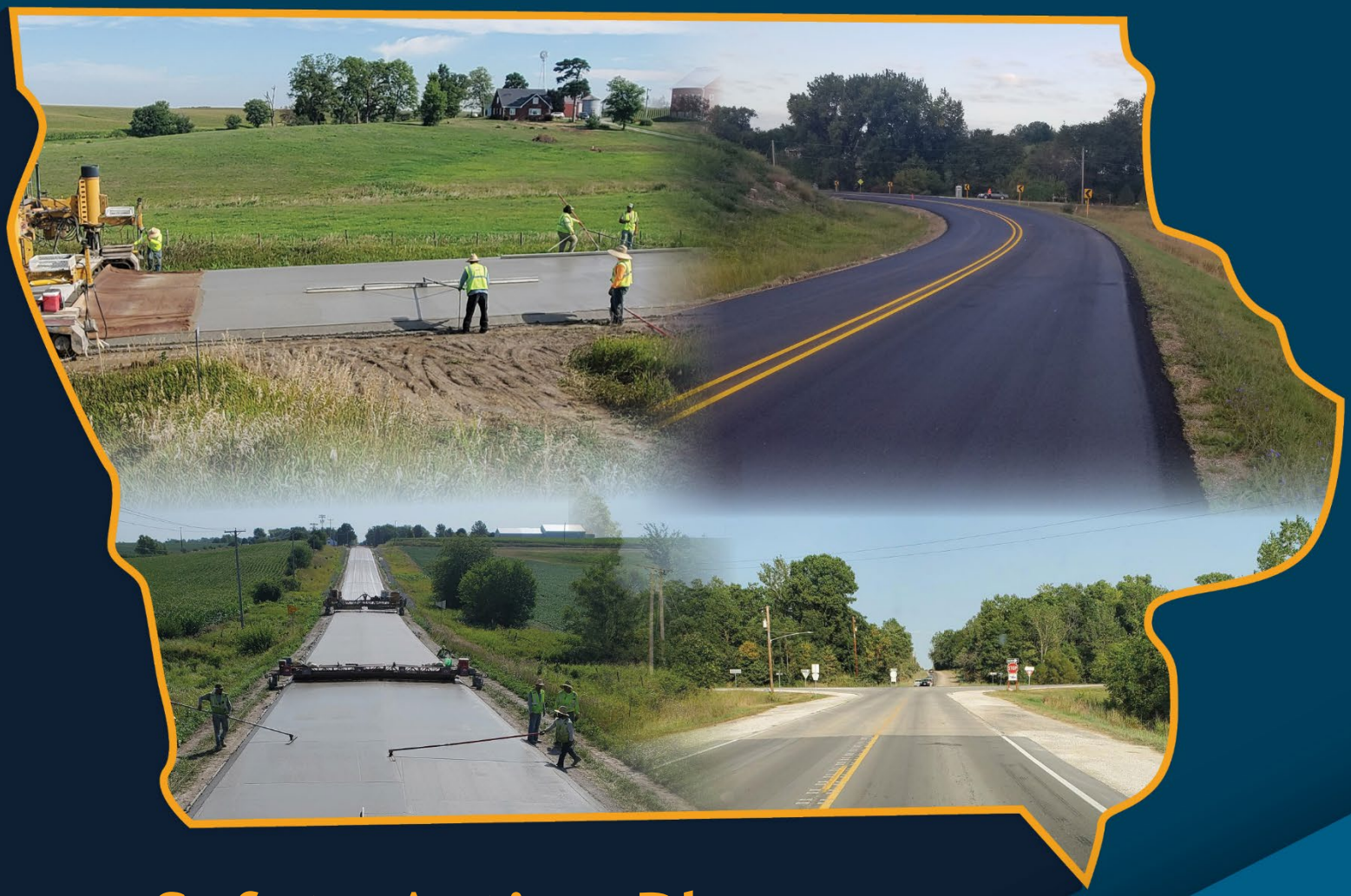
MAHASKA COUNTY



Safety Action Plan

July 2025

MAHASKA COUNTY SAFETY ACTION PLAN

Prepared for:

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July 2025
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Mahaska County Safety Action Plan

ACKNOWLEDGEMENTS

The Mahaska County employees and partners were instrumental in the development, review, and refinement of this Safety Action Plan. Iowa County Engineers Association (ICEA) and Kimley-Horn would like to express their appreciation to the supporting staff and partners for their participation and contributions. The identified partners are responsible for monitoring and implementing the plan in collaboration with ICEA and the Iowa DOT.

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STATUTORY NOTICE

23U.S.C. § 407: US Code - Section 407: 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.

E. EXECUTIVE SUMMARY

In the United States over 40,000 people lost their lives in motor vehicle crashes in 2023. According to the Federal Highway Administration (FHWA), rural fatalities account for 40 percent of all fatalities across the United States, yet less than 20 percent of the population lives in rural areas. In addition, the fatality rate on rural roads is 1.5 times higher than the fatality rate on roads in urban areas, resulting in a focus on rural road safety.

> ***"Reducing rural roadway departure crashes requires an integrated, disciplined approach. A safety action plan is a powerful way to prioritize safety improvements and justify investment decisions.***
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In Iowa, while county roads account for 17% of the total statewide vehicle miles of travel (VMT), they account for 78% of the mileage and 35% of the fatal and serious injury crashes. These serious crashes are overrepresented based on VMT and are spread over an extensive roadway network. County road crash patterns are typically characterized by similar types of crashes that occur at unique locations. In Mahaska County, there was an average of 3.6 fatal and serious injury crashes per year on approximately 950 miles of county roads between 2019-2023. Therefore, Mahaska County, in consultation with partners, prepared this Comprehensive Safety Action Plan (SAP) to present a holistic, well-defined strategy to reduce roadway fatalities and serious injuries in the county. Consistent with strategies included within Iowa's Five-Year Strategic Highway Safety Plan (SHSP) 2024-2028, this SAP identifies high-risk locations and prioritizes strategies to address them, allowing for the proactive implementation of safety countermeasures. The County has also pledged their commitment to a goal zero roadway fatalities and serious injuries by 2050. The signed pledge is included in **Appendix A**.

E.1. Mahaska County

Mahaska County is located in southeastern Iowa and was named for Chief Mahaska, one of the most noted chiefs of the Ioway nation. According to the 2020 census, the population of Mahaska County is 22,190. The county seat is Oskaloosa which is the largest city in the county and was named for a creek princess named Ouscaloosa, translating to "last of the beautiful". Mahaska County produced the largest amount of coal and contained the most mines in the State of Iowa in the late 1800's. According to the Iowa Department of Transportation (Iowa DOT), the county maintains approximately 968 miles of county roads which includes 128 miles of paved roads. From 2019 to 2023 there were 266 crashes on Mahaska county roads of which 18 crashes resulted in fatal and serious injuries.

E.2. Safe Streets and Roads for All (SS4A) Program

This SAP was prepared with funding from the Safe Street and Roads for All (SS4A) discretionary program as well as a local match from Iowa DOT Traffic & Safety Bureau. The Iowa County Engineers Association (ICEA), with lead applicant Mahaska County, received an SS4A planning grant to prepare SAPs for 97 counties in the state. The Bipartisan Infrastructure Law (BIL) established the SS4A discretionary program to fund improvements and strategies to prevent roadway fatalities and serious injuries of all users of highways, streets, and roadways: pedestrians, bicyclists, public transportation users, motorists, personal conveyance and micro-mobility users, and commercial vehicle operators. The SS4A program supports the U.S. Department of Transportation's (USDOT's) National Roadway Safety Strategy (NRSS) and a goal of zero roadway deaths using a Safe System Approach. The program includes $5 billion in appropriated funds over five years: 2022-2026. This SAP meets eligibility requirements that allow local jurisdictions to apply for implementation grants and additional funding through the USDOT SS4A discretionary program.

E.2.1. Safe System Approach

The USDOT has adopted a Safe System Approach as the guiding paradigm to address roadway safety. The Safe System Approach has been embraced as an effective way to address and mitigate the risks inherent in our complex transportation system. It works by building and reinforcing multiple layers of protection to both prevent crashes from happening in the first place and minimize the harm caused to those involved when crashes do occur. The Safe System Approach is founded on the principles that humans make mistakes and that human bodies have limited ability to tolerate crashes. It provides a holistic and comprehensive approach to roadway safety and is governed by the framework shown in **Figure E-1** to make places safer for people. The Safe System Approach is a shift from the conventional approach to roadway safety because it focuses on both human mistakes and human vulnerability, and designs for a system with many redundancies in place to protect everyone.

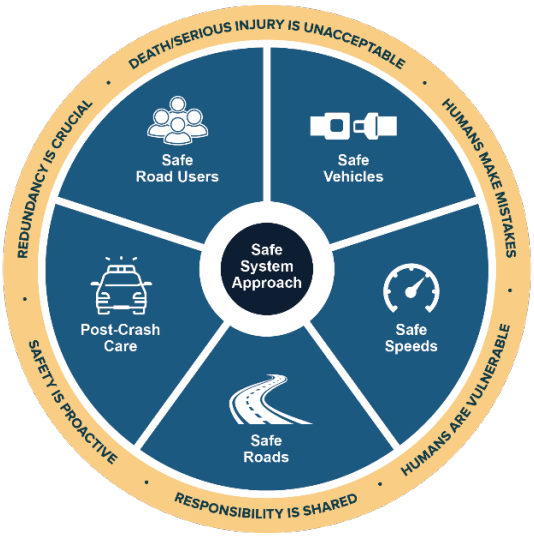

Figure E-1 - USDOT Safe System Approach

E.2.2. National Roadway Safety Strategy (NRSS)

USDOT's NRSS is a comprehensive approach to reduce fatal and serious injuries on highways, roads, and streets. This strategy outlines the USDOT's long-term goal of reaching zero roadway fatalities, the adoption of the Safe System Approach, and actions the department will take to target urgent problems. The NRSS states that across the nation, rural roads face safety impacts that largely outnumber their relative population and number of miles traveled. This leads to a fatality rate that is approximately two times higher on rural roads than on urban roads.

E.3. What is an SAP?

A Safety Action Plan (SAP) is intended to result in holistic, well-defined strategies intended to reduce roadway fatalities and serious injuries within a specific locality, tribal area, or region. SAPs can take many forms; however, to be eligible for Implementation and/or Planning and Demonstration funding through the USDOT SS4A discretionary grant program, the SAP is required to be completed within the time period specified for the Notice of Funding Opportunity (NOFO) period (generally within the last five years) and must include the following two components: (1) Safety Analysis and (2) Strategy and Project Selections, as well as at least three of the following elements:

- Leadership commitment and goal setting
- Planning structure
- Engagement and collaboration
- Policy and process changes
- Progress and transparency

More information about SAPs is available on the USDOT SS4A website.

This SAP uses a risk factor analysis to identify and prioritize locations for proactive safety improvements that can be implemented by the county, allowing practitioners to make informed, prioritized safety decisions. The recommendations focus on systemic transportation improvements with high crash reduction benefits and include driver-related countermeasures.

Figure E-2 - Iowa's Five Es of Safety

The planning process takes into consideration constraints within the local county network and incorporates feedback from the County Engineer and local stakeholders, including partners within Iowa's 5 Es of safety (Engineering, Emergency Response, Education, Enforcement, and Everyone), as shown in **Figure E-2**. 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), over 90 percent of all crashes are the result of driver-related factors. Because such a high percentage of crashes are a result of driver-related factors, making roadways safer requires all five Es to be involved.

E.4. SAP Development Process

The development of this SAP includes seven primary steps as illustrated in **Figure E-3**. More detailed descriptions of the process are included in subsequent sections of this document.

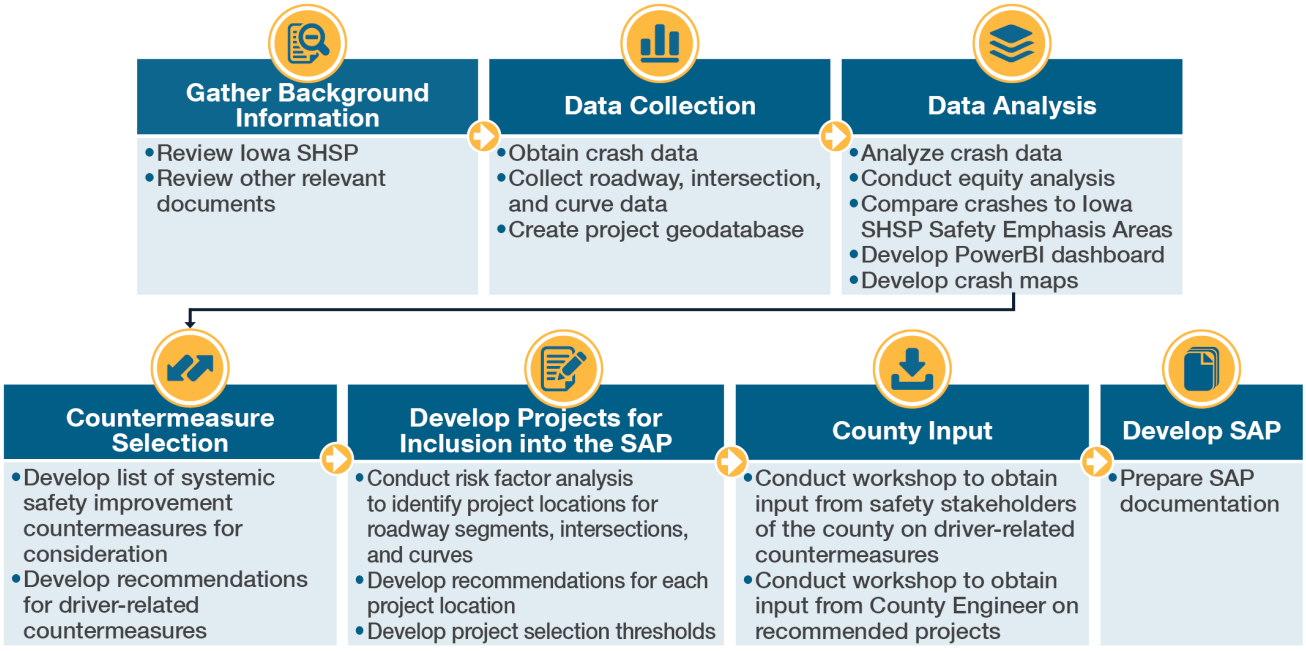

Figure E-3 - SAP Project Process

E.5. Recommendations

This SAP identifies both engineering and driver-related countermeasures intended to be implemented over the next five to ten years. The following sections summarize the recommended countermeasures and improvements for Mahaska County.

E.5.1. Engineering Countermeasures

Systemic safety improvement projects were developed with input from the county for high-ranking roadway segments, intersections, and horizontal curves on Mahaska County paved roads. Each project location is shown in **Figure E-4**, and **Table E-1** provides a cost summary of the recommended projects. Detailed information for each safety countermeasure is provided in **Section 6**, as well as in **Appendix B1**, **Appendix C1**, and **Appendix D1.** Detailed information for each project is provided in **Section 6**, as well as in project sheets in **Appendix B2**, **Appendix C2**, and **Appendix D2** for roadway segments, intersections, and horizontal curves, respectively. 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 local knowledge of the site, available funding, and/or specific needs.

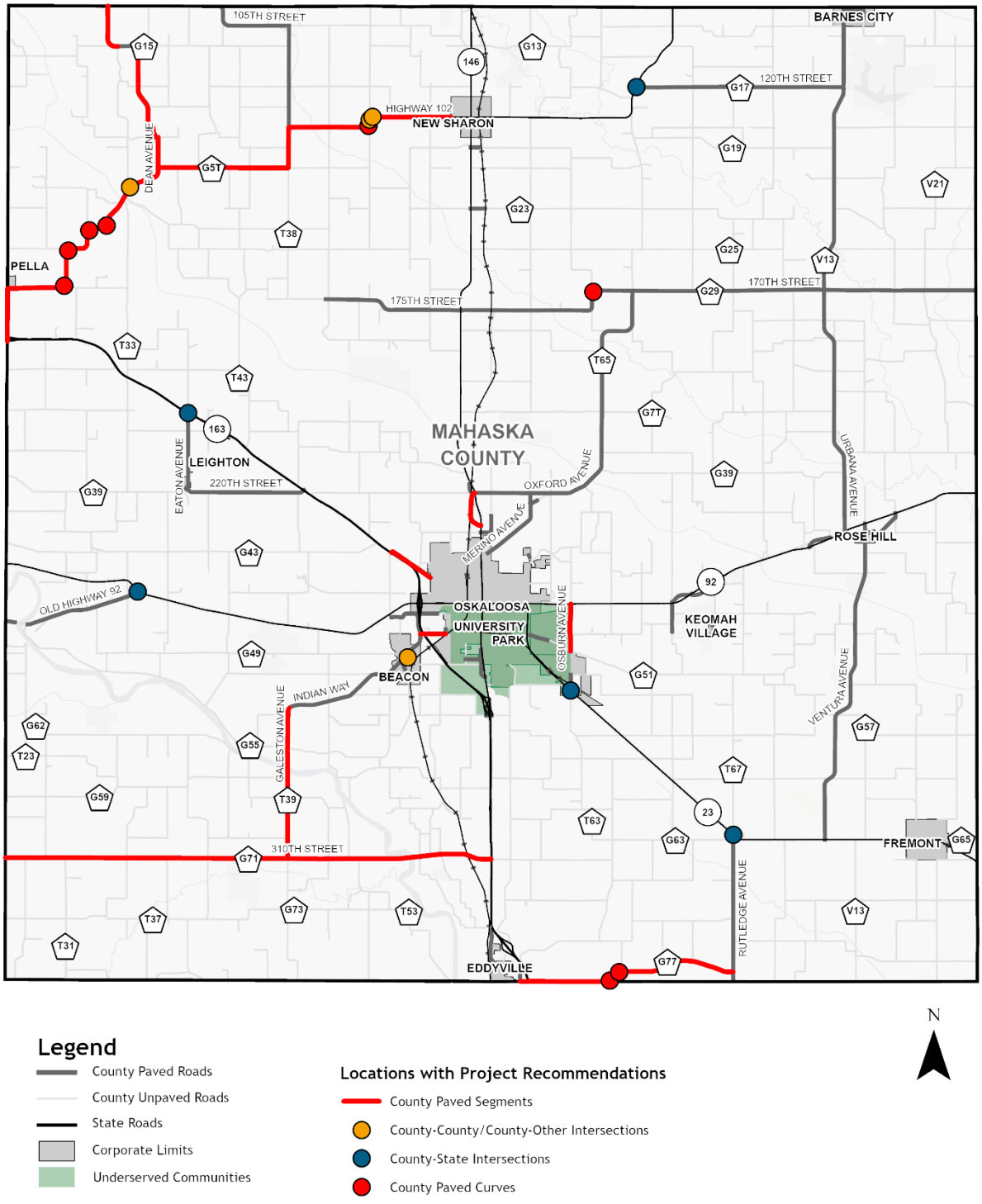

Figure E-4 - Mahaska County Prioritized Project Locations Selection Summary

Table E-1 – Engineering Countermeasure Cost Summary

Facility Type	Number of Locations	Estimated Project Cost
Segment	13	$6,094,000
Intersection	9	$3,053,000
Curve	10	$448,000
Total Improvement Costs	**32**	**$9,595,000**

E.5.2. Driver-Related Countermeasures

A workshop was conducted in Mahaska County on Thursday, September 19, 2024, to discuss driver related crashes occurring in the county and to identify strategies aimed at improving driver behavior to enhance road safety. A wide range of individuals were invited to the workshop, including elected officials, partner agencies that operate within the County, stakeholders representing the 5 Es of traffic safety, and the general public. The flyer used to publicize the workshop and the sign-in sheet is included in **Appendix F**. A summary of the workshop discussion is provided in **Section 5.2.** Based on these discussions, the status of implementing driver-related strategies in the county is summarized in **Table E-2.** It is recommended that the county partner with all five Es of safety to implement countermeasures that are not currently underway/ongoing and look for opportunities to introduce additional countermeasures that are not currently being implemented.

Table E-2 - County Driver-Related Countermeasures Summary

Countermeasure	Status
Speed Related	
Conduct targeted speed enforcement	Ongoing/Opportunity
Prosecute and impose sanctions on drivers not obeying school bus stop bars	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Occupant Protection	
Conduct targeted enforcement of restraint use	Opportunity
Instruction in proper child restraint use	Underway/Ongoing
Check for proper child restraint use in all motorist encounters	Opportunity
Positive reinforcement	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Younger Drivers	
Enforcement of minor school license and graduated driver's license laws	Ongoing/Opportunity
Additional training in schools	Opportunity
Conduct education awareness campaigns	Opportunity
Impairment Involved	
Conduct targeted OWI enforcement	Underway/Ongoing
Compliance checks for alcohol sales	Ongoing/Opportunity
Alternative transportation choices	Opportunity
Prosecute, impose sanctions on, and treat OWI offenders	Ongoing/Opportunity
Conduct education and awareness campaigns	Opportunity
Older Drivers	
Promote safe mobility choices	Ongoing/Opportunity
Encourage external reporting of at-risk drivers to licensing authorities	Ongoing/Opportunity
Conduct education and awareness campaigns	Opportunity
Distracted Driving	
Visibly enforce existing statutes to deter distracted driving	Opportunity
Agency policy for hands-free devices	Ongoing/Opportunity
Mobile simulator for distracted driving	Opportunity
Conduct education and awareness campaigns	Opportunity

E.6. Implementation

The SAP project aims to provide a document that is both practical and frequently referenced by the county for requesting funding and completing traffic safety improvement projects on county-maintained roads. The following outlines key opportunities that can be used to implement the recommendations included within this plan. ICEA staff is available to assist counties in identifying and pursuing funding opportunities.

SS4A Implementation Grant: With the completion of this SAP, Mahaska County is eligible to apply for additional funding through the SS4A program. An SS4A Implementation Grant provides federal funds to implement projects and strategies identified in an SAP to address roadway safety issues, including infrastructural, behavioral, and/or operational activities. The county should consider applying for an Implementation Grant to secure funding to implement the engineering projects and driver-related strategies recommended in this plan.

Iowa Transportation Funding Opportunities: The county should leverage funding opportunities available through Iowa DOT local funding programs such as Highway Safety Improvement Program – Local (HSIP-Local) or the Traffic Safety Improvement Program (TSIP) to implement the projects identified in this plan. The various funding opportunities are outlined in **Section 2.3**.

Five-Year Transportation Improvement Program: The county should review projects within the five-year program and consider including safety recommendations from the project sheets into those projects, where applicable. In future cycles of the program, it is recommended that safety projects included on the project sheets are considered for inclusion.

Maintenance Activities: Maintenance activities and upcoming design projects offer a great opportunity to incorporate safety countermeasures into already funded projects, often with minimal increases to the overall project cost. As such, it is recommended that when the county is designing projects and/or addressing a maintenance issue, the countermeasure selection thresholds (detailed in **Section 6.1.3**) are reviewed and countermeasures appropriate for the location are incorporated into the design. Doing so can help prioritize projects and emphasize safety in design and maintenance activities. In addition, the countermeasure information within this document should be used to provide instruction or education to maintenance crews about their ability to enhance safety in the county through their work.

Countywide Partnerships: It is recommended that the County continue to foster cooperation with safety stakeholders and look for opportunities to improve and expand the implementation of driver-related countermeasures.

E.7. Next Steps

The county should continue its history of implementing safety improvement projects annually. Based on current funding levels, it is anticipated that many of the engineering improvements listed in this plan could be implemented within five to ten years, or sooner. Additionally, this SAP should be updated within five to ten years to reflect improvements that have been implemented, additional availability of roadway feature data, and changes in crash types and patterns.

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LIST OF ABBREVIATIONS

APP	Area of Persistent Poverty
ADT	Average Daily Traffic
ARIDE	Advance Roadside Impaired Driving Enforcement
BIL	Bipartisan Infrastructure Law
CEJST	Climate and Economic Justice Screening Tool
CLCH	Candidate Locations based on Crash History
CMF	Crash Modification Factor
CPST	Child Passenger Safety Technician
CRF	Crash Reduction Factor
C-STEP	County-State Traffic Engineering Program
DEV	Daily Entering Volume
DOT	Department of Transportation
DRE	Drug Recognition Expert
EMS	Emergency Medical Services
ETC	Equitable Transportation Community
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
Five Es	Engineering, Emergency Response, Education, Enforcement, and Everyone
GIS	Geographic Information System
GPS	Global Positioning System
GTSB	Governor's Traffic Safety Bureau
HFST	High Friction Surface Treatment
HSIP-Local	Highway Safety Improvement Program - Local
HSM	Highway Safety Manual
HMVMT	Hundred Million Vehicle Miles Traveled
ICAT	Iowa DOT Crash Analysis Tool
ICE	Intersection Control Evaluation
ICEA	Iowa County Engineers Association
ICWS	Intersection Conflict Warning System
InTrans	Institute for Transportation at Iowa State University
IRI	International Roughness Index
KABCO	All Crashes (letter identifiers for crash severity)
K	Fatal Crash
A	Suspected Serious Injury Crash

B	Suspected Minor Injury Crash
C	Possible/Unknown Injury Crash
O/PDO	Property Damage Only Crash
LED	Light-Emitting Diode
LRS	Linear Referencing System
LRSP	Local Road Safety Plan
LTAP	Local Technical Assistance Program
MIRE	Model Inventory of Roadway Elements
MDST	Multi-Disciplinary Safety Team
mph	Miles Per Hour
MUTCD	Manual on Uniform Traffic Control Devices
NHTSA	National Highway Traffic Safety Administration
NOFO	Notice of Funding Opportunity
NRSS	National Roadway Safety Strategy
OWI	Operating While Intoxicated
PCR	Potential for Crash Reduction
RAMS	Roadway Asset Management System
RSA	Roadway Safety Audit
SAG	Iowa DOT Safety Analysis Guide
SAIPE	Small Area Income Poverty Estimates
SAP	Comprehensive Safety Action Plan
SHSP	Strategic Highway Safety Plan
SPF	Safety Performance Functions
SS4A	Safe Streets and Roads for All
TEAP	Traffic Engineering Assistance Program
TSIP	Traffic Safety Improvement Program
VMT	Vehicle Miles Traveled
USDOT	US Department of Transportation

1. INTRODUCTION

In the United States over 40,000 people lost their lives in motor vehicle crashes in 2023. According to the Federal Highway Administration (FHWA), rural fatalities account for 40 percent of all fatalities across the United States, yet less than 20 percent of the population lives in rural areas. In addition, the fatality rate on rural roads is 1.5 times higher than the fatality rate on roads in urban areas, resulting in a focus on rural road safety.

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1.1. Mahaska County

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This SAP was prepared with funding from the Safe Street and Roads for All (SS4A) discretionary program as well as a local match from Iowa DOT Traffic & Safety Bureau. The Iowa County Engineers Association (ICEA), with lead applicant Mahaska County, received an SS4A planning grant to prepare SAPs for 97 counties in the state. The Bipartisan Infrastructure Law (BIL) established the SS4A discretionary program to fund improvements and strategies to prevent roadway fatalities and serious injuries of all users of highways, streets, and roadways: pedestrians, bicyclists, public transportation users, motorists, personal conveyance and micro-mobility users, and commercial vehicle operators. The SS4A program supports the U.S. Department of Transportation's (USDOT's) National Roadway Safety Strategy (NRSS) and a goal of zero roadway deaths using a Safe System Approach. The program includes $5 billion in appropriated funds over five years: 2022-2026. This SAP meets eligibility requirements that allow local jurisdictions to apply for implementation grants and additional funding through the USDOT SS4A discretionary program.

1.2.1. Safe System Approach

The USDOT has adopted a Safe System Approach as the guiding paradigm to address roadway safety. The Safe System Approach has been embraced as an effective way to address and mitigate the risks inherent in our complex transportation system. It works by building and reinforcing multiple layers of protection to both prevent crashes from happening in the first place and minimize the harm caused to those involved when crashes do occur. The Safe System Approach is founded on the principles that humans make mistakes and that human bodies have limited ability to tolerate crashes. It provides a holistic and comprehensive approach to roadway safety and is governed by the framework shown in **Figure 1** to make places safer for people. The Safe System Approach is a shift from the conventional approach to roadway safety because it focuses on both human mistakes and human vulnerability, and designs for a system with many redundancies in place to protect everyone.

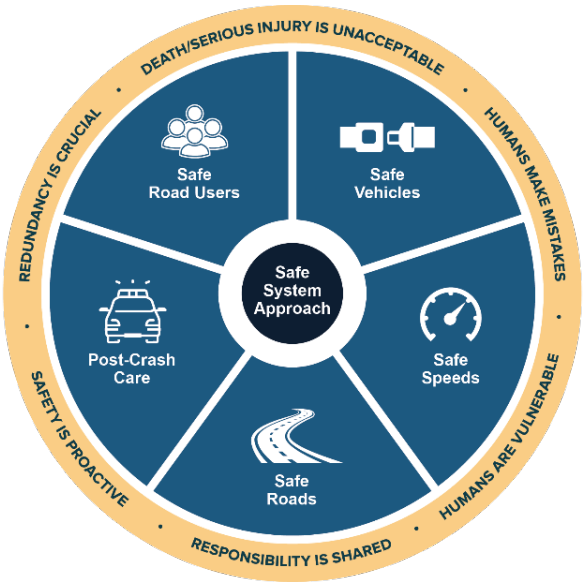


Figure 1 - USDOT Safe System Approach

1.2.2. National Roadway Safety Strategy (NRSS)

USDOT's NRSS is a comprehensive approach to reduce fatal and serious injuries and deaths on highways, roads, and streets. This strategy outlines the USDOT's long-term goal of reaching zero roadway fatalities, the adoption of the Safe System Approach, and actions the department will take to target urgent problems. The NRSS states that across the nation, rural roads face safety impacts that largely outnumber their relative population and number of miles traveled. This leads to a fatality rate that is approximately two times higher on rural roads than on urban roads.

1.3. What is an SAP?

An SAP is intended to result in holistic, well-defined strategies intended to reduce roadway fatalities and serious injuries within a specific locality, tribal area, or region. SAPs can take many forms; however, to be eligible for Implementation and/or Planning and Demonstration funding through the USDOT SS4A discretionary grant program, the SAP is required to be completed within the time period specified for the Notice of Funding Opportunity (NOFO) period (generally within the last five years) and must include the following two components: (1) Safety Analysis and (2) Strategy and Project Selections, as well as at least three of the following elements:

- Leadership commitment and goal setting
- Planning structure
- Engagement and collaboration
- Policy and process changes
- Progress and transparency

More information about SAPs is available on the USDOT SS4A website.

This SAP uses a risk factor analysis to identify and prioritize locations for proactive safety improvements that can be implemented by the county, allowing practitioners to make informed, prioritized safety decisions. The recommendations focus on systemic transportation improvements with high crash reduction benefits and include driver-related countermeasures.

The planning process takes into consideration constraints within the local county network and incorporates feedback from the County Engineer and local stakeholders, including partners within Iowa's 5 Es of safety (Engineering, Emergency Response, Education, Enforcement, and Everyone), as shown in **Figure 2**. 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), over 90 percent of all crashes are the result of driver-related factors. Because such a high percentage of crashes are a result of driver-related factors, making roadways safer requires all five Es to be involved.

Figure 2 - Iowa's Five Es of Safety

1.4. SAP Development Process

The development of this SAP includes seven primary steps as illustrated in **Figure 3**. More detailed descriptions of the process are included in subsequent sections of this document.

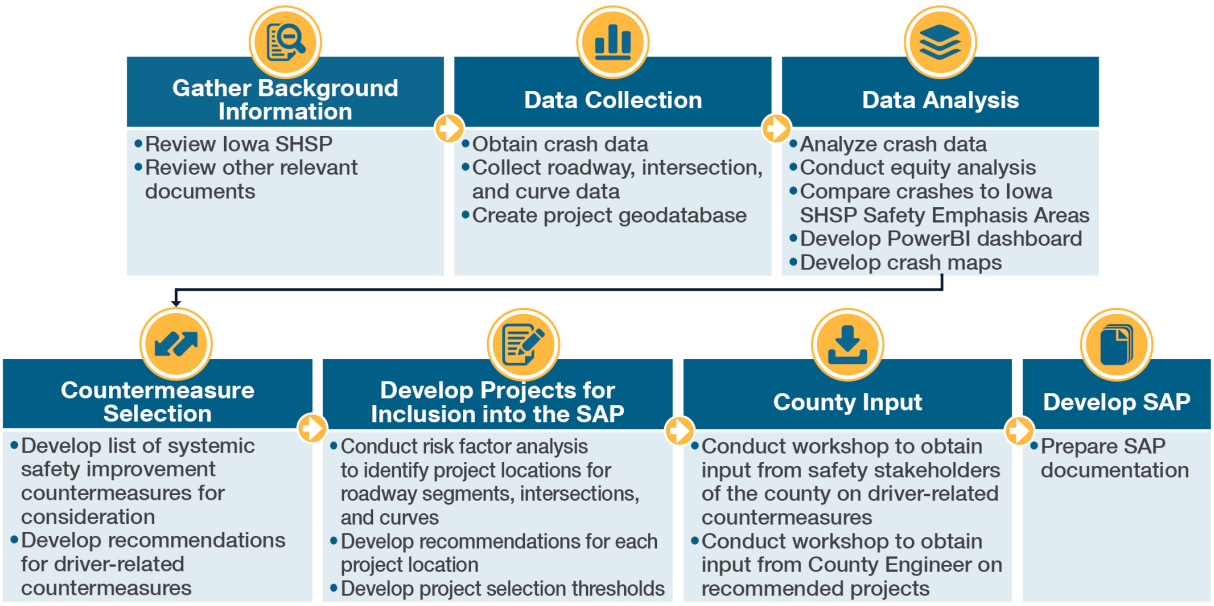


Figure 3 - SAP Development Process

1.5. Document Organization

This document is organized into the following sections:

- **Section 1. Introduction:** introduces SAPs and their purpose.
- **Section 2. Background:** provides a summary of relevant background information reviewed as part of the study.
- **Section 3. Data Collection:** summarizes the data collected and geodatabase developed for the analysis.
- **Section 4. Data Analysis:** describes the county crash data analysis.
- **Section 5. Countermeasure Selection:** provides a summary of potential engineering countermeasures and a summary of the driver-related countermeasure discussion from the Stakeholder Workshop.
- **Section 6. Safety Project Development:** describes the data analysis methodology used to select project locations and to identify safety improvements for roadway segments, intersections, and horizontal curves.
- **Section 7. Candidate Locations Based on Crash History (CLCH):** includes a list of high-crash segments, intersections, and curves for reference.
- **Section 8. Summary:** includes a summary of recommended improvements, implementation methods, and next steps.

2. BACKGROUND

Relevant safety documents were reviewed to gather background information for the SAP, including the Iowa SHSP, the Mahaska County Local Road Safety Plan (LRSP) (2017), Iowa safety funding opportunities, and safety resources. The following subsections summarize the background information gathered from each document.

2.1. Iowa SHSP

Iowa released its Five-Year SHSP 2024-2028, to meet the significant challenge of reducing fatal and serious injury crashes on public roadways within the state, shown in **Figure 4**. To understand fatality and serious injury trends within the state, the SHSP reviewed and analyzed five years of crash data for crashes resulting in fatalities and serious injuries from 2017 to 2021. The SHSP used a data-driven process that included input from safety stakeholders to determine seven Key Emphasis Areas, which are emphasis areas that have the greatest potential to reduce fatalities and serious injuries on public roads. The plan includes strategies, developed with input from professionals across the state, to address safety for each of the seven Key Emphasis Areas and to support the targets and goals defined annually by the state in support of Iowa's long-term vision of Zero Fatalities[1].

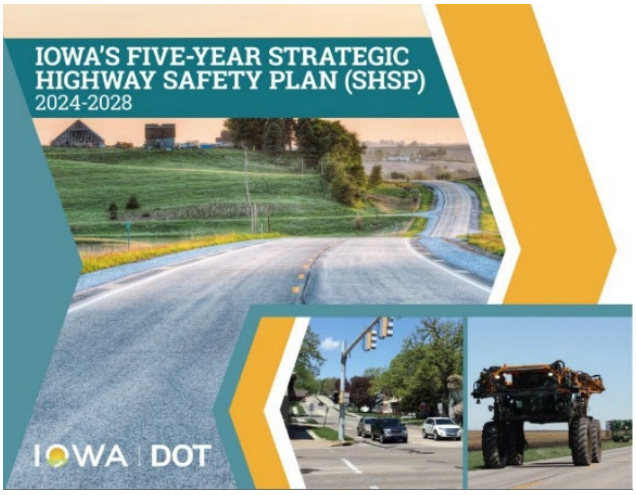


Figure 4 - Iowa's Five-Year SHSP

2.2. Mahaska County LRSP (2017)

In 2017, Mahaska County completed a Local Road Safety Plan (LRSP), shown **Figure 5**, through a program supported by the Iowa DOT's Traffic and Safety Bureau. The LRSP provided a basis for the proactive implementation of systemic safety countermeasures along local roads. Rather than only addressing "black spots," areas of the roadway where crashes typically occur, the LRSP identified systemic safety improvements based on a risk factor analysis of roadway segments, intersections, and curves within the county. The LRSP included project recommendations for a prioritized list of 30 high-risk locations, comprising segments, intersections, and curves. The recommended improvements take into consideration constraints within the local county network and incorporate feedback from the County Engineer and local stakeholders. The LRSP was developed to assist local practitioners in understanding the types of crashes occurring on its local roadways, as well as to define a locally focused plan for practitioners to make informed, prioritized safety decisions.

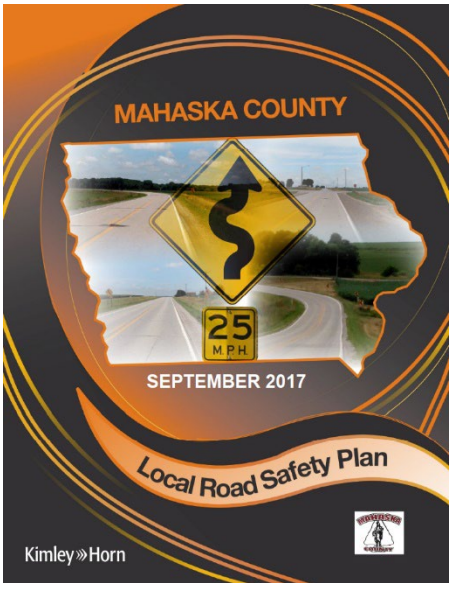


Figure 5 - Mahaska County LRSP

[1] https://zerofatalities.com/

2.3. Iowa Safety Funding Opportunities

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 SAP. The following safety programs are available for the County to apply for funding to aid in implementation of the safety countermeasures identified within this SAP.

2.3.1. County-State Traffic Engineering Program (C-STEP)

C-STEP helps solve traffic operation and safety problems involving primary roads outside incorporated cities. Project types include both spot and linear improvements.
https://iowadot.gov/grants-programs/County-State-Traffic-Engineering-Program

2.3.2. Governor's Traffic Safety Bureau (GTSB)

GTSB is a subdivision of the Iowa Department of Public Safety. GTSB's mission is to identify traffic safety issues through partnership with city, county, state, and local organizations to develop and implement strategies to reduce serious injury and fatal crashes on Iowa's roads.
https://dps.iowa.gov/bureaus-iowa-department-public-safety/gtsb

2.3.3. Highway Safety Improvement Program – Local (HSIP-Local)

This program promotes the installation of low-cost to medium-cost systemic improvements, with the goal of reducing fatal and serious injury crashes. HSIP-Local overlaps with TSIP but is more focused on implementing systemic, risk-factor improvements.
https://iowadot.gov/traffic/sections/hsip

2.3.4. Iowa DOT Roundabout Design Review

The Iowa DOT offers complimentary roundabout design review services to municipalities and counties throughout Iowa. Representatives from a nationally-known roundabout consulting firm are able to provide assistance during the feasibility, planning, concept, design, and operational planning stages of roundabout projects to help ensure early success.
https://iowadot.gov/traffic/roundabouts/roundabout-resources

2.3.5. Sign Replacement Program for Cities and Counties

This program provides funds to replace damaged, worn out, obsolete, or substandard signs and signposts for cities and counties in Iowa. The grant program is not used for ordering new signs that do not exist at the location specified in the application.
https://iowadot.gov/local_systems/City-Reports-Funding-and-Resources/Sign-Replacement-Program

2.3.6. Traffic Safety Improvement Program (TSIP)

The TSIP distributes funds for roadway safety improvements, traffic control devices, studies, and outreach. TSIP provides safety funds to cities, counties, and the Iowa DOT in three separate categories: site-specific, traffic control devices, and studies and outreach. TSIP overlaps with HSIP-Local but is more focused on reactive improvements based on a location's documented crash-history and the proposed project's benefit-cost ratio.
https://iowadot.gov/traffic/traffic-and-safety-programs/tsip/tsip-program

2.3.7. Traffic Engineering Assistance Program (TEAP)

TEAP provides up to 150 hours of free traffic engineering expertise to local units of government in the form of a traffic study. Studies identify cost-effective traffic safety and operational improvements as well as potential funding sources to implement the recommendations.
https://iowadot.gov/traffic/traffic-and-safety-programs/traffic-engineering-assistance-program-teap

2.4. Safety Resources

This section describes various transportation safety resources that are available for counties to improve safety on their roadways. It is recommended that the County Engineer review these resources and find programs or resources that are valuable and could be applied within the county.

2.4.1. Bike Safety

The Blank Children's Hospital has an *All Heads Covered: Our Wheeled-Sports Safety Program*. This program includes a curriculum kit that is designed to help educators teach bike and wheeled-sports safety in the classroom or community for elementary-aged children. They also have a Bike Safety Van that houses all the equipment to host a bike rodeo and is offered free of charge. Additionally, low-cost helmets are available through the program.
https://www.unitypoint.org/locations/unitypoint-health---blank-childrens-hospital/advocacy-and-outreach/safe-kids#helmetsafety

2.4.2. Child Passenger Safety

The Unity Point Health – Blank Children's Hospital, Center for Advocacy & Outreach provides an entire webpage focused on child passenger safety in Iowa for parents and caregivers, including a form to request an appointment with a certified Child Passenger Safety Technician (CPST).
https://www.unitypoint.org/blankchildrens/child-passenger-safety.aspx

2.4.3. Diminished Driving

The Iowa DOT has resources intended for family members, caregivers, or other concerned individuals who are responsible for evaluating the options for older Iowans, particularly those dealing with dementia. It provides useful information on how dementia can impact driving safety and what actions can be taken to protect both the affected individual and the community.
https://iowadot.gov/drivers-licenses-ids/other-services/safety-concerns

2.4.4. Fatality Analysis Reporting System (FARS)

FARS is a nationwide census that provides yearly data regarding fatal injuries suffered in motor vehicle traffic crashes. Users are able to create their own data run online by using the query system.
https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars

2.4.5. Iowa Department of Public Safety

The Iowa Department of Public Safety has traffic safety information available for the public to review, which includes access to crash reports, real-time roadway conditions, construction, rode closures, and more.
https://dps.iowa.gov/

2.4.6. Iowa DOT Crash Analysis Tool (ICAT)

The Iowa DOT crash mapping website, ICAT, can be used to develop crash maps and summarize data to compare crash history within a county. Crash maps and data summaries can be created by anyone with an internet connection.
https://icat.iowadot.gov/

2.4.7. Iowa DOT Potential for Crash Reduction (PCR)

The Iowa DOT PCR website can be used to understand the potential for safety improvement or PCR at intersections as well as primary and secondary roadway segments within the state. The tool compares segments or intersections with similar sites in the same category (e.g. speed, cross-section, traffic control). Archives of prior 5-year PCR maps are also available.
https://pcr.iowadot.gov/

2.4.8. Iowa DOT Roadside Chats

The Iowa DOT has created Roadside Chats, a traffic safety campaign that focuses on specific areas where drivers can make a difference in decreasing the number of fatalities: buckle up, slow down, drive sober, and pay attention.
http://www.transportationmatters.iowadot.gov/

2.4.9. Iowa DOT Safety Analysis Guide

Iowa DOT Safety Analysis Guide (SAG) for Practitioners, was developed to assist practitioners with conducting safety analyses in Iowa.
https://iowadot.gov/media/1597/download?inline=

2.4.10. Iowa Strategic Highway Safety Plan

As previously summarized, the Iowa SHSP was developed to meet the significant challenge of reducing fatal and serious injury crashes on public roadways within the state. The document establishes statewide goals, objectives and key emphasis areas developed in consultation with federal, state, local and private sector safety stakeholders.
https://iowadot.gov/traffic/shsp/home

2.4.11. Multi-Disciplinary Safety Teams (MDSTs)

Iowa's MDST Program facilitates the development and operations of local multi-discipline safety teams to help identify and resolve local crash causes and enhance local crash response practices. By coordinating communication and collaborating with other stakeholders, participants gain a broader perspective on safety issues and learn best practices from professionals outside their area of expertise. This ultimately leads to the development of solutions that may not have been considered otherwise.

If you are interested in developing an MDST for your area, contact the Statewide MDST Facilitator for more information. Contact information for the Statewide MDST Facilitator is available on the program website. As of November 2024, the Statewide MDST Facilitator is Theresa Litteral (515.294.7465 or litteral@iastate.edu).
http://www.iowaltap.iastate.edu/MDST/

2.4.12. NHTSA

NHTSA offers materials for numerous traffic safety campaigns, including drunk driving, car seats, vehicle safety, distracted driving, and motorcycles. These marketing tools offer a way to get involved through traditional media and online media.
https://www.nhtsa.gov/

2.4.13. NRSS

The USDOT NRSS outlines the Department's comprehensive approach to significantly reducing serious injuries and deaths on our nation's highways, roads, and streets. This is the first step in working toward an ambitious long-term goal of reaching zero roadway fatalities.
https://www.transportation.gov/NRSS

2.4.14. Road Safety Audits (RSAs)

An RSA is a formal safety performance examination that reviews, in detail, the geometry of a roadway facility. As part of an RSA, an independent, multi-disciplinary team assesses the condition of a given roadway and provides short-, mid-, and long-term recommendations for safety improvements for all modes provided or planned to be provided by the facility. RSAs have been conducted throughout the United States and are generally accepted as a proactive, low-cost approach to improve safety. This countermeasure cost estimate listed in the project sheets does not include the cost of implementing the recommendations of the RSA.

