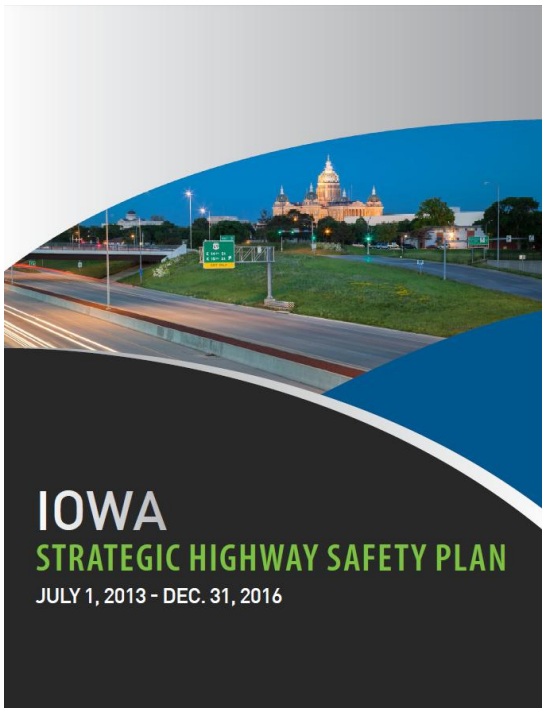
- **Section 1** presents the project background and purpose of the LRSP.
- **Section 2** provides a summary of relevant information and current Buchanan County practices reviewed as part of the study.
- **Section 3** summarizes the data collected and geodatabase developed for the analysis.
- **Section 4** describes the crash data analysis conducted for Buchanan County.
- **Section 5** provides a summary of potential countermeasures and a summary of the Countermeasure Selection Workshop.
- **Section 6** describes the methodology for project selection and safety improvement recommendations and provides a summary of the Project Selection Workshop.
- **Section 7** provides a summary of the LRSP recommendations.
- **Appendices** include detailed project sheets for Buchanan County paved intersections, curves, and segments as well as summary sheets including all locations that were analyzed as part of this LRSP.

2. BACKGROUND

Under this task, relevant documents were reviewed including the Iowa SHSP, funding sources, and other documents provided by the County. In addition, a questionnaire was developed to receive input on current safety countermeasure implementation within the County. The following subsections summarize of the background information that was gathered and reviewed as part of the LRSP.

2.1. Iowa SHSP

The most current Iowa SHSP was developed in July 2013, and is in effect until December 31, 2016. As part of the Iowa SHSP, five years of crash data for crashes resulting in fatalities and serious injuries were separated into 21 safety emphasis areas, which are generally defined by the American Association of State Highway and Transportation Officials (AASHTO) SHSP. This process determined the safety emphasis areas with the greatest number of crashes within Iowa, and resulted in the focused opportunities for safety improvements on Iowa roadways. **Table 1** (on the following page) provides a summary of the crash data as it relates to the safety emphasis areas.



The Iowa SHSP has 10 Key Safety Emphasis Areas that were determined by a data-driven process that took into account fatal and serious injury crashes by emphasis area, but also investigated trends within the emphasis areas. Identifying safety emphasis areas allows stakeholders to develop and prioritize strategies that can reduce fatal and serious crashes on Iowa roadways. Iowa's Key Safety Emphasis Areas can be broken down into two categories: driver-related and roadway/infrastructure. Following is a summary of the 10 Key Safety Emphasis Areas for Iowa:

- Driver-Related
  - Speed-related (48% of fatal and serious injury crashes)
  - Unprotected persons (38% of fatal and serious injury crashes)
  - Younger drivers (37% of fatal and serious injury crashes)
  - Impaired driving (18% of fatal and serious injury crashes)
  - Older drivers (16% of fatal and serious injury crashes)
  - Inattentive/distracted drivers (5% of fatal and serious injury crashes)
  - Traffic safety culture (n/a)
- Roadway/Infrastructure
  - Lane departure (53% of fatal and serious injury crashes)
  - Local roads (52% of fatal and serious injury crashes)
  - Intersections (30% of fatal and serious injury crashes)

The goal of Iowa's SHSP is to reduce fatalities and serious injuries by 15% on Iowa's roadways by the year 2020, which would result in approximately 280 fewer fatalities and serious injuries

than the 1,872 injuries reported in 2011. The Iowa SHSP identifies five basic components essential to meeting the goal:

- Education
- Enforcement
- Engineering
- Policy
- Research and data

By focusing on all of these components, Iowa believes it is possible to achieve the improved safety goal set forth in the SHSP.

Table 1 – Iowa Fatal and Serious Injuries by Safety Emphasis Area

Category/Safety Emphasis Area		Rank	Fatalities and Serious Injuries	Fatalities	Serious Injuries	% of Total	Key Safety Emphasis Area
Statewide Totals			**10,575**	**1,977**	**8,598**	**100%**	
Drivers	Speed-Related	3	5,126	991	4,135	48%	X
	Unprotected Persons	4	3,971	1,044	2,927	38%	X
	Younger Drivers	5	3,862	607	3,255	37%	X
	Impaired Driving	8	1,902	492	1,410	18%	X
	Older Drivers	9	1,723	431	1,292	16%	X
	Inattentive/Distracted Driving	14	477	66	411	5%	X
Highway	Lane Departures	1	5,609	1,332	4,277	53%	X
	Local Roads	2	5,521	931	4,590	52%	X
	Roadside Collision	6	3,485	752	2,733	33%	X
	Intersections	7	3,210	425	2,785	30%	X
	Winter Road Conditions	11	1,224	213	1,011	12%	
	Train	17	47	13	34	0%	
	Work Zone	16	159	35	124	2%	
Special Users	Pedestrian	13	561	112	449	5%	
	Bicycle	15	227	27	200	2%	
Vehicles	Motorcycle	10	1,491	257	1,234	14%	
	Heavy Truck	12	1,209	371	838	11%	
	Other Special Vehicles		193	47	146	2%	

Numbers in the columns may not add up to the totals because one crash may be associated with multiple emphasis areas. For example, there could be a lane departure crash with serious injuries involving an impaired young driver on a local road.
Source (Statewide Data): Iowa Strategic Highway Safety Plan, 2013 and Iowa crash data records, 2007 to 2011.

2.2. Iowa DOT Safety Programs

There are a wide variety of transportation safety funding sources available to counties within the State of Iowa. These funding programs can be used to implement treatments and recommendations for roadways and locations identified for improvements as part of this LRSP. The following Iowa DOT safety programs are available for the County to apply for funding to aid in implementation of the safety countermeasures identified within this LRSP.

- County-State Traffic Engineering Program (C-STEP)
  http://www.iowadot.gov/pol_leg_services/Funding-Guide.pdf
- Highway Safety Improvement Program – Secondary (HSIP-S)
  http://www.iowadot.gov/traffic/sections/HSIP.html
- Horizontal Curve Sign Program (HCSP)
  http://www.iowadot.gov/traffic/horizontalcurve.html
- Overhead Flashing Beacon Replacement Program
  http://www.iowadot.gov/traffic/flashingbeacon.html
- Safe Routes to School (SRTS)
  http://www.iowadot.gov/saferoutes/
- Sign Replacement Program for Cities (SRPFC)
  http://www.iowadot.gov/traffic/signreplacementprogram.htm
- Traffic Engineering Assistance Program (TEAP)
  http://www.iowadot.gov/traffic/teap.html
- Traffic Safety Improvement Program (TSIP)
  http://www.iowadot.gov/tsip.htm

2.3. Buchanan County Safety Questionnaire

A questionnaire was developed and distributed to the County Engineer to provide quantitative feedback on county-related safety practices. Based on the results of the questionnaire, 19 of the 25 safety treatments outlined in the questionnaire have been installed at least once in the County. Guardrails, curve chevrons, pavement markings, and safety ramps at T-intersections are safety treatments that can be found in many locations throughout the County. Other items to note regarding safety treatments found in the County are summarized below:

- **Shoulder widening** has been installed on approximately 30 miles of roadway, and Buchanan County has identified two more locations where they would like to widen shoulders; however, funding is not currently defined for these projects.
- The Buchanan County Board of Supervisors allows the addition of a 4-foot **paved shoulder** when the pavement surface is rehabilitated.
- When pavement surfaces are rehabilitated, a **Safety Edge** is added.
- It is believed that narrower and shallower **centerline rumble strips** would be more successful in Buchanan County.
- **Edgeline rumble strips** are installed on 11-foot lanes when there are no centerline rumble strips, and on 12-foot lanes **shoulder rumble strips** are installed.
- **Guardrail** is provided on all federally funded bridge projects and terminal end sections are provided on all four corners.
- Buchanan County has provided **flashing beacons** on both stop/yield signs as well as warning signs, but they feel this countermeasure is too expensive for widespread use.

- **Roundabouts** tend to yield tremendous opposition by the general public prior to construction, but receive public acceptance after they are completed. They have experienced difficulty with snow removal in their roundabouts and recommend a convex center to reduce snow removal problems.
- Currently, there are not any **high-friction surface treatments** within Buchanan County; however, they are interested in implementing the technology.
- **Mailboxes** are the largest issue relating to **obstructions within the clear zone/right-of-way**. If a mailbox is a hazard, and the Highway authority notifies the postmaster, mail delivery can be terminated until the issue is corrected. However, legislators are not in support of the corrective measures to address mailboxes within Buchanan County.
- **Safety ramps at T-intersections** are provided on paved routes where there are steep slopes.
- The **access management policy** requires 400 feet of separation on driveways (excluding field entrances) and driveways are not allowed within 150 feet of intersections.

2.4. Five-Year Secondary Road Construction Program

Each county in Iowa maintains a Five-Year Secondary Road Construction Program. The program lists current and future projects in the county as well as the funding status of each project. The projects are funded by four funding types: Local funding, Farm-to-Market funding, Special funding, and Federal Aid funding. The Five-Year Secondary Road Construction Program for Buchanan County has a budget of over $10.7 million. This includes $1.5 million local funding, and nearly half of the program is from federal-aid funding as shown in **Table 2**.

Table 2 – Five-Year Secondary Road Construction Program Summary

Funding, In Thousands of Dollars						
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**Total**
Local	771	435	274	10	10	1,500
Farm-to-Market	1,672	190	90	698	0	2,650
Special	1,275	0	0	0	644	1,919
Federal-Aid	2,425	760	360	1,142	0	4,687
TOTAL	**6,143**	**1,385**	**724**	**1,850**	**654**	**10,756**

3. Data Collection

As part of the LRSP project, a comprehensive GIS project database was developed utilizing crash data, roadway data, horizontal curve data, and the intersection database. The following sections describe the databases utilized for creation of the project geodatabase and later used for analysis.

3.1. Crash Data

The Iowa DOT statewide crash database includes crash history for all crashes occurring on a public roadway in the state that involve a personal injury or that satisfy a minimum property damage threshold of $1,500. This database is updated on a monthly basis.

The crash database provides crash-, driver/vehicle- and person-level attributes. All crashes are geocoded with respect to the Iowa DOT Geographic Information Management System (GIMS) roadway database. This LRSP utilizes 10 years of crash data for crashes occurring on roadways of interest between January 1, 2004 and December 31, 2013 (as of the January 15, 2015 database update).

Crashes included in the crash database were identified based on their “County” and “Concatenated System” attribute values. “Concatenated System” is an Iowa DOT-derived attribute, conveying the roadway system(s) on which a crash was located. The three roadway systems in Iowa are the Primary system (state-owned), the Secondary system (county-owned), and the Municipal system (city-owned). All crashes with a “Concatenated System” value containing either “Secondary” or “Municipal”, including intersections with state roadways, were selected for Buchanan County.

“County” and “City” attributes were added to the database to clearly identify on which system a crash likely occurred, as well as address any possible ambiguities in the initial “Concatenated System” derivation. This was initially accomplished by analyzing the spatial proximity of crashes with respect to county roads and city streets, as defined in the GIMS database. Additional analysis was performed for a limited number of crashes not located through the aforementioned technique. Crashes occurring at or near intersections of county roads and city streets were identified as occurring on both systems.

3.2. Roadway Data

The Iowa DOT GIMS database includes various roadway characteristics for all public roads in Iowa. Roadway attributes are regularly updated by the Iowa DOT from various sources, including local agency submittals. An annual GIMS history snapshot is created, representing the prior calendar year. This LRSP utilizes the GIMS history snapshot representing the year 2013.

A horizontal curve geospatial database was created for the Iowa DOT by the Institute for Transportation at Iowa State University (InTrans) in 2010. The database generally includes horizontal curve alignments on the rural state and county paved systems with a minimum speed limit of 45 miles per hour (mph). Minor updates have been made to this database since 2010. This LRSP utilizes the August 28, 2013 version of the database.

InTrans and the Iowa DOT have collaborated over the past several years to create a statewide intersection database. The foundation of this database is a GIS-based intersection point file created by the Iowa DOT’s Office of Traffic and Safety. A selected set of inventory elements are being captured for each intersection and approach roadway with aerial imagery and street-level images. The state and county roadway intersection data collection is essentially complete but has

not been formally delivered to the Iowa DOT because collection of the city street system is still in progress. This LRSP utilizes the March 9, 2015 version of the intersection database.

3.3. 911 Address Database

The Buchanan County 911 address database documents driveway addresses for all businesses, homes, and structures within the County. It was utilized to obtain driveway locations along the County paved roadway system for this project. While this database does not document all access points along the roadway system, such as farm access roadways, it does capture locations with a higher number of vehicular turning movements, such as homes and businesses. Roadway segments with a greater number of access points have a higher risk for crashes, due to increased potential for vehicle conflicts.

3.4. Stop Sign Locations

While the intersection database contains the control type for the intersection (all-way stop, two-way stop, one-way stop, etc.), stop control at the approach level is not included. The County Engineer provided a map illustrating where stop signs were located along the county paved roadway system. This information was geocoded into the GIS database.

3.5. Existing Condition Updates to the Database

Throughout the process, the County Engineer provided feedback on locations where the information contained within the existing databases was not current (for example, location of rumble strips, shoulder type and/or width, etc.). When these locations were identified, updates were made to the database.

3.6. Crash Tree Development

The following sections describe the development of crash trees as a means of displaying Buchanan County crashes. As previously noted, “County” and “City” road attributes were added to the crash database to more simply identify on which system a crash likely occurred as well as to address any possible ambiguities in the initial “Concatenated System” derivation. This was initially completed through analysis of the spatial proximity of crashes with respect to county roadways and city streets, as defined in the GIMS database. Additional review was performed for a limited number of crashes not addressed through the aforementioned technique. Crashes occurring at or near intersections of county roads and city streets were identified as occurring on both systems.

3.6.1. County Roadways

To supplement the crash database with additional available data sets, two new attributes relating to horizontal curvature and intersection traffic control were added and populated. Specifically, a horizontal curvature attribute was populated for all crashes within 200 feet of a horizontal curve on a paved county roadway. This was necessary because roadway alignment information is not currently captured on the standard Iowa DOT crash report form. However, as noted previously, the horizontal curve database is currently limited to rural, paved roadways only. The traffic control for county paved and unpaved roadway intersection crashes was populated based on their spatial proximity to the current statewide intersection database points and the corresponding reported traffic control at these intersections.

Upon identifying all “County” road crashes from the crash database, the Iowa DOT-derived “Paved” attribute was used to segregate the county roadway crashes into paved and unpaved surface types. For each of these surface types, the standard Iowa DOT crash database attributes

of “Type of Roadway Junction/Feature”, “Manner of Crash/Collision” and “Major Cause” were used to populate the trees. The new traffic control attribute was used to separate county paved and unpaved roadway intersection crashes into the different traffic control type categories. For county paved roadway crashes only, the new horizontal curvature attribute was used to separate non-intersection crashes into “on curve” and “off curve” categories.

3.6.2. City Streets

The city street crash trees differ from the county roadway crash trees in three primary ways: surface type segregation, horizontal curve crash identification and the manner in which the intersection control type was derived. Given the predominance of paved roads in cities, crash trees were not segregated by surface type. Additionally, due to the lack of horizontal curvature data on the city street system, non-intersection crashes could not be identified as “on curve” or “off curve”. Lastly, while the statewide intersection database is predominantly complete for rural areas, the city street system is still actively being captured and therefore, could not be used to derive traffic control type.

An alternate approach was employed to accomplish this, specifically through analysis of the standard Iowa DOT crash database vehicle-level attributes of “Traffic Controls” and “Initial Direction of Travel”. Depending on the combination of vehicles involved, their approaches (“Initial Direction of Travel”) and reported “Traffic Controls”, the intersection traffic control may be derived with varying levels of confidence. For example, the traffic control for a crash involving two vehicles both with “stop signs” reported as their traffic control, and traveling north and east respectively, may be derived as an all-way stop. Such derivation becomes more challenging when the only vehicles involved in a crash are travelling in the same or opposite directions and/or have conflicting reported traffic controls.

Upon identifying all “City” crashes from the crash database, the standard Iowa DOT crash database attributes of “Type of Roadway Junction/Feature”, “Manner of Crash/Collision” and “Major Cause” were used to populate the crash trees. The new traffic control attribute was used to separate intersection crashes into the different traffic control type categories.

A second set of crash trees was then created in a similar manner, simply limiting the crashes to “Fatal” and “Major Injury”, based on the Iowa DOT derived “Crash Severity” attribute. The two sets of crash trees were combined, and were utilized in the development of this LRSP.

3.6.3. Major Cause and Manner of Crash

“Major Cause” and “Manner of Crash” statistics are provided in the crash trees and are based on total crashes. The fatal and serious injury crashes had similar characteristics as the total crashes for Buchanan County.

4. DATA ANALYSIS

From January 1, 2004 to December 31, 2013 in Buchanan County, there were a total of 1,932 crashes on county roads and city streets, of which 95 resulted in fatalities or serious injuries. The following sections contain crash maps and summarize the data analysis prepared for the County, noting how it compares to the state of Iowa as a whole. Crash trees, high crash locations, and additional crash data analysis are included.

4.1. Crash Maps

Crash severity maps were created by employing an InTrans-developed, GIS-based crash stacking tool. The purpose of this tool is to produce maps in which spatially proximate crashes are vertically offset to produce crash "stacks," better conveying crash experience and severity at higher frequency locations. All crashes indicated as "County" were selected and stacked by ascending severity. In other words, the more serious crashes were located at the bottom of the crash stack, nearer to the actual crash location on the roadway. Given the small map scale (county-level), a 300-meter (985-foot) spatial proximity was utilized to provide a clearer and cleaner map product.

Figure 3 contains a map illustrating all crashes on county roads within Buchanan County stacked by ascending severity. **Figure 4** contains a map illustrating all fatal and serious injury crashes stacked by ascending severity. As shown in the maps, the majority of the county road crashes occurred on county paved roads as opposed to unpaved roads. City street crashes are not illustrated on the maps; however, they are included within the data analysis.

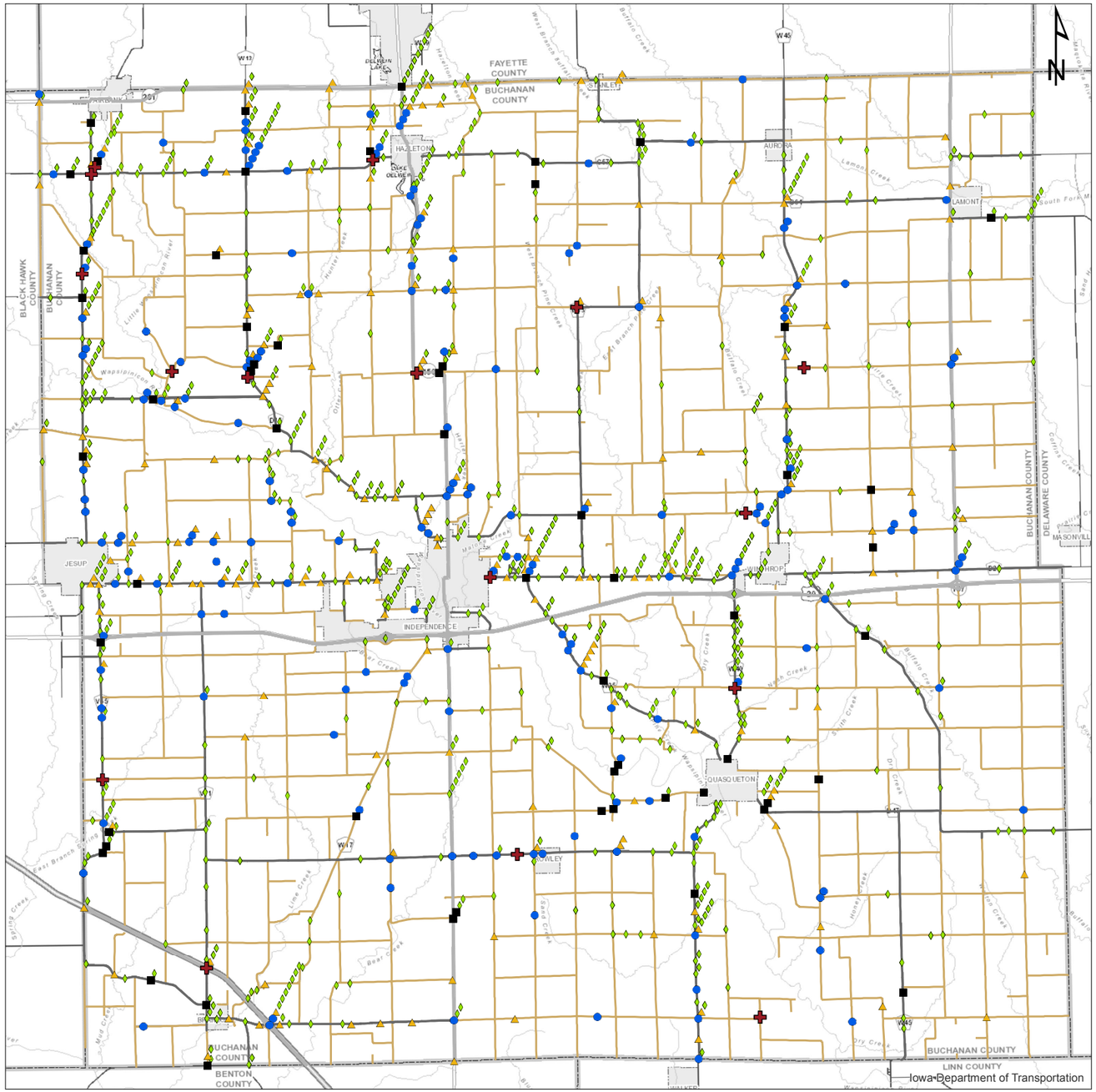


Figure 3 – All Crashes County Roads

All Crashes
County Roads
Buchanan County, Iowa
2004 - 2013

Crash Severity

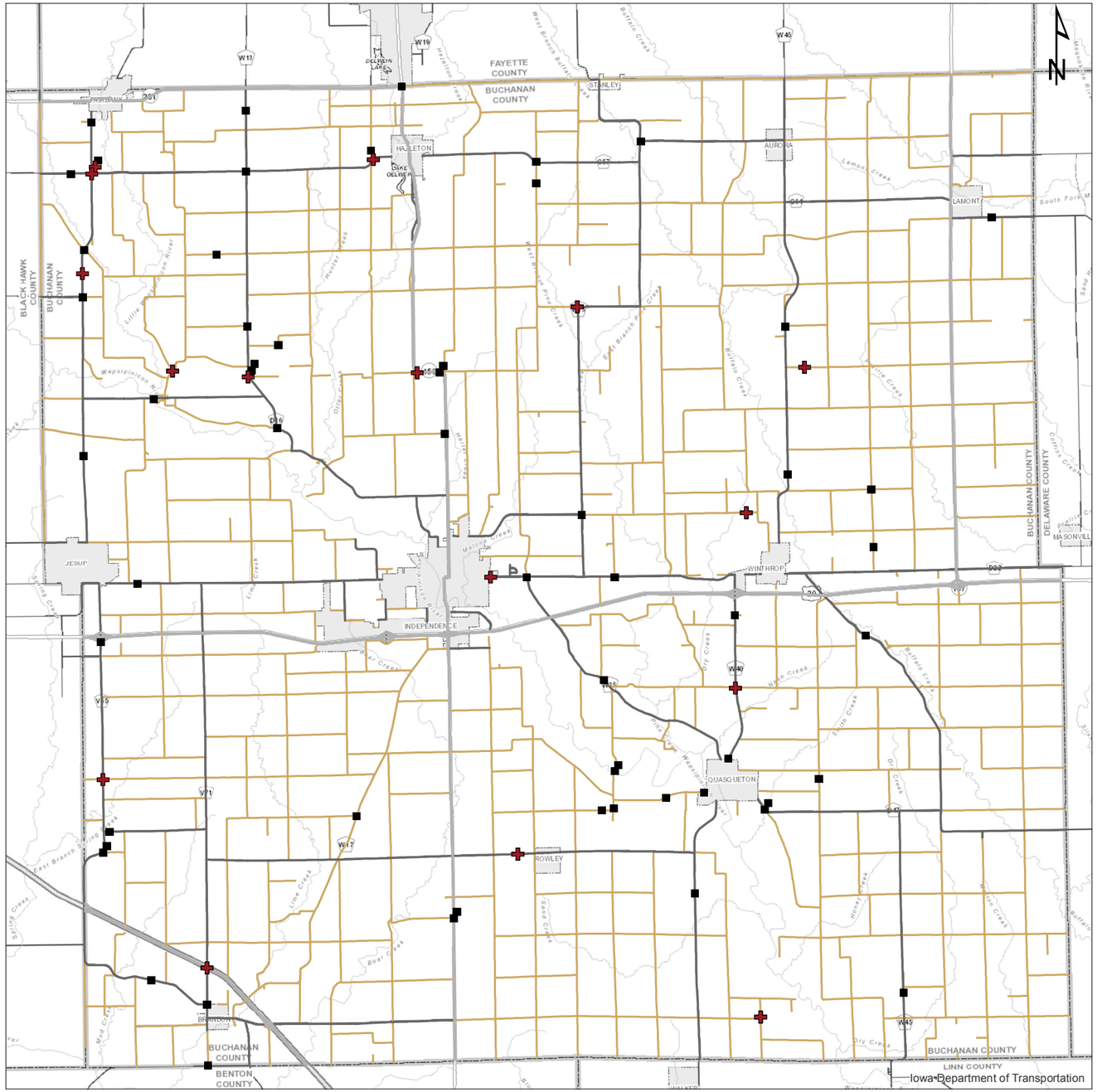
- Fatal (16)
- Serious Injury (57)
- Minor Injury (174)
- Possible/Unknown Injury (177)
- Property Damage Only (685)

Highways

- State
- County Paved
- County Unpaved

0 0.75 1.5 3 4.5 6 Miles

The information contained in this map was derived from the January 15, 2015 Iowa DOT crash database.



Fatal and Serious Injury Crashes
County Roads
Buchanan County, Iowa
2004 - 2013

Crash Severity

- Fatal (16)
- Serious Injury (57)

Highways

- State
- County Paved
- County Unpaved
- Secondary Unpaved

0 0.75 1.5 3 4.5 6 Miles

The information contained in this map was derived from the January 15, 2015 Iowa DOT crash database.

Figure 4 – Fatal and Serious Injury Crashes County Roads

4.2. Total Crashes

From 2004 to 2013, there were a total of 1,932 crashes on county roadways and city streets within Buchanan County. **Figure 5** illustrates the comparison of the Buchanan County crash rate per Million Vehicle Miles Traveled (MVMT) on county roads and city streets to the overall Iowa crash rate during the same timeframe. As shown in **Figure 5**, the Buchanan County crash rate on county roads and city streets was lower than the statewide Iowa crash rate between 2006 and 2010, and was higher than the statewide Iowa crash rate during the other study years.

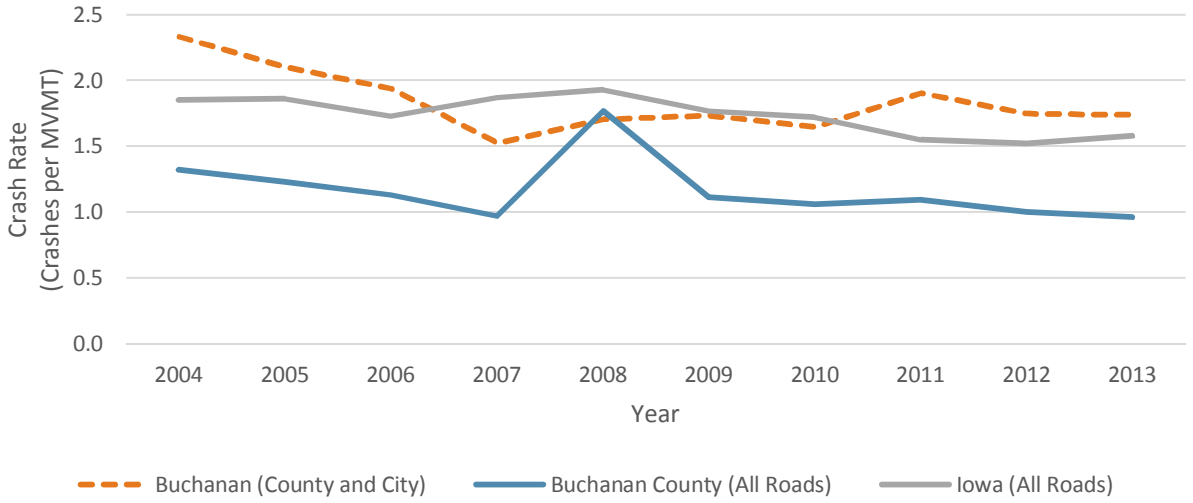


Figure 5 – Total Crashes per MVMT

The Buchanan County crash rate by roadway type is summarized in **Figure 6**. Statewide data is not included in the figure, as it was not derived for the entire state's county and city system as part of this project. As shown in **Figure 6**, the overall crash rate is higher on city streets versus county roads.

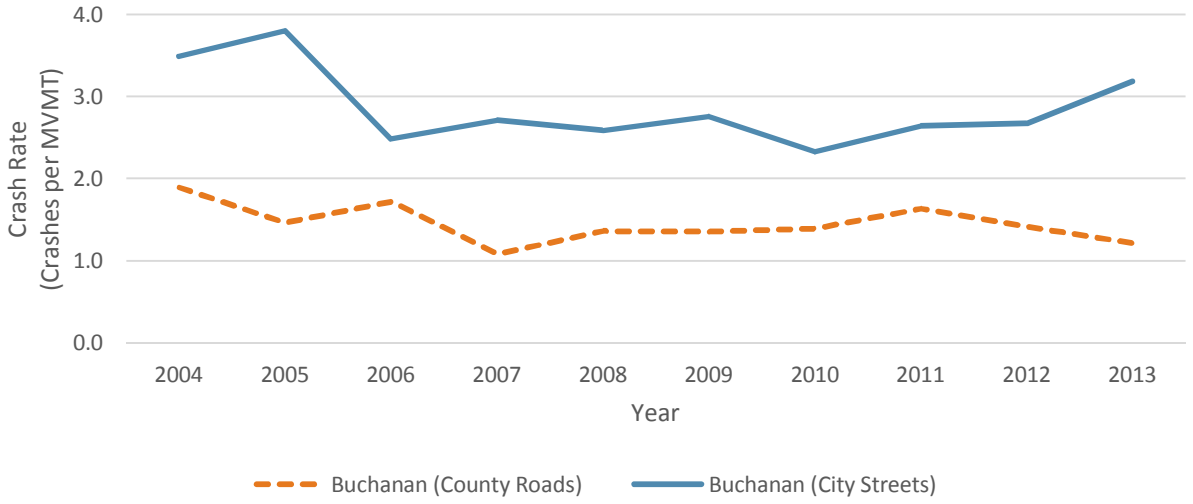


Figure 6 – Total Crashes by Roadway Type per MVMT

4.3. Fatal and Serious Injury Crashes

There were 95 fatal and serious injury crashes on county roads and city streets in Buchanan County from 2004 to 2013. Fatal and serious injury crash rates for Buchanan County and all of Iowa are illustrated in **Figure 7**. The Buchanan County fatal and serious injury crash rates on county roads and city streets was generally higher than the statewide Iowa crash rate during the study period.

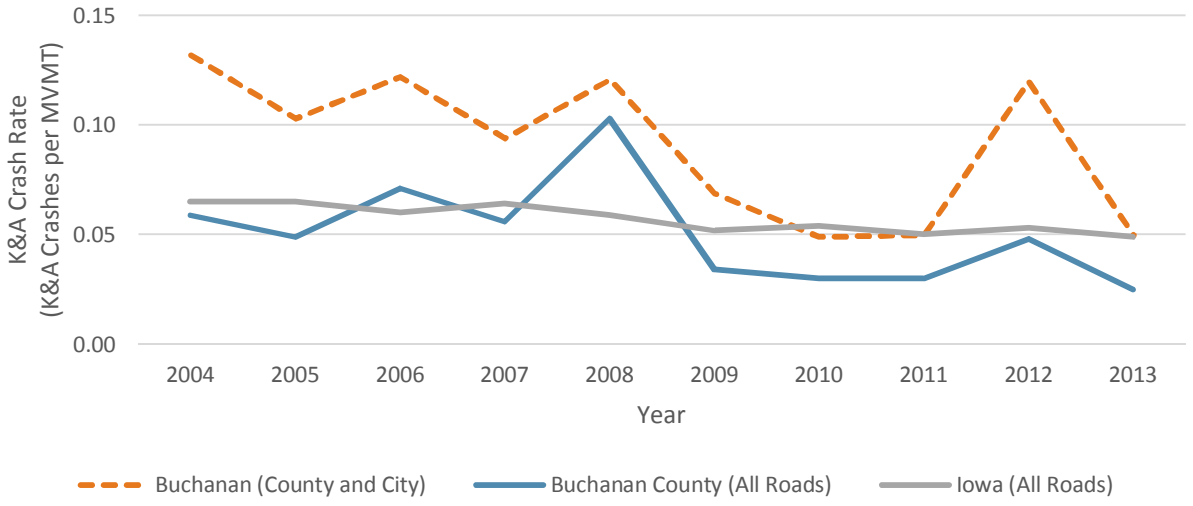


Figure 7 – Crash Rate (Fatal and Serious Injury Crashes)

Figure 8 displays fatal and serious injury crash rates for Buchanan County. Statewide data is not included in the figure, as it was not derived for the entire state's county and city system as part of this project. The Buchanan County fatal and serious injury crash rates, as shown, were highly variable during the study period on both county roads and city streets.

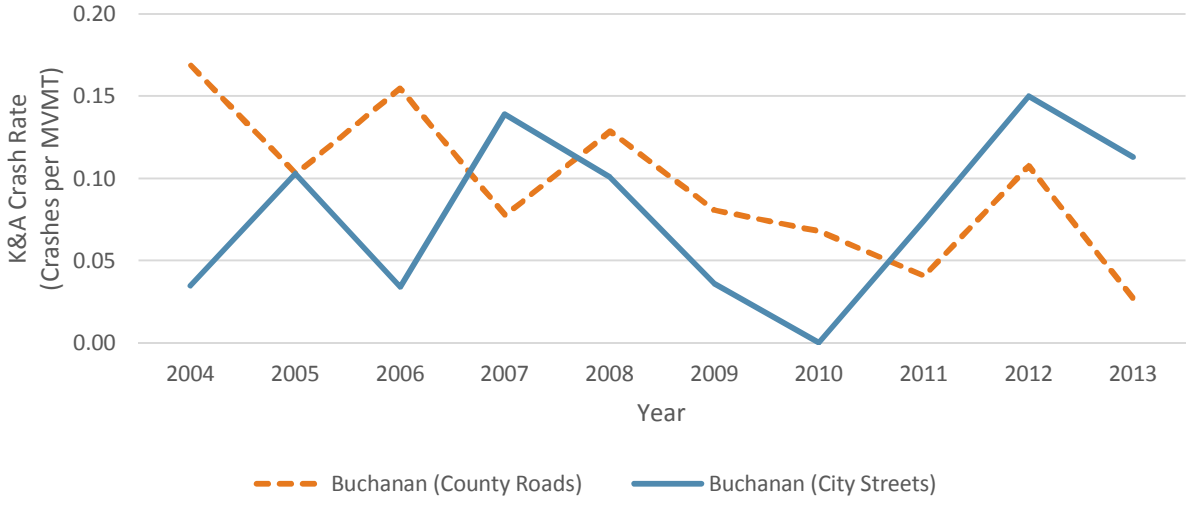


Figure 8 – Crash Rate by Roadway Type (Fatal and Serious Injury Crashes)

4.4. Comparison of County Crashes to SHSP Key Safety Emphasis Areas

The most current Iowa SHSP was developed in July 2013, and is in effect until December 31, 2016. As part of the Iowa SHSP, five years of crash data for crashes resulting in fatalities and serious injuries were separated into 21 safety emphasis areas, which are generally defined by the AASHTO SHSP. This process determined the safety emphasis areas with the greatest number of crashes within Iowa, and resulted in the focused opportunities for safety improvements on Iowa roadways.

Table 3 contains a comparison of Buchanan County crashes resulting in fatalities and serious injuries to the Key Safety Emphasis Areas from the Iowa SHSP. Because the SHSP was based on five years of crash data, five years of crash data (2009 to 2013) for the County was utilized to compare the crashes to the Iowa Key Safety Emphasis Areas. As shown in the table, the county crashes generally follow the same Key Safety Emphasis Areas as the state. **Table 3** provides a comparison of the county fatal and serious injury crashes to the Iowa SHSP Key Safety Emphasis Areas, and **Table 4** shows the difference in rank for comparison. As shown in **Table 3** and **Table 4**, the Key Safety Emphasis Areas for the County generally rank the same as the Key Safety Emphasis Areas from the SHSP.

Table 3 – County Serious Injuries by Safety Emphasis Area

Category	Safety Emphasis Area	Statewide Totals			Buchanan County			Key Safety Emphasis Area
		Fatal and Serious Injury	% of Total	Rank	Fatal and Serious Injury	% of Total	Rank	
		10,575	100%	N/A	50	100%	N/A	
Drivers	Younger Drivers	3,862	37%	5	16	32%	6	X
	Older Drivers	1,723	16%	9	9	18%	9	X
	Speed Related	5,126	48%	3	23	46%	3	X
	Impaired Driving	1,902	18%	8	10	20%	7	X
	Inattentive/Distracted Driving	477	5%	14	1	2%	15	X
	Unprotected Persons	3,971	38%	4	10	20%	7	X
Highway	Train	47	0.4%	17	0	0%	17	
	Lane Departures	5,609	53%	1	26	52%	2	X
	Roadside Collision	3,485	33%	6	22	44%	4	X
	Intersections	3,210	30%	7	19	38%	5	X
	Work Zone	159	2%	16	0	0%	17	
	Local Roads	5,521	52%	2	28	56%	1	X
	Winter Road Conditions	1,224	12%	11	3	6%	12	
Special Users	Pedestrian	561	5%	13	3	6%	12	
	Bicycle	227	2%	15	1	2%	15	
Vehicles	Motorcycle	1,491	14%	10	7	14%	10	
	Heavy Truck	1,209	11%	12	6	12%	11	
	Other Special Vehicle	193	2%	17	2	4%	14	

Numbers in the columns may not add up to the totals because the injuries in one crash may be associated with multiple emphasis areas. For example, there could be a lane departure crash with serious injuries involving an impaired young driver on a local road.
Source (Statewide Data): Iowa Strategic Highway Safety Plan, 2013 and Iowa crash data records, 2007 to 2011.
Source (County Data): Iowa crash data records, 2009-2013.

Table 4 – County Serious Injuries Rank by Safety Emphasis Area

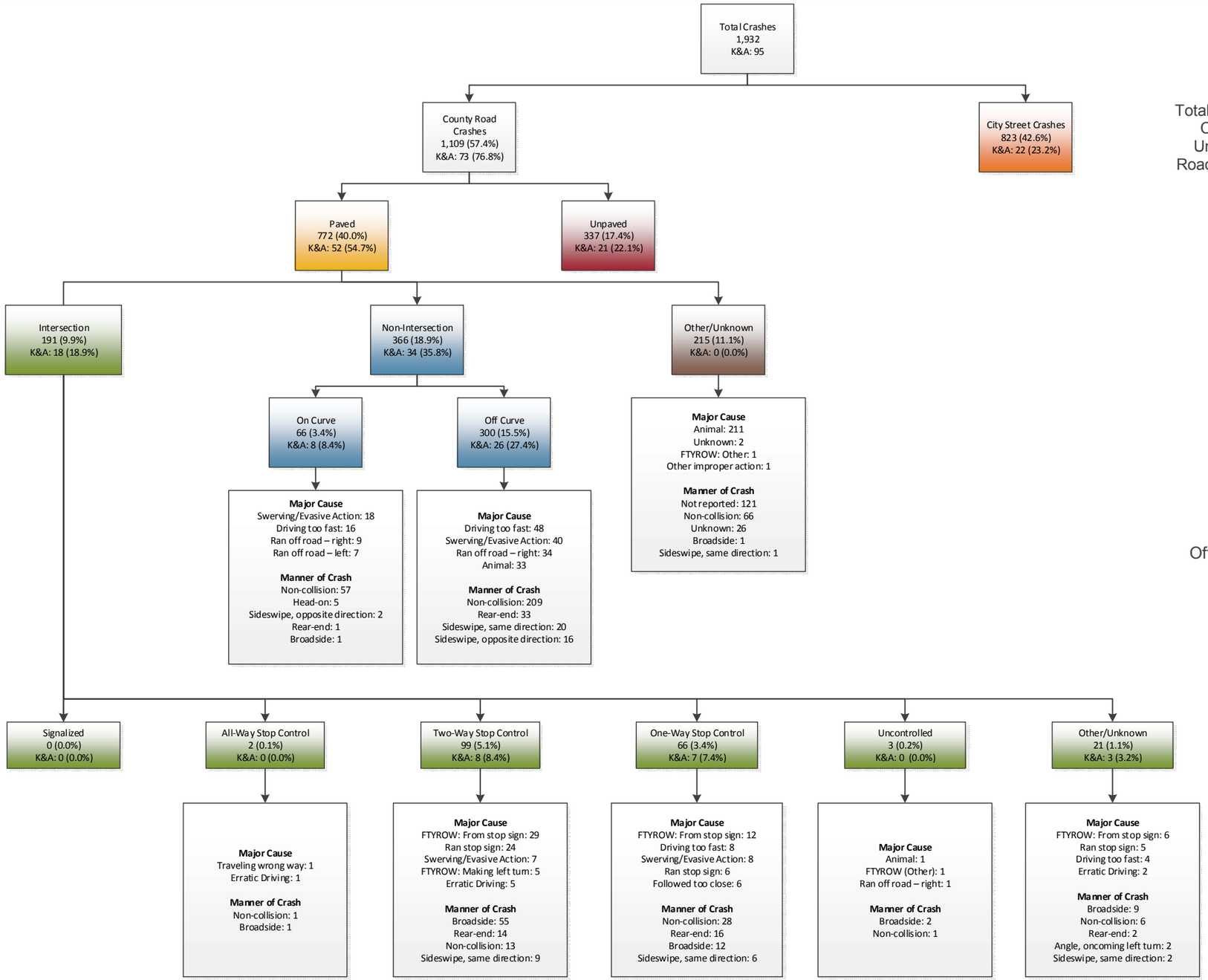
Category	Safety Emphasis Area	Rank			Key Safety Emphasis Area
		Statewide Totals	Buchanan County	Change in Rank	
Drivers	Younger Drivers	5	6	-1	X
	Older Drivers	9	9	0	X
	Speed Related	3	3	0	X
	Impaired Driving	8	7	+1	X
	Inattentive/Distracted Driving	14	15	-1	X
	Unprotected Persons	4	7	-3	X
Highway	Train	17	17	0	
	Lane Departures	1	2	-1	X
	Roadside Collision	6	4	+2	X
	Intersections	7	5	+2	X
	Work Zone	16	17	-1	
	Local Roads	2	1	+1	X
	Winter Road Conditions	11	12	-1	
Special Users	Pedestrian	13	12	+1	
	Bicycle	15	15	0	
Vehicles	Motorcycle	10	10	0	
	Heavy Truck	12	11	+1	
	Other Special Vehicle	17	14	+3	

4.5. Crash Trees

In order to further define the types of roadway features associated with crashes, three crash trees were developed for the County:

- County Paved Road Crashes (**Figure 9**)
- County Unpaved Road Crashes (**Figure 10**)
- City Street Crashes (**Figure 11**)

The crash trees include total crashes as well as fatal and serious injury crashes; however, the major cause of the crash and manner of crash are reported only for total crashes. The fatal and serious injury crashes had similar major causes and manners of crash as the total crashes.



NOTE:
Major Cause and Manner of Crash Statistics are based on Total Crashes.
K&A Crashes had similar Major Cause and Manner of Crash.