If you are interested in identifying funding for and conducting an RSA in your county, contact the Local Technical Assistance Program (LTAP) Safety Circuit Rider for more information. Contact information for the LTAP Safety Circuit Rider is available on the program website. As of November 2024, the LTAP Safety Circuit Rider is David Veneziano (dvenez@iastate.edu or 515.294.5480).
https://iowaltap.iastate.edu/safety-circuit-rider/

2.4.15. Teen Drive 365

Teen Drive 365 provides safe driving tips for educators, teens, and parents. It is a free resource that helps promote defensive driving behavior among the youngest drivers on the road. Teen Drive 365 created an educational program called HeadsUP, which is an online distracted driving challenge.
https://www.teendrive365inschool.com/sites/default/files/headsup/index.html

2.4.16. Teen Driving Safety Resource Guide

This resource guide provides drivers with organizations, programs, publications, and resources focused on teen driving safety.
https://www.childrenssafetynetwork.org/resources/teen-driving-safety-resource-guide

2.4.17. Traffic Safety Marketing

Traffic Safety Marketing is an online resource for safety materials that can be used for safety campaigns. There are various materials that are free of charge and others that can be purchased. Counties are encouraged to download and use the traffic safety materials provided during campaigns and throughout the year.
https://www.trafficsafetymarketing.gov/

3. DATA COLLECTION

As part of the SAP project, a comprehensive geographic information system (GIS) project database was developed utilizing available crash, roadway, and disadvantaged community databases. 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. The Iowa DOT ICAT tool was used to obtain crashes occurring on roadways of interest between January 1, 2014 and December 31, 2023. The crash database provides crash-, vehicle-, and person-level attributes in addition to several derived crash-level attributes, such as key emphasis area indicators. Additionally, each crash is classified using the KABCO Injury Classification Scale, which categorizes the crash based on the most serve injury sustained by any person involved in the crash, where K represents a fatal crash, A represents suspected serious injury crash, B represents a minor injury crash, C represents a possible/unknown injury crash, and O represents a property damage only crash. All crashes are geocoded with respect to the Iowa DOT Roadway Asset Management System (RAMS) roadway database.

This SAP utilizes five years (2019-2023) of crash data for analysis purposes and ten years (2014-2023) of data for crash mapping. 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 or maintained), and the Municipal System (City-owned). All crashes with a "Concatenated System" value containing "Secondary," including intersections with state roadways, were selected for analysis. "County" 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 secondary roads, as defined in the RAMS database. Additional analysis was performed for a limited number of crashes not identified through this technique.

3.2. Roadway Data

Various databases were used that contain different roadway data elements, including the RAMS, horizontal curve, intersection, and pavement management databases. Information on the locations of existing stop signs and updates to the databases were also considered.

3.2.1. RAMS Database

The Iowa DOT RAMS 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. The Iowa DOT regularly updates a road network snapshot with integrated RAMS attributes and publishes it on the Iowa DOT Open Data Portal. This SAP utilized a 2023 road network snapshot.

3.2.2. Horizontal Curve Database

A horizontal curve geospatial database was created for the Iowa DOT by Pathway Services Inc. in conjunction with their video log and pavement distress collection efforts. Kimley-Horn reviewed and refined the horizontal curve dataset for this SAP.

3.2.3. Intersection Database

In August 2017, the Institute for Transportation at Iowa State University (InTrans) and the Iowa DOT completed initial development of an intersection database. The foundation of this database was a GIS-based intersection point file created by the Iowa DOT's Traffic and Safety Bureau. A selected set of Model Inventory Roadway Elements (MIRE) were captured for each intersection and each intersection approach, including aerial imagery and street-level images.

The Iowa DOT Research and Analytics Bureau has been in the process of developing a new intersection database based on, and integrated with, the RAMS linear referencing system (LRS). In this database, a single functional intersection may be represented by multiple points. For example, the intersection of two divided roads, with no channelization, is represented by four intersection points, comprising a "complex" intersection. InTrans has collaborated with the Research and Analytics Bureau to conflate the original intersection database and corresponding elements to a May 2023 RAMS-based intersection database version. Intersection database elements have not been compressively updated since completion of the original intersection database; however, elements for a limited number of intersections (included in the May 2023 RAMS-based version) have been updated as part of other research efforts.

3.2.4. PCR Paved Public Road Intersection Database

The Iowa DOT Traffic and Safety Bureau, with assistance from InTrans, has developed safety performance functions (SPFs) for paved public road intersections by category. An SPF predicts the average number of crashes at an intersection based on various characteristics (e.g. speed, cross-section, and traffic control) and exposure (traffic volume). The difference between the SPF predicted crashes and adjusted, observed crashes at an intersection represents the Potential for Crash Reduction (PCR). The Traffic and Safety Bureau has established three categories for resulting PCR values: negligible, medium and high.

Two types of SPFs, one that includes all crashes and another that includes fatal, serious injury, and minor injury crashes, were first developed for the 2014 to 2018 analysis period and then the 2016-2018 analysis period based on the August 2017 intersection database and intersection crash definition. More recently, three types of SPFs, one that includes all crashes, another that includes fatal, serious injury, and minor injury crashes, and a third that includes possible injury and property damage crashes, were developed for a 2018 to 2022 analysis period, based on the May 2023 RAMS-based intersection database and an updated intersection crash definition.

This SAP utilizes the resulting 2018 to 2022 intersection PCR values for all crashes.

3.2.5. PCR Paved Secondary Road Database

Similar to the SPFs developed for paved public road intersections, Iowa DOT's Traffic and Safety Bureau has also developed SPFs for paved secondary road segments by category with assistance from InTrans. Two types of SPFs, one that includes all crashes and another that includes fatal, serious, and minor injury crashes, were developed for a 2016 to 2020 analysis period, considering only non-intersection crashes.

This SAP utilizes the resulting 2016 to 2020 paved secondary road PCR values for all crashes.

3.2.6. International Roughness Index (IRI) Database

InTrans summarized IRI data for paved secondary road segment and horizontal curve datasets provided by Kimley-Horn. Raw pavement condition data, collected by Pathway Services Inc. from 2018 to 2023 were utilized to provide the highest possible coverage. The most recent data was used to compute the summarized IRI. Invalid IRI measurements were excluded, and raw data was excluded within 75 feet of paved intersections.

The *Highway Safety Manual* (HSM) suggests that pavement in better condition provides a lower potential for crashes. The use of this database and the recorded IRI help determine additional potential for crashes along roadway segments and curves.

3.2.7. 911 Address Database

The Mahaska County 911 address database documents driveway addresses for businesses, homes, and structures within the county. It was utilized to obtain driveway locations along the County's 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.

3.2.8. 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. ICEA provided information indicating where stop signs were located along the county paved roadway system. This information was geocoded into the GIS database.

3.2.9. Existing Condition Updates

Throughout the SAP 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 to the project sheets were made.

3.3. Demographic Data

The following sections detail the demographic data that was obtained to identify areas that meet the SS4A definition of an Underserved Community as well as to conduct an equity analyses, which was previously included as an optional component of an SAP and was included as an element of the project based on the grant agreement signed with FHWA in 2023.

3.3.1. Underserved Communities

As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria:

- The County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets:
  - The 1990 decennial census;
  - The 2000 decennial census; and
  - The most recent Small Area Income Poverty Estimates (SAIPE); or

- The Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; or
- Any territory or possession of the United States.

US Census Bureau Data

The *Population by Poverty Status in 1989/1999 for Counties* dataset was obtained from the US Census Bureau website for the 1990 and 2000 Decennial Census. These datasets include a geographic distribution of poverty in 1989 and 1999, respectively, with data available at the county and census tract levels. The county-level data was used to identify if greater than or equal to 20% of the county was below the poverty level.

Small Area Income Poverty Estimates (SAIPE)

The Small Area Income Poverty Estimates 2023 Poverty and Median Household Income Estimates for counties, states, and national was obtained from the US Census Bureau website. The dataset includes a geographic distribution of poverty in 2023, with data available at the county, state, and national level. The county-level data was used to identify if greater than or equal to 20% of the county was below the poverty level.

SS4A Underserved Communities Tool

The SS4A Underserved Communities tool was used to download data at the census tract level for Iowa to identify the areas that met the SS4A definition of an underserved community.

Based on a review of the US Census Bureau and SAIPE datasets, no counties in Iowa have a poverty rate of 20 percent or greater. Therefore, only the data from the SS4A Underserved Communities Tool was used to determine underserved communities in this analysis.

3.3.2. Equity

When the SS4A program was established in 2022, an equity analysis was included as an optional component of an SAP. As such the Equitable Transportation Community Explorer and the Climate and Economic Justice Screening Tool were used to identify disadvantaged areas within Mahaska County. As of January 2025, the demographic data tools websites are currently unavailable. This information is included in this SAP as it was included as an element of the project based on the grant agreement signed with FHWA in 2023.

USDOT Equitable Transportation Community (ETC) Explorer

The USDOT ETC provided census tract data related to transportation insecurity, environmental burden, social vulnerability, health vulnerability, and climate and disaster risk burden to identify locations that can benefit from safety improvement projects. A census tract was considered in need if the final index score places it in the 65 percent of all US census tracts. USDOT ETC data was based on the 2020 US Census. The five scoring components included:

- Transportation Insecurity
- Environmental Burden
- Social Vulnerability
- Health Vulnerability
- Climate and Disaster Risk

Climate and Economic Justice Screening Tool (CEJST)

The CEJST provided census tract level data related to climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development to identify

locations that are disadvantaged. A community was considered in need if it is at or above a predetermined threshold for a burden within any of the key categories, as well as being at or above a predetermined threshold for an associated socioeconomic burden. Thresholds for the categories vary, and data sources range from 2010 to 2022. The eight scoring components included:

- Climate Change
- Energy
- Health
- Housing
- Legacy Pollution
- Transportation
- Water and Wastewater
- Workforce Development

4. DATA ANALYSIS

From January 1, 2019 to December 31, 2023, there were a total of 266 crashes on county roads in Mahaska County, of which 18 resulted in serious injuries and fatalities. 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. High-crash locations and additional crash data analyses are included in this section.

4.1. Comparison of County Crashes to SHSP Safety Emphasis Areas

As part of Iowa's Five-Year SHSP 2024-2028, five years of crash data for crashes resulting in fatalities and serious injuries were separated into safety emphasis areas. 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. To align with the national shift to the Safe System Approach, the Iowa SHSP grouped each emphasis area into the five Safe System elements: Safer People, Safer Speeds, Safer Roads, Safer Vehicles, and Post-Crash Care. Iowa's Emphasis Areas grouped by the Safe System Approach are shown in **Figure 6**.

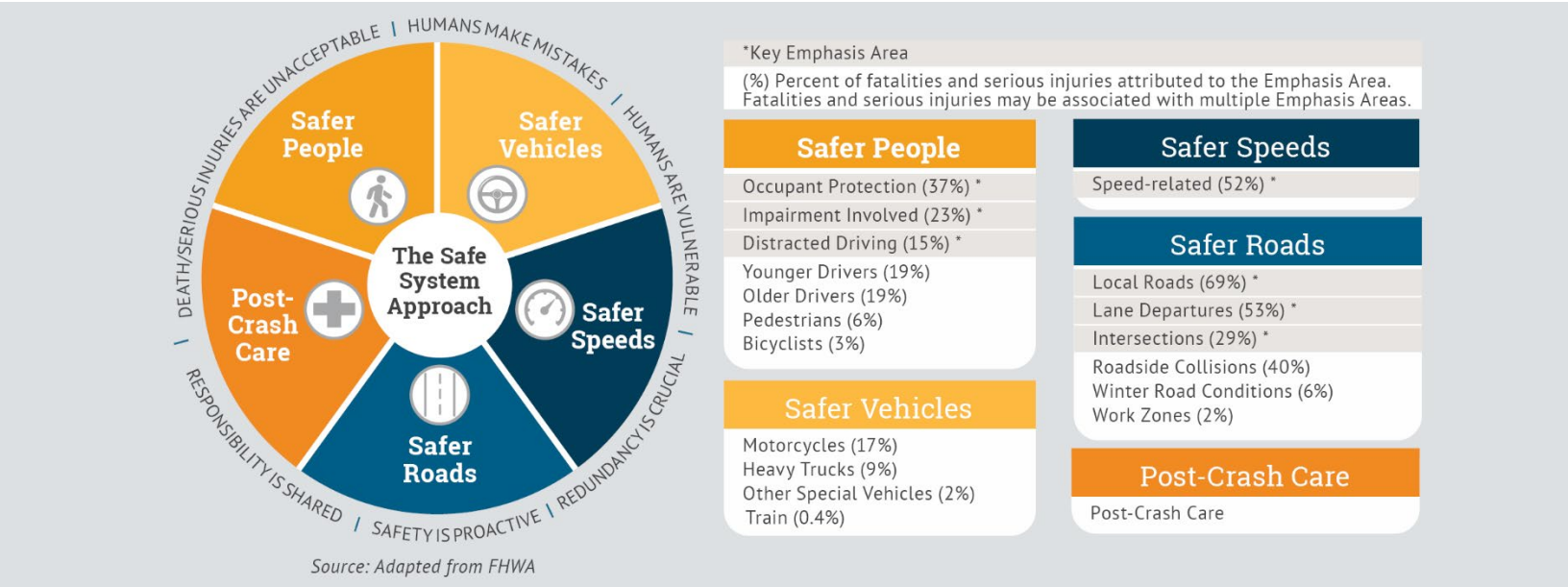


Figure 6 - Iowa's 2024 SHSP Emphasis Areas

Table 1 contains a comparison of Mahaska County crashes resulting in fatalities and serious injuries to the emphasis areas from Iowa's Five-Year SHSP 2024-2028. Because the latest SHSP was based on five years of crash data, five years of crash data (2019-2023) for the county was utilized to compare the crashes to the Iowa SHSP emphasis areas. For comparison, **Table 2** shows the change in rank between the county and the state. As shown in

Table 1 and **Table 2**, distracted driving rank higher for Mahaska County than the statewide totals, while intersections rank lower for Mahaska County that the statewide totals. It should be noted that this analysis includes all fatal and serious injury crashes within the county, not just those that occurred on county roads.

Table 1 - Mahaska County Fatalities and Serious Injuries by Safety Emphasis Area

Category	Emphasis Area	Mahaska County			Statewide Totals			Iowa DOT Key Emphasis Area
		Fatal & Serious Injury	% of Total	Rank	Fatal & Serious Injury	% of Total	Rank	
		59	100%	N/A	8,653	100%	N/A	
Safer People	Occupant Protection	27	46%	4	3,428	40%	5	X
	Impairment Involved	15	25%	6	2,042	24%	7	X
	Distracted Driving	13	22%	7	1,264	15%	11	X
	Younger Drivers	7	12%	10	1,582	18%	9	
	Older Drivers	11	19%	8	1,628	19%	8	
	Pedestrians	4	7%	13	511	6%	14	
	Bicyclists	2	3%	15	199	2%	15	
Safer Vehicles	Motorcycles	7	12%	10	1,577	18%	10	
	Heavy Trucks	7	12%	10	757	9%	12	
	Other Special Vehicle	1	2%	16	149	2%	17	
	Trains	0	0%	17	32	0%	18	
Safer Speeds	Speed-Related	31	53%	3	4,547	53%	2	X
Safer Roads	Local Roads	36	61%	1	6,405	74%	1	X
	Lane Departures	32	54%	2	4,537	52%	3	X
	Intersections	10	17%	9	2,532	29%	6	X
	Roadside Collisions	21	36%	5	3,540	41%	4	
	Winter Road Conditions	4	7%	13	512	6%	13	
	Work Zones	0	0%	17	166	2%	16	

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: Iowa Crash Analysis Tool (ICAT) 2019-2023

Table 2 - Mahaska County Fatalities and Serious Injuries Rank by Safety Emphasis Area

Category	Emphasis Area	Rank			Iowa DOT Key Emphasis Area
		County	State	Change in Rank	
Safer People	Occupant Protection	4	5	-1	X
	Impairment Involved	6	7	-1	X
	Distracted Driving	7	11	-4	X
	Younger Drivers	10	9	+1	
	Older Drivers	8	8	-	
	Pedestrians	13	14	-1	
	Bicyclists	15	15	-	
Safer Vehicles	Motorcycles	10	10	-	
	Heavy Trucks	10	12	-2	
	Other Special Vehicle	16	17	-1	
	Trains	17	18	-1	
Safer Speeds	Speed-Related	3	2	+1	X
Safer Roads	Local Roads	1	1	-	X
	Lane Departures	2	3	-1	X
	Intersections	9	6	+3	X
	Roadside Collisions	5	4	+1	
	Winter Road Conditions	13	13	-	
	Work Zones	17	16	+1	

Source: Iowa Crash Analysis Tool (ICAT) 2019-2023

4.2. Crashes on County Roads

The following sections summarize crashes occurring on county roads (2014-2023) and provide a comparison of crashes by roadway type and jurisdiction (2019-2023). The term "county roads" refers to roads defined by the Iowa DOT as Secondary Roads or roadways maintained by the county.

4.2.1. Crash Maps

Crash severity maps for the county 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" or located within 250 feet of a secondary road, with some refinement, 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 250-foot spatial proximity was utilized to more accurately convey crash locations. **Figure 7** contains a map illustrating all crashes on county roads within the county stacked by ascending severity. **Figure 8** contains a map illustrating all fatal and serious injury crashes stacked by ascending severity.

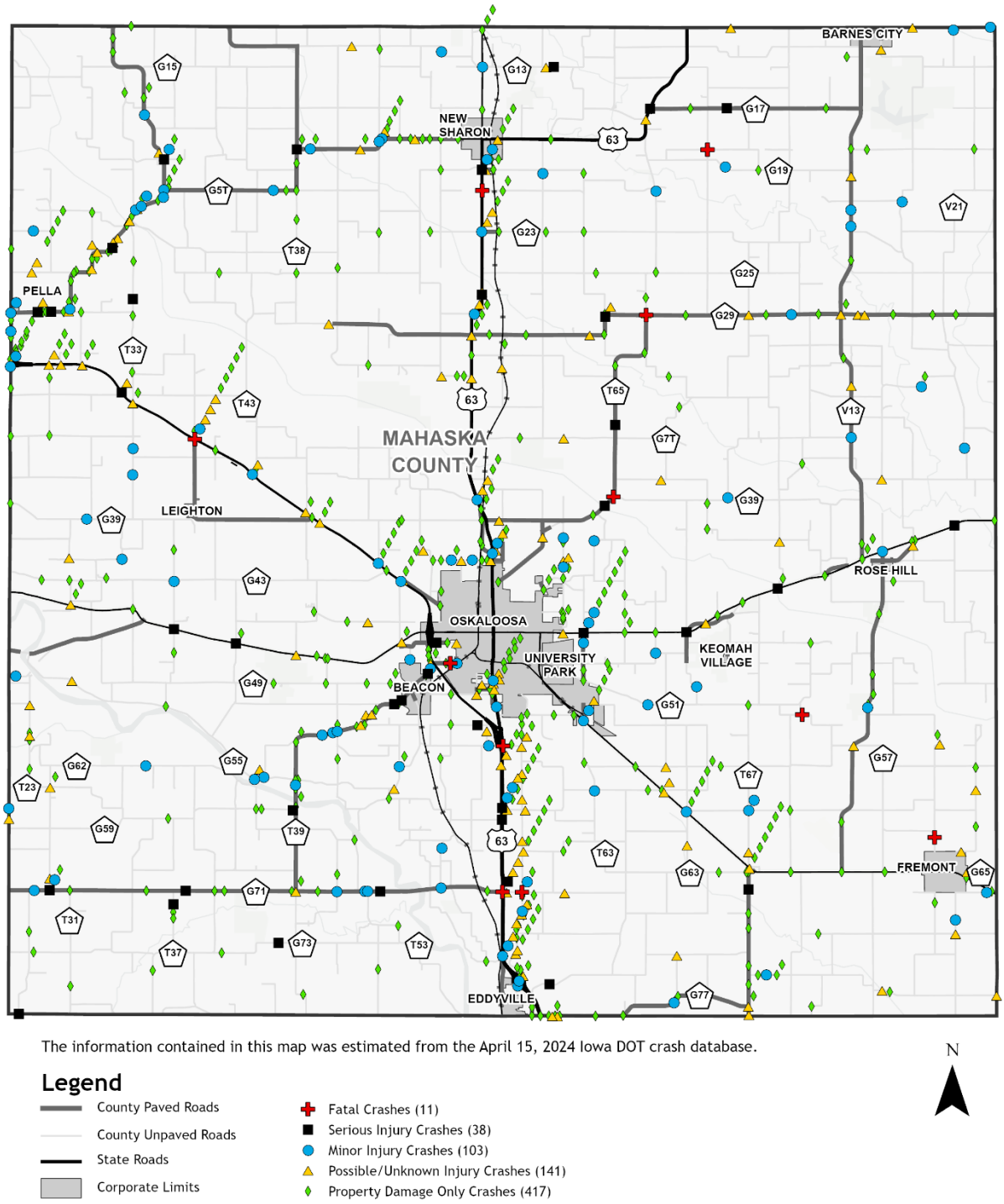


Figure 7 - Total Crashes Mahaska County Roads (2014-2023)

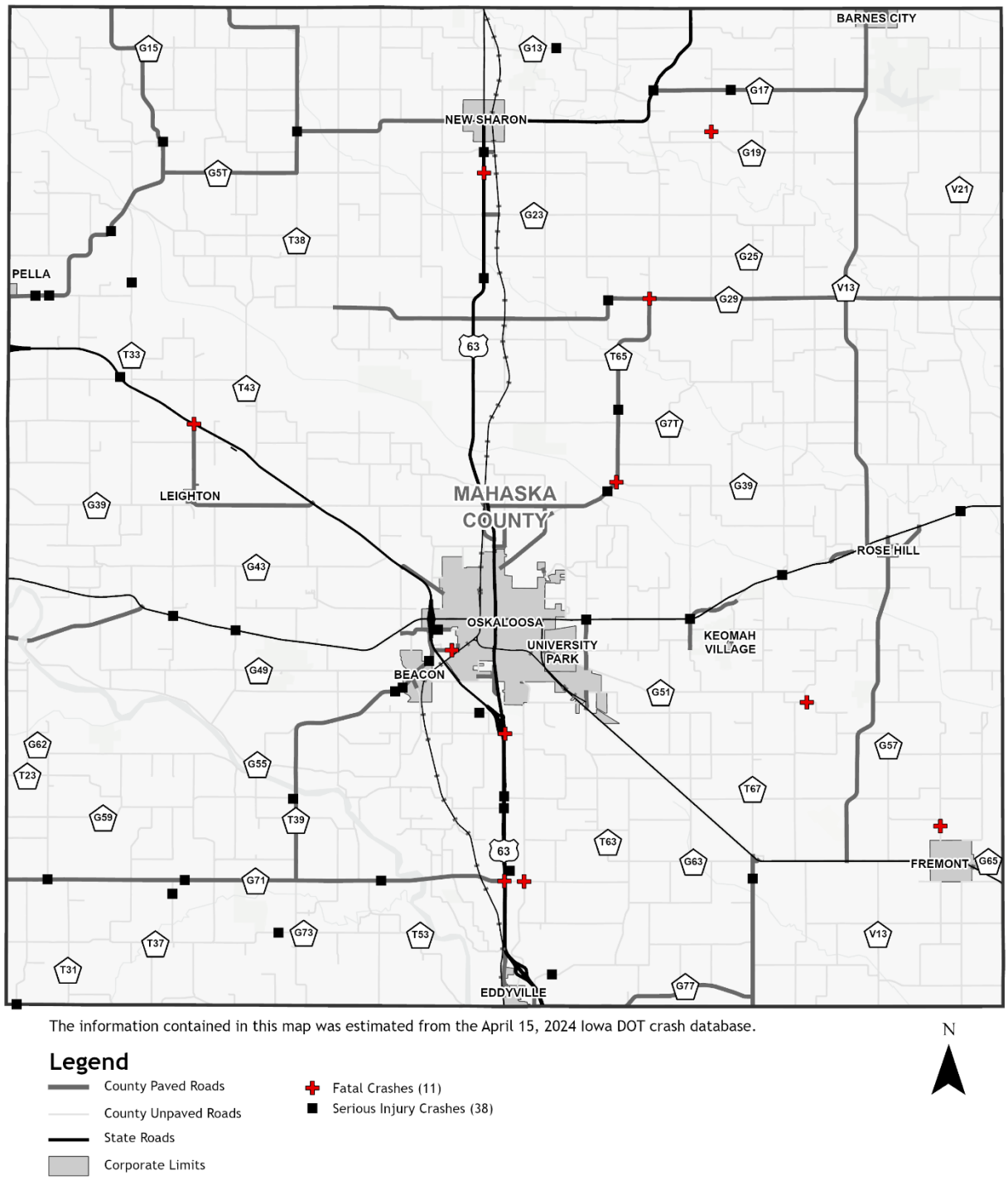


Figure 8 - Fatal and Serious Injury Crashes Mahaska County Roads (2014-2023)

4.2.2. Comparison by Roadway Type

As shown in the previous maps, more of the county road crashes occurred on county unpaved roads as opposed to paved roads. **Table 3** contains a tabular summary of the county crashes by roadway type and **Figure 9** contains a graphical summary of the county crashes by roadway type. K denotes a fatality, and A denotes a serious injury.

Table 3 - Mahaska County Crashes by Roadway Type (2019-2023)

Mahaska County					
Roadway Type		**Total Crashes**		**Fatal and Serious Injury (K & A) Crashes**	
		Count	**Percent**	**Count**	**Percent**
County Paved	Intersection	47	18%	5	28%
	Curve	24	9%	3	17%
	Segment	55	21%	6	33%
	Subtotal	**126**	**47%**	**14**	**78%**
County Unpaved	Intersection	31	12%	0	0%
	Curve	1	0%	0	0%
	Segment	108	41%	4	22%
	Subtotal	**140**	**53%**	**4**	**22%**
Total		**266**		**18**	

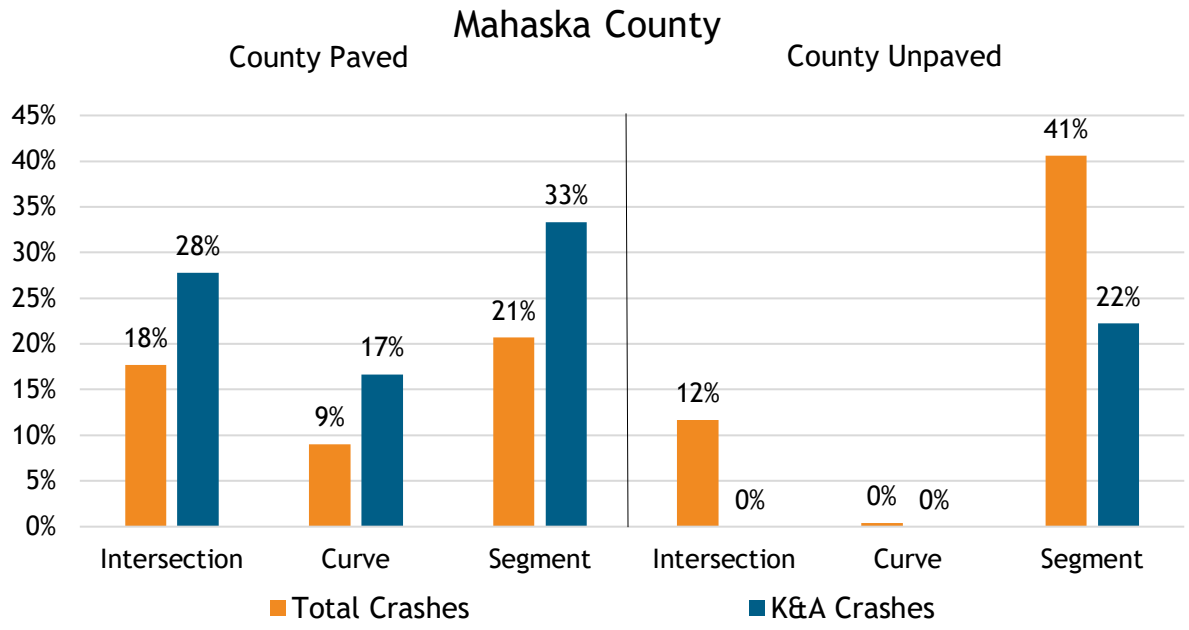


Figure 9 - Mahaska County Crashes by Roadway Type (2019-2023)

4.2.3. Crash Rate Comparisons

The following sections provide a comparison of crash rates on county roads and across the state for all crash severities and fatal and serious injury crashes.

Total Five-Year Crash Rates

From 2019 to 2023 there were a total of 266 crashes on county roadways within Mahaska County. A comparison of the five-year crash rate on county roads in Mahaska County to the rates on all roads in the county and all roads in Iowa during the same timeframe is illustrated in **Figure 10**. The Mahaska County five-year crash rate on county roads was lower than the five-year Iowa crash rate.

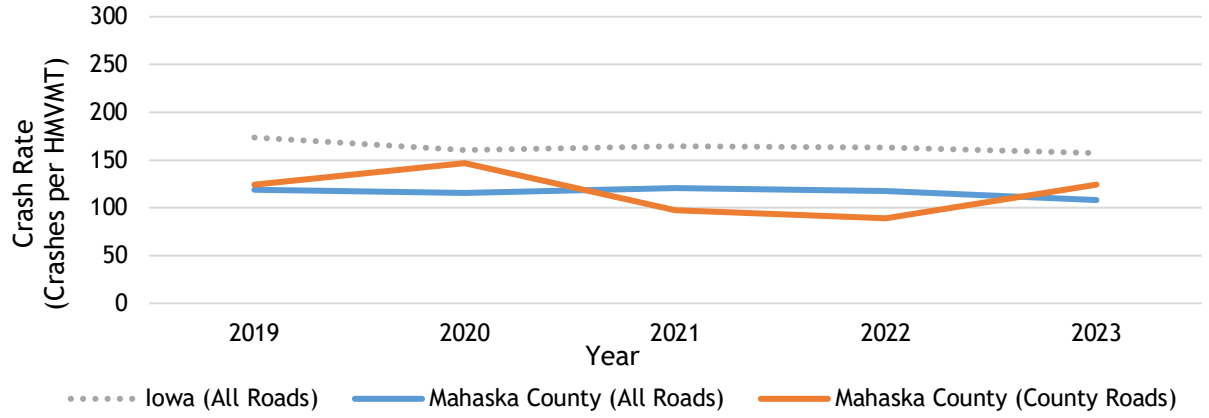


Figure 10 - Total 5-Year Crash Rates (2019-2023)

Fatal and Serious Injury Five-Year Crash Rates

From 2019 to 2023 there were a total of 18 fatal and serious injury crashes within Mahaska County. Fatal and serious injury five-year crash rates for all roads in Mahaska County, the county owned roads, and all roads in Iowa are illustrated in **Figure 11**. The Mahaska County fatal and serious injury crash rate on county roads was higher than the Iowa crash rate during 2019, 2020, 2022, and 2023 and was generally the same as the Iowa crash rate during 2021.

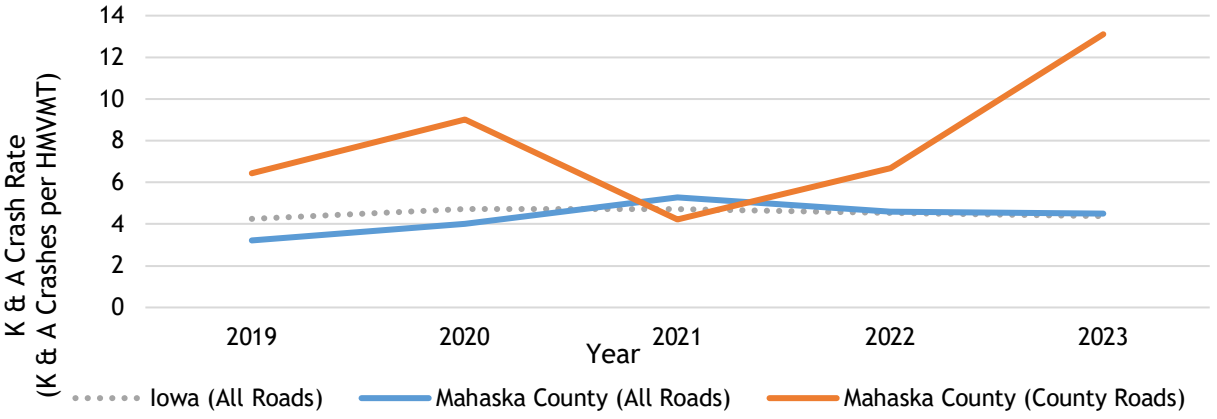


Figure 11 - Fatal and Serious Injury 5-Year Crash Rate (2019-2023)

Average 5-Year Crash Rates

Figure 12 shows the average crash rates for all crashes as well as fatal and serious injuries for county roads compared to all roads in Iowa from 2019 to 2023. As illustrated, the county road crash rate for all crashes is lower than the statewide crash rate and the fatal and serious injury crash rate on county roads is higher than the fatal and serious injury crash rate statewide, demonstrating the importance of a focus on fatal and serious injury crashes on county roads.

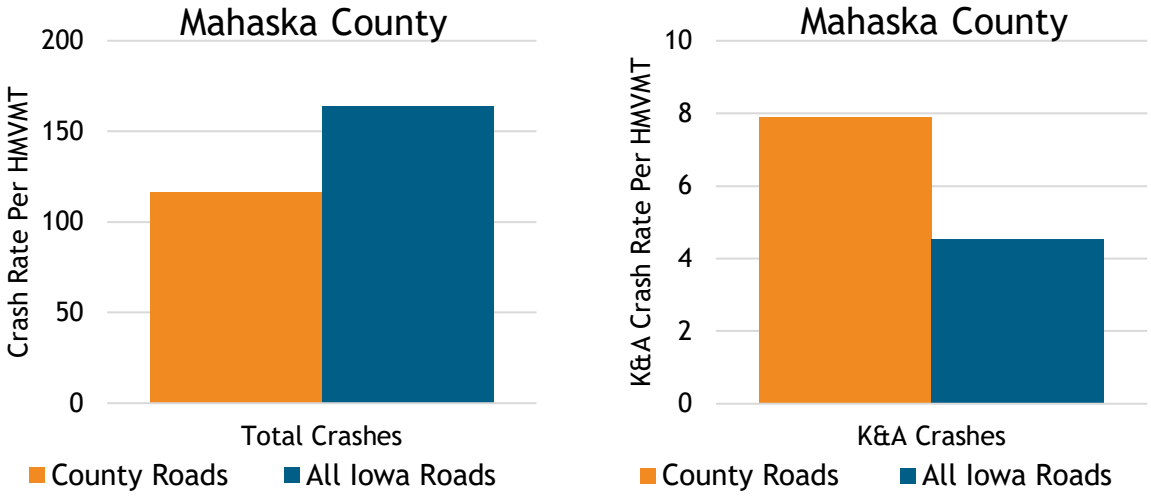


Figure 12 – Comparison of Mahaska County Roads to All Iowa Roads (2019-2023)

4.3. PowerBI Dashboard

An interactive dashboard was created using PowerBI that provides a comprehensive overview of crash data on secondary roads in Mahaska County. The dashboard provides a visual way to review crash trends and findings through charts and graphics. Users have the ability to filter the data by various attributes to find insights and trends associated with their selection(s) and the ability to export results. The dashboard includes crash data from 2019 to 2023.

The dashboard can be accessed via the secure portal on the ICEA website (https://www.iceasb.org/) by following these steps:

- Click on News & Updates
- Click on Headlines (which is under the News category)
- In the search bar type “crash”
- Click on headline: “County Safety Action Plans – ICEA Crash Data Dashboard”
- Click on the dashboard link: “ICEA Crash Data Dashboard”
- Bookmark the link for easy future access

4.4. County-Specific Data Analysis

It should be noted that the Iowa DOT has made crash data available through a crash mapping website, which can be used to develop additional crash maps: https://icat.iowadot.gov. Crash maps can also be requested through the Iowa Traffic Safety Data Service (ITSDS). More information is available on the following website: www.ctre.iastate.edu/itsds/.

4.5. Underserved Community Analysis

Based on the SS4A definition of Underserved Communities and the corresponding SS4A Underserved Communities tool, Underserved Communities in Mahaska County were identified to be located near Oskaloosa and University Park as shown in **Figure 13.** Projects located in Underserved Communities are given a higher priority in the SS4A grant program, as these areas could benefit from additional investment.

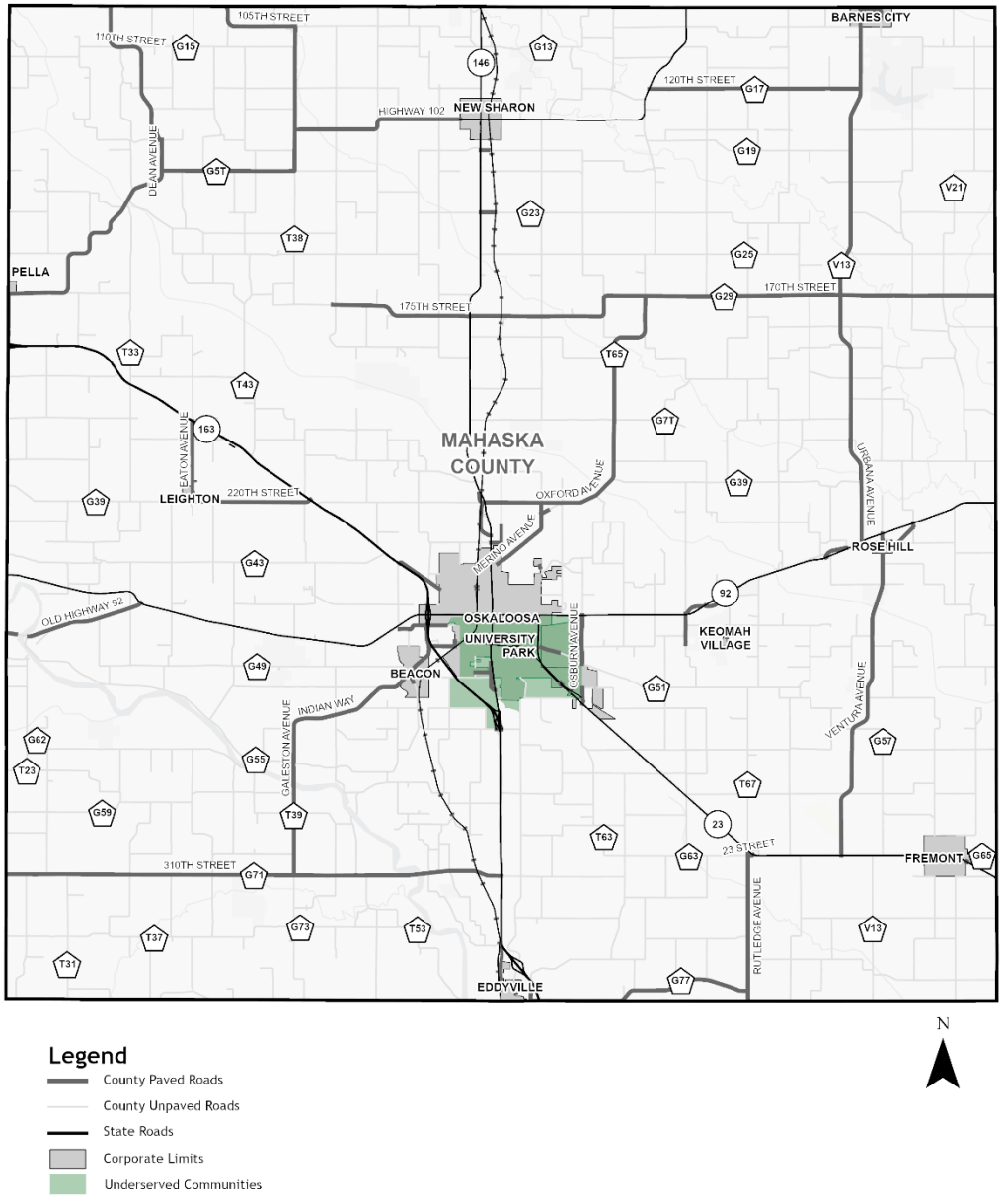


Figure 13 – Mahaska County Underserved Communities

4.6. Equity Analysis

Consistent with SS4A guidance at the start of this planning process, as well as agreed upon in the executed grant agreement with FHWA for this SAP, equity data was collected using the USDOT ETC and CEJST to identify disadvantaged areas in Mahaska County, which are shown in **Figure 14**. Portions of Mahaska County (near Barnes City, Fremont, Keomah Village, Leighton, New Sharon, Oskaloosa, Pella, Rose Hill, and University Park) are considered to be disadvantaged based on the CEJST and ETC screening tools.

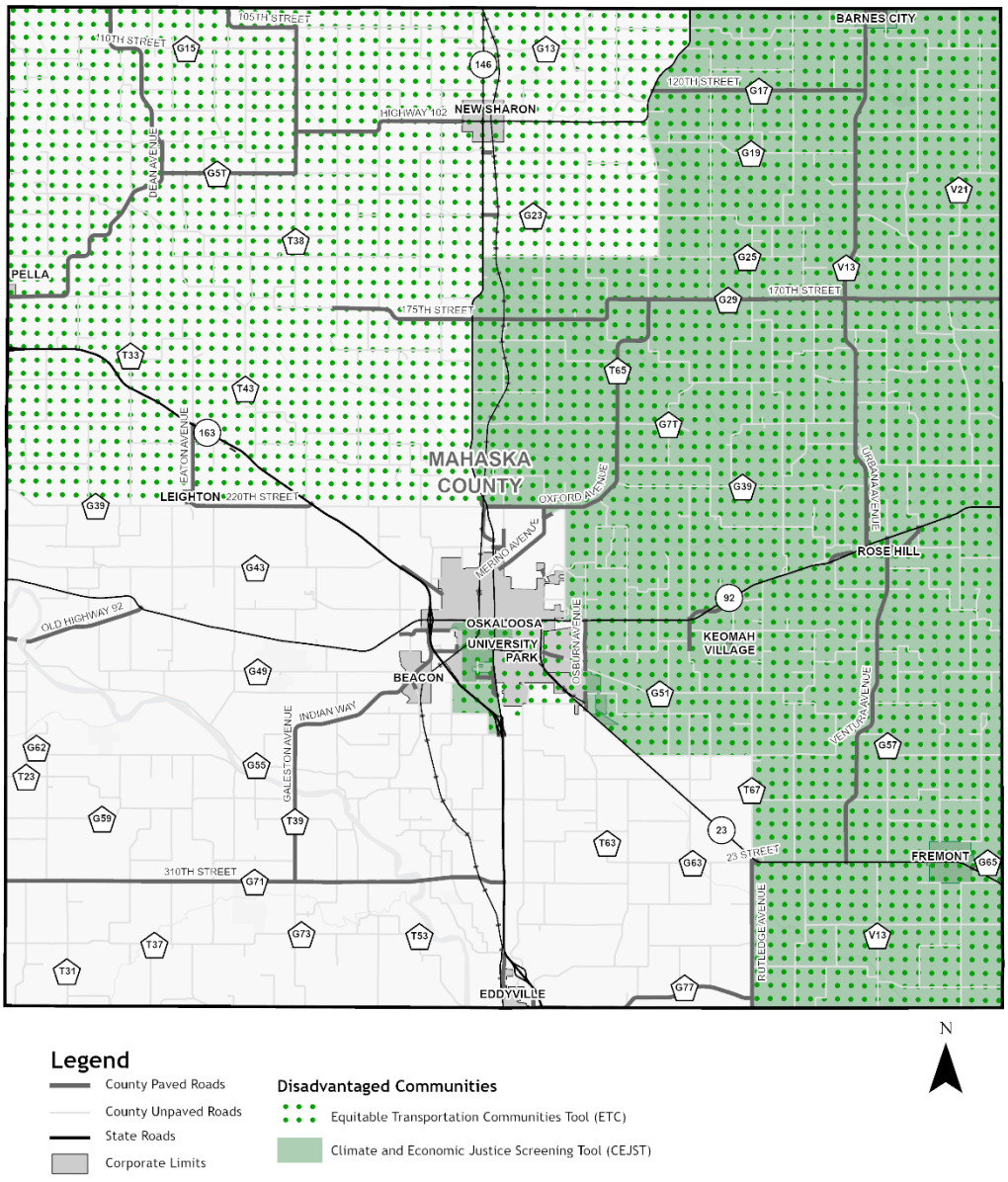


Figure 14 - Mahaska County Disadvantaged Communities

5. COUNTERMEASURE SELECTION

The following sections summarize engineering and driver-related safety improvement countermeasures considered for the SAP.

5.1. Potential Engineering Countermeasures

The engineering countermeasures proposed for consideration at each of the project locations are described in this section. Countermeasures are grouped by implementation at the systemic level and those that should be considered on a case-by-case basis by the County Engineer depending on the specific issues at a particular location. Nationally, there are relatively low percentages of fatal and serious injury crashes that occur on unpaved roadways when compared to paved roadways. As such, safety research has focused on paved roadways. The lack of research on the unpaved system results in very few Crash Modification Factors (CMFs) defined for safety countermeasures on unpaved roadways.

5.1.1. Countermeasure Effectiveness

The information about CMFs in this section is based on the Iowa DOT's Safety Analysis Guide and is provided for reference to demonstrate the potential positive impact the countermeasures can have on safety, if applied. The countermeasures recommended for consideration were chosen because of their effectiveness in reducing crashes. Some safety countermeasures recommended do not yet have CMF ratings (indicated by "CMF not defined" within this document), due to the amount of data and peer review that is required; however, preliminary studies show safety benefits as a result of these countermeasures. FHWA has also published a list of Proven Safety Countermeasures which is "a collection of countermeasures and strategies effective in reducing roadway fatalities and serious injuries. Transportation agencies are strongly encouraged to consider widespread implementation of [Proven Safety Countermeasures] to accelerate the achievement of local, State, and National Safety goals." https://safety.fhwa.dot.gov/provencountermeasures/

When identifying potential safety improvements, it is important to consider CMFs relevant to the proposed improvements using the CMF Method which is detailed in Part D of the HSM. CMFs are defined as the ratio of effectiveness of one condition compared to another and represent the relative change in crash frequency due to a change in a specific condition. In other words, a CMF is a multiplicative factor used to determine the anticipated number of crashes after implementing a particular countermeasure at a specific location. Countermeasures with CMFs less than one are anticipated to reduce crashes if applied, while those countermeasures with CMFs greater than one are anticipated to increase crashes. **Figure 15** illustrates the definition of CMFs.

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

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

Figure 15 - CMF Calculation

The CMF Method is used to calculate the anticipated number of crashes by multiplying the observed number of crashes by the applicable CMF for the proposed countermeasure. It is recommended to apply CMFs to a minimum of three years of crash data for urban and suburban

locations, and five years of crash data for rural locations. **Figure 16** provides an example calculation of the CMF method, demonstrating the application of a single CMF to a specific location 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 16 - CMF Application

A Crash Reduction Factor (CRF) is analogous to a CMF, but it is expressed differently. A CRF represents the percentage of crash reduction anticipated after the implementation of a specific countermeasure at a particular location. **Figure 17** illustrates the calculation of a CRF in relationship to a CMF.

$$CRF = (1 - CMF) \times 100$$

Figure 17 - CRF Calculation

Caution should be used when selecting appropriate CMFs. Section 2.3 of the Iowa DOT Safety Analysis Guide offers guidance for selecting and applying CMFs, including the following considerations:

- CMFs should primarily be selected from the Iowa Planning-Level CRF List (https://iowadot.gov/traffic/pdfs/CRFListVersion.pdf). If the desired CMF is not available in the list, then CMFs should be selected from the CMF Clearinghouse (http://www.cmfclearinghouse.org) using the guidance provided in Section 2.3.3 of the Iowa DOT Safety Analysis Guide.
- Only CMFs with a three-star rating or higher should be considered for use in analysis.
- The countermeasure abstract should be used to determine if the CMF is applicable to the proposed improvement.
- 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, CMF should be combined using the methodologies described in Section 2.3.4 of the Iowa DOT Safety Analysis Guide. It is suggested that no more than three CMFs are applied to a particular site.

5.1.2. County Paved Roadway Segment Countermeasures

The following roadway segment safety countermeasures were identified:

Systemic

- Conduct an RSA
- Conduct an access control analysis
- Install groove-in retroreflective pavement markings
- Install wider, retroreflective, pavement markings

Location Specific

- Flatten and widen foreslopes
- Provide on-pavement markings for speed control
- Delineate roadside hazards (trees or utility poles) with retroreflective strips

Systemic (continued)

- Increase shoulder width
- Install safety edge
- Install edgeline rumble strips
- Install centerline rumble strips
- Install/enhance curve chevron, advanced curve warning, and advisory speed signs
- Remove obstructions within right-of way (clearing and grubbing)
- Improve sight distance (clearing and grubbing)

Location Specific (continued)

- Install guardrails
- Install post-mounted delineators
- Install retroreflective strips on chevron signposts
- Install transverse rumble strips prior to curves
- Remove/relocate objects in hazardous locations
- Correct superelevation on curves
- Install High Friction Surface Treatment (HFST) on curves
- Install speed-activated flashers on chevron signs

5.1.3. County Paved Intersection Countermeasures

The following paved intersection safety countermeasures were identified:

Systemic

- Coordinate with local jurisdiction on signal modifications
- Conduct signal warrant analysis to consider removal of signal
- Conduct Intersection Control Evaluation (ICE)
- Implement the results of ICE
- Conduct all-way stop analysis to convert two-way stop to all-way stop or remove stop signs
- Install destination lighting
- Increase size and/or retroreflectivity of stop signs
- Duplicate signage
- Install groove-in retroreflective pavement markings
- Install wider, retroreflective pavement markings
- Install flashing beacons or LED flashing lights on stop/yield signs
- Install transverse rumble strips
- Install intersection warning signs and advanced street name plaques
- Improve sight distance (clearing and grubbing)

Location Specific

- Provide right-turn and/or left-turn lanes
- Realign intersection approaches to reduce or eliminate skew
- Provide bypass lane on shoulder at T-intersections
- Convert offset T-intersections to four-legged intersections
- Use indirect left-turn treatments to minimize conflicts at divided highway intersections
- Convert four-legged intersections to offset T-intersections
- Install flashing beacon on intersection warning signs
- Install low-cost Intersection Conflict Warning Systems (ICWS)
- Install a roundabout
- Increase shoulder width
- Install safety edge
- Install retroreflective markers for trees or utility poles
- Install guardrails
- Install retroreflective strips on stop signposts
- Implement access management

5.1.4. County Paved Curve Countermeasures

The following horizontal curve safety countermeasures were identified:

Systemic

- Install groove-in retroreflective pavement markings
- Install wider, groove-in retroreflective, pavement markings
- Increase shoulder width (paved)
- Install safety edge
- Install edgeline rumble strips
- Install centerline rumble strips
- Install/enhance curve chevron signs
- Provide advance warning signage
- Remove obstructions within right of way (clearing and grubbing)

Location Specific

- Install additional curve signage
- Install retroreflective strips on chevron signposts
- Install transverse rumble strips prior to curve
- Correct superelevation
- Install HFST on curves
- Install speed-activated flashers on chevron signs
- Install guardrails
- Install on-pavement markings for speed control
- Install post-mounted delineators

5.1.5. Additional Potential Safety Countermeasures

For each location, there are safety enhancements that could be considered even though they were not recommended as part of this project due to the availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. These types of improvements are included when requested by the County Engineer.

5.2. Driver-Related Countermeasures

The subsequent sections discuss the driver-related workshop conducted within the county and identify driver-related countermeasures for implementation in the county as well as their current implementation status. Driver-related countermeasures are strategies aimed at improving driver behavior to enhance road safety. The 2024 Iowa SHSP has 19 Safety Emphasis Areas, six of which are driver-related as shown in **Figure 18**. Countermeasure recommendations are included to address each of the driver-related emphasis areas.

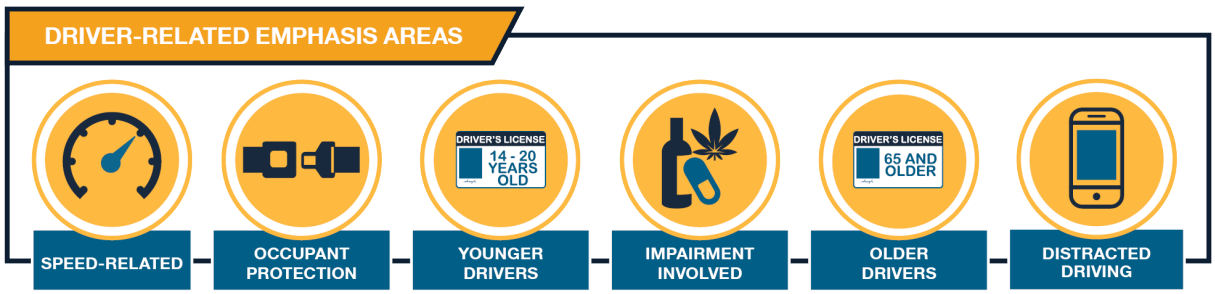


Figure 18 - Driver-Related Emphasis Areas

5.2.1. Stakeholder Workshop

A workshop was conducted in Mahaska County on Thursday, September 19, 2024, aimed at fostering a culture of safety within the county and identifying activities occurring in the county to address driver-related emphasis areas. A wide range of individuals were invited to the workshop, including elected officials, partner agencies that operate within the County,

stakeholders representing the 5 Es of traffic safety, and the general public. The flyer used to publicize the workshop and the sign-in sheet is included in **Appendix F**. During the workshop, participants discussed each of the driver-related emphasis areas and reviewed how fatal and serious injury crashes in the county aligned with statewide trends. Potential countermeasures from the NHTSA document, Countermeasures That Work, as well as previous planning efforts in the state were provided to stakeholders to facilitate discussions for each of the driver-related emphasis areas. Participants were invited to share their insights into the county's efforts to improve safety in each emphasis area and to discuss opportunities for further impact. An image from the workshop is shown in **Figure 19**. Stakeholders that attended the workshop included:

- Andrew McGuire, County Engineer
- Carter Brehm, Mahaska County
- Chuck Webb, Mahaska County Board of Supervisors
- Eric Dursky, Mahaska County Public Health
- Mitch Gibb, Mahaska County Engineer
- Mike Rodwell, Mahaska County
- Russell Van Renterghem, Sheriff's Office

Figure 19 – Mahaska County Workshop

Based on the discussion, the following statuses of implementation were assigned for each of the driver-related countermeasures discussed in the workshop:

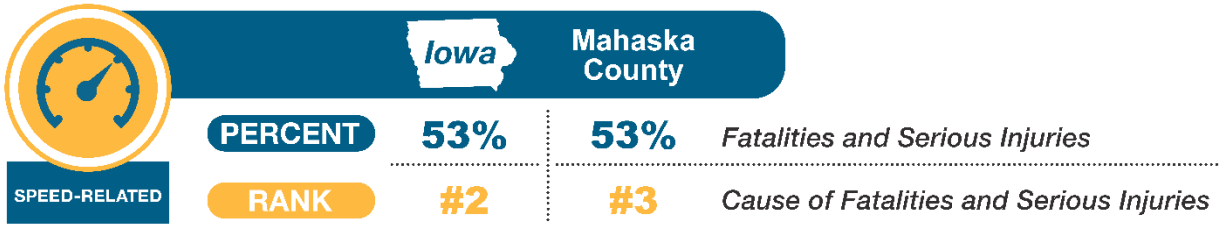
- Underway/Ongoing (currently being done)
- Ongoing/Opportunity (ongoing, but could be enhanced)
- Opportunity (not being done, but could be implemented)
- Completed in the Past (has been completed in the past, but not planned to be implemented in the future)

It is recommended that the county continue to implement countermeasures that are currently underway/ongoing and look for additional opportunities to implement countermeasures that

are not currently being implemented. This will require input from and coordination with all five Es of safety.

5.2.2. Speed-Related Countermeasures

Speed-related crashes account for 53 percent of fatal and serious injuries across the state of Iowa, and 53 percent of the fatalities and serious injuries in Mahaska County.



The Iowa SHSP recommends identifying corridors with a high frequency of speed-related crashes and implementing high-visibility enforcement in those areas. Mahaska County does not conduct targeted speed enforcement due to the lack of resources. The Iowa SHSP recommends implementing speed feedback signs at targeted locations as a speed-related countermeasure. The Iowa DOT has a program that allows eligible cities to partner with the DOT to install permanent speed feedback signs on state roadways within their city limits, and GTSB has grants available for counties to acquire mobile speed enforcement trailers. There is an opportunity for Mahaska County to conduct speed studies at locations with a history of frequent speeding. Additionally, the Iowa DOT is implementing other speed reduction strategies, as recommended in the SHSP, including using traffic calming practices such as lane reductions and installing medians, to help reduce speeds and improve safety in communities.

During the workshop, one topic of discussion involving speed-related incidents revolved around drivers illegally passing school buses. Mahaska County enforces the Keep Aware Driving – Youth Need School Safety Act (Kadyn's Law) 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. However, workshop attendees noted the 30-day suspension for first offenders is no longer mandatory. School buses are equipped with stop-arm cameras.

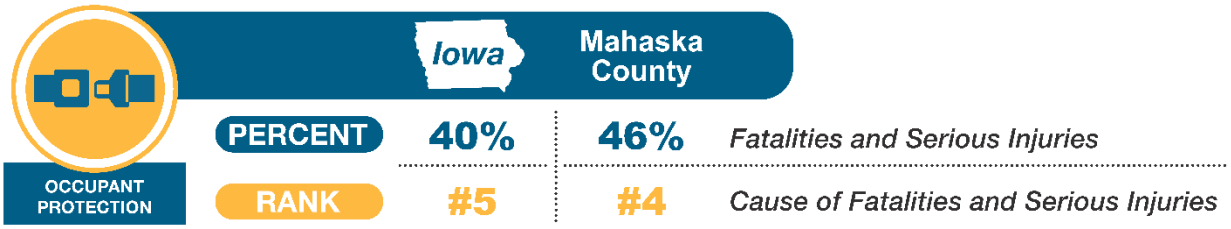
A summary of the speed-related countermeasures discussed during the workshop along with the county's status of implementation is included in **Table 4.**

Table 4 - Speed-Related Countermeasures

Countermeasure	Status
Conduct targeted speed enforcement • Sheriff's Office participates in GTSB funding • GTSB has grants available for funding to acquire mobile speed enforcement trailers	Ongoing/Opportunity
Prosecute and impose sanctions on drivers not obeying school bus stop bars • The Keep Aware Driving – Youth Need School Safety Act (Kadyn's Law) is actively enforced • Buses in the county are equipped with cameras	Underway/Ongoing
Conduct education and awareness campaigns • Opportunities to develop safety education programs within the county at the elementary, middle, or junior high level	Opportunity

5.2.3. Occupant Protection Countermeasures

Occupant protection crashes account for 40 percent of fatal and serious injuries across the state of Iowa, and 46 percent of the fatalities and serious injuries in Mahaska County.



The County uses GTSB funding, but workshop attendees could not confirm if the funding is used for occupant protection enforcement and surveying. Over the last ten years, typical seatbelt compliance was reported to be between 90 and 97 percent based on 2024 Iowa Seat Belt Use Report, meaning 3 to 10 percent of drivers and front-seat passengers were observed not wearing a seat belt. Conversely, 40 percent of fatalities and serious injuries across Iowa are related to occupant protection. Compared to the seat belt usage rates, the fatalities and serious injuries from occupant protection crashes are overrepresented; therefore, there is an opportunity for education on the importance of proper restraints or protective devices (seat belts, child restraint systems, helmets, or other devices).

The Sheriff's Office offers child seat installation. GTSB produces a "cheat sheet" to assist with child restraint laws. There is an opportunity for local law enforcement to provide a printed version to officers. Meeting attendees could not confirm if officers ensure that safety seats are being used and/or that children are using the correct type of restraint when a vehicle is pulled over, however they were able to confirm that a local hospital does check for proper child restraints before new parents leave the facility with their newborn.

In some communities, law enforcement offers positive reinforcement through programs that distribute ice cream coupons for children wearing their helmets while riding their bikes and wearing their seatbelt in the car. This is an excellent opportunity for positive reinforcement and encouragement for children to wear helmets and seatbelts. Law enforcement indicated that they conduct similar programs for school age children. A summary of the occupant

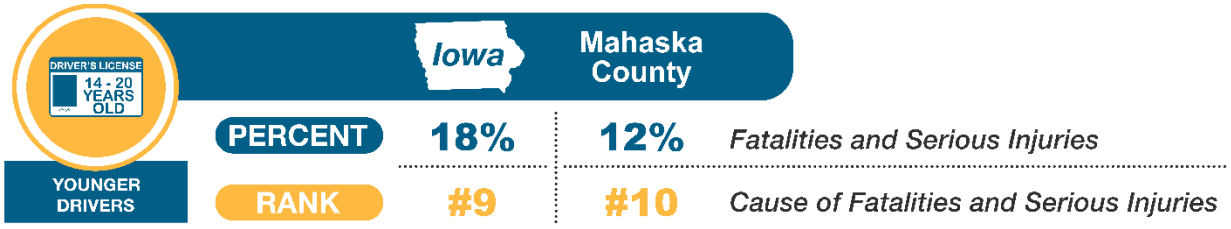
protection countermeasures discussed during the workshop along with the county's status of implementation is included in **Table 5**.

Table 5 - Occupant Protection Countermeasures

Countermeasure	Status
Conduct targeted enforcement of restraint use • Attendees could not confirm if occupant protection enforcement occurs	Opportunity
Instruction in proper child restraint use • Child seats can be inspected and installed at the Sheriff's Office	Underway/Ongoing
Check for proper child restraint use in all motorist encounters • Opportunity to provide officers with "cheat sheets" to enforce child restraint laws • Inform officers to check for proper child restraint use	Opportunity
Positive reinforcement • Local law enforcement distributes rewards for children performing proper safety	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity

5.2.4. Younger Drivers Countermeasures

Younger driver crashes account for 18 percent of fatal and serious injuries across the state of Iowa and 12 percent of the fatalities and serious injuries in Mahaska County.



Iowa passed a new law that allows 14.5-year-olds to drive to and from school/work/home. This law went into effect on July 1, 2024. Attendees noted driver's education is no longer taught directly by the school. but is subcontracted out. Additionally, many students are opting to do parent-led drivers' education. The Mahaska County Sheriff's Department stated concerns around parent-led drivers' education, as parents do not have to record learning hours.

The State has education programs and strategies for young drivers. It was noted that attendance for formal drivers' education class is in decline with students and parents opting to do parent-led drivers' education. An additional opportunity to educate young drivers includes using GTSB's impaired driving simulator or "drunk goggles" for hands-on demonstrations of the effects of drunk driving. There is an opportunity for the school system to have students sign a pledge (e.g., no texting and driving, no impaired driving, etc.) and to have someone from the community talk to students about the effects of crashes and the implications it has on your life after the crash. Attendees were unable to confirm if these demonstrations are used, or if students are asked to sign a pledge.

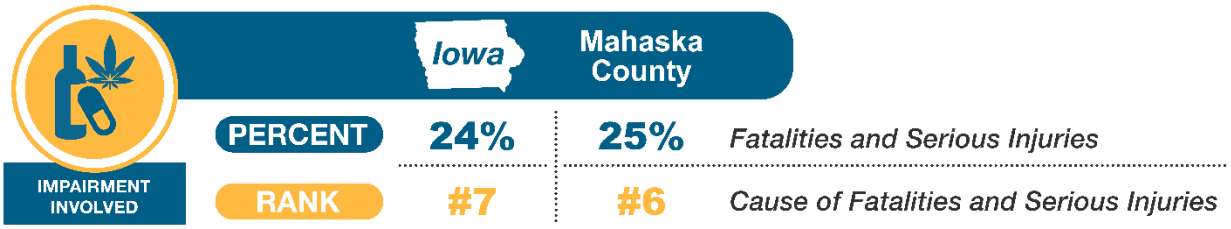
A summary of the younger driver countermeasures discussed during the workshop along with the county's status of implementation is included in **Table 6**.

Table 6 - Younger Driver-Related Countermeasures

Countermeasure	Status
Enforcement of minor school license and graduated driver's license laws	Ongoing/Opportunity
Additional education • Utilize "drunk goggles" and seatbelt simulator in drivers' education and community events	Opportunity
Conduct education awareness campaigns • Have students sign a no texting and driving/no impaired driving pledge	Opportunity

5.2.5. Impairment Involved Countermeasures

Impaired driving crashes account for 24 percent of fatal and serious injuries across the state of Iowa, and 25 percent of the fatalities and serious injuries in Mahaska County.



Mahaska County conducts Operating While Intoxicated (OWI) enforcement and use GTSB funds for enforcement during holidays. Locations for OWI enforcement are targeted to specific "hot spot" locations, such as the fairgrounds. Advanced Roadside Impaired Driving Enforcement (ARIDE) is a course designed such that officers become more proficient at detecting, apprehending, testing, and successfully prosecuting impaired drivers. The Sheriff Department confirmed the majority of their officers are ARIDE certified. The State Patrol has Drug Recognition Expert (DRE) trained officers, but they are not always patrolling the county.

Attendees could not confirm if Mahaska Couty conducts safety checkpoints on a regular basis. However, the Sheriff's Department noted they conduct high saturation patrols, when a larger number of officers patrol specific areas and times for impairment involved driving. The Sheriff's Department performs compliance checks in alcohol sales to ensure alcohol vendors are asking for valid identification when selling alcohol. Attendees were not aware of any alternative transportation options available in the county. Participants noted that OWI cases are being prosecuted in the county.

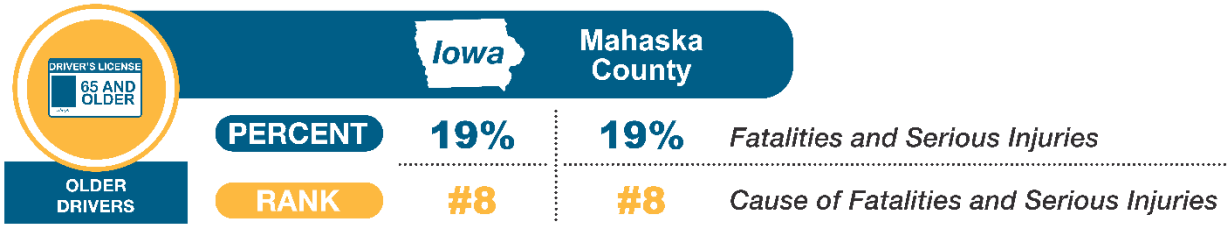
A summary of the impaired driving countermeasures discussed during the workshop along with the county's status of implementation is included in **Table 7**.

Table 7 - Impaired Driving Countermeasures

Countermeasure	Status
Conduct targeted OWI enforcement • Targeted OWI enforcement is conducted in the county • OWI enforcement is targeted to "hot spot" locations	Underway/Ongoing
Compliance checks for alcohol sales • Underage compliance checks are conducted on alcohol retailers • Over-serving compliance checks can be conducted at drinking establishments	Ongoing/Opportunity
Alternative transportation choices • Opportunity to increase the alternative transportation alternatives within the County	Opportunity
Prosecute, impose sanctions on, and treat OWI offenders	Ongoing/Opportunity
Conduct education and awareness campaigns	Opportunity

5.2.6. Older Drivers Countermeasures

Older driver crashes account for 19 percent of fatal and serious injuries across the state of Iowa, and 19 percent of the fatalities and serious injuries in Mahaska County.



Mahaska County provides limited safe mobility options for older drivers, including the 10-15 Transit Program, where scheduled rides are available through a multi-county transit service. Additional efforts could include long-term care facilities providing transportation to/from doctor's appointments and other activities, and veteran groups providing transportation to clinics. There is an opportunity for transit awareness campaigns, as attendees were not aware of information materials currently provided at senior or community centers.

The Sheriff's Department requests retesting for older drivers determined to be at fault in a crash or that receive a driving citation. Law enforcement stated they have caught older driver's driving with a revoked license.

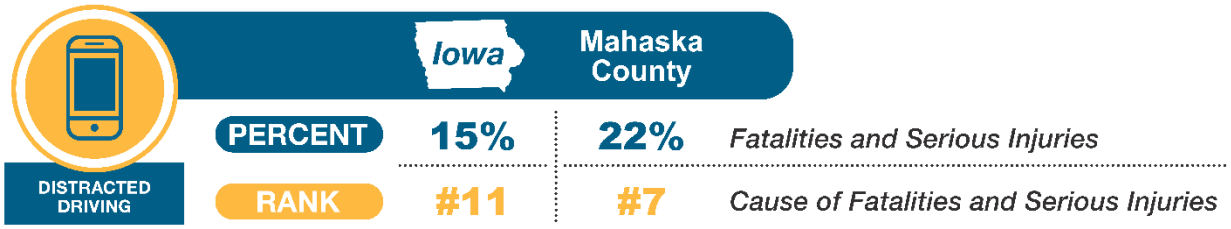
A summary of the older driver countermeasures discussed during the workshop along with the county's status of implementation is included in **Table 8**.

Table 8 - Older Driver Countermeasures

Countermeasure	Status
Promote safe mobility choices • Transit service provides scheduled rides in the county • Opportunity to distribute transit service materials at community and senior centers • Opportunity to use the Farm Bureau, veterans' groups, American Association of Retired Persons, etc. to communicate transportation options to older drivers	Ongoing/Opportunity
Encourage external reporting of at-risk drivers to licensing authorities • Law enforcement currently request retesting of drivers as appropriate • Encourage law enforcement to work with families of older drivers who have had their driver's license removed before their driving without a license becomes an issue	Ongoing/Opportunity
Conduct education and awareness campaigns	Opportunity

5.2.7. Distracted Driving Countermeasures

Distracted driving accounts for 15 percent of fatal and serious injuries across the state of Iowa, and 22 percent of the fatalities and serious injuries in Mahaska County.



Iowa passed a new law on April 2, 2025, which will go into effect on July 1, 2025, that prohibits the use of handheld cellphones while driving. The law replaces previous legislation that only prohibited texting while driving.

During the workshop, participants discussed the difficulty for law enforcement to prove distracted driving has occurred. Iowa DOT employees must be hands-free or may only use one earbud. Mahaska County does not have a hands-free driving policy, but provides hands-free equipment in some agency vehicles. There is an opportunity to promote education around distracted driving, particularly with the new hands-free law. Mobile driving simulators can be obtained via GTSB and can be used to demonstrate the effects of driving while distracted.

A summary of the distracted driving countermeasures discussed during the workshop along with the county's status of implementation is included in **Table 9**.

Table 9 - Distracted Driving Countermeasures

Countermeasure	Status
Visibly enforce existing statutes to deter distracted driving	Opportunity
Agency policy for hands-free devices • Opportunity for county policy • Hands-free equipment is provided in some county vehicles, but there is an opportunity to increase this provision • GTSB has sample policies for guidance	Ongoing/Opportunity
Mobile simulator for distracted driving • GTSB has a mobile simulator that can be used, free of charge • Various downloadable simulators are available online	Opportunity
Conduct education and awareness campaigns	Opportunity

6. SAFETY PROJECT DEVELOPMENT

Safety improvement projects were developed at high-priority locations along paved roadway segments, intersections, and horizontal curves within the county. Due to limited available data, low traffic volumes, and constraints on the types of systemic safety improvement projects that can be implemented on unpaved roads, location-specific recommendations were not developed for these roadways. Nevertheless, this Safety Action Plan includes safety recommendations that may be considered for implementation on the unpaved roadway system by the County Engineer. This section describes the data analysis methodology used to select project locations and to identify safety improvements for paved roadway segments, intersections, and horizontal curves, and outlines potential projects and/or activities that could be implemented on the unpaved system.

6.1. Methodology

As shown in **Figure 20**, GIS data, as described in **Section 3**, was used to rank each of the county paved roadway segments, intersections, and curves based on risk factors. Following the ranking process, safety improvement recommendations were formulated for the highest-risk locations. Draft project sheets were created for these highest-risk locations to summarize the recommendations and estimated implementation costs. These project sheets were then provided to the County for review and feedback, before being finalized. Each step of the methodology is detailed in the following sections.

Figure 20 - Project Development Methodology

6.1.1. GIS Data

GIS data for the county paved road segments, intersections, and curves were used to perform a systemic analysis of the county-owned roadway facilities. Databases were obtained through collaboration and coordination with InTrans, the Iowa DOT, and the County. Descriptions of these databases are in **Section 3**. The data was analyzed using ArcGIS Pro software as described in the following sections. Every roadway segment, intersection, and curve of the county-owned paved roadway system was analyzed.

6.1.2. Risk Factor Ranking

This SAP uses a systemic approach to identify comprehensive safety enhancements on county roads. A systemic approach considers risk across the entire roadway network, instead of focusing improvements solely on locations with a history of crashes. As such, risk factors along roadway segments, at intersections, and along curves were assessed to determine locations that may be more susceptible to future crashes involving serious injuries and/or fatalities. Various attributes were considered in this risk assessment.

> ***"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***

FHWA has compiled a list of potential risk factors in their Systemic Safety Project Selection Tool. The list can assist with identifying areas that might benefit from systemic safety improvements. While not all the risk factors are used for the SAP due to data limitations and the specific crash types being targeted, they are provided here for reference. The evaluated attributes that were evaluated for the SAP are detailed in the subsequent sections pertaining to segments, intersections, and curves.

- Roadway and Intersection Features
  - Number of lanes
  - Lane width
  - Shoulder surface width and type
  - Median width and type
  - Horizontal curvature, superelevation, delineation, or advanced 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 vs. pedestal-mounted signal heads
  - Pedestrian crosswalk presence, crossing distance, signal head type

- Traffic Volume
  - Average Daily Traffic volumes (ADT)
  - Average Daily Entering Vehicles (DEV)
  - 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

6.1.3. Countermeasure Selection Thresholds

To aid in the systemic selection of safety improvement recommendations for segments, intersections, and curves, project selection thresholds were developed and are shown in **Table 10** for segments, **Table 11** for intersections, and **Table 12** for curves. These tables were used to identify safety improvement recommendations for each of the prioritized project locations. Some countermeasures specific to curves are included with the segment countermeasures to address potential risk at curves within a certain segment. For each of the specified safety countermeasures, the tables list an associated CMF, a planning-level cost estimate, the implementation timeframe, and the project selection threshold criteria for the improvement. A more detailed description for each safety countermeasure is provided in **Appendix B1** for segments, **Appendix C1** for intersections, and **Appendix D1** for curves.

At times, the CMFs in the table are provided as a range, showing the range of potential crash modification the countermeasure can have based on differing research, specific crash types, or specific volume-level roadways (i.e., CMFs can vary based on the amount of traffic on the road, vary based on reducing crash severity, or vary between rear-end and run-off-road crashes). The SAP project does not include predictive crash analysis based on calculating the number of crashes that will be reduced by applying a specific countermeasure. The CMFs have been provided for reference to aid the counties in understanding potential reductions from crashes by different countermeasures. The planning-level costs included in the table are high-level estimates that were reviewed and approved by the County Engineer.

Countermeasures selected using the thresholds shown in the tables are shown on the front side of the project sheet. Additional data is needed to assess the suitability of some countermeasures, as this project only provides high-level data. When additional information is needed, the threshold is listed as “County Engineer’s discretion,” and the countermeasures are listed on the back side of the project sheet. These are included at the County Engineer’s request and considering their local knowledge of the roadway network. Additional potential improvements requested by the County Engineer are also included on the back side of the project sheet.

Table 10 - Segment Countermeasure Project Selection Thresholds

Safety Countermeasure	CMF	Cost	Short-Term	Long-Term	Threshold
Conduct Road Safety Assessment (RSA)	CMF varies based on recommendations	$40,000/each	X		K and A crash rate ≥ 14.41 HMVMT AND Total cash rate ≥ 179 HMVMT
Conduct Access Control Analysis	CMF varies based on recommendations	$30,000/each	X		Access Density ≥ 24 mile AND Total crash rate ≥ 179 HMVMT
Install 4" Retroreflective Centerline and Edgeline (Both Sides of Road)	0.76 when installed in combination with Edgelines	$3,000/mile (centerline) $3,000/mile (edgeline)	X		All paved roads with lane Width < 12 feet
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.63 – 0.78 FHWA Proven Safety Countermeasure	$6,000/mile	X		All paved roads with lane width ≥ 12 feet
Pave 2' Shoulder with Safety Edge (Both Sides of Road – Includes Earthwork)	0.79 – 0.89 FHWA Proven Safety Countermeasure	$150,000/mile		X	Paved roads with speed limit ≥ 40 mph AND length > 0.5 miles without existing paved shoulder AND existing shoulder width ≥ 2 feet AND ADT ≥ 200 with lanes < 11 feet wide OR ADT ≥ 1000
Install Edgeline Rumble Strips (Both Sides of Road)	0.49 – 0.87 FHWA Proven Safety Countermeasure	$5,000/mile		X	All paved roads with speed limit ≥ 40 mph AND length > 0.5 miles AND ADT ≥ 200 or when recommending to Pave 2' Shoulder with Safety Edge
Install Centerline Rumble Strips	0.36 – 0.56 FHWA Proven Safety Countermeasure	$2,000/mile		X	All paved roads with speed limit ≥ 40 mph AND length > 0.5 miles AND ADT ≥ 200
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0.59 – 0.84 FHWA Proven Safety Countermeasure	$3,500/curve	X		On all curves within the segment that do not have signage
Review and Upgrade Curve Signage (Warning signs, Speed Advisory plaques, Chevrons) to meet Manual on Uniform Traffic Control Devices (MUTCD) and Iowa DOT standards	0.59 – 0.84 FHWA Proven Safety Countermeasure	$1,000/curve	X		On all curves within the segment that currently have signage
Clear and Grub (15 ft Both Sides of Road)	0.78	$30,000/mile	X		All paved roads with speed limit ≥ 40 mph AND length > 0.5 miles
Flattening and Widening Foreslopes (Excludes Culvert Extensions)	0.88 – 0.92 FHWA Proven Safety Countermeasure	$85,000/mile		X	County Engineer's discretion
On-Pavement Marking for Speed Control	CMF not defined	$3,000/each	X		County Engineer's discretion
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape	CMF not defined	$100/each	X		County Engineer's discretion
Guardrail	0.53 – 0.56 New Guardrail along Embankment	$80/foot		X	County Engineer's discretion
Install Post-Mounted Delineators	0.55 when installed in combination with edgelines and centerlines	$5,000/mile	X		County Engineer's discretion
Retroreflective Strip on Chevron Signpost	CMF not defined	$500/curve	X		County Engineer's discretion
Transverse Rumble Strips Prior to Curve	CMF not defined	$5,000/curve	X		Segments prior to curves; County Engineer's discretion
Remove/Relocate Object in Hazardous Location	0.56 – 0.78 FHWA Proven Safety Countermeasure	$1,000/each		X	All (County Engineer's discretion)
Superelevation Correction on Curve	CMF not defined	$50,000/curve	X		County Engineer's discretion
Install High Friction Surface Treatment (HFST) on Curve	0.28 – 0.52 FHWA Proven Safety Countermeasure	$50,000/curve		X	County Engineer's discretion
Speed Activated Flashers on Chevron Sign	CMF not defined	$4,000 /each	X		County Engineer's discretion

Table 11 - Intersection Countermeasure Project Selection Thresholds

Safety Countermeasure	CMF	Cost	Short-Term	Long-Term	Threshold
Coordinate with Local Jurisdiction on Signal Modifications	CMF not defined	$2,500/each	X		Signalized and DEV > 10,000
Signal Warrant Analysis to Consider Removal of Signal	CMF not defined	$5,000/each		X	Signalized and DEV < 10,000
Intersection Configuration Evaluation (ICE)	CMF not defined	$25,000/each	X		One or more K or A crash, DEV > 5,000 and All approaches are county maintained OR Five or more approaches
Implement Results of ICE	CMF not defined	$750,000/each		X	County engineer's discretion
All-Way Stop Warrant Analysis and Converting Two-Way Stop to All-Way Stop	0.52 – 1.12	$5,000/each	X		Unsignalized, Total DEV > 4,500, Minor ADT > 500, Crashes >0, Major ADT = Minor ADT (within 10%) and right angle, rear end, or turning crashes > 0
All-Way Stop Warrant Analysis and Removal of Stop Signs on Major Approach	CMF not defined	$5,000/each	X		All way stop AND; Total DEV <4,500, or Minor ADT < 500, or crashes < 1
Install Destination Lighting	0.58 - 0.72 FHWA Proven Safety Countermeasure	$5,500/each		X	Unsignalized, Destination lighting not currently installed, and Minor ADT > 200
Upgrade Signs and Pavement Markings (Paved Approach)	0.34 - 0.91 FHWA Proven Safety Countermeasure	$2,200/leg (paved $1,100/leg (unpaved)	X		All unsignalized (signs only for unpaved approaches)
Install Second Stop Sign and Stop Ahead Sign	0.73 FHWA Proven Safety Countermeasure	$1,500/leg	X		Unsignalized, and Minor ADT > 200 Or; Distance from previous stop sign = 1.5 miles or more
Install Solar-Powered Beacon on Stop Signs or Stop Sign with LED Flashing Lights	0.84 - 0.95 "Beacon on Stop Sign"	$2,500/each	X		Unsignalized, Total DEV > 4,500, Minor ADT > 500, Crashes >0, Major ADT = Minor ADT (within 10%), and right angle, rear end, or turning crashes > 0 Or; Destination lighting installed, and Minor ADT > 500 Or; Destination lighting not currently installed, Major ADT > 1,000, and Minor ADT > 500
Install Transverse Rumble Strips	0.71 – 0.79	$2,500/leg	X		All paved, Unsignalized approaches
Install Intersection Warning Sign and Advance Street Name Plaque on Major Approach	CMF not defined	$1,200/leg	X		Unsignalized, and Minor ADT > 200
Clear and Grub within Sight Triangle	0.78	$5,000/leg	X		All unsignalized intersections
Provide Left-Turn Lane at Intersection	0.73	$150,000/leg		X	County Engineer's discretion
Provide Right-Turn Lane at Intersection	0.90 – 0.99	$150,000/leg		X	County Engineer's discretion
Realign Intersection Approaches to Reduce or Eliminate Skew (Paved and unpaved)	0.57 - 0.67	$100,000/leg (unpaved) $300,000/leg (paved)		X	County Engineer's discretion
Provide Bypass Lane on Shoulder at T-Intersection	CMF not defined	$100,000/each		X	County Engineer's discretion
Convert Offset T-Intersection to Four-Legged Intersection (Paved)	CMF not defined	$300,000/each		X	County Engineer's discretion
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection	CMF not defined	$75,000/leg		X	County Engineer's discretion
Convert Four-Legged Intersection to Offset T-Intersection	CMF not defined	$300,000/each		X	County Engineer's discretion
Install Solar-Powered Flashing Beacon on Intersection Warning Sign	CMF not defined	$2,500/leg	X		County Engineer's discretion
Install Retroreflective Strip on Stop Sign Post	CMF not defined	$500/intersection	X		County Engineer's discretion
Low-Cost Intersection Conflict Warning System (ICWS)	0.69 – 0.95	$100,000/each		X	County Engineer's discretion
Flashing Beacon on Intersection Warning Sign	CMF not defined	$2,500/sign	X		County Engineer's discretion

Table 12 - Horizontal Curve Countermeasure Project Selection Thresholds

Safety Countermeasure	CMF	Cost	Short-Term	Long-Term	Threshold
Install 4” Retroreflective Edgeline and Centerline	0.76 when installed in combination with edgelines	$3,000/mile (centerline) $3,000/mile (edgeline)	X		All paved curves (centerline) Lane width < 12 feet (edgeline)
Install 6” Retroreflective Edgeline (Both Sides of Road)	0.63 - 0.78 FHWA Proven Safety Countermeasure	$6,000/mile	X		All paved curves, Lane width ≥ 12 feet
Pave 2' Shoulder with Safety Edge (Both Sides of Road – Includes Earthwork)	0.79 - 0.89 FHWA Proven Safety Countermeasure	$150,000/mile		X	On paved curve, ADT ≥ 200, existing shoulder width > 2 feet
Install Edgeline Rumble Strips (Both Sides of Road)	0.49 – 0.87 FHWA Proven Safety Countermeasure	$5,000/mile		X	On paved curve, ADT ≥ 200
Install Centerline Rumble Strips	0.36 – 0.56 FHWA Proven Safety Countermeasure	$2,000/mile		X	On paved curve, ADT ≥ 1,000
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0.59 - 0.84 FHWA Proven Safety Countermeasure	$3,500/curve	X		On all curves that do not have signage
Review and Upgrade Curve Chevrons, Curve Warning Signs, and Speed Advisory Plaques to Meet MUTCD and Iowa DOT Standards, if Needed	0.59 - 0.84 FHWA Proven Safety Countermeasure	$1,000/curve	X		On all curves that currently have signage
Clear and Grub (15 ft Both Sides of Road)	0.78	$5,000/curve	X		All
Additional Curve Signage	CMF not defined	$1,000/curve	X		County Engineer’s discretion
Install Retroreflective Strips on Chevron Signpost	CMF not defined	$500/curve	X		County Engineer’s discretion
Transverse Rumble Strips Prior to Curve	CMF not defined	$5,000/curve	X		County Engineer’s discretion
Superelevation Correction	CMF not defined	$50,000/each		X	County Engineer’s discretion
Install High Friction Surface Treatment (HFST)	0.27 - 0.58 FHWA Proven Safety Countermeasure	$60,000/curve		X	County Engineer’s discretion
Speed Activated Flashers on Chevron Sign	CMF not defined	$4,000/each	X		County Engineer’s discretion
Guardrail	0.53 - 0.56 New Guardrail along Embankment	$80/foot		X	County Engineer’s discretion
On-Pavement Marking for Speed Control	CMF not defined	$3,000/each	X		County Engineer’s discretion
Install Post-Mounted Delineators	0.55 when installed in combination with edgelines and centerlines	$5,000/mile	X		County Engineer’s discretion

6.1.4. Draft Project Sheets

Using the data gathered for this plan, draft project sheets were created for roadway segments, intersections, and curves within the county that had the highest risk factor scores. These sheets compile the data used in the risk factor analysis and outline the recommended countermeasures for each location. They are designed to provide information that could be useful for future grant applications, including the project location, systematic ranking data, crash data, geometric data, whether the project is in a disadvantaged community, and an opinion of probable cost for the recommended safety improvements. **Figure 21** summarizes the general organization and information contained within the project sheets.

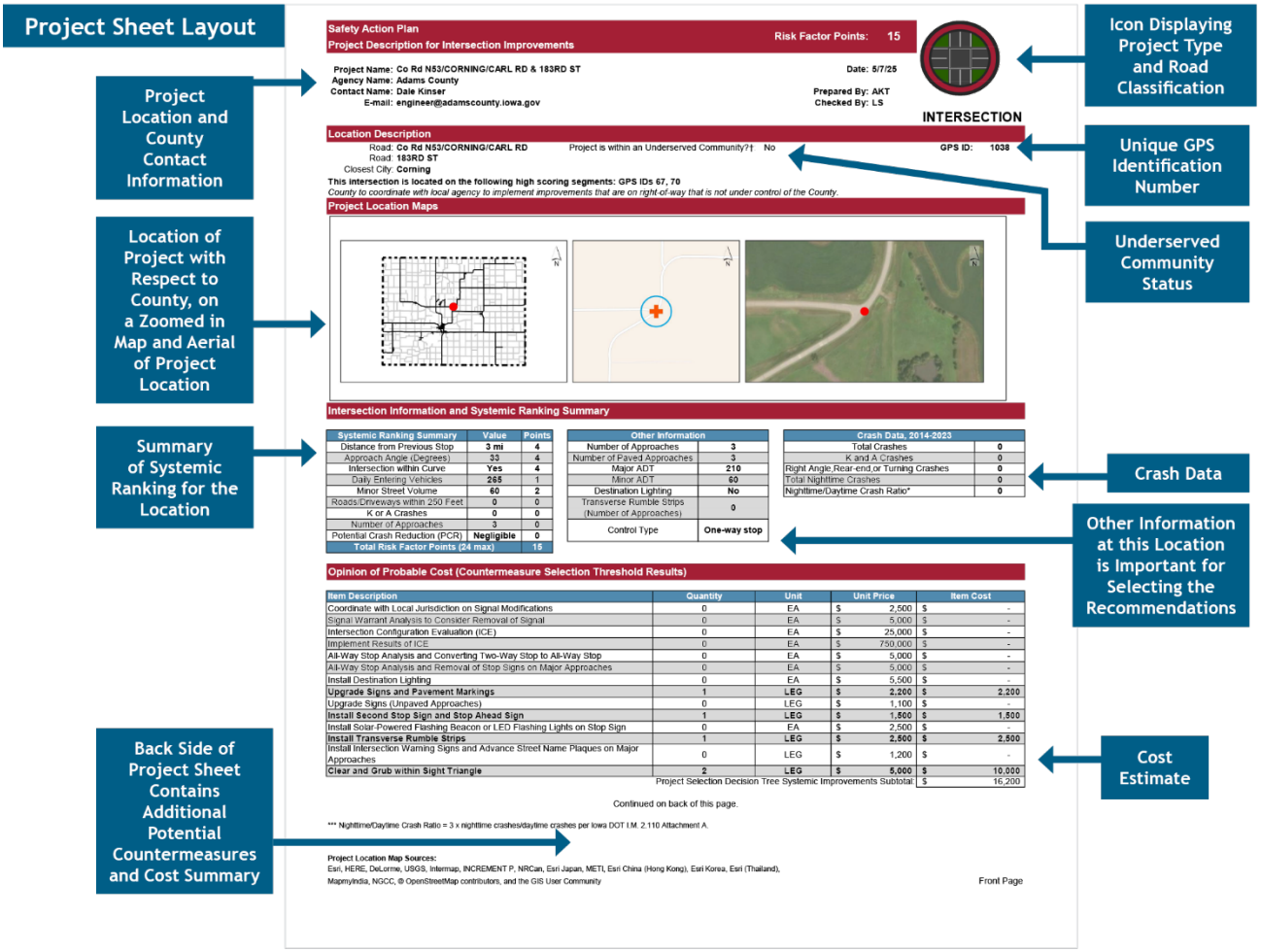


Figure 21 - Project Sheet Layout

6.1.5. County Input

An in-person workshop was conducted in Mahaska County on Thursday, September 19, 2024, to discuss location-specific countermeasures recommended for the high-risk roadway segment, intersection, and curve locations included on the draft project sheets. Detailed data used in the risk factor analysis and countermeasure selection threshold tables were reviewed for accuracy with the County Engineer, and necessary revisions were documented. Additionally, improvements requested by the County Engineer were noted for inclusion on the back side of the project sheet.

6.1.6. Final Project Sheets

After addressing the comments from the county, the project sheets for segments, intersections, and curves were finalized. These project sheets are included in **Appendix B2, Appendix C2,** and **Appendix D2.**

Project Recommendations Disclaimer

The recommended improvements contained in the project sheets were developed through a system-wide GIS database risk assessment, 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. Our team 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 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 using discretion for each individual location. Kimley-Horn endeavored to research issues and constraints to the extent practical given the project's scope, budget, and schedule. This assessment is largely based on information provided by others (Iowa DOT, County staff, etc.) and therefore is only as accurate and complete as the information provided.