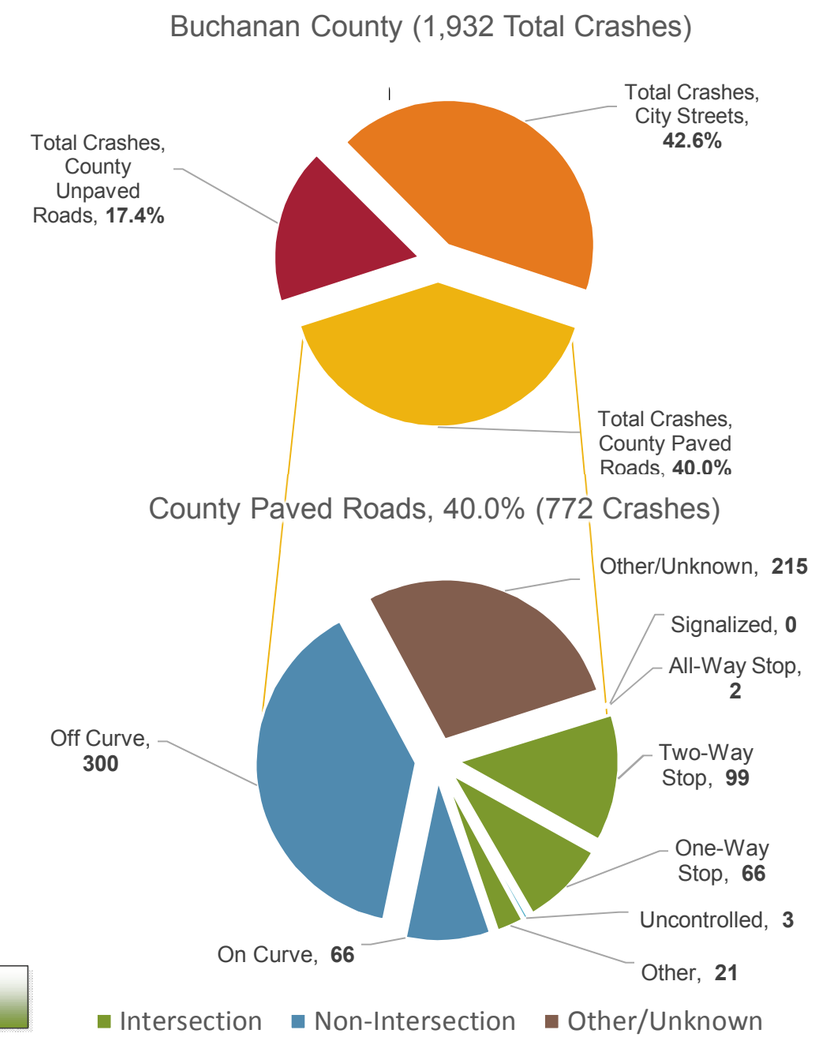
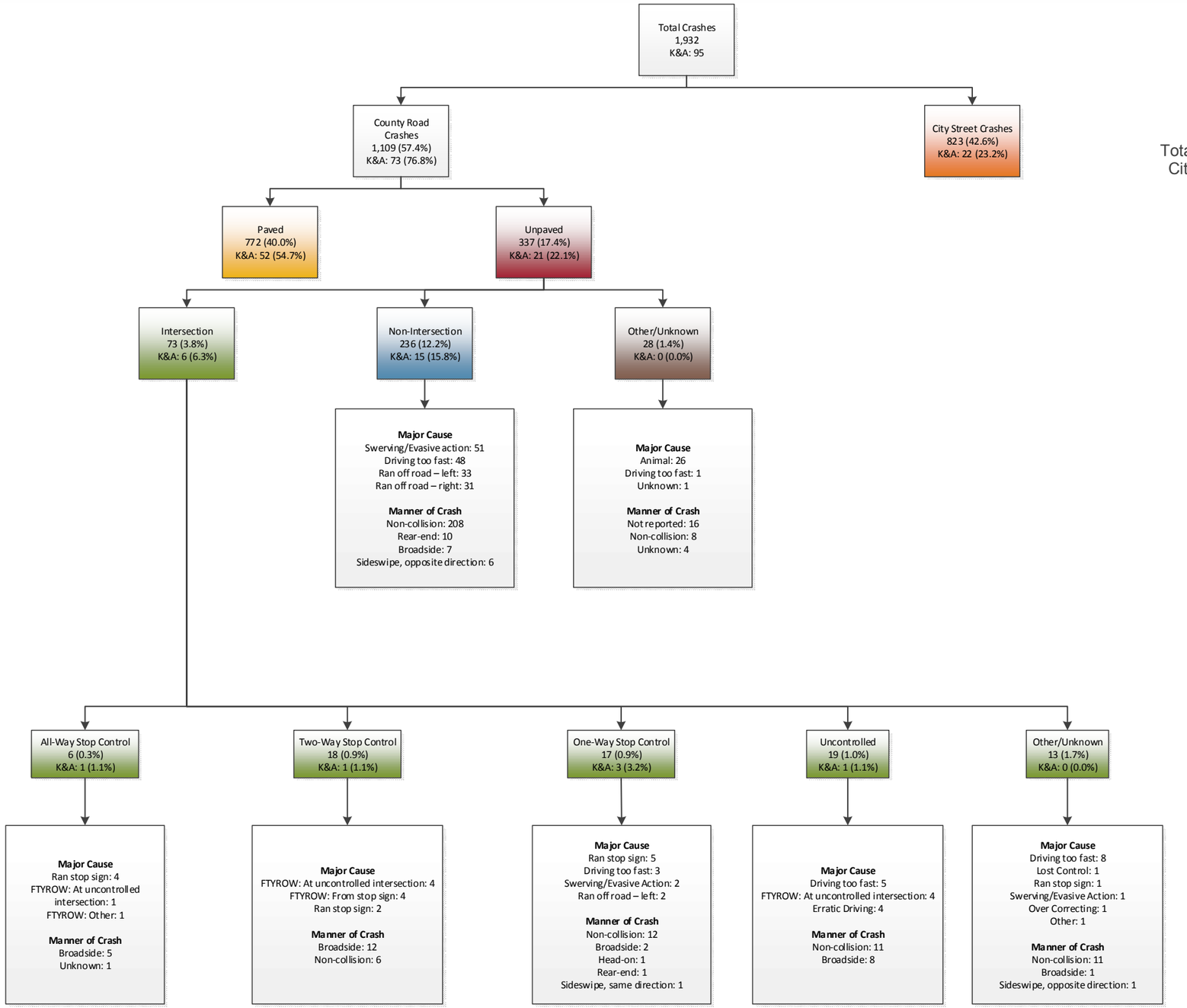
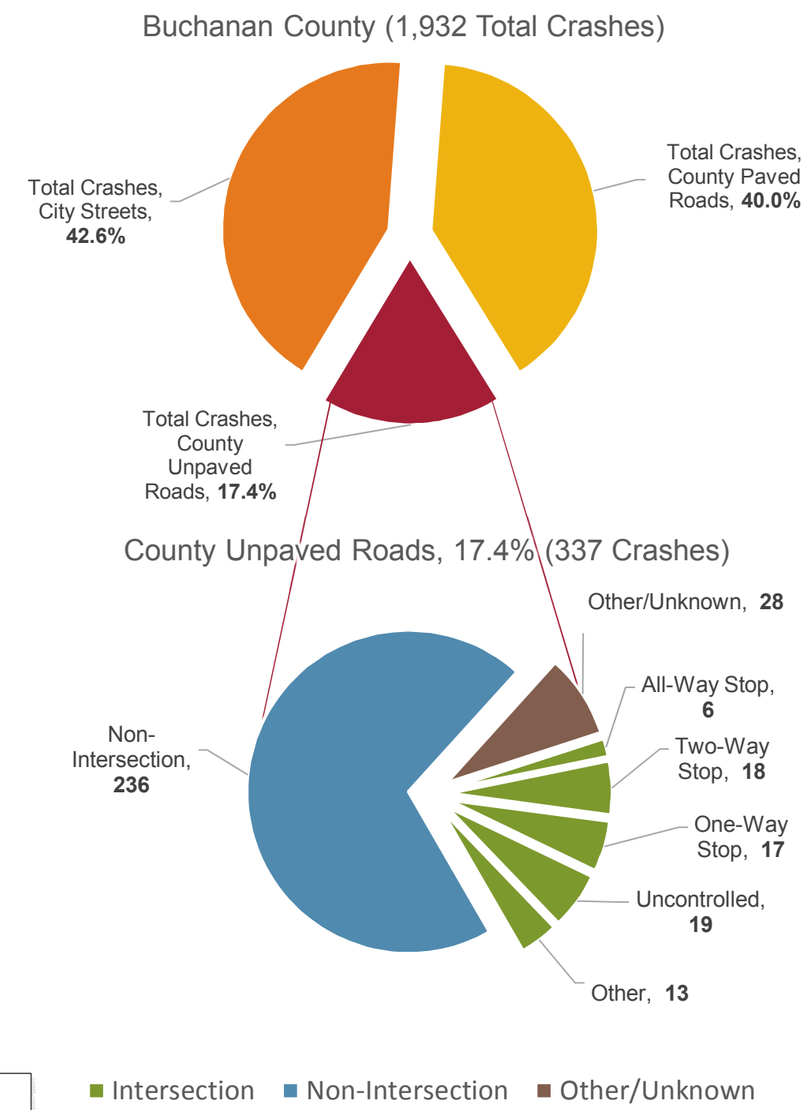


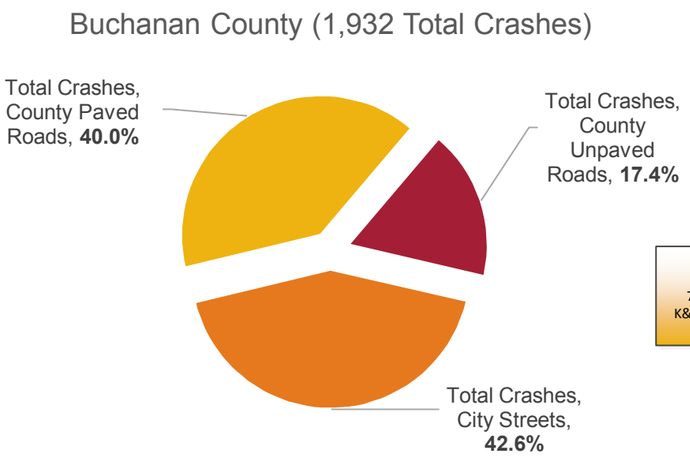
Figure 9 – County Paved Road Crash Tree





NOTE:
Major Cause and Manner of Crash Statistics are based on Total Crashes.
K&A Crashes had similar Major Cause and Manner of Crash.

Figure 10 – County Unpaved Road Crash Tree



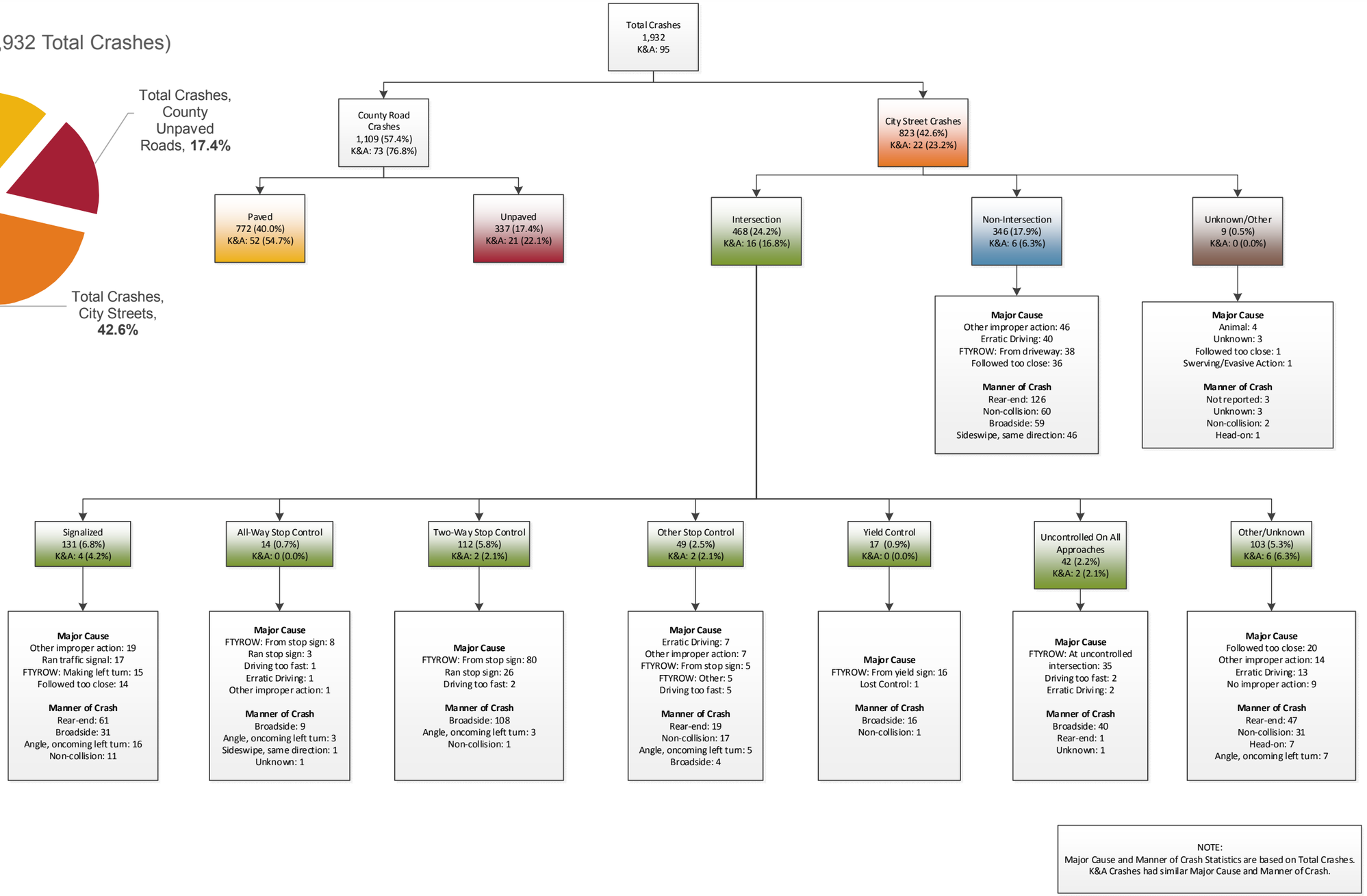


Figure 11 – City Street Crash Tree

Table 5 contains a tabular summary of the Buchanan County crashes by roadway type and **Figure 12** contains a graphical summary of the county crashes by roadway type, which is the same information presented in the crash trees. K denotes a fatality and A denotes a serious injury.

Table 5 – County Crashes by Roadway Type

Roadway Type		Total Crashes		K & A	
		Count	Percent	Count	Percent
County Paved	Intersection	191	9.9%	18	18.9%
	Non-Intersection (on curve)	66	3.4%	8	8.4%
	Non-Intersection (off curve)	300	15.5%	26	27.4%
	Other/Unknown	215	11.1%	0	0.0%
	Subtotal	**772**	**40%**	**52**	**54.7%**
County Unpaved	Intersection	73	3.8%	6	6.3%
	Non-Intersection	236	12.2%	15	15.8%
	Other/Unknown	28	1.4%	0	0.0%
	Subtotal	**337**	**17.4%**	**21**	**22.1%**
City	Intersection	468	24.2%	16	16.8%
	Non-Intersection	346	17.9%	6	6.3%
	Other/Unknown	9	0.5%	0	0.0%
	Subtotal	**823**	**42.6%**	**22**	**23.2%**
Total		**1,932**		**95**	

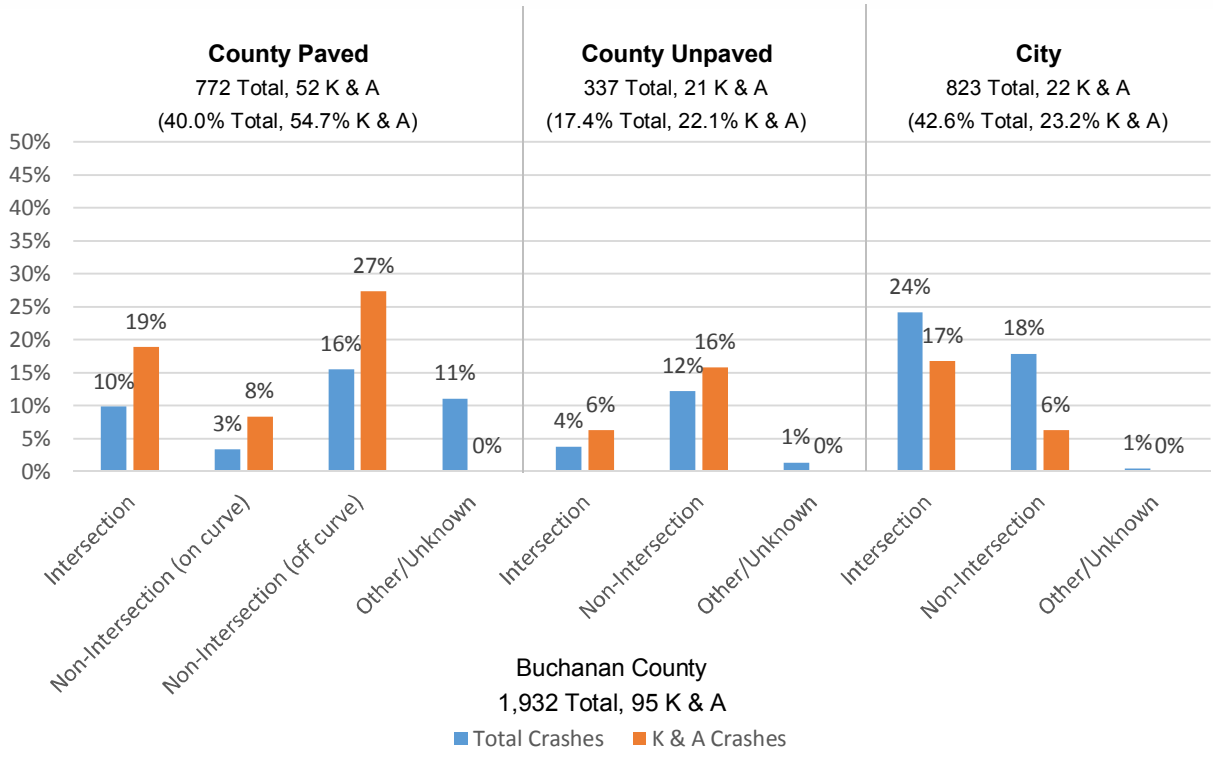


Figure 12 – County Crashes by Roadway Type

4.5.1. County Paved Road Crashes

As shown in the crash trees, county paved road crashes accounted for 40.0% of overall crashes and 54.7% of fatal and serious injury crashes within Buchanan County. The following sections further describe the crash characteristics for intersection, non-intersection (on curve), non-intersection (off-curve), and other crashes on county paved roads within Buchanan County.

4.5.1.1. Intersection Crashes

Intersection crashes accounted for 9.9% of the overall crashes within Buchanan County and approximately 18.9% of fatal and serious injury crashes. The majority of county paved road intersection crashes occurred at two-way stop-controlled intersections where the predominant major causes of the crashes were FTYROW from stop sign and ran stop sign. The resulting manner of crash was broadside, rear-end, and non-collision.

One-way stop-control intersection crashes were the second-most common intersection crash type on county paved roads. The top major causes included FTYROW from stop sign, driving too fast, and swerving/evasive action. The resulting manner of crashes included non-collision, rear-end, and broadside.

4.5.1.2. Non-Intersection Crashes (On Curve)

Crashes on curves accounted for 3.4% of the overall crashes within Buchanan County and 8.4% of fatal and serious injury crashes. **Table 6** provides a summary of the number of county paved road horizontal curves, total crashes occurring on the curves (excluding intersection crashes), unique county paved road horizontal curves with a crash, and the percent of curves with crashes. For example, there are 9 curves with less than a 500-foot radius on county paved roads in Buchanan County. During the 10-year study period, 6 crashes occurred on curves with less than

500-foot radii, and 4 of the 9 curves had crashes on them, resulting in 44.4% of the curves with radii less than 500 feet experiencing crashes.

Table 6 – County Paved Road Horizontal Curves with Crashes

	Estimated Curve Radius (ft.)						Total
	<500	500-1,000	1,000-1,500	1,500-2,000	2,000-2,500	>2,500	
County Paved Road Horizontal Curves by Radius	9	15	34	20	1	6	85
Total Crashes on Curves	6	27	21	8	0	4	66
Unique County Paved Road Horizontal Curves with a Crash	4	11	10	5	0	3	33
Percent of Curves with Crashes	44.4%	73.3%	29.4%	25.0%	0.0%	50.0%	38.8%

The major manner of crashes on curves were swerving/evasive action, driving too fast, ran off road – right and ran off road - left and the manner of crash was predominantly non-collision.

4.5.1.3. Non-Intersection Crashes (Off Curve)

Non-intersection (off curve) crashes accounted for 15.5% of the overall crashes and 27.4% of fatal and serious injury crashes. Major causes of non-intersection (off curve) crashes included driving too fast, swerving/evasive action, ran off road – right, and animal, mostly resulting in non-collision crashes.

4.5.1.4. Other/Unknown Location Crashes

Eleven percent (11.1%) of the total crashes and 0% of fatal and serious injury crashes on county paved roads were classified as other/unknown location. The major cause of other crashes was animals and the manner of crash was generally not reported.

4.5.2. County Unpaved Road Crashes

County unpaved road crashes resulted in 17.4% of overall crashes and 22.1% of fatal and serious injury crashes. The following sections describe the county unpaved road crashes that occurred at intersections, non-intersections, and other/unknown.

4.5.2.1. Intersection Crashes

County unpaved road intersection crashes accounted for 3.8% of overall crashes and 6.3% of fatal and serious injury crashes. Most intersection crashes on unpaved roads occurred at uncontrolled intersections. The most significant major cause of these crashes was driving too fast and the most common manner of crash was non-collision.

4.5.2.2. Non-Intersection Crashes

County unpaved road non-intersection crashes comprised 12.2% of overall crashes and 15.8% of fatal and serious injury crashes. The majority of these crashes resulted in non-collision crashes and the major causes included swerving/evasive action, driving too fast, ran off road – right, and ran off road – left.

4.5.2.3. Other/Unknown Location Crashes

Other/unknown location crashes resulted in a relatively small percentage of overall and fatal and serious injury crashes on county unpaved roads (1.4% and 0.0% respectively). These crashes generally involved animals and the manner of crash was not reported.

4.5.3. City Street Crashes

City street crashes made up 42.6% of the total county crashes, and accounted for 23.2% of fatal and serious injury crashes. The following sections summarize the characteristics for intersection, non-intersection, and other/unknown location crashes on city streets.

4.5.3.1. Intersection Crashes

Almost one-quarter (24.2%) of the county crashes occurred at city intersections, and 16.8% of the fatal and serious injury crashes occurred at city intersections. Signalized intersections contained the highest number of crashes accounting for 6.8% of total crashes and 4.2% of fatal and serious injury crashes. The major causes of these crashes included other improper action, ran traffic signal, FTYROW making left turn, and followed too close. Signalized intersection crashes resulted in rear-end, broadside, angle, oncoming left turn, and non-collision crashes.

Two-way stop-control intersections contained the next highest number of crashes resulting in 5.8% of the overall crashes and 2.1% of fatal and serious injury crashes. More than half of these crashes resulted from a FTYROW from stop sign and the majority of crashes were broadside crashes.

4.5.3.2. Non-Intersection Crashes

City non-intersection crashes accounted for 17.9% of overall crashes and 6.3% of fatal and serious injury crashes. The major cause of these crashes included other improper action, erratic driving, FTYROW from driveway, and followed too close. Common manner of crashes included rear-end, non-collision, broadside, and sideswipe, same direction.

4.5.3.3. Other/Unknown location

A very small percentage of the overall crashes were classified as other/unknown location on city streets (0.5%), and did not result in any fatalities or serious injuries. These crashes generally involved animals and the manner of crash was not reported.

4.6. High Crash Locations

During the LRSP Workshops, many County Engineers requested information about high crash locations within their counties. To respond to these requests, the following high crash location tables were developed. While the intent of the LRSP is to identify systemic safety improvements at intersections, curves, and segments throughout the county, the following tables provide a list of high crash locations throughout Buchanan County for reference.

- **Table 7** contains high crash intersections by intersection type, determined by all crashes per Million Entering Vehicles (MEV). The top 10 intersections by type were listed. In cases where there were less than 10 intersections with a crash history, only the intersections with crash history were listed in the table.
- **Table 8** contains high crash curves calculated by all crashes per MVMT. The top ten curves are listed in the table.
- **Table 9** contains high crash segments calculated by all crashes per MVMT. The top ten roadway segments are listed in the table.

Table 7 – County High Crash Intersections

GPS ID	Intersection	DEV	Total Crashes	Crash Rate (MEV)
All-Way Stop				
56402	KENTUCKY AVE & 14TH ST NE & 8TH AVE NE	1,020	2	0.54
Two-Way Stop				
632971	FONTANA BLVD & 125TH ST	213	2	2.57
54609	CO RD D47/290TH ST & IOWA AVE	368	2	1.49
54968	CO RD V71/DUGAN AVE & 250TH ST	388	2	1.41
55596	CO RD V62/BAXTER AVE & BUCK CREEK BLVD	1,248	6	1.32
55568	CO RD C57/120TH ST & CO RD W13/FAIRBANK-AMISH BLVD	2,380	11	1.27
55350	CO RD W45/SLATER AVE & 150TH ST	868	4	1.26
54472	CO RD D47/285TH ST & YORK AVE	238	1	1.15
54572	CO RD W35/QUASQUETON AVE & 310TH ST	1,375	5	1.00
55318	CO RD C64/130TH ST & CO RD W45/SLATER AVE	1,100	4	1.00
55098	CO RD W33/NATHAN BETHEL AVE & 205TH ST	605	2	0.91
One-Way Stop				
55198	CO RD W13/FAIRBANK-AMISH BLVD & 170TH ST	925	6	1.78
58110	JACKSON AVE & LOVERS LN SW	315	2	1.74
54558	CO RD D47/280TH ST/SCOTT BLVD	510	3	1.61
54642	CO RD D47/282ND ST & CO RD V71/DUGAN AVE	420	2	1.30
54763	CO RD W45/BUFFALO CREEK BLVD & STEWART AVE	425	2	1.29
55394	CO RD C57/OLYMPIC AVE/120TH ST & CO RD W33	640	3	1.28
55009	CO RD W45/SLATER AVE & 160TH ST	823	3	1.00
55082	CO RD W45/SLATER AVE & 200TH ST	828	3	0.99
55141	CO RD D16/OTTERVILLE BLVD	845	3	0.97
55390	CO RD C57/OLYMPIC AVE/115TH ST & CO RD W33	665	2	0.82

Table 7 – County High Crash Intersections (Continued)

GPS ID	Intersection	DEV	Total Crashes	Crash Rate (MEV)
Uncontrolled				
58138	KING AVE & 240TH ST	195	1	1.40
55052	CO RD W33/NATHAN BETHEL AVE & 180TH ST	355	1	0.77
55358	CO RD W45/SLATER AVE & SERGEANT AVE	818	1	0.33
55548	CO RD V62/BAXTER AVE & 108TH ST	1,155	1	0.24
54331	CO RD D22/220TH ST	1,405	1	0.19

Table 8 – County High Crash Curves

GPS ID	Roadway	Length (ft)	Radius (ft)	ADT	Total Crashes	Crash Rate (MVMT)
11495	FONTANA BLVD	223	132	60	1	108.0
10387	W13	390	582	700	6	31.8
10373	BLACKHAWK-BUCHA	162	269	625	2	28.5
10946	V71	263	1,628	400	2	27.5
10377	D47	787	842	340	5	27.0
10372	BLACKHAWK-BUCHA	194	197	625	2	23.9
10390	D16	358	617	790	4	20.5
10954	D16	562	1,699	530	3	14.6
10381	W35	393	634	910	3	12.1
10382	W35	425	1,030	910	3	11.2

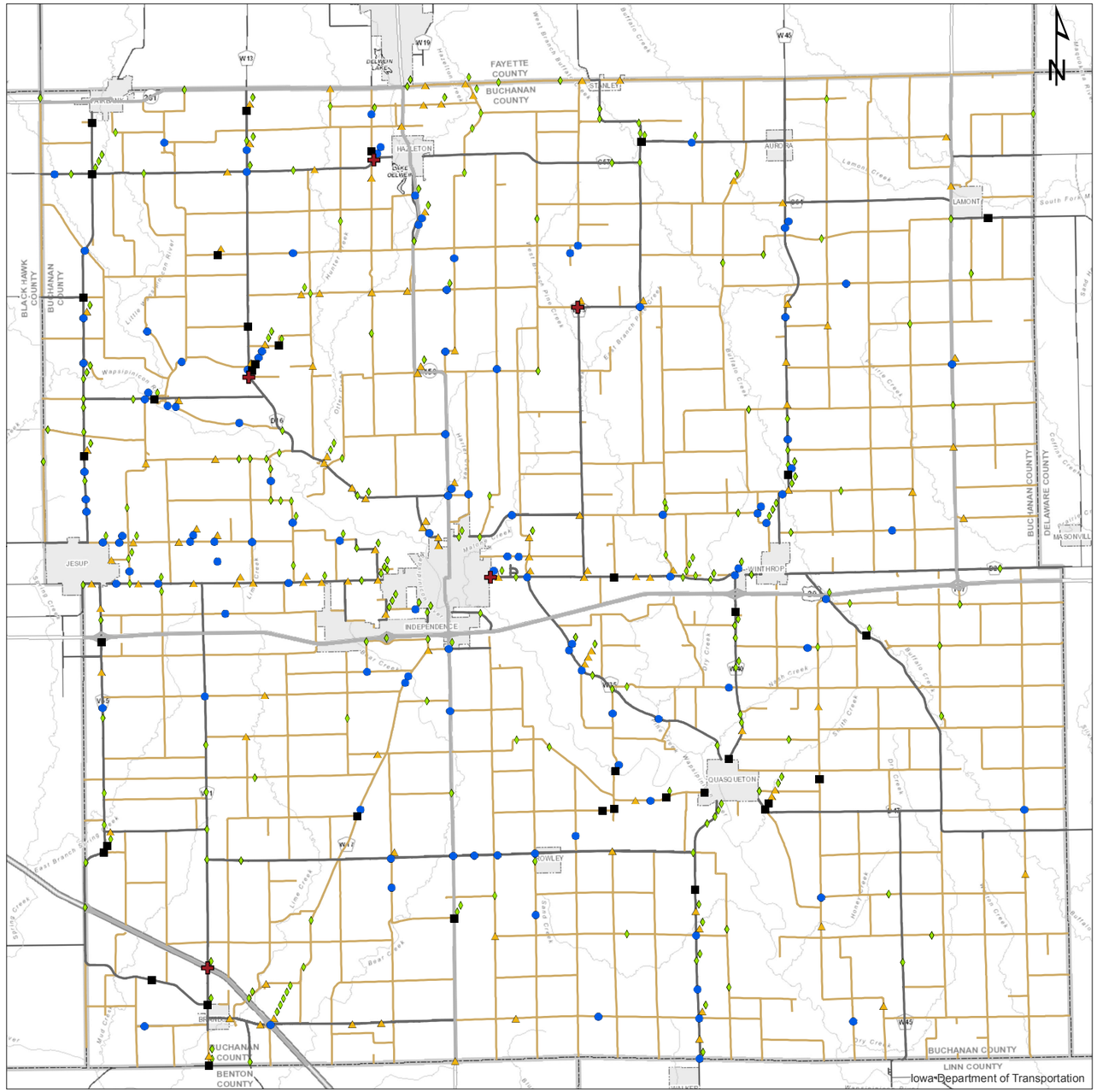
Table 9 – County High Crash Segments

GPS ID	Roadway	From	To	Length (mi)	VMT	Crashes	Crash Rate (MVMT)
653	FONTANA BLVD	FONTANA BLVD	FONTANA AND JACKSON CONN	1.63	69	4	15.9
623	120TH ST	CO RD C57/120TH ST	BUCHANAN-DELAWARE AVE	1.99	238	5	5.7
621	118TH ST	250 FT PAST INDIANA AVE	1200 FT PAST SHORT ST	0.55	405	6	4.1
660	MAIN ST	WEST ST	MAIN ST & EVERLY AVE	0.51	526	6	3.1
475	FAIRBANK-AMISH BLVD	110TH ST	CO RD W13/FAIRBANK-AMISH BLVD/T AVE	1.03	1197	12	2.7
636	240TH ST	CO RD W17/240TH ST	240TH ST	1.00	301	3	2.7
638	282ND ST	CO RD V65	CO RD V71/DUGAN AVE	2.49	424	4	2.6
656	HENLEY AVE	232ND ST	HENLEY AVE	0.97	213	2	2.6
669	ROWLEY ST	LUCAS AVE/3RD AVE	1200 FT PAST RAINBOW AVE	0.62	433	4	2.5
462	NELSON AVE	110TH ST	1000 FT SHORT OF MAIN ST	0.68	216	2	2.5

4.7. Additional Data Analysis

After reviewing the crash data analysis, the County requested the following additional crash data information be prepared to aid them in efforts in to reduce fatalities and serious injuries along county roads. The following information has been prepared to address their requests:

- Map of speed-related crashes (**Figure 13**);
- Map of impaired driver-related crashes (**Figure 14**); and
- Map of crashes by light conditions (**Figure 15**).



Speed-Related Crashes
County Roads
Buchanan County, Iowa
2004 - 2013

Crash Severity

- Fatal (5)
- Major Injury (36)
- Minor Injury (114)
- Possible/Unknown Injury (117)
- Property Damage Only (226)

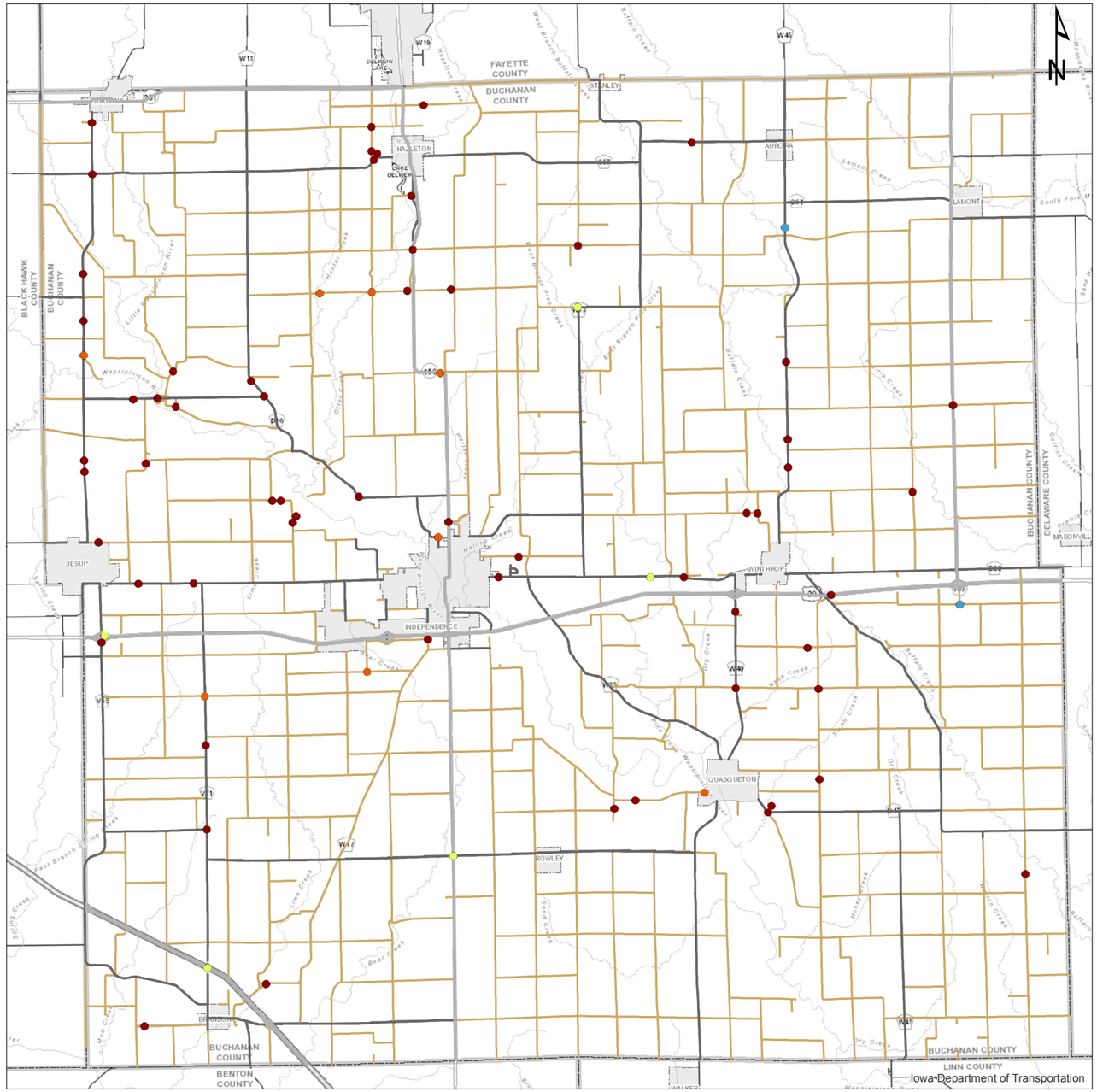
Highways

- State
- County Paved
- County Unpaved

0 0.75 1.5 3 4.5 6 Miles

The information contained in this map was derived from the January 15, 2015 Iowa DOT crash database.

Figure 13 – Speed-Related Crashes



Impaired Driver-Related Crashes
County Roads
Buchanan County, Iowa
2004 - 2013

Impaired Type

- Alcohol-Related (60)
- Test Refusal (8)
- Drug-Related (5)
- Possible Alcohol/Drugs/Medications-Related (2)
- Alcohol and Drug-Related (0)

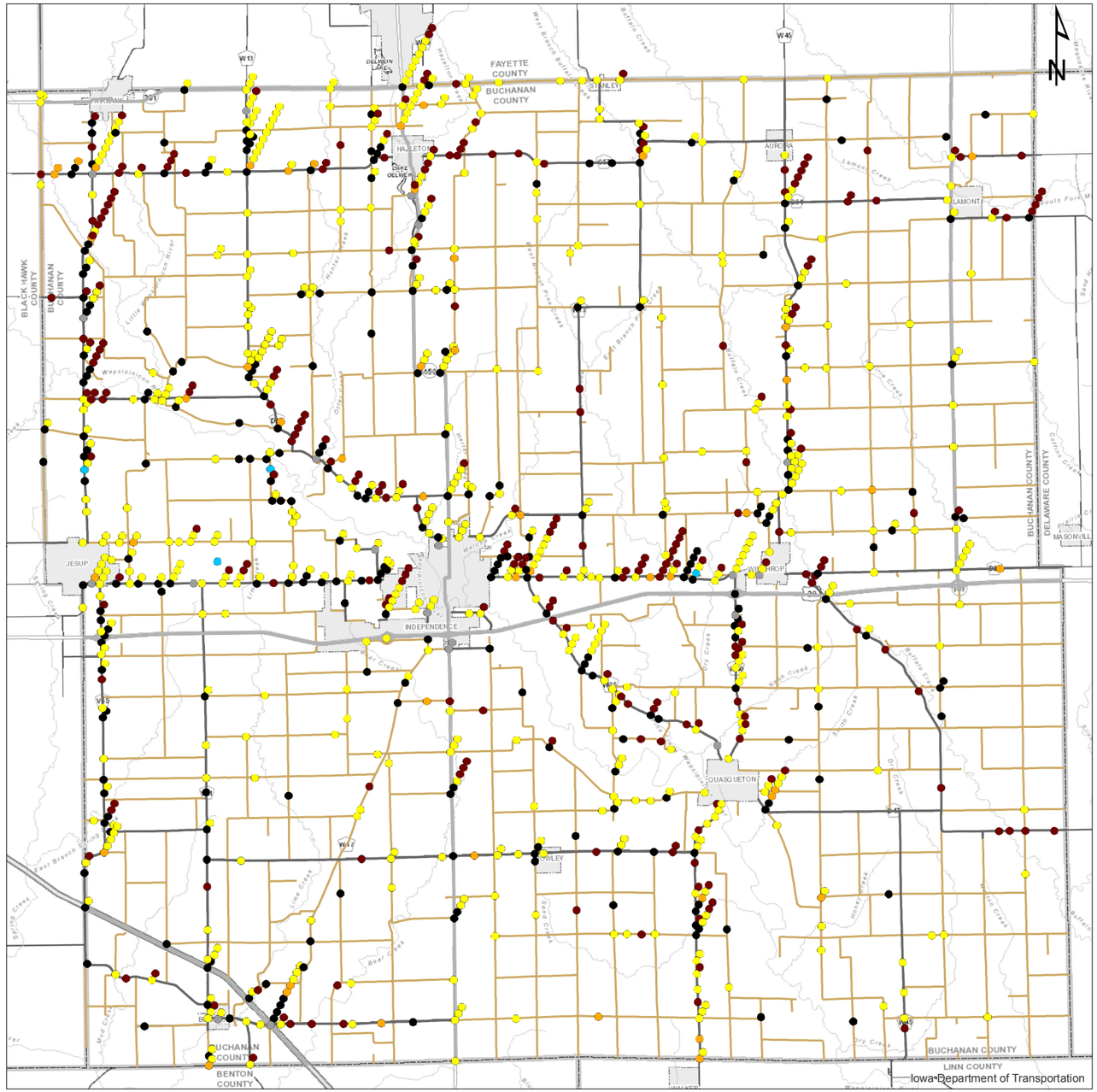
Highways

- State
- County Paved
- County Unpaved

0 0.75 1.5 3 4.5 6 Miles

The information contained in this map was derived from the January 15, 2015 Iowa DOT crash database.

Figure 14 – Impaired Driver-Related Crashes



All Crashes by Light Conditions
County Roads
Buchanan County, Iowa
2004 - 2013

Lighting Condition

- Dark - Roadway Lighted (20)
- Dark - Roadway Not Lighted (262)
- Dark - Unknown Roadway Lighting (4)
- Dawn/Dusk (47)
- Daylight (530)
- Unknown/Not Reported (246)

Highways

- State
- County Paved
- County Unpaved

0 0.75 1.5 3 4.5 6 Miles

The information contained in this map was derived from the January 15, 2015 Iowa DOT crash database.

Figure 15 – Crashes by Light Conditions

5. Countermeasure Selection

The following section summarizes potential systemic safety improvement countermeasures considered for this LRSP, risk factors, crash modification factors, and countermeasures considered for inclusion in the LRSP. Additional information is provided summarizing the driver-related countermeasures underway in the County.

5.1. Potential Systemic Safety Improvement Countermeasures

The purpose of the LRSP project is to identify systemic safety improvements that can be implemented on county roads. The systemic approach takes a broad view of risk, examining it across an entire roadway system, rather than applying improvements to locations where crashes have previously occurred.

> ***"The systemic approach to safety involves widely implemented improvements based on high-risk roadway features correlated with specific severe crash types. The approach provides a more comprehensive method for safety planning and implementation that supplements and complements traditional site analysis. It helps agencies broaden their traffic safety efforts and consider risk as well as crash history when identifying where to make low cost safety improvements."***
>
> ***FHWA – Office of Traffic Safety***

5.2. Risk Factors

When developing systemic safety improvements, it is important to note potential risk factors associated with the crash types. The FHWA, as part of their Systemic Safety Project Selection Tool, has developed a list of potential risk factors that can help identify locations for systemic safety improvements. While all of the risk factors outlined below are not utilized for the LRSP project due to data availability and crash types to be addressed, they have been included below for reference.

- Roadway and Intersection Features
  - Number of lanes
  - Lane width
  - Shoulder surface width and type
  - Median width and type
  - Horizontal curvature, superelevation, delineation, or advance warning devices
  - Horizontal curve density
  - Horizontal curve and tangent speed differential
  - Presence of a visual trap at a curve or combinations of vertical grade and horizontal curvature
  - Roadway gradient
  - Pavement condition and friction
  - Roadside or edge hazard rating (potentially including sideslope design)
  - Driveway presence, design, and density
  - Presence of shoulder or centerline rumble strips
  - Presence of lighting
  - Presence of on-street parking
  - Intersection skew angle
  - Intersection traffic control device

  - Number of signal heads vs. number of lanes
  - Presence of backplates
  - Presence of advanced warning signs
  - Intersection located in or near horizontal curve
  - Presence of left-turn or right-turn lanes
  - Left-turn phasing
  - Allowance of right-turn-on-red
  - Overhead versus pedestal-mounted signal heads
  - Pedestrian crosswalk presence, crossing distance, signal head type
- Traffic Volume
  - Average daily traffic volumes
  - Average daily entering vehicles
  - Proportion of commercial vehicles in traffic stream
- Other Features
  - Posted speed limit or operating speed
  - Presence of nearby railroad crossing
  - Presence of automated enforcement
  - Adjacent land use type (e.g., schools, commercial, or alcohol-sales establishments)
  - Location and presence of bus stops

5.3. Crash Modification Factors

When identifying potential systemic safety improvements, it is important to look at Crash Modification Factors (CMFs) for the proposed improvements. The CMF Method is found in Part D of the *Highway Safety Manual* (HSM). CMFs are defined as the ratio of effectiveness of one condition in comparison to another condition and represents the relative change in crash frequency due to a change in one specific condition. In other words, a CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site. Countermeasures with CMFs less than one are expected to reduce crashes if applied, while those countermeasures with CMFs greater than one are expected to increase crashes. **Figure 16** illustrates the definition of CMFs.

$$CMF = \frac{\text{EXPECTED CRASHES WITH TREATMENT}}{\text{EXPECTED CRASHES WITHOUT TREATMENT}}$$

CMF = 1.0	Expected to have no impact on safety
CMF < 1.0	Expected to reduce crashes
CMF > 1.0	Expected to increase crashes

Figure 16 – CMF Calculation

The CMF Method is used to calculate the expected number of crashes by taking the observed number of crashes and multiplying those crashes by the applicable CMF for the proposed countermeasure. It is recommended that CMFs be applied to a minimum of three years of crash data for urban and suburban sites and five years of crash data for a rural site. **Figure 17** is a sample calculation of the CMF method with one CMF being applied to a particular site for a single year.

10.1 crashes / year x 0.91 (CMF) =	9.2 crashes / year: a reduction of 0.9 total crashes per year and a CRF of 9%

Figure 17 – CMF Method Sample Calculation

A Crash Reduction Factor (CRF) is similar to a CMF but stated in different terms. A CRF is defined as a percentage of crash reduction that might be expected after the implementation of a given countermeasures at a specific site. **Figure 18** shows how a CRF is calculated in relationship to a CMF.

$$CRF = (1 - CMF) * 100$$

Figure 18 – CRF Calculation

Caution should be used in the selection of appropriate CMFs. The following guidance should be considered when selecting CMFs:

- CMFs should be selected from the HSM Part D or from FHWA's CMF Clearinghouse website (http://www.cmfclearinghouse.org).
- Read the countermeasure abstract to determine if the CMF is applicable to the proposed improvement.
- Only CMFs with a four-star rating or higher should be considered for use in analysis.
- Be sure the selected CMF is applicable to the set of crash data being used for analysis. Some CMFs may only be applicable to a subset of the crash data.
- The application of multiple CMFs can overestimate the expected crash reduction. Unless each CMF addresses independent crash types, multiple CMFs should not be used. It is suggested that no more than three independent CMFs may be applied to a particular site.

5.4. Potential Countermeasures

Table 10 provides a summary of potential risk factors and countermeasures by crash type for the County. CMFs are also provided when available four-star CMFs are available. In some cases CMFs are not available for particular countermeasures because sufficient data has yet to be collected, but the countermeasures are still believed to result in crash reductions. In other cases, the countermeasure is a proven FHWA countermeasure and the CMFs vary significantly based on the existing and proposed conditions.

Table 10 – Potential Risk Factors and Countermeasures by Crash Type

Crash Type	Buchanan County Total Crashes	Buchanan County K & A Crashes	Potential Risk Factors	Potential Countermeasures and CMFs
County Paved Roads				
Intersection	191	18	Traffic volume Distance from other intersections Lighting Proximity to horizontal curves Skewed approach Posted speed Crashes	Lighting (Intersection lighting and nighttime crashes CMF 0.62) Access management (FHWA proven countermeasure) Provide right turn lanes (CMF 0.74-0.92) Improve sight distance (CMF not available) Roundabout (CMF varies depending on condition and is an FHWA proven countermeasure) Improve pavement markings (Provide “Stop Ahead” pavement markings CMF 0.4-0.69) Increase retroreflectivity of stop signs (CMF 0.751-0.909) Flasher on stop/yield sign (CMF not available) Install transverse rumble strips on stop-controlled approaches in rural areas (CMF 0.785)
Road departure in horizontal curve	66	8	Traffic volume Number of lanes Curve radius Intersection in curve Road edge condition	Provide advance warning of unexpected changes in horizontal alignment (CMF 0.585-0.606) Enhanced delineation and friction for horizontal curves (FHWA proven countermeasure) Install edgeline rumble strips and wider pavement markings (CMF 0.74-0.9) Install centerline and edgeline rumble strips (CMF 0.79-0.82) Install centerline rumble strips (CMF 0.55-0.91) Paved shoulders (0-ft to 2-4-ft) (CMF 0.75-0.99) Install safety edge (CMF 0.769-0.962) Lighting (K&A crashes CMF 0.73) Improve pavement friction (increase skid resistance) (CMFs from 0.346-0.776) Delineate trees or utility poles with retroreflective markers (CMF not available)
Road departure in tangent section	300	26	Traffic volume Number of lanes Road edge condition Access density	Install edgeline rumble strips and wider pavement markings (CMF 0.74-0.9) Install centerline and edgeline rumble strips (CMF 0.79-0.82) Install centerline rumble strips (CMF 0.55-0.91) Paved shoulders (0-ft to 2-4-ft) (CMF 0.75-0.99) Install safety edge (CMF 0.769-0.962) Delineate trees or utility poles with retroreflective markers (CMF not available)
County Unpaved Roads				
Intersection	73	6	Traffic volume Distance from other intersections Lighting Proximity to horizontal curves Skewed approach	Lighting (Intersection lighting and nighttime crashes CMF 0.62) Access management (FHWA proven countermeasure) Improve sight distance (CMF not available) Increase retroreflectivity of stop signs (CMF 0.751-0.909) Flasher on stop/yield sign (CMF not available) Straighten intersection geometry
Non-Intersection	236	15	Traffic volume Road edge condition Access density	Improve/increase shoulder width (CMF not available) Provide advance warning of unexpected changes in horizontal alignment (CMF 0.585-0.606) Delineate trees or utility poles with retroreflective markers (CMF not available) Access management (FHWA proven countermeasure)

5.5. Countermeasure Selection Workshop

A Countermeasure Selection Workshop was conducted in Buchanan County on Tuesday, June 30, 2015. Representatives at the workshop included the County Engineer, County Staff, Sheriff's Office, and the Iowa DOT.

5.5.1. Driver-Related Crash Countermeasures

The Iowa SHSP has 10 Key Safety Emphasis Areas, of which six are driver-related emphasis areas:

- Speed-related
- Unprotected persons
- Younger drivers
- Impaired driving
- Inattentive/distracted driving
- Older drivers

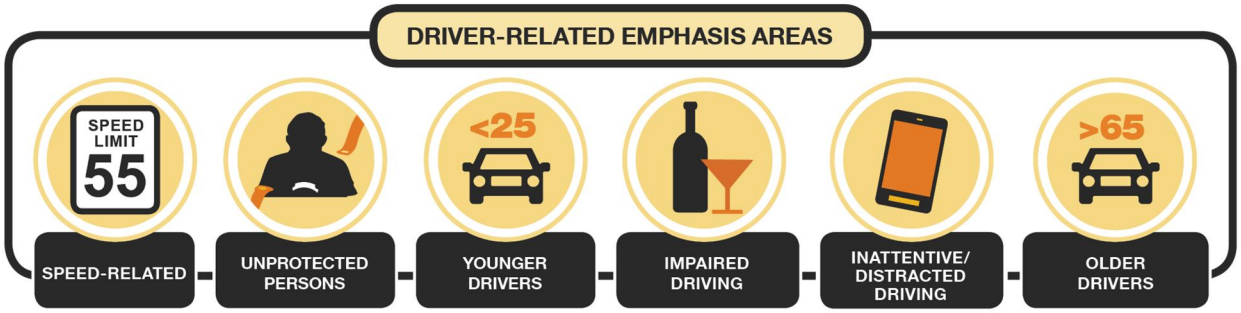


Figure 19 – Iowa SHSP Driver-Related Emphasis Areas

During the Countermeasure Selection Workshop, attendees were provided information regarding fatal and serious injury crashes within the County and how that data aligned with the Iowa SHSP Key Safety Emphasis Areas. Potential countermeasures from the *National Cooperative Highway Research Program* (*NCHRP) Report 500 Series* and the *Toward Zero Deaths* documents were provided to stakeholders to facilitate discussion on what action items were currently underway in the County with respect to driver-related crashes. Workshop participants agreed upon a status of implementation of the countermeasures. The following statuses of implementation for the various driver-related countermeasures were considered by workshop attendees:

- Underway/Ongoing (currently being done);
- Area for Improvement (ongoing, but could be enhanced);
- Opportunity (not being done, but could be implemented); or
- Completed in the Past (has been completed in the past, but not planned to be implemented in the future).