6.2. Segments

The methodology described in **Section 6.1** was followed for county-wide analysis of roadway segments based on the determined risk factors. The road segment limits were determined based on relevant roadway attribute changes along a roadway including pavement width, shoulder width, and street name.

6.2.1. Risk Factor Summary

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

- **Traffic Volume (ADT):** The daily average number of vehicles along the roadway segment. The average daily traffic (ADT) for all segments within the county were compared to assign higher risk factor points to segments with higher ADTs.
- **Pavement and Shoulder Width:** The width of pavement and shoulders were used to assign risk factor points to each segment. Segments with narrower pavement and shoulder widths were assigned more risk factor points. **Table 13** further describes the number of points assigned for various width combinations. No differentiation in scoring was given to the shoulder type (paved vs. gravel).
- **Access Density:** Risk factor points were assessed based on the number of driveways and/or intersections per mile. Segments with higher access densities were assigned more points.
- **Curve Density:** The number of curves per mile with a radius less than 1,000 feet and with a length greater than 100 feet. Segments with a higher curve density were assigned more risk factor points.
- **Pavement Condition:** The average of the recorded roughness indices for the length of the segment. Segments with an IRI value over 95 could potentially cause safety concerns and were assigned risk factor points. Per the FHWA, roadways with IRI values less than 95

are considered "good" condition, 95-170 are "acceptable," and less than 170 are "poor". Risk factor points were assigned to roadways with acceptable or poor ratings. Research has shown that a rougher ride can contribute to loss of control of a vehicle, particularly when braking or turning.

- **Crash Experience:** The number of lane departure crashes for each segment in the county was reviewed to assign risk factor points to segments where there was a history of lane departure crashes.
- **Potential for Crash Reduction (PCR):** PCR is a value that estimates the potential for safety improvements at a location based on the difference between the predicted average number of crashes per year and the actual number of crashes per year at comparable locations in the same category.

Recommendations were only made where segments were greater than 0.5 miles in length and where the posted speed limit was 40 miles per hour (mph) or higher. 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 13 shows the risk factors for the SAP projects. The maximum possible risk factor score for a segment is 21 points.

Table 13 - Segment Risk Factor Scores

Risk Factor	Measurement	Points	Max Points Available
Traffic volume	Average Daily Traffic (ADT)	0: ADT percentile is 0%-14.3%	6
		1: ADT percentile is 14.3%-28.6%	
		2: ADT percentile is 28.6%-42.9%	
		3: ADT percentile is 42.9%-57.1%	
		4: ADT percentile is 57.1%-71.4%	
		5: ADT percentile is 71.4%-85.7%	
		6: ADT percentile is 85.7%-100%	
Pavement and shoulder width	Pavement and shoulder width in feet (ft)	0: Pavement width ≥ 22 ft and shoulder width ≥ 2 ft	4
		0: Pavement width > 18 ft and < 22 ft, and shoulder width ≥ 4 ft	
		2: Pavement width ≥ 22 ft and shoulder width < 2 ft	
		2: Pavement width > 18 ft and < 22 ft and shoulder width ≥ 2 ft and < 4 ft	
		2: Pavement width ≤ 18 ft and shoulder width ≥ 4 ft	
		4: Pavement width > 18 ft and < 22 ft, and shoulder width < 2 ft	
		4: Pavement width ≤ 18 ft and shoulder width < 4 ft	
Potential for Crash Reduction (PCR)	Iowa DOT PCR level definition for all crashes	0: High (less than 0.2)	2
		1: Medium (0.2 to 0.99)	
		2: Negligible (1 or greater)	

Risk Factor	Measurement	Points	Max Points Available
Access density	Number of intersections and driveways per mile (driveway location per 911 address database)	0: Bottom fourth of the access density Crash Modification Factor (CMF) *	3
		1: Second lowest fourth of the access density CMF *	
		2: Second highest fourth of the access density CMF *	
		3: Top fourth of the access density CMF *	
Curve density	Number of curves per mile with a radius less than 1,000 ft	0: Segments with no curves	2
		1: Curve density percentile is 1%-50% of segments with curves	
		2: Curve density percentile is more than 50% of segments with curves	
Pavement condition	Average International Roughness Index (IRI)	0: Less than 95	2
		1: 95 to 170	
		2: More than 170	
Crash experience	Presence of a lane departure crash	0: No lane departure crashes	2
		2: One or more lane departure crashes	
Total available points			**21**

* Access density CMF equation as presented in the HSM (Equation 13-7)

6.2.2. Risk Factor Rankings

Segment risk factor ranking calculations were performed on all county paved roadway segments (greater than 0.5 miles in length and with posted speed limits of 40 mph or greater). The results of the rankings are shown in **Figure 22. Figure 23** shows the location and summary of risk factor ranking of each of the roadway segments analyzed within the SAP. Segments were identified as high, medium-high, medium-low, or low based on the risk factor points they received. These categories were determined by comparing the scores of the segments against each other. If a segment was manually selected by the County to include as a prioritized segment, it is automatically categorized as a high-risk segment.

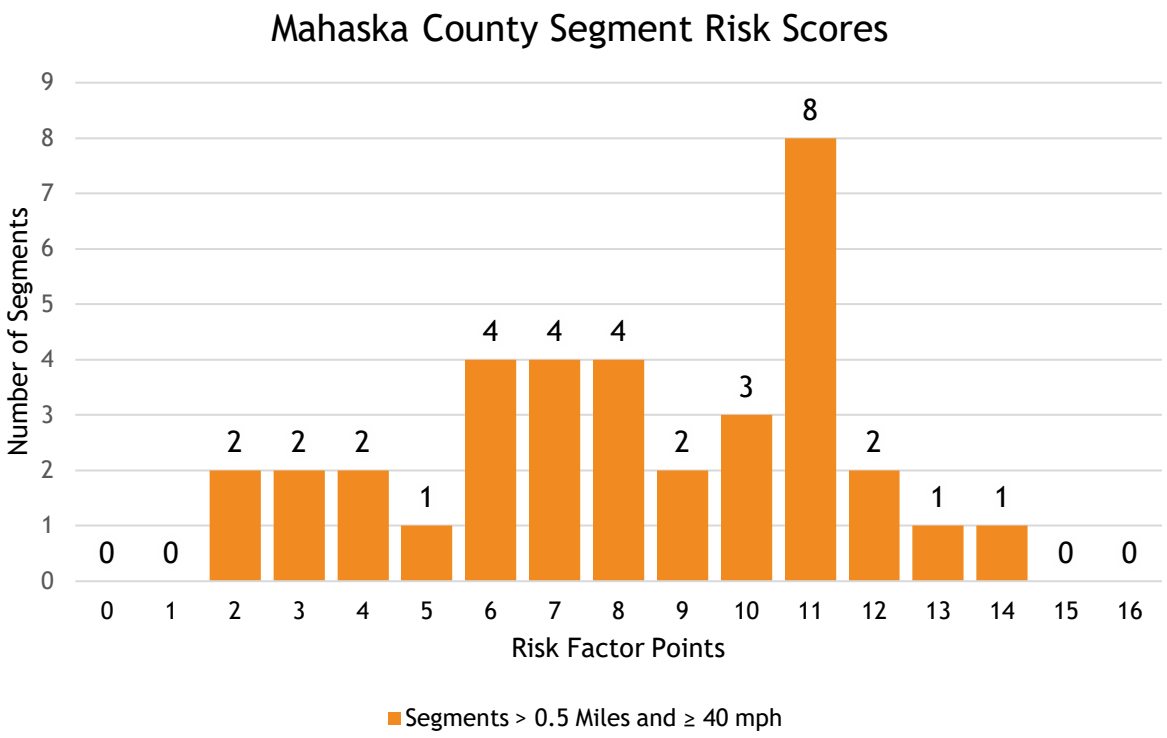


Figure 22 – Mahaska County Segment Risk Factor Scores

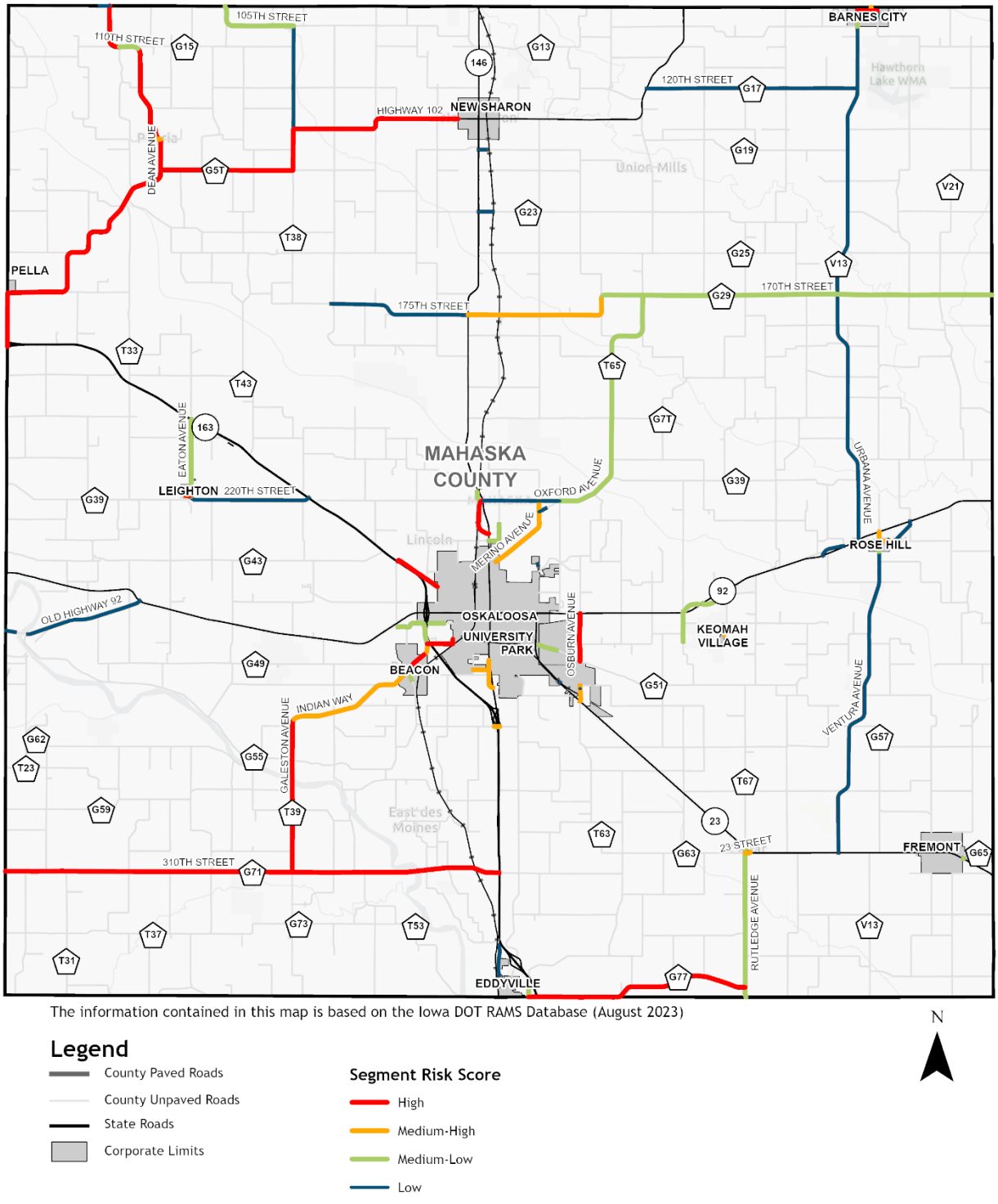


Figure 23 - Mahaska County Segment Risk Factor Map

6.2.3. Prioritized Segment Recommendations

Project sheets were developed for segment locations with the greatest amount of risk factor points. The segments for which project sheets were developed (those with the greatest amount of risk factor points) are summarized in **Table 14** and the project sheets are included in **Appendix B2**. Also included in the table are the high-scoring intersections and high-scoring curves that fall within the segments.

Table 14 - Prioritized Segment Recommendations

GPS ID	Segment	Segment Length (miles)	Risk Factor Points	High Scoring Intersections (GPS ID)	High Scoring Curves (GPS ID)	Estimated Project Cost
6005	Indian Way between Joiner Avenue and South O Street	1	14			$165,000
5969	Dean Avenue between Peoria Main Street and Co Road G15/110th Street	2	13			$629,000
5978	Lynndale Road between US 63 (South) and US 63 (North)	1	12			$301,000
5968	Dean Avenue between Highway 102 and 133rd Street	1	12			$243,000
8532	Wapello-Mahaska Road between 330th Street and 400 feet southwest of 220th Avenue	2	11			$126,000
5989	Osburn Avenue between 265th Street and IA 92	1	11			$127,000
5966	Adams Avenue between East Highway 163 Eastbound Ramps and Highway 102 & Old Highway 102	1	11			$344,000
5999	340th Street between 400 feet southwest of 220th Avenue and Rutledge Avenue	3	11		3701, 3704, 3721	$587,000
6000	310th Street between Adams Avenue and US 63	12	11			$650,000
6023	Highway 102 between 250th Avenue and South Columbia Street	14	11	53088, 53100, 53101	3403, 3411, 3428, 3444, 3573, 3575	$2,333,000
5971	Galeston Avenue between 310th Street and Gambell Avenue	4	10			$207,000

GPS ID	Segment	Segment Length (miles)	Risk Factor Points	High Scoring Intersections (GPS ID)	High Scoring Curves (GPS ID)	Estimated Project Cost
5967	Cordova Avenue between Co Road G15/Cordova Avenue and Co Road G13/100th Street	1	10			$309,000
5974	Old IA 163 Signed Route Between IA 163 and 900 feet northwest of Orchard Avenue	1	10			$73,000
Total (13 Segments)						**$6,094,000**

Figure 24 shows the locations of the roadway segments with highest risk factor ranking, where project sheets and specific segment recommendations were made. The segment risk factor ranking results and relevant data for every analyzed roadway segment is included in **Appendix B3**.

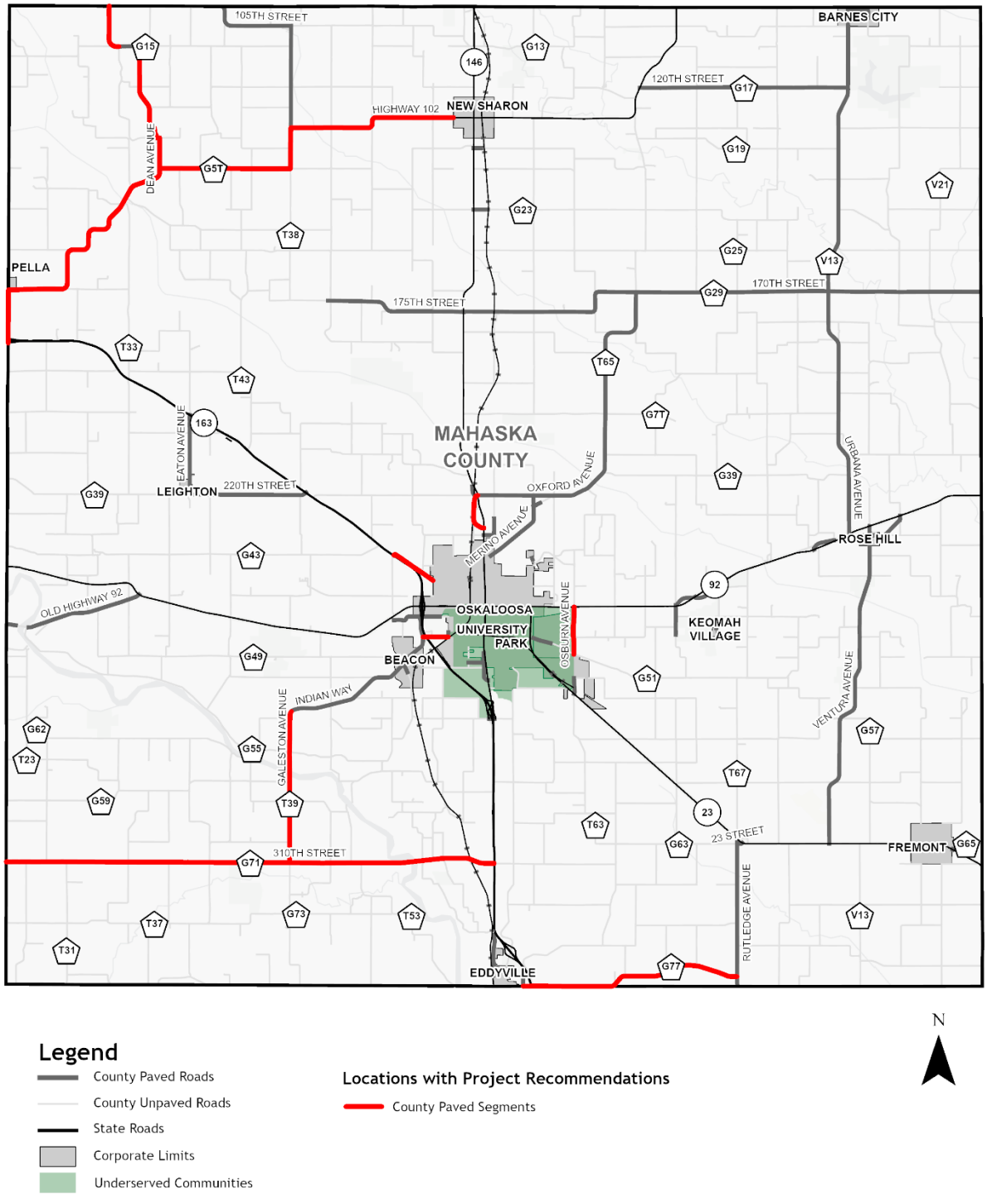


Figure 24 - Mahaska County Prioritized Segment Project Locations Map

6.3. 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.

6.3.1. Risk Factor Summary

Every intersection within each county containing at least one County-maintained paved roadway leg is analyzed for risk according to the following nine key attributes:

- **Distance from Previous Stop Sign:** if any stop-controlled approach had a distance of at least 1.5 miles from the previous stop sign, risk points were assigned. The longer the 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:** the intersection was assigned risk factor points if any of the side roads had an approach angle (skew) of less than 85 degrees. Based on Iowa crash data analyzed by InTrans, crash experience increases at intersections with skew at 85 degrees and 70 degrees. 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."
- **Horizontal Curvature:** the number of curves (with length more than 100 feet and radius less than 1,000 feet) within 250 feet of the intersection on any County- or State-maintained approach. Risk factor points were assigned to intersections with one or more curves within close proximity of the intersection. Roadway curves in close proximity to intersections can limit sight distance, increasing crash potential.
- **Traffic Volume (DEV):** the average number of vehicles entering the intersection per day. The daily entering volume (DEVs) for all the intersections in the county were compared against each other to assign higher risk factor points 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.
- **Minor Street Volume:** with a higher minor street volume, there is an increase in crash exposure, specifically with angle crashes. The third highest approach volume was used for the minor street volume. Minor street volumes for all the intersections in the county were compared against each other to assign higher risk factor points to intersections with higher minor street volumes within the county.
- **Access Management:** risk points were assigned if an access point (driveway or other intersection) 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 more decisions within the functional area of an intersection, increasing risk for a crash.
- **Crash Experience:** each intersection was assigned risk factor points if a K or A crash occurred within 150 feet of the intersection. This attribute accounts for crash history, which may be indicative of improvement needs.

- **Intersection Configuration:** as an additional risk factor to capture potential conflicts at an intersection, the number of approaches were considered as a risk factor. If an intersection had four or more approaches, it was assigned a risk factor point.
- **PCR:** a value that estimates the potential for safety improvements at a location based on the difference between the predicted average number of crashes per year and the actual number of crashes per year at comparable locations in the same category.

Table 15 shows the risk factors for the SAP projects. The maximum possible risk factor score for an intersection is 24 points.

Table 15 - Intersection Risk Factor Scores

Risk Factor	Measurement	Points	Max Points Available
Distance from previous stop sign	Stop sign locations based on information provided by the County Engineer	0: Less than 1.5 miles	4
		4: 1.5 miles or more	
Intersection skew	Skew angle of most skewed approach	0: 85-90 degrees	4
		2: 70-85 degrees	
		4: Less than 70 degrees	
Horizontal curvature	Intersection on or within 250 feet of a curve (length > 100' and radius < 1,000')	0: None	4
		4: 1 or more	
Traffic volume	DEV	0: DEV percentile is 0%-25%	3
		1: DEV percentile is 25%-50%	
		2: DEV percentile is 50%-75%	
		3: DEV percentile is 75%-100%	
Minor street volume	ADT	0: Bottom third of county minor street ADTs	2
		1: Middle third of county minor street ADTs	
		2: Top third of county minor street ADTs	
Access management	Driveways or another intersection within 250 feet of the intersection	0: None	2
		1: 1 or 2	
		2: More than 2	
Crash experience	Fatal or serious injury (K or A) crash within 150 feet of the intersection	0: None	2
		2: 1 or more	
Intersection configuration	Number of approaches	0: Less than 4 approaches	1
		1: 4 or more approaches	
PCR	Iowa DOT PCR level definition for all crashes	0: High (less than 0.2)	2
		1: Medium (0.2 to 0.99)	
		2: Negligible (1 or greater)	
Total available points			**24**

6.3.2. Risk Factor Rankings

Risk factor calculations were performed for each of the intersections in the county containing at least one County-maintained paved approach. The results of the risk factor rankings are provided in **Figure 25**. To further aid the county in determining which projects they may want to pursue, the intersections were divided into two categories:

- **County-State:** This includes intersections of county roads with Iowa DOT-maintained roads.
- **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 the County or the Iowa DOT (such as city streets).

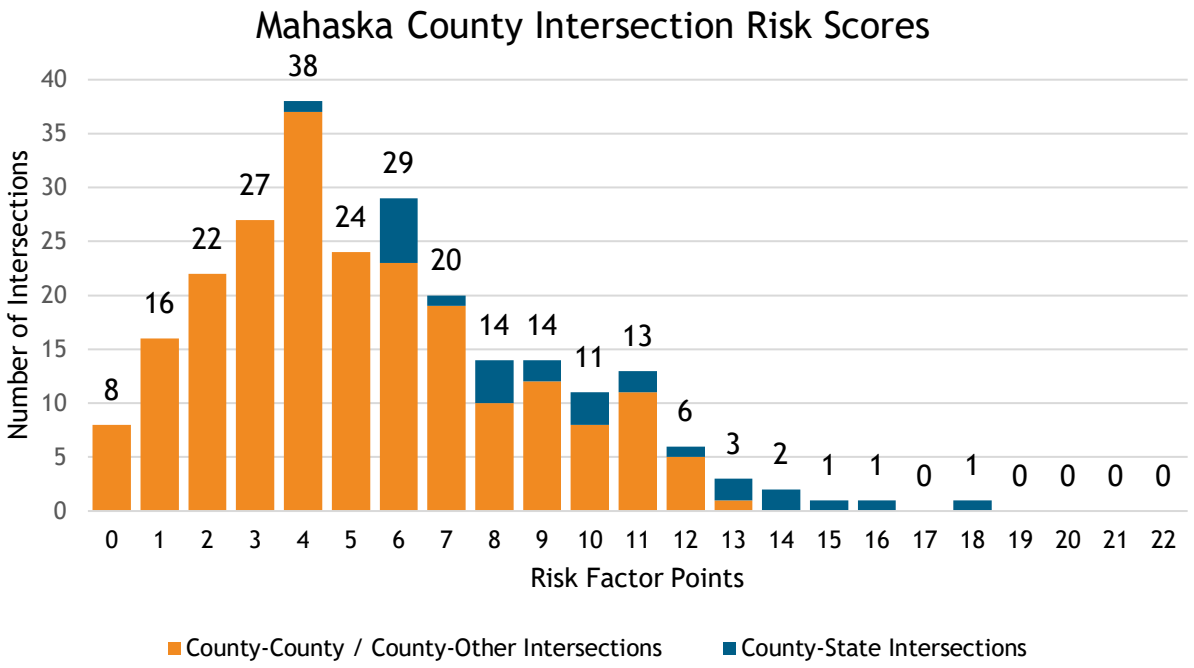


Figure 25 - Mahaska County Intersection Risk Factor Scores

Figure 26 on the following page shows the location and risk factor score of each intersection analyzed within the SAP. Intersections were identified as high, medium-high, medium-low, or low based on the risk factor points they received. These categories were determined by comparing the scores of the intersections against each other. If an intersection was manually selected by the County to include as a prioritized intersection, it is automatically categorized as a high-risk intersection.

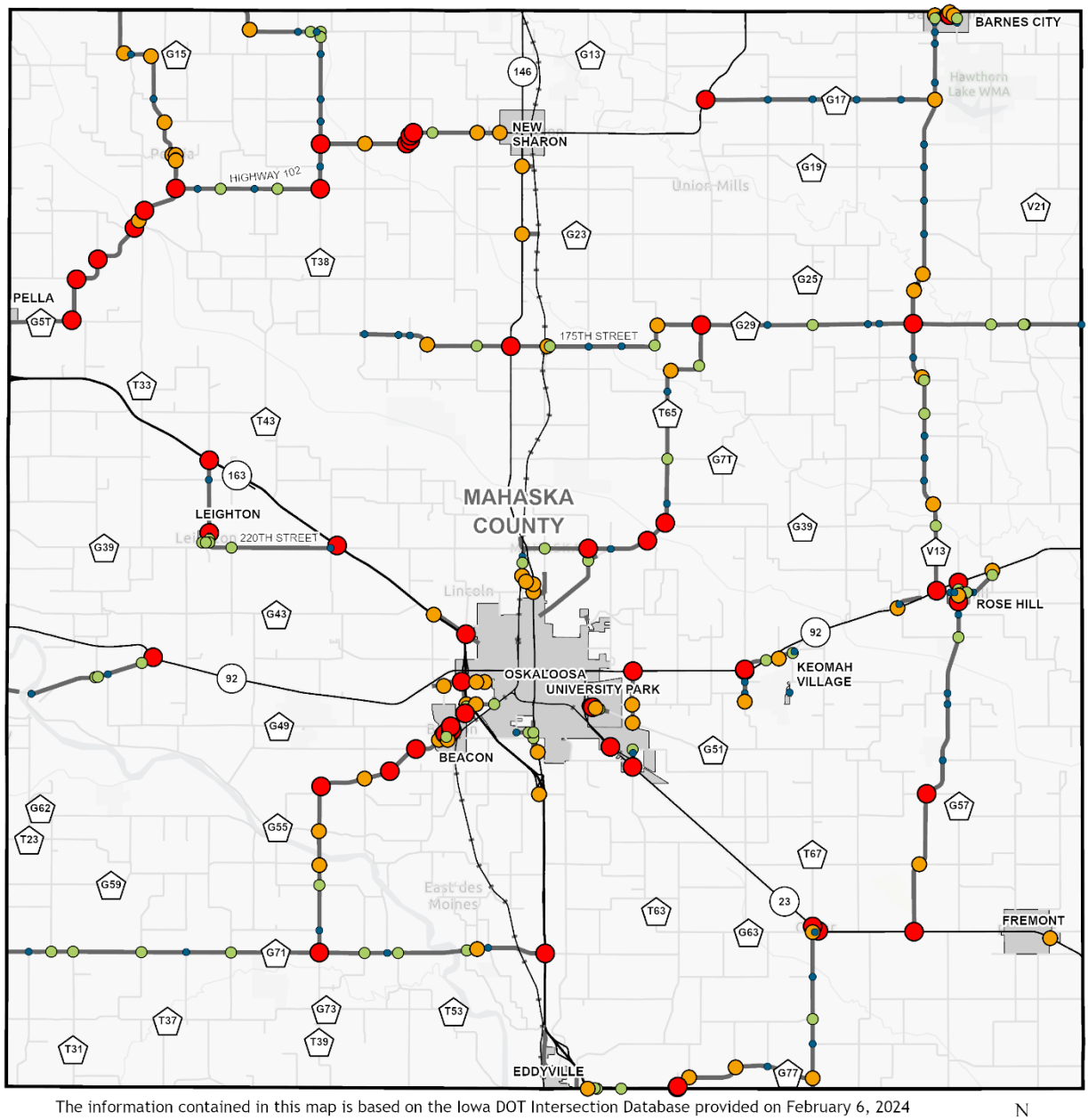


Figure 26 - Mahaska County Intersection Risk Factor Map

6.3.3. Prioritized Intersection Recommendations

Project sheets were developed for intersection locations with the greatest amount of risk factor points. The intersections for which project sheets were developed (those with the greatest amount of risk factor points) are summarized in **Table 16** and the project sheets are in **Appendix C2**. For intersections located on a high-scoring roadway segment, the GPS ID of the segment is listed in the table.

Table 16 - Prioritized Intersection Recommendations

GPS ID	Intersection	Risk Factor Points	High Scoring Segment (GPS ID)	Estimated Project Cost
County-County / County-Other Intersections				
53298*	Co Road T39/Indian Way & Karen Lane	13		-
53517	Kilbourn Street & Sheridan Street	12		$54,000
53101	Highway 102 & Irvine Avenue	12	6023	$825,000
53088	Co Road T33/Old Highway 102 & Cordova Avenue	11	6023	$420,000
53100	Highway 102 & Irvine Avenue	11	6023	$17,000
County-County / County-Other Total (5 Intersections)†				**$1,316,000**
County-State Intersections				
53047	IA 23/Iowa 23 & Co Road T63/Osburn Avenue	18		$449,000
53043	IA 23/Iowa 23 & Co Road T67/Rutledge Avenue & 304th Street	16		$450,000
53030	US 63 & Co Road G17/120th Street	15		$569,000
53115	IA 163 & Eaton Avenue	14		$246,000
53053	IA 92/Iowa 92 & Old Highway 92	14		$23,000
County-State Total (5 Intersections)				**$1,737,000**
Intersection Total (10 Intersections)†				**$3,053,000**

*Intersection removed at the request of the County Engineer. No project sheets will be developed.
†Total cost excludes intersections that are no longer prioritized.

Figure 27 illustrates the locations of the intersections with highest risk factor ranking, where project sheets and specific intersection improvement recommendations were made. The intersection risk factor ranking results and relevant data for every analyzed intersection is included in the summary spreadsheet included in **Appendix C3**.

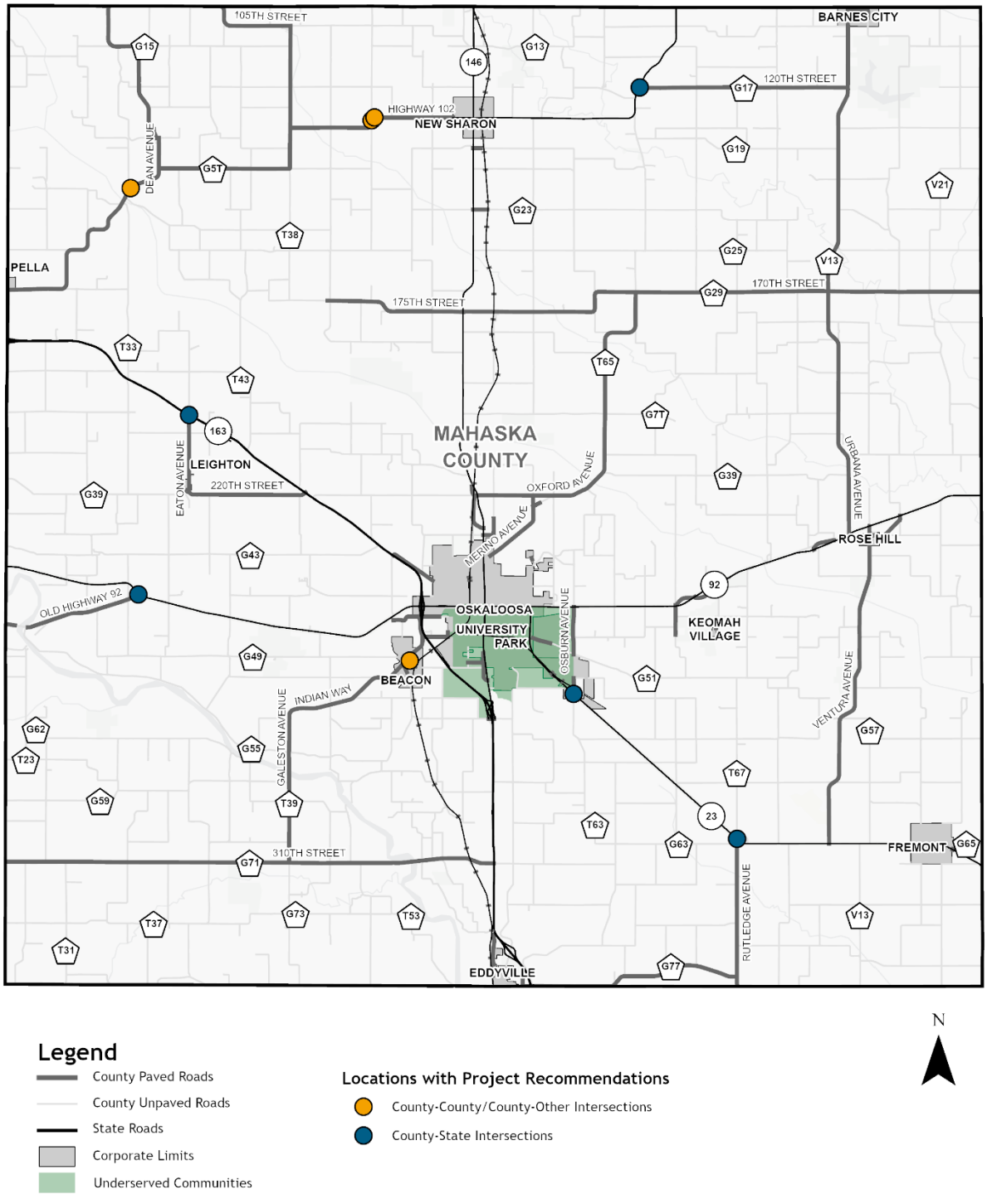


Figure 27 - Mahaska County Prioritized Intersection Project Locations Map

6.4. Horizontal Curves

The methodology described in **Section 6.1** was followed by 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.

6.4.1. Risk Factor Summary

Each paved horizontal curve that was identified in the horizontal curve database within the county is systematically analyzed for risk according to the following six key attributes:

- **Traffic Volume (ADT):** the average number of vehicles per day along the roadway curve. The ADTs for all curves within the county were compared to assign higher risk factors to curves with a higher ADT. 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 and with a length greater than 100 feet were assessed as risk factor points. Curves with smaller radii 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. No differentiation in scoring was given to the shoulder type (paved vs. gravel).
- **Access Management:** risk was assessed if a driveway was within 250 feet of the curve. Additional risk points were assessed if an intersection was within 250 feet of the curve. Driveways and other access points located on 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.
- **Pavement Condition:** the average of the recorded roughness indices for the length of the segment. Pavement with an IRI value over 95 could potentially cause safety concerns and were assigned risk factor points.
- **Crash Experience:** each curve was assigned risk factor points if a K or A crash occurred within 150 feet of the curve. This attribute accounts for crash history, which may be indicative of improvement needs.

Table 17 shows the risk factors in the SAP projects. The maximum possible risk factor score for a horizontal curve is 21 points.

Table 17 - Horizontal Curve Risk Factor Scores

Risk Factor	Measurement	Points	Max Points Available
Traffic volume	ADT	0: ADT percentile is 0%-14.3%	6
		1: ADT percentile is 14.3%-28.6%	
		2: ADT percentile is 28.6%-42.9%	
		3: ADT percentile is 42.9%-57.1%	
		4: ADT percentile is 57.1%-71.4%	
		5: ADT percentile is 71.4%-85.7%	
		6: ADT percentile is 85.7%-100%	
Curve radius	Radius of curve in feet	0: Greater than 2,500 feet	4
		1: 1,000 to 2,500 feet	
		3: 500 to 1,000 feet	
		4: Less than or equal to 500 feet	
Shoulder width	Shoulder width in feet	0: 6-foot shoulder and greater	4
		2: 2-foot shoulder to 6-foot shoulder	
		4: less than 2-foot shoulder	
Access management	Intersections and driveways within 250 feet of the curve	0: no intersection or driveway within 250 feet	3
		1: driveway within 250 feet	
		3: intersection within 250 feet	
Pavement condition	Average IRI	0: Less than 95	2
		1: 95 to 170	
		2: More than 170	
Crash experience	Fatal or serious injury (K or A) crash within 150 feet of the curve	0: none	2
		2:1 or more	
Total available points			**21**

6.4.2. Risk Factor Rankings

The risk factor calculations were performed on each of the curves on paved roads in the county which have a length greater than or equal to 100 feet and a radius less than 2,500 feet. The results of the risk factor rankings are provided in **Figure 28**. **Figure 29** on the following page shows the location and risk factor ranking of each curve analyzed within the SAP. Curves were identified as high, medium-high, medium-low, or low based on the risk factor points they received. These categories were determined by comparing the scores of the curves against each other. If a curve was manually selected by the County to include as a prioritized curve, it is automatically categorized as a high-risk curve.

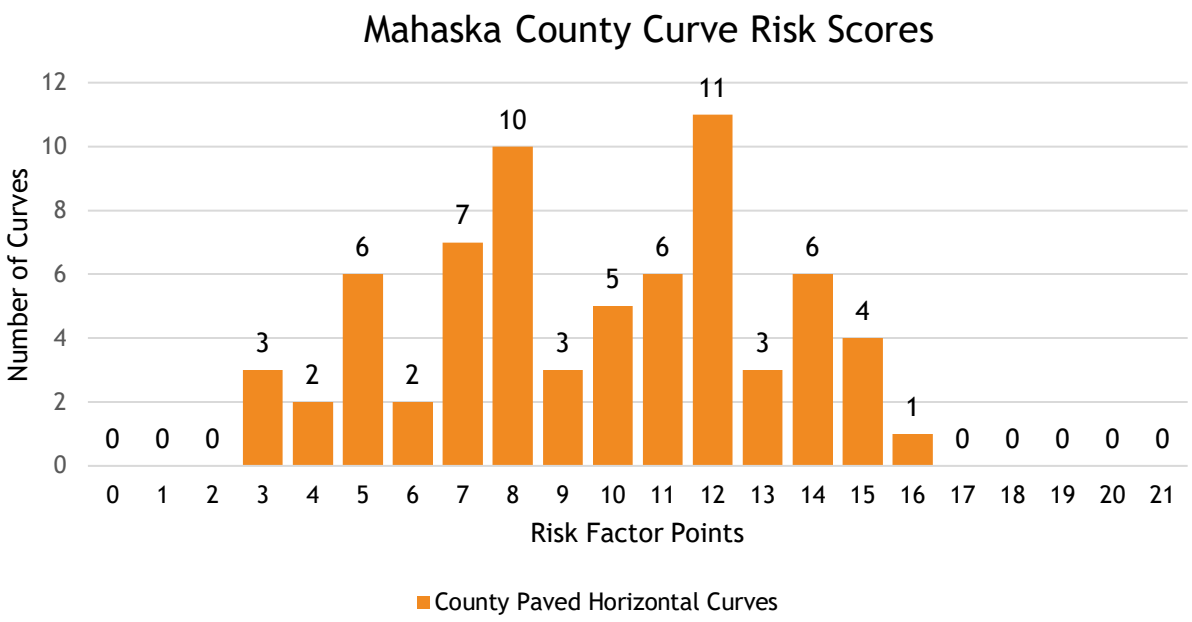
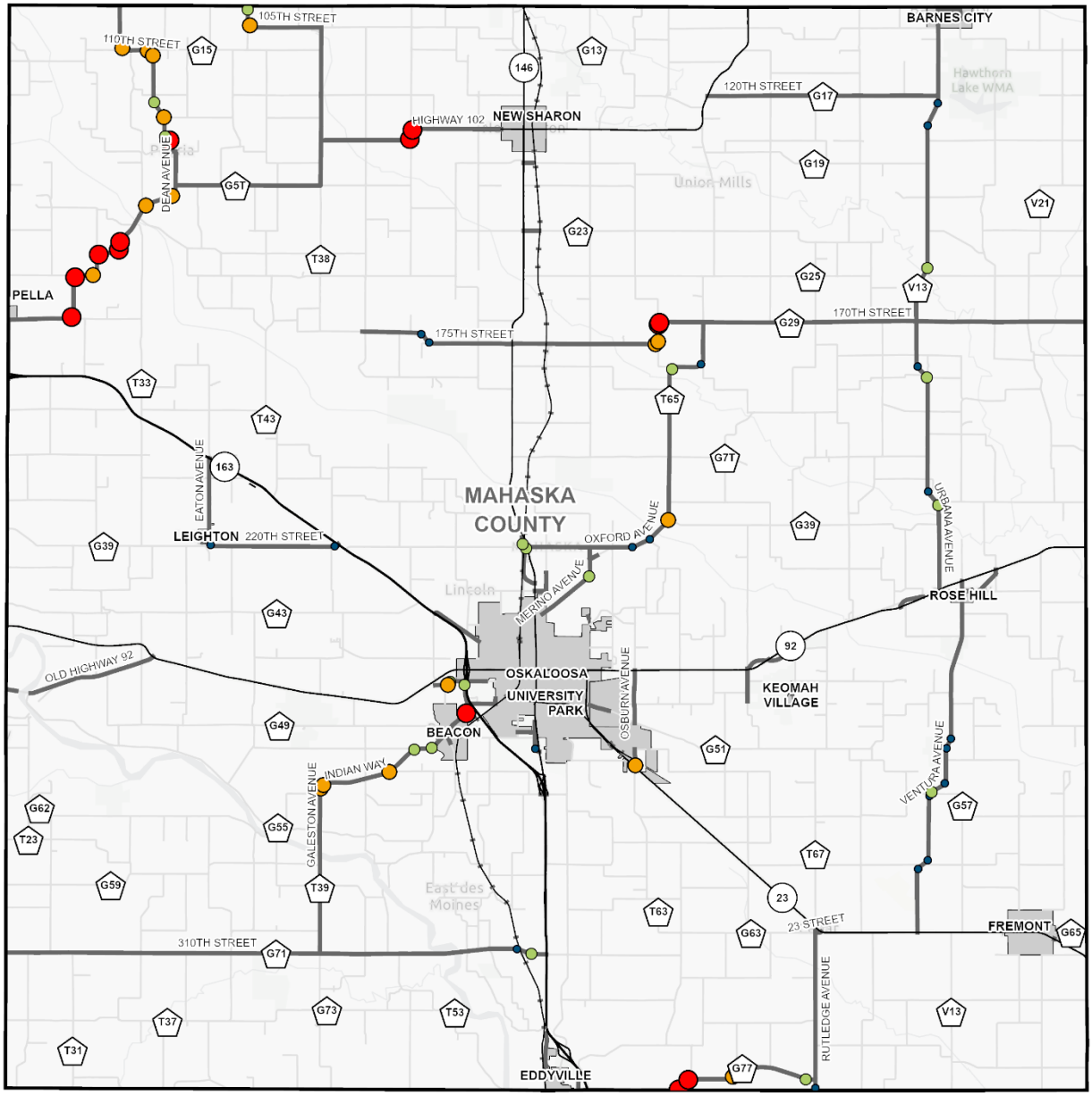


Figure 28 - Mahaska County Horizontal Curve Risk Scores



The information contained in this map is based on the Iowa DOT Curves Database provided on February 6, 2024.

N

Legend

- County Paved Roads
- County Unpaved Roads
- State Roads
- Corporate Limits

Curve Risk Score

- High
- Medium-High
- Medium-Low
- Low

Figure 29 – Mahaska County Horizontal Curve Risk Factor Map

6.4.3. Prioritized Horizontal Curve Recommendations

Project sheets were developed for curve locations with the greatest amount of risk factor points. The curves with the greatest amount of risk factor points are shown in **Table 18** and project sheets are in **Appendix D2**. For curves located on a high-scoring roadway segment, the GPS ID of the segment is listed in the table.

Table 18 - Prioritized Horizontal Curve Recommendations

GPS ID	Curve	Risk Factor Points	High Scoring Segment (GPS ID)	Estimated Project Cost
3573	Curve 3573 on G5T	16	6023	$12,000
3403	Curve 3403 on G5T	15	6023	$60,000
3411	Curve 3411 on G5T	15	6023	$60,000
3428	Curve 3428 on G5T	15	6023	$60,000
3575	Curve 3575 on G5T	15	6023	$41,000
3444	Curve 3444 on G5T	14	6023	$42,000
3692	Curve 3692 on 170th Street	14		$55,000
3701	Curve 3701 on 340th Street	14	5999	$32,000
3704	Curve 3704 on 340th Street	14	5999	$39,000
3721	Curve 3721 on 340th Street	14	5999	$47,000
Total (10 Curves) †				**$448,000**

†Total cost excludes curves that are no longer prioritized.

Figure 30 shows the locations of the curves where project sheets and specific curve improvement recommendations were made. The risk factor ranking results and relevant data for every analyzed curve is included in **Appendix D3.**

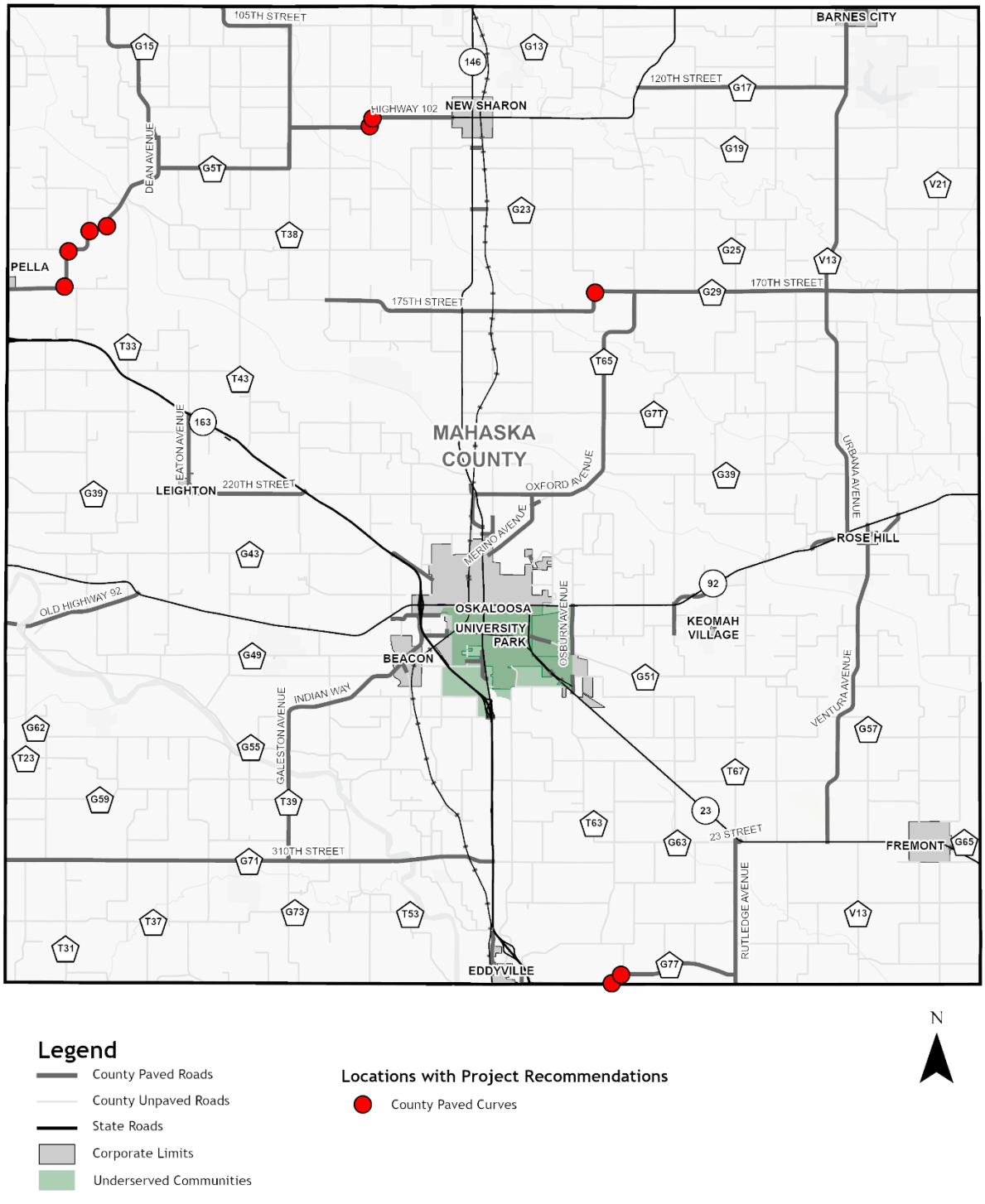


Figure 30 - Prioritized Horizontal Curve Project Locations Map

6.5. Unpaved Roadways

Mahaska County maintains 968 miles of county roads, of which approximately 840 miles are unpaved (87%). Crashes on unpaved roads accounted for 140 of the 266 crashes (53%) in Mahaska County from 2019 to 2023. Unpaved roadways were not included in the analysis based on limited data availability, low traffic 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 along unpaved segments, at unpaved intersections, and along unpaved curves is also important. Potential projects and/or activities that could be implemented on unpaved roadways include the following items:

- Maintenance of gravel
- Major rehabilitation
- Upgrade signs
- Realign intersection
- Improve/increase shoulder/lane width
- Delineate roadside hazards with retroreflective markers
- Curve chevrons
- Advance curve warning signs and speed advisory plaques
- Driveway entrance policy
- Clear and grub
- Winter maintenance

Descriptions of each of these unpaved roadway safety countermeasures are provided in **Appendix E**.

7. CANDIDATE LOCATIONS BASED ON CRASH HISTORY (CLCH)

While the intent of the SAP is to identify systemic safety improvements at segments, intersections, and curves throughout the county, the following tables provide a list of high-crash locations which were identified using a crash experience methodology for roadway segments (**Table 19**), intersections (**Table 20**), and curves (**Table 21**). For the purposes of this project, the CLCH methodology included ten years of crash data, and was modified and applied to segments and curves, normalizing the analysis by crashes per mile.

It is recommended that the County Engineer consider applying for TSIP funding at these locations because TSIP more heavily weights benefit-cost analysis using the most recent 5-years of crash data. The County Engineer can review these locations to determine if safety improvements, similar to the ones outlined within **Section 6.2**, **Section 6.3**, and **Section 6.4** are applicable, and develop a TSIP application based on the recommended improvements.

Table 19 - Segment High-Crash Locations

Rank	GPS ID	Segment	Length (mi)	Identified as High-Risk Location
1	5968	Dean Avenue between Highway 102 and 133rd Street	0.75	Yes
2	5989	Osburn Avenue between 265th Street and IA 92	1.16	Yes
3	6005	Indian Way between Joiner Avenue and South O Street	0.62	Yes
4	5966	Adams Avenue between East Highway 163 Eastbound Ramps and Highway 102 & Old Highway 102	1.30	Yes
5	5970	Eaton Avenue between Leighton Corporate Limit and IA 163	1.57	No
6	5980	Luminary Lane between Us 63 and end of Luminary Lane	0.72	No
7	6003	Indian Way between Gambell Avenue and 400 feet southwest of Leighton Street	2.86	No
8	5991	Rutledge Avenue between South County Line and IA 23/Iowa 23	3.62	No
9	5978	Lynndale Road between US 63 (South) and US 63 (North)	0.98	Yes
10	5975	Joiner Avenue between Co Road T39 and Suffolk Road	0.51	No

Table 20 - Intersection High-Crash Locations

Rank	GPS ID	Intersection	Control Type	Identified as High-Risk Location
1	53018	US 63 & 135th Street	One-way stop	No
2	53063	IA 92/Iowa 92 & Osburn Avenue	Two-way stop	No
3	53502	Co Road T33/Cross Street/Main Street & 133rd Street	One-way stop	No
4	53358	Co Road G29/Niland Avenue & Co Road G29/170th Street	One-way stop	No
5	52988	US 63 & G63/310th Street	Two-way stop	No
6	53243	Co Road G71/310th Street & Co Road T31/Barrows Avenue	One-way stop	No
7	53115	IA 163 & Eaton Avenue	Two-way stop	Yes
8	53371	Co Road G39/215th Street & Co Road T65/Oxford Avenue	One-way stop	No
9	53016	US 63 & G23/150th Street	Two-way stop	No
10	53096	Co Rd T38/Highway 102/Galeston Avenue & Co Road T38/Galeston Avenue	Two-way stop	No

Table 21 - Curve High-Crash Candidate Locations

Rank	GPS ID	Roadway	Nearest Town	Length (ft)	Radius (ft)	Identified as High-Risk Location
1	3681	Osburn Avenue	Oskaloosa	167	274	No
2	3690	Niland Avenue	New Sharon	433	567	No
3	3575	Old Highway 102 Signed Route	New Sharon	768	510	Yes
4	3696	Oxford Avenue	Oskaloosa	659	885	No
5	3444	Old Highway 102 Signed Route	Pella	812	740	Yes
6	3403	Old Highway 102 Signed Route	Pella	1214	785	Yes
7	3464	Old Highway 102 Signed Route	Pella	940	1333	No
8	3569	Indian Way	Beacon	721	1464	No
9	3718	340th Street	Eddyville	747	855	No
10	3473	Dean Avenue	Pella	978	1536	No

8. SUMMARY

The Mahaska County SAP was developed to aid County leaders in identifying and prioritizing safety improvement projects for their paved, county-maintained roadways and to build a culture of safety within the county.

8.1. Overview of SAP Development Process

The SAP was developed through a seven-step process as outlined below.

- **Gather Background Information:** The Iowa SHSP was reviewed, and data was requested from the county to provide the location and presence of rumble strips, destination lighting, stop signs, and other pertinent safety improvements.
- **Data Collection:** A comprehensive GIS project database was developed utilizing the following databases as provided by Iowa DOT, the County, or collected as part of this project:
  - Crash
  - Roadway
  - Pavement management
  - Roadside hazard
  - Horizontal curve
  - County stop sign locations
  - Intersection
- **Data Analysis:** After development of the comprehensive GIS project database, county crash data was analyzed. Crashes were compared to the Iowa SHSP Safety Emphasis Areas and maps were prepared for the County as well as the PowerBI dashboard.
- **Countermeasure Selection:** A list of systemic safety improvement countermeasures was developed as well as list of safety topics and potential driver-related countermeasures, which were shared with County safety stakeholders for review.
- **Develop Projects for Inclusion into the SAP:** A risk factor ranking process was developed for segments, intersections, and curves, and risk factor scores were calculated for all the segments, intersections, and curves within Mahaska County. After conducting the risk factor analysis, safety improvement recommendations were developed for the feature types and summarized in location-specific project sheets. These project sheets, detailing the recommended safety improvements at specific locations, were then provided to the County Engineer for review.
- **County Input:** A workshop was held with the County's safety stakeholders. At the workshop, driver-related countermeasures were reviewed and stakeholders discussed existing and proposed driver-related countermeasures. In addition, a workshop was held with the County Engineer to obtain input on the developed projects. Draft project sheets were reviewed at the workshop and the County Engineer provided input for additional safety countermeasures based on engineering judgment and site-specific knowledge.
- **Develop SAP:** An SAP was developed for Mahaska County including a summary of the SAP process along with recommended safety projects for implementation by the County.

8.2. Recommended Improvements

The following sections summarize the engineering and driver-related countermeasures identified as part of this SAP that should be explored for implementation in the county over the next five to ten years.

8.2.1. Engineering Countermeasures

Systemic safety improvement projects were developed with input from the county for high-ranking roadway segments, intersections, and horizontal curves on Mahaska County paved roads. Each project location is shown in **Figure 31**, and **Table 22** provides a cost summary of the recommended projects. Detailed information for each safety countermeasure is provided in **Section 6**, as well as in **Appendix B1**, **Appendix C1**, and **Appendix D1.** Detailed information for each project is provided in **Section 6**, as well as in project sheets in **Appendix B2, Appendix C2,** and **Appendix D2** for roadway segments, intersections, and horizontal curves, respectively. 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 local knowledge of the site, available funding, and/or specific needs.

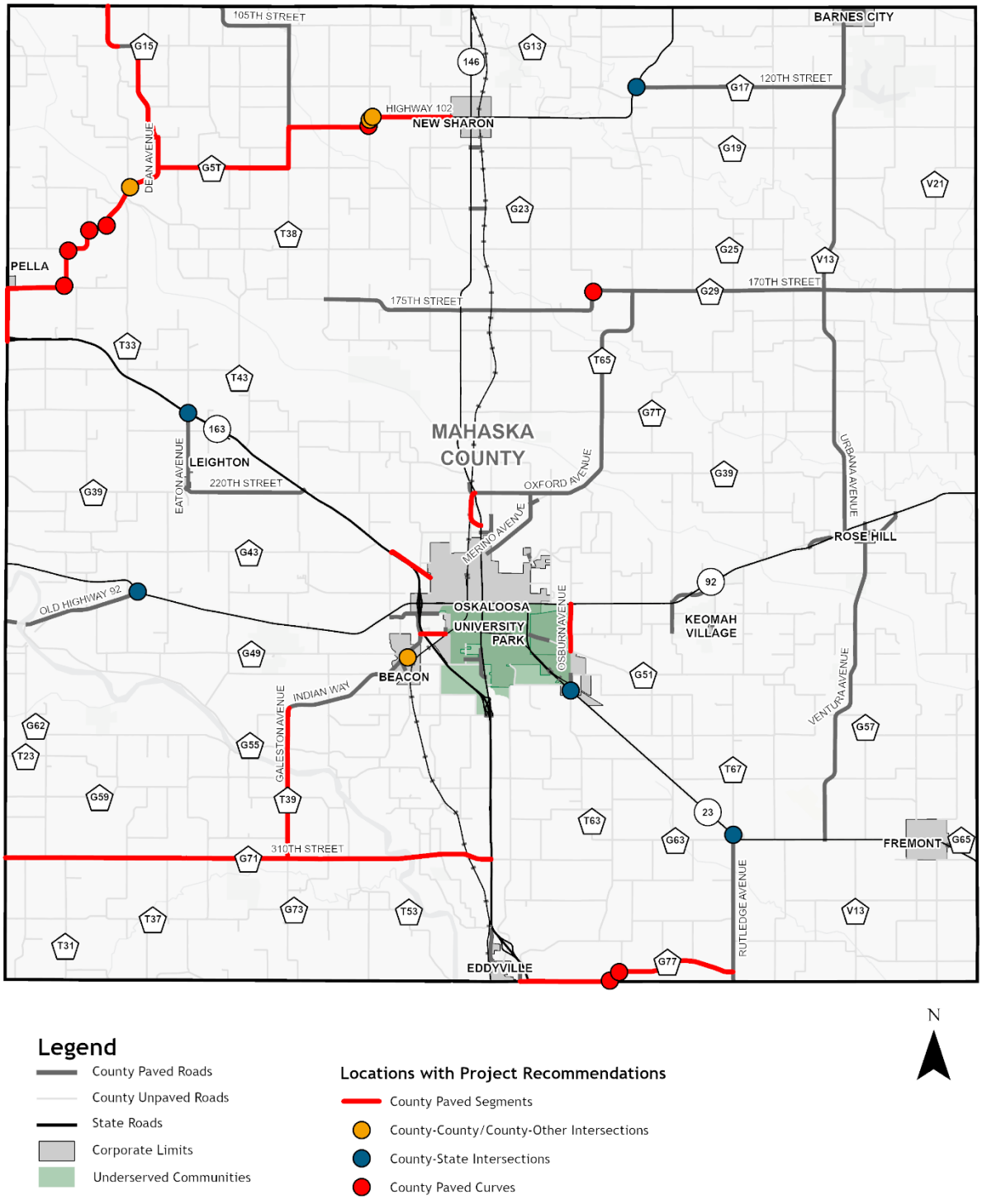


Figure 31 - Prioritized Project Locations

Table 22 - Engineering Countermeasure Cost Summary

Facility Type	Number of Locations	Estimated Project Cost
Segment	13	$6,094,000
Intersection	9	$3,053,000
Curve	10	$448,000
Total Improvement Costs	**32**	**$9,595,000**

While improvements were identified for the prioritized locations, low-cost countermeasures are recommended to be implemented for all paved roadway segments, intersections, and curves as funding becomes available. The countermeasure selection threshold tables (**Table 10** for segments, **Table 11** for intersections, and **Table 12** for curves) should be used to identify appropriate safety improvement recommendations for those locations.

8.2.2. Driver-Related Countermeasures

A workshop was conducted in Mahaska County on Thursday, September 19, 2024, to discuss driver-related crashes occurring in the county and to identify strategies aimed at improving driver behavior to enhance road safety. A summary of the workshop discussion is provided in **Section 5.2**. Based on these discussions, the status of implementing driver-related strategies in the county is summarized in **Table 23.** It is recommended that the county partner with all five Es of safety to implement countermeasures that are not currently underway/ongoing and look for opportunities to introduce additional countermeasures that are not currently being implemented.

Table 23 - County Driver-Related Countermeasures Summary

Countermeasure	Status
Speed Related	
Conduct targeted speed enforcement	Ongoing/Opportunity
Prosecute and impose sanctions on drivers not obeying school bus stop bars	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Occupant Protection	
Conduct targeted enforcement of restraint use	Opportunity
Instruction in proper child restraint use	Underway/Ongoing
Check for proper child restraint use in all motorist encounters	Opportunity
Positive reinforcement	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Younger Drivers	
Enforcement of minor school license and graduated driver's license laws	Ongoing/Opportunity
Additional training in schools	Opportunity
Conduct education awareness campaigns	Opportunity
Impairment Involved	
Conduct targeted OWI enforcement	Underway/Ongoing
Compliance checks for alcohol sales	Ongoing/Opportunity
Alternative transportation choices	Opportunity
Prosecute, impose sanctions on, and treat OWI offenders	Ongoing/Opportunity
Conduct education and awareness campaigns	Opportunity
Older Drivers	
Promote safe mobility choices	Ongoing/Opportunity
Encourage external reporting of at-risk drivers to licensing authorities	Ongoing/Opportunity
Conduct education and awareness campaigns	Opportunity
Distracted Driving	
Visibly enforce existing statutes to deter distracted driving	Opportunity
Agency policy for hands-free devices	Ongoing/Opportunity
Mobile simulator for distracted driving	Opportunity
Conduct education and awareness campaigns	Opportunity

8.3. Implementation

The SAP project aims to provide a document that is both practical and frequently referenced by the county for requesting funding and completing traffic safety improvement projects on county-maintained roads. The following outlines key opportunities that can be used to implement the recommendations included within this plan. ICEA staff is available to assist counties in identifying and pursuing funding opportunities.

- **SS4A Implementation Grant:** With the completion of this SAP, Mahaska County is eligible to apply for additional funding through the SS4A program. An SS4A Implementation Grant provides federal funds to implement projects and strategies identified in an SAP to address roadway safety issues, including infrastructural, behavioral, and/or operational activities. The county should consider applying for an Implementation Grant to secure funding to implement the engineering projects and driver-related strategies recommended in this plan.
- **Iowa Transportation Funding Opportunities:** The county should leverage funding opportunities available through Iowa DOT funding programs such as HSIP-Local or TSIP, to implement the projects identified in this plan. The various funding opportunities are outlined in **Section 2.3**.
- **Five-Year Transportation Improvement Program:** The county should review projects within the five-year program and consider including safety recommendations from the project sheets into those projects, where applicable. In future cycles of the program, it is recommended that safety projects included on the project sheets are considered for inclusion.
- **Maintenance Activities:** Maintenance activities and upcoming design projects offer a great opportunity to incorporate safety countermeasures into already funded projects, often with minimal increases to the overall project cost. As such, it is recommended that when the county is designing projects and/or addressing a maintenance issue, the countermeasure selection thresholds (detailed in **Section 6.1.3**) are reviewed and countermeasures appropriate for the location are incorporated into the design. Doing so can help prioritize projects and emphasize safety in design and maintenance activities. In addition, the countermeasure information within this document should be used to provide instruction or education to maintenance crews about their ability to enhance safety in the county through their work.
- **Countywide Partnerships:** It is recommended that the County continue to foster cooperation with safety stakeholders and look for opportunities to improve and expand the implementation of driver-related countermeasures.

8.4. Next Steps

The county should continue its history of implementing safety improvement projects annually. Based on current funding levels, it is anticipated that many of the engineering improvements listed in this plan could be implemented within five to ten years, or sooner. Additionally, this SAP should be updated within five to ten years to reflect improvements that have been implemented, additional availability of roadway feature data, and changes in crash types and patterns.

APPENDIX A
COUNTY COMMITMENT PLEDGE

MAHASKA COUNTY PLEDGE

In this pledge, we formalize Mahaska County's support of the strategies outlined in Iowa's Five-Year Strategic Highway Safety Plan (SHSP) 2024-2028 and the overall vision of Zero Fatalities on Iowa's public roadways. In addition, we reaffirm Mahaska County's goal of a dramatic decrease in roadway fatalities and serious injuries by the years 2030 and 2050, respectively, as detailed in the resolution adopted in 2022 by our Board of Supervisors for participation in the Iowa County Engineers Association (ICEA) Safe Streets for All (SS4A) Grant Application. Mahaska County is committed to implementing the safety strategies outlined in this Safety Action Plan (SAP), which will assist road users with staying safe while driving, walking, or riding in Mahaska County. Mahaska County is dedicated to measuring its progress towards these goals and providing quantitative metrics as we continue to take the necessary steps to improve safety on the county's roadways in order to realize our eventual goal of zero roadway fatalities and serious injuries by 2050.

Mark Groenendyk

Board Chairman

APPENDIX B1

SEGMENT SAFETY COUNTERMEASURES

COUNTY PAVED ROADWAY SEGMENT COUNTERMEASURES

This appendix summarizes the **segment** safety countermeasures for consideration and provides detailed descriptions for each countermeasure from both the risk factor analysis as well as the additional potential improvements listed on the back side of the project sheets.

Systematic Countermeasures

The countermeasures in this section were included in the risk factor analysis and recommended on the segment project sheets based on the criteria described in **Section 5.1.2.**

Conduct a Road Safety Assessment (RSA)

An RSA is a formal safety performance examination that reviews, in detail, the geometry of a roadway facility. As part of an RSA, an independent, multi-disciplinary team assesses the condition of a given roadway and provides short-, mid-, and long-term recommendations for safety improvements for all modes currently or planned to be provided by the facility. RSAs have been conducted throughout the United States and are generally accepted as a proactive, low-cost approach to improve safety. This countermeasure cost estimate does not include the cost of implementing the recommendations of the RSA.

Conduct Access Control Analysis

An access control analysis can aid in determining access management decisions along a corridor. This countermeasure is intended to provide additional information on a specific facility as to the most appropriate access control treatments. Consolidating driveways reduces the number of conflict points on a given roadway and concentrates access where through-drivers can expect and anticipate left and/or right-turning vehicles, thus improving safety. The cost estimate associated with this countermeasure does not include implementing the findings of the access control analysis.

New Pavement Markings

This safety countermeasure includes new groove-in centerline and edgeline retroreflective pavement markings. The updated markings can clarify and further delineate the segment or curve, reducing the risk of a lane departure crash. If the lanes were 12 feet or wider, new edgeline pavement markings of six inches were recommended; Research suggests that widening pavement markings from four to six inches in rural areas results in a CMF of 0.64 to 0.83. Otherwise, new four-inch pavement markings were recommended. Research suggests that installing new 4” pavement markings in rural areas results in a CMF of 0.61 to 0.74.

Increase Shoulder Width/Safety Edge

Constructing or increasing the width of an existing paved 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 suggested 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 0.77 - 0.96 and is an FHWA Proven Safety Countermeasure.

Edgeline Rumble Strips

Edgeline rumble strips 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 to 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.

Centerline Rumble Strips

CMFs of 0.55 to 0.91 represent the safety benefit from 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 provides an audible and tactile warning to drivers when crossing the centerline and can aid in the avoidance of some high-severity lane departure crashes.

Curve Chevron Advanced Curve Warning or Advisory Speed Signs

This countermeasure includes the installation of Curve Chevron signs—static or dynamic—and Advisory Speed Signs to improve driver awareness and navigation through horizontal curves. As identified by the Federal Highway Administration (FHWA), these treatments are Proven Safety Countermeasures that significantly reduce crash risks, particularly on rural and county roads. Chevron signs, especially when enhanced with retroreflective materials or deployed in sequential dynamic formats, can reduce fatal and injury crashes by up to 60 percent. Advisory Speed Signs complement these by clearly communicating safe travel speeds based on curve geometry, helping drivers adjust their behavior in advance. Together, these low-cost, high-impact interventions provide continuous visual guidance, and improve nighttime and low-visibility navigation.

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 decreases the hazard of a run-off-the-road crash by reducing the number of obstructions a vehicle could impact after a lane departure. A 0.78 CMF has been documented as the distance from roadside features was increased.

For descriptions on curve countermeasures see **Appendix D1**.

Location Specific Countermeasures

Safety improvements not included on the first page of the roadway segment project sheet may still merit consideration at a specific location. There are a variety of other safety improvements that could be considered that were not included in the risk factor analysis due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at road segments throughout the county. The following sections additional roadway segment safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets.

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 0.71.

On-pavement Markings for Speed Control

This improvement includes installing in-lane pavement markings, including the speed limit, 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 of observing their speed. A CMF of 0.62 has been recorded for adding additional on-pavement markings.

Delineate Roadside Hazards with Retroreflective Markers

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

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 to 0.56 have been recorded for installing new guardrail along an embankment.

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.” Providing 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.

Retroreflective Strips on Chevron Signposts

This countermeasure involves the application of retroreflective strips directly onto the vertical posts of Chevron Alignment signs to enhance nighttime and low-visibility curve delineation. Retroreflective strips increase the visibility of signposts from a wider range of angles and distances, providing drivers with earlier and clearer recognition of horizontal curves. This added conspicuity is especially beneficial in dark or adverse weather conditions, where traditional signage may be less effective. As a low-cost enhancement, retroreflective post treatments support the Safe System Approach by reinforcing multiple layers of visual guidance, ultimately helping to reduce crash severity and improve overall roadway safety.

Transverse Rumble Strips Prior to Curves

This countermeasure involves the installation of transverse rumble strips—raised or grooved patterns placed across the travel lane in advance of horizontal curves—to alert drivers through sound and vibration. According to the Federal Highway Administration (FHWA), transverse rumble strips are an effective low-cost treatment for reducing vehicle speeds and enhancing driver alertness before entering curves, particularly in rural areas where roadway departure crashes are prevalent. These strips provide a tactile and audible warning that prompts drivers to reduce speed and focus attention, especially in conditions of low visibility or driver fatigue.

Their use has been associated with measurable reductions in speed-related crashes and improved compliance with advisory speeds.

Remove/Relocate Objects in Hazardous Locations

This countermeasure includes removing or relocating objects from within the clear zone of the roadside. This allows drivers who run off the road to potentially return to the road or have a less severe consequence when departing the roadway. A CMF of 0.62 is associated with this countermeasure.

Superelevation on Curves

This countermeasure involves adjusting the roadway's cross slope (superelevation) to help vehicles safely navigate horizontal curves by counteracting lateral acceleration. Proper superelevation design significantly improves vehicle stability and reduces the likelihood of roadway departure crashes, particularly on rural two-lane highways. Superelevation allows vehicles to maintain safer speeds through curves by aligning the road surface with the natural path of travel, thereby reducing side friction demand and the risk of skidding or rollover. Correcting the superelevation variance demonstrates a measurable reduction in crash frequency when curves are properly banked.

High Friction Surface Treatment (HFST) on Curves

This countermeasure involves applying a thin layer of durable, polish-resistant aggregate—typically calcined bauxite—bonded with a high-strength resin to the pavement surface at horizontal curves. HFST dramatically improves pavement friction, especially in wet or high-demand braking conditions, helping drivers maintain control and reduce stopping distances. Though curves make up only about 5 percent of U.S. roadway miles, they account for over 25 percent of fatal crashes, underscoring the need for targeted safety interventions. HFST has been shown to reduce injury and fatal crashes by approximately 50 percent. Its long service life, rapid installation, and minimal environmental impact make it a cost-effective solution for high-risk locations.

Speed Flashers on Chevron Signs

This countermeasure involves the installation of speed-activated flashing lights on chevron alignment signs to alert drivers approaching horizontal curves at unsafe speeds. These systems, known as Sequential Dynamic Curve Warning Systems (SDCWS), use solar-powered LEDs embedded in chevron signs that flash in sequence as a vehicle approaches, creating a dynamic visual cue that enhances driver awareness and encourages speed reduction. Field studies show that these systems can reduce mean operating speeds by up to 2.6 mph even 12 months after installation, with sustained speed reductions observed up to 24 months later. By providing real-time, speed-responsive feedback, these signs are particularly effective on rural two-lane highways where roadway departure crashes are common.

For descriptions on additional curve countermeasures see **Appendix D1**.

APPENDIX B2

SEGMENT PROJECT SHEETS

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 14

Project Name: INDIAN WAY between JOINER AVE and S O ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

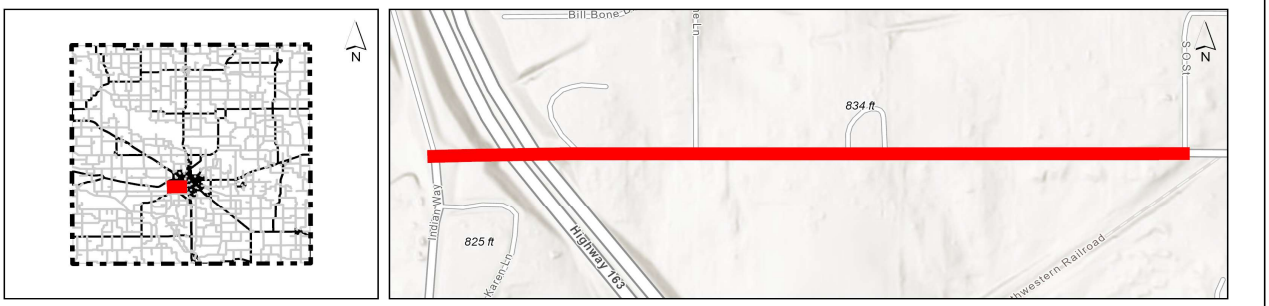
Road: **INDIAN WAY**
From: **JOINER AVE**
To: **S O ST**
Length (miles): **0.62**

Project is within an Underserved Community?†: No

GPS ID: 6005

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2,320	6
Pavement | Shoulder Width (ft)	24' | 10'	0
Potential Crash Reduction (PCR)	Medium	1
Access Points per Mile	53.2	3
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	186	2
Lane Departure Crashes	4	2
Total Risk Factor Points (21 max)		**14**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	10
Speed Limit (mph)	45
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2014-2023	
Total Crashes	7
K and A Crashes	2
Lane Departure Crashes	4
Lane Departure K and A Crashes	1
Total Crash Rate (per HMVMT)	133.2
K and A Crash Rate (per HMVMT)	38.1

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.62**	**MILE**	**$ 6,000**	**$ 3,720**
Install 4" Retroreflective Centerline	**0.62**	**MILE**	**$ 3,000**	**$ 1,860**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	**0.62**	**MILE**	**$ 150,000**	**$ 93,000**
Install Edgeline Rumble Strips (Both Sides of Road)	**0.62**	**MILE**	**$ 5,000**	**$ 3,100**
Install Centerline Rumble Strips	**0.62**	**MILE**	**$ 2,000**	**$ 1,240**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**0.62**	**MILE**	**$ 30,000**	**$ 18,600**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 121,520

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 14

Project Name: INDIAN WAY between JOINER AVE and S O ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 6005

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 121,520
			Subtotal:	$ 121,520
			Mobilization: (% +/-)* 10%	$ 12,160
			Traffic Control: (% +/-) 5%	$ 6,264
			Contingency: (% +/-) 20%	$ 25,056
			Estimated Project Cost	**$ 165,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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 Kimley-Horn's judgment as a design professional familiar with the construction industry. 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. Kimley-Horn endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. The 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. No formal assessment was made for the improvement recommendations contained on this page. If in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of July 2024.

End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 13

Project Name: DEAN AVENUE between Peoria Main St and Co Rd G15/110TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

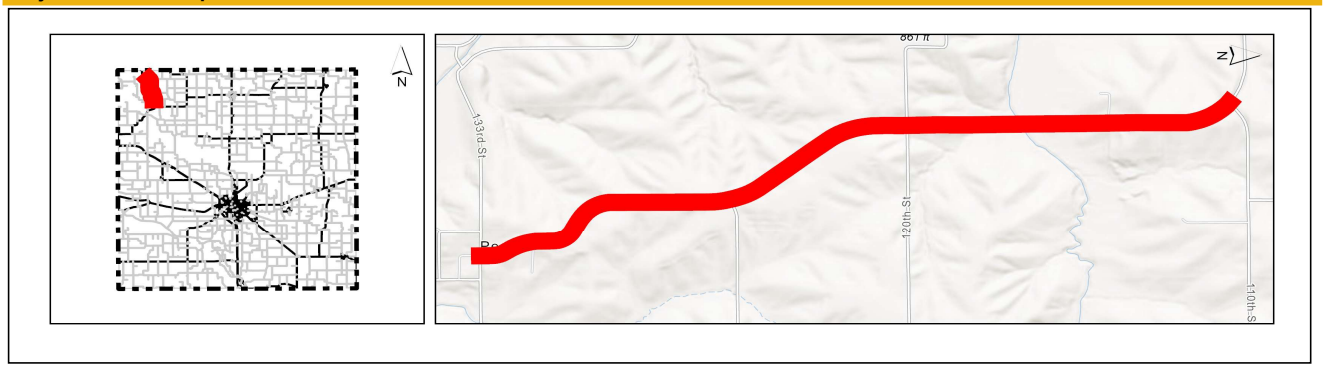
Road: **DEAN AVENUE**
From: **Peoria Main St**
To: **Co Rd G15/110TH ST**
Length (miles): **2.35**

Project is within an Underserved Community?†: No

GPS ID: 5969

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,130	6
Pavement | Shoulder Width (ft)	24' | 4'	0
Potential Crash Reduction (PCR)	Negligible	0
Access Points per Mile	9.4	2
High Risk Curve Density/Mile	0.9	2
Avg. Pavement Condition (IRI)	97	1
Lane Departure Crashes	2	2
Total Risk Factor Points (21 max)		**13**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	2
Curves with Chevrons	5

Crash Data, 2014-2023	
Total Crashes	4
K and A Crashes	0
Lane Departure Crashes	2
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	41.3
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**2.35**	**MILE**	**$ 6,000**	**$ 14,100**
Install 4" Retroreflective Centerline	**2.35**	**MILE**	**$ 3,000**	**$ 7,050**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	**2.35**	**MILE**	**$ 150,000**	**$ 352,500**
Install Edgeline Rumble Strips (Both Sides of Road)	**2.35**	**MILE**	**$ 5,000**	**$ 11,750**
Install Centerline Rumble Strips	**2.35**	**MILE**	**$ 2,000**	**$ 4,700**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**5**	**CURVE**	**$ 1,000**	**$ 5,000**
Clear and Grub (15 ft Both Sides of Road)**	**2.35**	**MILE**	**$ 30,000**	**$ 70,500**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 465,600

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 13

Project Name: DEAN AVENUE between Peoria Main St and Co Rd G15/110TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5969

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 465,600
			Subtotal:	$ 465,600
			Mobilization: (% +/-)* 10%	$ 46,560
			Traffic Control: (% +/-) 5%	$ 23,368
			Contingency: (% +/-) 20%	$ 93,472
			Estimated Project Cost	**$ 629,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 12

Project Name: LYNNDALE ROAD between US 63 (S) and US 63 (N)
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

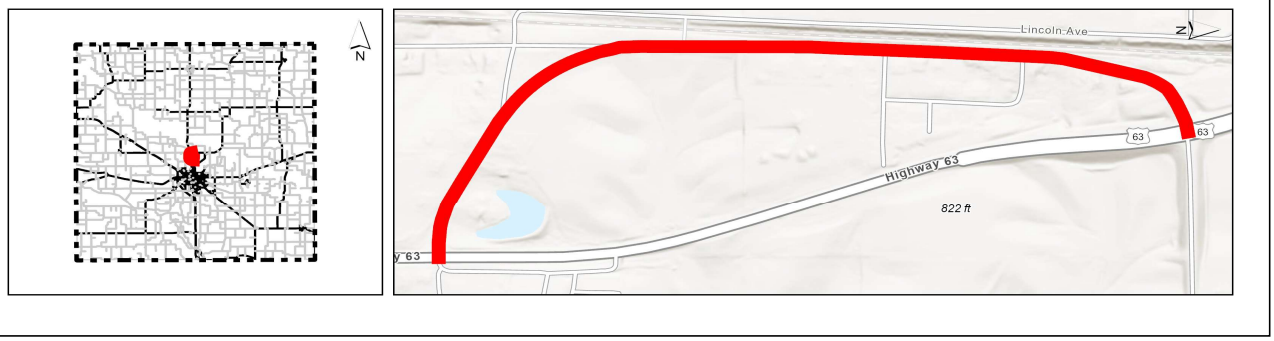
Road: **LYNNDALE ROAD**
From: **US 63 (S)**
To: **US 63 (N)**
Length (miles): **0.98**

Project is within an Underserved Community?†: No

GPS ID: 5978

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	220	1
Pavement | Shoulder Width (ft)	18' | 4'	2
Potential Crash Reduction (PCR)	Negligible	0
Access Points per Mile	24.4	3
High Risk Curve Density/Mile	1.0	2
Avg. Pavement Condition (IRI)	246	2
Lane Departure Crashes	1	2
Total Risk Factor Points (21 max)		**12**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	9
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	1
Curves with Chevrons	0

Crash Data, 2014-2023	
Total Crashes	4
K and A Crashes	0
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	505.8
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	**1**	**EA**	**$ 30,000**	**$ 30,000**
Install 4" Retroreflective Edgeline (Both Sides of Road)	**0.98**	**MILE**	**$ 3,000**	**$ 2,940**
Install 6" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 6,000	$ -
Install 4" Retroreflective Centerline	**0.98**	**MILE**	**$ 3,000**	**$ 2,940**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	**0.98**	**MILE**	**$ 150,000**	**$ 147,000**
Install Edgeline Rumble Strips (Both Sides of Road)	**0.98**	**MILE**	**$ 5,000**	**$ 4,900**
Install Centerline Rumble Strips	**0.98**	**MILE**	**$ 2,000**	**$ 1,960**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 3,500**	**$ 3,500**
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**0.98**	**MILE**	**$ 30,000**	**$ 29,400**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 222,640

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 12

Project Name: LYNNDALE ROAD between US 63 (S) and US 63 (N)
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5978

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 222,640
			Subtotal:	$ 222,640
			Mobilization: (% +/-)* 10%	$ 22,270
			Traffic Control: (% +/-) 5%	$ 11,218
			Contingency: (% +/-) 20%	$ 44,872
			Estimated Project Cost	**$ 301,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 12

Project Name: DEAN AVENUE between HIGHWAY 102 and 133RD ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

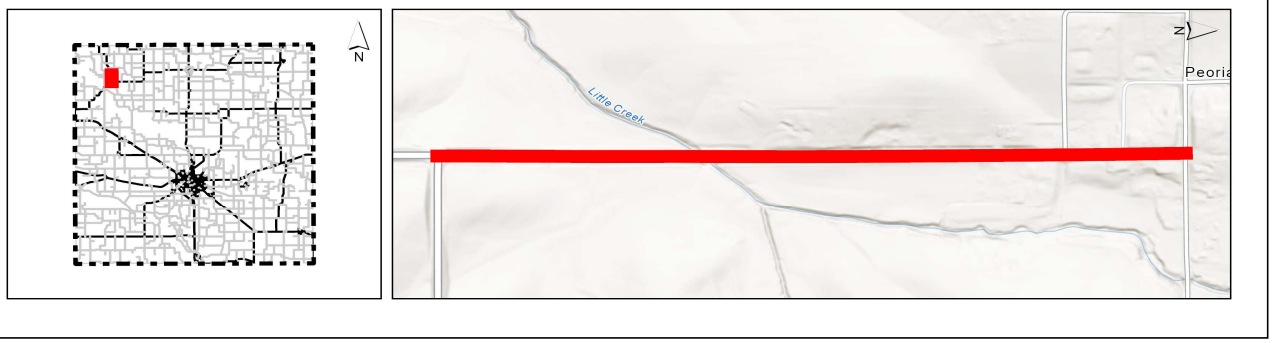
Road: **DEAN AVENUE**
From: **HIGHWAY 102**
To: **133RD ST**
Length (miles): **0.75**

Project is within an Underserved Community?†: No

GPS ID: 5968

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,130	6
Pavement | Shoulder Width (ft)	22' | 3'	0
Potential Crash Reduction (PCR)	Medium	1
Access Points per Mile	18.7	3
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	41	0
Lane Departure Crashes	6	2
Total Risk Factor Points (21 max)		**12**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	Yes
Centerline Rumble Strips	Yes
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2014-2023	
Total Crashes	7
K and A Crashes	1
Lane Departure Crashes	6
Lane Departure K and A Crashes	1
Total Crash Rate (per HMVMT)	227.1
K and A Crash Rate (per HMVMT)	32.4

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	**1**	**EA**	**$ 40,000**	**$ 40,000**
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	**0.75**	**MILE**	**$ 3,000**	**$ 2,250**
Install 6" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 6,000	$ -
Install 4" Retroreflective Centerline	**0.75**	**MILE**	**$ 3,000**	**$ 2,250**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	**0.75**	**MILE**	**$ 150,000**	**$ 112,500**
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**0.75**	**MILE**	**$ 30,000**	**$ 22,500**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 179,500

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 12

Project Name: DEAN AVENUE between HIGHWAY 102 and 133RD ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5968

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 179,500
			Subtotal:	$ 179,500
			Mobilization: (% +/-)* 10%	$ 17,950
			Traffic Control: (% +/-) 5%	$ 9,110
			Contingency: (% +/-) 20%	$ 36,440
			Estimated Project Cost	**$ 243,000**

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

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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: WAPELLO-MAHASKA ROAD between 330TH ST and 400 feet SW of 220TH AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

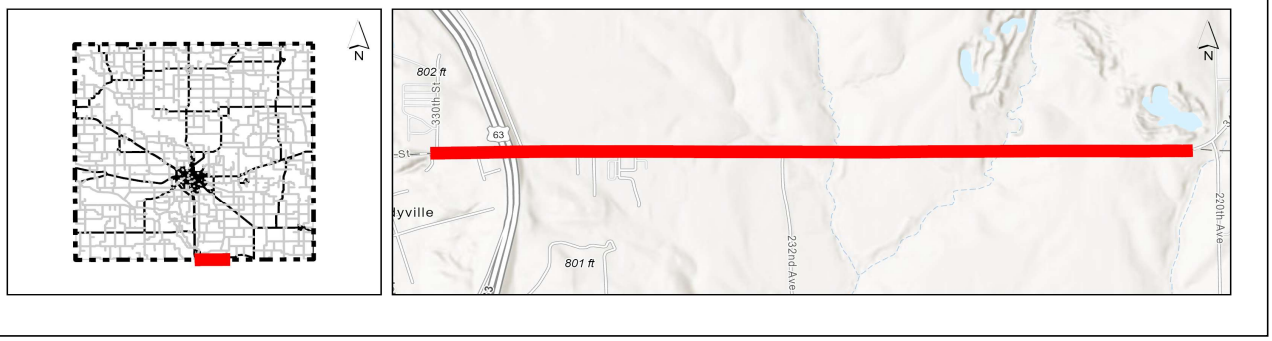
Road: **WAPELLO-MAHASKA ROAD**
From: **330TH ST**
To: **400 feet SW of 220TH AVE**
Length (miles): **2.16**

Project is within an Underserved Community?†: No

GPS ID: 8532

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	**770**	**5**
Pavement | Shoulder Width (ft)	**22' | 6'**	**0**
Potential Crash Reduction (PCR)	**Negligible**	**0**
Access Points per Mile	**11.5**	**3**
High Risk Curve Density/Mile	**0.0**	**0**
Avg. Pavement Condition (IRI)	**125**	**1**
Lane Departure Crashes	**2**	**2**
Total Risk Factor Points (21 max)		**11**

Other Information	
Paved Shoulder	**No**
Shoulder Width (ft)	**6**
Speed Limit (mph)	**55**
Lane Width (ft)	**11**
Number of Lanes	**2**
Edgeline Rumble Strips	**No**
Centerline Rumble Strips	**No**
Curves (L>100', R≤1,000')	**0**
Curves with Chevrons	**0**

Crash Data, 2014-2023	
Total Crashes	**12**
K and A Crashes	**0**
Lane Departure Crashes	**2**
Lane Departure K and A Crashes	**0**
Total Crash Rate (per HMVMT)	**198.4**
K and A Crash Rate (per HMVMT)	**0**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	**2.16**	**MILE**	**$ 3,000**	**$ 6,480**
Install 6" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 6,000	$ -
Install 4" Retroreflective Centerline	**2.16**	**MILE**	**$ 3,000**	**$ 6,480**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	0	MILE	$ 150,000	$ -
Install Edgeline Rumble Strips (Both Sides of Road)	**2.16**	**MILE**	**$ 5,000**	**$ 10,800**
Install Centerline Rumble Strips	**2.16**	**MILE**	**$ 2,000**	**$ 4,320**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**2.16**	**MILE**	**$ 30,000**	**$ 64,800**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 92,880

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: WAPELLO-MAHASKA ROAD between 330TH ST and 400 feet SW of 220TH AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 8532

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 92,880
			Subtotal:	$ 92,880
			Mobilization: (% +/-)* 10%	$ 9,290
			Traffic Control: (% +/-) 5%	$ 4,766
			Contingency: (% +/-) 20%	$ 19,064
			Estimated Project Cost	**$ 126,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: OSBURN AVENUE between 265TH ST and IA 92
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

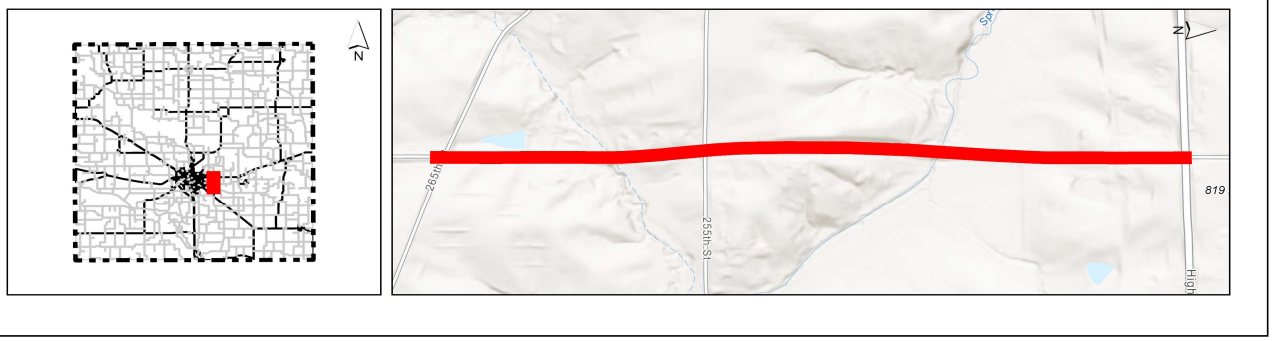
Road: **OSBURN AVENUE**
From: **265TH ST**
To: **IA 92**
Length (miles): **1.16**

Project is within an Underserved Community?†: **Yes**

GPS ID: 5989

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	**840**	**5**
Pavement | Shoulder Width (ft)	**24' | 6'**	**0**
Potential Crash Reduction (PCR)	**Medium**	**1**
Access Points per Mile	**9.5**	**3**
High Risk Curve Density/Mile	**0.0**	**0**
Avg. Pavement Condition (IRI)	**78**	**0**
Lane Departure Crashes	**2**	**2**
Total Risk Factor Points (21 max)		**11**