The following sections provide a summary of the status of implementation of the driver-related countermeasures within the County. It is recommended that the County continue to implement countermeasures that are currently underway/ongoing, and look for opportunities to implement countermeasures that are not currently being implemented. This will require input from and coordination with all of the five E's of safety.

5.5.1.1. Speed-Related

Speed-related crashes are a common concern within all of the LRSP Phase 1 counties, and account for almost half (48%) of fatal and serious injuries across the state of Iowa. Many counties are facing budgetary constraints which limit the number of officers available to proactively conduct speed enforcement. Some counties stated that they could provide better enforcement with their available resources if speeding locations were identified on a map and/or if a speed trailer with the ability to log speed data by time of day and day of week were available to them. There is a common opportunity to provide an education campaign with respect to speed-related crashes.

Speed-related crashes resulted in 23 (46%) of the fatalities and serious injuries in Buchanan County. The Buchanan County Sheriff has utilized dynamic speed signs to record speeds at various locations throughout the day, and uses the information for targeted law enforcement. As part of this LRSP, additional data has been provided summarizing speed-related crashes by day of week and time of day to potentially aid in targeted law enforcement activities (**Table 10**). **Table 11** provides a summary of the level of implementation of speed-related countermeasures in the County.

Table 11 – Speed-Related Countermeasure Implementation Status

Countermeasure	Status
Conduct speed enforcement - Dynamic speed signs have been used to record speeds at various locations throughout the day. The Sheriff's department then passes this information to the deputies to let them know what time of day the speeding occurs (for directed enforcement). - County has eight contracted cities for Sheriff/law enforcement services, so speed enforcement is part of these contracts.	Underway/Ongoing
Implement rigorous aggressive driving and speeding-related enforcement programs	Opportunity
Education campaigns relative to locations with high-risk of speed-related crashes, potentially in schools	Opportunity

5.5.1.2. Unprotected Persons

Many counties noted that their seat belt compliance rates are over 90%; however, unprotected persons still comprise more than one-third (38%) of the fatalities and serious injuries on Iowa roads. Most counties have at least one location within their community for instruction on proper child restraint use; however, there are opportunities to conduct high-profile "child restraint inspections and/or installation" events either individually or as part of a larger community event, such as a county fair, safety fair, or Fire Department open house. Additionally, counties could provide training to middle school children potentially through the Drug Abuse Resistance Education (DARE) program.

Several counties have trained law enforcement to check for proper child restraints and provide them with a "cheat sheet" to keep in their vehicle so they are aware of the current laws. Marshall County is in the process of developing a program where individuals who are cited for providing improper child restraint can attend a course on proper child restraints in lieu of paying the fine. A program such as this could provide valuable education on proper child restraints that can improve safety within Buchanan County as well.

Multiple counties have programs where law enforcement or EMS pass out ice cream certificates to children wearing their helmets while riding their bikes. This is an excellent opportunity for positive enforcement and encouragement for children to wear helmets. It is important to note that since helmets are not required for motorcyclists in Iowa, there is little to no effort put forth to educate citizens on the importance of wearing a helmet when riding a motorcycle.

Unprotected person crashes resulted in 10 (20%) of the fatalities and serious injuries in Buchanan County. The County conducts compliance checks three times each year, and the Sheriff's Department holds an annual safety fair to provide training for proper car seat installation. Workshop participants noted that some schools use their guidance department to educate children on seat belt use. Participants also noted that the Sheriff's Department receives negative feedback for education efforts on helmet use, however, most of the motorcycle fatalities have involved riders that were not wearing helmets. A summary of unprotected persons countermeasure implementation in the County is included in **Table 12**.

Table 12 – Unprotected Persons Countermeasure Implementation Status

Countermeasure	Status
Conduct publicized enforcement campaigns	Underway/Ongoing
Community locations for instruction in proper child restraint use	Underway/Ongoing
Conduct high-profile "child restraint inspection and/or installation" events at community locations - Sheriff Department currently holds a yearly safety fair to provide training for proper child seat installation.	Underway/Ongoing
Train law enforcement to check for proper child restraint use in all motorist encounters	Underway/Ongoing
Education campaigns in grade schools	Underway/Ongoing
Hand out ice cream gift certificates for children wearing bicycle helmets (law enforcement, EMS, and/or fire department) - Need local businesses to step forward to donate ice cream gift certificates.	Opportunity

5.5.1.3. Younger Drivers

Younger drivers account for more than one-third (37%) of fatalities and serious injuries in Iowa. In counties where driver's education is still taught through the high schools, there is an opportunity for law enforcement to participate and provide training on targeted topic areas such as distracted driving, impaired driving, and seatbelt use. In locations where driver's education is privatized, it can be more difficult for law enforcement to become involved in additional training during driver's education courses.

Although schools have strict curricula to adhere to, there is still the opportunity for education with respect to younger drivers' issues such as "don't veer for deer"; texting and driving; what to do on an edge drop-off; etc. to occur through health classes or other programs within the schools. Many schools are participating in "Operation Prom" mock disaster events to raise awareness of impaired and distracted driving. It is important to note that counties can apply for the Traffic Engineering Assistance Program (TEAP) funding to obtain assistance in reviewing traffic/safety issues around existing school sites.

A topic of discussion in many of the workshops involved drivers illegally passing school buses. While law enforcement in most counties are ticketing drivers for illegally passing school buses, it is unclear whether or not the Keep Aware Driving – Youth Need School Safety Act (Kadyn's Law) is being implemented in the court system. This law states that driving privileges will be suspended for 30 days for a first conviction, 90 days for a second conviction, and 180 days for a third or subsequent conviction along with fines.

Younger driver crashes account for 16 (32%) of the fatalities and serious injuries in Buchanan County. The Buchanan County Sheriff's department participates in some in-school training, in addition to conducting events with "drunk goggles" and mock crash events. It was noted that Drivers Education (DE) is no longer offered through the school districts, so school-based strategies are limited. School permits allow family members and up to one unrelated passenger to ride to/from school with 14-year old drivers. It was noted that local newspapers are eager to publish information pertaining to younger driver safety, but younger drivers typically do not read the newspaper. Buchanan County is looking for ways to use technology to expand younger driver initiatives. **Table 13** provides a summary of the level of implementation of younger driver-related countermeasures in the County.

Table 13 – Younger Drivers Countermeasure Implementation Status

Countermeasure	Status
Improve content and delivery of driver education/training - School districts no longer teach Drivers Education (DE) during the school year, so this is no longer a built-in opportunity for school-based strategies. - The sheriff's department uses "drunk goggles" in local DE programs for a hands-on demonstration of the effects of drunk driving.	Underway/Ongoing, Completed in the Past
Review transportation plans for new/expanded/existing high school sites - New high school - could be opportunity	Opportunity

Table 13 – Younger Drivers Countermeasure Implementation Status (Continued)

Countermeasure	Status
Conduct additional training in schools ("drunk goggles"; "don't veer for deer"; what to do when on an edge drop-off; training in health class; etc.) - The County Sheriff's department currently participates in some in school training. They go whenever asked.	Underway/Ongoing
"Operation Prom" mock disaster - Mock crash events (every 4 years) have been used by the Sheriff's department to more effectively present the messages of don't text/drive, obey the speed limits, and don't drink/drive.	Underway/Ongoing
Prosecute and impose sanctions on drivers not obeying school bus stop bars	Underway/Ongoing
Enforcement of graduated driver's license laws	Underway/Ongoing

5.5.1.4. Impaired Driving

During the workshops, many counties noted that, while they felt that drunk driving was on the decline, there has been an increase in "drug" driving. Impaired driving accounts for 18% of fatalities and serious injuries across the state. Most counties have access to a Drug Recognition Expert (DRE) to assist in determining intoxication in routine traffic stops as well as crashes. Most counties proactively conduct Operating While Intoxicated (OWI) enforcement, and some counties receive Governors Traffic Safety Bureau (GTSB) grants for additional targeted enforcement. Over the years, some counties have conducted safety checkpoints. These checkpoints require a significant amount of resources from multiple jurisdictions, thus making them more difficult to conduct with the limited resources available. GTSB has a trailer that is available to counties and contains all of the supplies required to conduct a safety checkpoint.

In multiple workshops the topic of repeat OWIs was discussed. It was mentioned that prosecuting and imposing sanctions on OWI offenders can at times be difficult and that at times, second and third offenses were being recorded as first and second offenses. Workshop attendees voiced the concern that considerable discretion is given to the County Attorney for plea bargains and diversion programs in order to manage caseloads.

Twenty percent (20%) of fatalities and serious injuries resulted from impaired driving in Buchanan County over the study period. The County uses grant funding for additional enforcement, and is proactive when looking for impaired drivers. The County Sheriff's Department conducts random checkpoints for OWI enforcement approximately once per year. Repeat offenders have been identified as a problem, and OWI offenders tend to be older drivers. Drivers can refuse testing by a Drug Recognition Expert (DRE), so drug-related impaired driving can be difficult to prove. The County Sheriff currently relies on state patrol for DRE testing. A summary of the impaired driving countermeasures discussed during the workshops along with the County's level of implementation is included in **Table 14**.

Table 14 – Impaired Driving Countermeasure Implementation Status

Countermeasure	Status
Conduct regular well-publicized safety checkpoints - The County Sheriff's Department does conduct random checkpoints for OWI enforcement (approximately once per year). They use grant money to conduct these checkpoints.	Underway/Ongoing
Proactively conduct OWI enforcement - Buchanan County is proactive in looking for impaired drivers, and has used grant funding for additional enforcement. - County does not have specific locations where they focus their OWI enforcement.	Underway/Ongoing
Conduct regular well-publicized compliance checks of alcohol retailers to reduce sales to underage drivers - The County Sheriff's department currently conducts compliance checks 1 to 2 times per year (using grant money for these checks).	Opportunity
Prosecute, impose sanctions on, and treat operating while intoxicated (OWI) offenders - First offense OWI penalties are pretty standard. Deferred judgements are at the discretion of the County Attorney. While State Laws may require the removal of driver's license for third offense, there is considerable discretion given to the county attorneys for plea bargains and diversion programs in order reduce penalties.	Underway/Ongoing, Area for Improvement

5.5.1.5. Inattentive/Distracted Driving

During all of the workshops, it was noted that inattentive/distracted driving was most likely largely underreported, as it is difficult for law enforcement to determine what events specifically led to the crash. Workshop attendees noted that as cell phone coverage increases in rural areas, drivers using their cell phones will most likely increase. Additionally, Iowa does not have a "hands free" law as a primary offense, so law enforcement does not have the ability to pull drivers over and cite them for using their cell phones unless they are engaged in another illegal action.

There are opportunities to conduct education and awareness campaigns with respect to inattentive/distracted driving, either through schools, social media, radio, or TV. The City of Waterloo (located in Blackhawk County) is currently using TSIP funding for driver safety awareness campaigns, and Buchanan County could apply for these funds as well.

The Cerro Gordo County Sheriff utilized the distracted driving video simulator from *It Can Wait* (http://www.itcanwaitsimulator.org/) at the last county fair. The simulator is a free download from the website, and all that is needed is a video game steering wheel, cell phone, and laptop. According to the County Sheriff, it was very popular, easy to use, and they are looking for opportunities to utilize it at future events. Buchanan County could consider this simulator for use during community events.

Many counties including Cerro Gordo, Clinton, Hamilton, Mills, Monona, and Montgomery County have policies permitting only hands-free cell phone usage while on county business or within a county vehicle. Many of these policies were based on state policies such as that of the Iowa DOT. A hands-free policy is an opportunity for Buchanan County to consider.

Inattentive/distracted driving crashes resulted in 1 (2%) of the fatalities and serious injuries in Buchanan County. Attendees noted that it is difficult to identify all crashes that were caused by distracted driving, and enforcement is extremely difficult due to cell phone laws not being a primary offense in Iowa. Local news stations have run public service announcements (PSAs) regarding inattentive/distracted driving. Attendees suggested handouts such as bumper stickers/static clings at safety events; however, this would require assistance from the state level. **Table 15** summarizes the implementation status of the inattentive/distracted driver countermeasures as recorded in the workshops in the County.

Table 15 – Inattentive/Distracted Driving Countermeasure Implementation Status

Countermeasure	Status
Incorporate information on distracted driving into education programs for young drivers - Give texting presentations in the high schools.	Underway/Ongoing, Opportunity
Conduct education and awareness campaigns - Local news stations have PSAs regarding inattentive/distracted driving.	Underway/Ongoing
Visibly enforce existing statutes to deter distracted and drowsy driving	Opportunity
County policy for "hands free" devices while driving county vehicle	Opportunity
Mobile simulator for distracted driving at community events or schools	Opportunity

5.5.1.6. Older Drivers

Older driver crashes accounted for 16% of fatalities and serious injuries statewide. The counties mentioned that engineering countermeasures such as larger text, signs, and advanced intersection signage could be useful for older drivers. Law enforcement in many of the counties do recommend vision retesting for driver's licenses, but at times this can be difficult as some County Attorney's Offices are concerned about profiling. Retesting is successfully being implemented in many counties in situations where older drivers were involved in a crash or as a result of a traffic stop. However, law enforcement in several counties noted that even when older drivers lose their license, they still tend to drive due to the rural nature of the state and their need to access services. Older drivers are a consistent issue as driving is considered a form of independence that can be difficult to deny life-long rural drivers.

Paratransit is an important service and provided within each of the counties. It was noted that information on paratransit could be provided at community centers as is being done in Mills County and Monona County.

In several counties, law enforcement noted a high percentage of older drivers on the roads during severe weather because they were following their daily routine regardless of the weather. There are opportunities to use local radio/TV stations to raise awareness of adverse weather conditions when drivers (particularly older drivers) should not drive. General weather/driving education could be given through community centers as well.

In Cerro Gordo County, the County Sheriff participates in the Seniors and Law Enforcement Together (SALT) program which helps seniors adjust their car mirrors, seats, etc. to make sure they are "fit for driving". This could be considered by Buchanan County.

Older driver crashes resulted in 9 (18%) of the fatalities and serious injuries in Buchanan County. The County provides limited para-transit/dial-a-ride service for the elderly, which could be advertised at senior centers. The County does not require license retesting for elderly involved in a crash. Attendees discussed implementing larger text/signs per the Manual on Uniform Traffic Control Devices (MUTCD). A summary of older driver countermeasure implementation by the County is included in **Table 16**.

Table 16 – Older Driver Countermeasure Implementation Status

Countermeasure	Status
Establish resource centers within communities to promote safe mobility choices	Underway/Ongoing
Paratransit for older drivers - County does have some limited para-transit/dial-a-ride service for the elderly.	Underway/Ongoing
Provide materials on paratransit information at community centers - Could advertise this service at the local senior centers.	Opportunity
Recommend re-testing of older drivers involved in crashes and citations - County does not require retesting for the elderly involved in crashes (there has been concern from the county attorney's office regarding profiling of older drivers if they issued retesting as a general rule-of-thumb).	Opportunity

5.5.2. Engineering Countermeasures

During the Countermeasure Selection Workshops, attendees were encouraged to discuss potential safety engineering countermeasures related to paved intersections, curves, and roadway segments. The following sections summarize the proposed safety countermeasures that were discussed during the workshops for Buchanan County.

5.5.2.1. County Paved Intersection Countermeasures

The following paved intersection safety countermeasures were identified:

- Wider pavement markings
- Improve pavement markings
- Duplication of signage
- Shoulder width increase *
- Safety edge *
- Increased lighting
- Improved sight distance
- Use of retroreflective markers for trees or utility poles *
- Use of guardrails *
- Increase size and/or retroreflectivity of stop signs
- Flashing beacons on stop/yield signs
- Transverse rumble strips
- Provide right-turn lanes *
- Install a roundabout
- Access management *

5.5.2.2. County Paved Curve Countermeasures

The following horizontal curve safety countermeasures were identified:

- Wider pavement markings
- Centerline rumble strips
- Edgeline rumble strips
- Shoulder width increase (paved)
- Safety edge
- Use of retroreflective markers for trees or utility poles *
- Provide advance warning signage
- Enhanced delineation and horizontal friction *
- Install/enhance curve chevron signs
- Use of guardrails *
- Remove obstructions within right of way (clearing and grubbing)

5.5.2.3. County Paved Roadway Segment Countermeasures

The following roadway segment safety countermeasures were identified:

- Improved lighting *
- Improved pavement markings
- Duplication of signage

- Improve sight distance (clearing and grubbing)
- Shoulder width increase
- Improve access management (driveway policy) *
- Conduct speed studies *
- Modify lane width *

* After conducting the Countermeasure Selection Workshops with counties, these countermeasures were determined to not be implemented at a systemic level; however, they should still be considered on a case by case basis by the County Engineer depending on the specific issues at a particular location.

6. Safety Project Development

Safety improvement projects were developed at high-priority locations along paved intersections, curves, and roadway segments within Buchanan County. Due to the limited amount of available data, low traffic volumes, and limitations on the types of systemic safety improvement projects that can be implemented on unpaved roads, location specific recommendations were not developed for unpaved roadways. However, this LRSP includes safety recommendations that can be considered for implementation on the unpaved roadway system by the County Engineer.

This section describes the methodology of data analysis for project selection and prioritization for safety improvement projects for paved intersections, horizontal curves and roadway segments.

6.1. Methodology

As shown in **Figure 20**, GIS data, as described in **Section 3**, was utilized to rank each of the county paved intersections, curves, and roadway segments based on risk factors. After the facilities were ranked, a decision tree was used to develop location specific safety improvement recommendations along the facilities with the highest risk factor rankings. Project sheets for the highest ranking facilities were developed summarizing the recommendations and estimated implementation costs for the project recommendations. Each of the methodology steps are described in detail in the following sections.

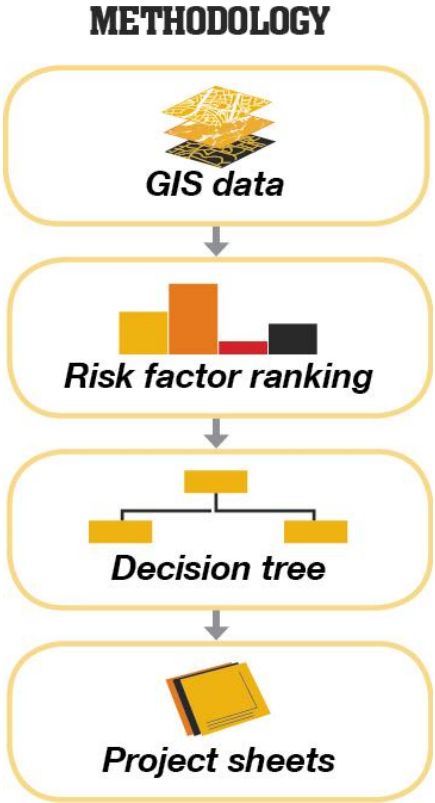


Figure 20 – Project Analysis Methodology

6.1.1. GIS Data

GIS data for Buchanan County paved intersections, curves, and road segments was utilized to perform a systemic analysis of the county-owned roadway facilities. Databases were obtained with collaboration and coordination with Iowa DOT, InTrans, and the County. Descriptions of the databases utilized for the analysis are included in **Section 3** of this document.

Once obtained, the data was analyzed using ArcMap GIS software as described in the following sections. Every intersection, curve, and roadway along the county-owned paved roadway system was analyzed.

6.1.2. Risk Factor Ranking

Iowa DOT crash data from 2004 to 2013 (as of the January 15, 2015 database update) was utilized for analysis. This represents the most recent 10 years of crash data available at the time the project began. Risk factors at intersections, curves, and along roadway segments were assessed to determine locations that may be more susceptible to crashes involving serious injuries and/or fatalities in the future, as opposed to focusing only on locations that have had such crashes previously. In this analysis, various attributes were assessed in determining risk. The attributes that were assessed for determining risk are included in the subsequent sections for intersections, curves, and segments. Rankings and weighting of those attributes were developed for the LRSP in coordination with Iowa DOT.

6.1.3. Project Selection Decision Tree

To aid in the systematic selection of safety improvement recommendations for the intersections, curves, and roadway segments with the highest risk factor rankings, three project decision trees were developed. A decision tree was developed for each facility type and are individually described in subsequent sections. A logical flow was created within the decision trees based on traffic volumes and roadway characteristics. Facility data was utilized to select which safety countermeasures (projects) were recommended at each location.

6.1.4. Project Sheets

To summarize the information used in the systematic analysis of the intersections, curves, and roadway segments within the County, individual project sheets were developed for those facilities with the highest risk scores. The project sheets include location, systematic ranking data, crash data, geometric data, and opinion of probable cost for the recommended safety improvements. **Figure 21** summarizes the organization of and information contained within the project sheets.

6.1.5. Project Selection Workshop

After development of the potential location specific safety improvements and project sheets, a second in-person workshop was conducted in Buchanan County on Tuesday, August 25, 2015, to review implementation of the driver-related countermeasures along with the engineering safety countermeasures that were recommended.

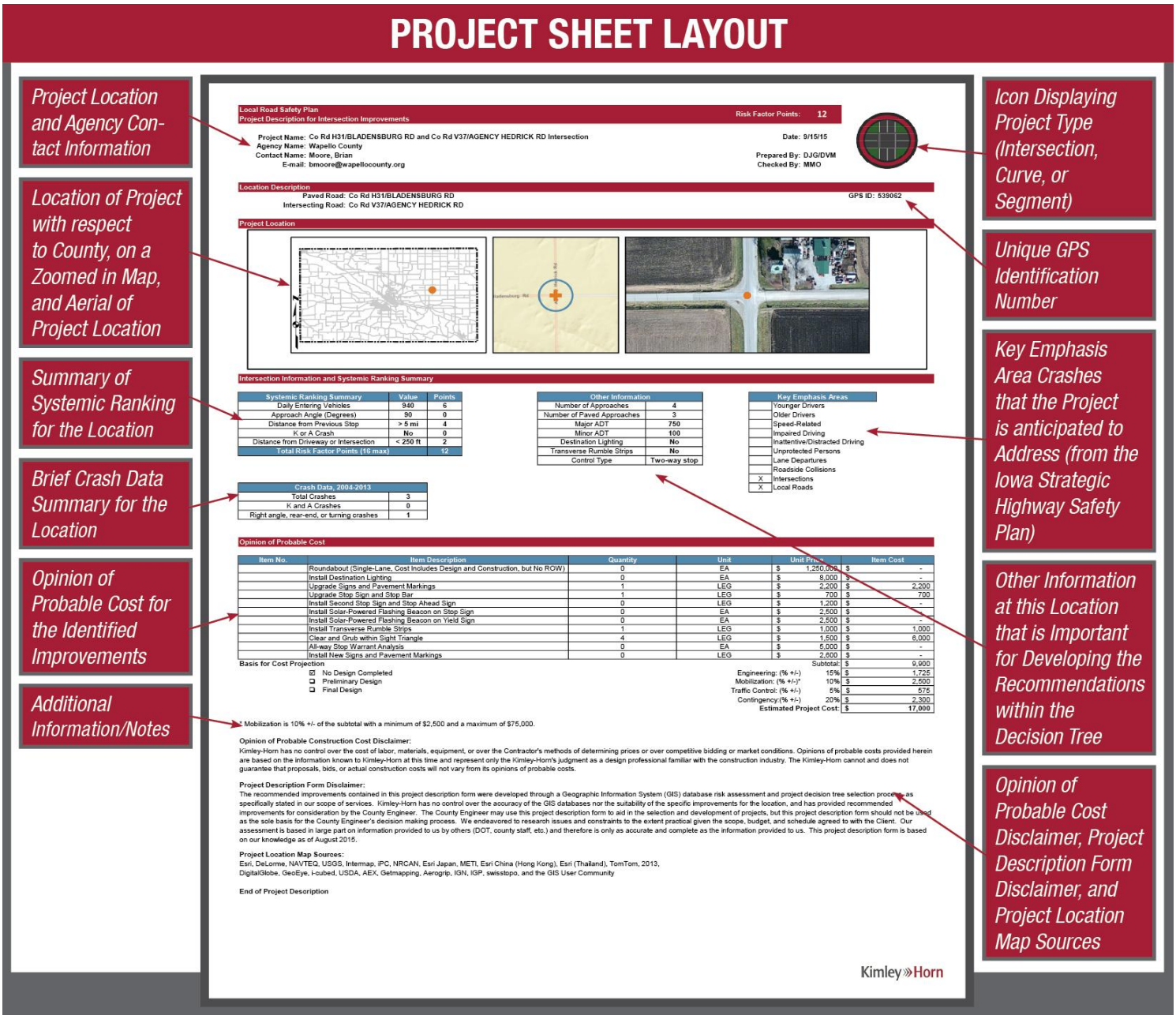


Figure 21 – Project Sheet Summary

6.1.5.1. Project Recommendations Disclaimer

The recommended improvements contained in the project sheets were developed through a system-wide GIS database risk assessment and project decision tree selection process, as described previously. Kimley-Horn could not confirm or control the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. Site surveys were not conducted at the specific locations detailed in the project sheets. The County Engineer may use these project sheets as part of their due diligence, but these project sheets should not be used as the sole basis for the County Engineer's decision-making. The County Engineer can make changes to the

prepared project sheets at their discretion. Kimley-Horn endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule of the project. This assessment is based in large part on information provided by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided. The project sheets included in **Appendix A**, **Appendix C**, and **Appendix E** are based on the best available information as of August 2015.

6.2. Intersections

The methodology described in **Section 6.1** was followed for a systematic analysis of county paved intersections based on the determined risk factors. Additional details on the risk factor calculations, risk factor ranking results, project selection decision tree and project sheets are described in the following sections.

6.2.1. Risk Factor Summary

Every intersection containing at least one county-maintained paved roadway leg was analyzed for risk according to the following five key attributes:

- **Volume (DEV):** the average number of vehicles entering the intersection per day. The Daily Entering Volumes (DEVs) for all the intersections in the County were compared against each other to assign higher risk to intersections with higher DEVs within the County. It is understood that more vehicles entering an intersection creates more exposure and therefore, increases the risk of a crash.
- **Distance from Previous Stop:** if any stop-controlled approach had a distance of at least 1.5 miles from the previous stop sign, risk points were assigned. Additional risk points were assigned when an intersection had an approach with greater than five miles from the previous stop sign. The longer distance a driver travels without stopping, the more likely they are to fail to stop at the next stop sign because they are not expecting it.
- **Intersection Skew:** minimum approach angle (skew) of the intersection was used if a skew of less than 75-degrees was present. According to the *Highway Design Handbook for Older Drivers and Pedestrians*, “Skew angles in excess of 75 degrees often create special problems at stop-controlled rural intersections. The angle complicates the vision triangle for the stopped vehicle; increases the time to cross the through road; and results in a larger, more potentially confusing intersection.”
- **Crash Data:** each intersection was assigned additional risk factor points if a K or A crash occurred at or within 150 feet of the intersection. This attribute takes into account crash history, which may be indicative of improvement needs.
- **Access Management:** risk was assessed if an access point (driveway or other intersection) was within 500 feet of the intersection. Additional risk points were assessed if an access point was located within 250 feet of the intersection. Driveways and other access points located within the functional area of intersections create additional opportunities for conflict points and cause drivers to make additional decisions within the functional area of an intersection, increasing risk for a crash.

Table 17 summarizes the risk factors utilized for the risk factor analysis as well as the points and risk factor weight developed in coordination with the Iowa DOT. The maximum number of available points for intersection risk was 16.

Table 17 – County Paved Intersections – Risk Factor Ranking

Risk Factor	Measurement	Points	Risk Factor Weight	Max Points Available
Volume	Daily entering vehicles per intersection with a paved approach	0: Bottom third of the DEV for the County	3	6
		1: Middle third of the DEV for the County		
		2: Top third of the DEV for the County		
Distance from previous stop sign	Stop sign locations based on information provided by the County Engineer	0: 1.5 miles or less	2	4
		1: 1.5 miles to less than five miles		
		2: Five miles or more		
Skewed approach	Degrees	0: 75 degree to 90 degree intersection approaches	2	2
		1: 75 degree or less intersection approach		
Crash	K or A crash within 150 feet of the intersection	0: No K or A crashes within 150 feet of the intersection	2	2
		1: K or A crash within 150 feet of the intersection		
Access Management	Distance to nearest driveway or intersection	0: 500 feet or more from a driveway or intersection	1	2
		1: 250 to less than 500 feet from a driveway or intersection		
		2: Less than 250 feet from a driveway or intersection		
Total available points				**16**

6.2.2. Risk Factor Rankings

Risk factor calculations were performed on each of the intersections in Buchanan County containing at least one county-maintained paved leg. The results of the risk factor rankings are provided in **Figure 22**. To further aid the County in determining which projects they may want to pursue, the intersections were divided into two categories:

- **County-County and County-Other:** This includes intersections of county roads with other county roads as well as intersections of county roads with other roads that are not maintained by Buchanan County or the Iowa DOT (such as city streets).
- **County-State:** This included intersections of county roads with Iowa DOT or state-maintained roads.

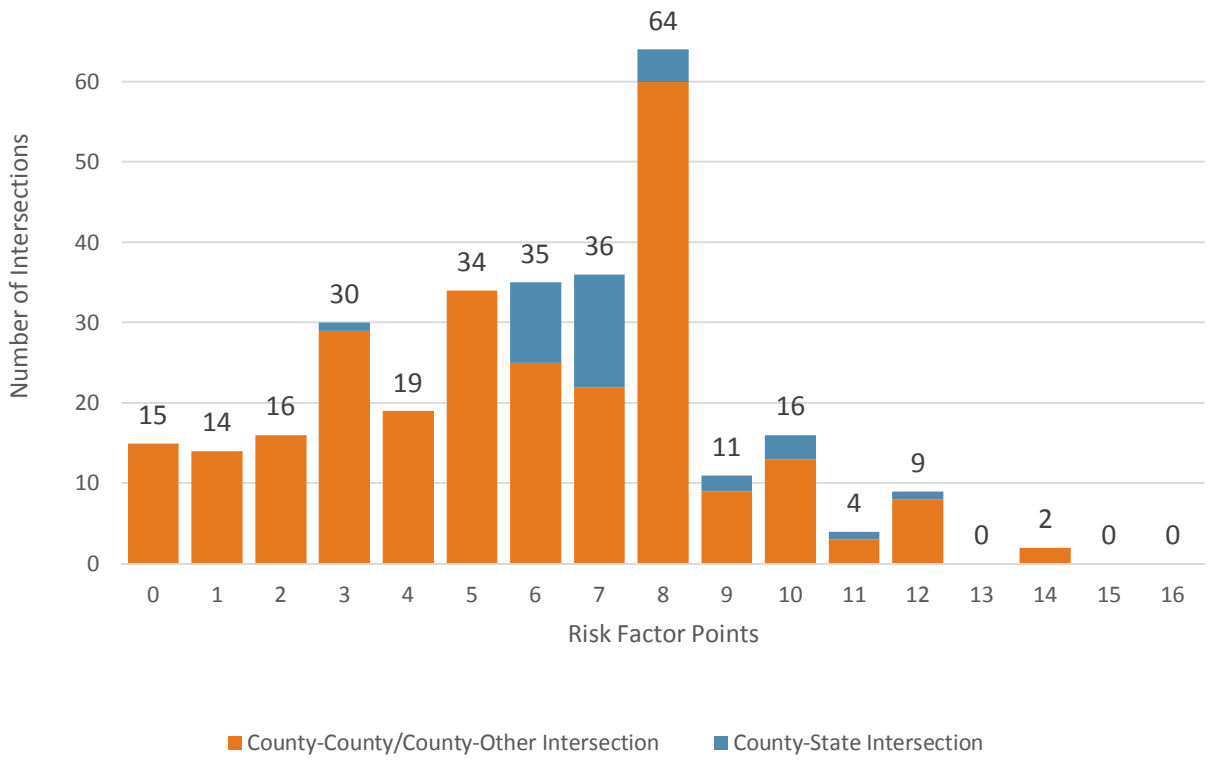


Figure 22 – County Paved Intersections Risk Factor Ranking Summary

For visualization purposes, **Figure 23** on the following page shows the location and risk factor score of each intersection analyzed within the LRSP.

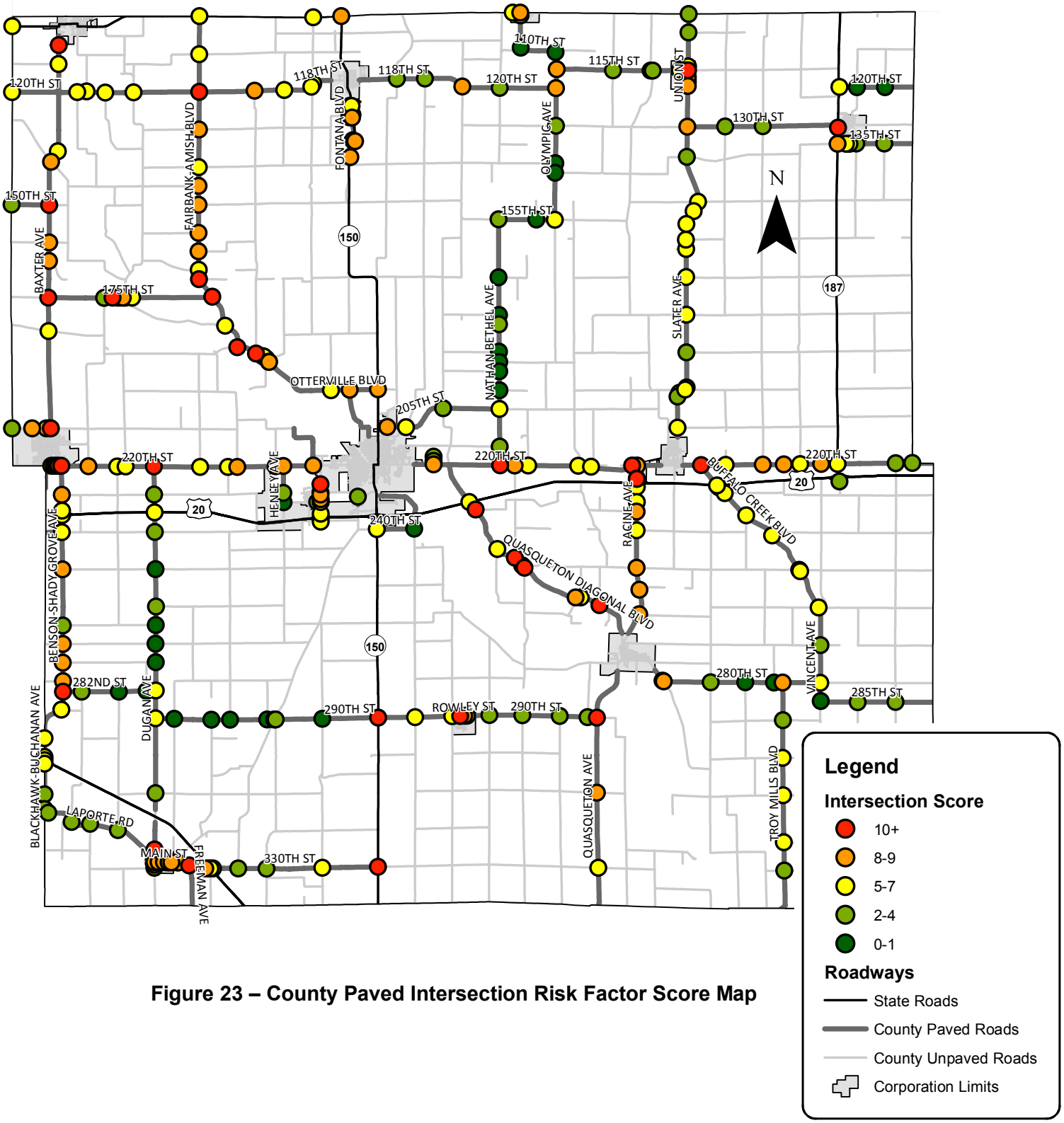


Figure 23 – County Paved Intersection Risk Factor Score Map

6.2.3. Intersection Countermeasures

The following subsections detail the intersection countermeasures for consideration at the county paved intersections, summarized with CMFs and estimated costs in **Table 18**.

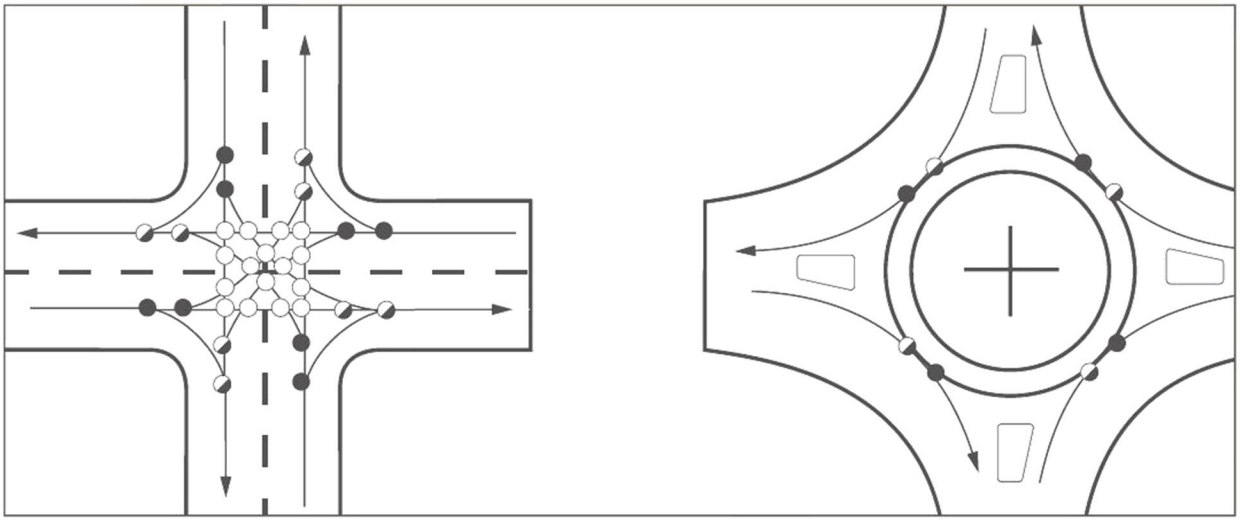
Table 18 – County Paved Intersection Safety Countermeasure Summary

Safety Countermeasure	CMF	Estimated Cost
Roundabout	0.18 – 0.42	$1,250,000
Destination Lighting	0.62	$5,000
All-Way Stop Warrant Analysis and Converting Two-Way Stop to All-Way Stop	0.52	$5,000
Upgrade Signs and Pavement Markings (Paved Approach)	0.4 – 0.69 "Stop Ahead" 0.751 – 0.909 "New Stop Sign"	$2,200/leg
Upgrade Stop Sign and Stop Bar (Unpaved Approach)	0.751 – 0.909 "New Stop Sign"	$1,000/leg
Install Second Stop Sign and Stop Ahead Signs	CMF not defined	$1,200/leg
Beacon on All Stop Signs	CMF not defined	$2,500/sign
Transverse Rumble Strips on All or Minor Approaches	0.785	$1,000/leg
Clear and Grub	CMF not defined	$1,500/leg

6.2.3.1. Roundabout

Roundabouts are an FHWA proven safety countermeasure with marked safety improvements thoroughly documented. CMFs for converting a stop-controlled rural intersection to a roundabout have been recorded from 0.18 - 0.42 showing reductions of over 50% in crashes. In addition to providing significant safety benefits, roundabouts are also able to better accommodate abnormal intersections, such as intersections with more than four approaches or an angled minor or major approach. Many of the safety benefits of roundabouts stem from the fact that they have fewer conflict points (See **Figure 24** – next page). In a conventional intersection, 32 conflict points exist at which a crash may occur. This is reduced to eight conflict points in a typical one-lane roundabout. Furthermore the vehicle conflict points at a roundabout are unlikely to yield right-angle or head-on collisions which tend to be more severe crash types. Instead the majority will be rear-end or side-swipe collisions. In addition to less-severe crash types, crashes at roundabouts tend to occur at lower speeds which results in fewer injuries and fatalities.

The cost estimate for a roundabout in the project sheets was determined by reviewing costs for other rural single-lane roundabout construction projects in the Midwest.



Four-Leg Intersection
32 Conflict Points

Roundabout
8 Conflict Points

Source: Federal Highway Administration

Figure 24 – Conflict Points at Intersections

6.2.3.2. Destination Lighting

Destination lighting is different than typical intersection lighting, in that the purpose of destination lighting is to inform drivers, from a distance, that an intersection is located near the light. As can be seen in **Figure 25**, the traditional High Pressure Sodium (HPS) lighting option provides a better spreading of light to the approaching driver. Light-Emitting Diode (LED) lighting options dissipate less light outward and typically focus light down, towards the roadway. For the purpose of destination lighting HPS lighting systems are preferred due to their dispersion of light, unless a lens is provided on the LED light to disperse light in a similar manner to HPS lighting. In rural situations, especially during nighttime conditions, intersections can be difficult to identify without the presence of destination lighting. For this purpose, destination lighting is recommended when certain volume thresholds as defined in the decision tree are exceeded.

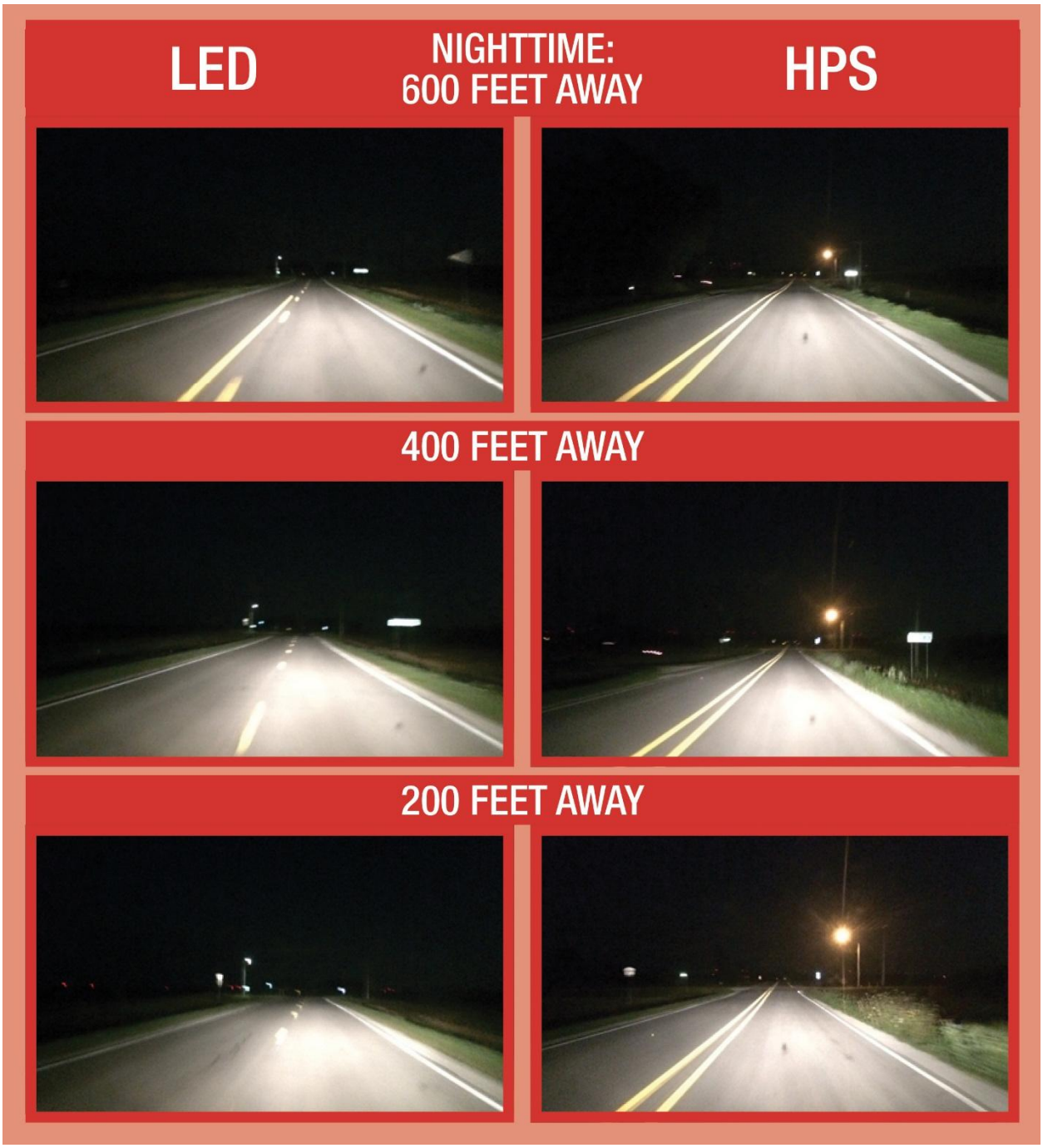


Figure 25 – Examples of Destination Lighting

Destination lighting, as a recommended safety countermeasure with a CMF of 0.62, can be installed on a new light pole or be attached to an existing utility pole near the subject intersection as shown in **Figure 26**. Some counties noted a preference to not install a new pole due to the increased maintenance and cost of a new pole while others have identified the coordination with the utility companies as a hindrance to installing destination lighting on existing utility poles and prefer installing a new pole.

Figure 26 – Destination Lighting Installation Options

6.2.3.3. All-Way Stop Warrant Analysis

This safety countermeasure includes the individual intersection analysis of traffic volumes, crash history and sight distance as detailed in the Manual on Uniform Traffic Control Devices (MUTCD). This safety countermeasure was recommended based on the CMFs in the range of 0.52 for converting a two-way stop-controlled intersection to all-way stop. An engineering study is required to warrant the installation of all-way stop control. Only the analysis was recommended in the decision tree, based on traffic volumes that could potentially meet the minimum volume thresholds for an all-way stop to be warranted.

6.2.3.4. Upgrade Signs and Pavement Markings

Another low-cost intersection safety countermeasure includes the upgrading of signs and pavement markings. Providing “Stop Ahead” pavement markings has a recorded CMF range of 0.4 to 0.69, increasing the retroreflectivity of stop signs (or replacing signs with new larger signs) have CMFs from 0.751 to 0.909. The following improvements were recommended for applicable intersection approaches:

- Stop sign (R1-1 36”x36”) and post
  - Large stop sign for enhanced visibility from a greater distance
- All Way (plaque) (R1-3P 18”x6”) or

Cross Traffic Does Not Stop (plaque) (W4-4P 24”x12”)
  - Informational plaque to provide valuable information to drivers
- Intersection Warning Sign and Post (W2-1 – W2-6 24”x24”)
  - Installed on uncontrolled intersection approaches to warn users of potential vehicle conflicts from the intersection roadway and/or vehicles slowing to make turns
- Stop ahead sign and post (W3-1 30”x30”)
  - This sign is installed upstream to inform drivers of upcoming stop-controlled conditions
- Stop ahead pavement markings
  - Installed as a supplement to the “Stop Ahead” sign, this on-pavement marking has a recorded CMF of 0.4 to 0.69 adding reinforcement of the upcoming stop-controlled condition
- Stop bar
  - Installed to delineate where the driver should stop to check for oncoming vehicles and reinforce the stop-controlled condition with on-pavement markings at the intersection. This pavement marking can also be visible from cross-traffic, further delineating the intersection. In the case of an unpaved minor approach a stop bar may not be feasible, but is nevertheless recommended.
- Double yellow line 100’ back from the intersection
  - Provides additional delineation of the intersection

6.2.3.5. Install Second Stop Sign and Stop Ahead Signs

Installing a second stop sign and stop ahead sign on the left side of the roadway for reinforcement of the stop-controlled condition was another safety countermeasure that was implemented where certain volume thresholds were met. Installing the second stop sign and stop ahead signs on the left side of the roadway provide for additional visibility and reinforce the stop-controlled condition ahead.

6.2.3.6. Flashing Beacon on All Stop Signs

This countermeasure includes installing flashing beacons on top of all stop signs and/or yield signs at an intersection. It is anticipated that the flashing beacons would be solar-power LED beacons to expedite the installation cost and reduce the monthly cost associated with power for the lights. This countermeasure provides enhanced visibility and reinforcement of the stop/yield-controlled condition.