Other Information	
Paved Shoulder	**No**
Shoulder Width (ft)	**6**
Speed Limit (mph)	**55**
Lane Width (ft)	**12**
Number of Lanes	**2**
Edgeline Rumble Strips	**No**
Centerline Rumble Strips	**No**
Curves (L>100', R≤1,000')	**0**
Curves with Chevrons	**0**

Crash Data, 2014-2023	
Total Crashes	**12**
K and A Crashes	**1**
Lane Departure Crashes	**2**
Lane Departure K and A Crashes	**0**
Total Crash Rate (per HMVMT)	**336.1**
K and A Crash Rate (per HMVMT)	**28.0**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	**1**	**EA**	**$ 40,000**	**$ 40,000**
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**1.16**	**MILE**	**$ 6,000**	**$ 6,960**
Install 4" Retroreflective Centerline	**1.16**	**MILE**	**$ 3,000**	**$ 3,480**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	0	MILE	$ 150,000	$ -
Install Edgeline Rumble Strips (Both Sides of Road)	**1.16**	**MILE**	**$ 5,000**	**$ 5,800**
Install Centerline Rumble Strips	**1.16**	**MILE**	**$ 2,000**	**$ 2,320**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**1.16**	**MILE**	**$ 30,000**	**$ 34,800**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 93,360

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: OSBURN AVENUE between 265TH ST and IA 92
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5989

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 93,360
			Subtotal:	$ 93,360
			Mobilization: (% +/-)* 10%	$ 9,340
			Traffic Control: (% +/-) 5%	$ 4,860
			Contingency: (% +/-) 20%	$ 19,440
			Estimated Project Cost	**$ 127,000**

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

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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: ADAMS AVENUE between EAST HWY 163 EB Ramps and HWY 102 & OLD HWY 102
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

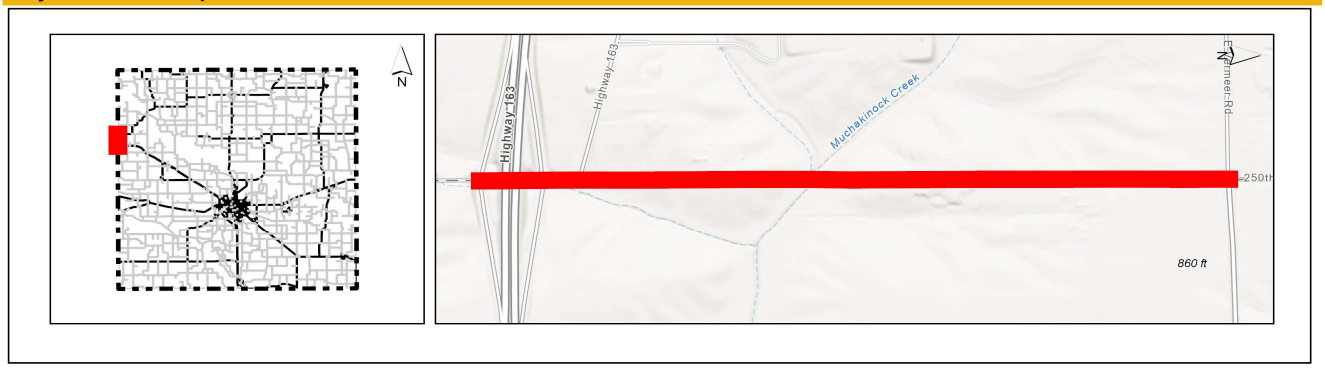
Road: **ADAMS AVENUE**
From: **EAST HWY 163 EB Ramps**
To: **HWY 102 & OLD HWY 102**
Length (miles): **1.30**

Project is within an Underserved Community?†: No

GPS ID: 5966

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	4,080	6
Pavement | Shoulder Width (ft)	24' | 6'	0
Potential Crash Reduction (PCR)	Negligible	0
Access Points per Mile	4.6	1
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	194	2
Lane Departure Crashes	5	2
Total Risk Factor Points (21 max)		**11**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2014-2023	
Total Crashes	30
K and A Crashes	0
Lane Departure Crashes	5
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	154.8
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**1.30**	**MILE**	**$ 6,000**	**$ 7,800**
Install 4" Retroreflective Centerline	**1.30**	**MILE**	**$ 3,000**	**$ 3,900**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	**1.30**	**MILE**	**$ 150,000**	**$ 195,000**
Install Edgeline Rumble Strips (Both Sides of Road)	**1.30**	**MILE**	**$ 5,000**	**$ 6,500**
Install Centerline Rumble Strips	**1.30**	**MILE**	**$ 2,000**	**$ 2,600**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**1.30**	**MILE**	**$ 30,000**	**$ 39,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 254,800

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: ADAMS AVENUE between EAST HWY 163 EB Ramps and HWY 102 & OLD HWY 102
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5966

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 254,800
			Subtotal:	$ 254,800
			Mobilization: (% +/-)* 10%	$ 25,480
			Traffic Control: (% +/-) 5%	$ 12,744
			Contingency: (% +/-) 20%	$ 50,976
			Estimated Project Cost	**$ 344,000**

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

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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: 340TH STREET between 400 feet SW of 220TH AVE and RUTLEDGE AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

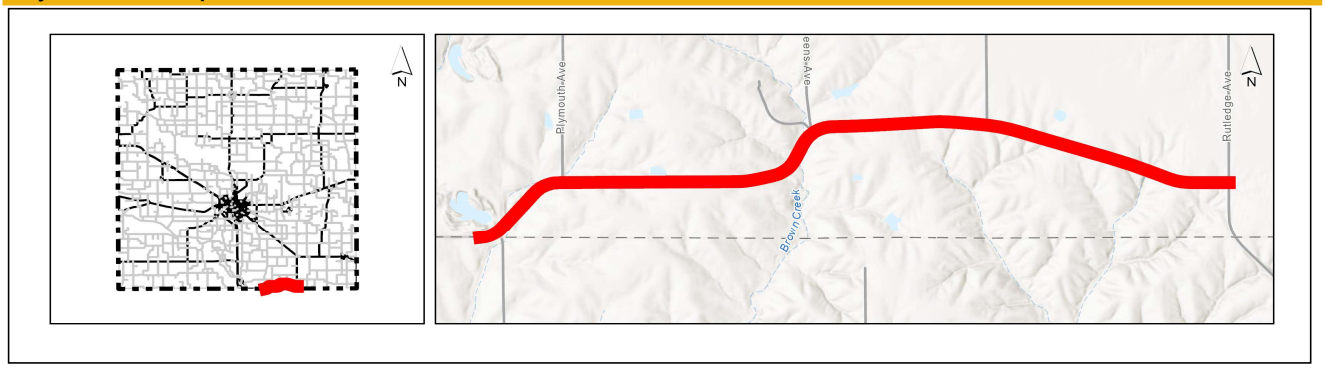
Road: **340TH STREET**
From: **400 feet SW of 220TH AVE**
To: **RUTLEDGE AVE**
Length (miles): **3.34**

Project is within an Underserved Community?†: No

GPS ID: 5999

This segment does not contain high scoring intersections.
This segment contains the following high scoring curves: GPS IDs 3701, 3704, 3721

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	**720**	**5**
Pavement | Shoulder Width (ft)	**24' | 5'**	**0**
Potential Crash Reduction (PCR)	**Negligible**	**0**
Access Points per Mile	**3.9**	**1**
High Risk Curve Density/Mile	**1.2**	**2**
Avg. Pavement Condition (IRI)	**119**	**1**
Lane Departure Crashes	**2**	**2**
Total Risk Factor Points (21 max)		**11**

Other Information	
Paved Shoulder	**No**
Shoulder Width (ft)	**5**
Speed Limit (mph)	**55**
Lane Width (ft)	**24**
Number of Lanes	**2**
Edgeline Rumble Strips	**Yes**
Centerline Rumble Strips	**Yes**
Curves (L>100', R≤1,000')	**4**
Curves with Chevrons	**4**

Crash Data, 2014-2023	
Total Crashes	**6**
K and A Crashes	**0**
Lane Departure Crashes	**2**
Lane Departure K and A Crashes	**0**
Total Crash Rate (per HMVMT)	**68.4**
K and A Crash Rate (per HMVMT)	**0**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**3.34**	**MILE**	**$ 6,000**	**$ 20,040**
Install 4" Retroreflective Centerline	**3.34**	**MILE**	**$ 3,000**	**$ 10,020**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	0	MILE	$ 150,000	$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**4**	**CURVE**	**$ 1,000**	**$ 4,000**
Clear and Grub (15 ft Both Sides of Road)**	**3.34**	**MILE**	**$ 30,000**	**$ 100,200**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 134,260

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
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Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: 340TH STREET between 400 feet SW of 220TH AVE and RUTLEDGE AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5999

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve	**6**	**CURVE**	**$ 50,000**	**$ 300,000**
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				

Additional Potential Improvements Subtotal:		$ 300,000
Project Selection Decision Tree Systemic Improvements Subtotal:		$ 134,260
Subtotal:		$ 434,260
Mobilization: (% +/-)*	10%	$ 43,430
Traffic Control: (% +/-)	5%	$ 21,862
Contingency: (% +/-)	20%	$ 87,448
Estimated Project Cost		**$ 587,000**

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

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End of Project Description

Back Page

Safety Action Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: 310TH STREET between ADAMS AVE and US 63
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

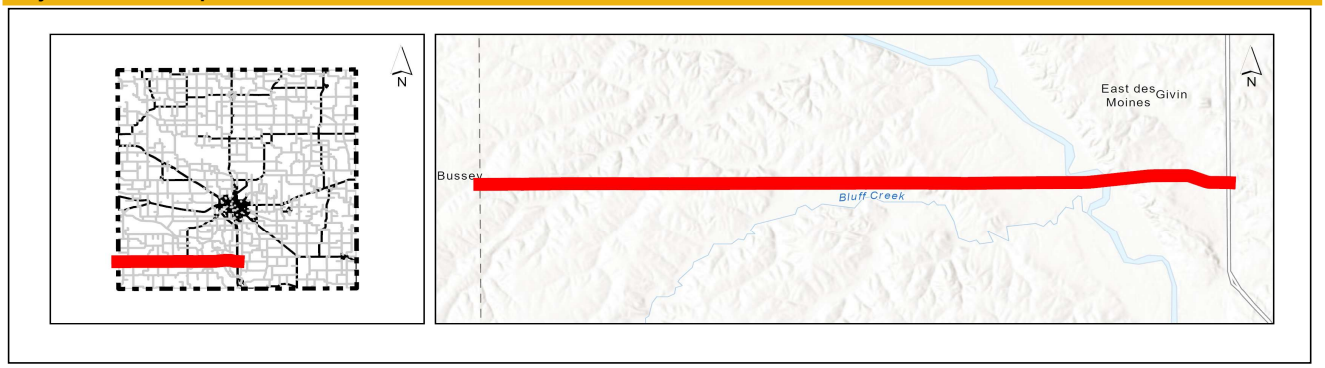
Road: **310TH STREET**
From: **ADAMS AVE**
To: **US 63**
Length (miles): **12.00**

Project is within an Underserved Community?†: No

GPS ID: 6000

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	**650**	**5**
Pavement | Shoulder Width (ft)	**22' | 5'**	**0**
Potential Crash Reduction (PCR)	**High**	**2**
Access Points per Mile	**3.7**	**1**
High Risk Curve Density/Mile	**0.0**	**0**
Avg. Pavement Condition (IRI)	**137**	**1**
Lane Departure Crashes	**10**	**2**
Total Risk Factor Points (21 max)		**11**

Other Information	
Paved Shoulder	**No**
Shoulder Width (ft)	**5**
Speed Limit (mph)	**55**
Lane Width (ft)	**11**
Number of Lanes	**2**
Edgeline Rumble Strips	**Partial**
Centerline Rumble Strips	**Partial**
Curves (L>100', R≤1,000')	**0**
Curves with Chevrons	**0**

Crash Data, 2014-2023	
Total Crashes	**29**
K and A Crashes	**5**
Lane Departure Crashes	**10**
Lane Departure K and A Crashes	**2**
Total Crash Rate (per HMVMT)	**101.5**
K and A Crash Rate (per HMVMT)	**17.5**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	**12.00**	**MILE**	**$ 3,000**	**$ 36,000**
Install 6" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 6,000	$ -
Install 4" Retroreflective Centerline	**12.00**	**MILE**	**$ 3,000**	**$ 36,000**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	0	MILE	$ 150,000	$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**12.00**	**MILE**	**$ 30,000**	**$ 360,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 432,000

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: 310TH STREET between ADAMS AVE and US 63
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 6000

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other: Install Edgeline Rumble Strips (Both Sides of Road)	**7**	**MILE**	**$ 5,000**	**$ 35,000**
Other: Install Centerline Rumble Strips	**7**	**MILE**	**$ 2,000**	**$ 14,000**
Other:				
Other:				

Additional Potential Improvements Subtotal:		$ 49,000
Project Selection Decision Tree Systemic Improvements Subtotal:		$ 432,000
Subtotal:		$ 481,000
Mobilization: (% +/-)*	10%	$ 48,100
Traffic Control: (% +/-)	5%	$ 24,180
Contingency: (% +/-)	20%	$ 96,720
Estimated Project Cost		**$ 650,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

Opinion of Probable Construction Cost Disclaimer:
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End of Project Description

Back Page

Safety Action Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: HIGHWAY 102 between 250TH AVE and S COLUMBIA ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

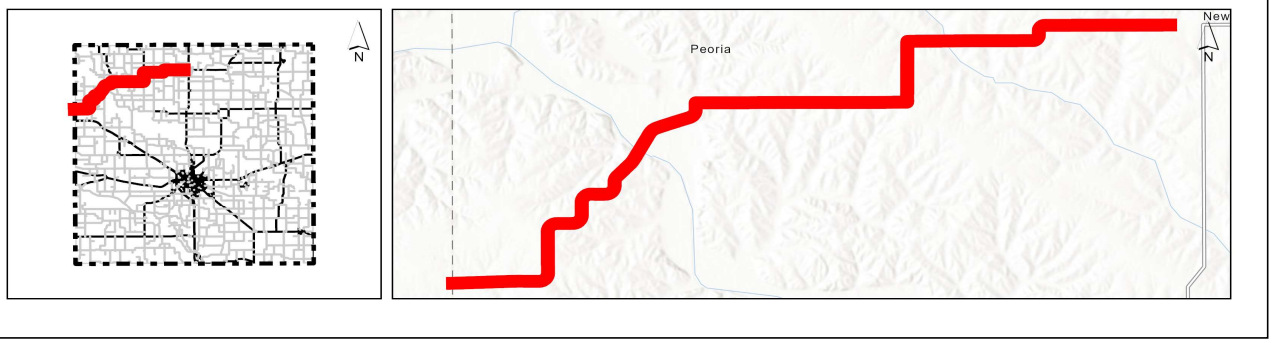
Road: **HIGHWAY 102**
From: **250TH AVE**
To: **S COLUMBIA ST**
Length (miles): **14.13**

Project is within an Underserved Community?†: No

GPS ID: 6023

This segment contains the following high scoring intersections: GPS IDs 53088, 53100, 53101
This segment contains the following high scoring curves: GPS IDs 3403, 3411, 3428, 3444, 3573, 3575

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,790	6
Pavement | Shoulder Width (ft)	24' | 3'	0
Potential Crash Reduction (PCR)	Negligible	0
Access Points per Mile	5.4	1
High Risk Curve Density/Mile	0.6	1
Avg. Pavement Condition (IRI)	117	1
Lane Departure Crashes	43	2
Total Risk Factor Points (21 max)		**11**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	Partial
Centerline Rumble Strips	Partial
Curves (L>100', R≤1,000')	9
Curves with Chevrons	10

Crash Data, 2014-2023	
Total Crashes	76
K and A Crashes	4
Lane Departure Crashes	43
Lane Departure K and A Crashes	3
Total Crash Rate (per HMVMT)	82.4
K and A Crash Rate (per HMVMT)	4.3

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**14.13**	**MILE**	**$ 6,000**	**$ 84,780**
Install 4" Retroreflective Centerline	**14.13**	**MILE**	**$ 3,000**	**$ 42,390**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	**5.70**	**MILE**	**$ 150,000**	**$ 855,000**
Install Edgeline Rumble Strips (Both Sides of Road)	**5.70**	**MILE**	**$ 5,000**	**$ 28,500**
Install Centerline Rumble Strips	**5.70**	**MILE**	**$ 2,000**	**$ 11,400**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**10**	**CURVE**	**$ 1,000**	**$ 10,000**
Clear and Grub (15 ft Both Sides of Road)**	**14.13**	**MILE**	**$ 30,000**	**$ 423,900**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 1,455,970

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 11

Project Name: HIGHWAY 102 between 250TH AVE and S COLUMBIA ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 6023

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve	**7**	**CURVE**	**$ 50,000**	**$ 350,000**
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				

Additional Potential Improvements Subtotal:		$ 350,000
Project Selection Decision Tree Systemic Improvements Subtotal:		$ 1,455,970
Subtotal:		$ 1,805,970
Mobilization: (% +/-)*	10%	$ 75,000
Traffic Control: (% +/-)	5%	$ 90,406
Contingency: (% +/-)	20%	$ 361,624
Estimated Project Cost		**$ 2,333,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 10

Project Name: GALESTON AVENUE between 310TH ST and GAMBELL AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

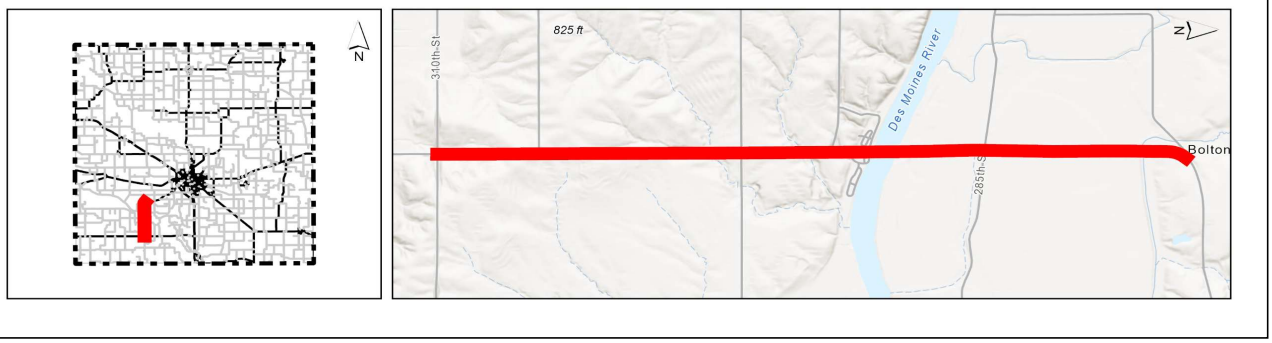
Road: **GALESTON AVENUE**
From: **310TH ST**
To: **GAMBELL AVE**
Length (miles): **3.71**

Project is within an Underserved Community?†: No

GPS ID: 5971

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	**480**	**4**
Pavement | Shoulder Width (ft)	**22' | 5'**	**0**
Potential Crash Reduction (PCR)	**Medium**	**1**
Access Points per Mile	**3.0**	**0**
High Risk Curve Density/Mile	**0.3**	**1**
Avg. Pavement Condition (IRI)	**173**	**2**
Lane Departure Crashes	**4**	**2**
Total Risk Factor Points (21 max)		**10**

Other Information	
Paved Shoulder	**No**
Shoulder Width (ft)	**5**
Speed Limit (mph)	**55**
Lane Width (ft)	**11**
Number of Lanes	**2**
Edgeline Rumble Strips	**No**
Centerline Rumble Strips	**Yes**
Curves (L>100', R≤1,000')	**1**
Curves with Chevrons	**1**

Crash Data, 2014-2023	
Total Crashes	**9**
K and A Crashes	**0**
Lane Departure Crashes	**4**
Lane Departure K and A Crashes	**0**
Total Crash Rate (per HMVMT)	**137.5**
K and A Crash Rate (per HMVMT)	**0**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	**3.71**	**MILE**	**$ 3,000**	**$ 11,130**
Install 6" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 6,000	$ -
Install 4" Retroreflective Centerline	**3.71**	**MILE**	**$ 3,000**	**$ 11,130**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	0	MILE	$ 150,000	$ -
Install Edgeline Rumble Strips (Both Sides of Road)	**3.71**	**MILE**	**$ 5,000**	**$ 18,550**
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)**	**3.71**	**MILE**	**$ 30,000**	**$ 111,300**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 153,110

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 10

Project Name: GALESTON AVENUE between 310TH ST and GAMBELL AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5971

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 153,110
			Subtotal:	$ 153,110
			Mobilization: (% +/-)* 10%	$ 15,320
			Traffic Control: (% +/-) 5%	$ 7,714
			Contingency: (% +/-) 20%	$ 30,856
			Estimated Project Cost	**$ 207,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 10

Project Name: CORDOVA AVENUE between Co Rd G15/CORDOVA AVE and Co Rd G13/100TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

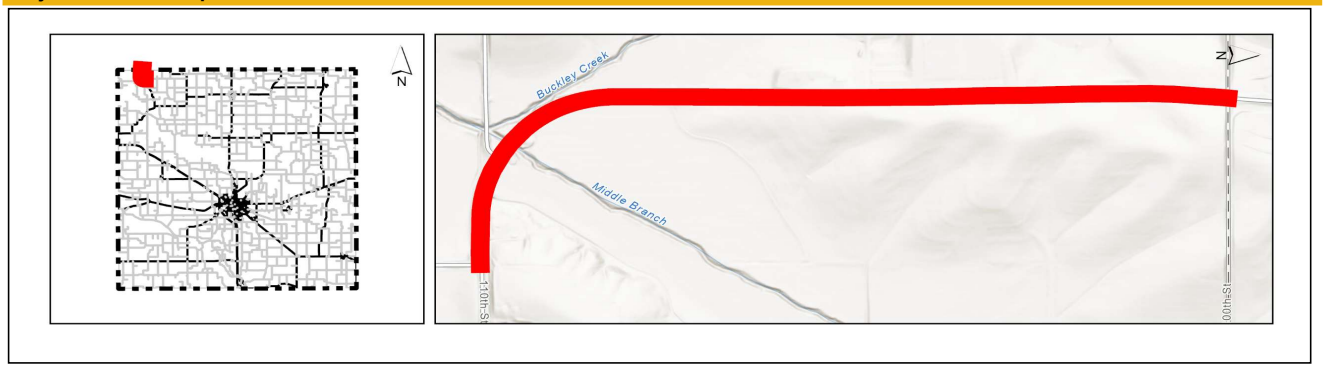
Road: **CORDOVA AVENUE**
From: **Co Rd G15/CORDOVA AVE**
To: **Co Rd G13/100TH ST**
Length (miles): **1.16**

Project is within an Underserved Community?†: No

GPS ID: 5967

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,130	6
Pavement | Shoulder Width (ft)	24' | 4'	0
Potential Crash Reduction (PCR)	Negligible	0
Access Points per Mile	4.3	1
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	101	1
Lane Departure Crashes	2	2
Total Risk Factor Points (21 max)		**10**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	1

Crash Data, 2014-2023	
Total Crashes	2
K and A Crashes	0
Lane Departure Crashes	2
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	41.7
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**1.16**	**MILE**	**$ 6,000**	**$ 6,960**
Install 4" Retroreflective Centerline	**1.16**	**MILE**	**$ 3,000**	**$ 3,480**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	**1.16**	**MILE**	**$ 150,000**	**$ 174,000**
Install Edgeline Rumble Strips (Both Sides of Road)	**1.16**	**MILE**	**$ 5,000**	**$ 5,800**
Install Centerline Rumble Strips	**1.16**	**MILE**	**$ 2,000**	**$ 2,320**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)**	**1.16**	**MILE**	**$ 30,000**	**$ 34,800**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 228,360

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 10

Project Name: CORDOVA AVENUE between Co Rd G15/CORDOVA AVE and Co Rd G13/100TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5967

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 228,360
			Subtotal:	$ 228,360
			Mobilization: (% +/-)* 10%	$ 22,840
			Traffic Control: (% +/-) 5%	$ 11,560
			Contingency: (% +/-) 20%	$ 46,240
			Estimated Project Cost	**$ 309,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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 Kimley-Horn's judgment as a design professional familiar with the construction industry. 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:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 10

Project Name: OLD IA 163 SIGNED ROUTE between IA 163 and 900 feet NW of ORCHARD AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Location Description

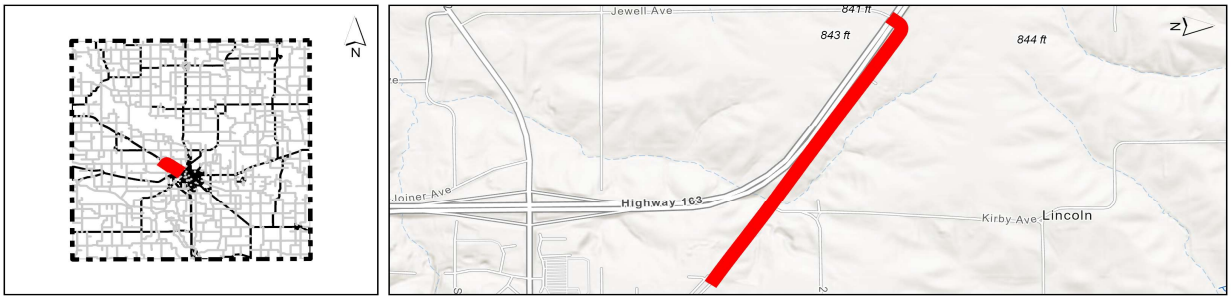
Road: **OLD IA 163 SIGNED ROUTE**
From: **IA 163**
To: **900 feet NW of ORCHARD AVE**
Length (miles): **1.17**

Project is within an Underserved Community?†: No

GPS ID: 5974

This segment does not contain high scoring intersections.
This segment does not contain high scoring curves.

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,070	5
Pavement | Shoulder Width (ft)	24' | 6'	0
Potential Crash Reduction (PCR)	Negligible	0
Access Points per Mile	3.4	1
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	191	2
Lane Departure Crashes	3	2
Total Risk Factor Points (21 max)		**10**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2014-2023	
Total Crashes	7
K and A Crashes	0
Lane Departure Crashes	3
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	153.7
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Audit (RSA)	0	EA	$ 40,000	$ -
Conduct Access Control Analysis	0	EA	$ 30,000	$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**1.17**	**MILE**	**$ 6,000**	**$ 7,020**
Install 4" Retroreflective Centerline	**1.17**	**MILE**	**$ 3,000**	**$ 3,510**
Pave 2' Shoulder with Safety Edge (Both Sides of Road - Includes Earth Work)	0.00	MILE	$ 150,000	$ -
Install Edgeline Rumble Strips (Both Sides of Road)	**1.17**	**MILE**	**$ 5,000**	**$ 5,850**
Install Centerline Rumble Strips	**1.17**	**MILE**	**$ 2,000**	**$ 2,340**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 1,000	$ -
Clear and Grub (15 ft Both Sides of Road)**	**1.17**	**MILE**	**$ 30,000**	**$ 35,100**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 53,820

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Roadway Segment Improvements

Risk Factor Points: 10

Project Name: OLD IA 163 SIGNED ROUTE between IA 163 and 900 feet NW of ORCHARD AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: FJC
Checked By: DJG

SEGMENT

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 5974

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	$ 85,000	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Delineate Roadside Hazard (tree or utility pole) with Retroreflective Tape		EA	$ 100	$ -
Guardrail		FOOT	$ 80	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Remove/Relocate Object in Hazardous Location		EA	$ 1,000	$ -
Superelevation Correction on Curve		CURVE	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 50,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 53,820
			Subtotal:	$ 53,820
			Mobilization: (% +/-)* 10%	$ 5,390
			Traffic Control: (% +/-) 5%	$ 2,758
			Contingency: (% +/-) 20%	$ 11,032
			Estimated Project Cost	**$ 73,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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End of Project Description

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APPENDIX B3

SEGMENT RISK FACTOR RANKING RESULTS

Mahaska County
Safety Action Plan
Segment Risk Factor Points

GPS ID	Paved Road	Beginning of Segment	End of Segment	Length (mi)	Total Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Pavement Width (ft) (Value)	Shoulder Width (ft) (Value)	Pavement and Shoulder Width (ft) (Points)	KABCO PCR Level (Value)	KABCO PCR Level (Points)	Access Density (points/mile) (Value)	Access Density (points/mile) (Points)	High Risk Curve Density (Value)	High Risk Curve Density (Points)	Pavement Condition (Value)	Pavement Condition (Points)	Lane Departure Crashes (Value)	Lane Departure Crashes (Points)	Total Crashes	K and A Crashes	Paved Shoulder	Speed Limit (mph)	Number of Lanes	Edgeline Rumble Strips	Centerline Rumble Strips	Curves (L>100', R≤1,000')	Curves with Chevrons
6005	INDIAN WAY	JOINER AVE	S O ST	0.62	14	2,320	6	24	10	0	Medium	1	53.2	3	0.00	0	186	2	4	2	7	2	No	55	2	No	No	0	0
5969	DEAN AVENUE	Peoria Main St	Co Rd G15/110TH ST	2.35	13	1,130	6	24	4	0	Negligible	0	9.4	2	0.85	2	97	1	2	2	4	0	No	55	2	No	No	2	5
5968	DEAN AVENUE	HIGHWAY 102	133RD ST	0.75	12	1,130	6	22	3	0	Medium	1	18.7	3	0.00	0	41	0	6	2	7	1	No	55	2	Yes	Yes	0	0
5978	LYNNDALE ROAD	US 63 (S)	US 63 (N)	0.98	12	220	1	18	4	2	Negligible	0	24.4	3	1.02	2	246	2	1	2	4	0	No	55	2	No	No	1	0
5966	ADAMS AVENUE	EAST HWY 163 EB Ramps	HWY 102 & OLD HWY 102	1.30	11	4,079	6	24	6	0	Negligible	0	4.6	1	0.00	0	194	2	5	2	30	0	No	55	2	No	No	0	0
5980	LUMINARY LANE	US 63	End of Luminary Lane	0.72	11	125	0	18	8	2	Negligible	0	22.3	3	1.39	2	303	2	3	2	7	0	No	55	2	No	No	1	0
5981	MERINO AVENUE	CRESTVIEW DR	Co Rd G39/220TH ST	1.98	11	330	3	20	4	0	Negligible	0	10.6	3	0.51	1	227	2	1	2	2	0	No	45	2	No	No	1	1
5989	OSBURN AVENUE	265TH ST	IA 92	1.16	11	840	5	24	6	0	Medium	1	9.5	3	0.00	0	78	0	2	2	12	1	No	55	2	No	No	0	0
5999	340TH STREET	400 feet SW of 220TH AVE	RUTLEDGE AVE	3.34	11	720	5	24	5	0	Negligible	0	3.9	1	1.20	2	119	1	2	2	6	0	No	55	1	Yes	Yes	4	4
6000	310TH STREET	ADAMS AVE	US 63	12.00	11	652	5	22	5	0	High	2	3.7	1	0.00	0	137	1	10	2	29	5	No	55	2	Partial	Partial	0	0
6023	HIGHWAY 102	250TH AVE	S COLUMBIA ST	14.13	11	1,787	6	24	3	0	Negligible	0	5.4	1	0.64	1	117	1	43	2	76	4	No	55	2	Partial	Partial	9	10
8532	WAPELLO-MAHASKA ROAD	330TH ST	400 feet SW of 220TH AVE	2.16	11	765	5	22	6	0	Negligible	0	11.5	3	0.00	0	125	1	2	2	12	0	No	55	2	No	No	0	0
5967	CORDOVA AVENUE	Co Rd G15/CORDOVA AVE	Co Rd G13/190TH ST	1.16	10	1,130	6	24	4	0	Negligible	0	4.3	1	0.00	0	101	1	2	2	2	0	No	55	2	No	No	0	1
5971	GALESTON AVENUE	310TH ST	GAMBELL AVE	3.71	10	483	4	22	5	0	Medium	1	3.0	0	0.27	1	173	2	4	2	9	0	No	55	2	No	Yes	1	1
5974	OLD IA 163 SIGNED ROUTE	IA 163	900 feet NW of ORCHARD AVE	1.17	10	1,065	5	24	6	0	Negligible	0	3.4	1	0.00	0	191	2	3	2	7	0	No	55	2	No	No	0	0
6003	INDIAN WAY	Gambell Ave	400 feet SW of Leighton St	2.86	9	620	4	22	5	0	Negligible	0	5.6	2	0.70	1	90	0	10	2	11	2	No	55	2	No	No	2	4
6022	175TH STREET	G29/175th St.	Co Rd G29/175TH ST	3.21	9	370	3	24	4	0	Negligible	0	6.5	2	0.31	1	107	1	2	2	8	0	No	55	2	No	No	1	1
5970	EATON AVENUE	Leighton Corporate Limit	IA 163	1.57	8	459	4	22	3	0	Negligible	0	7.6	2	0.00	0	93	0	3	2	8	1	No	55	2	No	No	0	0
5975	JOINER AVENUE	Co Rd T39	Suffolk Rd	0.51	8	500	4	24	6	0	Negligible	0	3.9	1	0.00	0	131	1	1	2	6	0	No	45	2	No	No	0	0
5990	QUEENS AVENUE	255 ST	QUEENS AVE & 248TH ST	0.72	8	312	2	24	4	0	Negligible	0	19.4	3	0.00	0	161	1	1	2	1	1	No	50	2	No	No	0	0
6030	105TH STREET	CO RD G13/100TH ST/105TH ST & CO RD T38/HWY T-38 S	DIAGONAL ST	1.81	8	330	3	24	3	0	Negligible	0	5.5	2	0.55	1	214	2	0	0	0	0	No	55	2	Yes	Yes	1	2
5985	OXFORD AVENUE	NEWPORT AVE & 220TH ST	Co Rd T65/OXFORD AVE	6.43	7	358	3	22	6	0	Negligible	0	4.0	1	0.31	1	54	0	4	2	7	4	Yes	55	2	Partial	Partial	2	5
5991	RUTLEDGE AVENUE	South County Line	IA 23/IOWA 23	3.62	7	456	3	24	4	0	Negligible	0	6.4	2	0.00	0	89	0	6	2	18	1	No	55	2	Yes	Yes	0	0
6014	248TH STREET	248TH ST	ROYAL LN	0.69	7	93	0	18	5	2	Negligible	0	17.3	3	0.00	0	337	2	0	0	1	0	No	55	2	No	No	0	0
6024	170TH STREET	Co Rd G29/170TH ST	Co Rd V23/ZEPHYR AVE	9.45	7	385	3	23	4	0	Negligible	0	2.3	0	0.11	1	97	1	9	2	15	2	No	55	2	Partial	Partial	1	1
5993	URBANA AVENUE	Co Rd V13/URBANA AVE	Co Rd V13/URBANA AVE & C AVE	12.71	6	328	2	24	4	0	Medium	1	3.6	0	0.00	0	133	1	3	2	14	0	No	55	2	No	No	0	4
5996	VENTURA AVENUE	Co Rd V13/VENTURA AVE/URBANA AVE	300 feet of MONROE ST	4.47	6	330	3	22	6	0	Negligible	0	1.8	0	0.22	1	82	0	2	2	6	0	No	55	2	No	No	1	4
6009	OLD HIGHWAY 92	230TH ST	OLD HWY 92	0.57	6	70	0	22	3	0	Negligible	0	5.2	2	0.00	0	282	2	1	2	1	0	No	55	2	No	No	0	0
6010	OLD HIGHWAY 92	OLD HWY 92	OLD HWY 92	2.85	6	43	0	18	9	2	Negligible	0	6.0	2	0.00	0	286	2	0	0	0	0	No	55	2	No	No	0	0
5972	GALESTON AVENUE	Co Rd T38/GALESTON AVE	Co Rd T38/SHORT ST	2.50	5	210	1	24	3	0	No Data	0	6.8	2	0.00	0	191	2	0	0	2	1	No	55	2	Yes	Yes	0	0
5994	URBANA AVENUE	Co Rd V13/URBANA AVE	Co Rd V13/VENTURA AVE/URBANA AVE	3.18	4	330	3	22	8	0	Negligible	0	1.3	0	0.00	0	150	1	0	0	3	0	No	55	2	No	No	0	3
6019	220TH STREET	600 feet of LINCOLN AVE	NEWPORT AVE & 220TH ST	1.87	4	517	4	24	7	0	Negligible	0	3.2	0	0.00	0	95	0	0	0	1	0	No	55	2	No	No	0	0
6020	220TH STREET	EATON AVE & PATCH ST	G39/220th St	2.92	3	269	1	24	5	0	Negligible	0	4.1	1	0.69	1	89	0	0	0	1	0	No	55	2	No	No	2	1
6021	175TH STREET	300 feet of HICKORY AVE	G29/175th St.	3.41	3	287	1	24	5	0	Negligible	0	3.5	0	0.00	0	215	2	0	0	3	0	No	55	2	No	No	0	2
5982	PALMER AVENUE	600 feet of 3RD ST	1000 feet of Kirby Ave	0.76	2	180	0	22	8	0	Negligible	0	0.0	0	0.00	0	214	2	0	0	0	0	No	55	2	No	No	0	0
6028	120TH STREET	Co Rd G17/120TH ST	Co Rd V13/URBANA AVE	5.11	2	190	1	22	5	0	Negligible	0	2.9	0	0.00	0	148	1	0	0	4	2	No	55	2	No	No	0	0

Disclaimer: Throughout the SAP 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 to the project sheets were made. As such the information in this table may vary from final information presented on the project sheets. Priority locations selected for project sheets were selected in coordination with the County and may not align with the highest scoring locations.

APPENDIX C1

INTERSECTION SAFETY COUNTERMEASURES

COUNTY PAVED ROADWAY INTERSECTION COUNTERMEASURES

This appendix summarizes the **intersection** safety countermeasures for consideration and provides detailed descriptions for each countermeasure from both the risk factor analysis as well as the additional potential improvements listed on the back side of the project sheets.

Systematic Countermeasures

The countermeasures in this section were included in the risk factor analysis and recommended on the intersection project sheets based on the criteria described in **Section 5.1.2.**

Coordinate with Local Jurisdiction on Signal Modifications

Although there are not many traffic signals along the county road system that are operated and maintained by the county, the recommendations from this Safety Action Plan (SAP) include a coordination item with the local jurisdiction at locations where signalized intersections scored high on the risk factor rankings. This coordination could include the installation of retroreflective backplates, installing larger signal heads, signal retiming, flashing yellow arrow implementation, and/or overhead signal installation.

Signal Warrant Analysis to Consider Removal of Signal

At locations where a signalized intersection may not be warranted, based on reported daily entering vehicles (DEVs), it is recommended that a signal warrant analysis, including the required traffic counts, be conducted to determine if the traffic signal is warranted. Removing an unwarranted traffic signal has a documented crash modification factor (CMF) as high as 0.76. The cost associated with this recommendation includes only the counts and analysis, not the physical removal of the traffic signal.

Intersection Control Evaluation (ICE)

Per the Minnesota Department of Transportation (MnDOT),

“ICE is a process that identifies the best intersection control through a comprehensive analysis and documentation of the technical (safety and operational), economic, and political issues of viable alternatives” (https://www.dot.state.mn.us/trafficeng/safety/ice/).

This evaluation broadens the framework for considering intersection control beyond the traditional traffic signal. Through this process, the optimal control is recommended based on an objective analysis. Possible outcomes of an ICE include stop signs, yield signs, channelized movements, access control, grade separation, roundabouts, or fully signalized intersections. MnDOT’s most recent guidance on ICE is available on their official ICE webpage (linked above), which outlines the current process and expectations for ICE studies.

Many states now require ICE to be completed prior to determining intersection control and configurations, including California, Indiana, Florida, Minnesota, Washington, and Wisconsin. Iowa is also in the process of finalizing its own ICE guidelines.

The recommended ICE process includes identifying intersections, collecting data, performing warrant analyses, analyzing alternatives, and selecting a preferred option. This is followed by conceptual design, right-of-way assessment, life-cycle cost estimation, political impact consideration, reevaluation of alternatives, and staff approval. The final step is compiling an ICE report that documents the entire process and its conclusions.

Additional guidance on ICE can be found in the FHWA ICE Primer, which provides a comprehensive overview of the Intersection Control Evaluation process, including its purpose, benefits, and implementation. (https://highways.fhwa.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa18076.pdf).

Implement Results of ICE

Along with the recommendation of the ICE, this recommendation includes implementing the selected intersection configuration. Since the evaluation is necessary to determine which configuration to implement, the cost associated with this recommendation is the estimated average of potential intersection configurations. Intersection configurations that could be considered include: roundabouts, multi-way stop control, traffic signals, restricting left-turn movements, median U-turn intersections, and grade separation.

All-Way Stop Warrant Analysis (Install)

This safety countermeasure includes conducting an all-way stop warrant analysis on an existing minor-leg stop-controlled intersection. The analysis should include a review of traffic volumes, crash history and sight distance as detailed in the Manual of Uniform Traffic Control Devices (MUTCD) for an intersection that is not currently controlled by stop signs for all approaches. This safety countermeasure was recommended based on the CMFs in the range of 0.39 for converting a two-way stop-controlled intersection to all-way stop control. An engineering study is required to warrant the installation of all-way stop control. Only the analysis was recommended in the risk factor analysis, based on traffic volumes that could potentially meet the minimum volume thresholds for an all-way stop to be warranted.

All-Way Stop Warrant Analysis (Remove)

This safety countermeasure includes conducting an all-way stop warrant analysis on an existing all-way stop-controlled intersection. The analysis should include a review of traffic volumes, crash history and sight distance as detailed in the MUTCD. An engineering study is required to warrant the removal of all-way stop control, converting to minor-leg stop-control. Only the analysis was recommended in the risk factor analysis, based on traffic volumes that would potentially not meet the minimum volume thresholds for an all-way stop to be warranted.

Destination Lighting

The Iowa DOT has a Destination Lighting Specifics and Best Practices (2018) document that should be consulted prior to installation of destination lighting. Various options are available including replacing existing High-Pressure Sodium (HPS) lights, new installations, and solar installations. The document provides detail on luminaire type, pole design, mounting height, pole placement, preferred luminaires, and sample specifications.

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. HPS lighting option has traditionally provided a better spreading of light to the approaching driver when the Light-Emitting Diode (LED) system does not have a drop lens. LED lighting options without a drop lens dissipate less light outward and typically focus light down, towards the roadway. For the purpose of destination lighting, HPS or LED with drop lenses are preferred due to their dispersion of light. 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 defined in the risk factor analysis are exceeded.

Larger/Retroreflective Stop Signs

This countermeasure includes the use of oversized Stop signs and Stop signs with enhanced retroreflective sheeting to improve visibility and driver compliance at stop-controlled intersections. According to the Federal Highway Administration (FHWA), intersections account for over 40 percent of all reported crashes, with a significant portion occurring due to drivers failing to recognize or respond to stop control. Larger Stop signs increase conspicuity, especially in rural or high-speed environments, while retroreflective materials enhance nighttime and low-visibility recognition by reflecting headlights directly back toward the driver's eyes. FHWA evaluations have shown that Stop signs with higher retro-reflectivity can significantly reduce crashes related to driver unawareness, particularly at unsignalized intersections.

Duplicate Signage

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 suggested where certain volume thresholds were met. Installing the second stop sign and stop ahead signs on the left side of the roadway provides for additional visibility and reinforces the stop-controlled condition ahead.

New Pavement Markings

This countermeasure includes the installation of groove-in retroreflective pavement markings and the use of wider, high-visibility markings at intersections to improve lane guidance and driver awareness, particularly in low-light and wet conditions. Retroreflective pavement markings significantly enhance nighttime visibility by reflecting headlights back toward the driver, improving lane discipline and reducing lane departure crashes. Grooving the markings into the pavement protects them from snowplow damage and wear, extending their service life and maintaining visibility in adverse weather. Additionally, wider markings—typically 6 inches or more—at intersections and stop bars increase conspicuity and help drivers better identify lane boundaries and stopping points.

Flashing Beacons/LED Lights on 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 and reduce the monthly cost associated with power for the lights. This countermeasure provides enhanced visibility and reinforcement of the stop/yield-controlled condition.

Transverse Rumble Strips

Installing transverse rumble strips can alert drivers of an upcoming stop sign. 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 has a CMF of 0.79 to 0.87.

Advanced Intersection Warning Signs

This safety countermeasure includes the installation of cross street name signs with the intersection warning signs in advance of an intersection on the major approaches to provide additional information to drivers, increasing their decision time and distance. This improvement also provides additional emphasis of an upcoming intersection.

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.

Location Specific Countermeasures

Safety improvements not included on the first page of the roadway intersection project sheet may still merit consideration at a specific location. There are a variety of other safety improvements that could be considered that were not included in the risk factor analysis due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at intersections throughout the county. The following sections describe several other roadway intersection safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets.

Construction of Turn Lanes

Providing right- and left-turn lanes to remove slowing or turning vehicles from the through lanes has CMFs ranging from 0.52 to 0.74. 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.

Realignment of Intersection to Reduce or Eliminate Skew

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 geometrics that could not be determined from a systemic approach. Depending on existing site conditions, this countermeasure could be particularly beneficial and should be considered where feasible. The CMF for intersection geometry reconfiguration is included in the Highway Safety Manual (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.

Provide Bypass Lane on Shoulder at T-Intersection

A bypass lane at a T-intersection allows through traffic a separate lane of travel from those vehicles intending to turn left at the intersection. This improvement removes some conflict points and has the potential to reduce the frequency of rear-end crashes.

Convert Offset T-Intersection to Four-Legged Intersection

Where two offset T-intersections are within close proximity, this countermeasure suggests combining the two intersections into a single four-legged intersection. The consolidation of the two intersections into one reduces conflict points and aligns better with driver expectations.

Use Indirect Left-Turn Treatments

Restricting or eliminating turning maneuvers by providing channelization or closing median openings can have significant safety benefits. This safety countermeasure could be

implemented as part of an access management policy, referenced below. A CMF of 0.8 has been determined for providing indirect left-turn treatments.