6.2.3.7. Transverse Rumble Strips on All or Minor Approaches

Installing transverse rumble strips can audibly and tactilely alert drivers of upcoming stop control. In the case of an all-way stop-controlled intersection, rumble strips are recommended on all approaches. For a one-way or two-way stop-controlled intersection, only the minor paved approaches (those that are stop-controlled) are recommended for rumble strip installation. Installing transverse rumble strips on stop-controlled approaches in rural areas have a CMF of 0.785.

6.2.3.8. Clear and Grub

This includes clearing and grubbing the areas within the sight triangles of the vehicles that approach stop signs at a given intersection. This safety countermeasure increases the sight distance for vehicles prior to entering an intersection. This is particularly beneficial under two-way stop-controlled or uncontrolled situations where conflicting vehicles may not stop or yield. A

budgetary cost has been included in the project sheets; however, it is recommended that the County Engineer confirm the need to clear and grub as projects move forward.

Figure 27 illustrates the proposed intersection improvements as described in the previous sections. It is important to note that the County Engineer should follow all applicable guidelines and standards when implementing the intersection improvements.

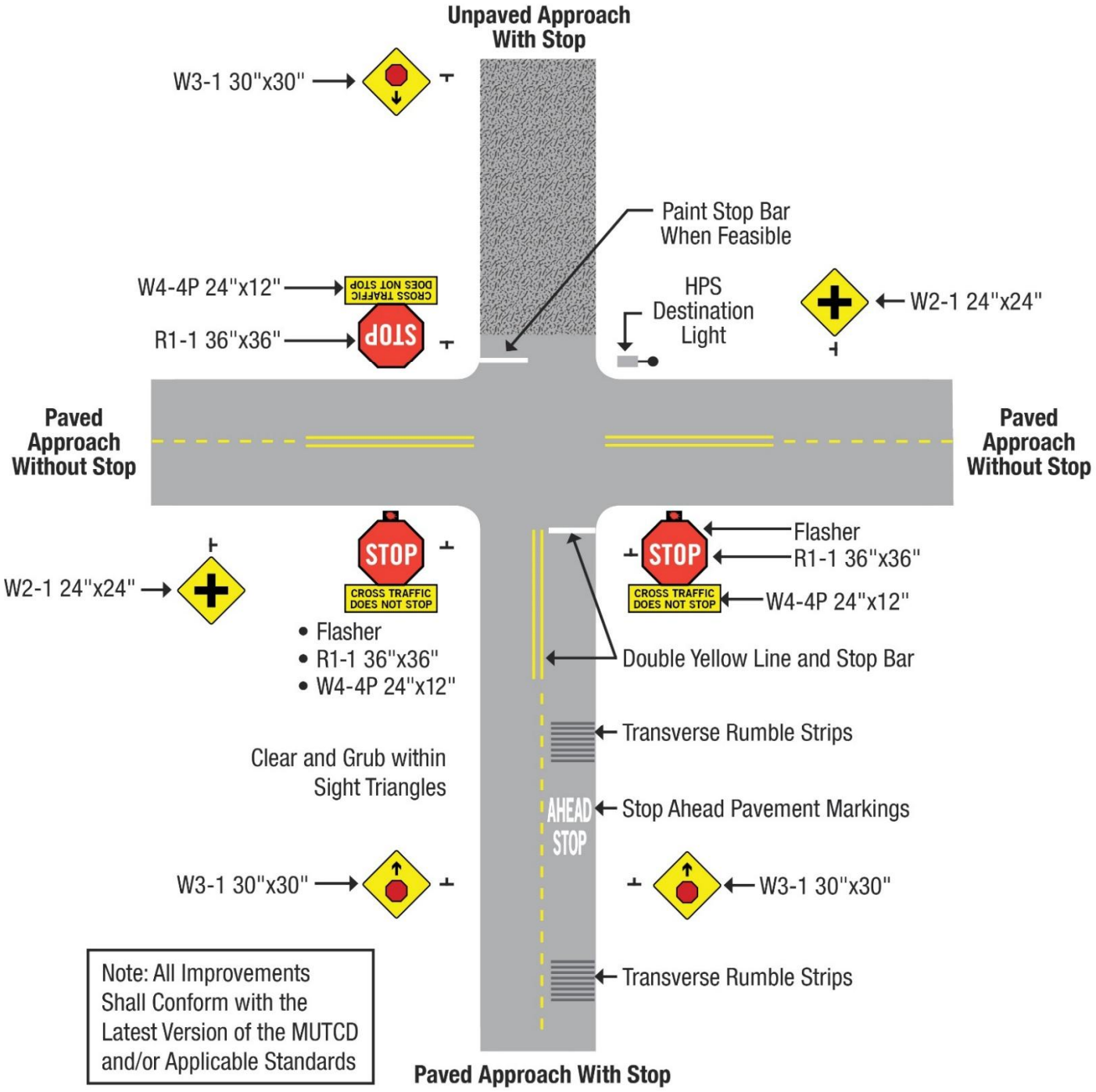


Figure 27 – County Paved Intersection Safety Improvements

6.2.4. Project Selection Decision Tree

After conducting the risk factor calculations and rankings for all intersections within the County, and developing the county paved intersection countermeasures, a project selection decision tree was developed. The decision tree was utilized to develop and systemically define location specific safety recommendations for the intersections based on the characteristics of the intersections (DEV, paved approaches, crash history, major approach Average Daily Traffic (ADT), minor approach ADT, etc.). The decision tree for intersection safety improvements is shown in **Figure 28**.

Each possible decision tree outcome represents a set of potential safety improvements for the intersection. The decision tree was utilized to determine projects for the intersections with the highest risk factor rankings. Project sheets were developed for a minimum of the five top-scoring intersections in the county-county and county-other and county-state categories. Not all improvements are recommended at all locations and the project sheets contain the recommended improvements for the specific location based on the decision tree process, existing conditions, and defined criteria.

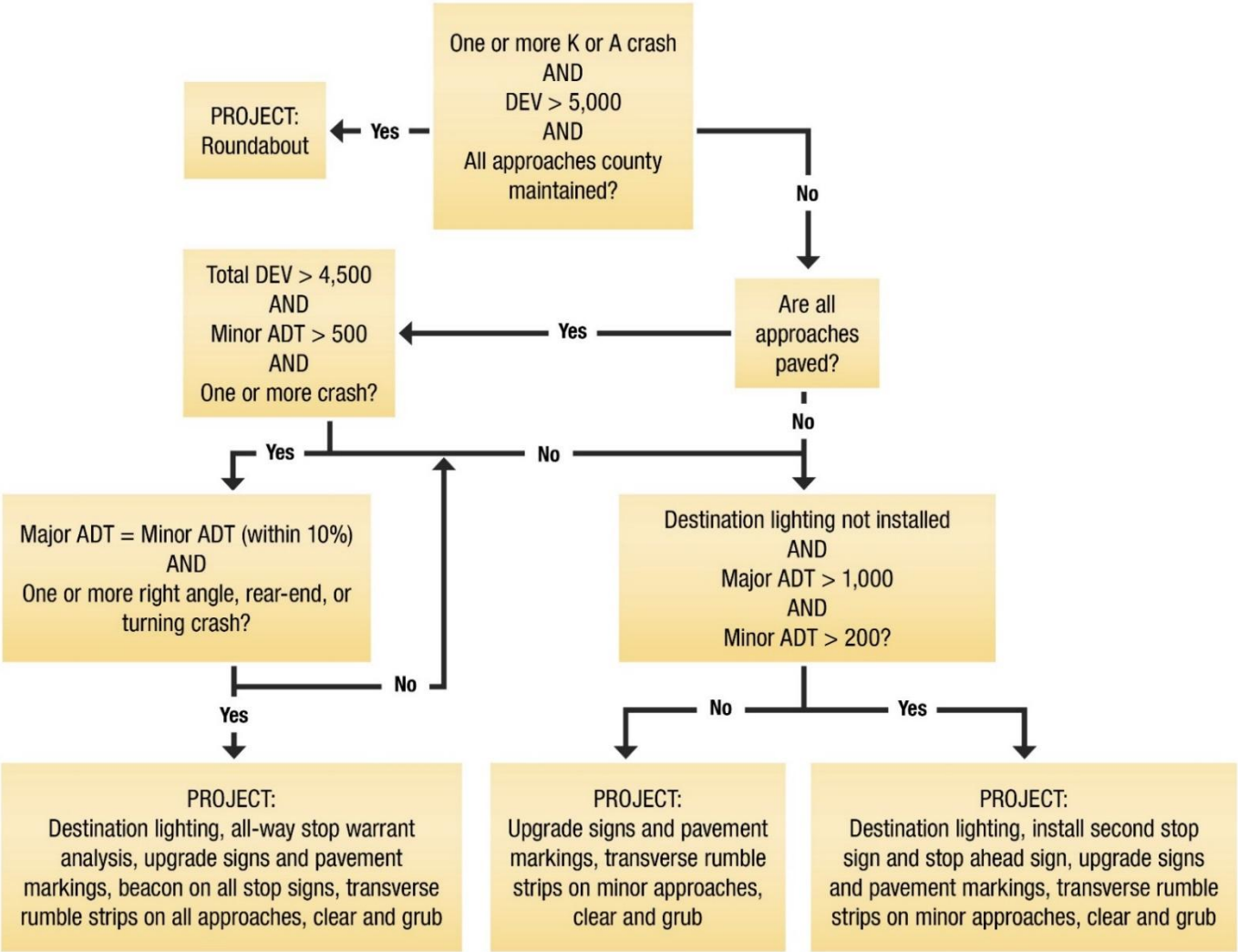


Figure 28 – County Paved Intersection Project Decision Tree

6.2.5. Prioritized Intersection Recommendations

After the decision tree was utilized to identify safety improvement projects for the intersections with the greatest amount of risk factor points, project sheets were developed for these locations. The intersections for which project sheets were developed (those with the greatest amount of risk factor points) are summarized in **Table 19** and the project sheets are located in **Appendix A**.

Table 19 – County Paved Intersection Prioritized Project Cost Summary

GPS ID	Intersection	Risk Factor Points	Estimated Project Cost
54355	CO RD D22/220TH ST & CO RD W45/BUFFALO CREEK BLVD	14	*
55568	CO RD C57/120TH ST & CO RD W13/FAIRBANK-AMISH BLVD	14	$ 35,000
54271	CO RD D22/220TH ST & CO RD V71/DUGAN AVE	12	$ 25,000
54560	CO RD D47/QUASQUETON AVE/290TH ST & CO RD W35	12	$ 20,000
55131	CO RD D16/FAIRBANK-AMISH BLVD & OTTERVILLE BLVD	12	$ 15,000
55198	CO RD W13/FAIRBANK-AMISH BLVD & 170TH ST	12	*
55213	CO RD D16/175TH ST & WATER ST	12	$ 9,000
55230	CO RD D16/FAIRBANK-AMISH BLVD/175TH ST & CO RD W13	12	$ 12,000
55274	CO RD D20/210TH ST & CO RD V62/BAXTER AVE & MAIN ST	12	$ 36,000
55622	CO RD V62/BAXTER AVE & 150TH ST	12	$ 17,000
County-County / County-Other Total			**$ 169,000**
53829	IA 150/JAMESTOWN AVE & CO RD D48/330TH ST	12	$ 20,000
53847	IA 150/JAMESTOWN AVE & CO RD D47/290TH ST	11	$ 35,000
53768	US 20/NE RAMP/NW RAMP & CO RD W40/RACINE AVE	10	*
54057	IA 187/WASHBURN AVE & CO RD C64/130TH ST	10	$ 25,000
5005537	US 20/NE RAMP/NW RAMP & CO RD W40/RACINE AVE	10	*
54019	IA 150/JACKSON AVE/PALACE RD & IA 281/100TH ST	9	$ 17,000
632894	IA 150/JACKSON AVE & 133RD ST INTERSECTION	9	$ 12,000
County-State Total			**$ 109,000**
Intersection Total			**$ 278,000**

**This intersection received a high-risk factor ranking; however, based on discussion with the County Engineer it was removed from the list of standard improvements. It is recommended that the County Engineer consider safety improvements that meet the needs of this location.*

Figure 29 illustrates the locations of the intersections with highest risk ranking, where project sheets and specific intersection improvement recommendations were made.

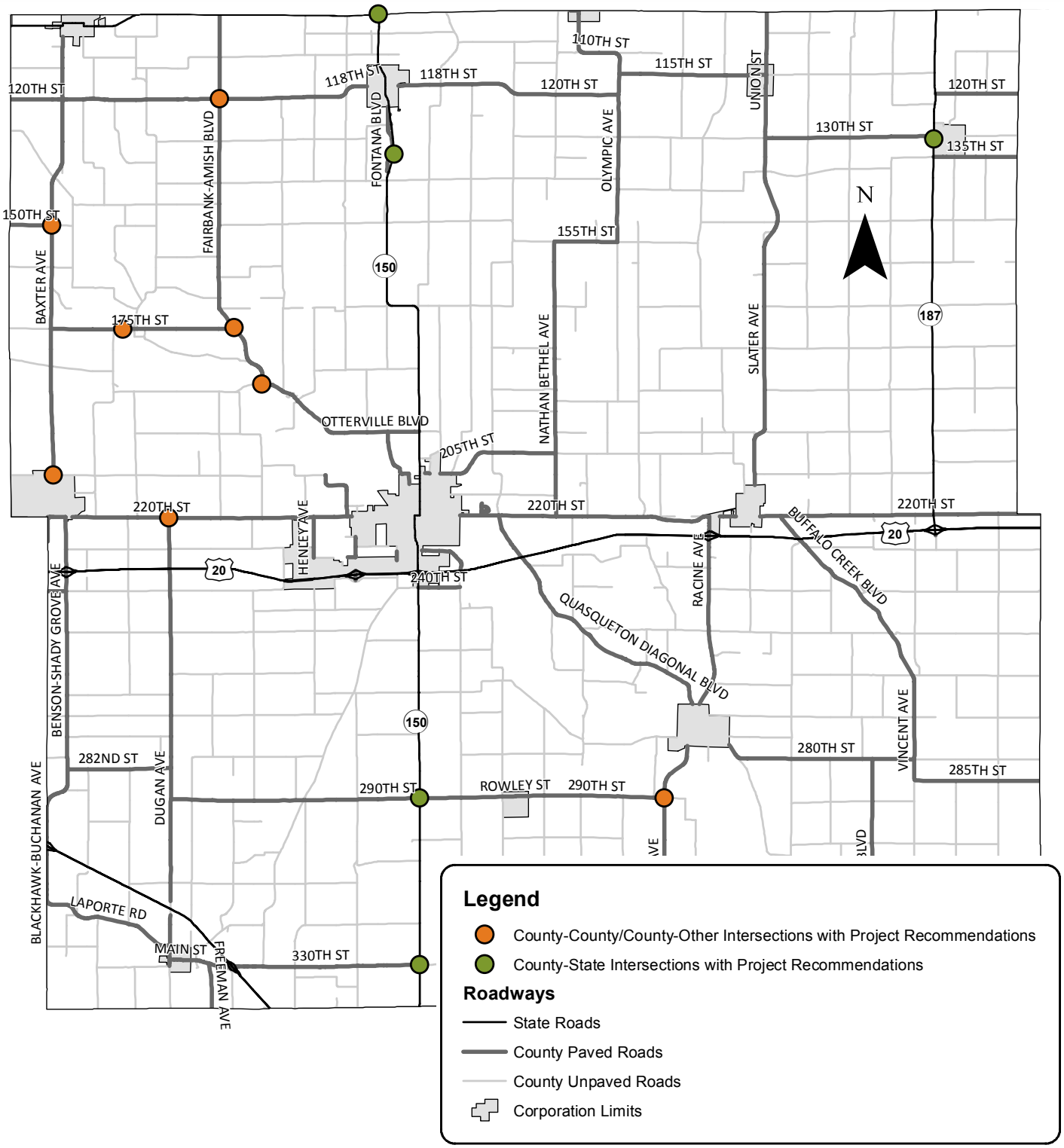


Figure 29 – County Paved Intersection Prioritized Project Location

Project sheets for the intersections with risk factor rankings of 10 or more points are included in **Appendix A**. The intersection risk factor ranking results and relevant data for every analyzed intersection is included in the summary spreadsheet included in **Appendix B**.

6.2.6. Other Intersection Countermeasures

The purpose of the LRSP project is to identify systemic safety improvement projects using a GIS analysis and low-cost safety improvements. A safety improvement that is not included within the project sheet may still merit consideration at the location. There are a variety of safety improvements that could be considered at locations that were not included in the project decision tree due to availability of data, the need for site specific information, and/or the appetite for the countermeasure to be deployed at county intersections throughout the state. Several other intersection safety improvements that could be considered appropriate by the County Engineer are described in the following sections.

6.2.6.1. Construction of Turn Lanes

Providing right- and left-turn lanes to remove slowing/turning vehicles from the through lanes has CMFs ranging from 0.56 to 0.92. This safety countermeasure needs to be evaluated on a case-by-case basis based on turning movement volumes, which were not available as part of this project. This improvement can be particularly effective where there are high amounts of conflicting movements at intersections. When considering turn lanes for a specific location, right-of-way constraints will need to be considered.

6.2.6.2. Realignment of Intersection to Increase Angles to 90-degrees

Intersection skew was reviewed as part of the risk factor analysis, but realignment of specific intersections was not recommended, due to constraints such as right-of-way and geometric alignments that could not be determined from a systemic approach. Based on right-of-way and site conditions, this countermeasure could be particularly beneficial and should be considered where feasible. The CMF for intersection geometry reconfiguration is included in the HSM and varies based on the existing skew angle. With the optimal 90-degree intersection configuration sight triangles are maximized, crossing distance is minimized and the intersection meets typical driver expectations.

6.2.6.3. Stop Signs with LED Flashing Lights

Installing stop signs with LEDs embedded in the border of the sign can increase the visibility of the sign from a greater distance, particularly at nighttime. CMFs have been recorded from 0.585 to 0.59 when replacing a standard stop sign with a stop sign with LED flashing lights.

6.2.6.4. Through Route Activated Warning System

This safety improvement warns vehicles on the major approach of a two-way stop-controlled intersection when there is a vehicle present/stopped at the upcoming intersection. According to the FHWA,

> "These systems usually use a double set of detectors on the stop approach to identify approaching and stopped vehicles and warn traffic on the through approach of their presence using activated flashing beacons on passive intersection warning signs to indicate that a vehicle from the cross street may enter the intersection. They are often deployed at rural stop-controlled intersections that have either a history of crash experience or limited sight distance. Missouri, Minnesota, North Carolina, Pennsylvania, and Virginia have deployed these systems or variations of them."

The FHWA also states that, this technology "has been successfully deployed… at a relatively low cost per intersection and has generally resulted in substantial intersection crash reductions."

6.2.6.5. Access Management

According to the Transportation Research Board, "Access management is the systematic control of the location, spacing, design and operation of driveways, median openings, interchanges, and street connections to a roadway." Various counties throughout Iowa have access management policies in place and substantial research has been conducted supporting the safety, operations, economic and environmental effects of access management.

Generally, **Figure 30** shows the definition of the functional area of an intersection. Driveways should be located outside of the functional area of the intersection so as not to negatively impact the operations of the intersection.

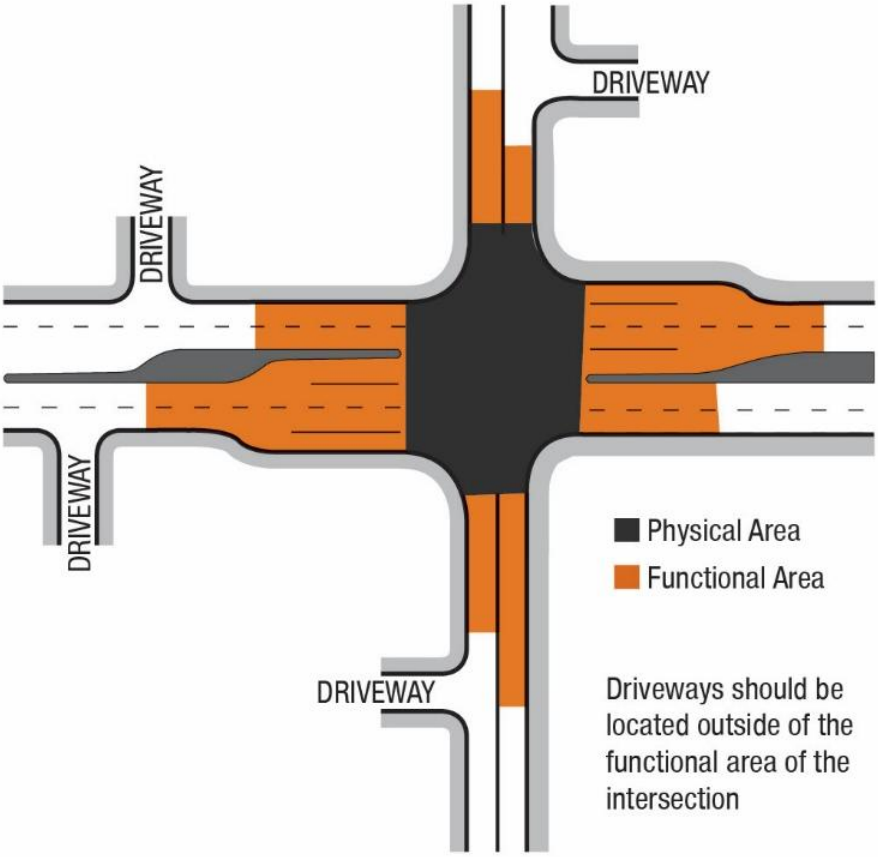


Figure 30 – Intersection Functional Area

In rural scenarios, access management is best applied by limiting left turn movements onto high-speed roadways and providing sufficient spacing between roadway access points. Please refer to the *Statewide Urban Design and Specifications* (SUDAS) and AASHTO's *A Policy on Geometric Design of Highways and Streets* (Green Book) for more information.

6.3. Horizontal Curves

The methodology described in **Section 6.1** was followed for county-wide analysis of paved horizontal curves based on the determined risk factors. Additional details on the risk factor calculations, risk factor ranking results, project selection decision tree and project sheets are described in the following sections.

6.3.1. Risk Factor Summary

Each paved horizontal curve that was identified in the horizontal curve database (August 28, 2013 update) within Buchanan County was systematically analyzed for risk according to the following five key attributes:

- **Volume (ADT):** the average number of vehicles per day along the roadway curve. The ADTs for all the curves within the County were compared against each other to assign higher risk to curves with higher ADT within the County. It is understood that more vehicles traveling along a curve increases the risk of a crash.
- **Curve Radius:** all curves with radii smaller than 2,500 feet were assessed risk factor points. Curves with radii smaller than 1,000 feet were assigned additional points based on the crash data reviewed for county paved horizontal curves, showing more crashes on curves with smaller radii.
- **Shoulder Width:** risk factor points were assigned to all curves with shoulder widths less than six feet, with more risk factor points associated with narrower shoulders. This was based on the HSM Chapter 10, Table 10-9 and 10-10 which illustrates that with wider shoulders, crash risk is reduced.
- **Access Management:** risk was assessed if a driveway was on or within 200 feet of the curve. Additional risk points were assessed if an intersection was within 200 feet of the curve. Driveways and other access points located within or near curves create additional opportunities for conflict points and cause drivers to make additional decisions within the curve, with a potential for reduced sight distance, increasing risk of a crash.
- **Crash Data:** each curve was assigned risk factor points if a K or A crash occurred within 200 feet of the curve. This attribute takes into account crash history, which may be indicative of improvement needs.

Table 20 summarizes the risk factors used for the risk factor analysis as well as the points and risk factor weight developed in coordination with the Iowa DOT. As can be seen, the maximum number of available points for curve risk was 18 points.

Table 20 – County Paved Horizontal Curves – Risk Factor Ranking

Risk Factor	Measurement	Points	Risk Factor Weight	Max Points Available
Volume	Average curve volume	0: Bottom third of the average curve volume for the County	3	6
		1: Middle third of the average curve volume for the County		
		2: Top third of the average curve volume for the County		
Curve radius	Radius of curve in feet	0: curve radius greater than or equal to 2,500 feet	2	4
		1: curve radius less than 2,500 feet and greater than 1,000 feet		
		2: curves radius 1,000 feet or less		
Shoulder width	Shoulder width in feet	0: 6 foot shoulder and greater	2	4
		1: 2 foot shoulder to 6 foot shoulder		
		2: less than 2 foot shoulder		
Access Management	Intersections and driveways within the curve (driveways from 911 address database)	0: no intersection or driveway in or within 200 feet of the curve	1	2
		1: driveway on or within 200 feet of the curve		
		2: intersection on or within 200 feet of the curve, or driveway and intersection on or within 200 feet of the curve		
Crash	K or A crash on or within 200 feet of the curve	0: no K or A crashes on or within 200 feet of the curve	2	2
		1: K or A crash on or within 200 feet of the curve		
Total available points				**18**

6.3.2. Risk Factor Rankings

The risk factor calculations were performed on each of the curves on paved roads in the County. The results of the risk factor rankings are provided in **Figure 31**.

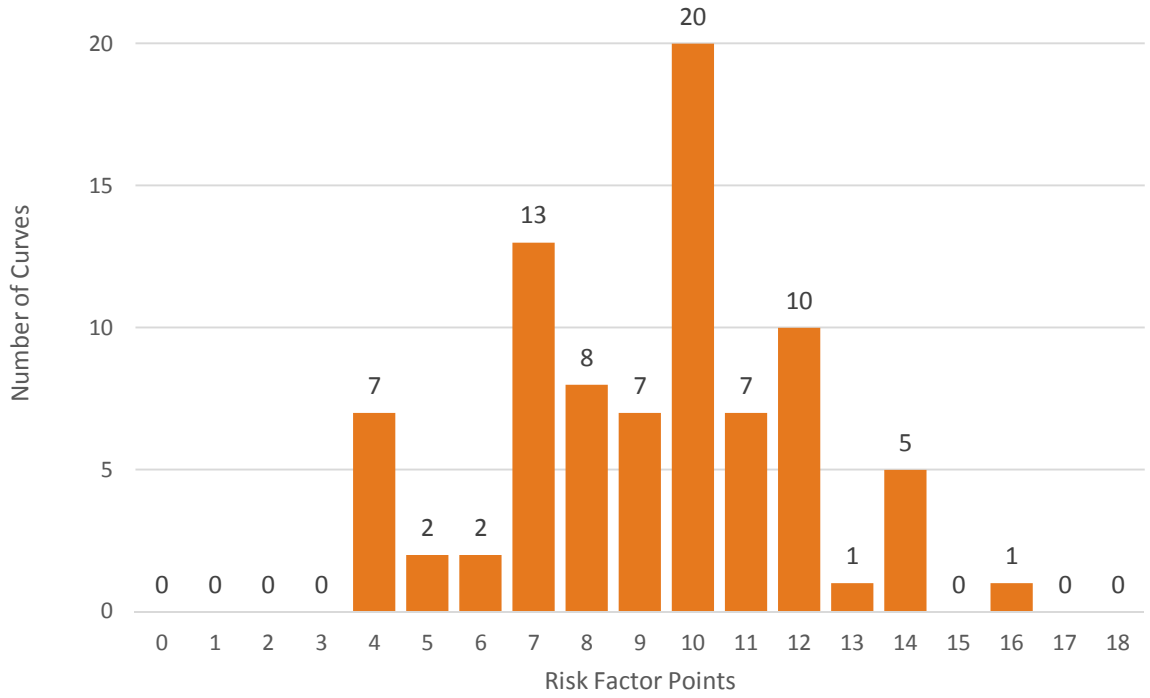


Figure 31 – County Paved Horizontal Curves Risk Factor Ranking Summary

For visualization purposes, **Figure 32** on the following page shows the location and risk factor ranking of each curve analyzed within the LRSP.

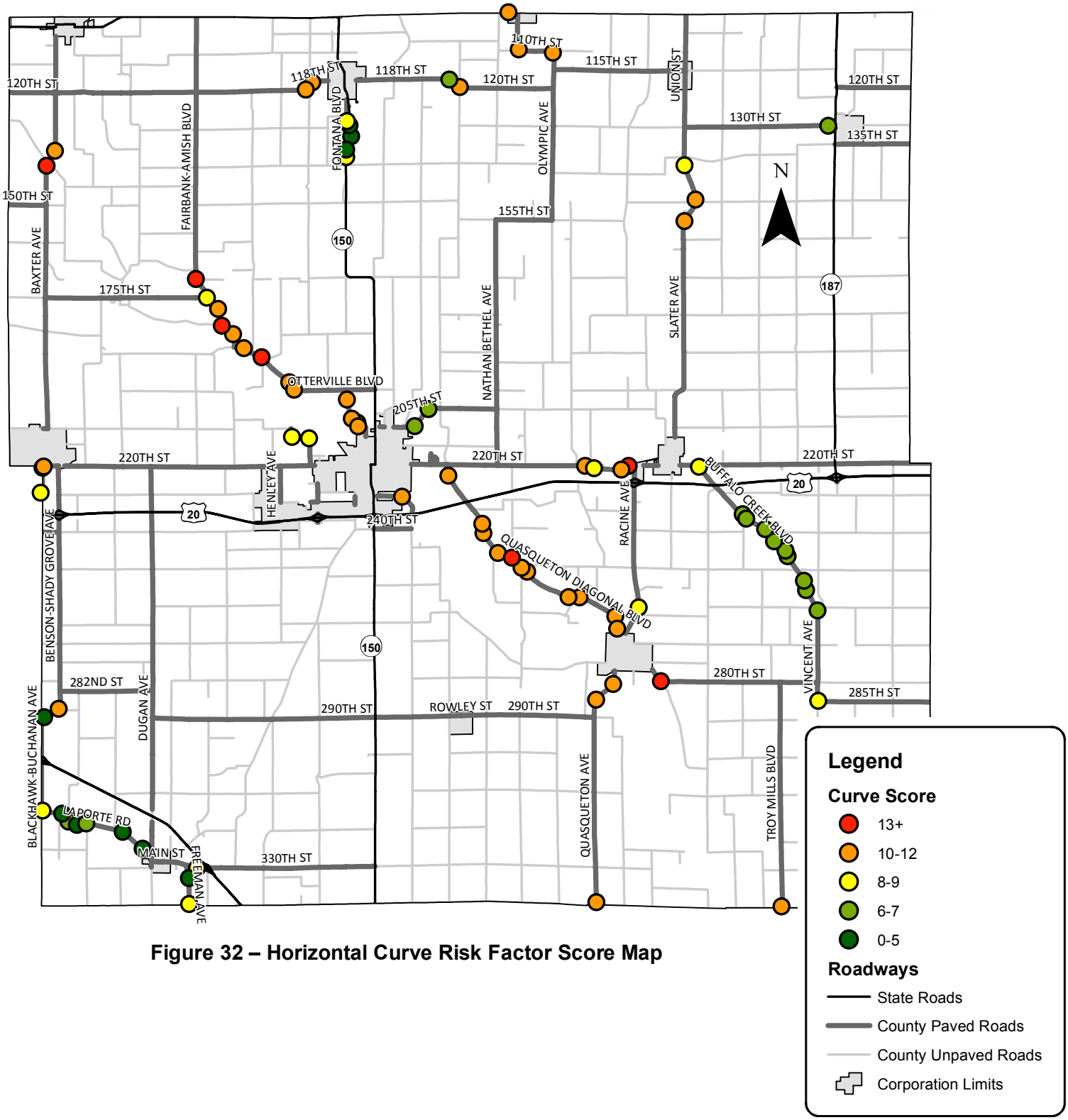


Figure 32 – Horizontal Curve Risk Factor Score Map

6.3.3. Curve Countermeasures

The following subsections detail the curve countermeasures for consideration along the county paved horizontal curves, summarized with CMFs and estimated costs in **Table 21**.

Table 21 – County Paved Horizontal Curve Safety Countermeasure Summary

Safety Countermeasure	CMF	Estimated Cost
Curve Chevrons	0.75 – 0.96	$3,500
Advance Warning Signs and Speed Advisory Plaques	0.585 – 0.606 (when installed in conjunction with curve chevrons)	$1,500
New Pavement Markings	0.825	$2,000/mile
Clear and Grub	CMF not defined	$20,000/mile
Edgeline Rumble Strips	0.61 – 0.67	$2,500/mile
Pave Shoulder with Safety Edge	0.75 – 0.99 "Pave Shoulder" 0.769 – 0.962 "Safety Edge"	$65,000/mile
Centerline Rumble Strips	0.55 – 0.91	$1,000/mile

6.3.3.1. Curve Chevrons

This safety countermeasure includes the installation of curve chevrons placed along the outer radius of the curved roadway segment. If curve chevrons do exist it is recommended that the County Engineer determine if the curve chevrons have adequate retroreflectivity, size, and/or placement that meets current guidelines. In some instances, County Engineers have replaced curve chevrons on their paved system and have relocated the older curve chevrons to curves located on their unpaved system. Installing curve chevron signs have CMFs ranging from 0.75 to 0.96, and when installed in combination with other advance warning signage have CMFs ranging from 0.585 to 0.606.

6.3.3.2. Advance Warning Signs and Speed Advisory Plaques

Providing advance warning of unexpected changes in horizontal alignment in conjunction with curve chevron signs have reported CMFs ranging from 0.585 to 0.606.

6.3.3.3. New Pavement Markings

This safety countermeasure includes new centerline and edgeline pavement markings along the curve. The updated markings can clarify and further delineate the curve, reducing the risk of a run off the road crash. If the lanes were wider than 12 feet, new edgeline pavement markings of 6 inches were recommended; otherwise, new 4 inch pavement markings were recommended. Research suggests that widening pavement markings from four to six inches in rural areas results in a CMF of 0.825.

6.3.3.4. Clear and Grub

Clearing and grubbing the areas within the clear zone of the roadway increases the sight distance for vehicles prior to entering, during, and after exiting a curve. This safety countermeasure also reduces the hazard of a run off the road crash by reducing the number of obstructions a vehicle could impact after a lane departure.

6.3.3.5. Edgeline Rumble Strips

The installation of edgeline rumble strips along a curve provides tactile and audible warning to a driver if they are beginning to depart the lane. This safety improvement has recorded CMFs in the range of 0.61 to 0.67 for rural run off the road injury crashes. Depending on the conditions of the roadway, the County Engineer may choose to install rumble strips placed in the shoulder offset from the edgeline, or they may place the rumble strips on the edgeline and provide pavement markings over them, resulting in edgeline rumble stripes. For purposes of this document, both will be called rumble strips.

6.3.3.6. Pave Shoulder with Safety Edge

Installing or increasing the width of a roadway shoulder can reduce the potential for a severe crash as the result of a lane departure. CMFs associated with paving the shoulder in rural areas range from 0.75 to 0.99. At locations where paved shoulders are recommended, it is recommended that the County Engineer consider a minimum of a two foot shoulder; however, based on right-of-way and roadway characteristics, the County Engineer may choose to install a wider shoulder.

According to the FHWA, a Safety Edge is “a simple but effective solution that can help save lives by allowing drivers who drift off [roadways] to return to the road safely. Instead of a vertical drop-off, the Safety Edge shapes the edge of pavement to 30 degrees.” The installation of a Safety Edge has CMFs ranging from 0.769 to 0.962. According to the FHWA, from a maintenance standpoint, “because the Safety Edge provides an additional level of consolidation on the edge, edge raveling is decreased. This contributes to longer pavement life.”

6.3.3.7. Centerline Rumble Strips

CMFs of 0.55 to 0.91 represent the safety benefit of the installation of centerline rumble strips. In Iowa, rumble strips placed in the centerline of the roadway generally have pavement markings over them. To be consistent with the Iowa DOT Design Manual 3C-5, centerline rumble strips will be referred to as rumble strips even though in circumstances they may technically be “rumble stripes”. This safety improvement can audibly and tactilely warn drivers when crossing the centerline and can aid in the avoidance of some high severity lane departure crashes on curves.

Figure 33 illustrates the proposed horizontal curve safety improvements as described in the previous sections. It is important to note that the County Engineer should follow all applicable guidelines and standards when implementing the curve improvements.

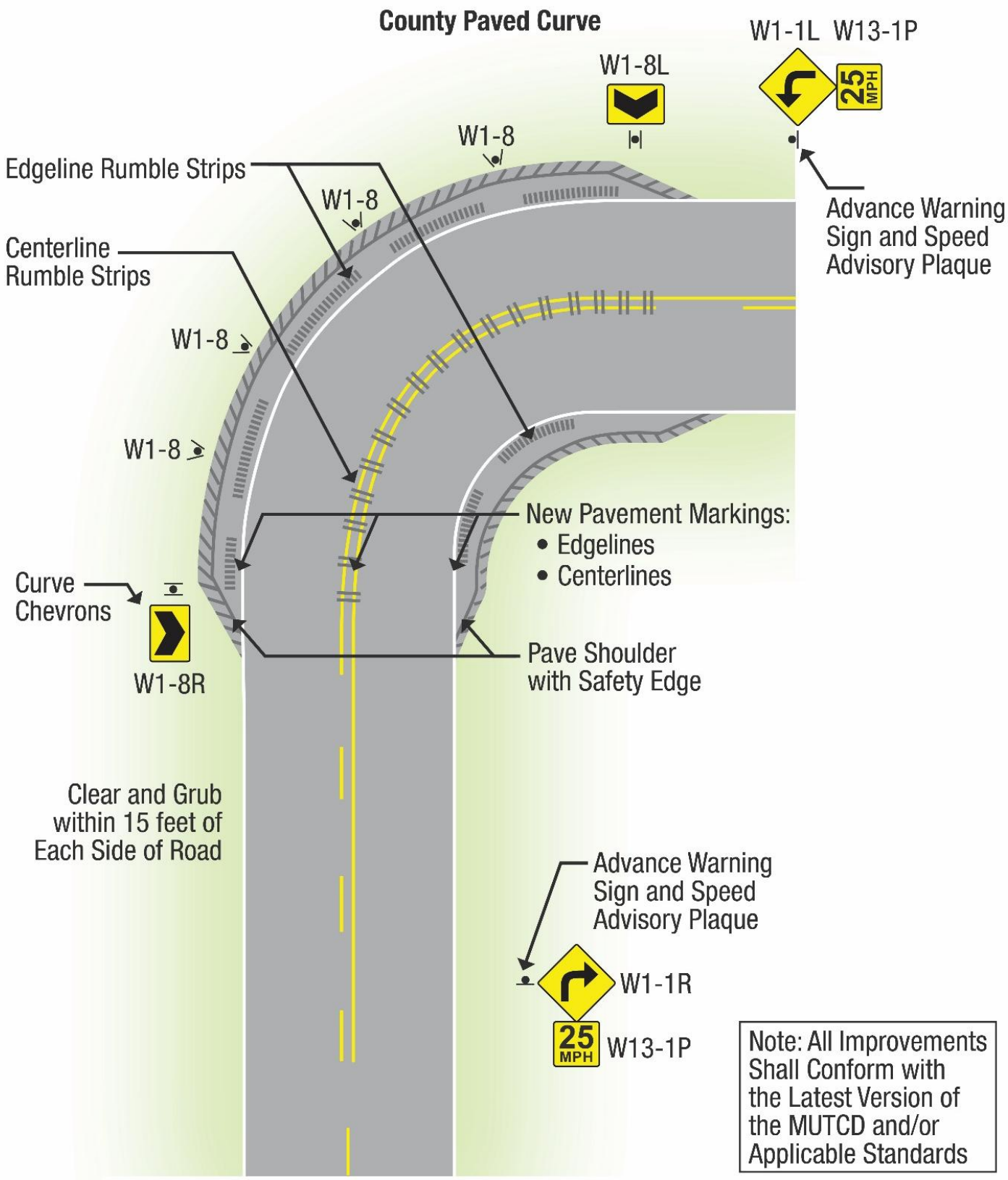
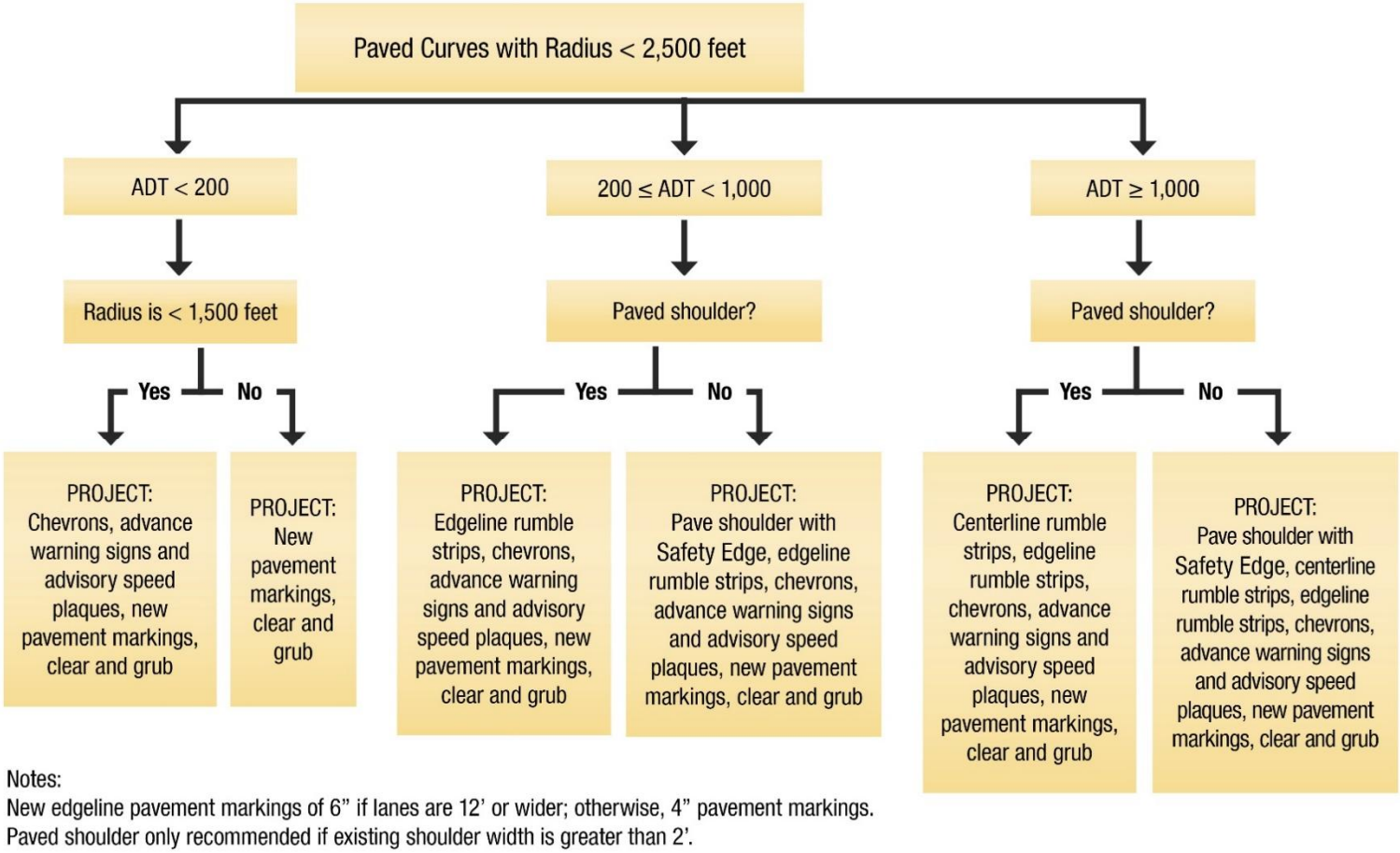


Figure 33 – County Paved Horizontal Curve Safety Improvements

6.3.4. Project Selection Decision Tree

After conducting the risk factor calculations and rankings for all paved curves within the County, and developing the curve safety countermeasures, a project selection decision tree was developed. The decision tree was utilized to develop and systemically define location specific recommendations for the curves based on the characteristics of the curves (ADT, radius, paved shoulder, lane width, etc.). The decision tree for curve safety improvements is shown in **Figure 34**.

Each possible decision tree outcome represents a set of potential safety improvements for the curve. The decision tree was utilized to determine projects for the curves with the highest risk factor rankings. Project sheets were developed for a minimum of the ten top-scoring curves in the County. Not all improvements are recommended at all locations and the project sheets contain the recommended improvements for the specific location based on the decision tree process, existing conditions, and defined criteria.



Notes:
New edgeline pavement markings of 6" if lanes are 12' or wider; otherwise, 4" pavement markings.
Paved shoulder only recommended if existing shoulder width is greater than 2'.

Figure 34 – County Paved Horizontal Curve Project Decision Tree

6.3.5. Prioritized Curve Recommendations

After the decision tree was utilized to identify safety improvements for the curves with the greatest amount of risk factor points, project sheets were developed for these locations. The curves with the greatest amount of risk factor points are shown in **Table 22** and project sheets are located in **Appendix C**.

Table 22 – County Paved Horizontal Curve Prioritized Project Cost Summary

GPS ID	Curve	Risk Factor Points	Estimated Project Cost
10387	Curve 10387 on FAIRBANK-AMISH BLVD	16	$ 19,000
6590	Curve 6590 on 220TH ST	14	$ 21,000
10390	Curve 10390 on OTTERVILLE BLVD	14	$ 18,000
10393	Curve 10393 on BAXTER AVE	14	$ 28,000
10950	Curve 10950 on QUASQUETON DIAGONAL BLVD	14	$ 32,000
10955	Curve 10955 on FAIRBANK-AMISH BLVD	14	$ 38,000
10377	Curve 10377 on 280TH ST	13	$ 29,000
16	Curve 16 on 118TH ST	12	$ 35,000
10363	Curve 10363 on WAPSIE ACCESS BLVD	12	$ 18,000
10364	Curve 10364 on WAPSIE ACCESS BLVD	12	$ 22,000
10376	Curve 10376 on QUASQUETON AVE	12	$ 17,000
10379	Curve 10379 on QUASQUETON DIAGONAL BLVD	12	$ 22,000
10381	Curve 10381 on QUASQUETON DIAGONAL BLVD	12	$ 19,000
10949	Curve 10949 on QUASQUETON DIAGONAL BLVD	12	$ 21,000
11475	Curve 11475 on WAPSIE ACCESS BLVD	12	*
11489	Curve 11489 on QUASQUETON DIAGONAL BLVD	12	$ 18,000
11500	Curve 11500 on BAXTER AVE	12	$ 28,000
Total			**$ 385,000**

**This curve received a high-risk factor ranking; however, based on discussion with the County Engineer it was removed from the list of standard improvements. It is recommended that the County Engineer consider safety improvements that meet the needs of this location.*

Figure 35 shows the locations of the curves with highest risk ranking, where project sheets and specific curve improvement recommendations were made.

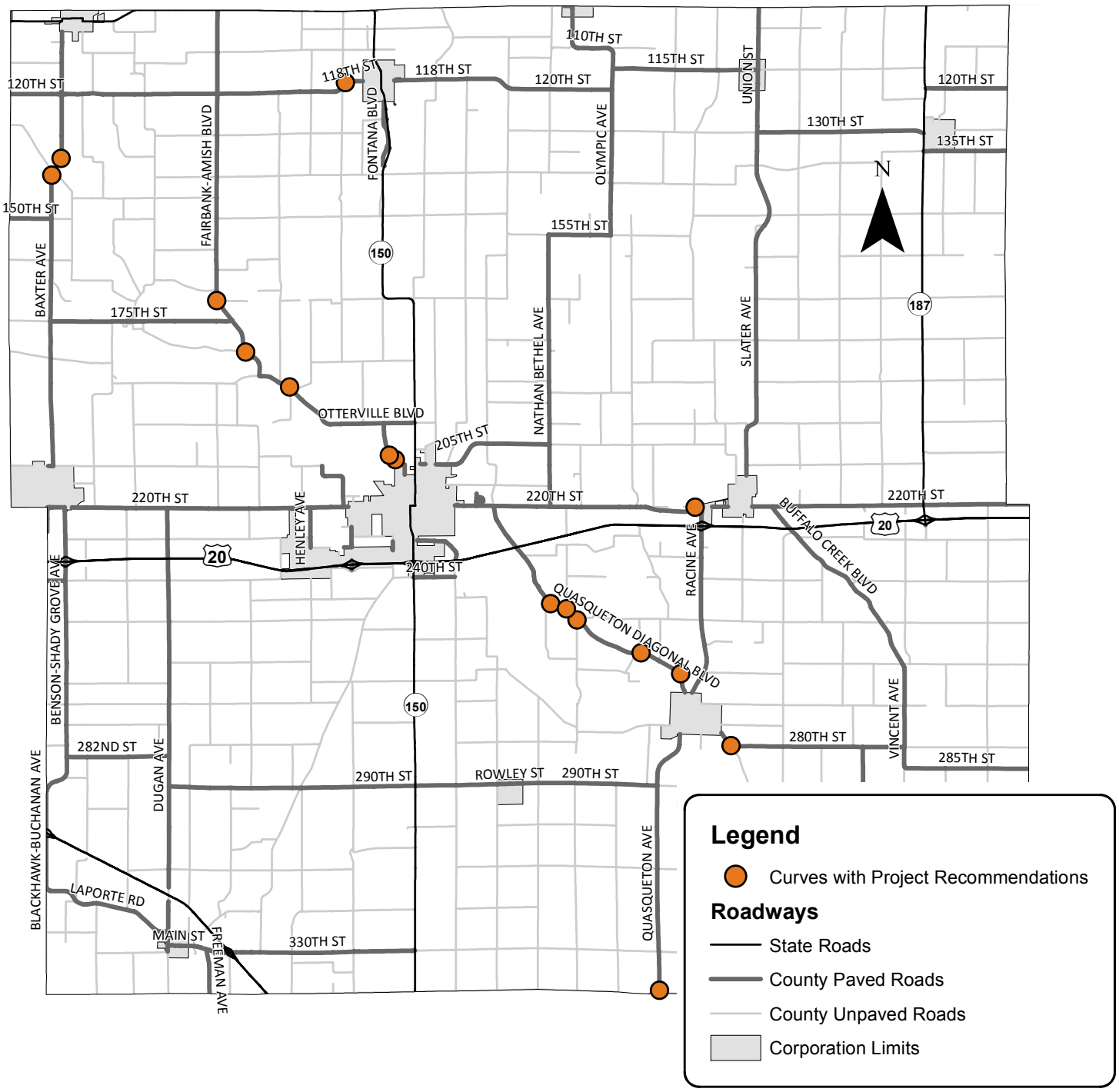


Figure 35 – County Paved Horizontal Curve Prioritized Project Locations

Project sheets for the curves with risk factor rankings of 13 points or more are included in **Appendix C**. The curve risk factor ranking results and relevant data for every analyzed curve is included in **Appendix D**.