Convert Four-Legged Intersections to T-Intersections

Where a four-legged intersection has high opposing turning movements, two offset T-intersections may provide the needed traffic flow while reducing conflicts.

Install LED Flashing Beacons on Intersection Warning Signs

Flashing beacons draw the attention of drivers to the associated signage. This improvement enhances the conspicuity of intersection warning signs for drivers approaching the intersection. This sign/beacon combination can help increase awareness of drivers to potential upcoming vehicle conflicts. Flashing beacons on stop signs and curve chevron signs have measured safety benefits and are expected to provide safety benefits when applied to intersection warning signs as well.

Low-Cost Intersection Conflict Warning System (ICWS)

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."

Install a Roundabout

Roundabouts are a Federal Highway Administration (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 in crashes as high as 82%. In addition to providing significant safety benefits, roundabouts are also able to 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 as compared to a four-legged intersection. 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 result in right-angle or head-on collisions which tend to be more severe crash types. Instead, the majority of crashes are 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.

Increase Shoulder Width/Safety Edge

Constructing or increasing the width of an existing paved 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 suggested 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 dropoff, the Safety Edge shapes the edge of pavement to 30 degrees." The installation of a Safety Edge has CMFs of 0.77 - 0.96 and is an FHWA Proven Safety Countermeasure.

Guardrails

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 to 0.56 have been recorded for installing new guardrail along an embankment.

Retroreflective Strips on Stop Signposts

This countermeasure includes the installation of retroreflective strips on the posts of stop signs. The strips can increase the visibility of the stop signs and increase driver awareness of a stop-controlled intersection.

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.

The functional area of an intersection includes regions where vehicle speeds vary in order to change lanes and complete turns. Queues may also develop on the approach legs of the intersection. Driveways should be located outside of the functional area of the intersection so as not to negatively impact the operations of the intersection.

In rural scenarios, access management is best applied by limiting left-turn movements onto highspeed 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.

APPENDIX C2
INTERSECTION PROJECT SHEETS

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: KILBOURN ST & SHERIDAN ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **KILBOURN ST**
Road: **SHERIDAN ST**
Closest City: **Beacon**

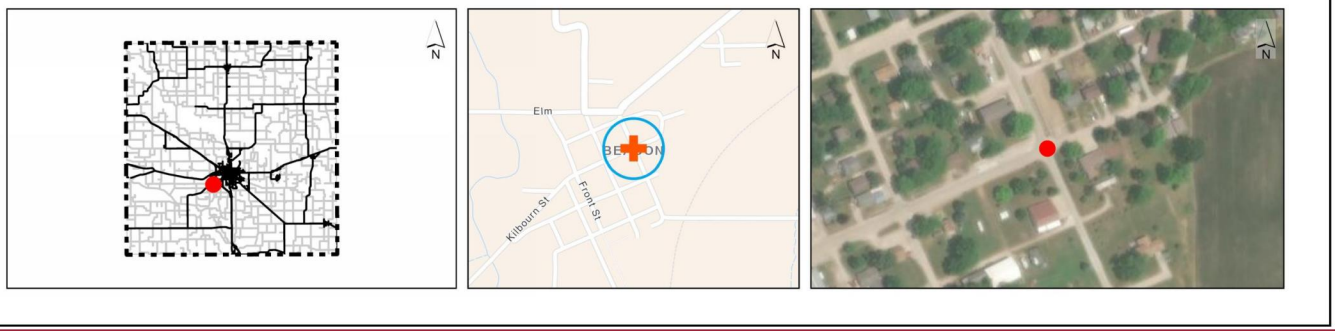
Project is within an Underserved Community?† No

GPS ID: 53517

This intersection does not contain high scoring segments.

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	7 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	No	0
Daily Entering Vehicles	1,605	3
Minor Street Volume	85	2
Roads/Driveways within 250 Feet	10	2
K or A Crashes	0	0
Number of Approaches	4	1
Potential Crash Reduction (PCR)	Negligible	0
Total Risk Factor Points (24 max)		**12**

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	1,570
Minor ADT	85
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	0
Control Type	All-way stop

Crash Data, 2014-2023	
Total Crashes	1
K and A Crashes	0
Right Angle,Rear-end,or Turning Crashes	1
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	**1**	**EA**	**$ 5,000**	**$ 5,000**
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	**4**	**LEG**	**$ 2,200**	**$ 8,800**
Upgrade Signs (Unpaved Approaches)	0	LEG	$ 1,100	$ -
Install Second Stop Sign and Stop Ahead Sign	**4**	**LEG**	**$ 1,500**	**$ 6,000**
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	0	LEG	$ 2,500	$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	0	LEG	$ 1,200	$ -
Clear and Grub within Sight Triangle	**4**	**LEG**	**$ 5,000**	**$ 20,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 39,800

Continued on back of this page.

*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: KILBOURN ST & SHERIDAN ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53517

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection						LEG	$ 150,000	$ -
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)						LEG	$ 300,000	$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign						SIGN	$ 2,500	$ -
Other:								
Other:								
							Additional Potential Improvements Subtotal:	$ -
							Project Selection Decision Tree Systemic Improvements Subtotal:	**$ 39,800**
							Subtotal:	**$ 39,800**
							Mobilization: (% +/-)* 10%	**$ 3,980**
							Traffic Control: (% +/-) 5%	**$ 2,044**
							Contingency: (% +/-) 20%	**$ 8,176**
							Estimated Project Cost	**$ 54,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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 Kimley-Horn's judgment as a design professional familiar with the construction industry. 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. Kimley-Horn endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. The 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. No formal assessment was made for the improvement recommendations contained on this page. If in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of July 2024.

End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: HWY 102 & IRVINE AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **HWY 102**
Road: **IRVINE AVE**
Closest City: **New Sharon**

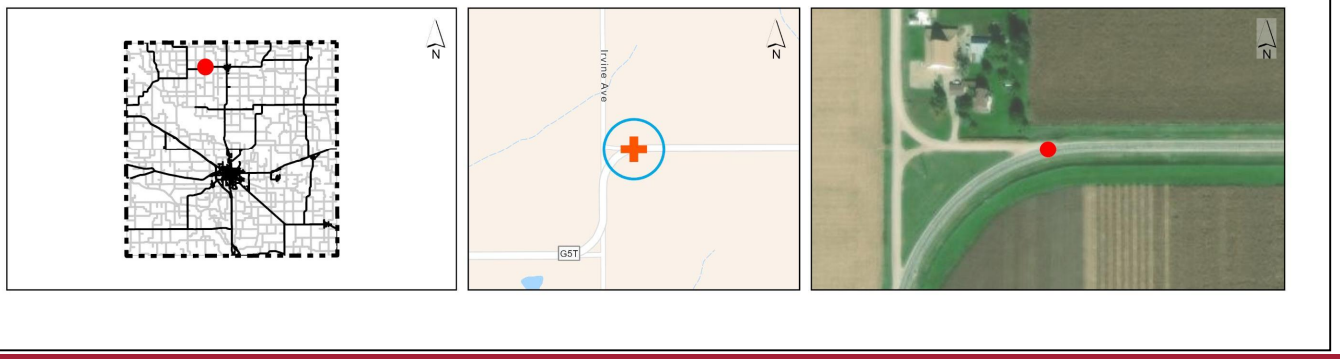
Project is within an Underserved Community?† No

GPS ID: 53101

This intersection is located on the following high scoring segment: GPS ID 6023

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	< 1.5 mi	0
Approach Angle (Degrees)	25	4
Intersection within Curve	Yes	4
Daily Entering Vehicles	1,565	3
Minor Street Volume	15	0
Roads/Driveways within 250 Feet	1	1
K or A Crashes	0	0
Number of Approaches	3	0
Potential Crash Reduction (PCR)	Negligible	0
Total Risk Factor Points (24 max)		**12**

Other Information	
Number of Approaches	3
Number of Paved Approaches	2
Major ADT	1,550
Minor ADT	15
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	0
Control Type	One-way stop

Crash Data, 2014-2023	
Total Crashes	1
K and A Crashes	0
Right Angle,Rear-end,or Turning Crashes	0
Total Nighttime Crashes	1
Nighttime/Daytime Crash Ratio*	3.0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	0	LEG	$ 2,200	$ -
Upgrade Signs (Unpaved Approaches)	**1**	**LEG**	**$ 1,100**	**$ 1,100**
Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,500	$ -
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	0	LEG	$ 2,500	$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	0	LEG	$ 1,200	$ -
Clear and Grub within Sight Triangle	**2**	**LEG**	**$ 5,000**	**$ 10,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 11,100

Continued on back of this page.

*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: HWY 102 & IRVINE AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53101

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection						LEG	$ 150,000	$ -
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)			x		1	**LEG**	**$ 300,000**	**$ 300,000**
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign						SIGN	$ 2,500	$ -
Other: Realign Curve	x				1	**EA**	**$ 300,000**	**$ 300,000**
Other:								

Additional Potential Improvements Subtotal:		**$ 600,000**
Project Selection Decision Tree Systemic Improvements Subtotal:		**$ 11,100**
Subtotal:		**$ 611,100**
Mobilization: (% +/-)*	10%	**$ 61,110**
Traffic Control: (% +/-)	5%	**$ 30,558**
Contingency: (% +/-)	20%	**$ 122,232**
Estimated Project Cost		**$ 825,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

Opinion of Probable Construction Cost Disclaimer:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 11

Project Name: Co Rd T33/OLD HWY 102 & CORDOVA AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **Co Rd T33/OLD HWY 102**
Road: **CORDOVA AVE**
Closest City: **Pella**

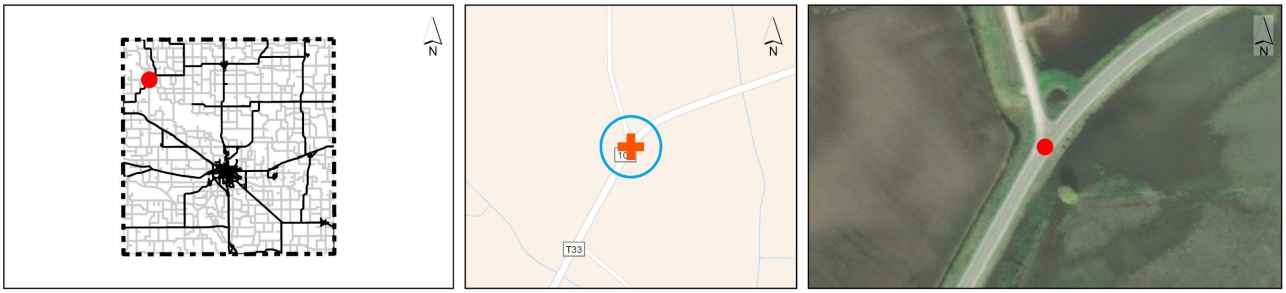
Project is within an Underserved Community?† No

GPS ID: 53088

This intersection is located on the following high scoring segment: GPS ID 6023

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	< 1.5 mi	0
Approach Angle (Degrees)	55	4
Intersection within Curve	Yes	4
Daily Entering Vehicles	2,360	3
Minor Street Volume	15	0
Roads/Driveways within 250 Feet	0	0
K or A Crashes	0	0
Number of Approaches	3	0
Potential Crash Reduction (PCR)	Negligible	0
Total Risk Factor Points (24 max)		**11**

Other Information	
Number of Approaches	3
Number of Paved Approaches	2
Major ADT	2,340
Minor ADT	15
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	0
Control Type	One-way stop

Crash Data, 2014-2023	
Total Crashes	1
K and A Crashes	0
Right Angle,Rear-end,or Turning Crashes	0
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	0	LEG	$ 2,200	$ -
Upgrade Signs (Unpaved Approaches)	**1**	**LEG**	**$ 1,100**	**$ 1,100**
Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,500	$ -
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	0	LEG	$ 2,500	$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	0	LEG	$ 1,200	$ -
Clear and Grub within Sight Triangle	**2**	**LEG**	**$ 5,000**	**$ 10,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 11,100

Continued on back of this page.

*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 11

Project Name: Co Rd T33/OLD HWY 102 & CORDOVA AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53088

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection						LEG	$ 150,000	$ -
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)		x			1	LEG	$ 300,000	$ 300,000
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign						SIGN	$ 2,500	$ -
Other:								
Other:								
							Additional Potential Improvements Subtotal:	**$ 300,000**
							Project Selection Decision Tree Systemic Improvements Subtotal:	**$ 11,100**
							Subtotal:	**$ 311,100**
							Mobilization: (% +/-)* 10%	**$ 31,110**
							Traffic Control: (% +/-) 5%	**$ 15,558**
							Contingency: (% +/-) 20%	**$ 62,232**
							Estimated Project Cost	**$ 420,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 11

Project Name: HWY 102 & IRVINE AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **HWY 102**
Road: **IRVINE AVE**
Closest City: **New Sharon**

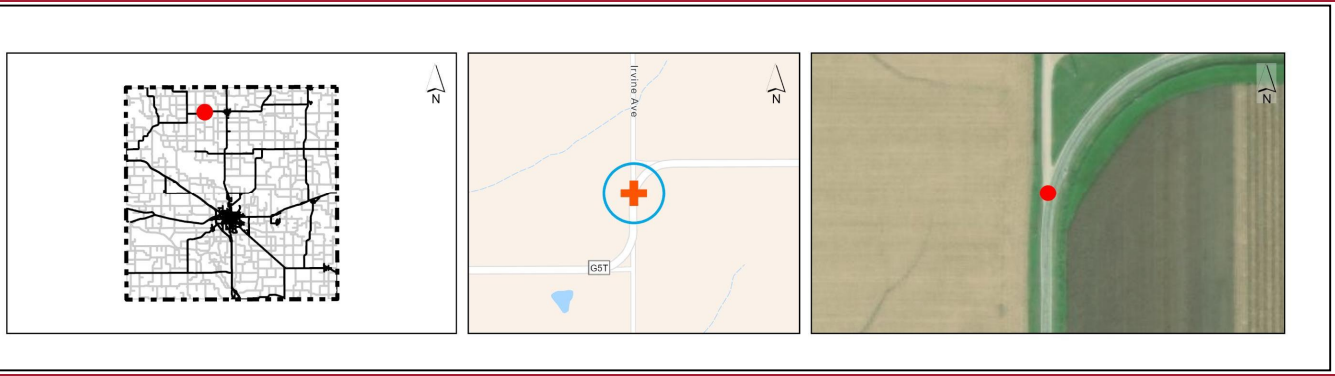
Project is within an Underserved Community?† No

GPS ID: 53100

This intersection is located on the following high scoring segment: GPS ID 6023

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	**< 1.5 mi**	**0**
Approach Angle (Degrees)	**25**	**4**
Intersection within Curve	**Yes**	**4**
Daily Entering Vehicles	**1,565**	**3**
Minor Street Volume	**15**	**0**
Roads/Driveways within 250 Feet	**0**	**0**
K or A Crashes	**0**	**0**
Number of Approaches	**3**	**0**
Potential Crash Reduction (PCR)	**Negligible**	**0**
Total Risk Factor Points (24 max)		**11**

Other Information	
Number of Approaches	**3**
Number of Paved Approaches	**2**
Major ADT	**1,550**
Minor ADT	**15**
Destination Lighting	**No**
Transverse Rumble Strips (Number of Approaches)	**0**
Control Type	**One-way stop**

Crash Data, 2014-2023	
Total Crashes	**3**
K and A Crashes	**0**
Right Angle,Rear-end,or Turning Crashes	**0**
Total Nighttime Crashes	**1**
Nighttime/Daytime Crash Ratio*	**1.5**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	0	LEG	$ 2,200	$ -
Upgrade Signs (Unpaved Approaches)	**1**	**LEG**	**$ 1,100**	**$ 1,100**
Install Second Stop Sign and Stop Ahead Sign	0	LEG	$ 1,500	$ -
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	0	LEG	$ 2,500	$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	0	LEG	$ 1,200	$ -
Clear and Grub within Sight Triangle	**2**	**LEG**	**$ 5,000**	**$ 10,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 11,100

Continued on back of this page.

*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 11

Project Name: HWY 102 & IRVINE AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53100

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection						LEG	$ 150,000	$ -
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)						LEG	$ 300,000	$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign						SIGN	$ 2,500	$ -
Other:								
Other:								
							Additional Potential Improvements Subtotal:	$ -
							Project Selection Decision Tree Systemic Improvements Subtotal:	**$ 11,100**
							Subtotal:	**$ 11,100**
							Mobilization: (% +/-)* 10%	**$ 2,500**
							Traffic Control: (% +/-) 5%	**$ 680**
							Contingency: (% +/-) 20%	**$ 2,720**
							Estimated Project Cost	**$ 17,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 18

Project Name: IA 23/IOWA 23 & Co Rd T63/OSBURN AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **IA 23/IOWA 23**
Road: **Co Rd T63/OSBURN AVE**
Closest City: **Oskaloosa**

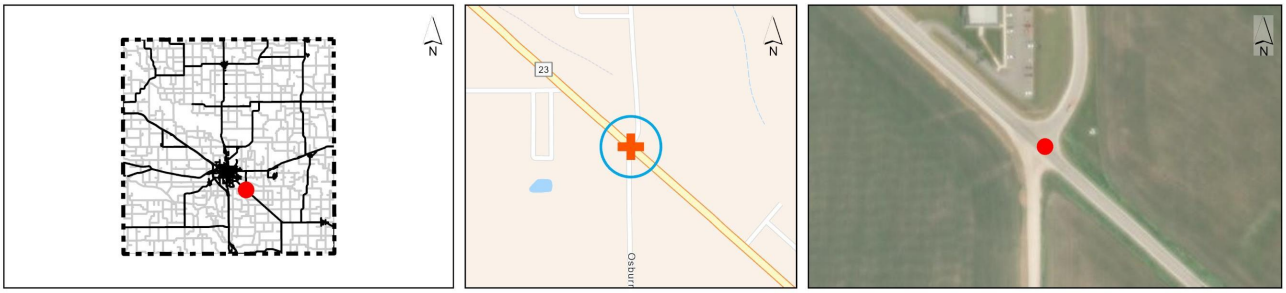
Project is within an Underserved Community?† No

GPS ID: 53047

This intersection does not contain high scoring segments.

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	**2.1 mi**	**4**
Approach Angle (Degrees)	**52**	**4**
Intersection within Curve	**Yes**	**4**
Daily Entering Vehicles	**3,185**	**3**
Minor Street Volume	**860**	**2**
Roads/Driveways within 250 Feet	**0**	**0**
K or A Crashes	**0**	**0**
Number of Approaches	**4**	**1**
Potential Crash Reduction (PCR)	**Negligible**	**0**
Total Risk Factor Points (24 max)		**18**

Other Information	
Number of Approaches	**4**
Number of Paved Approaches	**3**
Major ADT	**3,000**
Minor ADT	**860**
Destination Lighting	**Yes**
Transverse Rumble Strips (Number of Approaches)	**1**
Control Type	**Two-way stop**

Crash Data, 2014-2023	
Total Crashes	**5**
K and A Crashes	**0**
Right Angle,Rear-end,or Turning Crashes	**1**
Total Nighttime Crashes	**3**
Nighttime/Daytime Crash Ratio*	**4.5**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	**1**	**LEG**	**$ 2,200**	**$ 2,200**
Upgrade Signs (Unpaved Approaches)	**1**	**LEG**	**$ 1,100**	**$ 1,100**
Install Second Stop Sign and Stop Ahead Sign	**1**	**LEG**	**$ 1,500**	**$ 1,500**
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	**2**	**EA**	**$ 2,500**	**$ 5,000**
Install Transverse Rumble Strips	0	LEG	$ 2,500	$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	**2**	**LEG**	**$ 1,200**	**$ 2,400**
Clear and Grub within Sight Triangle	**4**	**LEG**	**$ 5,000**	**$ 20,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 32,200

Continued on back of this page.

*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 18

Project Name: IA 23/IOWA 23 & Co Rd T63/OSBURN AVE
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53047

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection						LEG	$ 150,000	$ -
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)	x				1	LEG	$ 300,000	$ 300,000
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign						SIGN	$ 2,500	$ -
Other:								
Other:								
							Additional Potential Improvements Subtotal:	**$ 300,000**
							Project Selection Decision Tree Systemic Improvements Subtotal:	**$ 32,200**
							Subtotal:	**$ 332,200**
							Mobilization: (% +/-)* 10%	**$ 33,220**
							Traffic Control: (% +/-) 5%	**$ 16,716**
							Contingency: (% +/-) 20%	**$ 66,864**
							Estimated Project Cost	**$ 449,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 16

Project Name: IA 23/IOWA 23 & Co Rd T67/RUTLEDGE AVE & 304TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

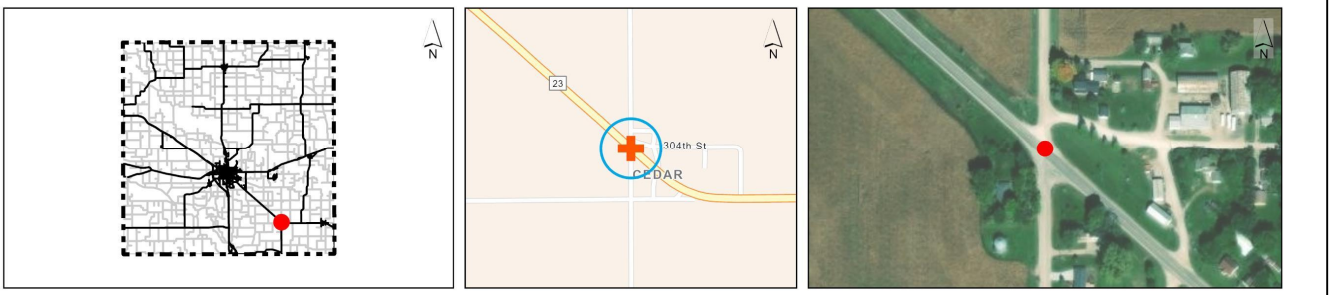
INTERSECTION

Location Description

Road: **IA 23/IOWA 23** Project is within an Underserved Community?† No **GPS ID: 53043**
Road: **Co Rd T67/RUTLEDGE AVE & 304TH ST**
Closest City: **Fremont**

This intersection does not contain high scoring segments.
County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	5.2 mi	4
Approach Angle (Degrees)	63	4
Intersection within Curve	No	0
Daily Entering Vehicles	3,595	3
Minor Street Volume	360	2
Roads/Driveways within 250 Feet	5	2
K or A Crashes	0	0
Number of Approaches	4	1
Potential Crash Reduction (PCR)	Negligible	0
Total Risk Factor Points (24 max)		**16**

Other Information	
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	2,350
Minor ADT	360
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	0
Control Type	Two-way stop

Crash Data, 2014-2023	
Total Crashes	7
K and A Crashes	0
Right Angle,Rear-end,or Turning Crashes	3
Total Nighttime Crashes	1
Nighttime/Daytime Crash Ratio*	0.5

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	**1**	**LEG**	**$ 2,200**	**$ 2,200**
Upgrade Signs (Unpaved Approaches)	**1**	**LEG**	**$ 1,100**	**$ 1,100**
Install Second Stop Sign and Stop Ahead Sign	**1**	**LEG**	**$ 1,500**	**$ 1,500**
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	**1**	**LEG**	**$ 2,500**	**$ 2,500**
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	**2**	**LEG**	**$ 1,200**	**$ 2,400**
Clear and Grub within Sight Triangle	**4**	**LEG**	**$ 5,000**	**$ 20,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 29,700

Continued on back of this page.

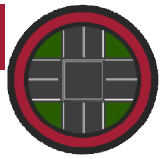
*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 16



Project Name: IA 23/IOWA 23 & Co Rd T67/RUTLEDGE AVE & 304TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53043

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection				x	1	LEG	$ 150,000	$ 150,000
Provide Right-Turn Lane at Intersection			x		1	LEG	$ 150,000	$ 150,000
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)						LEG	$ 300,000	$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post	x				1	INT	$ 500	$ 500
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign	x				1	SIGN	$ 2,500	$ 2,500
Other:								
Other:								

Additional Potential Improvements Subtotal:		$ 303,000
Project Selection Decision Tree Systemic Improvements Subtotal:		$ 29,700
Subtotal:		$ 332,700
Mobilization: (% +/-)*	10%	$ 33,270
Traffic Control: (% +/-)	5%	$ 16,806
Contingency: (% +/-)	20%	$ 67,224
Estimated Project Cost		$ 450,000

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

Opinion of Probable Construction Cost Disclaimer:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 15

Project Name: US 63 & Co Rd G17/120TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **US 63**
Road: **Co Rd G17/120TH ST**
Closest City: **New Sharon**

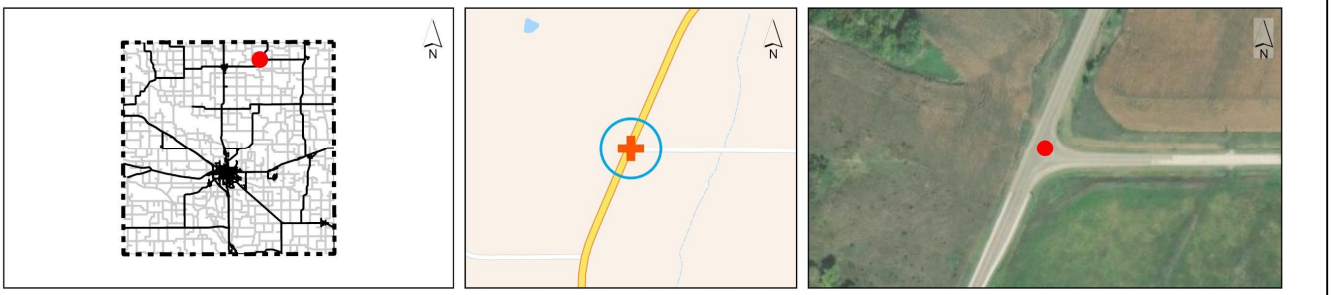
Project is within an Underserved Community?† No

GPS ID: 53030

This intersection does not contain high scoring segments.

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	5.1 mi	4
Approach Angle (Degrees)	66	4
Intersection within Curve	No	0
Daily Entering Vehicles	2,235	3
Minor Street Volume	190	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	1	2
Number of Approaches	3	0
Potential Crash Reduction (PCR)	Negligible	0
Total Risk Factor Points (24 max)		**15**

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	1,500
Minor ADT	190
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	1
Control Type	One-way stop

Crash Data, 2014-2023	
Total Crashes	1
K and A Crashes	1
Right Angle,Rear-end,or Turning Crashes	1
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	**1**	**LEG**	**$ 2,200**	**$ 2,200**
Upgrade Signs (Unpaved Approaches)	0	LEG	$ 1,100	$ -
Install Second Stop Sign and Stop Ahead Sign	**1**	**LEG**	**$ 1,500**	**$ 1,500**
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	0	LEG	$ 2,500	$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	0	LEG	$ 1,200	$ -
Clear and Grub within Sight Triangle	**2**	**LEG**	**$ 5,000**	**$ 10,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 13,700

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*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 15

Project Name: US 63 & Co Rd G17/120TH ST
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53030

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection						LEG	$ 150,000	$ -
Realign Intersection Approach to Reduce or Eliminate Intersection Skew				x	1	**LEG**	**$ 300,000**	**$ 300,000**
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)				x	1	**EA**	**$ 100,000**	**$ 100,000**
Flashing Beacon on Intersection Warning Sign	x	x		x	3	**SIGN**	**$ 2,500**	**$ 7,500**
Other:								
Other:								

Additional Potential Improvements Subtotal:		**$ 407,500**
Project Selection Decision Tree Systemic Improvements Subtotal:		**$ 13,700**
Subtotal:		**$ 421,200**
Mobilization: (% +/-)*	10%	**$ 42,120**
Traffic Control: (% +/-)	5%	**$ 21,136**
Contingency: (% +/-)	20%	**$ 84,544**
Estimated Project Cost		**$ 569,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 14

Project Name: IA 163 & Eaton Ave
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **IA 163**
Road: **Eaton Ave**
Closest City: **Leighton**

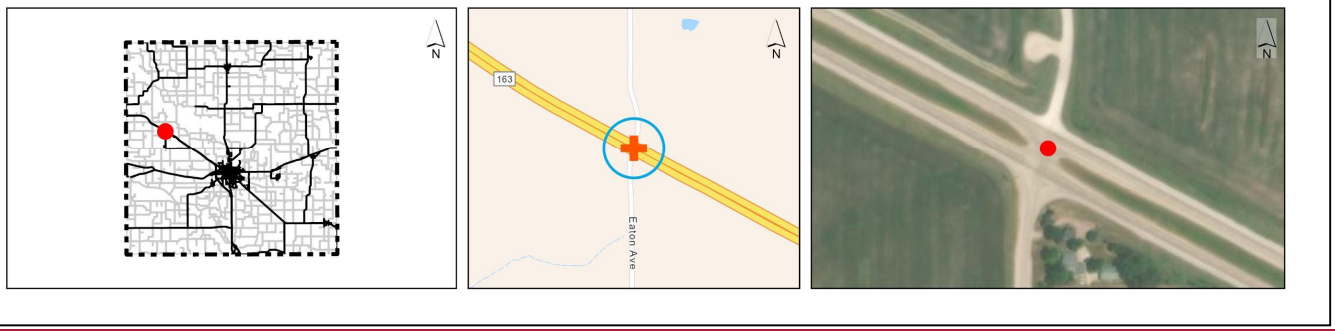
Project is within an Underserved Community?† No

GPS ID: 53115

This intersection does not contain high scoring segments.

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	1.6 mi	4
Approach Angle (Degrees)	74	2
Intersection within Curve	No	0
Daily Entering Vehicles	24,200	3
Minor Street Volume	460	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	1	2
Number of Approaches	4	1
Potential Crash Reduction (PCR)	Negligible	0
Total Risk Factor Points (24 max)		**14**

Other Information	
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	12,200
Minor ADT	460
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	1
Control Type	Two-way stop

Crash Data, 2014-2023	
Total Crashes	10
K and A Crashes	1
Right Angle,Rear-end,or Turning Crashes	4
Total Nighttime Crashes	2
Nighttime/Daytime Crash Ratio*	0.8

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	**1**	**LEG**	**$ 2,200**	**$ 2,200**
Upgrade Signs (Unpaved Approaches)	**1**	**LEG**	**$ 1,100**	**$ 1,100**
Install Second Stop Sign and Stop Ahead Sign	**1**	**LEG**	**$ 1,500**	**$ 1,500**
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	0	LEG	$ 2,500	$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	**2**	**LEG**	**$ 1,200**	**$ 2,400**
Clear and Grub within Sight Triangle	**4**	**LEG**	**$ 5,000**	**$ 20,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 27,200

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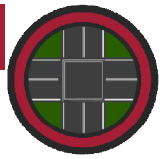
*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 14



Project Name: IA 163 & Eaton Ave
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53115

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection			x		1	LEG	$ 150,000	$ 150,000
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)						LEG	$ 300,000	$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign			x	x	2	SIGN	$ 2,500	$ 5,000
Other:								
Other:								
							Additional Potential Improvements Subtotal:	$ 155,000
							Project Selection Decision Tree Systemic Improvements Subtotal:	$ 27,200
							Subtotal:	$ 182,200
							Mobilization: (% +/-)* 10%	$ 18,220
							Traffic Control: (% +/-) 5%	$ 9,116
							Contingency: (% +/-) 20%	$ 36,464
							Estimated Project Cost	$ 246,000

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 14

Project Name: IA 92/IOWA 92 & OLD HWY 92
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Location Description

Road: **IA 92/IOWA 92**
Road: **OLD HWY 92**
Closest City: **Leighton**

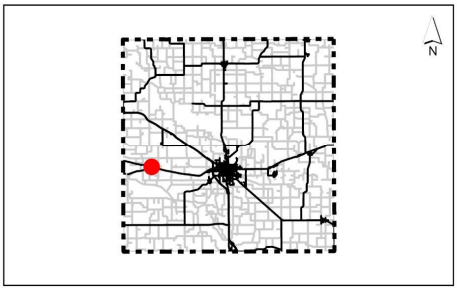
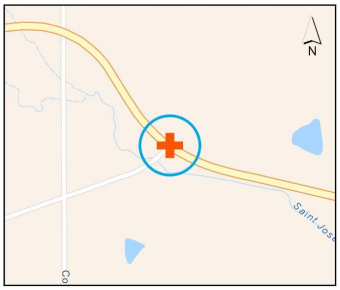
Project is within an Underserved Community?† No

GPS ID: 53053

This intersection does not contain high scoring segments.

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps


Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	**2.8 mi**	**4**
Approach Angle (Degrees)	**82**	**2**
Intersection within Curve	**Yes**	**4**
Daily Entering Vehicles	**3,075**	**3**
Minor Street Volume	**35**	**1**
Roads/Driveways within 250 Feet	**0**	**0**
K or A Crashes	**0**	**0**
Number of Approaches	**3**	**0**
Potential Crash Reduction (PCR)	**Negligible**	**0**
Total Risk Factor Points (24 max)		**14**

Other Information	
Number of Approaches	**3**
Number of Paved Approaches	**3**
Major ADT	**3,240**
Minor ADT	**35**
Destination Lighting	**No**
Transverse Rumble Strips (Number of Approaches)	**0**
Control Type	**One-way stop**

Crash Data, 2014-2023	
Total Crashes	**0**
K and A Crashes	**0**
Right Angle,Rear-end,or Turning Crashes	**0**
Total Nighttime Crashes	**0**
Nighttime/Daytime Crash Ratio*	**0**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	$ 2,500	$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	$ 5,000	$ -
Intersection Configuration Evaluation (ICE)	0	EA	$ 25,000	$ -
Implement Results of ICE	0	EA	$ 750,000	$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	$ 5,000	$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	$ 5,000	$ -
Install Destination Lighting	0	EA	$ 5,500	$ -
Upgrade Signs and Pavement Markings	**1**	**LEG**	**$ 2,200**	**$ 2,200**
Upgrade Signs (Unpaved Approaches)	0	LEG	$ 1,100	$ -
Install Second Stop Sign and Stop Ahead Sign	**1**	**LEG**	**$ 1,500**	**$ 1,500**
Install Solar-Powered Flashing Beacon or LED Flashing Lights on Stop Sign	0	EA	$ 2,500	$ -
Install Transverse Rumble Strips	**1**	**LEG**	**$ 2,500**	**$ 2,500**
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	0	LEG	$ 1,200	$ -
Clear and Grub within Sight Triangle	**2**	**LEG**	**$ 5,000**	**$ 10,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 16,200

Continued on back of this page.

*** Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Intersection Improvements

Risk Factor Points: 14

Project Name: IA 92/IOWA 92 & OLD HWY 92
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 5/22/25
Prepared By: AKT
Checked By: DJG

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 53053

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lane at Intersection						LEG	$ 150,000	$ -
Provide Right-Turn Lane at Intersection						LEG	$ 150,000	$ -
Realign Intersection Approach to Reduce or Eliminate Intersection Skew (Paved)						LEG	$ 300,000	$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	$ 50,000	$ -
Convert Offset T-Intersection to Four-Legged Intersection (Paved)						EA	$ 300,000	$ -
Use Indirect Left-Turn Treatment to Minimize Conflicts at Divided Highway Intersection						LEG	$ 75,000	$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	$ 300,000	$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	$ 2,500	$ -
Install Retroreflective Strip on Stop Sign Post						INT	$ 500	$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	$ 100,000	$ -
Flashing Beacon on Intersection Warning Sign						SIGN	$ 2,500	$ -
Other:								
Other:								
							Additional Potential Improvements Subtotal:	$ -
							Project Selection Decision Tree Systemic Improvements Subtotal:	**$ 16,200**
							Subtotal:	**$ 16,200**
							Mobilization: (% +/-)* 10%	**$ 2,500**
							Traffic Control: (% +/-) 5%	**$ 860**
							Contingency: (% +/-) 20%	**$ 3,440**
							Estimated Project Cost	**$ 23,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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 Kimley-Horn's judgment as a design professional familiar with the construction industry. 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. Kimley-Horn endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. The 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. No formal assessment was made for the improvement recommendations contained on this page. If in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of July 2024.