6.3.6. Other Curve Countermeasures

The purpose of the LRSP project is to identify systemic safety improvement projects using a GIS analysis and low-cost safety improvements. However, just because a safety improvement is not included within the project sheet does not mean that it should not be considered at the location. There are a variety of safety improvements that could be considered at the location that were not included in the project decision tree due to availability of data, the need for site specific information, and/or the appetite for the countermeasure to be deployed at county curves throughout the state. Some other curve safety improvements that could be considered appropriate by the County Engineer are described in the following sections.

6.3.6.1. Additional Curve Signage

Curve signage in addition to the signage included in the project sheets could be considered, including the one direction large arrow sign (W1-6 48”x24”) and the combination of horizontal alignment/advisory speed sign (W1-1a 36”x36”). This additional curve signage could be appropriate in some situations to further warn drivers of the change in the horizontal alignment of the roadway.

6.3.6.2. Retroreflective Strips on Chevron Sign Posts

The installation of retroreflective markers on sign posts is currently under study by Iowa State University (InTrans) and the preliminary results are positive. This improvement can further enhance the visibility of signs to warn drivers of upcoming unexpected changes in horizontal alignment.

6.3.6.3. Transverse Rumble Strips Prior to Curve

This treatment can provide additional tactile and audible warning to the driver of an upcoming curve. It is recommended that this treatment be used with caution as the driver may misinterpret the rumble strips since in Iowa, transverse rumble strips are typically installed prior to stop controlled intersections.

6.3.6.4. Superelevation Correction

The use of superelevation, where none exists, or the correction of existing superelevation can provide a safety benefit, helping to maintain vehicles within the travel lanes while negotiating a curve. This recommendation is site specific and would need additional attention by the County Engineer is order to be implemented at a specific location.

6.3.6.5. High Friction Surface Treatment

Increasing the pavement friction on curves by the use of a High Friction Surface Treatment (HFST) has CMFs ranging from 0.385 to 0.522. According to the FHWA,

> “HFSTs use aggregates that are both polish- and wear-resistant and develop channels to prevent water buildup on wet surfaces. The bonding materials such as Epoxy and other available blends are designed to set quickly. HFST can be applied by machine at a similar speed to other paving surface treatments, or applied with hand tools, but the road surface must be durable with few to no cracks and crumbling.”

This treatment can be particularly beneficial on high-speed curves and curves with small radii to decrease the risk of skidding-related crashes.

6.3.6.6. Speed Activated Flashers on Chevron Signs

This improvement can provide additional visible warning to drivers exceeding the suggested speed limit through a curve section of roadway. When the speed limit is exceeded, flashers are activated to advise drivers to slow down prior to the change in horizontal alignment.

6.3.6.7. Delineate Roadside Hazards with Retroreflective Markers

Retroreflective markers can be applied to roadside objects and trees increasing the visibility of hazards and help delineate the roadway where minimal delineation may exist.

6.3.6.8. Flattening and Widening Foreslopes

This improvement includes flattening the foreslopes of the roadway edge from 2V:1H (typical) to 3V:1H to increase the ability of a driver after a lane departure to return to the roadway safely. CMFs for flattening side slopes are in the range of 0.9, while flattening to 4:1 or 6:1 are in the range of 0.58 to 0.78.

6.3.6.9. Guardrail

Installing guardrail can help redirect vehicles after a lane departure to remain on the roadway and avoid roadside hazards. CMFs in the range of 0.53 have been recorded for installing new guardrail.

6.4. Segments

The methodology described in **Section 6.1** was followed for county-wide analysis of roadway segments based on the determined risk factors.

The limits of road segments were determined based on wherever relevant roadway attributes changed along a roadway. These attributes included pavement width, shoulder width, paved shoulder, rumble strips, and speed limit. Several of these attributes directly determined how many risk factor points a segment received, while others affected the project recommendations for the segment.

6.4.1. Risk Factor Summary

Each county paved road segment was assigned risk factor points based on the following four roadway attributes:

- **Volume (ADT):** the daily average number of vehicles along the roadway segment. The ADTs for all the segments within Buchanan County were compared against each other to assign higher risk to segments with higher ADT within the County.
- **Pavement and Shoulder Width:** width of pavement and shoulders were used to assign risk to each segment. Segments with narrower pavement and shoulder widths were assigned more risk factor points. **Table 23** further describes the amount of points assigned for various width combinations.
- **Access Density:** risk was assessed based on the density of driveways and/or intersections per mile. Segments with higher access density were assigned more points.
- **Lane Departure Crashes:** the number of lane departure crashes for each segment in the County was compared against the other segments to assign higher risk to segments with a higher number of lane departure crashes within the County.

Recommendations were only made where segments were greater than 0.5 miles in length and where the posted speed limit was higher than 40 mph. This was agreed upon based on the nature of the recommendations, which are more applicable to rural roadway segments, and to provide

segments of sufficient length to justify mobilization of construction/maintenance crews and equipment.

Table 23 summarizes the risk factors used as well as the points and risk factor weight developed in coordination with the Iowa DOT. As can be seen, the maximum number of available points for roadway segment risk was 18 points.

Table 23 – County Paved Roadway Segments – Risk Factor Ranking

Risk Factor	Measurement	Points	Risk Factor Weight	Max Points Available
Volume	Average roadway segment volume	0: Bottom third of the average segment volume for the County	3	6
		1: Middle third of the average segment volume for the County		
		2: Top third of the average segment volume for the County		
Pavement and shoulder width	Pavement and shoulder width in feet	0: Pavement width greater than or equal to 22 feet and shoulder width greater than or equal to 2 feet	2	6
		0: Pavement width greater than 18 feet and less than 22 feet, and shoulder width greater than or equal to 4 feet		
		1: Pavement width greater than or equal to 22 feet and shoulder width less than 2 feet		
		1: Pavement width greater than 18 feet and less than 22 feet, and shoulder width greater than or equal to 2 feet and less than 4 feet		
		1: Pavement width less than or equal to 18 feet, and shoulder width greater than or equal to 4 feet		
		2: Pavement width greater than 18 feet and less than 22 feet, and shoulder width less than 2 feet		
		2: Pavement width less than or equal to 18 feet, and shoulder width greater than or equal to 2 feet and less than 4 feet		
		3: Pavement width less than or equal to 18 feet, and shoulder width less than 2 feet		
Access density	Density of intersections and driveways per mile (driveway location per 911 address database)	0: 0 to 10 driveways and/or intersections per mile	2	4
		1: 10 to 20 driveways and/or intersections per mile		
		2: More than 10 driveways and/or intersections per mile		
Lane departure crashes	Lane departure crash rate per VMT	0: Bottom third of roadway departure crash rate along the roadway segment	1	2
		1: Middle third of roadway departure crash rate along the roadway segment		
		2: Top third of roadway departure crash rate along the roadway segment		
Total available points				**18**

6.4.2. Risk Factor Rankings

Segment risk factor ranking calculations were performed on all county paved roadway segments. The result of the rankings are shown in **Figure 36**.

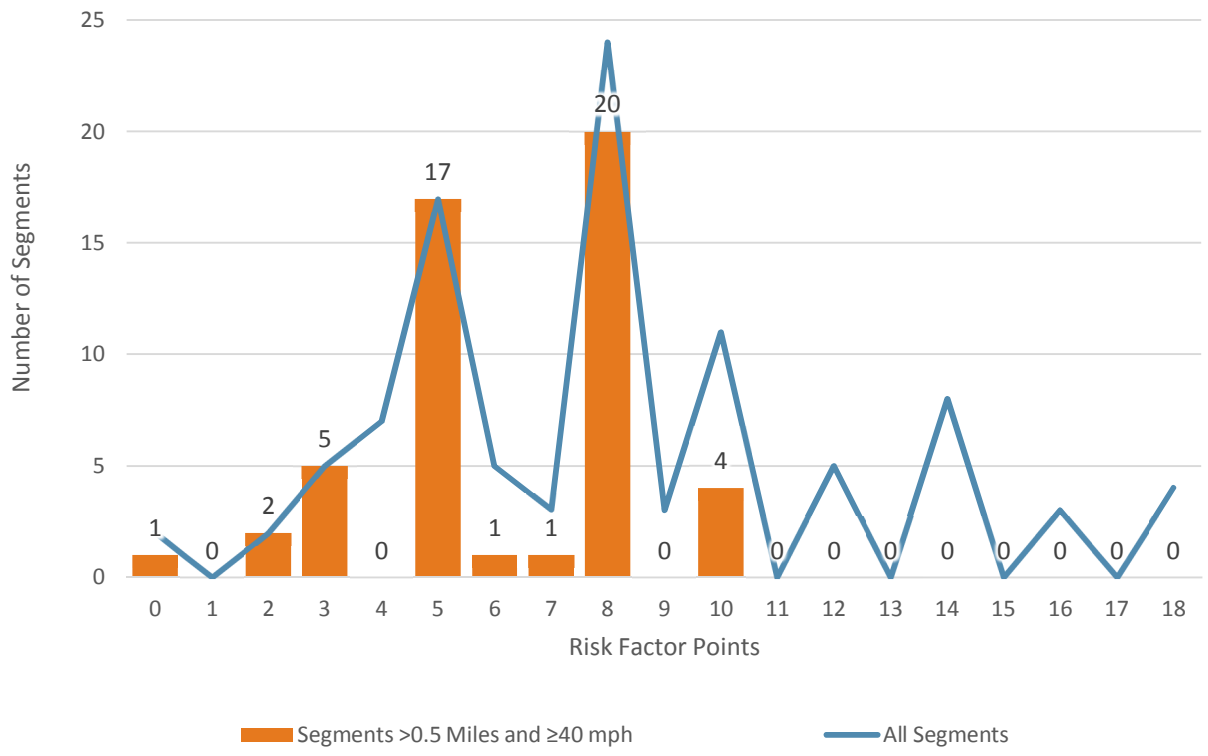


Figure 36 – County Paved Roadway Segments Risk Factor Ranking Summary

For visualization purposes, **Figure 37** shows the location and risk factor ranking of each of the roadway segments greater than 0.5 miles and with posted speed limits of 40 or greater analyzed within the LRSP.

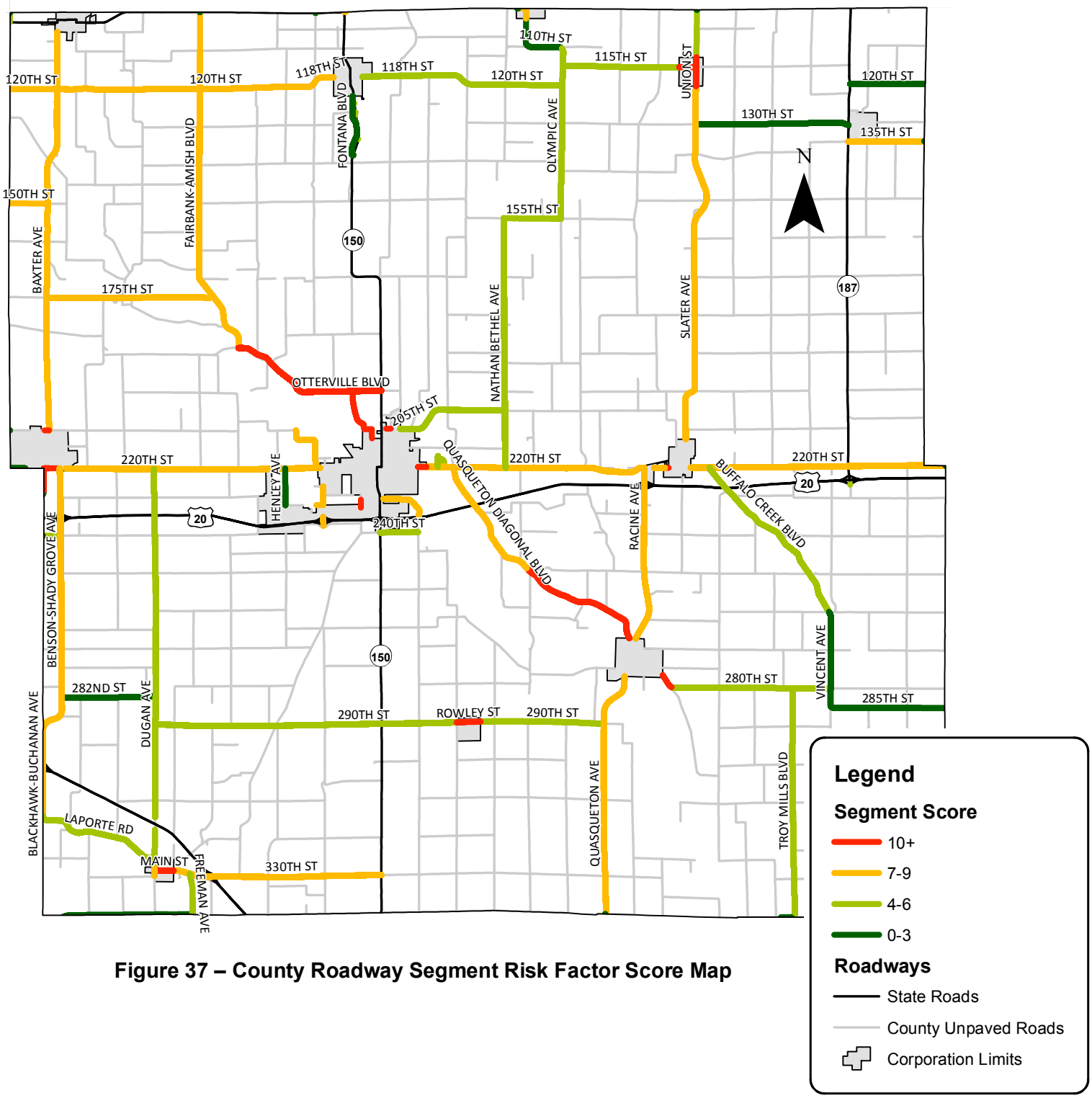


Figure 37 – County Roadway Segment Risk Factor Score Map

6.4.3. Segment Countermeasures

The following subsections detail the curve countermeasures for consideration along the county paved roadway segments, summarized with CMFs and estimated costs in **Table 24**.

Table 24 – County Paved Roadway Segment Safety Countermeasure Summary

Safety Countermeasure	CMF	Estimated Cost
New Pavement Markings	0.825	$2,000/mile
Clear and Grub	CMF not defined	$20,000/mile
Edgeline Rumble Strips	0.61 – 0.67	$2,500/mile
Pave Shoulder with Safety Edge	0.75 – 0.99 "Pave Shoulder" 0.769 – 0.962 "Safety Edge"	$65,000/mile
Centerline Rumble Strips	0.55 – 0.91	$1,000/mile

6.4.3.1. New Pavement Markings

This safety countermeasure includes new pavement markings along the segment for the centerline and edgelines. The updated markings can clarify and further delineate the roadway, reducing the risk of a lane departure crash. If the existing lanes were wider than 12 feet, new edgeline pavement markings of six inches were recommended; otherwise, new four-inch pavement markings were recommended. Research suggests that widening pavement markings from four to six inches in rural areas results in a CMF of 0.825.

6.4.3.2. Clear and Grub

This countermeasure includes clearing and grubbing the areas within the clear zone of the roadway (defined here as 15 feet on each side of the road). This safety countermeasure reduces the hazard of a run off the road crash by reducing the number of obstructions a vehicle could impact after a lane departure.

6.4.3.3. Edgeline Rumble Strips

The installation of edgeline rumble strips along a roadway segment provide tactile and audible warning to a driver if they are beginning to depart the lane. This safety improvement has recorded CMFs in the range of 0.61-0.67. Depending on the conditions of the roadway, the County Engineer may choose to install rumble strips placed in the shoulder offset from the edgeline, or they may place the rumble strips on the edgeline and provide pavement markings over them, resulting in edgeline rumble stripes. For purposes of this document, both will be called rumble strips.

6.4.3.4. Pave Shoulder with Safety Edge

Installing or increasing the width of a roadway shoulder can reduce the potential for a severe crash as the result of a lane departure. CMFs associated with paving the shoulder in rural areas range from 0.75-0.99. At locations where paved shoulders are recommended, it is recommended that the County Engineer consider a minimum of a two foot shoulder; however, based on right-of-way and roadway characteristics, the County Engineer may choose to install a wider shoulder.

According to the FHWA, a Safety Edge is "a simple but effective solution that can help save lives by allowing drivers who drift off [roadways] to return to the road safely. Instead of a vertical drop-off, the Safety Edge shapes the edge of pavement to 30 degrees." The installation of a Safety Edge has CMFs of 0.769-0.962.

6.4.3.5. Centerline Rumble Strips

CMFs of 0.55 to 0.91 represent the safety benefit of the installation of centerline rumble strips. In Iowa, rumble strips placed in the centerline of the roadway generally have pavement markings over them. To be consistent with the Iowa DOT Design Manual 3C-5, centerline rumble strips will be referred to as rumble strips even though in circumstances they may technically be "rumble stripes". This safety improvement can audibly and tactilely warn drivers when crossing the centerline and can aid in the avoidance of some high severity lane departure crashes.

Figure 38 illustrates the proposed roadway segment safety improvements as described in the previous sections. It is important to note that the County Engineer should follow all applicable guidelines and standards when implementing the roadway segment improvements.

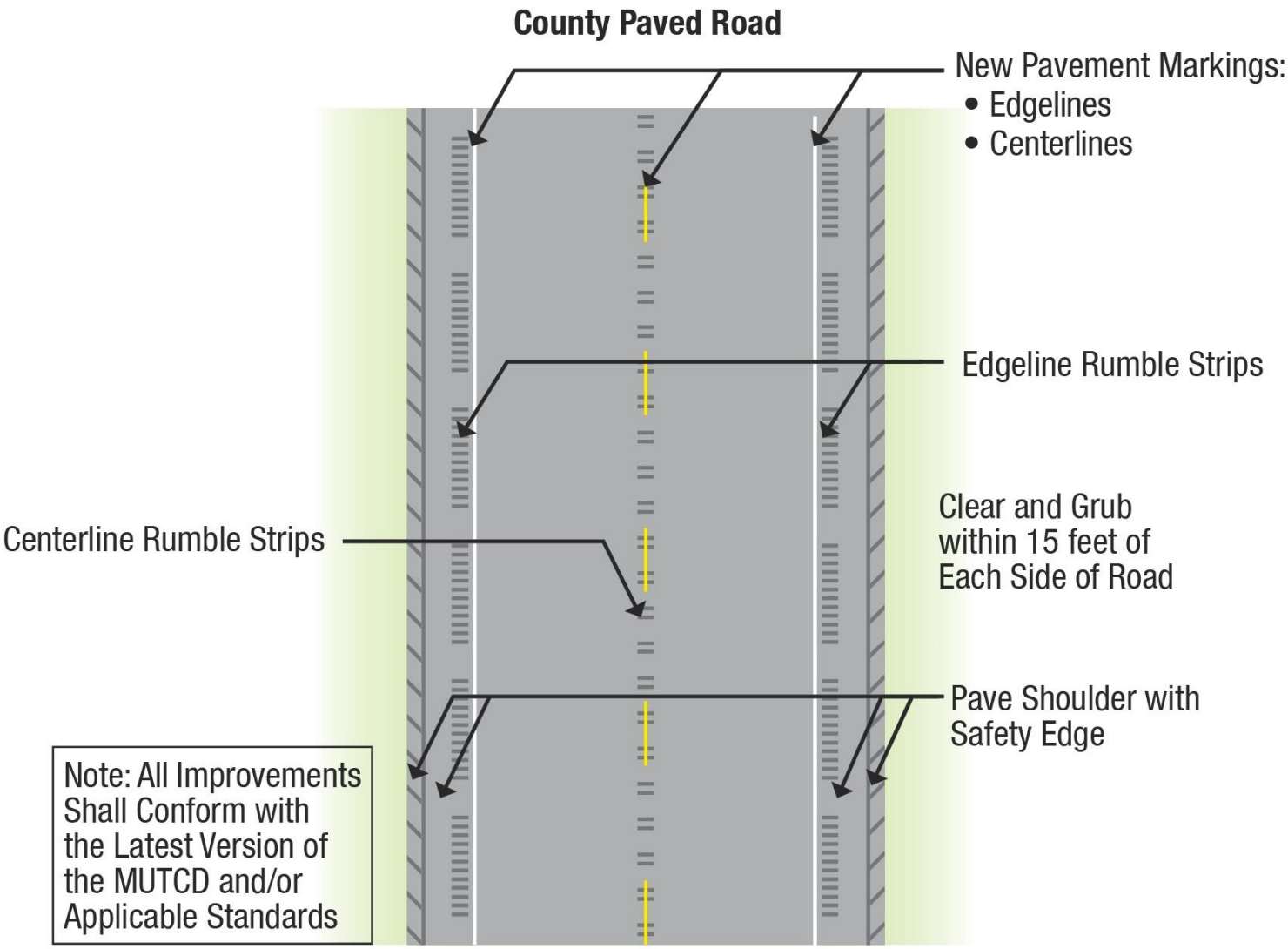


Figure 38 – County Paved Roadway Segment Safety Improvements

6.4.4. Project Selection Decision Tree

After conducting the risk factor calculations and rankings for all paved roadway segments within the County, and developing the segment safety countermeasures, a project selection decision tree was developed. The decision tree was utilized to develop and systemically define projects for the segments based on the characteristics of the segments (shoulder material type, lane width, etc.). The decision tree for curve safety improvements is shown in **Figure 39**.

Each possible decision tree outcome represents a set of potential safety improvements for the roadway segment. The decision tree was utilized to determine projects for the segments with the highest risk factor rankings. Project sheets were developed for a minimum of the ten top-scoring segments in the County. Not all improvements are recommended at all locations and the project sheets contain the recommended improvements for the specific location based on the decision tree process, existing conditions, and defined criteria.

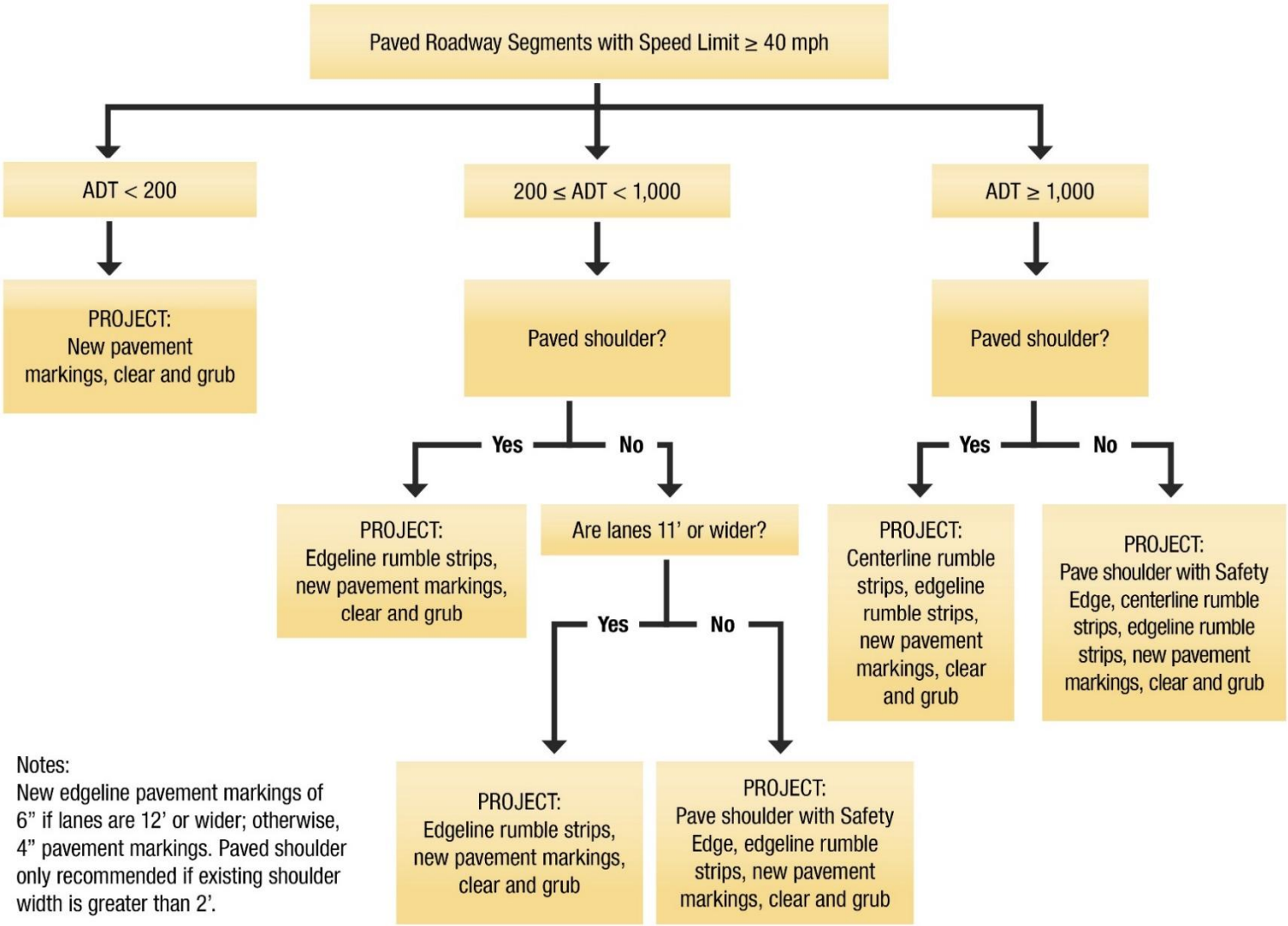


Figure 39 – County Paved Roadway Segment Project Decision Tree

6.4.5. Prioritized Segment Recommendations

After the decision tree was utilized to determine projects for the roadway segments with the greatest amount of risk factor points, project sheets were developed for these locations. The segments for which project sheets were developed (those with the greatest amount of risk factor points) are summarized in **Table 25** and the project sheets are included in **Appendix E**.

Table 25 – County Paved Roadway Segment Prioritized Project Cost Summary

GPS ID	Segment	Segment Length (miles)	Risk Factor Points	Cost
647	BLACKHAWK-BUCHANAN AVE between 400 FT PAST SOUTH ST and COUNTY LINE	0.54	10	*
664	OTTERVILLE BLVD between FAIRBANK-AMISH BLVD and JAMESTOWN AVE	4.22	10	$ 152,000
666	QUASQUETON DIAGONAL BLVD between 250TH ST and 1500 FT PAST N FIRST ST	3.46	10	$ 468,000
678	WAPSIE ACCESS BLVD between OTTERVILLE BLVD and 14TH ST NE	1.09	10	$ 148,000
474	150TH ST between BLACK HAWK BUCHANAN AVE and V62/BAXTER AVE	1.01	8	$ 37,000
475	FAIRBANK-AMISH BLVD between 110TH ST and CO RD W13/FAIRBANK-AMISH BLVD/T AVE	1.03	8	$ 39,000
622	120TH ST between INDIANA AVE and CO RD V62/BAXTER AVE	6.75	8	$ 243,000
624	120TH ST between BLACKHAWK-BUCHANAN AVE and CO RD V62/BAXTER AVE	1.15	8	$ 156,000
627	135TH ST between CO RD C64/135TH ST and BUCHANAN-DELAWARE AVE	2.01	8	$ 73,000
629	175TH ST between CO RD V62/BAXTER AVE and CO RD W13	4.41	8	$ 159,000
631	220TH ST between RACINE AVE and 1500 FT PAST DOUBLE L DR	5.81	8	$ 198,000
633	220TH ST between CO RD V65/BENSON-SHADY GROVE AVE and GOLF COURSE BLVD	6.72	8	$ 913,000
635	220TH ST between EASY ST and COUNTY LINE	6.74	8	$ 249,000
642	330TH ST between MAIN ST & EVERLY AVE and CO RD D48/330TH ST	5.53	8	$ 205,000
643	BAXTER AVE between MAIN ST and CO RD V62/BAXTER AVE	8.99	8	$ 1,209,000
644	BAXTER AVE between CO RD V62/BAXTER AVE and WALNUT ST	1.45	8	$ 197,000
645	BENSON-SHADY GROVE AVE between 220TH ST/SOUTH ST and 3300 FT PAST 288TH ST	7.17	8	$ 968,000
646	BLACKHAWK-BUCHANAN AVE between 3300 FT SHORT OF 288TH ST and LAPORTE RD	2.28	8	$ 85,000

Table 25 – County Paved Roadway Segment Prioritized Project Cost Summary (Continued)

GPS ID	Segment	Segment Length (miles)	Risk Factor Points	Cost
652	FAIRBANK-AMISH BLVD between OTTERVILLE BLVD and 110TH ST	8.20	8	$ 296,000
655	GOLF COURSE BLVD between 2500 FT SHORT OF HARRISON AVE and 220TH ST	1.44	8	$ 52,000
665	QUASQUETON AVE between 1000 FT S OF W LINN ST and COUNTY LINE	6.50	8	$ 878,000
667	QUASQUETON DIAGONAL BLVD between CO RD W35/QUASQUETON DIAGONAL BLVD & LUCAS AVE and 250TH ST	3.44	8	$ 465,000
668	RACINE AVE between 220TH ST and 3100 FT PAST 262ND ST	4.59	8	$ 621,000
671	SLATER AVE between 1ST ST and ALICE ST	9.56	8	$ 345,000
Total				**$8,156,000**

**This segment received a high-risk factor ranking; however, based on discussion with the County Engineer it was removed from the list of standard improvements. It is recommended that the County Engineer consider safety improvements that meet the needs of this location.*

Figure 40 shows the locations of the roadway segments with highest risk ranking, where project sheets and specific segment recommendations were made.

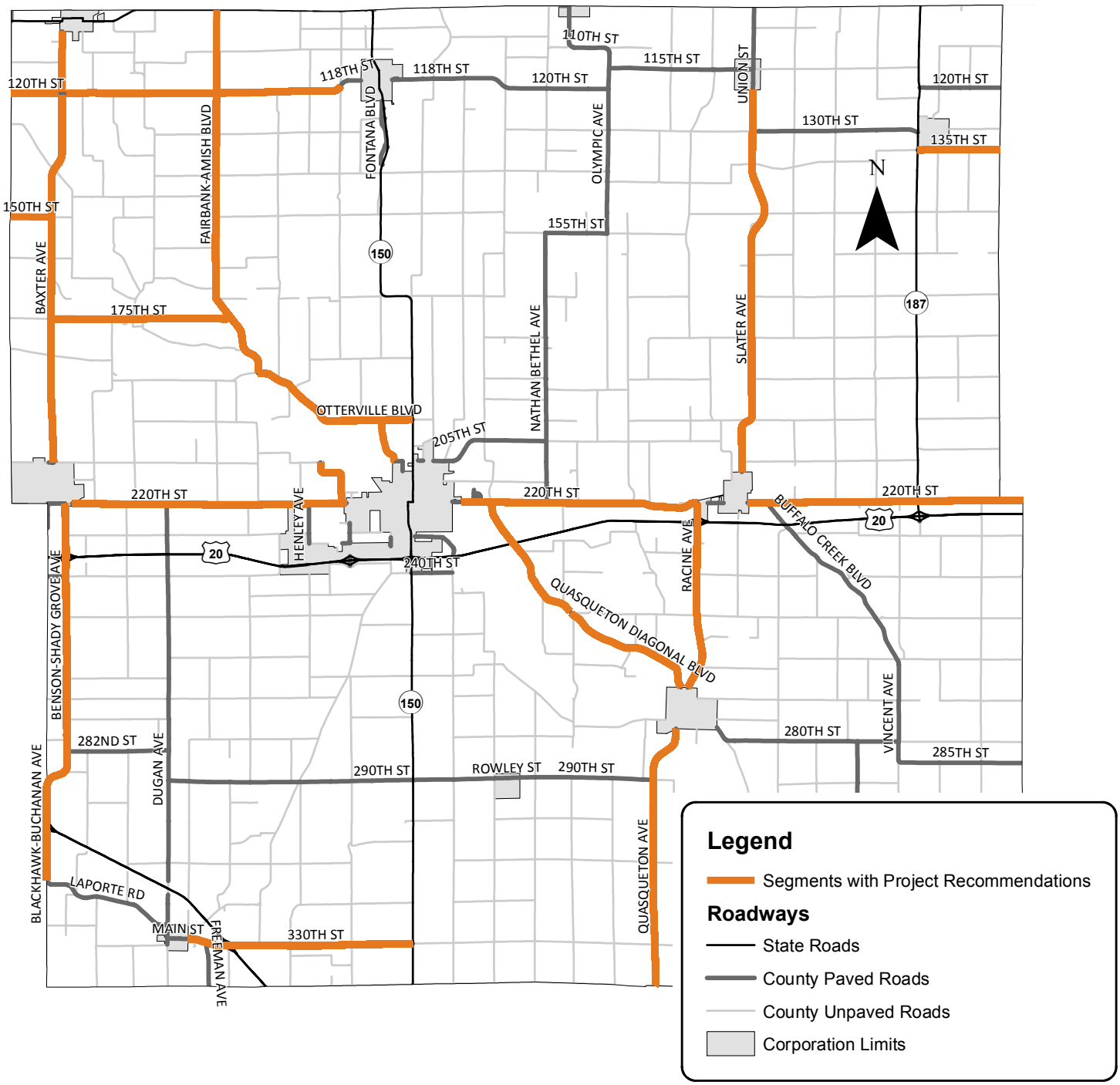


Figure 40 – County Paved Roadway Segment Prioritized Project Locations

Project sheets for the roadway segments with risk factor rankings of 10 points or more are included in **Appendix E**. The segment risk factor ranking results and relevant data for every analyzed roadway segment is included in **Appendix F**.

6.4.6. Other Segment Countermeasures

As stated previously, the purpose of the LRSP project is to identify systemic safety improvement projects using a GIS analysis and low-cost safety improvements. Safety improvements not included in the roadway segment project sheet may still merit consideration at the location. There are a variety of other safety improvements that could be considered at the location that were not included in the project decision tree due to availability of data, the need for site specific information, and/or the appetite for the countermeasure to be deployed at county roadway segments throughout the state. Another roadway segment safety improvement that could be considered appropriate by the County Engineer is described in the following section.

6.4.6.1. On-pavement Markings for Speed Control

This improvement includes striping the speed limit on the pavement to reinforce the posted speed limit. On-pavement markings can serve as additional information and reminders to drivers of the posted speed limit and the importance to observe their speed.

6.4.6.2. Delineate Roadside Hazards with Retroreflective Markers

Retroreflective markers can be applied to roadside objects and trees increasing the visibility of hazards and help delineate the roadway where minimal delineation may exist.

6.4.6.3. Flattening and Widening Foreslopes

This improvement includes flattening the foreslopes of the roadway edge from 2V:1H (typical) to 3V:1H to increase the ability of a driver after a lane departure to return to the roadway safely. CMFs for flattening side slopes are in the range of 0.9, while flattening to 4:1 or 6:1 are in the range of 0.58 to 0.78.

6.4.6.4. Guardrail

Installing guardrail can help redirect vehicles after a lane departure to remain on the roadway and avoid roadside hazards. CMFs in the range of 0.53 have been recorded for installing new guardrail.

6.4.6.5. Post-Mounted Delineators

As stated in the MUTCD, “delineators are particularly beneficial at locations where the [roadway] alignment might be confusing or unexpected, such as at lane-reduction transitions and curves. Delineators are effective guidance devices at night and during adverse weather. An important advantage of delineators in certain locations is that they remain visible when the roadway is wet or snow covered.” Proving post-mounted retroreflective delineators along the roadway can give additional information to drivers as to the location of the roadside edge and alignment. The CMF for installing post-mounted delineators in combination with edgelines and centerlines has been recorded at 0.55.

6.5. Unpaved Roadways

Buchanan County maintains approximately 950 miles of County roads, of which, approximately 750 are unpaved (79%). County unpaved road crashes accounted for 337 of the 1,109 crashes (30%) in Buchanan County from 2004 to 2013. Unpaved roadways were not included in the analysis based on limited data availability, low vehicle volumes, and limited types of safety improvements that can be systemically implemented on unpaved roads. Even though location specific recommendations were not made as part of this project, safety at unpaved intersections, along unpaved curves and along unpaved segments is also important. Potential projects and/or activities that could be implemented by the County Engineer on unpaved roadways include:

6.5.1.1. Upgrade Signs

A low-cost safety countermeasure that could be considered along unpaved roadways includes upgrading existing stop signs. Increasing the retroreflectivity of stop signs (or replacing signs with new signs) have CMFs from 0.751 to 0.909. This improvement increases the visibility of the signs, giving drivers more time to react to the stop-controlled condition.

6.5.1.2. Realign Intersection

Based on right-of-way and site conditions, this countermeasure could be particularly beneficial and should be considered where feasible at locations where there is intersection skew. The CMF for intersection geometry reconfiguration is included in the HSM and varies based on the existing skew angle. With the optimal 90-degree intersection configuration sight triangles are maximized, crossing distance is minimized and the intersection meets typical driver expectations.

6.5.1.3. Improve/Increase Shoulder/Lane Width

The County Engineer could consider the recommendation to improve/increase the shoulder width or lane width to accommodate traffic volumes and/or speed. This countermeasure could add safety benefits when applied properly, but could also encourage driving in excess of the speed limit, so it should be applied with caution.

6.5.1.4. Delineate Roadside Hazards with Retroreflective Markers

Retroreflective markers can be applied to roadside objects and trees increasing the visibility of hazards and help delineate the roadway where minimal delineation may exist.

6.5.1.5. Curve Chevrons

This safety countermeasure includes the installation of curve chevrons placed along the outer radius of the curved roadway segment. In some instances, county engineers have relocated older curve chevrons, when replaced from their paved system, along curves located on their unpaved system. Installing curve chevron signs have CMFs ranging from 0.75 to 0.96 and when installed in combination with other advance warning signage have CMFs ranging from 0.585 to 0.606.

6.5.1.6. Advance Curve Warning Signs and Speed Advisory Plaques

Providing advance warning of unexpected changes in horizontal alignment in conjunction with curve chevron signs have reported CMFs ranging from 0.585 to 0.606.

6.5.1.7. Maintenance of Gravel

It is important to preserve and maintain a proper road crown for proper drainage to avoid ponding in potholes and/or ruts. Regular grading can help keep the roadway surface maintained, reducing water infiltration and enhancing erosion control.

Similar to the information provided on the paved Safety Edge, the maintenance of edge slopes on unpaved roads can allow vehicles that depart the travel lane to safely return to the roadway.

6.5.1.8. Clear and Grub

Vegetation should be kept clear of the roadway although a natural vegetation buffer between the roadway and any ditches or waterways can help reduce runoff velocity and provide some erosion control. This safety countermeasure reduces the hazard of a run off the road crash by reducing the number of obstructions a vehicle could impact after a lane departure.

In addition, clearing and grubbing the areas within the sight triangles of the vehicles at intersections should also be considered. This safety countermeasure increases the sight distance for vehicles prior to entering an intersection. This is particularly beneficial under two-way stop-controlled or uncontrolled situations where conflicting vehicles may not stop or yield. This improvement can also be implemented along unpaved roadway segments and on unpaved curves.

6.5.1.9. Winter Maintenance

As salt cannot be used on gravel roads and frozen ground cannot be graded, sand is recommended for increased traction on curves and corners during winter events.

7. SUMMARY

The Buchanan County LRSP was developed to aid the County Engineer in identifying and prioritizing intersections, curves, and roadway segments for safety improvements. The LRSP followed a data-driven process to develop systemic safety improvements on Buchanan County paved roads. The LRSP was developed through a six-step process that included gathering background information, data collection, data analysis, countermeasure selection, project development, and development of the LRSP.

- **Gather Background Information:** Relevant documents were reviewed including the Iowa SHSP, funding sources, and other relevant documents provided by the counties. In addition, a questionnaire was developed and distributed to the counties to receive input on current safety measure implementation within their jurisdictions. Technical Memorandum #1 summarizing the document review phase of the project was prepared.
- **Data Collection:** A comprehensive GIS project database was developed utilizing crash data, roadway data, horizontal curve data, and the intersection database.
- **Data Analysis:** After development of the comprehensive GIS project database, the crash data was analyzed for the County. Crashes were compared to the SHSP Key Safety Emphasis Areas for the State of Iowa, and crash trees and maps were prepared for the County. Technical Memorandum #2 summarizing the data analysis for Buchanan County as well as all 12 counties included in Phase 1 was developed.
- **Countermeasure Selection:** Following data analysis, Countermeasure Selection Workshops were held with each of the 12 counties in Phase 1 of the project. Technical Memorandum #3 summarizing the discussions at the Countermeasure Selection Workshops with each of the 12 counties was prepared.
- **Develop Projects for Inclusion into the LRSP:** A risk factor ranking process was developed for intersections, curves, and segments, and risk factors were calculated for all of the intersections, curves, and segments within Buchanan County. After conducting the risk factor analysis, safety improvement recommendations were developed for the feature types based on the project selection decision trees and summarized in location specific project sheets. After development of the project sheets, another workshop was conducted with Buchanan County to review the projects that were developed. Technical Memorandum #4 summarizing the Project Selection Workshops conducted with Buchanan County was prepared.
- **Develop LRSPs:** An LRSP was developed for Buchanan County. This LRSP includes a summary of the LRSP process along with recommended safety projects for implementation by the County.

7.1. Recommended Improvements

This LRSP identified driver-related countermeasures in addition to engineering-related countermeasures. The following sections summarize the recommended countermeasures and improvements for Buchanan County.

7.1.1. Driver-Related Countermeasures

During the Countermeasure Selection Workshop, attendees were provided information regarding fatal and serious injury crashes within the County and how that data aligned with the Iowa SHSP Key Safety Emphasis Areas. Potential countermeasures from the *NCHRP Report 500 Series* and the *Toward Zero Deaths* documents were provided to stakeholders to facilitate discussion on what action items were currently underway in the County with respect to driver-related crashes.

Countermeasures were grouped according to the Iowa SHSP 10 Key Safety Emphasis Areas, of which six are driver-related emphasis areas:

- Speed-related
- Unprotected persons
- Younger drivers
- Impaired driving
- Inattentive/distracted driving
- Older drivers

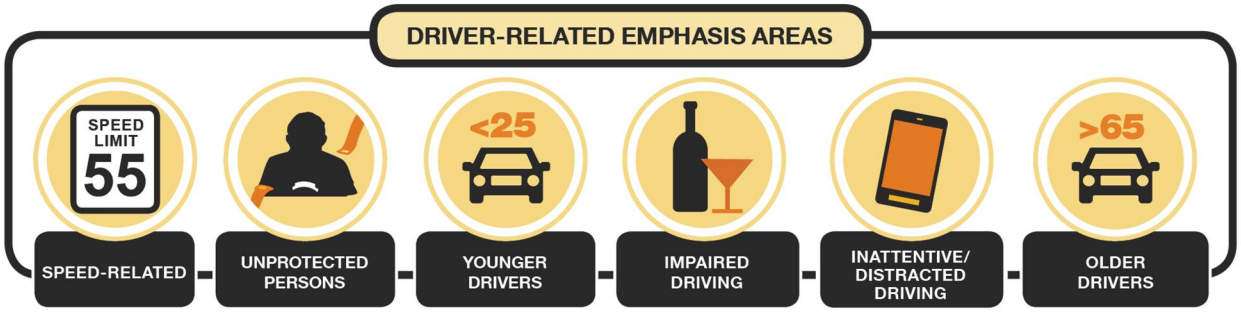


Figure 41 – Iowa SHSP Driver-Related Emphasis Areas

Workshop participants agreed upon an implementation status of various driver-related countermeasures in Buchanan County of Underway/Ongoing, Area for Improvement, Opportunity, or Completed in the Past.

Table 26 provides a summary of the status of implementation of the driver-related countermeasures within the County. It is recommended that the County continue to implement countermeasures that are currently underway/ongoing, and look for opportunities to implement countermeasures that are not currently being implemented within the County. This will require input and coordination from all of the five E's of safety.

Table 26 – County Driver-Related Countermeasure Summary

Countermeasure	Status
Speed-Related	
Conduct speed enforcement - Dynamic speed signs have been used to record speeds at various locations throughout the day. The Sheriff's department then passes this information to the deputies to let them know what time of day the speeding occurs (for directed enforcement). - County has eight contracted cities for Sheriff/law enforcement services, so speed enforcement is part of these contracts.	Underway/Ongoing
Implement rigorous aggressive driving and speeding-related enforcement programs	Opportunity
Education campaigns relative to locations with high-risk of speed-related crashes, potentially in schools	Opportunity

Table 26 – County Driver-Related Countermeasure Summary (Continued)

Countermeasure	Status
Unprotected Persons	
Conduct publicized enforcement campaigns	Underway/Ongoing
Community locations for instruction in proper child restraint use	Underway/Ongoing
Conduct high-profile "child restraint inspection and/or installation" events at community locations - Sheriff Department currently holds a yearly safety fair to provide training for proper child seat installation.	Underway/Ongoing
Train law enforcement to check for proper child restraint use in all motorist encounters	Underway/Ongoing
Education campaigns in grade schools	Underway/Ongoing
Hand out ice cream gift certificates for children wearing bicycle helmets (law enforcement, EMS, and/or fire department) - Need local businesses to step forward to donate ice cream gift certificates.	Opportunity
Younger Drivers	
Improve content and delivery of driver education/training - School districts no longer teach Drivers Education (DE) during the school year, so this is no longer a built-in opportunity for school-based strategies. - The sheriff's department uses "drunk goggles" in local DE programs for a hands-on demonstration of the effects of drunk driving.	Underway/Ongoing, Completed in the Past
Review transportation plans for new/expanded/existing high school sites - New high school - could be opportunity	Opportunity
Conduct additional training in schools ("drunk goggles"; "don't veer for deer"; what to do when on an edge drop-off; training in health class; etc.) - The County Sheriff's department currently participates in some in school training. They go whenever asked.	Underway/Ongoing
"Operation Prom" mock disaster - Mock crash events (every 4 years) have been used by the Sheriff's department to more effectively present the messages of don't text/drive, obey the speed limits, and don't drink/drive.	Underway/Ongoing
Prosecute and impose sanctions on drivers not obeying school bus stop bars	Underway/Ongoing
Enforcement of graduated driver's license laws	Underway/Ongoing

Table 26 – County Driver-Related Countermeasure Summary (Continued)

Countermeasure	Status
Impaired Driving	
Conduct regular well-publicized safety checkpoints - The County Sheriff's Department does conduct random checkpoints for OWI enforcement (approximately once per year). They use grant money to conduct these checkpoints.	Underway/Ongoing
Proactively conduct OWI enforcement - Buchanan County is proactive in looking for impaired drivers, and has used grant funding for additional enforcement. - County does not have specific locations where they focus their OWI enforcement.	Underway/Ongoing
Conduct regular well-publicized compliance checks of alcohol retailers to reduce sales to underage drivers - The County Sheriff's department currently conducts compliance checks 1 to 2 times per year (using grant money for these checks).	Opportunity
Prosecute, impose sanctions on, and treat operating while intoxicated (OWI) offenders - First offense OWI penalties are pretty standard. Deferred judgements are at the discretion of the County Attorney. While State Laws may require the removal of driver's license for third offense, there is considerable discretion given to the county attorneys for plea bargains and diversion programs in order reduce penalties.	Underway/Ongoing, Area for Improvement
Inattentive/Distracted Driving	
Incorporate information on distracted driving into education programs for young drivers - Give texting presentations in the high schools.	Underway/Ongoing, Opportunity
Conduct education and awareness campaigns - Local news stations have PSAs regarding inattentive/distracted driving.	Underway/Ongoing
Visibly enforce existing statutes to deter distracted and drowsy driving	Opportunity
County policy for "hands free" devices while driving county vehicle	Opportunity
Mobile simulator for distracted driving at community events or schools	Opportunity

Table 26 – County Driver-Related Countermeasure Summary (Continued)

Countermeasure	Status
Older Drivers	
Establish resource centers within communities to promote safe mobility choices	Underway/Ongoing
Paratransit for older drivers - County does have some limited para-transit/dial-a-ride service for the elderly.	Underway/Ongoing
Provide materials on paratransit information at community centers - Could advertise this service at the local senior centers.	Opportunity
Recommend re-testing of older drivers involved in crashes and citations - County does not require retesting for the elderly involved in crashes (there has been concern from the county attorney's office regarding profiling of older drivers if they issued retesting as a general rule-of-thumb).	Opportunity

7.1.2. Engineering Countermeasures

In addition to the driver-related countermeasures, engineering projects were developed for high-risk intersections, curves, and roadway segments on county paved roads. **Table 27** provides a cost summary of the projects developed for the County.

Table 27 – Engineering Countermeasures Cost Summary

Facility Type	Number of Locations	Estimated Project Cost
Intersections	13	$278,000
Curves	16	$385,000
Segments	23	$8,156,000
Total Improvement Costs	**52**	**$8,819,000**

7.2. Next Steps

Project sheets containing the prioritized list of projects have been provided in **Appendix A**, **Appendix C**, and **Appendix E** to aid the County Engineer in obtaining funding for safety improvements and/or for incorporating recommendations into planned roadway improvement projects. These sheets may require updating for funding applications in future years. The County Engineer may also make changes to the prepared project sheets based on their local knowledge of the site, available funding, and/or needs specific to Buchanan County.

It is recommended that the County continue to foster cooperation with other stakeholders and look for opportunities to improve and expand implementation of driver-related countermeasures. The County should continue its past history of annually implementing a number of safety improvement projects. Based on current funding levels, it is anticipated that many of the engineering improvements could be implemented within 5 to 10 years, or sooner. Additionally, it is recommended that this LRSP should be updated within 5 to 10 years to reflect improvements that have been implemented, additional availability of roadway feature data, and changes in crash types and patterns.

APPENDIX A

INTERSECTION PROJECT SHEETS

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 14

Project Name: Co Rd C57/120TH ST and Co Rd W13/FAIRBANK-AMISH BLVD Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

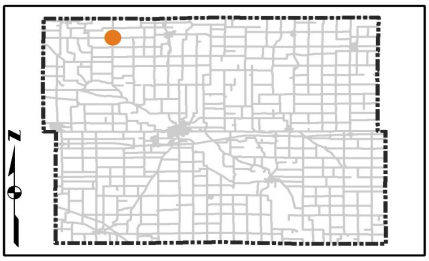
Date: 10/5/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: Co Rd C57/120TH ST
Intersecting Road: Co Rd W13/FAIRBANK-AMISH BLVD

GPS ID: 55568

Project Location



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	2380	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	> 5 mi	4
K or A Crash	Yes	2
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**14**

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	1160
Minor ADT	740
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	Two-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	11
K and A Crashes	1
Right angle, rear-end, or turning crashes	10

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	1	EA	$ 8,000	$ 8,000
	Upgrade Signs and Pavement Markings	2	LEG	$ 2,200	$ 4,400
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	2	LEG	$ 1,200	$ 2,400
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	2	LEG	$ 1,000	$ 2,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 22,800
				Engineering: (% +/-) 15%	$ 3,638
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 1,213
				Contingency:(% +/-) 20%	$ 4,850
				Estimated Project Cost:	**$ 35,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: Co Rd D22/220TH ST and Co Rd V71/DUGAN AVE Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15

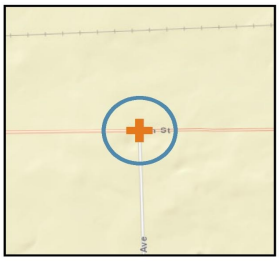
Prepared By: DJG/DVM
Checked By: MMO

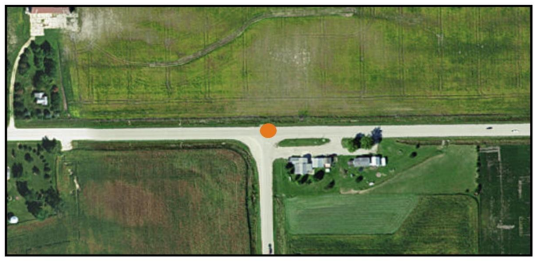
Location Description

Paved Road: Co Rd D22/220TH ST
Intersecting Road: Co Rd V71/DUGAN AVE

GPS ID: 54271

Project Location





Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	1915	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	> 5 mi	4
K or A Crash	No	0
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	2650
Minor ADT	460
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	One-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	1
K and A Crashes	0
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	1	EA	$ 8,000	$ 8,000
	Upgrade Signs and Pavement Markings	1	LEG	$ 2,200	$ 2,200
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	1	LEG	$ 1,200	$ 1,200
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	1	LEG	$ 1,000	$ 1,000
	Clear and Grub within Sight Triangle	2	LEG	$ 1,500	$ 3,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 15,400
				Engineering: (% +/-) 15%	$ 2,663
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 888
				Contingency:(% +/-) 20%	$ 3,550
				Estimated Project Cost:	**$ 25,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: Co Rd D47/QUASQUETON AVE/290TH ST and Co Rd W35 Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: Co Rd D47/QUASQUETON AVE/290TH ST
Intersecting Road: Co Rd W35
GPS ID: 54560

Project Location

Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	1640	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	> 5 mi	4
K or A Crash	No	0
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	1810
Minor ADT	70
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	Two-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	0
Right angle, rear-end, or turning crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	2	LEG	$ 2,200	$ 4,400
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	2	LEG	$ 1,000	$ 2,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 12,400
				Engineering: (% +/-) 15%	$ 1,913
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 638
				Contingency:(% +/-) 20%	$ 2,550
				Estimated Project Cost:	**$ 20,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: Co Rd D16/FAIRBANK-AMISH BLVD and OTTERVILLE BLVD Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: Co Rd D16/FAIRBANK-AMISH BLVD
Intersecting Road: OTTERVILLE BLVD

GPS ID: 55131

Project Location

Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	915	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	> 5 mi	4
K or A Crash	No	0
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	870
Minor ADT	220
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	Two-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	0
K and A Crashes	0
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	2	LEG	$ 2,200	$ 4,400
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	1	LEG	$ 1,000	$ 1,000
	Clear and Grub within Sight Triangle	2	LEG	$ 1,500	$ 3,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 8,400
				Engineering: (% +/-) 15%	$ 1,538
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 513
				Contingency:(% +/-) 20%	$ 2,050
				Estimated Project Cost:	**$ 15,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: Co Rd D16/175TH ST and WATER ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15

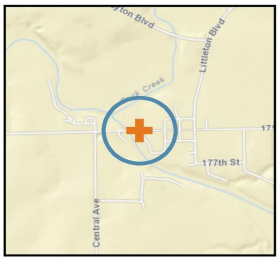
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: Co Rd D16/175TH ST
Intersecting Road: WATER ST

GPS ID: 55213

Project Location



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	875	6
Approach Angle (Degrees)	65	2
Distance from Previous Stop	< 1.5 mi	0
K or A Crash	Yes	2
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	3
Number of Paved Approaches	2
Major ADT	660
Minor ADT	80
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	One-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	1
K and A Crashes	1
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	0	LEG	$ 2,200	$ -
	Upgrade Signs and Stop Bar	1	LEG	$ 1,000	$ 1,000
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	0	LEG	$ 1,000	$ -
	Clear and Grub within Sight Triangle	2	LEG	$ 1,500	$ 3,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 4,000
				Engineering: (% +/-) 15%	$ 938
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 313
				Contingency:(% +/-) 20%	$ 1,250
				Estimated Project Cost:	**$ 9,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

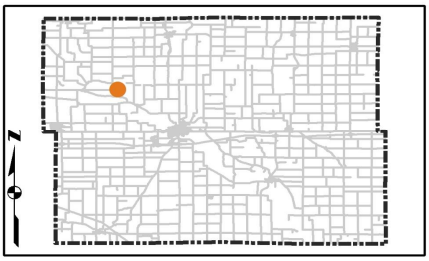
Project Name: Co Rd D16/FAIRBANK-AMISH BLVD/175TH ST and Co Rd W13 Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

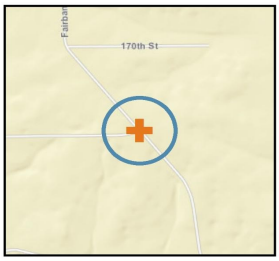
Date: 10/5/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: Co Rd D16/FAIRBANK-AMISH BLVD/175TH ST
Intersecting Road: Co Rd W13
GPS ID: 55230

Project Location





Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	1205	6
Approach Angle (Degrees)	70	2
Distance from Previous Stop	1.5-5 mi	2
K or A Crash	No	0
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	870
Minor ADT	490
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	One-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	3
K and A Crashes	0
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	1	LEG	$ 2,200	$ 2,200
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	1	LEG	$ 1,000	$ 1,000
	Clear and Grub within Sight Triangle	2	LEG	$ 1,500	$ 3,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 6,200
				Engineering: (% +/-) 15%	$ 1,238
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 413
				Contingency:(% +/-) 20%	$ 1,650
				Estimated Project Cost:	**$ 12,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: Co Rd D20/210TH ST and Co Rd V62/BAXTER AVE & MAIN ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

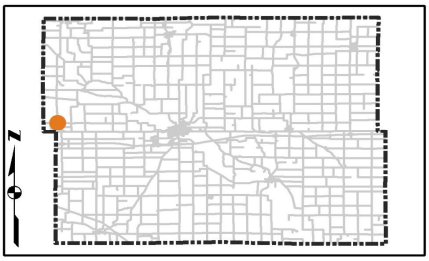
Date: 10/5/15
Prepared By: DJG/DVM
Checked By: MMO

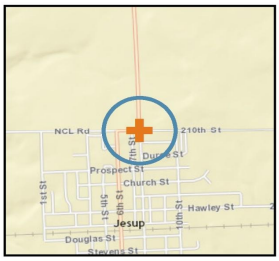
Location Description

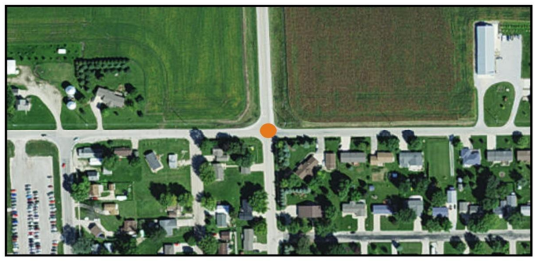
Paved Road: Co Rd D20/210TH ST
Intersecting Road: Co Rd V62/BAXTER AVE & MAIN ST

GPS ID: 55274

Project Location







Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	2295	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	> 5 mi	4
K or A Crash	No	0
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	1670
Minor ADT	210
Destination Lighting	Yes
Transverse Rumble Strips	No
Control Type	All-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	0
K and A Crashes	0
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	4	LEG	$ 2,200	$ 8,800
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	4	LEG	$ 1,200	$ 4,800
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	4	LEG	$ 1,000	$ 4,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 23,600
				Engineering: (% +/-) 15%	$ 3,713
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 1,238
				Contingency:(% +/-) 20%	$ 4,950
				Estimated Project Cost:	**$ 36,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

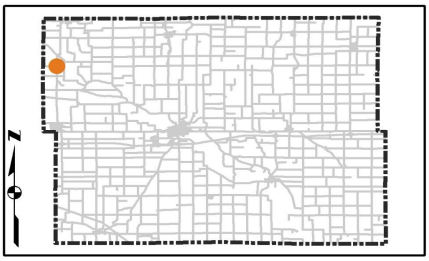
Project Name: Co Rd V62/BAXTER AVE and 150TH ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

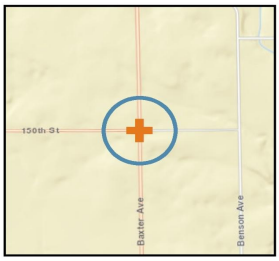
Date: 10/5/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: Co Rd V62/BAXTER AVE
Intersecting Road: 150TH ST
GPS ID: 55622

Project Location





Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	1530	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	1.5-5 mi	2
K or A Crash	Yes	2
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	1180
Minor ADT	100
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	Two-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	1
K and A Crashes	1
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	1	LEG	$ 2,200	$ 2,200
	Upgrade Signs and Stop Bar	1	LEG	$ 1,000	$ 1,000
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	1	LEG	$ 1,000	$ 1,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 10,200
				Engineering: (% +/-) 15%	$ 1,613
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 538
				Contingency:(% +/-) 20%	$ 2,150
				Estimated Project Cost:	**$ 17,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: IA 150/JAMESTOWN AVE and Co Rd D48/330TH ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15

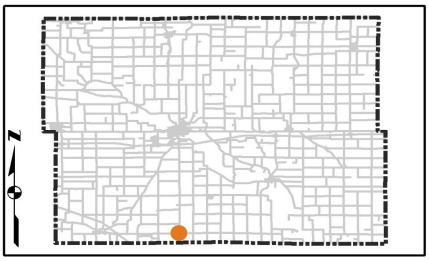
Prepared By: DJG/DVM
Checked By: MMO

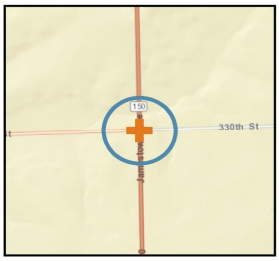
Location Description

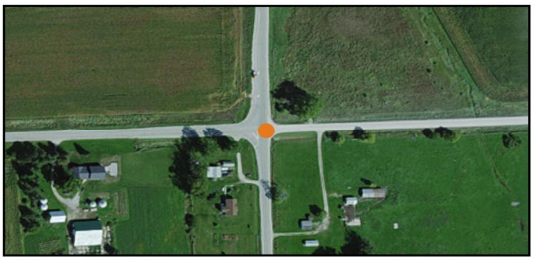
Paved Road: IA 150/JAMESTOWN AVE
Intersecting Road: Co Rd D48/330TH ST

GPS ID: 53829

Project Location







Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	4015	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	> 5 mi	4
K or A Crash	No	0
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**12**

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	3810
Minor ADT	120
Destination Lighting	Yes
Transverse Rumble Strips	No
Control Type	Two-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	0
Right angle, rear-end, or turning crashes	2

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	2	LEG	$ 2,200	$ 4,400
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	2	LEG	$ 1,000	$ 2,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 12,400
				Engineering: (% +/-) 15%	$ 1,913
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 638
				Contingency:(% +/-) 20%	$ 2,550
				Estimated Project Cost:	**$ 20,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 11

Project Name: IA 150/JAMESTOWN AVE and Co Rd D47/290TH ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

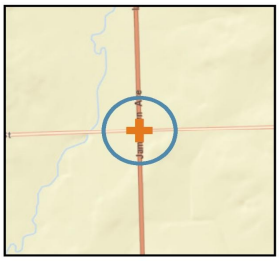
Date: 10/5/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: IA 150/JAMESTOWN AVE
Intersecting Road: Co Rd D47/290TH ST

GPS ID: 53847

Project Location



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	4720	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	> 5 mi	4
K or A Crash	No	0
Distance from Driveway or Intersection	250-500 ft	1
Total Risk Factor Points (16 max)		**11**

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	3520
Minor ADT	310
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	Two-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	1
K and A Crashes	0
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	1	EA	$ 8,000	$ 8,000
	Upgrade Signs and Pavement Markings	2	LEG	$ 2,200	$ 4,400
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	2	LEG	$ 1,200	$ 2,400
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	2	LEG	$ 1,000	$ 2,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 22,800
				Engineering: (% +/-) 15%	$ 3,638
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 1,213
				Contingency:(% +/-) 20%	$ 4,850
				Estimated Project Cost:	**$ 35,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 10

Project Name: IA 187/WASHBURN AVE and Co Rd C64/130TH ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15

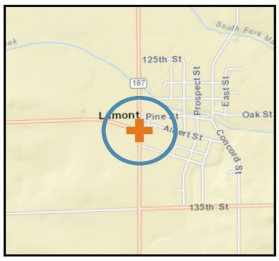
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: IA 187/WASHBURN AVE
Intersecting Road: Co Rd C64/130TH ST

GPS ID: 54057

Project Location



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	2145	6
Approach Angle (Degrees)	70	2
Distance from Previous Stop	< 1.5 mi	0
K or A Crash	No	0
Distance from Driveway or Intersection	< 250 ft	2
Total Risk Factor Points (16 max)		**10**

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	1650
Minor ADT	490
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	One-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	0
K and A Crashes	0
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	1	EA	$ 8,000	$ 8,000
	Upgrade Signs and Pavement Markings	1	LEG	$ 2,200	$ 2,200
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	1	LEG	$ 1,200	$ 1,200
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	1	LEG	$ 1,000	$ 1,000
	Clear and Grub within Sight Triangle	2	LEG	$ 1,500	$ 3,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 15,400
				Engineering: (% +/-) 15%	$ 2,663
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 888
				Contingency:(% +/-) 20%	$ 3,550
				Estimated Project Cost:	**$ 25,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 9

Project Name: IA 150/JACKSON AVE/PALACE RD and IA 281/100TH ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15

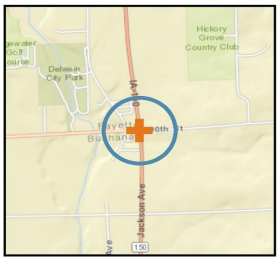
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: IA 150/JACKSON AVE/PALACE RD
Intersecting Road: IA 281/100TH ST

GPS ID: 54019

Project Location



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	8055	6
Approach Angle (Degrees)	90	0
Distance from Previous Stop	< 1.5 mi	0
K or A Crash	Yes	2
Distance from Driveway or Intersection	250-500 ft	1
Total Risk Factor Points (16 max)		**9**

Other Information	
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	6000
Minor ADT	290
Destination Lighting	Yes
Transverse Rumble Strips	No
Control Type	Two-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	9
K and A Crashes	1
Right angle, rear-end, or turning crashes	7

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	1	LEG	$ 2,200	$ 2,200
	Upgrade Signs and Stop Bar	1	LEG	$ 1,000	$ 1,000
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	1	LEG	$ 1,000	$ 1,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 10,200
				Engineering: (% +/-) 15%	$ 1,613
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 538
				Contingency:(% +/-) 20%	$ 2,150
				Estimated Project Cost:	**$ 17,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 9

Project Name: IA 150/JACKSON AVE and 133RD ST Intersection
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 10/5/15

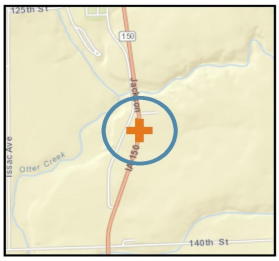
Prepared By: DJG/DVM
Checked By: MMO

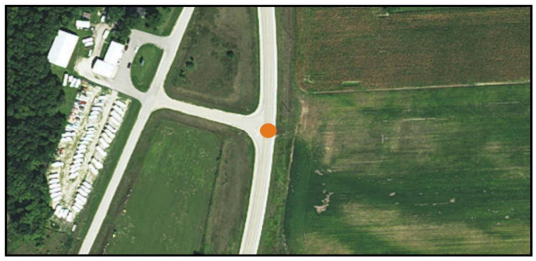
Location Description

Paved Road: IA 150/JACKSON AVE
Intersecting Road: 133RD ST

GPS ID: 632894

Project Location





Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	4875	6
Approach Angle (Degrees)	73	2
Distance from Previous Stop	< 1.5 mi	0
K or A Crash	No	0
Distance from Driveway or Intersection	250-500 ft	1
Total Risk Factor Points (16 max)		**9**

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	4750
Minor ADT	30
Destination Lighting	No
Transverse Rumble Strips	No
Control Type	One-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	1
K and A Crashes	0
Right angle, rear-end, or turning crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	1	LEG	$ 2,200	$ 2,200
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,200	$ -
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	1	LEG	$ 1,000	$ 1,000
	Clear and Grub within Sight Triangle	2	LEG	$ 1,500	$ 3,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 6,200
				Engineering: (% +/-) 15%	$ 1,238
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 413
				Contingency:(% +/-) 20%	$ 1,650
				Estimated Project Cost:	**$ 12,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

APPENDIX B

INTERSECTION RISK FACTOR RANKING RESULTS

Buchanan County
Local Road Safety Plan
Intersection Risk Factor Points

GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Approach Angle (Value)	Approach Angle (Points)	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	K or A Crash (Value)	K or A Crash (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips	Control Type
54355	Co Rd D22/220TH ST	Co Rd W45/BUFFALO CREEK BLVD	14	1,405	6	70	2	> 5 mi	4	No	0	< 250 ft	2	1	0	0	1,180	280	No	No	One-way stop
55568	Co Rd C57/120TH ST	Co Rd W13/FAIRBANK-AMISH BLVD	14	2,380	6	90	0	> 5 mi	4	Yes	2	< 250 ft	2	11	1	10	1,160	740	No	No	Two-way stop
53829	IA 150/JAMESTOWN AVE	Co Rd D48/330TH ST	12	4,015	6	90	0	> 5 mi	4	No	0	< 250 ft	2	2	0	2	3,810	120	Yes	No	Two-way stop
54271	Co Rd D22/220TH ST	Co Rd V71/DUGAN AVE	12	1,915	6	90	0	> 5 mi	4	No	0	< 250 ft	2	1	0	0	2,650	460	No	No	One-way stop
54560	Co Rd D47/QUASQUETON AVE/290TH ST	Co Rd W35	12	1,640	6	90	0	> 5 mi	4	No	0	< 250 ft	2	2	0	1	1,810	70	No	No	Two-way stop
55131	Co Rd D16/FAIRBANK-AMISH BLVD	OTTERVILLE BLVD	12	915	6	90	0	> 5 mi	4	No	0	< 250 ft	2	0	0	0	870	220	No	No	Two-way stop
55198	Co Rd W13/FAIRBANK-AMISH BLVD	170TH ST	12	925	6	55	2	< 1.5 mi	0	Yes	2	< 250 ft	2	6	3	0	740	10	No	No	One-way stop
55213	Co Rd D16/175TH ST	WATER ST	12	875	6	65	2	< 1.5 mi	0	Yes	2	< 250 ft	2	1	1	0	660	80	No	No	One-way stop
55230	Co Rd D16/FAIRBANK-AMISH BLVD/175TH ST	Co Rd W13	12	1,205	6	70	2	1.5-5 mi	2	No	0	< 250 ft	2	3	0	0	870	490	No	No	One-way stop
55274	Co Rd D20/210TH ST	Co Rd V62/BAXTER AVE & MAIN ST	12	2,295	6	90	0	> 5 mi	4	No	0	< 250 ft	2	0	0	0	1,670	210	Yes	No	All-way stop
55622	Co Rd V62/BAXTER AVE	150TH ST	12	1,530	6	90	0	1.5-5 mi	2	Yes	2	< 250 ft	2	1	1	0	1,180	100	No	No	Two-way stop
53847	IA 150/JAMESTOWN AVE	Co Rd D47/290TH ST	11	4,720	6	90	0	> 5 mi	4	No	0	250-500 ft	1	1	0	0	3,520	310	No	No	Two-way stop
54200	Co Rd D48/330TH ST	Co Rd V71/FREEMAN AVE	11	1,410	6	65	2	1.5-5 mi	2	No	0	250-500 ft	1	1	0	1	1,240	460	No	No	One-way stop
54259	Co Rd D22/220TH ST/SOUTH ST	Co Rd V65/BENSON-SHADY GROVE AVE	11	5,745	6	90	0	> 5 mi	4	No	0	250-500 ft	1	3	0	3	5,300	2,650	Yes	No	One-way stop
54732	Co Rd D48/DUGAN AVE/LAPORTE RD	Co Rd V71	11	675	3	90	0	> 5 mi	4	Yes	2	< 250 ft	2	1	1	0	710	370	No	No	One-way stop
53768	US 20/NE RAMP/NW RAMP	Co Rd W40/RACINE AVE	10	2,525	6	60	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	2,520	190	No	No	Unknown
54057	IA 187/WASHBURN AVE	Co Rd C64/130TH ST	10	2,145	6	70	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1,650	490	No	No	One-way stop
54309	Co Rd D22/220TH ST	Co Rd W33/NATHAN BETHEL AVE	10	1,695	6	90	0	> 5 mi	4	No	0	> 500 ft	0	1	0	0	1,590	390	No	No	One-way stop
54331	Co Rd D22/220TH ST	Unknown	10	1,405	6	21	2	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	1,410	10	No	No	Uncontrolled
54654	Co Rd D47/282ND ST/BENSON-SHADY GROVE A	Co Rd V65	10	900	6	90	0	< 1.5 mi	0	Yes	2	< 250 ft	2	1	1	1	790	170	No	No	One-way stop
54835	Co Rd W35/QUASQUETON DIAGONAL BLVD	NELSON AVE	10	945	6	60	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1,120	90	No	No	One-way stop
54840	Co Rd W35/QUASQUETON DIAGONAL BLVD	NOLAN AVE	10	975	6	55	2	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	1,120	180	No	No	One-way stop
54849	Co Rd W35/QUASQUETON DIAGONAL BLVD	POSTEL AVE	10	955	6	60	2	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	1,120	110	No	No	One-way stop
54890	Co Rd W35/QUASQUETON DIAGONAL BLVD	235TH ST	10	920	6	50	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1,120	80	No	No	One-way stop
55137	Co Rd D16/OTTERVILLE BLVD	GRANT AVE	10	890	6	60	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	870	100	No	No	One-way stop
55204	Co Rd D16/175TH ST	Co Rd V62/BAXTER AVE	10	1,813	6	90	0	1.5-5 mi	2	No	0	< 250 ft	2	2	0	1	1,670	45	No	No	Two-way stop
55548	Co Rd V62/BAXTER AVE	108TH ST	10	1,155	6	90	0	< 1.5 mi	0	Yes	2	< 250 ft	2	1	1	0	1,160	10	No	No	Uncontrolled
55659	YORK ST	UNION ST	10	930	6	90	0	1.5-5 mi	2	No	0	< 250 ft	2	0	0	0	930	80	No	No	Two-way stop
633475	ROWLEY ST	GRANDE AVE	10	960	6	60	2	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	920	240	Yes	No	One-way stop
633546	MENTAL HEALTH INSTITUTE	IOWA AVE & 20TH AVE SW	10	3,305	6	50	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	3,800	0	Yes	No	One-way stop
5005537	US 20/NE RAMP/NW RAMP	Co Rd W40/RACINE AVE	10	2,525	6	60	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	2,520	190	No	No	Unknown
54019	IA 150/JACKSON AVE/PALACE RD	IA 281/100TH ST	9	8,055	6	90	0	< 1.5 mi	0	Yes	2	250-500 ft	1	9	1	7	6,000	290	Yes	No	Two-way stop
54153	Co Rd W40/RACINE AVE	250TH ST	9	1,625	6	90	0	< 1.5 mi	0	Yes	2	250-500 ft	1	2	1	1	1,640	70	No	No	Two-way stop
54183	Co Rd D22/220TH ST	Co Rd W40/RACINE AVE	9	3,260	6	90	0	1.5-5 mi	2	No	0	250-500 ft	1	4	0	2	2,470	1,410	Yes	No	One-way stop
54203	Co Rd D48/330TH ST	FROST AVE	9	1,440	6	65	2	< 1.5 mi	0	No	0	250-500 ft	1	2	0	0	1,240	40	No	No	One-way stop
54558	Co Rd D47/280TH ST/SCOTT BLVD	Unknown	9	510	3	65	2	< 1.5 mi	0	Yes	2	< 250 ft	2	3	2	0	840	50	No	No	One-way stop
54839	Co Rd W35/QUASQUETON DIAGONAL BLVD	250TH ST	9	950	6	50	2	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	1,120	80	No	No	One-way stop
55170	Co Rd D16/OTTERVILLE BLVD	WAPSIE ACCESS BLVD	9	1,150	6	90	0	1.5-5 mi	2	No	0	250-500 ft	1	0	0	0	1,120	600	No	No	One-way stop
55367	Co Rd W33/100TH ST	NELSON ST	9	580	3	90	0	> 5 mi	4	No	0	< 250 ft	2	0	0	0	350	320	Yes	No	One-way stop
55634	Co Rd W13/FAIRBANK-AMISH BLVD	158TH ST	9	930	6	90	0	< 1.5 mi	0	Yes	2	250-500 ft	1	1	1	0	740	10	No	No	One-way stop
632894	IA 150/JACKSON AVE	133RD ST	9	4875	6	73	2	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	4750	30	No	No	One-way stop
633548	IOWA AVE	MENTAL HEALTH INSTITUTE	9	2610	6	45	2	< 1.5 mi	0	No	0	250-500 ft	1	2	0	1	2520	0	No	No	One-way stop
53943	IA 150/JAMESTOWN AVE	Co Rd D16/OTTERVILLE BLVD & 200TH ST	8	5675	6	14	0	< 1.5 mi	0	No	0	< 250 ft	2	5	0	3	5400	50	No	No	Two-way stop
53969	IA 150/JACKSON AVE	FONTANA BLVD	8	4890	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	4750	25	No	No	One-way stop
54053	IA 187/WASHBURN AVE	Co Rd C64/135TH ST	8	2065	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	2	0	1	1650	35	No	No	Two-way stop
54147	Co Rd W40/RACINE AVE	262ND ST	8	1555	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	1640	30	No	No	One-way stop
54151	Co Rd W40/RACINE AVE	255TH ST	8	1545	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1640	10	No	No	One-way stop
54157	Co Rd W40/RACINE AVE	235TH ST	8	1580	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	1640	80	No	No	One-way stop
54186	MAIN ST	BRANARD ST	8	1080	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	2	0	2	1220	130	Yes	No	Two-way stop
54189	Co Rd D48/330TH ST	MAIN ST & EVERLY AVE	8	955	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1090	50	Yes	No	One-way stop
54193	Co Rd D48/330TH ST	Co Rd W17/BRANDON DIAGONAL BLVD & FINLE	8	990	6	80	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1090	10	No	No	Two-way stop
54265	Co Rd D22/220TH ST	CARTER AVE	8	1900	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	2650	130	No	No	One-way stop
54279	Co Rd D22/220TH ST	GENTRY AVE	8	1650	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	2460	100	No	No	One-way stop
54283	Co Rd D22/220TH ST	HARRISON AVE	8	1645	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	2460	90	No	No	One-way stop
54285	Co Rd D22/220TH ST	HENLEY AVE	8	1650	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	2460	220	No	No	One-way stop
54289	Co Rd D22/220TH ST	GOLF COURSE BLVD	8	2335	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	3	0	1	2460	700	No	No	One-way stop
54311	Co Rd D22/220TH ST	NELSON AVE	8	1415	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	1410	10	No	No	One-way stop
54363	Co Rd D22/220TH ST	UNION AVE	8	953	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	700	45	No	No	One-way stop
54365	Co Rd D22/220TH ST	UPPER AVE	8	935	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	700	10	No	No	One-way stop
54369	Co Rd D22/220TH ST	VINCENT AVE	8	930	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	700	0	No	No	Uncontrolled
54486	Co Rd D47/280TH ST	Co Rd W45/TROY MILLS BLVD	8	525	3	90	0	> 5 mi	4	No	0	250-500 ft	1	0	0	0	480	290	No	No	One-way stop
54572	Co Rd W35/QUASQUETON AVE	310TH ST	8	1375	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	5	0	0	1080	25	No	No	Two-way stop
54651	Co Rd D47/280TH ST/BENSON-SHADY GROVE A	Co Rd V65	8	880	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	930	60	No	No	One-way stop
54843	Co Rd W35/QUASQUETON DIAGONAL BLVD	PARRISH AVE	8	930	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1120	80	No	No	One-way stop
54954	Co Rd V65/BENSON-SHADY GROVE AVE	230TH ST	8	4365	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	2660	40	Yes	No	One-way stop
54970	Co Rd V65/BENSON-SHADY GROVE AVE	250TH ST	8	895	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	930	60	No	No	One-way stop
54998	Co Rd V65/BENSON-SHADY GROVE AVE	270TH ST	8	905	6	90	0	< 1.5 mi	0	Yes	2	> 500 ft	0	1	1	1	930	25	No	No	Two-way stop
55000	Co Rd V65/BENSON-SHADY GROVE AVE	275TH ST	8	885	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	930	70	No	No	One-way stop
55146	Co Rd D16/OTTERVILLE BLVD	HENLEY AVE	8	920	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	870	60	No	No	One-way stop
55194	Co Rd W13/FAIRBANK-AMISH BLVD	162ND ST	8	943	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	740	45	No	No	One-way stop
55199	Co Rd V62/BAXTER AVE	160TH ST	8	1195	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	1180	10	No	No	Two-way stop
55200	Co Rd V62/BAXTER AVE	BENSON AVE	8	1145	6	55	2	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	1180	10	No	No	One-way stop
55219	Co Rd D16/175TH ST	PERRY ST N & PERRY ST S	8	895	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	660	160	No	No	Two-way stop
55275	Co Rd D20/210TH ST	NCL RD & 1ST ST	8	880	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	870	330	Yes	No	One-way stop
55277	Co Rd D20/210TH ST	6TH ST	8	2280	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	1350	870	Yes	No	One-way stop
55279	Co Rd D20/210TH ST	7TH ST	8	2240	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	950	289	Yes	No	One-way stop
55318	Co Rd C64/130TH ST	Co Rd W45/SLATER AVE	8	1100	6	90	0	1.5-5 mi	2	No	0	> 500 ft	0	4	0	1	970	120	No	No	Two-way stop
55390	Co Rd C57/OLYMPIC AVE/115TH ST	Co Rd W33	8	665	3	90	0	1.5-5 mi	2	Yes	2	250-500 ft	1	2	1	0	540	320	No	No	One-way stop
55394	Co Rd C57/OLYMPIC AVE/120TH ST	Co Rd W33	8	640	3	90	0	> 5 mi	4	No	0	250-500 ft	1	3	0	1	520	390	No	No	One-way stop
55414	Co Rd C57/120TH ST/118TH ST	MASON AVE	8	515	3	55	2	< 1.5 mi	0	Yes	2	250-500 ft	1	1	1	1	430	20	No	No	Two-way stop
55509	Co Rd C57/120TH ST	GRANT AVE	8	1010	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	740	100	No	No	One-way stop
55572	Co Rd W13/FAIRBANK-AMISH BLVD	130TH ST	8	975	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	740	50	No	No	Two-way stop
55596	Co Rd V62/BAXTER AVE	BUCK CREEK BLVD	8	1248	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	6	0	0	1180	45	No	No	Two-way stop
55604	Co Rd W13/FAIRBANK-AMISH BLVD	145TH ST	8	970	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	740	100	No	No	One-way stop
55606	Co Rd W13/FAIRBANK-AMISH BLVD	150TH ST	8	980	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	740	120	Yes	No	One-way stop

GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Approach Angle (Value)	Approach Angle (Points)	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	K or A Crash (Value)	K or A Crash (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips	Control Type
55641	UNION ST	ALICE ST	8	915	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	930	170	No	No	Two-way stop
55703	MAIN ST	WEST ST	8	1145	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	880	289	Yes	No	Two-way stop
55705	MAIN ST	WILSON ST	8	1305	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1220	840	Yes	No	One-way stop
56402	KENTUCKY AVE	14TH ST NE & 8TH AVE NE	8	1020	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	2	0	1	780	150	No	No	All-way stop
57173	ROWLEY ST	MARKET AVE	8	945	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	920	440	Yes	No	One-way stop
59153	IA 150/JACKSON AVE	NO NAME	8	4865	6	0	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	4750	10	No	No	Unknown
632920	MAIN ST	EAST ST	8	1235	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	1020	250	Yes	No	Two-way stop
632922	MAIN ST	PEARL ST	8	1120	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1090	289	Yes	No	One-way stop
632923	MAIN ST	ETHEL ST	8	1087	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1090	25	Yes	No	One-way stop
632924	MAIN ST	ETHEL ST	8	1087	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1090	25	Yes	No	One-way stop
632925	MAIN ST	SARAH ST	8	1075	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	1090	289	Yes	No	One-way stop
632927	Co Rd D22/SOUTH ST/220TH ST	6TH ST RAMP & MAIN ST	8	4413	6	15	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	5300	486	Yes	No	Two-way stop
632929	Co Rd D22/220TH ST	8TH ST	8	5445	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	5300	289	Yes	No	One-way stop
632930	Co Rd D22/220TH ST	9TH ST	8	5445	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	2	0	2	5300	289	Yes	No	One-way stop
632933	Co Rd D22/220TH ST	DOUBLE L DR	8	3355	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	3330	50	Yes	No	One-way stop
632982	UNION ST	HAWKEYE ST	8	944	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	930	367	No	No	One-way stop
632983	UNION ST	PROSPECT ST	8	899	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	930	289	No	No	Two-way stop
632984	UNION ST	WARREN ST	8	1245	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	981	289	No	No	Two-way stop
633549	IOWA AVE	MENTAL HEALTH INSTITUTE	8	2610	6	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	2520	0	No	No	Uncontrolled
2001072	Co Rd D16/OTTERVILLE BLVD	HENLEY AVE	8	920	6	0	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	870	60	No	No	One-way stop
4003278	Co Rd D22/220TH ST	10TH ST	8	5313	6	0	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	5300	26	Yes	No	One-way stop
29301	I-380	Co Rd V65/BLACKHAWK-BUCHANAN AVE	7	1100	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	1	850	190	No	No	Unknown
53595	I-380	Co Rd D48/330TH ST	7	16150	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	6	0	0	15400	1000	No	No	Unknown
53601	I-380	Co Rd D48/330TH ST	7	1080	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	1000	140	No	No	Unknown
53652	US 20/NE RAMP/NW RAMP	Co Rd V65/BENSON-SHADY GROVE AVE	7	4625	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	2660	370	No	No	Unknown
53696	US 20/SE RAMP/SW RAMP	IOWA AVE	7	1655	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	1570	170	No	No	Unknown
53770	US 20/SE RAMP/SW RAMP	Co Rd W40/RACINE AVE	7	2155	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	1960	220	No	No	Unknown
53879	IA 150/JAMESTOWN AVE/3RD AVE SE	Co Rd W17/240TH ST	7	5165	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	2	0	1	4480	210	No	No	Two-way stop
53975	IA 150/JACKSON AVE	125TH ST	7	4950	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	3	0	1	4750	180	No	No	One-way stop
53981	IA 150/JACKSON AVE	FONTANA AND JACKSON CONN	7	4870	6	85	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	4750	20	No	No	One-way stop
54067	IA 187/WASHBURN AVE	Co Rd C57/120TH ST	7	1885	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	2	0	0	1650	120	No	No	One-way stop
54267	Co Rd D22/220TH ST	DANIEL AVE	7	1848	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	2650	35	No	No	One-way stop
54275	Co Rd D22/220TH ST	FROST AVE	7	1675	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	2460	200	No	No	One-way stop
54277	Co Rd D22/220TH ST	GABRIEL AVE	7	1640	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	1	2460	80	No	No	One-way stop
54470	IOWA AVE	232ND ST	7	3090	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	1	2780	500	Yes	No	One-way stop
54481	Co Rd D47/VINCENT AVE/280TH ST	Co Rd W45	7	455	3	90	0	1.5-5 mi	2	No	0	< 250 ft	2	0	0	0	330	50	No	No	Two-way stop
54644	Co Rd D47/290TH ST	Co Rd V71/DUGAN AVE	7	555	3	90	0	> 5 mi	4	No	0	> 500 ft	0	1	0	0	470	310	No	No	One-way stop
54767	Co Rd W45/BUFFALO CREEK BLVD	228TH ST	7	430	3	50	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	280	50	No	No	One-way stop
54773	Co Rd W45/BUFFALO CREEK BLVD	TUCKER AVE	7	405	3	35	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	280	30	No	No	One-way stop
54792	Co Rd W45/BUFFALO CREEK BLVD	250TH ST	7	410	3	55	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	280	45	No	No	One-way stop
54845	Co Rd W35/QUASQUETON DIAGONAL BLVD	PINE CREEK AVE	7	935	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	1120	70	No	No	One-way stop
54962	Co Rd V65/BENSON-SHADY GROVE AVE	240TH ST	7	1650	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	1080	50	No	No	Two-way stop
55098	Co Rd W33/NATHAN BETHEL AVE	205TH ST	7	605	3	90	0	1.5-5 mi	2	Yes	2	> 500 ft	0	2	1	2	430	50	No	No	Two-way stop
55173	Co Rd D16/OTTERVILLE BLVD	ISSAC AVE	7	875	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	2	0	0	870	70	No	No	One-way stop
55183	205TH ST	KING AVE & UNION AVE NE	7	565	3	60	2	< 1.5 mi	0	No	0	< 250 ft	2	1	0	1	610	25	Yes	No	Two-way stop
55236	Co Rd D16/FAIRBANK-AMISH BLVD	RIVER ROAD BLVD	7	875	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	870	70	No	No	One-way stop
55350	Co Rd W45/SLATER AVE	150TH ST	7	868	6	75	0	< 1.5 mi	0	No	0	250-500 ft	1	4	0	3	970	45	No	No	Two-way stop
55455	Co Rd W33/155TH ST/OLYMPIC AVE	Unknown	7	420	3	90	0	> 5 mi	4	No	0	> 500 ft	0	1	0	0	390	50	No	No	Two-way stop
55546	Co Rd W13/FAIRBANK-AMISH BLVD	110TH ST	7	1468	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	3	0	1	1160	45	No	No	Two-way stop
55560	Co Rd V62/BAXTER AVE	112TH ST	7	1165	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	1160	30	No	No	One-way stop
55585	Co Rd C57/120TH ST	BUTLER AVE	7	1490	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	980	40	No	No	One-way stop
58072	BLAND BLVD	IOWA AVE	7	3190	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	4	0	1	3800	950	Yes	No	One-way stop
632872	I-380	Co Rd D48/330TH ST	7	1535	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	2	0	1	1240	210	No	No	Unknown
632873	US 20	Co Rd W45/BUFFALO CREEK BLVD	7	6490	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	7800	280	No	No	Unknown
632934	Co Rd D22/220TH ST	Unknown	7	1415	6	90	0	< 1.5 mi	0	No	0	250-500 ft	1	3	0	1	1410	10	No	No	One-way stop
632956	I-380	Co Rd V65/BLACKHAWK-BUCHANAN AVE	7	15492	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	14700	850	No	No	Unknown
632957	I-380	Co Rd V65/BLACKHAWK-BUCHANAN AVE	7	1130	6	0	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	910	240	No	No	Unknown
31093	IA 281/FAIRBANK RD/102ND ST	BLACKHAWK-BUCHANAN AVE	6	1905	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	2120	80	No	No	Two-way stop
32347	Co Rd C57/E CEDAR-WAPSI RD/120TH ST	BLACKHAWK-BUCHANAN AVE	6	1198	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	1160	35	No	No	Two-way stop
53645	US 20	Co Rd V65/BENSON-SHADY GROVE AVE	6	11670	6	0	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	8700	1820	No	No	Unknown
53667	US 20	Co Rd V71/DUGAN AVE	6	10880	6	0	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	9500	460	No	No	Unknown
53687	US 20	IOWA AVE	6	10010	6	0	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	8200	1570	No	No	Unknown
53694	US 20/NE RAMP/NW RAMP	IOWA AVE	6	3135	6	0	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	2780	620	No	No	Unknown
53739	US 20	Co Rd W35/QUASQUETON DIAGONAL BLVD	6	8100	6	0	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	9700	1120	No	No	Unknown
53761	US 20	Co Rd W40/RACINE AVE	6	7540	6	0	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	7400	1960	No	No	Unknown
54027	IA 187/WASHBURN AVE	Co Rd D22/220TH ST	6	2225	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	5	0	4	1570	670	No	No	Two-way stop
54115	IA 281/100TH ST	Co Rd W13/FAIRBANK-AMISH BLVD/T AVE	6	2900	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	3	0	3	2840	410	No	No	Two-way stop
54125	IA 281/100TH ST	INDIANA AVE & Q AVE	6	2465	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	2840	140	No	No	Two-way stop
54155	Co Rd W40/RACINE AVE	240TH ST	6	1580	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	1640	80	No	No	One-way stop
54159	Co Rd W40/RACINE AVE	232ND ST	6	1545	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	1640	10	No	No	One-way stop
54269	Co Rd D22/220TH ST	DEACON AVE	6	1885	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	2	0	1	2650	110	No	No	One-way stop
54315	Co Rd D22/220TH ST	NORTH DORIS AVE	6	1420	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	1410	20	No	No	One-way stop
54321	Co Rd D22/220TH ST	PINE CREEK AVE	6	1450	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	1410	80	No	No	One-way stop
54359	Co Rd D22/220TH ST	TAYLOR AVE	6	935	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	700	10	No	No	One-way stop
54367	Co Rd D22/220TH ST	VICTOR AVE	6	950	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	700	40	No	No	One-way stop
54582	Co Rd W35/QUASQUETON AVE	330TH ST	6	1390	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	3	0	0	1080	50	No	No	Two-way stop
54596	Co Rd D47/290TH ST	LUCAS AVE & ROWLEY ST	6	975	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	2	0	2	920	50	No	No	Two-way stop
54615	Co Rd D47/290TH ST	KING AVE	6	1055	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	880	50	No	No	Two-way stop
54834	Co Rd W35/QUASQUETON DIAGONAL BLVD	MICHEL AVE	6	940	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	2	0	1	1120	80	No	No	One-way stop
55009	Co Rd W45/SLATER AVE	160TH ST	6	823	3	90	0	< 1.5 mi	0	Yes	2	250-500 ft	1	3	1	0	970	25	No	No	One-way stop
55016	Co Rd W45/SLATER AVE	180TH ST	6	870	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	970	70	No	No	Two-way stop
55086	Co Rd W45/SLATER AVE	210TH ST	6	870	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	970	120	No	No	One-way stop
55196	Co Rd W13/FAIRBANK-AMISH BLVD	165TH ST	6	970	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	740	100	No	No	One-way stop
55250	Co Rd D16/183RD ST	Co Rd V62/BAXTER AVE	6	1730	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	1670	90	No	No	Two-way stop
55473	Co Rd C57/120TH ST	INDIANA AVE	6	995	6	75	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	740	70	No	No	One-way stop

Buchanan County
Local Road Safety Plan
Intersection Risk Factor Points

GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Approach Angle (Value)	Approach Angle (Points)	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	K or A Crash (Value)	K or A Crash (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips	Control Type
55475	Co Rd C57/118TH ST	INDIANA AVE	6	1025	6	75	0	< 1.5 mi	0	No	0	> 500 ft	0	2	0	0	740	130	No	No	One-way stop
55505	Co Rd C57/120TH ST	HENLEY AVE	6	983	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	740	20	No	No	Two-way stop
55563	Co Rd C57/120TH ST	CARTER AVE	6	1530	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	980	120	No	No	One-way stop
55575	Co Rd C57/120TH ST	DENISON AVE	6	1560	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	980	90	No	No	Two-way stop
55579	Co Rd C57/120TH ST	CENTRAL AVE	6	1515	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	980	90	No	No	One-way stop
55594	Co Rd V62/BAXTER AVE	Unknown	6	1185	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	1180	10	No	No	One-way stop
55600	Co Rd W13/FAIRBANK-AMISH BLVD	140TH ST	6	1010	6	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	740	70	No	No	Two-way stop
41165	Co Rd V65/BLACKHAWK-BUCHANAN AVE	WELLMAN RD	5	760	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	790	60	No	No	One-way stop
54235	Co Rd D48/330TH ST	IOWA AVE	5	560	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	580	30	No	No	Two-way stop
54500	Co Rd W45/TROY MILLS BLVD	300TH ST	5	523	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	480	40	No	No	Two-way stop
54506	Co Rd W45/TROY MILLS BLVD	310TH ST	5	595	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	480	80	No	No	Two-way stop
54538	Co Rd W45/TROY MILLS BLVD	322ND ST	5	485	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	480	15	No	No	One-way stop
54642	Co Rd D47/282ND ST	Co Rd V71/DUGAN AVE	5	420	3	90	0	1.5-5 mi	2	No	0	> 500 ft	0	2	0	1	470	170	No	No	One-way stop
54657	Co Rd V65/BENSON-SHADY GROVE AVE	288TH ST	5	735	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	790	10	No	No	One-way stop
54778	Co Rd W45/BUFFALO CREEK BLVD	240TH ST	5	425	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	280	70	No	No	One-way stop
54800	Co Rd W45/BUFFALO CREEK BLVD	250TH ST	5	425	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	280	70	No	No	One-way stop
54802	Co Rd W45/BUFFALO CREEK BLVD/VINCENT AV	260TH ST	5	433	3	60	2	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	280	25	No	No	Two-way stop
54870	Co Rd D47/SCOTT BLVD	NO NAME	5	545	3	0	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	840	50	No	No	Unknown
55010	Co Rd W45/SLATER AVE	162ND ST	5	815	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	970	10	No	No	One-way stop
55012	Co Rd W45/SLATER AVE	170TH ST	5	845	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	970	50	No	No	One-way stop
55082	Co Rd W45/SLATER AVE	200TH ST	5	828	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	3	0	2	970	35	No	No	One-way stop
55139	Co Rd D16/OTTERVILLE BLVD	Unknown	5	858	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	870	35	No	No	One-way stop
55141	Co Rd D16/OTTERVILLE BLVD	Unknown	5	845	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	3	0	0	870	10	No	No	One-way stop
55143	Co Rd D16/OTTERVILLE BLVD	Unknown	5	850	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	870	20	No	No	One-way stop
55215	Co Rd D16/175TH ST	MAIN ST N & MAIN ST S	5	808	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	660	15	No	No	Two-way stop
55217	Co Rd D16/175TH ST	COLUMBUS ST	5	828	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	660	25	No	No	Two-way stop
55221	Co Rd D16/175TH ST	CHATHAM ST	5	655	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	490	10	No	No	Uncontrolled
55223	Co Rd D16/175TH ST	RIVER ROAD BLVD	5	690	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	490	50	No	No	One-way stop
55337	Co Rd C64/135TH ST	HENDERSON ST	5	775	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	520	289	No	No	One-way stop
55356	Co Rd W45/SLATER AVE	SERGEANT AVE	5	818	3	55	2	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	970	15	No	No	One-way stop
55358	Co Rd W45/SLATER AVE	SERGEANT AVE	5	818	3	22	2	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	970	15	No	No	Uncontrolled
55695	WEST ST	SOUTH ST	5	595	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	490	120	No	No	Two-way stop
57026	Co Rd C64/135TH ST	MONROE ST	5	645	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	520	140	Yes	No	One-way stop
57204	NELSON ST	MAIN ST	5	460	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	320	190	Yes	No	One-way stop
632975	YORK ST	LUELLA ST	5	695	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	580	160	No	No	One-way stop
632976	YORK ST	WOODRUFF ST	5	630	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	580	160	Yes	No	One-way stop
632977	YORK ST	MAIN ST	5	620	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	580	140	Yes	No	One-way stop
632978	YORK ST	BUFFALO ST	5	734	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	580	367	Yes	No	One-way stop
632985	UNION ST	CORNELIA ST	5	765	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	580	289	No	No	One-way stop
633476	ROWLEY ST	RAINBOW AVE	5	740	3	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	450	260	No	No	One-way stop
633555	Co Rd W33/100TH ST/L AVE	Unknown	5	700	3	20	2	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	350	80	No	No	One-way stop
32389	E DUNKERTON RD	150TH ST & BLACKHAWK-BUCHANAN AVE	4	603	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	730	25	No	No	One-way stop
54225	Co Rd D48/330TH ST	GENTRY AVE	4	550	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	580	80	No	No	One-way stop
54565	Co Rd D47/290TH ST	PLYMOTH AVE	4	463	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	450	5	No	No	One-way stop
54600	Co Rd D47/290TH ST	Co Rd W17/BRANDON DIAGONAL BLVD	4	385	0	65	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	310	70	No	No	Two-way stop
54698	Co Rd D48/LAPORTE RD/BLACKHAWK-BUCHAN	Unknown	4	330	0	30	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	370	30	No	No	One-way stop
54763	Co Rd W45/BUFFALO CREEK BLVD	STEWART AVE	4	425	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	2	0	1	280	60	No	No	One-way stop
54966	Co Rd V71/DUGAN AVE	240TH ST	4	445	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	460	45	No	No	Two-way stop
54996	Co Rd V65/BENSON-SHADY GROVE AVE	265TH ST	4	865	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	930	30	No	No	One-way stop
55032	Co Rd W45/SLATER AVE	200TH ST	4	828	3	0	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	970	35	No	No	Unknown
55083	Co Rd W45/SLATER AVE	200TH ST	4	840	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	970	60	No	No	One-way stop
55108	Co Rd W33/NATHAN BETHEL AVE	215TH ST	4	403	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	390	25	No	No	One-way stop
55209	Co Rd D16/175TH ST	CENTRAL AVE	4	850	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	660	100	No	No	One-way stop
55329	Co Rd C64/130TH ST	UNION AVE	4	560	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	490	30	No	No	Two-way stop
55401	Co Rd C57/115TH ST	REED AVE	4	560	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	540	80	No	No	One-way stop
55403	Co Rd C57/115TH ST	RINGOLD AVE	4	535	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	540	30	No	No	One-way stop
55410	Co Rd C64/130TH ST	Co Rd W33/OLYMPIC AVE	4	405	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	1	390	10	No	No	Two-way stop
55447	Co Rd W33/155TH ST/NATHAN BETHEL AVE	Unknown	4	365	0	90	0	< 1.5 mi	0	Yes	2	< 250 ft	2	1	1	0	390	80	No	No	One-way stop
55502	FONTANA BLVD	NO NAME	4	53	0	70	2	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	60	10	No	No	Uncontrolled
633547	232ND ST	MENTAL HEALTH INSTITUTE	4	500	3	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	500	0	No	No	Uncontrolled
31773	Co Rd D48/BRANDON RD	Co Rd V65/BLACKHAWK-BUCHANAN AVE	3	805	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	910	370	No	No	One-way stop
32253	Co Rd D20/OSAGE RD/210TH ST	BLACKHAWK-BUCHANAN AVE	3	555	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	790	120	Yes	No	One-way stop
53810	US 20/SE RAMP/SW RAMP	IA 187/WASHBURN AVE	3	645	3	0	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	880	170	No	No	Unknown
54227	Co Rd D48/330TH ST	HAMILTON AVE	3	570	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	580	50	No	No	Two-way stop
54488	Co Rd W45/TROY MILLS BLVD	290TH ST	3	498	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	480	5	No	No	Two-way stop
54494	Co Rd D47/280TH ST	STEWART AVE	3	405	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	560	30	No	No	Two-way stop
54540	Co Rd W45/TROY MILLS BLVD	330TH ST	3	520	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	480	20	No	No	Two-way stop
54561	Co Rd D47/290TH ST	NOLAN AVE	3	468	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	450	15	No	No	One-way stop
54562	Co Rd D47/290TH ST	MICHEL AVE	3	610	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	450	40	No	No	Two-way stop
54563	Co Rd D47/290TH ST	OVERLAND AVE	3	473	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	450	40	No	No	One-way stop
54690	Co Rd V71/DUGAN AVE	310TH ST	3	450	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	400	20	No	No	Two-way stop
54697	Co Rd D48/LAPORTE RD	Unknown	3	330	0	30	2	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	370	30	No	No	One-way stop
54739	Co Rd V66/330TH ST	DUGAN AVE & WEST ST	3	285	0	60	2	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	270	80	No	No	One-way stop
54747	Co Rd D22/220TH ST	BUCHANAN-DELAWARE AVE	3	720	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	670	40	No	No	One-way stop
54748	Co Rd D22/220TH ST	YORK AVE	3	740	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	670	80	No	No	One-way stop
54816	Co Rd W45/VINCENT AVE	270TH ST	3	425	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	280	10	No	No	Two-way stop
54946	Co Rd V71/DUGAN AVE	230TH ST	3	423	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	460	35	No	No	Two-way stop
55028	Co Rd W45/SLATER AVE	190TH ST	3	855	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	2	0	1	970	90	No	No	One-way stop
55157	205TH ST	LEE AVE	3	505	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	430	70	No	No	Two-way stop
55291	Co Rd W45/SLATER AVE/G AVE	100TH ST	3	643	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	580	15	No	No	Two-way stop
55292	Co Rd W45/SLATER AVE	105TH ST	3	630	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	580	20	No	No	One-way stop
55323	Co Rd C64/130TH ST	TAYLOR AVE	3	555	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	490	20	No	No	Two-way stop
55326	Co Rd W45/SLATER AVE	136TH ST	3	833	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	970	15	No	No	Two-way stop
55339	Co Rd C64/135TH ST	WASHINGTON AVE & CONCORD ST	3	840	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	640	60	No	No	Two-way stop
55345	Co Rd C64/135TH ST	YORK AVE	3	635	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	640	5	No	No	One-way stop

Buchanan County
Local Road Safety Plan
Intersection Risk Factor Points

GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Approach Angle (Value)	Approach Angle (Points)	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	K or A Crash (Value)	K or A Crash (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips	Control Type
55382	Co Rd C57/120TH ST	NATHEN BETHEL AVE	3	513	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	430	20	No	No	Two-way stop
55399	Co Rd C57/115TH ST	QUINN AVE	3	555	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	540	10	No	No	Two-way stop
55491	Co Rd C57/118TH ST	KEOKUK AVE	3	700	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	670	40	No	No	Two-way stop
55493	Co Rd C57/118TH ST	LAWRENCE AVE	3	500	3	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	430	40	No	No	One-way stop
632964	Co Rd W45/SLATER AVE	Unknown	3	828	3	0	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	970	35	No	No	Unknown
54472	Co Rd D47/285TH ST	YORK AVE	2	238	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	1	0	0	200	25	No	No	Two-way stop
54475	Co Rd D47/285TH ST	WASHINGTON AVE	2	225	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	200	30	Yes	No	One-way stop
54603	Co Rd D47/290TH ST	HARRISON AVE	2	323	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	310	25	No	No	One-way stop
54650	Co Rd D47/282ND ST	CARROLL AVE	2	230	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	170	20	No	No	One-way stop
54703	Co Rd D48/LAPORTE RD	BUTLER AVE & 318TH ST	2	360	0	60	2	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	370	30	No	No	Two-way stop
54707	Co Rd D48/LAPORTE RD	CARTER AVE	2	360	0	80	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	370	60	No	No	One-way stop
54709	Co Rd D48/LAPORTE RD	DANIEL AVE	2	335	0	80	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	370	10	No	No	One-way stop
54878	HENLEY AVE	230TH ST	2	103	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	220	15	No	No	One-way stop
54982	Co Rd V71/DUGAN AVE	260TH ST	2	325	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	460	35	No	No	One-way stop
55064	Co Rd W33/NATHAN BETHEL AVE	183RD ST	2	345	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	390	10	No	No	One-way stop
55498	FONTANA BLVD	FONTANA AND JACKSON CONN	2	48	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	45	20	No	No	One-way stop
55518	FONTANA BLVD	133RD ST	2	75	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	60	25	No	No	One-way stop
58110	JACKSON AVE	LOVERS LN SW	2	315	0	75	0	< 1.5 mi	0	No	0	< 250 ft	2	2	0	0	2310	740	Yes	No	One-way stop
58692	HS DR	DOUBLE L DR	2	43	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	40	15	No	No	Uncontrolled
58696	HORSESHOE DR	DOUBLE L DR	2	50	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	0	0	0	50	30	No	No	Uncontrolled
632971	FONTANA BLVD	125TH ST	2	213	0	90	0	< 1.5 mi	0	No	0	< 250 ft	2	2	0	0	180	30	No	No	Two-way stop
54609	Co Rd D47/290TH ST	IOWA AVE	1	368	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	2	0	0	310	25	No	No	Two-way stop
54646	Co Rd D47/282ND ST	DANIEL AVE	1	255	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	170	40	No	No	One-way stop
54671	Co Rd D47/290TH ST	EVERLY AVE	1	333	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	310	15	No	No	Two-way stop
54677	Co Rd D47/290TH ST	FROST AVE	1	320	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	310	20	No	No	One-way stop
54880	HENLEY AVE	232ND ST	1	110	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	220	50	No	No	One-way stop
54992	Co Rd V71/DUGAN AVE	265TH ST	1	310	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	460	50	No	No	One-way stop
55004	Co Rd V71/DUGAN AVE	275TH ST	1	265	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	460	70	No	No	One-way stop
55050	Co Rd W33/NATHAN BETHEL AVE	170TH ST	1	363	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	390	45	No	No	One-way stop
55052	Co Rd W33/NATHAN BETHEL AVE	180TH ST	1	355	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	390	20	No	No	Uncontrolled
55066	Co Rd W33/NATHAN BETHEL AVE	190TH ST	1	350	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	390	20	No	No	One-way stop
55305	Co Rd C57/120TH ST	YORK AVE	1	225	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	120	10	No	No	One-way stop
55311	Co Rd C57/120TH ST	WASHINGTON AVE	1	313	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	180	15	No	No	Two-way stop
55440	Co Rd W33/OLYMPIC AVE	142ND ST	1	363	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	0	0	0	390	45	No	No	One-way stop
58138	KING AVE	240TH ST	1	195	0	90	0	< 1.5 mi	0	No	0	250-500 ft	1	1	0	0	300	10	No	No	Uncontrolled
54482	Co Rd D47/VINCENT AVE/285TH ST	Unknown	0	220	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	200	25	No	No	One-way stop
54489	Co Rd D47/280TH ST	UPPER AVE	0	300	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	290	40	No	No	One-way stop
54490	Co Rd D47/280TH ST	TUCKER AVE	0	295	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	290	30	No	No	One-way stop
54602	Co Rd D47/290TH ST	HAMILTON AVE	0	315	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	310	35	No	No	One-way stop
54640	Co Rd D47/290TH ST	GABRIEL AVE	0	345	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	310	60	No	No	One-way stop
54645	Co Rd D47/282ND ST	DILLON AVE	0	220	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	170	10	No	No	One-way stop
54968	Co Rd V71/DUGAN AVE	250TH ST	0	388	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	2	0	1	460	25	No	No	Two-way stop
54994	Co Rd V71/DUGAN AVE	270TH ST	0	305	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	1	460	25	No	No	Two-way stop
55070	Co Rd W33/NATHAN BETHEL AVE	192ND ST	0	370	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	390	60	No	No	One-way stop
55072	Co Rd W33/NATHAN BETHEL AVE	195TH ST	0	350	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	390	20	No	No	One-way stop
55074	Co Rd W33/NATHAN BETHEL AVE	200TH ST	0	345	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	390	10	No	No	One-way stop
55370	Co Rd W33/NELSON AVE/110TH ST	Unknown	0	368	0	80	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	320	35	No	No	One-way stop
55391	Co Rd W33/110TH ST/OLYMPIC AVE	Unknown	0	360	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	1	0	0	320	40	No	No	One-way stop
55422	Co Rd W33/OLYMPIC AVE	140TH ST	0	353	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	390	25	No	No	One-way stop
55451	Co Rd W33/155TH ST	OBRIEN AVE	0	345	0	90	0	< 1.5 mi	0	No	0	> 500 ft	0	0	0	0	390	10	No	No	One-way stop

APPENDIX C

CURVE PROJECT SHEETS

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 16

Project Name: Curve 10387 on FAIRBANK-AMISH BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: FAIRBANK-AMISH BLVD
Length (ft): 390 **Length (mi):** 0.07
GPS ID: 10387

Project Location

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	700	6
Curve Radius (ft)	582	4
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	6	2
K or A Crash	Yes	2
Total Risk Factor Points (18 max)		**16**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	Yes
Shoulder Width (ft)	6
Rumble Strips	Yes
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	6
K and A Crashes	3

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.07	MILE	$ 1,200	$ 89
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.07	MILE	$ 800	$ 59
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.07	MILE	$ 65,000	$ 4,802
	Install Edgeline Rumble Strips (Both Sides of Road)	0.07	MILE	$ 2,500	$ 185
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.07	MILE	$ 20,000	$ 1,478
				Subtotal:	$ 11,612
				Engineering: (% +/-) 15%	$ 1,833
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 611
				Contingency: (% +/-) 20%	$ 2,444
				Estimated Project Cost:	**$ 19,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 6590 on 220TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

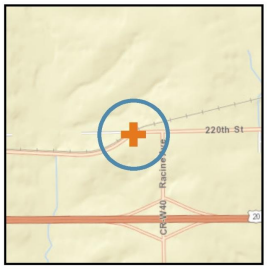
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 220TH ST
Length (ft): 458 **Length (mi):** 0.09

GPS ID: 6590

Project Location



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1610	6
Curve Radius (ft)	831	4
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	4	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**14**

Other Information	
Speed Limit (mph)	40
Number of Lanes	2
Lane Width (ft)	12
Paved Shoulder	Yes
Shoulder Width (ft)	4
Rumble Strips	Yes
Existing Curve Chevrons	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,200	$ -
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.09	MILE	$ 1,800	$ 156
	Install 4" Retroreflective Centerline	0.09	MILE	$ 800	$ 69
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.09	MILE	$ 65,000	$ 5,640
	Install Edgeline Rumble Strips (Both Sides of Road)	0.09	MILE	$ 2,500	$ 217
	Install Centerline Rumble Strips	0.09	MILE	$ 1,000	$ 87
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.09	MILE	$ 20,000	$ 1,735
				Subtotal:	$ 12,905
				Engineering: (% +/-) 15%	$ 2,098
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 699
				Contingency: (% +/-) 20%	$ 2,798
				Estimated Project Cost:	**$ 21,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 10390 on OTTERVILLE BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: OTTERVILLE BLVD
Length (ft): 358 **Length (mi):** 0.07
GPS ID: 10390

Project Location

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	790	6
Curve Radius (ft)	617	4
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	6	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**14**

Other Information	
Speed Limit (mph)	25
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	6
Rumble Strips	No
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	4
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.07	MILE	$ 1,200	$ 81
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.07	MILE	$ 800	$ 54
	Pave 2' Shoulder with Safety Edge (Both Sides of Road) **	0.07	MILE	$ 65,000	$ 4,404
	Install Edgeline Rumble Strips (Both Sides of Road)	0.07	MILE	$ 2,500	$ 169
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.07	MILE	$ 20,000	$ 1,355
				Subtotal:	$ 11,064
				Engineering: (% +/-) 15%	$ 1,664
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 555
				Contingency: (% +/-) 20%	$ 2,218
				Estimated Project Cost:	**$ 18,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.
** Funding through TSIP has been requested to pave the shoulder along the bridge portion of the curve. The recommendation will remain in the project sheet for reference.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14

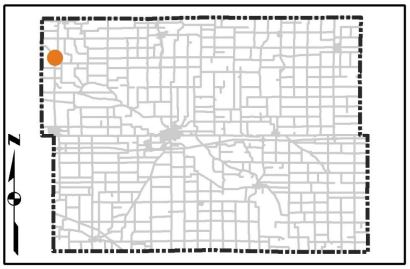
Project Name: Curve 10393 on BAXTER AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: BAXTER AVE
Length (ft): 754 **Length (mi):** 0.14
GPS ID: 10393

Project Location



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1470	6
Curve Radius (ft)	1868	2
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	6	2
K or A Crash	Yes	2
Total Risk Factor Points (18 max)		**14**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	6
Rumble Strips	No
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	8
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.14	MILE	$ 1,200	$ 171
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.14	MILE	$ 800	$ 114
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.14	MILE	$ 65,000	$ 9,282
	Install Edgeline Rumble Strips (Both Sides of Road)	0.14	MILE	$ 2,500	$ 357
	Install Centerline Rumble Strips	0.14	MILE	$ 1,000	$ 143
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.14	MILE	$ 20,000	$ 2,856
				Subtotal:	$ 17,924
				Engineering: (% +/-) 15%	$ 2,841
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 947
				Contingency: (% +/-) 20%	$ 3,788
				Estimated Project Cost:	**$ 28,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 10950 on QUASQUETON DIAGONAL BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON DIAGONAL BLVD
Length (ft): 919 **Length (mi):** 0.17
GPS ID: 10950

Project Location

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	910	6
Curve Radius (ft)	1906	2
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	4	2
K or A Crash	Yes	2
Total Risk Factor Points (18 max)		**14**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	4
Rumble Strips	No
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.17	MILE	$ 1,200	$ 209
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.17	MILE	$ 800	$ 139
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.17	MILE	$ 65,000	$ 11,312
	Install Edgeline Rumble Strips (Both Sides of Road)	0.17	MILE	$ 2,500	$ 435
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.17	MILE	$ 20,000	$ 3,481
				Subtotal:	$ 20,575
				Engineering: (% +/-) 15%	$ 3,347
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 1,116
				Contingency: (% +/-) 20%	$ 4,462
				Estimated Project Cost:	**$ 32,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 10955 on FAIRBANK-AMISH BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: FAIRBANK-AMISH BLVD
Length (ft): 1183 **Length (mi):** 0.22
GPS ID: 10955

Project Location

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	790	6
Curve Radius (ft)	1422	2
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	5	2
K or A Crash	Yes	2
Total Risk Factor Points (18 max)		**14**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	5
Rumble Strips	Yes
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.22	MILE	$ 1,200	$ 269
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.22	MILE	$ 800	$ 179
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.22	MILE	$ 65,000	$ 14,559
	Install Edgeline Rumble Strips (Both Sides of Road)	0.22	MILE	$ 2,500	$ 560
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.22	MILE	$ 20,000	$ 4,480
				Subtotal:	$ 25,047
				Engineering: (% +/-) 15%	$ 3,916
				Mobilization: (% +/-)* 10%	$ 2,510
				Traffic Control: (% +/-) 5%	$ 1,305
				Contingency: (% +/-) 20%	$ 5,222
				Estimated Project Cost:	**$ 38,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 13

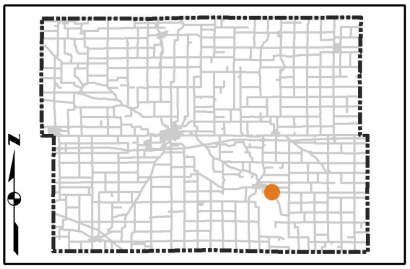
Project Name: Curve 10377 on 280TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 280TH ST
Length (ft): 787 **Length (mi):** 0.15
GPS ID: 10377

Project Location



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	340	3
Curve Radius (ft)	842	4
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	5	2
K or A Crash	Yes	2
Total Risk Factor Points (18 max)		**13**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	5
Rumble Strips	No
Existing Curve Chevrons	Yes **

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	5
K and A Crashes	2

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.15	MILE	$ 1,200	$ 179
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.15	MILE	$ 800	$ 119
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.15	MILE	$ 65,000	$ 9,687
	Install Edgeline Rumble Strips (Both Sides of Road)	0.15	MILE	$ 2,500	$ 373
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.15	MILE	$ 20,000	$ 2,981
				Subtotal:	$ 18,338
				Engineering: (% +/-) 15%	$ 3,061
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 1,020
				Contingency: (% +/-) 20%	$ 4,081
				Estimated Project Cost:	**$ 29,000**

Basis for Cost Projection
- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.
** Curve chevrons exist; however, it is recommended that the County Engineer determine if they need to be upgraded or replaced.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

Project Name: Curve 16 on 118TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 118TH ST
Length (ft): 1040 **Length (mi):** 0.20

GPS ID: 16

Project Location

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	820	6
Curve Radius (ft)	1199	2
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	10	0
K or A Crash	Yes	2
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	10
Rumble Strips	No
Existing Curve Chevrons	Yes **

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	5
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.20	MILE	$ 1,200	$ 236
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.20	MILE	$ 800	$ 158
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.20	MILE	$ 65,000	$ 12,801
	Install Edgeline Rumble Strips (Both Sides of Road)	0.20	MILE	$ 2,500	$ 492
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.20	MILE	$ 20,000	$ 3,939
				Subtotal:	$ 22,627
				Engineering: (% +/-) 15%	$ 3,703
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 1,234
				Contingency: (% +/-) 20%	$ 4,937
				Estimated Project Cost:	**$ 35,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.
** Curve chevrons exist; however, it is recommended that the County Engineer determine if they need to be upgraded or replaced.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

Project Name: Curve 10363 on WAPSIE ACCESS BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

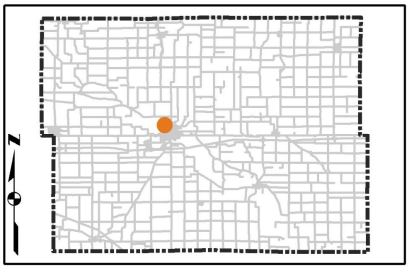
Prepared By: DJG/DVM
Checked By: MMO

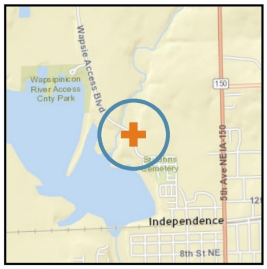
Location Description

Paved Road: WAPSIE ACCESS BLVD
Length (ft): 330 **Length (mi):** 0.06

GPS ID: 10363

Project Location





Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	880	6
Curve Radius (ft)	296	4
Distance from Driveway or Intersection	> 200 ft	0
Shoulder Width (ft)	3	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	35
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	3
Rumble Strips	No
Existing Curve Chevrons	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.06	MILE	$ 1,200	$ 75
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.06	MILE	$ 800	$ 50
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.06	MILE	$ 65,000	$ 4,062
	Install Edgeline Rumble Strips (Both Sides of Road)	0.06	MILE	$ 2,500	$ 156
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.06	MILE	$ 20,000	$ 1,250
				Subtotal:	$ 10,593
				Engineering: (% +/-) 15%	$ 1,840
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 613
				Contingency: (% +/-) 20%	$ 2,454
				Estimated Project Cost:	**$ 18,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

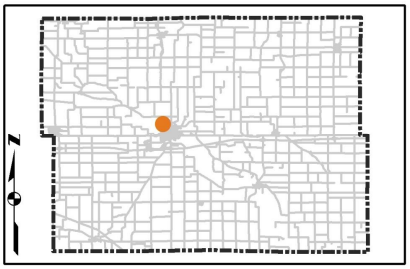
Project Name: Curve 10364 on WAPSIE ACCESS BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: WAPSIE ACCESS BLVD
Length (ft): 491 **Length (mi):** 0.09
GPS ID: 10364

Project Location



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	880	6
Curve Radius (ft)	809	4
Distance from Driveway or Intersection	> 200 ft	0
Shoulder Width (ft)	3	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	35
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	3
Rumble Strips	No
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	3
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.09	MILE	$ 1,200	$ 112
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.09	MILE	$ 800	$ 74
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.09	MILE	$ 65,000	$ 6,050
	Install Edgeline Rumble Strips (Both Sides of Road)	0.09	MILE	$ 2,500	$ 233
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.09	MILE	$ 20,000	$ 1,861
				Subtotal:	$ 13,330
				Engineering: (% +/-) 15%	$ 2,314
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 771
				Contingency: (% +/-) 20%	$ 3,085
				Estimated Project Cost:	**$ 22,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

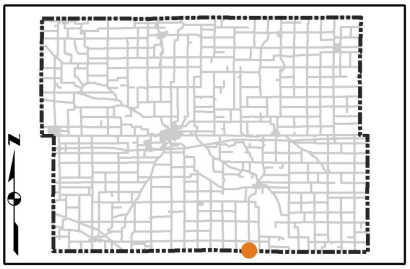
Project Name: Curve 10376 on QUASQUETON AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

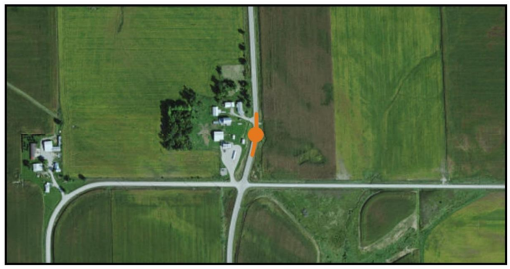
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON AVE
Length (ft): 295 **Length (mi):** 0.06
GPS ID: 10376

Project Location





Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1400	6
Curve Radius (ft)	978	4
Distance from Driveway or Intersection	> 200 ft	0
Shoulder Width (ft)	4	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	4
Rumble Strips	No
Existing Curve Chevrons	Yes **

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.06	MILE	$ 1,200	$ 67
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.06	MILE	$ 800	$ 45
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.06	MILE	$ 65,000	$ 3,634
	Install Edgeline Rumble Strips (Both Sides of Road)	0.06	MILE	$ 2,500	$ 140
	Install Centerline Rumble Strips	0.06	MILE	$ 1,000	$ 56
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.06	MILE	$ 20,000	$ 1,118
				Subtotal:	$ 10,060
				Engineering: (% +/-) 15%	$ 1,665
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 555
				Contingency: (% +/-) 20%	$ 2,220
				Estimated Project Cost:	**$ 17,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.
** Curve chevrons exist; however, it is recommended that the County Engineer determine if they need to be upgraded or replaced.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

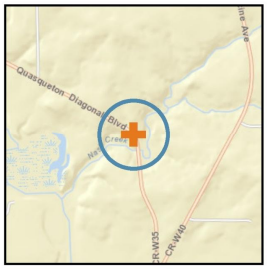
Project Name: Curve 10379 on QUASQUETON DIAGONAL BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON DIAGONAL BLVD
Length (ft): 493 **Length (mi):** 0.09
GPS ID: 10379

Project Location



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	910	6
Curve Radius (ft)	629	4
Distance from Driveway or Intersection	> 200 ft	0
Shoulder Width (ft)	4	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	Yes
Shoulder Width (ft)	4
Rumble Strips	Yes
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	0
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.09	MILE	$ 1,200	$ 112
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.09	MILE	$ 800	$ 75
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.09	MILE	$ 65,000	$ 6,069
	Install Edgeline Rumble Strips (Both Sides of Road)	0.09	MILE	$ 2,500	$ 233
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.09	MILE	$ 20,000	$ 1,867
				Subtotal:	$ 13,356
				Engineering: (% +/-) 15%	$ 2,304
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 768
				Contingency: (% +/-) 20%	$ 3,072
				Estimated Project Cost:	**$ 22,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

Project Name: Curve 10381 on QUASQUETON DIAGONAL BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON DIAGONAL BLVD
Length (ft): 393 **Length (mi):** 0.07
GPS ID: 10381

Project Location

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	910	6
Curve Radius (ft)	634	4
Distance from Driveway or Intersection	> 200 ft	0
Shoulder Width (ft)	4	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	45
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	Yes
Shoulder Width (ft)	4
Rumble Strips	Yes
Existing Curve Chevrons	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	3
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.07	MILE	$ 1,200	$ 89
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.07	MILE	$ 800	$ 60
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.07	MILE	$ 65,000	$ 4,836
	Install Edgeline Rumble Strips (Both Sides of Road)	0.07	MILE	$ 2,500	$ 186
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.07	MILE	$ 20,000	$ 1,488
				Subtotal:	$ 11,659
				Engineering: (% +/-) 15%	$ 1,815
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 605
				Contingency: (% +/-) 20%	$ 2,420
				Estimated Project Cost:	**$ 19,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

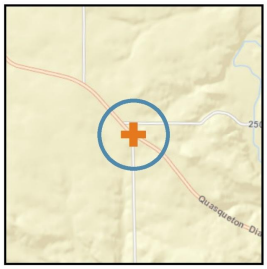
Project Name: Curve 10949 on QUASQUETON DIAGONAL BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON DIAGONAL BLVD
Length (ft): 457 **Length (mi):** 0.09
GPS ID: 10949

Project Location



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	910	6
Curve Radius (ft)	1922	2
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	4	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	4
Rumble Strips	No
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	1
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.09	MILE	$ 1,200	$ 104
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.09	MILE	$ 800	$ 69
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.09	MILE	$ 65,000	$ 5,624
	Install Edgeline Rumble Strips (Both Sides of Road)	0.09	MILE	$ 2,500	$ 216
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.09	MILE	$ 20,000	$ 1,730
				Subtotal:	$ 12,743
				Engineering: (% +/-) 15%	$ 2,159
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 720
				Contingency: (% +/-) 20%	$ 2,878
				Estimated Project Cost:	**$ 21,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

Project Name: Curve 11489 on QUASQUETON DIAGONAL BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON DIAGONAL BLVD
Length (ft): 326 **Length (mi):** 0.06
GPS ID: 11489

Project Location

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	910	6
Curve Radius (ft)	1368	2
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	4	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information		
Speed Limit (mph)	55	
Number of Lanes	2	
Lane Width (ft)	11	
Paved Shoulder	No	
Shoulder Width (ft)	4	
Rumble Strips	No	**
Existing Curve Chevrons	No	

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	0
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.06	MILE	$ 1,200	$ 74
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.06	MILE	$ 800	$ 49
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.06	MILE	$ 65,000	$ 4,017
	Install Edgeline Rumble Strips (Both Sides of Road)	0.06	MILE	$ 2,500	$ 155
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.06	MILE	$ 20,000	$ 1,236
				Subtotal:	$ 10,532
				Engineering: (% +/-) 15%	$ 1,863
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 621
				Contingency: (% +/-) 20%	$ 2,484
				Estimated Project Cost:	**$ 18,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.
** There are centerline rumble strips.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 12

Project Name: Curve 11500 on BAXTER AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

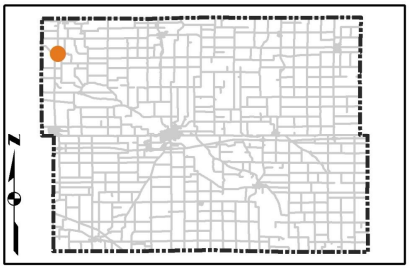
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: BAXTER AVE
Length (ft): 754 **Length (mi):** 0.14

GPS ID: 11500

Project Location



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1470	6
Curve Radius (ft)	1907	2
Distance from Driveway or Intersection	< 200 ft	2
Shoulder Width (ft)	6	2
K or A Crash	No	0
Total Risk Factor Points (18 max)		**12**

Other Information	
Speed Limit (mph)	55
Number of Lanes	2
Lane Width (ft)	11
Paved Shoulder	No
Shoulder Width (ft)	6
Rumble Strips	No
Existing Curve Chevrons	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	1
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.14	MILE	$ 1,200	$ 171
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	0.14	MILE	$ 800	$ 114
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.14	MILE	$ 65,000	$ 9,279
	Install Edgeline Rumble Strips (Both Sides of Road)	0.14	MILE	$ 2,500	$ 357
	Install Centerline Rumble Strips	0.14	MILE	$ 1,000	$ 143
	Install Curve Chevrons	1	CURVE	$ 3,500	$ 3,500
	Install Advance Warning Signs and Speed Advisory Plaques	1	CURVE	$ 1,500	$ 1,500
	Clear and Grub (15 ft Both Sides of Road)	0.14	MILE	$ 20,000	$ 2,855
				Subtotal:	$ 17,919
				Engineering: (% +/-) 15%	$ 2,843
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 948
				Contingency: (% +/-) 20%	$ 3,790
				Estimated Project Cost:	**$ 28,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

APPENDIX D

CURVE RISK FACTOR RANKING RESULTS

Buchanan County
Local Road Safety Plan
Curve Risk Factor Points

GPS ID	Paved Road	Length (ft)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Distance from Driveway/ Intersection (Value)	Distance from Driveway/ Intersection (Points)	Shoulder Width (Value)	Shoulder Width (Points)	K or A Crash (Value)	K or A Crash (Points)	Total Crashes	K and A	Paved Shoulder	Speed Limit	Rumble Strips	Existing Curve Chevrons	Lane Width (ft)
10387	FAIRBANK-AMISH BLVD	390	**16**	700	**6**	582	**4**	< 200 ft	**2**	6	**2**	Yes	**2**	6	3	Yes	55	Yes	No	11
6590	220TH ST	458	**14**	1,610	**6**	831	**4**	< 200 ft	**2**	4	**2**	No	**0**	2	0	Yes	40	Yes	No	12
10390	OTTERVILLE BLVD	358	**14**	790	**6**	617	**4**	< 200 ft	**2**	6	**2**	No	**0**	4	0	No	25	No	No	11
10393	BAXTER AVE	754	**14**	1,470	**6**	1,868	**2**	< 200 ft	**2**	6	**2**	Yes	**2**	8	1	No	55	No	No	11
10950	QUASQUETON DIAGONAL BLVD	919	**14**	910	**6**	1,906	**2**	< 200 ft	**2**	4	**2**	Yes	**2**	2	1	No	55	No	No	11
10955	FAIRBANK-AMISH BLVD	1,183	**14**	790	**6**	1,422	**2**	< 200 ft	**2**	5	**2**	Yes	**2**	2	1	No	55	Yes	No	11
10377	280TH ST	787	**13**	340	**3**	842	**4**	< 200 ft	**2**	5	**2**	Yes	**2**	5	2	No	55	No	Yes	11
16	118TH ST	1,040	**12**	820	**6**	1,199	**2**	< 200 ft	**2**	10	**0**	Yes	**2**	5	1	No	55	No	Yes	11
10363	WAPSIE ACCESS BLVD	330	**12**	880	**6**	296	**4**	> 200 ft	**0**	3	**2**	No	**0**	2	0	No	35	No	No	11
10364	WAPSIE ACCESS BLVD	491	**12**	880	**6**	809	**4**	> 200 ft	**0**	3	**2**	No	**0**	3	0	No	35	No	No	11
10376	QUASQUETON AVE	295	**12**	1,400	**6**	978	**4**	> 200 ft	**0**	4	**2**	No	**0**	2	0	No	55	No	Yes	11
10379	QUASQUETON DIAGONAL BLVD	493	**12**	910	**6**	629	**4**	> 200 ft	**0**	4	**2**	No	**0**	0	0	Yes	55	Yes	No	11
10381	QUASQUETON DIAGONAL BLVD	393	**12**	910	**6**	634	**4**	> 200 ft	**0**	4	**2**	No	**0**	3	0	Yes	45	Yes	No	11
10949	QUASQUETON DIAGONAL BLVD	457	**12**	910	**6**	1,922	**2**	< 200 ft	**2**	4	**2**	No	**0**	1	0	No	55	No	No	11
11475	WAPSIE ACCESS BLVD	357	**12**	880	**6**	284	**4**	> 200 ft	**0**	3	**2**	No	**0**	0	0	No	25	No	No	11
11489	QUASQUETON DIAGONAL BLVD	326	**12**	910	**6**	1,368	**2**	< 200 ft	**2**	4	**2**	No	**0**	0	0	No	55	No	No	11
11500	BAXTER AVE	754	**12**	1,470	**6**	1,907	**2**	< 200 ft	**2**	6	**2**	No	**0**	1	0	No	55	No	No	11
10371	BENSON-SHADY GROVE AVE	1,349	**11**	590	**3**	1,190	**2**	< 200 ft	**2**	5	**2**	Yes	**2**	5	2	No	55	No	No	11
10373	BLACKHAWK-BUCHANAN AVE	162	**11**	625	**3**	269	**4**	< 200 ft	**2**	4	**2**	No	**0**	2	0	No	55	No	No	11
10386	120TH ST	1,117	**11**	490	**3**	1,706	**2**	< 200 ft	**2**	6	**2**	Yes	**2**	1	1	No	55	No	No	11
10952	OLYMPIC AVE	1,085	**11**	410	**3**	768	**4**	< 200 ft	**2**	5	**2**	No	**0**	1	0	No	55	No	No	11
11478	TROY MILLS BLVD	789	**11**	560	**3**	581	**4**	< 200 ft	**2**	6	**2**	No	**0**	0	0	No	55	No	No	11
11493	110TH ST	1,009	**11**	440	**3**	754	**4**	< 200 ft	**2**	4	**2**	No	**0**	1	0	No	55	No	No	11
11623	L AVE	422	**11**	480	**3**	385	**4**	< 200 ft	**2**	4	**2**	No	**0**	0	0	No	55	No	No	11
3239	120TH ST	999	**10**	760	**6**	1,182	**2**	< 200 ft	**2**	10	**0**	No	**0**	0	0	No	55	No	No	11
6588	220TH ST	426	**10**	1,610	**6**	1,129	**2**	> 200 ft	**0**	4	**2**	No	**0**	4	0	No	55	No	No	12
9659	220TH ST	819	**10**	1,610	**6**	1,883	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	40	No	No	12
10366	THREE ELMS PARK BLVD	261	**10**	1,100	**6**	570	**4**	> 200 ft	**0**	8	**0**	No	**0**	2	0	Yes	55	No	No	11
10374	QUASQUETON AVE	1,840	**10**	1,210	**6**	2,237	**2**	> 200 ft	**0**	4	**2**	No	**0**	1	0	No	55	No	No	11
10375	QUASQUETON AVE	1,151	**10**	1,210	**6**	1,422	**2**	> 200 ft	**0**	4	**2**	No	**0**	2	0	No	55	No	No	11
10380	QUASQUETON DIAGONAL BLVD	559	**10**	910	**6**	1,622	**2**	> 200 ft	**0**	4	**2**	No	**0**	1	0	No	55	No	No	11
10382	QUASQUETON DIAGONAL BLVD	425	**10**	910	**6**	1,030	**2**	> 200 ft	**0**	4	**2**	No	**0**	3	0	No	45	No	No	11
10383	QUASQUETON DIAGONAL BLVD	361	**10**	910	**6**	1,255	**2**	> 200 ft	**0**	4	**2**	No	**0**	1	0	No	55	No	No	11
10385	SLATER AVE	1,608	**10**	810	**6**	2,836	**0**	< 200 ft	**2**	4	**2**	No	**0**	2	0	No	55	No	No	11
10388	FAIRBANK-AMISH BLVD	1,342	**10**	790	**6**	1,430	**2**	> 200 ft	**0**	5	**2**	No	**0**	4	0	No	55	No	No	11
10389	OTTERVILLE BLVD	621	**10**	790	**6**	1,116	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	11
10391	OTTERVILLE BLVD	522	**10**	790	**6**	1,100	**2**	> 200 ft	**0**	4	**2**	No	**0**	3	0	No	55	No	No	11
10392	OTTERVILLE BLVD	1,181	**10**	790	**6**	1,139	**2**	> 200 ft	**0**	4	**2**	No	**0**	3	0	No	55	No	No	11
10947	WAPSIE ACCESS BLVD	229	**10**	880	**6**	2,000	**2**	> 200 ft	**0**	3	**2**	No	**0**	1	0	No	55	No	No	11
10951	SLATER AVE	2,657	**10**	810	**6**	2,868	**0**	< 200 ft	**2**	4	**2**	No	**0**	5	0	No	55	No	No	11
11488	QUASQUETON DIAGONAL BLVD	593	**10**	910	**6**	1,745	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	11
11490	QUASQUETON DIAGONAL BLVD	458	**10**	910	**6**	1,367	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	11
11491	QUASQUETON DIAGONAL BLVD	361	**10**	910	**6**	1,162	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	11
11499	FAIRBANK-AMISH BLVD	753	**10**	790	**6**	1,859	**2**	> 200 ft	**0**	5	**2**	No	**0**	0	0	No	55	No	No	11
122	BLACKHAWK-BUCHANAN AVE	1,432	**9**	625	**3**	980	**4**	> 200 ft	**0**	4	**2**	No	**0**	1	0	No	55	No	No	11
10367	GOLF COURSE BLVD	627	**9**	560	**3**	412	**4**	> 200 ft	**0**	3	**2**	No	**0**	2	0	No	55	No	No	11
10368	GOLF COURSE BLVD	651	**9**	560	**3**	402	**4**	> 200 ft	**0**	3	**2**	No	**0**	1	0	No	55	No	No	11
10372	BLACKHAWK-BUCHANAN AVE	194	**9**	625	**3**	197	**4**	> 200 ft	**0**	4	**2**	No	**0**	2	0	No	55	No	No	11
10378	BUFFALO CREEK BLVD	362	**9**	440	**3**	1,047	**2**	< 200 ft	**2**	4	**2**	No	**0**	1	0	No	55	No	No	12
10946	FREEMAN AVE	263	**9**	400	**3**	1,628	**2**	< 200 ft	**2**	5	**2**	No	**0**	2	0	No	55	No	No	11
10954	175TH ST	562	**9**	530	**3**	1,699	**2**	< 200 ft	**2**	5	**2**	No	**0**	3	0	No	55	No	No	11
6587	RACINE AVE	1,508	**8**	1,530	**6**	2,852	**0**	> 200 ft	**0**	3	**2**	No	**0**	2	0	No	55	No	No	11
6589	220TH ST	557	**8**	1,610	**6**	3,700	**0**	> 200 ft	**0**	4	**2**	No	**0**	1	0	No	40	No	No	12

Buchanan County
Local Road Safety Plan
Curve Risk Factor Points

GPS ID	Paved Road	Length (ft)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Distance from Driveway/ Intersection (Value)	Distance from Driveway/ Intersection (Points)	Shoulder Width (Value)	Shoulder Width (Points)	K or A Crash (Value)	K or A Crash (Points)	Total Crashes	K and A	Paved Shoulder	Speed Limit	Rumble Strips	Existing Curve Chevrons	Lane Width (ft)
9658	330TH ST	295	**8**	1,020	**6**	1,666	**2**	> 200 ft	**0**	7	**0**	No	**0**	1	0	No	55	No	No	12
10369	LAPORTE RD	947	**8**	300	**0**	712	**4**	< 200 ft	**2**	3	**2**	No	**0**	1	0	No	55	No	No	11
11477	285TH ST	495	**8**	170	**0**	389	**4**	< 200 ft	**2**	4	**2**	No	**0**	0	0	No	25	No	No	11
11492	SLATER AVE	885	**8**	810	**6**	2,785	**0**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	11
11495	FONTANA BLVD	223	**8**	60	**0**	132	**4**	< 200 ft	**2**	6	**2**	No	**0**	1	0	No	55	No	No	12
11498	FONTANA BLVD	555	**8**	60	**0**	929	**4**	< 200 ft	**2**	6	**2**	No	**0**	0	0	No	55	No	No	12
10365	205TH ST	1,014	**7**	440	**3**	1,131	**2**	> 200 ft	**0**	4	**2**	No	**0**	2	0	No	55	No	No	11
10384	130TH ST	460	**7**	530	**3**	1,856	**2**	> 200 ft	**0**	6	**2**	No	**0**	0	0	No	55	No	No	11
10948	BUFFALO CREEK BLVD	590	**7**	440	**3**	1,502	**2**	< 200 ft	**2**	7	**0**	No	**0**	1	0	No	55	No	No	12
11476	205TH ST	984	**7**	440	**3**	1,148	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	11
11479	VINCENT AVE	525	**7**	440	**3**	1,142	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11480	BUFFALO CREEK BLVD	425	**7**	440	**3**	1,458	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11481	BUFFALO CREEK BLVD	492	**7**	440	**3**	1,586	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11482	BUFFALO CREEK BLVD	361	**7**	440	**3**	1,260	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11483	BUFFALO CREEK BLVD	592	**7**	440	**3**	1,133	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11484	BUFFALO CREEK BLVD	392	**7**	440	**3**	1,688	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11485	BUFFALO CREEK BLVD	428	**7**	440	**3**	1,128	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11486	BUFFALO CREEK BLVD	394	**7**	440	**3**	1,087	**2**	> 200 ft	**0**	4	**2**	No	**0**	0	0	No	55	No	No	12
11494	118TH ST	1,016	**7**	490	**3**	1,736	**2**	> 200 ft	**0**	5	**2**	No	**0**	0	0	No	55	No	No	11
10362	LAPORTE RD	755	**6**	300	**0**	1,408	**2**	< 200 ft	**2**	4	**2**	No	**0**	1	0	No	55	No	No	11
11471	LAPORTE RD	555	**6**	300	**0**	1,922	**2**	< 200 ft	**2**	4	**2**	No	**0**	0	0	No	55	No	No	11
10370	BENSON-SHADY GROVE AVE	1,935	**5**	590	**3**	1,632	**2**	> 200 ft	**0**	7	**0**	No	**0**	2	0	No	55	No	No	12
11474	FREEMAN AVE	394	**5**	400	**3**	2,706	**0**	> 200 ft	**0**	5	**2**	No	**0**	0	0	No	55	No	No	11
10945	LAPORTE RD	459	**4**	300	**0**	1,116	**2**	> 200 ft	**0**	4	**2**	No	**0**	1	0	No	55	No	No	11
10953	FONTANA BLVD	363	**4**	60	**0**	1,048	**2**	> 200 ft	**0**	6	**2**	No	**0**	0	0	No	55	No	No	12
11470	LAPORTE RD	948	**4**	300	**0**	1,142	**2**	> 200 ft	**0**	5	**2**	No	**0**	0	0	No	55	No	No	11
11472	LAPORTE RD	426	**4**	300	**0**	1,049	**2**	> 200 ft	**0**	5	**2**	No	**0**	0	0	No	55	No	No	11
11473	LAPORTE RD	689	**4**	300	**0**	1,150	**2**	> 200 ft	**0**	5	**2**	No	**0**	0	0	No	55	No	No	11
11496	FONTANA BLVD	393	**4**	60	**0**	1,378	**2**	> 200 ft	**0**	6	**2**	No	**0**	0	0	No	55	No	No	12
11497	FONTANA BLVD	525	**4**	60	**0**	1,124	**2**	> 200 ft	**0**	6	**2**	No	**0**	0	0	No	55	No	No	12

APPENDIX E

SEGMENT PROJECT SHEETS

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 10

Project Name: OTTERVILLE BLVD between FAIRBANK-AMISH BLVD and JAMESTOWN AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

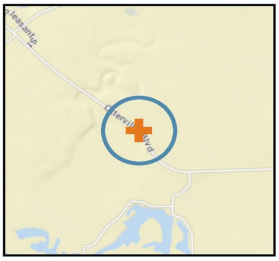
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: OTTERVILLE BLVD
Length (mi): 4.22

GPS ID: 664

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	822	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	15.18	2
Lane Departure Crash Rate per VMT	0.00009	2
Total Risk Factor Points (18 max)		**10**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	28
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	4.22	MILE	$ 1,200	$ 5,058
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	4.22	MILE	$ 800	$ 3,372
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	4.22	MILE	$ 2,000	$ 8,431
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	4.22	MILE	$ 20,000	$ 84,306

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 101,167
Engineering: (% +/-)	15%	$ 15,267
Mobilization: (% +/-)*	10%	$ 10,120
Traffic Control: (% +/-)	5%	$ 5,089
Contingency:(% +/-)	20%	$ 20,356
Estimated Project Cost:		**$ 152,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 10

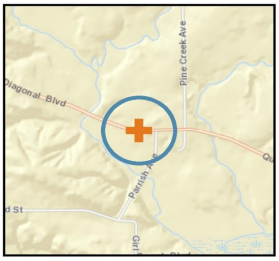
Project Name: QUASQUETON DIAGONAL BLVD between 250TH ST and 1500 FT PAST N FIRST ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON DIAGONAL BLVD
Length (mi): 3.46
GPS ID: 666

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1120	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	10.98	2
Lane Departure Crash Rate per VMT	0.00005	2
Total Risk Factor Points (18 max)		**10**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	45
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	11
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	3.46	MILE	$ 1,200	$ 4,152
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	3.46	MILE	$ 800	$ 2,768
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	3.46	MILE	$ 65,000	$ 224,885
	Install Edgeline Rumble Strips (Both Sides of Road)	3.46	MILE	$ 2,000	$ 6,920
	Install Centerline Rumble Strips	3.46	MILE	$ 1,000	$ 3,460
	Clear and Grub (15 ft Both Sides of Road)	3.46	MILE	$ 20,000	$ 69,195
				Subtotal:	$ 311,379
				Engineering: (% +/-) 15%	$ 47,055
				Mobilization: (% +/-)* 10%	$ 31,140
				Traffic Control: (% +/-) 5%	$ 15,685
				Contingency:(% +/-) 20%	$ 62,741
				Estimated Project Cost:	**$ 468,000**

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 10

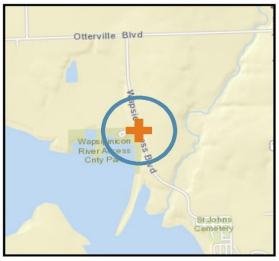
Project Name: WAPSIE ACCESS BLVD between OTTERVILLE BLVD and 14TH ST NE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: WAPSIE ACCESS BLVD
Length (mi): 1.09
GPS ID: 678

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1120	6
Pavement and Shoulder Width (ft)	28.0	0
Number of Driveways/Intersections per Mile	24.75	4
Lane Departure Crash Rate per VMT	0.00000	0
Total Risk Factor Points (18 max)		**10**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	45
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	6
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	1.09	MILE	$ 1,200	$ 1,309
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	1.09	MILE	$ 800	$ 873
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	1.09	MILE	$ 65,000	$ 70,915
	Install Edgeline Rumble Strips (Both Sides of Road)	1.09	MILE	$ 2,000	$ 2,182
	Install Centerline Rumble Strips	1.09	MILE	$ 1,000	$ 1,091
	Clear and Grub (15 ft Both Sides of Road)	1.09	MILE	$ 20,000	$ 21,820

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 98,190
Engineering: (% +/-)	15%	$ 14,996
Mobilization: (% +/-)*	10%	$ 9,820
Traffic Control: (% +/-)	5%	$ 4,999
Contingency:(% +/-)	20%	$ 19,995
Estimated Project Cost:		**$ 148,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

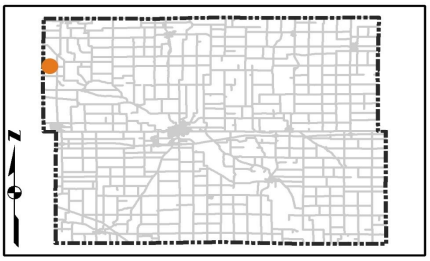
Project Name: 150TH ST between BLACK HAWK BUCHANAN AVE and V62/BAXTER AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 150TH ST
Length (mi): 1.01
GPS ID: 474

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	730	6
Pavement and Shoulder Width (ft)	34.0	0
Number of Driveways/Intersections per Mile	4.95	0
Lane Departure Crash Rate per VMT	0.00014	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	2
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	1.01	MILE	$ 1,200	$ 1,213
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	1.01	MILE	$ 800	$ 809
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	1.01	MILE	$ 2,000	$ 2,022
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	1.01	MILE	$ 20,000	$ 20,217

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 24,261
Engineering: (% +/-)	15%	$ 3,840
Mobilization: (% +/-)*	10%	$ 2,500
Traffic Control: (% +/-)	5%	$ 1,280
Contingency:(% +/-)	20%	$ 5,120
Estimated Project Cost:		**$ 37,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

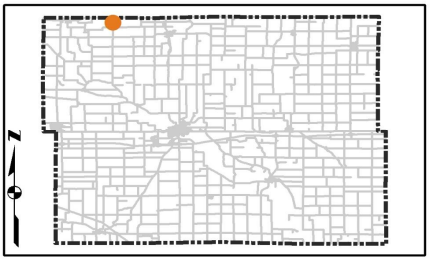
Project Name: FAIRBANK-AMISH BLVD between 110TH ST and CO RD W13/FAIRBANK-AMISH BLVD/T AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

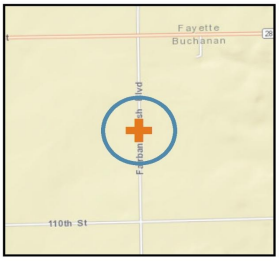
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: FAIRBANK-AMISH BLVD
Length (mi): 1.03
GPS ID: 475

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1160	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	4.84	0
Lane Departure Crash Rate per VMT	0.00050	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	Yes
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	12
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	1.03	MILE	$ 1,200	$ 1,239
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	1.03	MILE	$ 800	$ 826
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	1.03	MILE	$ 2,000	$ 2,064
	Install Centerline Rumble Strips	1.03	MILE	$ 1,000	$ 1,032
	Clear and Grub (15 ft Both Sides of Road)	1.03	MILE	$ 20,000	$ 20,643

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 25,804
Engineering: (% +/-)	15%	$ 3,977
Mobilization: (% +/-)*	10%	$ 2,590
Traffic Control: (% +/-)	5%	$ 1,326
Contingency:(% +/-)	20%	$ 5,303
Estimated Project Cost:		**$ 39,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

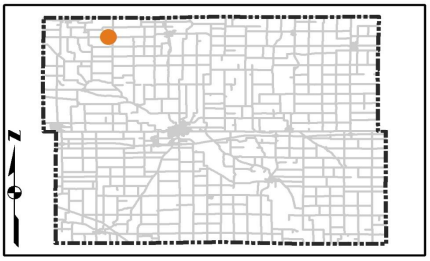
Project Name: 120TH ST between INDIANA AVE and CO RD V62/BAXTER AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

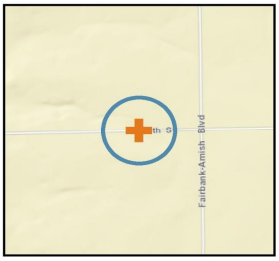
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 120TH ST
Length (mi): 6.75
GPS ID: 622

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	870	6
Pavement and Shoulder Width (ft)	42.0	0
Number of Driveways/Intersections per Mile	5.93	0
Lane Departure Crash Rate per VMT	0.00002	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	10
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	32
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	6.75	MILE	$ 1,200	$ 8,098
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	6.75	MILE	$ 800	$ 5,399
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	6.75	MILE	$ 2,000	$ 13,496
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	6.75	MILE	$ 20,000	$ 134,963

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 161,956
Engineering: (% +/-)	15%	$ 24,317
Mobilization: (% +/-)*	10%	$ 16,200
Traffic Control: (% +/-)	5%	$ 8,106
Contingency:(% +/-)	20%	$ 32,422
Estimated Project Cost:		**$ 243,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

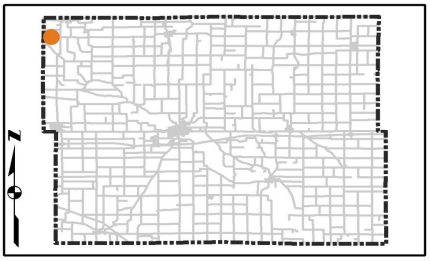
Project Name: 120TH ST between BLACKHAWK-BUCHANAN AVE and CO RD V62/BAXTER AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 120TH ST
Length (mi): 1.15
GPS ID: 624

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1160	6
Pavement and Shoulder Width (ft)	32.0	0
Number of Driveways/Intersections per Mile	3.48	0
Lane Departure Crash Rate per VMT	0.00015	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	6
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	1.15	MILE	$ 1,200	$ 1,380
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	1.15	MILE	$ 800	$ 920
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	1.15	MILE	$ 65,000	$ 74,736
	Install Edgeline Rumble Strips (Both Sides of Road)	1.15	MILE	$ 2,000	$ 2,300
	Install Centerline Rumble Strips	1.15	MILE	$ 1,000	$ 1,150
	Clear and Grub (15 ft Both Sides of Road)	1.15	MILE	$ 20,000	$ 22,996

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 103,481
Engineering: (% +/-)	15%	$ 15,813
Mobilization: (% +/-)*	10%	$ 10,350
Traffic Control: (% +/-)	5%	$ 5,271
Contingency:(% +/-)	20%	$ 21,084
Estimated Project Cost:		**$ 156,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

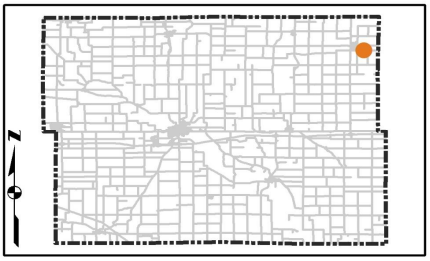
Project Name: 135TH ST between CO RD C64/135TH ST and BUCHANAN-DELAWARE AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

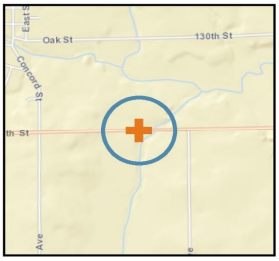
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 135TH ST
Length (mi): 2.01
GPS ID: 627

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	610	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	6.48	0
Lane Departure Crash Rate per VMT	0.00016	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	10
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	2.01	MILE	$ 1,200	$ 2,409
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	2.01	MILE	$ 800	$ 1,606
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	2.01	MILE	$ 2,000	$ 4,015
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	2.01	MILE	$ 20,000	$ 40,154

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 48,185
Engineering: (% +/-)	15%	$ 7,498
Mobilization: (% +/-)*	10%	$ 4,820
Traffic Control: (% +/-)	5%	$ 2,499
Contingency:(% +/-)	20%	$ 9,998
Estimated Project Cost:		**$ 73,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

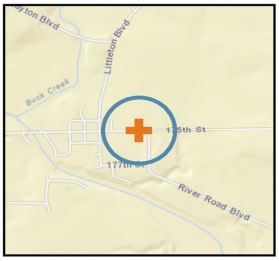
Project Name: 175TH ST between CO RD V62/BAXTER AVE and CO RD W13
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

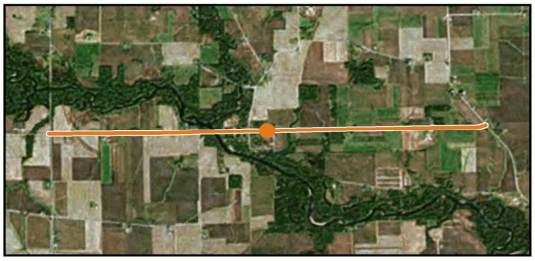
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 175TH ST
Length (mi): 4.41
GPS ID: 629

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	567	6
Pavement and Shoulder Width (ft)	32.0	0
Number of Driveways/Intersections per Mile	9.99	0
Lane Departure Crash Rate per VMT	0.00008	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	17
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	4.41	MILE	$ 1,200	$ 5,287
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	4.41	MILE	$ 800	$ 3,525
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	4.41	MILE	$ 2,000	$ 8,812
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	4.41	MILE	$ 20,000	$ 88,115

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 105,738
Engineering: (% +/-)	15%	$ 16,006
Mobilization: (% +/-)*	10%	$ 10,580
Traffic Control: (% +/-)	5%	$ 5,335
Contingency:(% +/-)	20%	$ 21,341
Estimated Project Cost:		**$ 159,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

Project Name: 220TH ST between RACINE AVE and 1500 FT PAST DOUBLE L DR
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

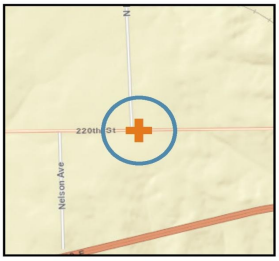
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 220TH ST
Length (mi): 5.81

GPS ID: 631

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1691	6
Pavement and Shoulder Width (ft)	44.0	0
Number of Driveways/Intersections per Mile	7.05	0
Lane Departure Crash Rate per VMT	0.00010	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	Yes
Shoulder Width (ft)	10
Speed Limit (mph)	55
Lane Width (ft)	12.0
Number of Lanes	2
Rumble Strips	Yes

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	61
K and A Crashes	2

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,200	$ -
	Install 6" Retroreflective Edgeline (Both Sides of Road)	5.81	MILE	$ 1,800	$ 10,461
	Install 4" Retroreflective Centerline	5.81	MILE	$ 800	$ 4,649
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	0.00	MILE	$ 2,000	$ -
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	5.81	MILE	$ 20,000	$ 116,230

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 131,340
Engineering: (% +/-)	15%	$ 20,070
Mobilization: (% +/-)*	10%	$ 13,140
Traffic Control: (% +/-)	5%	$ 6,690
Contingency:(% +/-)	20%	$ 26,760
Estimated Project Cost:		**$ 198,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.
** Centerline and Edgeline rumble strips exist.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

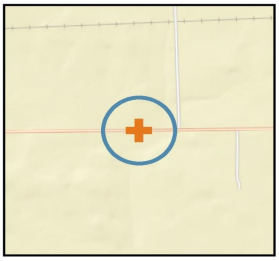
Project Name: 220TH ST between CO RD V65/BENSON-SHADY GROVE AVE and GOLF COURSE BLVD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: 220TH ST
Length (mi): 6.72
GPS ID: 633

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2516	6
Pavement and Shoulder Width (ft)	40.0	0
Number of Driveways/Intersections per Mile	8.64	0
Lane Departure Crash Rate per VMT	0.00007	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	8
Speed Limit (mph)	55
Lane Width (ft)	12.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	39
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,200	$ -
	Install 6" Retroreflective Edgeline (Both Sides of Road)	6.72	MILE	$ 1,800	$ 12,089
	Install 4" Retroreflective Centerline	6.72	MILE	$ 800	$ 5,373
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	6.72	MILE	$ 65,000	$ 436,533
	Install Edgeline Rumble Strips (Both Sides of Road)	6.72	MILE	$ 2,000	$ 13,432
	Install Centerline Rumble Strips	6.72	MILE	$ 1,000	$ 6,716
	Clear and Grub (15 ft Both Sides of Road)	6.72	MILE	$ 20,000	$ 134,318

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 608,459
Engineering: (% +/-)	15%	$ 91,384
Mobilization: (% +/-)*	10%	$ 60,850
Traffic Control: (% +/-)	5%	$ 30,461
Contingency:(% +/-)	20%	$ 121,845
Estimated Project Cost:		**$ 913,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

Project Name: 220TH ST between EASY ST and COUNTY LINE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

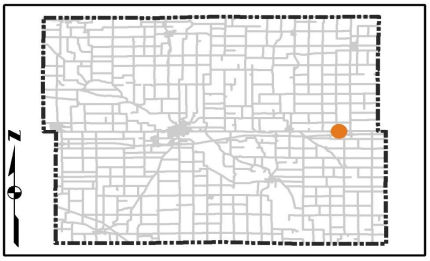
Prepared By: DJG/DVM
Checked By: MMO

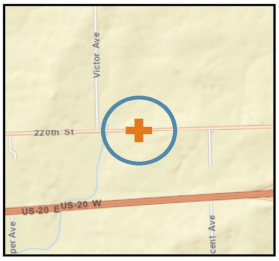
Location Description

Paved Road: 220TH ST
Length (mi): 6.74

GPS ID: 635

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	724	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	4.30	0
Lane Departure Crash Rate per VMT	0.00004	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	11
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,200	$ -
	Install 6" Retroreflective Edgeline (Both Sides of Road)	6.74	MILE	$ 1,800	$ 12,129
	Install 4" Retroreflective Centerline	6.74	MILE	$ 800	$ 5,391
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	6.74	MILE	$ 2,000	$ 13,477
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	6.74	MILE	$ 20,000	$ 134,766

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 165,762
Engineering: (% +/-)	15%	$ 24,997
Mobilization: (% +/-)*	10%	$ 16,580
Traffic Control: (% +/-)	5%	$ 8,332
Contingency:(% +/-)	20%	$ 33,329
Estimated Project Cost:		**$ 249,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

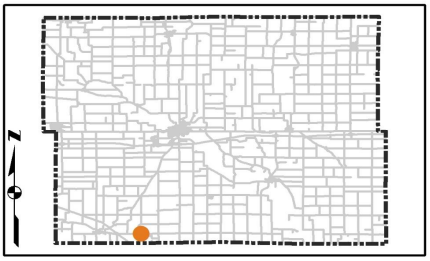
Project Name: 330TH ST between MAIN ST & EVERLY AVE and CO RD D48/330TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

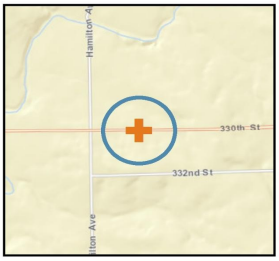
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

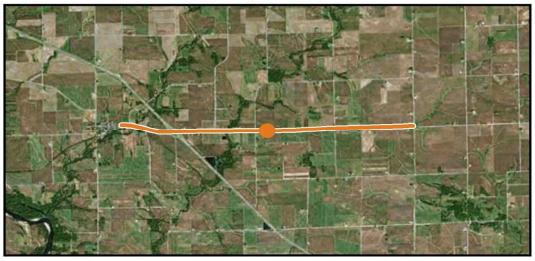
Location Description

Paved Road: 330TH ST
Length (mi): 5.53
GPS ID: 642

Project Location







Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	692	6
Pavement and Shoulder Width (ft)	38.0	0
Number of Driveways/Intersections per Mile	4.16	0
Lane Departure Crash Rate per VMT	0.00013	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	7
Speed Limit (mph)	55
Lane Width (ft)	12.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	23
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,200	$ -
	Install 6" Retroreflective Edgeline (Both Sides of Road)	5.53	MILE	$ 1,800	$ 9,955
	Install 4" Retroreflective Centerline	5.53	MILE	$ 800	$ 4,425
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	5.53	MILE	$ 2,000	$ 11,061
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	5.53	MILE	$ 20,000	$ 110,613

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 136,054
Engineering: (% +/-)	15%	$ 20,751
Mobilization: (% +/-)*	10%	$ 13,610
Traffic Control: (% +/-)	5%	$ 6,917
Contingency:(% +/-)	20%	$ 27,668
Estimated Project Cost:		**$ 205,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

Project Name: BAXTER AVE between MAIN ST and CO RD V62/BAXTER AVE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

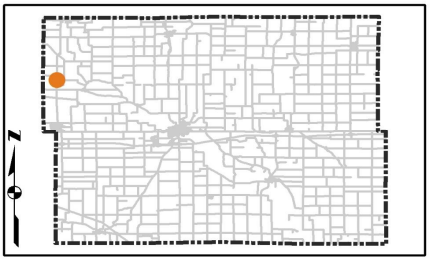
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: BAXTER AVE
Length (mi): 8.99

GPS ID: 643

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1370	6
Pavement and Shoulder Width (ft)	32.0	0
Number of Driveways/Intersections per Mile	5.23	0
Lane Departure Crash Rate per VMT	0.00008	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	51
K and A Crashes	4

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	8.99	MILE	$ 1,200	$ 10,793
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	8.99	MILE	$ 800	$ 7,195
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	8.99	MILE	$ 65,000	$ 584,600
	Install Edgeline Rumble Strips (Both Sides of Road)	8.99	MILE	$ 2,000	$ 17,988
	Install Centerline Rumble Strips	8.99	MILE	$ 1,000	$ 8,994
	Clear and Grub (15 ft Both Sides of Road)	8.99	MILE	$ 20,000	$ 179,877

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 809,446
Engineering: (% +/-)	15%	$ 121,708
Mobilization: (% +/-)*	10%	$ 75,000
Traffic Control: (% +/-)	5%	$ 40,569
Contingency:(% +/-)	20%	$ 162,277
Estimated Project Cost:		**$ 1,209,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

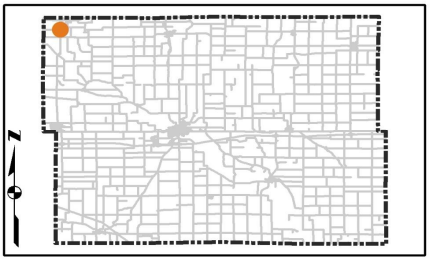
Project Name: BAXTER AVE between CO RD V62/BAXTER AVE and WALNUT ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

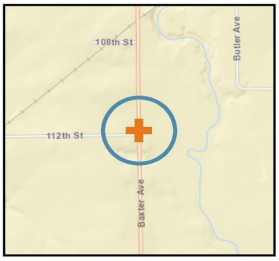
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: BAXTER AVE
Length (mi): 1.45
GPS ID: 644

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1160	6
Pavement and Shoulder Width (ft)	34.0	0
Number of Driveways/Intersections per Mile	6.19	0
Lane Departure Crash Rate per VMT	0.00006	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	5
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	1.45	MILE	$ 1,200	$ 1,744
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	1.45	MILE	$ 800	$ 1,163
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	1.45	MILE	$ 65,000	$ 94,454
	Install Edgeline Rumble Strips (Both Sides of Road)	1.45	MILE	$ 2,000	$ 2,906
	Install Centerline Rumble Strips	1.45	MILE	$ 1,000	$ 1,453
	Clear and Grub (15 ft Both Sides of Road)	1.45	MILE	$ 20,000	$ 29,063

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 130,782
Engineering: (% +/-)	15%	$ 19,927
Mobilization: (% +/-)*	10%	$ 13,080
Traffic Control: (% +/-)	5%	$ 6,642
Contingency:(% +/-)	20%	$ 26,569
Estimated Project Cost:		**$ 197,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

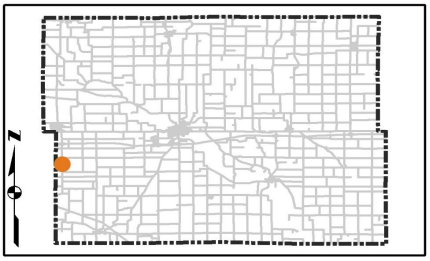
Project Name: BENSON-SHADY GROVE AVE between 220TH ST/SOUTH ST and 3300 FT PAST 288TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

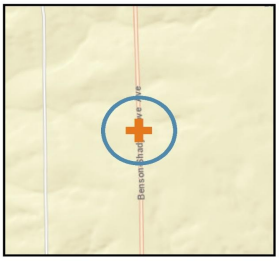
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: BENSON-SHADY GROVE AVE
Length (mi): 7.17
GPS ID: 645

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1225	6
Pavement and Shoulder Width (ft)	32.0	0
Number of Driveways/Intersections per Mile	9.35	0
Lane Departure Crash Rate per VMT	0.00013	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	36
K and A Crashes	5

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	7.17	MILE	$ 1,200	$ 8,601
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	7.17	MILE	$ 800	$ 5,734
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	7.17	MILE	$ 65,000	$ 465,873
	Install Edgeline Rumble Strips (Both Sides of Road)	7.17	MILE	$ 2,000	$ 14,335
	Install Centerline Rumble Strips	7.17	MILE	$ 1,000	$ 7,167
	Clear and Grub (15 ft Both Sides of Road)	7.17	MILE	$ 20,000	$ 143,345

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 645,054
Engineering: (% +/-)	15%	$ 96,913
Mobilization: (% +/-)*	10%	$ 64,510
Traffic Control: (% +/-)	5%	$ 32,304
Contingency:(% +/-)	20%	$ 129,218
Estimated Project Cost:		**$ 968,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

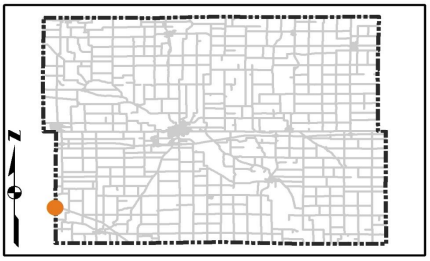
Project Name: BLACKHAWK-BUCHANAN AVE between 3300 FT SHORT OF 288TH ST and LAPORTE RD
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

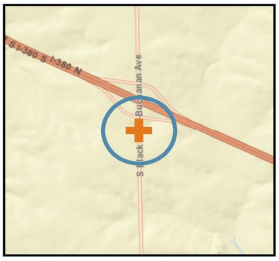
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: BLACKHAWK-BUCHANAN AVE
Length (mi): 2.28
GPS ID: 646

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	764	6
Pavement and Shoulder Width (ft)	40.0	0
Number of Driveways/Intersections per Mile	3.94	0
Lane Departure Crash Rate per VMT	0.00011	2
Total Risk Factor Points (18 max)		8

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	8
Speed Limit (mph)	55
Lane Width (ft)	12.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	3
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,200	$ -
	Install 6" Retroreflective Edgeline (Both Sides of Road)	2.28	MILE	$ 1,800	$ 4,110
	Install 4" Retroreflective Centerline	2.28	MILE	$ 800	$ 1,827
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	2.28	MILE	$ 2,000	$ 4,566
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	2.28	MILE	$ 20,000	$ 45,664

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 56,166
Engineering: (% +/-)	15%	$ 8,705
Mobilization: (% +/-)*	10%	$ 5,620
Traffic Control: (% +/-)	5%	$ 2,902
Contingency:(% +/-)	20%	$ 11,607
Estimated Project Cost:		**$ 85,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

Project Name: FAIRBANK-AMISH BLVD between OTTERVILLE BLVD and 110TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

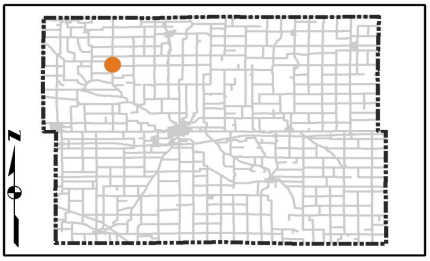
Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: FAIRBANK-AMISH BLVD
Length (mi): 8.20

GPS ID: 652

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	817	6
Pavement and Shoulder Width (ft)	38.0	0
Number of Driveways/Intersections per Mile	5.12	0
Lane Departure Crash Rate per VMT	0.00016	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	Yes
Shoulder Width (ft)	8
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	53
K and A Crashes	6

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	8.20	MILE	$ 1,200	$ 9,841
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	8.20	MILE	$ 800	$ 6,561
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	8.20	MILE	$ 2,000	$ 16,402
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	8.20	MILE	$ 20,000	$ 164,024

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 196,829
Engineering: (% +/-)	15%	$ 29,805
Mobilization: (% +/-)*	10%	$ 19,690
Traffic Control: (% +/-)	5%	$ 9,935
Contingency:(% +/-)	20%	$ 39,740
Estimated Project Cost:		**$ 296,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

Project Name: GOLF COURSE BLVD between 2500 FT SHORT OF HARRISON AVE and 220TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: GOLF COURSE BLVD
Length (mi): 1.44
GPS ID: 655

Project Location

Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	700	6
Pavement and Shoulder Width (ft)	28.0	0
Number of Driveways/Intersections per Mile	8.36	0
Lane Departure Crash Rate per VMT	0.00020	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	6
K and A Crashes	0

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	1.44	MILE	$ 1,200	$ 1,723
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	1.44	MILE	$ 800	$ 1,149
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	1.44	MILE	$ 2,000	$ 2,872
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	1.44	MILE	$ 20,000	$ 28,724

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 34,469
Engineering: (% +/-)	15%	$ 5,280
Mobilization: (% +/-)*	10%	$ 3,450
Traffic Control: (% +/-)	5%	$ 1,760
Contingency:(% +/-)	20%	$ 7,041
Estimated Project Cost:		**$ 52,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

Project Name: QUASQUETON AVE between 1000 FT S OF W LINN ST and COUNTY LINE
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

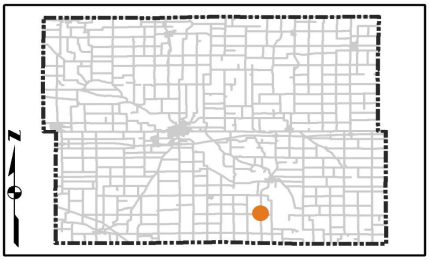
Prepared By: DJG/DVM
Checked By: MMO

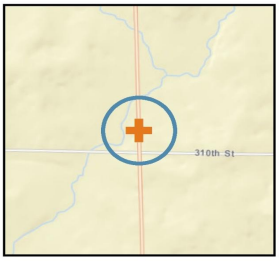
Location Description

Paved Road: QUASQUETON AVE
Length (mi): 6.50

GPS ID: 665

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1245	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	5.23	0
Lane Departure Crash Rate per VMT	0.00011	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	37
K and A Crashes	1

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	6.50	MILE	$ 1,200	$ 7,802
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	6.50	MILE	$ 800	$ 5,201
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	6.50	MILE	$ 65,000	$ 422,613
	Install Edgeline Rumble Strips (Both Sides of Road)	6.50	MILE	$ 2,000	$ 13,003
	Install Centerline Rumble Strips	6.50	MILE	$ 1,000	$ 6,502
	Clear and Grub (15 ft Both Sides of Road)	6.50	MILE	$ 20,000	$ 130,035

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 585,157
Engineering: (% +/-)	15%	$ 87,871
Mobilization: (% +/-)*	10%	$ 58,520
Traffic Control: (% +/-)	5%	$ 29,290
Contingency:(% +/-)	20%	$ 117,162
Estimated Project Cost:		**$ 878,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

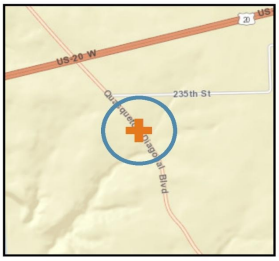
Project Name: QUASQUETON DIAGONAL BLVD between CO RD W35/QUASQUETON DIAGONAL BLVD & LUCAS AVE and 250TH ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: QUASQUETON DIAGONAL BLVD
Length (mi): 3.44
GPS ID: 667

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1120	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	6.69	0
Lane Departure Crash Rate per VMT	0.00013	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	45
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	28
K and A Crashes	2

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	3.44	MILE	$ 1,200	$ 4,126
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	3.44	MILE	$ 800	$ 2,751
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	3.44	MILE	$ 65,000	$ 223,478
	Install Edgeline Rumble Strips (Both Sides of Road)	3.44	MILE	$ 2,000	$ 6,876
	Install Centerline Rumble Strips	3.44	MILE	$ 1,000	$ 3,438
	Clear and Grub (15 ft Both Sides of Road)	3.44	MILE	$ 20,000	$ 68,763

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 309,432
Engineering: (% +/-)	15%	$ 46,732
Mobilization: (% +/-)*	10%	$ 30,950
Traffic Control: (% +/-)	5%	$ 15,577
Contingency:(% +/-)	20%	$ 62,309
Estimated Project Cost:		**$ 465,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

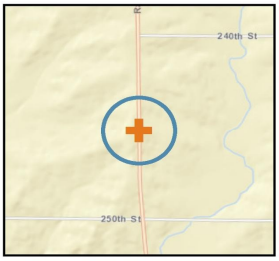
Project Name: RACINE AVE between 220TH ST and 3100 FT PAST 262ND ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: RACINE AVE
Length (mi): 4.59
GPS ID: 668

Project Location



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1717	6
Pavement and Shoulder Width (ft)	28.0	0
Number of Driveways/Intersections per Mile	7.18	0
Lane Departure Crash Rate per VMT	0.00006	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	29
K and A Crashes	3

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	4.59	MILE	$ 1,200	$ 5,514
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	4.59	MILE	$ 800	$ 3,676
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	4.59	MILE	$ 65,000	$ 298,664
	Install Edgeline Rumble Strips (Both Sides of Road)	4.59	MILE	$ 2,000	$ 9,190
	Install Centerline Rumble Strips	4.59	MILE	$ 1,000	$ 4,595
	Clear and Grub (15 ft Both Sides of Road)	4.59	MILE	$ 20,000	$ 91,896

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 413,534
Engineering: (% +/-)	15%	$ 62,290
Mobilization: (% +/-)*	10%	$ 41,360
Traffic Control: (% +/-)	5%	$ 20,763
Contingency:(% +/-)	20%	$ 83,053
Estimated Project Cost:		**$ 621,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

Local Road Safety Plan
Project Description for Segment Improvements

Risk Factor Points: 8

Project Name: SLATER AVE between 1ST ST and ALICE ST
Agency Name: Buchanan County
Contact Name: Keierleber, Brian
E-mail: engineer@co.buchanan.ia.us

Date: 8/17/15

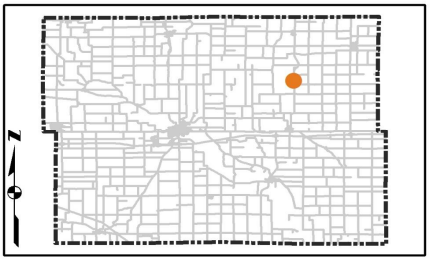
Prepared By: DJG/DVM
Checked By: MMO

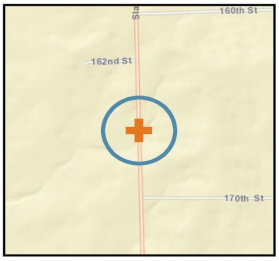
Location Description

Paved Road: SLATER AVE
Length (mi): 9.56

GPS ID: 671

Project Location





Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	966	6
Pavement and Shoulder Width (ft)	30.0	0
Number of Driveways/Intersections per Mile	4.19	0
Lane Departure Crash Rate per VMT	0.00012	2
Total Risk Factor Points (18 max)		**8**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	11.0
Number of Lanes	2
Rumble Strips	No

Key Emphasis Areas	
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
X	Lane Departures
X	Roadside Collisions
	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	46
K and A Crashes	2

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Install 4" Retroreflective Edgeline (Both Sides of Road)	9.56	MILE	$ 1,200	$ 11,467
	Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	$ 1,800	$ -
	Install 4" Retroreflective Centerline	9.56	MILE	$ 800	$ 7,645
	Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	$ 65,000	$ -
	Install Edgeline Rumble Strips (Both Sides of Road)	9.56	MILE	$ 2,000	$ 19,112
	Install Centerline Rumble Strips	0.00	MILE	$ 1,000	$ -
	Clear and Grub (15 ft Both Sides of Road)	9.56	MILE	$ 20,000	$ 191,120

Basis for Cost Projection

- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

Subtotal:		$ 229,344
Engineering: (% +/-)	15%	$ 34,768
Mobilization: (% +/-)*	10%	$ 22,940
Traffic Control: (% +/-)	5%	$ 11,589
Contingency:(% +/-)	20%	$ 46,358
Estimated Project Cost:		**$ 345,000**

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

APPENDIX F

SEGMENT RISK FACTOR RANKING RESULTS

GPS ID	Paved Road	Beginning of Segment	End of Segment	Length (mi)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Pavement and Shoulder Width (ft) (Value)	Pavement and Shoulder Width (ft) (Points)	Number of Driveways/ Intersections per Mile (Value)	Number of Driveways/ Intersections per Mile (Points)	Lane Departure Crash Rate (Value)	Lane Departure Crash Rate (Points)	Total Crashes	K and A	Paved Shoulder	Shoulder Width (ft)	Lane Width	Speed Limit	Number of Lanes	Rumble Strips
660	MAIN ST	WEST ST	MAIN ST & EVERLY AVE	0.51	**14**	1033	**6**	40	**2**	120	**4**	0.00	**2**	6	0	No	0	20	25	2	No
647	BLACKHAWK-BUCHANAN AVE	400 FT PAST SOUTH ST	COUNTY LINE	0.54	**10**	710	**6**	30	**0**	13	**2**	0.00	**2**	2	0	No	4	11	55	2	No
664	OTTERVILLE BLVD	FAIRBANK-AMISH BLVD	JAMESTOWN AVE	4.22	**10**	822	**6**	30	**0**	15	**2**	0.00	**2**	28	0	No	4	11	55	2	No
666	QUASQUETON DIAGONAL BLVD	250TH ST	1500 FT PAST N FIRST ST	3.46	**10**	1120	**6**	30	**0**	11	**2**	0.00	**2**	11	0	No	4	11	45	2	No
669	ROWLEY ST	LUCAS AVE/3RD AVE	1200 FT PAST RAINBOW AVE	0.62	**10**	692	**6**	32	**0**	29	**4**	0.00	**0**	4	0	No	5	11	25	2	No
676	UNION ST	450 FT S OF HAWKEYE ST	750 FT N OF CORNELIA ST	0.75	**10**	814	**6**	32	**0**	37	**4**	0.00	**0**	1	0	No	5	11	25	2	No
678	WAPSIE ACCESS BLVD	OTTERVILLE BLVD	14TH ST NE	1.09	**10**	1120	**6**	28	**0**	25	**4**	0.00	**0**	6	0	No	3	11	45	2	No
474	150TH ST	BLACK HAWK BUCHANAN AVE	V62/BAXTER AVE	1.01	**8**	730	**6**	34	**0**	5	**0**	0.00	**2**	2	1	No	6	11	55	2	No
475	FAIRBANK-AMISH BLVD	110TH ST	CO RD W13/FAIRBANK-AMISH BLVD/	1.03	**8**	1160	**6**	30	**0**	5	**0**	0.00	**2**	12	1	Yes	4	11	55	2	No
621	118TH ST	250 FT PAST INDIANA AVE	1200 FT PAST SHORT ST	0.55	**8**	740	**6**	42	**0**	4	**0**	0.00	**2**	6	1	No	10	11	25	2	No
622	120TH ST	INDIANA AVE	CO RD V62/BAXTER AVE	6.75	**8**	870	**6**	42	**0**	6	**0**	0.00	**2**	32	1	No	10	11	55	2	No
624	120TH ST	BLACKHAWK-BUCHANAN AVE	CO RD V62/BAXTER AVE	1.15	**8**	1160	**6**	32	**0**	3	**0**	0.00	**2**	6	1	No	5	11	55	2	No
627	135TH ST	CO RD C64/135TH ST	BUCHANAN-DELAWARE AVE	2.01	**8**	610	**6**	30	**0**	6	**0**	0.00	**2**	10	1	No	4	11	55	2	No
629	175TH ST	CO RD V62/BAXTER AVE	CO RD W13	4.41	**8**	567	**6**	32	**0**	10	**0**	0.00	**2**	17	1	No	5	11	55	2	No
631	220TH ST	RACINE AVE	1500 FT PAST DOUBLE L DR	5.81	**8**	1691	**6**	44	**0**	7	**0**	0.00	**2**	61	2	Yes	10	12	55	2	Yes
633	220TH ST	CO RD V65/BENSON-SHADY GROVE	GOLF COURSE BLVD	6.72	**8**	2516	**6**	40	**0**	9	**0**	0.00	**2**	39	1	No	8	12	55	2	No
635	220TH ST	EASY ST	COUNTY LINE	6.74	**8**	724	**6**	30	**0**	4	**0**	0.00	**2**	11	0	No	3	12	55	2	No
642	330TH ST	MAIN ST & EVERLY AVE	CO RD D48/330TH ST	5.53	**8**	692	**6**	38	**0**	4	**0**	0.00	**2**	23	0	No	7	12	55	2	No
643	BAXTER AVE	MAIN ST	CO RD V62/BAXTER AVE	8.99	**8**	1370	**6**	32	**0**	5	**0**	0.00	**2**	51	4	No	5	11	55	2	No
644	BAXTER AVE	CO RD V62/BAXTER AVE	WALNUT ST	1.45	**8**	1160	**6**	34	**0**	6	**0**	0.00	**2**	5	1	No	6	11	55	2	No
645	BENSON-SHADY GROVE AVE	220TH ST/SOUTH ST	3300 FT PAST 288TH ST	7.17	**8**	1225	**6**	32	**0**	9	**0**	0.00	**2**	36	5	No	5	11	55	2	No
646	BLACKHAWK-BUCHANAN AVE	3300 FT SHORT OF 288TH ST	LAPORTE RD	2.28	**8**	764	**6**	40	**0**	4	**0**	0.00	**2**	3	0	No	8	12	55	2	No
652	FAIRBANK-AMISH BLVD	OTTERVILLE BLVD	110TH ST	8.20	**8**	817	**6**	38	**0**	5	**0**	0.00	**2**	53	6	No	8	11	55	2	No
655	GOLF COURSE BLVD	2500 FT SHORT OF HARRISON AVE	220TH ST	1.44	**8**	700	**6**	28	**0**	8	**0**	0.00	**2**	6	0	No	3	11	55	2	No
665	QUASQUETON AVE	1000 FT S OF W LINN ST	COUNTY LINE	6.50	**8**	1245	**6**	30	**0**	5	**0**	0.00	**2**	37	1	No	4	11	55	2	No
667	QUASQUETON DIAGONAL BLVD	CO RD W35/QUASQUETON DIAGON/	250TH ST	3.44	**8**	1120	**6**	30	**0**	7	**0**	0.00	**2**	28	2	No	4	11	45	2	No
668	RACINE AVE	220TH ST	3100 FT PAST 262ND ST	4.59	**8**	1717	**6**	28	**0**	7	**0**	0.00	**2**	29	3	No	3	11	55	2	No
671	SLATER AVE	1ST ST	ALICE ST	9.56	**8**	966	**6**	30	**0**	4	**0**	0.00	**2**	46	2	No	4	11	55	2	No
674	THREE ELMS PARK BLVD	500 FT PAST 3RD AVE SE	END OF ROAD	1.22	**7**	518	**3**	28	**0**	17	**2**	0.00	**2**	3	0	No	3	11	55	2	No
672	SLATER AVE	CORNELIA ST	105TH ST	0.75	**6**	580	**6**	28	**0**	5	**0**	0.00	**0**	0	0	No	3	11	55	2	No
619	115TH ST	OLYMPIC AVE	2600 FT PAST RINGOLD AVE	3.06	**5**	540	**3**	38	**0**	2	**0**	0.00	**2**	5	1	No	8	11	55	2	No
620	118TH ST	MONROE ST	MASON AVE	2.84	**5**	524	**3**	32	**0**	6	**0**	0.00	**2**	9	1	No	5	11	55	2	No
625	120TH ST	MASON AVE	CO RD W33	2.51	**5**	430	**3**	30	**0**	4	**0**	0.00	**2**	7	1	No	4	11	55	2	No
628	155TH ST	OLYMPIC AVE	NATHAN BETHEL AVE	1.51	**5**	390	**3**	30	**0**	5	**0**	0.00	**2**	2	1	No	4	11	55	2	No
630	205TH ST	NATHAN BETHEL AVE	1300 FT PAST UNION AVE NE	3.00	**5**	445	**3**	30	**0**	8	**0**	0.00	**2**	7	1	No	4	11	55	2	No
636	240TH ST	CO RD W17/240TH ST	240TH ST	1.00	**5**	300	**3**	34	**0**	9	**0**	0.00	**2**	3	0	No	6	11	55	2	No
637	280TH ST	SCOTT BLVD	VINCENT AVE	4.22	**5**	381	**3**	32	**0**	5	**0**	0.00	**2**	3	2	No	5	11	55	2	No
640	290TH ST	CO RD V71/DUGAN AVE	LUCAS AVE & ROWLEY ST	7.98	**5**	452	**3**	34	**0**	4	**0**	0.00	**2**	13	1	No	6	11	55	2	No
641	290TH ST	QUASQUETON AVE	1900 FT PAST MICHEL AVE	3.27	**5**	450	**3**	30	**0**	5	**0**	0.00	**2**	10	0	No	4	11	55	2	No
648	BUFFALO CREEK BLVD	CO RD W45/BUFFALO CREEK BLVD	260TH ST	5.06	**5**	280	**3**	32	**0**	4	**0**	0.00	**2**	10	1	No	4	12	55	2	No
650	DUGAN AVE	MILLER ST	CO RD V71/DUGAN AVE	1.01	**5**	486	**3**	34	**0**	4	**0**	0.00	**2**	1	1	No	6	11	55	2	No
651	DUGAN AVE	220TH ST	2300 FT PAST 310TH ST	9.18	**5**	445	**3**	34	**0**	5	**0**	0.00	**2**	13	0	No	6	11	55	2	No
654	FREEMAN AVE	CO RD V71/26 AVE/FREEMAN AVE	CO RD V71/FREEMAN AVE	1.08	**5**	460	**3**	32	**0**	6	**0**	0.00	**2**	3	0	No	5	11	55	2	No
659	LAPORTE RD	BLACKHAWK-BUCHANAN AVE	DUGAN AVE	3.34	**5**	367	**3**	32	**0**	3	**0**	0.00	**2**	7	2	No	5	11	55	2	No
661	NATHAN BETHEL AVE	155TH ST	220TH ST	6.57	**5**	390	**3**	30	**0**	5	**0**	0.00	**2**	7	2	No	4	11	55	2	No
663	OLYMPIC AVE	110TH ST	155TH ST	4.48	**5**	397	**3**	30	**0**	3	**0**	0.00	**2**	12	1	No	4	11	55	2	No
675	TROY MILLS BLVD	280TH ST	COUNTY LINE	6.10	**5**	480	**3**	30	**0**	4	**0**	0.00	**2**	4	1	No	4	11	55	2	No
462	NELSON AVE	110TH ST	1000 FT SHORT OF MAIN ST	0.68	**3**	320	**3**	32	**0**	1	**0**	0.00	**0**	2	0	No	5	11	55	2	No
618	110TH ST	NELSON AVE	OLYMPIC AVE	0.97	**3**	320	**3**	30	**0**	6	**0**	0.00	**0**	2	0	No	4	11	55	2	No
626	130TH ST	CO RD W45/SLATER AVE	CO RD C64/130TH ST	4.05	**3**	490	**3**	34	**0**	3	**0**	0.00	**0**	9	0	No	6	11	55	2	No
656	HENLEY AVE	232ND ST	HENLEY AVE	0.97	**3**	220	**3**	36	**0**	9	**0**	0.00	**0**	2	0	No	7	11	55	2	No
677	VINCENT AVE	285TH ST	260TH ST	2.51	**3**	264	**3**	32	**0**	4	**0**	0.00	**0**	1	0	No	4	12	55	2	No
638	282ND ST	CO RD V65	CO RD V71/DUGAN AVE	2.49	**2**	170	**0**	34	**0**	5	**0**	0.00	**2**	4	1	No	6	11	55	2	No
653	FONTANA BLVD	FONTANA BLVD	FONTANA AND JACKSON CONN	1.63	**2**	42	**0**	36	**0**	13	**2**	0.00	**0**	4	0	No	6	12	55	2	No
623	120TH ST	CO RD C57/120TH ST	BUCHANAN-DELAWARE AVE	1.99	**0**	120	**0**	30	**0**	4	**0**	0.00	**0**	5	0	No	4	11	55	2	No
639	285TH ST	VINCENT AVE	5200 FT PAST YORK AVE	3.01	**0**	200	**0**	32	**0**	4	**0**	0.00	**0**	4	0	No	5	11	25	2	No