End of Project Description

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APPENDIX C3

INTERSECTION RISK FACTOR RANKING RESULTS

Mahaska County
Safety Action Plan
Intersection Risk Factor Points

GPS ID	Road Name	Intersecting Road	Total Risk Factor Points	Distance from Previous Stop (miles) (Value)	Distance from Previous Stop (miles) (Points)	Intersection Skew (degrees) (Value)	Intersection Skew (degrees) (Points)	Intersection Within Curve (Value)	Intersection Within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Access Management (250 ft) (Value)	Access Management (250 ft) (Points)	K and A Crashes (Value)	K and A Crashes (Points)	Number of Approaches (Value)	Number of Approaches (Points)	KABCO PCR Level (Value)	KABCO PCR Level (Points)	Total Crashes	Right Angle, Rear-end, or Turning Crashes	Number of Paved Approaches	Major Street ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type
2017053047	IA 23/IOWA 23	Co Rd T63/OSBURN AVE	18	2.1	4	52	4	Yes	4	3,185	3	860	2	0	0	0	0	4	1	Negligible	0	5	1	3	3,000	Yes	1	Two-way stop
2017053043	IA 23/IOWA 23	Co Rd T67/RUTLEDGE AVE & 304TH ST	16	5.2	4	63	4	No	0	3,595	3	360	2	5	2	0	0	4	1	Negligible	0	7	3	2	2,350	Yes	0	Two-way stop
2017053030	US 63	Co Rd G17/120TH ST	15	5.1	4	66	4	No	0	2,235	3	190	2	0	0	1	2	3	0	Negligible	0	1	1	3	1,500	No	1	One-way stop
2017053053	IA 92/IOWA 92	OLD HWY 92	14	2.8	4	82	2	Yes	4	3,075	3	35	1	0	0	0	0	3	0	Negligible	0	0	0	3	3,240	No	0	One-way stop
2017053115	IA 163	Eaton Ave	14	1.6	4	74	2	No	0	24,200	3	460	2	0	0	1	2	4	1	Negligible	0	10	4	2	12,200	Yes	1	Two-way stop
2017053041	IA 23/IOWA 23	Co Rd G63/305TH ST	13	< 1.5	0	71	2	Yes	4	2,330	3	200	2	4	2	0	0	3	0	Negligible	0	0	0	3	2,130	Yes	0	One-way stop
2017053063	IA 92/IOWA 92	OSBURN AVE	13	2.1	4	90	0	No	0	6,605	3	220	2	2	1	1	2	4	1	Negligible	0	9	6	3	4,630	Yes	1	Two-way stop
2017053298	Co Rd T39/INDIAN WAY	KAREN LN	13	< 1.5	0	55	4	Yes	4	1,800	3	40	1	2	1	0	0	3	0	Negligible	0	0	0	2	1,760	No	0	One-way stop
2017052988	US 63	G63/310th St	12	13.0	4	90	0	No	0	25,000	3	580	2	0	0	2	2	4	1	Negligible	0	10	9	3	12,500	No	1	Two-way stop
2017053096	Co Rd T38/HWY 102/GALESTON AVE	Co Rd T38/GALESTON AVE	12	1.9	4	90	0	No	0	1,395	3	105	2	2	1	1	2	3	0	Negligible	0	2	1	3	1,550	Yes	0	Two-way stop
2017053101	HWY 102	IRVINE AVE	12	< 1.5	0	25	4	Yes	4	1,565	3	15	0	1	1	0	0	3	0	Negligible	0	1	0	2	1,550	No	0	One-way stop
2017053302	Co Rd T39/INDIAN WAY	270TH ST	12	< 1.5	0	40	4	Yes	4	655	2	35	1	1	1	0	0	3	0	Negligible	0	2	0	2	620	No	0	One-way stop
2017053303	Co Rd T39/GALESTON AVE/INDIAN WAY	GAMBELL AVE	12	< 1.5	0	55	4	Yes	4	645	2	25	1	1	1	0	0	3	0	Negligible	0	0	0	2	620	No	0	One-way stop
2017053517	KILBOURN ST	SHERIDAN ST	12	7.0	4	90	0	No	0	1,605	3	85	2	10	2	0	0	4	1	Negligible	0	1	1	4	1,570	Yes	0	All-way stop
2017053077	IA 92/IOWA 92	Co Rd V13/URBANA AVE	11	4.4	4	71	2	No	0	2,960	3	160	2	0	0	0	0	3	0	Negligible	0	3	3	3	2,850	Yes	0	One-way stop
2017053083	OLD HWY 102	170TH ST	11	< 1.5	0	80	2	Yes	4	2,420	3	80	2	0	0	0	0	3	0	Negligible	0	1	1	2	2,340	No	0	One-way stop
2017053086	Co Rd T33/OLD HWY 102/CORDOVA AVE	145TH ST	11	< 1.5	0	55	4	No	0	2,455	3	70	2	1	1	0	0	4	1	Negligible	0	1	0	2	2,340	No	0	Two-way stop
2017053088	Co Rd T33/OLD HWY 102	CORDOVA AVE	11	< 1.5	0	55	4	Yes	4	2,360	3	15	0	0	0	0	0	3	0	Negligible	0	1	0	2	2,340	No	0	One-way stop
2017053098	HWY 102	IRVINE AVE	11	< 1.5	0	30	4	Yes	4	1,555	3	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	1,550	No	0	One-way stop
2017053099	HWY 102	IRVINE AVE	11	< 1.5	0	25	4	Yes	4	1,560	3	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	1,550	No	0	One-way stop
2017053100	HWY 102	IRVINE AVE	11	< 1.5	0	25	4	Yes	4	1,565	3	15	0	0	0	0	0	3	0	Negligible	0	3	0	2	1,550	No	0	One-way stop
2017053120	IA 163	G39/220th St	11	3.2	4	75	2	No	0	17,950	3	135	2	0	0	0	0	3	0	Negligible	0	1	0	2	12,000	No	1	One-way stop
2017053283	Co Rd G57/275TH ST	Co Rd V13/VENTURA AVE/URBANA AVE	11	< 1.5	0	50	4	Yes	4	360	1	30	1	0	0	0	0	4	1	Negligible	0	1	1	2	330	No	0	Two-way stop
2017053353	Co Rd G29/170TH ST	Co Rd T65/OXFORD AVE	11	8.3	4	90	0	No	0	590	2	110	2	0	0	1	2	4	1	Negligible	0	1	0	3	400	Yes	1	Two-way stop
2017053512	SPRUCE ST	BROADWAY ST	11	7.5	4	90	0	No	0	610	2	195	2	16	2	0	0	4	1	Negligible	0	1	0	4	430	Yes	0	All-way stop
2017053874	JOINER AVE	PROGRESS DR & SUFFOLK RD	11	< 1.5	0	75	2	Yes	4	1,375	3	45	2	0	0	0	0	3	0	Negligible	0	0	0	3	2,160	No	0	One-way stop
2017121152	Co Rd G77/340TH ST	220TH AVE	11	< 1.5	0	65	4	Yes	4	1,080	2	5	0	1	1	0	0	3	0	Negligible	0	0	0	2	720	No	0	Uncontrolled
2017053011	US 63	G29/175th St.	10	16.0	4	90	0	No	0	5,865	3	145	2	1	1	0	0	3	0	Negligible	0	4	3	6	4,240	No	1	One-way stop
2017053066	IA 92/IOWA 92	QUEENS AVE & 248TH ST	10	< 1.5	0	90	0	No	0	3,700	3	310	2	3	2	1	2	4	1	Negligible	0	1	1	4	3,870	Yes	0	Two-way stop
2017053084	OLD HWY 102	160TH ST	10	< 1.5	0	80	2	Yes	4	2,375	3	35	1	0	0	0	0	3	0	Negligible	0	1	0	2	2,340	No	0	One-way stop
2017053085	OLD HWY 102	BAYARD AVE	10	< 1.5	0	70	2	Yes	4	2,360	3	20	1	0	0	0	0	3	0	Negligible	0	0	0	2	2,340	No	0	One-way stop
2017053094	Co Rd G23/140TH ST	Co Rd T38/HWY 102/GALESTON AVE & OLD HWY 102	10	3.2	4	90	0	No	0	1,295	3	120	2	0	0	0	0	4	1	Negligible	0	1	1	2	1,340	No	0	Other
2017053286	IA 92/IOWA 92	QUEENS AVE & 248TH ST	10	< 1.5	0	78	2	No	0	3,545	3	45	2	2	1	1	2	3	0	Negligible	0	1	1	3	370	No	0	One-way stop
2017053301	Co Rd T39/INDIAN WAY	265TH ST	10	< 1.5	0	20	2	Yes	4	660	2	40	1	1	1	0	0	3	0	Negligible	0	0	0	2	620	No	0	One-way stop
2017053371	Co Rd G39/215TH ST	Co Rd T65/OXFORD AVE	10	< 1.5	0	85	2	Yes	4	460	1	30	1	0	0	1	2	3	0	Negligible	0	1	1	2	430	No	0	One-way stop
2017053402	CARSS ST	JACKSON ST	10	3.2	4	90	0	No	0	525	2	125	2	5	2	0	0	3	0	Negligible	0	0	0	3	460	No	0	All-way stop
2017121177	KILBOURN ST	SHERMAN AVE	10	< 1.5	0	68	4	No	0	1,025	2	140	2	9	2	0	0	3	0	Negligible	0	1	1	3	1,290	Yes	0	One-way stop
2017158683	IA 23/IOWA 23	S 31ST ST	10	< 1.5	0	82	2	Yes	4	3,020	3	25	1	0	0	0	0	3	0	Negligible	0	0	0	3	3,000	No	0	One-way stop
2017053037	IA 23/IOWA 23	Co Rd V13/URBANA AVE	9	7.0	4	90	0	No	0	2,295	3	165	2	0	0	0	0	3	0	Negligible	0	1	0	3	2,130	No	1	One-way stop
2017053078	IA 92/IOWA 92	Co Rd V13/VENTURA AVE	9	< 1.5	0	69	4	No	0	3,065	3	35	1	0	0	0	0	4	1	Negligible	0	1	1	3	2,750	Yes	0	Two-way stop
2017053089	Co Rd T33/OLD HWY 102	DEAN AVE	9	3.2	4	90	0	No	0	2,405	3	565	2	0	0	0	0	3	0	Negligible	0	4	1	3	2,340	Yes	2	One-way stop
2017053127	OLD HWY 163	KIRBY AVE	9	< 1.5	0	60	4	No	0	1,105	2	90	2	1	1	0	0	3	0	Negligible	0	0	0	2	1,120	No	0	One-way stop
2017053188	Co Rd G77/340TH ST	220TH AVE	9	< 1.5	0	80	2	Yes	4	1,080	2	15	0	1	1	0	0	3	0	Negligible	0	1	0	2	720	No	0	One-way stop
2017053212	Co Rd G71/310TH ST	Co Rd T39/GALESTON AVE	9	7.0	4	90	0	No	0	890	2	100	2	0	0	0	0	4	1	Negligible	0	2	1	3	710	Yes	0	Two-way stop
2017053329	Co Rd G29/170TH ST	Co Rd V13/URBANA AVE	9	7.5	4	90	0	No	0	705	2	320	2	0	0	0	0	4	1	Negligible	0	2	2	4	400	No	1	Two-way stop
2017053370	Co Rd T65/OXFORD AVE	OSBURN AVE	9	< 1.5	0	85	2	Yes	4	465	1	35	1	2	1	0	0	3	0	Negligible	0	0	0	2	430	No	0	One-way stop
2017053516	KILBOURN ST	FRONT ST	9	< 1.5	0	81	2	No	0	1,260	3	35	1	9	2	0	0	4	1	Negligible	0	1	1	4	1,290	Yes	0	Two-way stop
2017053812	Co Rd G39/MERINO AVE	Co Rd G39/220TH ST	9	2.2	4	90	0	No	0	755	2	100	2	0	0	0	0	4	1	Negligible	0	0	0	3	590	No	1	Two-way stop
2017089190	KILBOURN ST	FLORA ST	9	< 1.5	0	47	4	No	0	905	2	20	1	10	2	0	0	3	0	Negligible	0	2	1	3	850	No	0	One-way stop
2017121188	ELM ST	SHERIDAN ST & BEACON RD	9	< 1.5	0	75	2	No	0	3,250	3	95	2	10	2	0	0	3	0	Negligible	0	2	0	3	2,290	Yes	0	One-way stop
2017121477	MARKET ST	MONROE ST	9	7.0	4	90	0	No	0	565	2	30	1	1	1	0	0	4	1	Negligible	0	1	0	4	455	Yes	0	All-way stop
2017121483	BURLINGTON RD	BETHEL ST	9	< 1.5	0	70	2	No	0	615	2	185	2	8	2	0	0	4	1	Negligible	0	3	2	4	330	Yes	0	All-way stop
2017052993	US 63	CO RD G55/275TH ST & LYNN AVE	8	< 1.5	0	70	2	No	0	640	2	140	2	1	1	0	0	4	1	Negligible	0	0	0	3	530	Yes	0	Two-way stop
2017053002	US 63	230TH ST	8	< 1.5	0	90	0	No	0	4,340	3	45	2	7	2	0	0	4	1	Negligible	0	2	2	4	4,190	No	0	Two-way stop
2017053018	US 63	135TH ST	8	< 1.5	0	90	0	No	0	4,350	3	110	2	2	1	1	2	3	0	Negligible	0	7	7	3	4,240	Yes	0	One-way stop
2017053074	IA 92/IOWA 92	230TH CR	8	< 1.5	0	90	0	Yes	4	2,875	3	25	1	0	0	0	0	3	0	Negligible	0	0	0	3	2,850	No	0	One-way stop
2017053154	Co Rd G77/340TH ST	Co Rd T67/RUTLEDGE AVE	8	5.8	4	90	0	No	0	755	2	160	2	0	0	0	0	3	0	Negligible	0	2	0	3	720	Yes	1	One-way stop
2017053287	Co Rd G51/265TH ST	OSBURN AVE & S 35TH ST	8	< 1.5	0	70	2	No	0	1,355	3	130	2	0	0	0	0	4	1	Negligible	0	1	1	2	860	No	0	Two-way stop
2017053339	Co Rd V13/URBANA AVE	185TH ST	8	< 1.5	0	50	4	Yes	4	325	0	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	320	No	0	One-way stop
2017053486	Co Rd G15/110TH ST/CORDOVA AVE	Co Rd T33	8	< 1.5	0	90	0	Yes	4	1,165	3	35	1	0	0	0	0	3	0	Negligible	0	0	0	2	1,130	No	0	One-way stop
2017053492	Co Rd G15/110TH ST	Co Rd T33/DEAN AVE	8	< 1.5	0	90	0	Yes	4	1,170	3	40	1	0	0	0	0	3	0	Negligible	0	0	0	2	1,130	No	0	One-way stop
2017053500	Co Rd T33/DEAN AVE	125TH ST	8	< 1.5	0	75	2	Yes	4	1,150	2	15	0	0	0	0	0	3	0	Negligible	0	0	0	2	1,130	No	0	One-way stop
2017053873	JEWELL AVE	SUFFOLK RD	8	< 1.5	0	80	2	Yes	4	140	0	40	1	2	1	0	0	3	0	Negligible	0	0	0	3	110	No	0	One-way stop
2017121150	QUEENS AVE	255 ST	8	< 1.5	0	25	4	Yes	4	175	0	0	0	0	0	0	0	3	0	No Data	0	0	0	3	175	No	0	One-way stop
2017121176	LEIGHTON ST	KILBOURN ST	8	< 1.5	0	25	4	No	0	910	2	130	2	0	0	0	0	3	0	Negligible	0	0	0	3	850	Yes	0	One-way stop
2017121178	KILBOURN ST	GRANT ST	8	< 1.5	0	90	0	No	0	1,590	3	120	2	9	2	0	0	4	1	Negligible	0	0	0	4	1,295	Yes	0	Two-way stop
2017053079	IA 92	Vermillion Ave.	7	< 1.5	0	70	2	No	0	2,800	3	25	1	0	0	0	0	4	1	Negligible	0	1	0	3	2,750	No	0	Two-way stop
2017053087	Co Rd G29/155TH ST	Co Rd T33/OLD HWY 102	7	< 1.5	0	80	2	No	0	2,410	3	70	2	0	0	0	0	3	0	Negligible	0	1	0	2	2,340	No	0	One-way stop
2017053140	Co Rd V13/URBANA AVE	290TH ST	7	< 1.5	0	40	4	No	0	365	1	35	1	0	0	0	0	4	1	Negligible	0	0	0	2	330	No	0	Two-way stop
2017053147	Co Rd G63/305TH ST	Co Rd T67/RUTLEDGE AVE	7	< 1.5	0	90	0	No	0	675	2	120	2	4	2	0	0	4	1	Negligible	0	1	1	3	470	No	0	Two-way stop
2017053191	Co Rd G77/340TH ST	PLYMOUTH AVE	7	< 1.5	0	90	0	Yes	4	750	2	30	1	0	0	0	0	3	0	Negligible	0	0	0	2	720	No	0	One-way stop
2017053200	Co Rd G55/285TH ST	Co Rd T39/GALESTON AVE	7	< 1.5	0	80	2	No	0	685	2	45	2	0	0	0	0	4	1	Negligible	0	1	0	2	620	No	0	Two-way stop
2017053256	Co Rd V13/VENTURA AVE	WASHINGTON ST & MARKET ST & 230TH ST	7	< 1.5	0	90	0	No	0	640	2	80	2	7	2	0	0	4	1	Negligible	0	0	0	4	590	Yes	0	Two-way stop
2017053295	Co Rd T39/INDIAN WAY	JOINER AVE	7	< 1.5	0	80	2	No	0	2,290	3	250	2	0	0	0	0	3	0	Negligible	0	2	1	3	2,320	No	0	All-way stop
2017053304	Co Rd T39/INDIAN WAY	HICKORY AVE	7	< 1.5	0	75	2	No	0	700	2	80	2	0	0	0	0	4	1	Negligible	0	1	1	2	620	No	0	Two-way stop
2017053347	Co Rd G39/210TH ST	Co Rd V13/URBANA AVE	7	< 1.5	0	90	0	Yes	4	480	1	25	1	1	1	0	0	3	0	Negligible	0	0	0	2	320	No	0	One-way stop
2017053358	Co Rd G29/NILAND AVE	Co Rd G29/170TH ST	7	< 1.5	0	90	0	Yes	4	385	1	15	0	0	0	1	2	3	0	Negligible	0	2	0	2	370	No	1	One-way stop
2017053414	Co Rd G17/120TH ST	Co Rd V13/URBANA AVE	7	5.1	4	90	0	No	0	450	1	95	2	0	0	0	0	3	0	Negligible	0	0	0	3	390	Yes	1	One-way stop
2017053501	Co Rd T33/DEAN AVE/MAIN ST	WEST ST	7	< 1.5	0	90	0	No	0	1,175	3	20	1	4	2	0	0	4	1	Negligible	0	0	0	2	1,130	No	0	One-way stop
2017053509	SPRUCE ST	C AVE	7	< 1.5	0	90	0	No	0	805	2	65	2	6	2	0	0	4	1	Negligible	0	1	1	4	590	Yes	0	Two-way stop
2017053511	SPRUCE ST	CHERRY ST	7	< 1.5	0	90	0	No	0	620	2	80	2	10	2	0	0	4	1	Negligible	0	0	0	4	430	Yes	0	Two-way stop
2017053514	BROADWAY ST	VINE ST	7	< 1.5	0	90	0	No	0	545	2	80	2	10	2	0	0	4	1	Negligible	0	0	0	4	300	Yes	0	Two-way stop
2017121187	REED ST	SHERIDAN ST & BEACON RD	7	< 1.5	0	90	0	No	0	3,250	3	130	2	9	2	0	0	3	0	Negligible	0	2	0	3	2,290	Yes	0	One-way stop
2017121478	MARKET ST	MAIN ST	7	< 1.5	0	90	0	No	0	760	2	115	2	11	2	0	0	4	1	Negligible	0	0	0	4	455	Yes	0	All-way stop
2017121482	BURLINGTON RD	PENIEL ST	7	< 1.5	0	70	2	No	0	395	1	55	2	8	2	0	0	3	0	Negligible	0	0	0	3	330	Yes	0	One-way stop
2017121484	BURLINGTON RD	CENTER ST	7	< 1.5	0	74	2	No	0	425	1	80	2	6	2	0	0	3	0	Negligible	0	0	0	3	330	Yes	0	One-way stop
2017052995	US 63	LUMINARY LN	6	< 1.5	0	90	0	No	0	6,580	3	80	2	1	1	0	0	3	0	Negligible	0	1	1	3	6,500	No	0	One-way stop
2017053003	US 63	LYNNDALE RD	6	< 1.5	0	90	0	No	0	4,300	3	110	2	2	1	0	0	3	0	Negligible	0	3	3	3	4,190	No	0	One-way stop
2017053016	US 63	G23/150th St.	6	< 1.5	0	90	0	No	0	4,365	3	60	2	0	0	0	0	4	1	Negligible	0	6	5	3	4,240	No	0	Two-way stop
2017053097	HWY 102	HICKORY AVE	6	< 1.5	0	90	0	No	0	1,580	3	25	1	2	1	0	0	4	1	Negligible	0	0	0	2	1,550	No	0	Two-way stop
2017053103	HWY 102	KENT AVE	6	< 1.5	0	90	0	No	0	1,630	3	80	2	0	0	0	0	4	1	Negligible	0	1	0	2	1,550	No	0	Two-way stop
2017053124	IA 163	Old Hwy 163/Jewell Ave	6	< 1.5	0	90	0	No	0	22,400	3	710	2	0	0	0	0	4	1	Negligible	0	5	2	2	11,900	No	0	Two-way stop
2017053193	Co Rd G77/340TH ST	QUEENS AVE	6	< 1.5	0	90	0	Yes	4	730	2	10	0	0	0	0	0	3	0	Negligible	0	1	0	2	720	No	0	One-way stop
2017053202	Co Rd G62/290TH ST	Co Rd T39/GALESTON AVE	6	< 1.5	0	80	2	No	0	595	2	105	2	0	0	0	0	3	0	Negligible	0	0	0	2	620	No	0	One-way stop
2017053209	Co Rd G71/310TH ST	KENT AVE	6	< 1.5	0	85	2	No	0	765	2	55	2	0	0	0	0	3	0	Negligible	0	1	0	2	710	No	0	One-way stop
2017053297	Co Rd T39/INDIAN WAY	BILL BONE DR	6	< 1.5	0	90	0	No	0	2,345	3	25	1	6	2	0	0	3	0	Negligible	0	0	0	2	2,320	No	0	One-way stop
2017053328	Co Rd G25/163RD ST	Co Rd V13/URBANA AVE	6	< 1.5	0	90	0	Yes	4	320	0	320	2	0	0	0	0	3	0	No Data	0	0	0	2	0	No	0	One-way stop
2017053354	Co Rd G29/BROADWAY ST/175TH ST	WILSON ST	6	< 1.5	0	90	0	No	0	400	1	60	2	4	2	0	0	4	1	No Data	0	0	0	2	340	No	0	One-way stop
2017053363	Co Rd T65/OXFORD AVE	NILAND AVE	6	< 1.5	0	85	2	Yes	4	320	0	15	0	0	0	0	0	3	0	Negligible	0	0	0	2	300	No	0	One-way stop
2017053383	Co Rd G29/175TH ST	JERSEY AVE	6	< 1.5	0	80	2	Yes	4	295	0	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	290	No	0	Uncontrolled
2017053435	Co Rd V13/URBANA AVE	160TH ST	6	< 1.5	0	85	2	Yes	4	325	0	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	320	No	0	One-way stop
2017053483	Co Rd G13/105TH ST	FISHER AVE	6	< 1.5	0	90	0	Yes	4	350	1	20	1	0	0	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053502	Co Rd T33/CROSS ST/MAIN ST	133RD ST	6	< 1.5	0	90	0	No	0	1,135	2	5	0	4	2	1	2	3	0	Negligible	0	3	0	2	1,130	No	0	One-way stop
2017053504	Co Rd T33/CROSS ST/DEAN AVE	CHESTNUT ST	6	< 1.5	0	90	0	No	0	1,155	3	25	1	5	2	0	0	3	0	Negligible	0	0	0	2	1,130	No	0	One-way stop
2017053523	IA 23/IOWA 23	PHILLIPS AVE	6	< 1.5	0	80	2	No	0	2,990	3	30	1	0	0	0	0	3	0	Negligible	0	1	0	3	2,020	Yes	0	One-way stop
2017053599	SUFFOLK RD	250Th St	6	< 1.5	0	20	2	No	0	395	1	75	2	1	1	0	0	3	0	Negligible	0	1	0	2	410	No	0	One-way stop
2017053824	248TH ST	RESOLVE AVE	6	< 1.5	0	50	4	No	0	100	0	5	0	3	2	0	0	3	0	Negligible	0	0	0	2	110	No	0	Uncontrolled
2017053831	255TH ST	OSBURN AVE	6	< 1.5	0	90	0	No	0	940	2	90	2	1	1	0	0	4	1	Negligible	0	0	0	2	840	No	0	Two-way stop
2017053855	LYNNDALE RD	LYNNDALE LN	6	< 1.5	0	25	4	No	0	290	0	70	2	0	0	0	0	3	0	Negligible	0	1	1	3	220	No	0	One-way stop
2017053857	LYNNDALE LN	LYNNDALE RD	6	< 1.5	0	25	4	No	0	235	0	15	0	4	2	0	0	3	0	Negligible	0	0	0	2	220	No	0	One-way stop
2017053875	SUFFOLK RD	GATEWAY DR	6	< 1.5	0	75	2	No	0	455	1	75	2	1	1	0	0	3	0	Negligible	0	0	0	3	580	No	0	One-way stop
2017121160	SPRUCE ST	ELM ST	6	< 1.5	0	90	0	No	0	410	1	70	2	8	2	0	0	4	1	Negligible	0	0	0	2	225	No	0	Two-way stop
2017121182	WILLIAMS ST	SHERMAN AVE	6	< 1.5	0	90	0	No	0	465	1	140	2	7	2	0	0	4	1	Negligible	0	0	0	4	280	Yes	0	Two-way stop
2017152128	Co Rd G77/WAPELLO-MAHASKA RD	Co Rd T63/330TH ST	6	< 1.5	0	70	2	No	0	955	2	25	1	2	1	0	0	3	0	Negligible	0	0	0	2	1,000	No	0	One-way stop
2017153011	IA 102/MARKET ST	HWY 102 & S COLUMBIA ST	6	< 1.5	0	90	0	No	0	1,495	3	30	1	7	2	0	0	3	0	Negligible	0	0	0	2	1,370	No	0	One-way stop
2017053208	Co Rd G71/310TH ST	KIRBY AVE	5	< 1.5	0	85	2	No	0	750	2	40	1	0	0	0	0	3	0	Negligible	0	0	0	2	710	No	0	One-way stop
2017053213	Co Rd G71/310TH ST	HICKORY AVE	5	< 1.5	0	90	0	No	0	730	2	20	1	1	1	0	0	4	1	Negligible	0	1	0	2	710	No	0	Two-way stop
2017053240	Co Rd G71/310TH ST	DOVER AVE	5	< 1.5	0	90	0	No	0	645	2	35	1	1	1	0	0	4	1	Negligible	0	0	0	2	610	No	0	Two-way stop
2017053243	Co Rd G71/310TH ST	Co Rd T31/BARROWS AVE	5	< 1.5	0	90	0	No	0	645	2	35	1	0	0	1	2	3	0	Negligible	0	2	0	2	610	No	0	One-way stop
2017053244	Co Rd G71/310TH ST	Co Rd T31/BARROWS AVE	5	< 1.5	0	90	0	No	0	660	2	50	2	2	1	0	0	3	0	Negligible	0	1	0	2	610	No	0	One-way stop
2017053259	Co Rd V13/VENTURA AVE	240TH ST	5	< 1.5	0	80	2	No	0	355	1	20	1	0	0	0	0	4	1	Negligible	0	0	0	2	330	No	0	Two-way stop
2017053296	Co Rd T39/INDIAN WAY	KAREN LN	5	< 1.5	0	90	0	No	0	1,800	3	40	1	1	1	0	0	3	0	Negligible	0	0	0	2	1,760	No	0	One-way stop
2017053299	Co Rd T39/INDIAN WAY	S O ST & 11TH AVE W	5	< 1.5	0	90	0	No	0	2,940	3	550	2	0	0	0	0	3	0	Negligible	0	1	0	3	2,380	Yes	0	One-way stop
2017053333	Co Rd G29/170TH ST	Co Rd G7T/RUTLEDGE AVE	5	< 1.5	0	90	0	No	0	455	1	45	2	1	1	0	0	4	1	Negligible	0	1	0	2	400	No	0	Two-way stop

Disclaimer: Throughout the SAP 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 to the project sheets were made. As such the information in this table may vary from final information presented on the project sheets. Priority locations selected for project sheets were selected in coordination with the County and may not align with the highest scoring locations.

Mahaska County
Safety Action Plan
Intersection Risk Factor Points

GPS ID	Road Name	Intersecting Road	Total Risk Factor Points	Distance from Previous Stop (miles) (Value)	Distance from Previous Stop (miles) (Points)	Intersection Skew (degrees) (Value)	Intersection Skew (degrees) (Points)	Intersection Within Curve (Value)	Intersection Within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Access Management (250 ft) (Value)	Access Management (250 ft) (Points)	K and A Crashes (Value)	K and A Crashes (Points)	Number of Approaches (Value)	Number of Approaches (Points)	KABCO PCR Level (Value)	KABCO PCR Level (Points)	Total Crashes	Right Angle, Rear-end, or Turning Crashes	Number of Paved Approaches	Major Street ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type
2017053341	Co Rd V13/URBANA AVE	190TH ST	5	< 1.5	0	90	0	No	0	370	1	45	2	1	1	0	0	4	1	Negligible	0	0	0	2	320	No	0	Two-way stop
2017053359	Co Rd G29/NILAND AVE	Co Rd G29/175TH ST	5	< 1.5	0	90	0	Yes	4	390	1	15	0	0	0	0	0	3	0	Negligible	0	1	0	2	370	No	1	One-way stop
2017053405	CARSS ST	EATON AVE & PATCH ST	5	< 1.5	0	90	0	No	0	420	1	130	2	3	2	0	0	3	0	Negligible	0	0	0	3	300	No	0	Two-way stop
2017053465	Co Rd G13/105TH ST/MILLER ST	Co Rd T38/SHORT ST	5	3.5	4	90	0	No	0	325	0	15	0	2	1	0	0	3	0	Negligible	0	0	0	2	330	No	0	Two-way stop
2017053467	Co Rd T38/SHORT ST/GALESTON AVE	DIAGONAL ST	5	< 1.5	0	70	2	No	0	230	0	35	1	3	2	0	0	3	0	No Data	0	0	0	2	195	No	0	One-way stop
2017053525	PATCH ST	OTLEY ST	5	< 1.5	0	90	0	No	0	500	1	90	2	5	2	0	0	3	0	Negligible	0	0	0	3	375	No	0	One-way stop
2017053663	BURLINGTON RD	PARK ST	5	< 1.5	0	78	2	No	0	270	0	25	1	3	2	0	0	3	0	Negligible	0	0	0	3	330	Yes	0	All-way stop
2017053906	OLD HWY 92	CORDOVA AVE	5	< 1.5	0	70	2	No	0	85	0	20	1	1	1	0	0	4	1	Negligible	0	0	0	2	70	No	0	Two-way stop
2017053908	OLD HWY 92	CARBON TRL	5	< 1.5	0	60	4	No	0	45	0	10	0	2	1	0	0	3	0	Negligible	0	0	0	1	45	No	0	One-way stop
2017053911	OLD HWY 92	CARBON TRL	5	< 1.5	0	30	4	No	0	30	0	5	0	1	1	0	0	3	0	Negligible	0	0	0	1	25	No	0	One-way stop
2017089058	Co Rd G77/WAPELLO-MAHASKA RD	SUNFLOWER DR	5	< 1.5	0	90	0	No	0	815	2	20	1	5	2	0	0	3	0	Negligible	0	1	0	3	860	Yes	0	One-way stop
2017121510	262ND ST	FAIRVIEW DR	5	< 1.5	0	90	0	No	0	425	1	120	2	5	2	0	0	3	0	Negligible	0	0	0	3	290	Yes	0	One-way stop
2017159802	OLD HWY 92	CARBON TRAIL	5	< 1.5	0	27	4	No	0	30	0	5	0	1	1	0	0	3	0	Negligible	0	0	0	1	25	No	0	Uncontrolled
2017159803	OLD HWY 92	CARBON TRAIL	5	< 1.5	0	51	4	No	0	45	0	10	0	2	1	0	0	3	0	Negligible	0	0	0	1	45	No	0	Uncontrolled
2017164589	SHERMAN STREET	LEIGHTON STREET	5	< 1.5	0	90	0	No	0	450	1	130	2	12	2	0	0	3	0	Negligible	0	0	0	3	280	Yes	0	All-way stop
2017053068	IA 92/IOWA 92	248TH ST	4	< 1.5	0	90	0	No	0	2,890	3	40	1	0	0	0	0	3	0	Negligible	0	1	1	3	2,850	No	0	One-way stop
2017053091	OLD HWY 102	ELBA AVE	4	< 1.5	0	90	0	No	0	1,355	3	15	0	1	1	0	0	3	0	Negligible	0	0	0	2	1,340	No	0	One-way stop
2017053093	OLD HWY 102	FISHER AVE	4	< 1.5	0	90	0	No	0	1,365	3	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	1,340	No	0	Two-way stop
2017053102	HWY 102	JEWELL AVE	4	< 1.5	0	90	0	No	0	1,560	3	10	0	1	1	0	0	3	0	Negligible	0	1	1	2	1,550	No	0	One-way stop
2017053151	Co Rd T67/RUTLEDGE AVE	325TH ST	4	< 1.5	0	85	2	No	0	495	1	25	1	0	0	0	0	3	0	Negligible	0	0	0	2	470	No	0	One-way stop
2017053204	Co Rd T39/GALESTON AVE	295TH ST	4	< 1.5	0	90	0	No	0	390	1	25	1	1	1	0	0	4	1	Negligible	0	0	0	2	360	No	0	Two-way stop
2017053216	Co Rd G71/310TH ST	Co Rd T53/JAMES TR	4	< 1.5	0	90	0	No	0	765	2	55	2	0	0	0	0	3	0	Negligible	0	1	1	2	710	No	0	One-way stop
2017053247	Co Rd G71/310TH ST	Co Rd T37/ELBA AVE	4	< 1.5	0	90	0	No	0	645	2	20	1	0	0	0	0	4	1	Negligible	0	1	1	2	610	No	0	Two-way stop
2017053254	VERMILLION AVE	OLD HWY 92	4	< 1.5	0	40	4	No	0	80	0	10	0	0	0	0	0	3	0	Negligible	0	1	0	2	70	No	0	Uncontrolled
2017053285	Co Rd G39/MERINO AVE	Co Rd T65/OXFORD AVE	4	< 1.5	0	65	4	No	0	335	0	10	0	0	0	0	0	3	0	No Data	0	0	0	3	325	No	0	One-way stop
2017053310	Co Rd G39/220TH ST	ELBA AVE	4	< 1.5	0	90	0	No	0	315	0	45	2	3	2	0	0	3	0	Negligible	0	0	0	2	270	No	0	One-way stop
2017053326	Co Rd G29/170TH ST	Co Rd V21/YALE AVE	4	< 1.5	0	90	0	No	0	555	2	30	1	1	1	0	0	3	0	Negligible	0	0	0	2	370	No	0	One-way stop
2017053327	Co Rd V13/URBANA AVE	163RD ST	4	< 1.5	0	90	0	Yes	4	325	0	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	320	No	0	Uncontrolled
2017053338	Co Rd G29/170TH ST	VICTORIA AVE	4	< 1.5	0	90	0	No	0	385	1	370	2	0	0	0	0	4	1	Negligible	0	0	0	2	370	No	0	Two-way stop
2017053348	Co Rd G39/215TH ST	Co Rd V13/URBANA AVE	4	< 1.5	0	85	2	No	0	340	1	20	1	0	0	0	0	3	0	Negligible	0	0	0	2	320	No	0	One-way stop
2017053355	Co Rd G29/BROADWAY ST/175TH ST	SLEEPER ST	4	< 1.5	0	90	0	No	0	390	1	20	1	5	2	0	0	3	0	Negligible	0	0	0	2	370	No	0	Uncontrolled
2017053360	Co Rd T65/OXFORD AVE	185TH ST	4	< 1.5	0	90	0	Yes	4	305	0	5	0	0	0	0	0	3	0	Negligible	0	1	0	2	300	No	0	One-way stop
2017053365	Co Rd G7T/200TH ST	Co Rd T65/OXFORD AVE	4	< 1.5	0	90	0	No	0	440	1	70	2	0	0	0	0	4	1	Negligible	0	0	0	2	430	No	0	Two-way stop
2017053384	Co Rd G29/175TH ST	KENT AVE	4	< 1.5	0	90	0	No	0	370	1	80	2	0	0	0	0	4	1	Negligible	0	0	0	2	290	No	0	Two-way stop
2017053404	CARSS ST	PERRY ST	4	< 1.5	0	90	0	No	0	330	0	50	2	5	2	0	0	3	0	Negligible	0	0	0	3	290	No	0	One-way stop
2017053470	Co Rd G13/105TH ST/MILLER ST	DIAGONAL ST	4	< 1.5	0	75	2	No	0	340	1	10	0	2	1	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053503	Co Rd T33/CROSS ST	SOUTH ST	4	< 1.5	0	90	0	No	0	1,140	2	10	0	5	2	0	0	3	0	Negligible	0	0	0	2	1,130	No	0	Uncontrolled
2017053813	Co Rd G39/220TH ST	LYNN AVE	4	< 1.5	0	90	0	No	0	520	2	10	0	1	1	0	0	4	1	Negligible	0	0	0	2	490	No	0	One-way stop
2017053825	248TH ST	ROYAL LN	4	< 1.5	0	70	2	No	0	110	0	25	1	1	1	0	0	3	0	Negligible	0	0	0	2	110	No	0	One-way stop
2017053838	OSBURN AVE	270TH ST & S 35TH ST	4	< 1.5	0	90	0	No	0	905	2	45	2	0	0	0	0	3	0	Negligible	0	0	0	2	860	No	0	One-way stop
2017053854	LINCOLN AVE	FORREST AVE & LYNNDALE RD	4	< 1.5	0	90	0	No	0	280	0	60	2	5	2	0	0	3	0	Negligible	0	0	0	3	220	No	0	One-way stop
2017053877	LUMINARY LN	263RD ST	4	< 1.5	0	90	0	No	0	255	0	80	2	3	2	0	0	3	0	Negligible	0	1	0	2	190	No	0	One-way stop
2017053932	Co Rd G29/170TH ST	Co Rd V21/YALE AVE	4	< 1.5	0	90	0	No	0	555	2	30	1	1	1	0	0	3	0	Negligible	0	0	0	2	370	No	0	One-way stop
2017121153	Co Rd V13/VENTURA AVE	HIGH ST	4	< 1.5	0	90	0	No	0	615	2	25	1	1	1	0	0	3	0	Negligible	0	0	0	2	590	No	0	Uncontrolled
2017121165	C AVE	WYMORE ST	4	< 1.5	0	90	0	No	0	670	2	15	0	2	1	0	0	4	1	Negligible	0	0	0	3	590	Yes	0	One-way stop
2017121169	OAK ST	PINE ST	4	< 1.5	0	90	0	No	0	275	0	45	2	5	2	0	0	3	0	Negligible	0	0	0	3	225	No	0	One-way stop
2017121210	PATCH ST	REID ST	4	< 1.5	0	90	0	No	0	400	1	25	1	6	2	0	0	3	0	Negligible	0	0	0	3	375	No	0	One-way stop
2017121474	WASHINGTON ST	STUART ST	4	< 1.5	0	90	0	No	0	200	0	30	1	8	2	0	0	4	1	Negligible	0	0	0	4	120	No	0	Two-way stop
2017121475	WASHINGTON ST	COMMERCIAL ST	4	< 1.5	0	90	0	No	0	300	0	30	1	7	2	0	0	4	1	Negligible	0	0	0	4	120	No	0	Uncontrolled
2017121511	262ND ST	LUMINARY LN & 21ST AVE	4	< 1.5	0	90	0	No	0	425	1	50	2	0	0	0	0	4	1	Negligible	0	0	0	4	320	No	0	Two-way stop
2017142276	Co Rd G77/WAPELLO-MAHASKA RD	LOWELL RD	4	< 1.5	0	90	0	No	0	875	2	10	0	5	2	0	0	3	0	Negligible	0	1	1	3	860	No	0	One-way stop
2017154836	Co Rd V13/URBANA AVE	USHER AVE & 185TH ST	4	< 1.5	0	90	0	Yes	4	330	0	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	320	No	0	One-way stop
2017157766	Co Rd G77/WAPELLO-MAHASKA RD	232ND AVE	4	< 1.5	0	90	0	No	0	765	2	45	2	0	0	0	0	3	0	Negligible	0	0	0	2	720	No	0	One-way stop
2017045588	Co Rd G29/170TH ST	Co Rd V23/ZEPHYR AVE	3	< 1.5	0	90	0	No	0	405	1	30	1	0	0	0	0	4	1	Negligible	0	0	0	2	370	No	0	Two-way stop
2017053090	OLD HWY 102	EATON AVE	3	< 1.5	0	90	0	No	0	1,360	3	15	0	0	0	0	0	3	0	Negligible	0	0	0	2	1,340	No	0	One-way stop
2017053092	OLD HWY 102	FORD AVE	3	< 1.5	0	90	0	No	0	1,360	3	15	0	0	0	0	0	3	0	Negligible	0	0	0	2	1,340	No	0	One-way stop
2017053095	Co Rd T38/HWY 102	135TH ST	3	< 1.5	0	90	0	No	0	1,045	2	15	0	1	1	0	0	3	0	Negligible	0	0	0	2	1,030	No	0	One-way stop
2017053125	QUEENS AVE	255TH ST	3	< 1.5	0	90	0	No	0	340	1	30	1	1	1	0	0	3	0	Negligible	0	0	0	2	310	No	0	One-way stop
2017053148	Co Rd G63/305TH ST	SIMON AVE	3	< 1.5	0	90	0	No	0	415	1	15	0	7	2	0	0	3	0	Negligible	0	0	0	2	400	No	0	Uncontrolled
2017053152	Co Rd G77/330TH ST	Co Rd T67/RUTLEDGE AVE	3	< 1.5	0	90	0	No	0	515	1	45	2	0	0	0	0	3	0	Negligible	0	0	0	2	470	No	0	One-way stop
2017053192	Co Rd G77/340TH ST	ROWLAND AVE	3	< 1.5	0	90	0	No	0	725	2	5	0	1	1	0	0	3	0	Negligible	0	0	0	2	720	No	0	One-way stop
2017053210	Co Rd G71/310TH ST	KYLE AVE & KENT AVE	3	< 1.5	0	87	0	No	0	740	2	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	710	No	0	Two-way stop
2017053215	Co Rd G71/310TH ST	INDEPENDENCE AVE	3	< 1.5	0	90	0	No	0	720	2	10	0	1	1	0	0	3	0	Negligible	0	0	0	2	710	No	0	One-way stop
2017053241	Co Rd G71/310TH ST	ASHLAND AVE	3	< 1.5	0	90	0	No	0	640	2	30	1	0	0	0	0	3	0	Negligible	0	0	0	2	610	No	0	One-way stop
2017053246	Co Rd G71/310TH ST	DEAN AVE	3	< 1.5	0	90	0	No	0	640	2	30	1	0	0	0	0	3	0	Negligible	0	0	0	2	610	No	0	One-way stop
2017053255	OLD HWY 92	230TH ST	3	< 1.5	0	20	2	No	0	85	0	15	0	1	1	0	0	3	0	Negligible	0	0	0	0	70	No	0	Uncontrolled
2017053356	Co Rd G29/175TH ST	MERINO AVE	3	< 1.5	0	90	0	No	0	410	1	40	1	0	0	0	0	4	1	Negligible	0	0	0	2	370	No	0	Two-way stop
2017053361	Co Rd G29/170TH ST	QUEENS AVE	3	< 1.5	0	90	0	No	0	425	1	25	1	1	1	0	0	3	0	Negligible	0	0	0	2	400	No	0	One-way stop
2017053399	EATON AVE	205TH ST	3	< 1.5	0	90	0	No	0	485	1	10	0	1	1	0	0	4	1	Negligible	0	0	0	2	460	No	0	Two-way stop
2017053466	Co Rd T38/SHORT ST	RICHMOND ST	3	< 1.5	0	90	0	No	0	220	0	20	1	5	2	0	0	3	0	No Data	0	0	0	2	200	No	0	One-way stop
2017053495	Co Rd T33/DEAN AVE	120TH ST	3	< 1.5	0	90	0	No	0	1,145	2	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	1,130	No	0	Two-way stop
2017053510	SPRUCE ST	D AVE	3	< 1.5	0	90	0	No	0	430	1	15	0	8	2	0	0	3	0	Negligible	0	1	1	3	410	Yes	0	One-way stop
2017053826	248TH ST	ROYAL LN	3	< 1.5	0	20	2	No	0	55	0	15	0	1	1	0	0	3	0	Negligible	0	0	0	2	60	No	0	One-way stop
2017053851	LYNNDANNA LN	LYNNDALE RD	3	< 1.5	0	90	0	No	0	250	0	30	1	4	2	0	0	3	0	Negligible	0	0	0	3	220	No	0	One-way stop
2017053910	OLD HWY 92	CARBON TRL	3	< 1.5	0	70	2	No	0	60	0	5	0	1	1	0	0	3	0	Negligible	0	0	0	2	45	No	0	One-way stop
2017053912	Co Rd G55/RIVER RD	OLD HWY 92	3	< 1.5	0	70	2	No	0	65	0	20	1	0	0	0	0	3	0	Negligible	0	0	0	2	50	No	0	Uncontrolled
2017053988	Co Rd T65/OXFORD AVE	NEWPORT AVE & 220TH ST	3	< 1.5	0	90	0	No	0	880	2	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	590	No	0	Two-way stop
2017121183	LEIGHTON ST	SHERMAN AVE	3	< 1.5	0	90	0	No	0	450	1	15	0	11	2	0	0	3	0	Negligible	0	0	0	3	280	Yes	0	All-way stop
2017121504	230TH ST	WILLIAMS ST	3	< 1.5	0	90	0	No	0	120	0	35	1	5	2	0	0	3	0	Negligible	0	0	0	3	80	No	0	One-way stop
2017121507	OSBURN AVE	28TH AVE	3	< 1.5	0	90	0	No	0	885	2	25	1	0	0	0	0	3	0	Negligible	0	0	0	3	860	No	0	One-way stop
2017053257	230TH ST	WASHINGTON ST & ORNBAUM ST	2	< 1.5	0	90	0	No	0	140	0	15	0	5	2	0	0	3	0	Negligible	0	0	0	3	120	No	0	One-way stop
2017053258	Co Rd V13/VENTURA AVE	235TH ST	2	< 1.5	0	90	0	No	0	360	1	30	1	0	0	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053270	Co Rd G51/255TH ST	Co Rd V13/VENTURA AVE	2	< 1.5	0	90	0	No	0	355	1	25	1	0	0	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053274	Co Rd V13/VENTURA AVE	268TH ST	2	< 1.5	0	90	0	No	0	360	1	30	1	0	0	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053335	Co Rd G29/170TH ST	TELLER AVE	2	< 1.5	0	90	0	No	0	430	1	30	1	0	0	0	0	3	0	Negligible	0	0	0	2	400	No	0	One-way stop
2017053337	Co Rd V13/URBANA AVE	177TH ST	2	< 1.5	0	90	0	No	0	355	1	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	320	No	0	Two-way stop
2017053342	Co Rd V13/URBANA AVE	195TH ST	2	< 1.5	0	90	0	No	0	345	1	25	1	0	0	0	0	3	0	Negligible	0	0	0	2	320	No	0	One-way stop
2017053343	Co Rd V13/URBANA AVE	200TH ST	2	< 1.5	0	90	0	No	0	345	1	25	1	0	0	0	0	3	0	Negligible	0	1	0	2	320	No	0	One-way stop
2017053381	Co Rd G29/175TH ST	HICKORY AVE	2	< 1.5	0	90	0	No	0	265	0	25	1	0	0	0	0	4	1	Negligible	0	0	0	2	290	No	1	Two-way stop
2017053403	CARSS ST	CHESTNUT ST	2	< 1.5	0	90	0	No	0	305	0	15	0	10	2	0	0	3	0	Negligible	0	0	0	3	290	No	0	One-way stop
2017053410	Co Rd G13/105TH ST	Co Rd V13/URBANA AVE & C AVE	2	< 1.5	0	90	0	No	0	420	1	20	1	0	0	0	0	3	0	Negligible	0	0	0	2	410	No	0	One-way stop
2017053423	Co Rd G19/130TH ST	Co Rd V13/URBANA AVE	2	< 1.5	0	90	0	No	0	350	1	30	1	0	0	0	0	3	0	Negligible	0	1	0	2	320	No	0	One-way stop
2017053426	Co Rd G19/133RD ST	Co Rd V13/URBANA AVE	2	< 1.5	0	90	0	No	0	345	1	25	1	0	0	0	0	3	0	Negligible	0	0	0	2	320	No	0	One-way stop
2017053471	Co Rd G13/MILLER ST	BROADWAY ST	2	< 1.5	0	90	0	No	0	340	1	10	0	2	1	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053472	Co Rd T38/GALESTON AVE	120TH ST	2	< 1.5	0	90	0	No	0	250	0	40	1	0	0	0	0	4	1	Negligible	0	0	0	2	210	No	0	Two-way stop
2017053475	Co Rd T38/GALESTON AVE	125TH ST	2	< 1.5	0	90	0	No	0	230	0	20	1	1	1	0	0	3	0	Negligible	0	0	0	2	210	No	0	One-way stop
2017053491	Co Rd G15/CORDOVA AVE	Co Rd G15/CORDOVA AVE/110TH ST	2	< 1.5	0	90	0	No	0	1,140	2	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	1,130	No	0	One-way stop
2017053524	KEOMAH AVE	B ST	2	< 1.5	0	90	0	No	0	165	0	5	0	3	2	0	0	3	0	Negligible	0	0	0	2	220	No	0	One-way stop
2017053654	262ND ST	LINCOLN AVE & S F ST	2	< 1.5	0	90	0	No	0	235	0	40	1	2	1	0	0	3	0	Negligible	0	0	0	3	240	Yes	0	One-way stop
2017121155	Co Rd V13/URBANA AVE	HAWTHORNE LAKE WMA	2	< 1.5	0	90	0	No	0	390	1	0	0	1	1	0	0	3	0	No Data	0	0	0	3	390	No	0	One-way stop
2017121164	C AVE	DRUSE ST	2	< 1.5	0	90	0	No	0	425	1	15	0	2	1	0	0	3	0	Negligible	0	0	0	3	410	No	0	One-way stop
2017121503	230TH ST	JACKSON ST	2	< 1.5	0	90	0	No	0	85	0	5	0	3	2	0	0	3	0	Negligible	0	0	0	3	80	No	0	Uncontrolled
2017053149	Co Rd T67/RUTLEDGE AVE	315TH ST	1	< 1.5	0	90	0	No	0	475	1	5	0	0	0	0	0	3	0	Negligible	0	1	0	2	470	No	0	One-way stop
2017053211	Co Rd T39/GALESTON AVE	305TH ST	1	< 1.5	0	90	0	No	0	375	1	15	0	0	0	0	0	3	0	Negligible	0	0	0	2	360	No	0	One-way stop
2017053271	Co Rd V13/VENTURA AVE	255TH ST	1	< 1.5	0	90	0	No	0	345	1	15	0	0	0	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053336	Co Rd G29/170TH ST	TELLER AVE	1	< 1.5	0	90	0	No	0	410	1	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	400	No	0	One-way stop
2017053344	Co Rd V13/URBANA AVE	205TH ST	1	< 1.5	0	90	0	No	0	335	0	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	320	No	0	Two-way stop
2017053357	Co Rd G29/175TH ST	NO NAME	1	< 1.5	0	90	0	No	0	375	1	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	370	No	0	Uncontrolled
2017053368	Co Rd T65/OXFORD AVE	210TH ST	1	< 1.5	0	90	0	No	0	440	1	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	430	No	0	One-way stop
2017053411	Co Rd V13/URBANA AVE	107TH ST	1	< 1.5	0	90	0	No	0	395	1	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	390	No	0	One-way stop
2017053424	Co Rd G17/120TH ST	SNYDER AVE	1	< 1.5	0	90	0	No	0	205	0	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	190	No	0	Two-way stop
2017053431	Co Rd V13/URBANA AVE	143RD ST	1	< 1.5	0	90	0	No	0	335	0	10	0	0	0	0	0	4	1	Negligible	0	0	0	2	320	No	0	Two-way stop
2017053442	Co Rd G17/120TH ST	QUEENS AVE	1	< 1.5	0	90	0	No	0	210	0	15	0	0	0	0	0	4	1	Negligible	0	0	0	2	190	No	0	Two-way stop
2017053469	Co Rd G13/105TH ST	GALESTON AVE	1	< 1.5	0	90	0	No	0	345	1	15	0	0	0	0	0	3	0	Negligible	0	0	0	2	330	No	0	One-way stop
2017053506	OAK ST	DRUSE ST	1	< 1.5	0	90	0	No	0	95	0	10	0	2	1	0	0	3	0	Negligible	0	0	0	3	85	No	0	One-way stop
2017053513	SPRUCE ST	OAK ST	1	< 1.5	0	90	0	No	0	205	0	10	0	1	1	0	0	3	0	Negligible	0	0	0	2	195	No	0	One-way stop
2017053780	230TH CR	230TH CR	1	< 1.5	0	90	0	No	0	35	0	5	0	2	1	0	0	3	0	Negligible	0	0	0	2	45	No	0	Uncontrolled
2017054001	Co Rd G29/175TH ST	IRVINE AVE	1	< 1.5	0	90	0	No	0	295	0	5	0	1	1	0	0	3	0	Negligible	0	0	0	2	290	No	0	One-way stop
2017053126	QUEENS AVE	250TH ST	0	< 1.5	0	90	0	No	0	315	0	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	310	No	0	One-way stop
2017053294	Co Rd G39/220TH ST	HIGHLAND AVE	0	< 1.5	0	90	0	No	0	280	0	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	270	No	0	One-way stop
2017053364	Co Rd T65/OXFORD AVE	180TH ST	0	< 1.5	0	90	0	No	0	310	0	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	300	No	0	One-way stop
2017053382	Co Rd G29/175TH ST	INDEPENDENCE AVE	0	< 1.5	0	90	0	No	0	300	0	10	0	0	0	0	0	3	0	Negligible	0	0	0	2	290	No	0	One-way stop
2017053422	Co Rd G17/120TH ST	UNION AVE	0	< 1.5	0	90	0	No	0	195	0	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	190	No	0	One-way stop
2017053425	Co Rd G17/120TH ST	RUTLEDGE AVE	0	< 1.5	0	90	0	No	0	195	0	5	0	0	0	0	0	3	0	Negligible	0	0	0	2	190	No	0	One-way stop

Disclaimer: Throughout the SAP 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 to the project sheets were made. As such the information in this table may vary from final information presented on the project sheets. Priority locations selected for project sheets were selected in coordination with the County and may not align with the highest scoring locations.

Mahaska County
Safety Action Plan
Intersection Risk Factor Points

GPS ID	Road Name	Intersecting Road	Total Risk Factor Points	Distance from Previous Stop (miles) (Value)	Distance from Previous Stop (miles) (Points)	Intersection Skew (degrees) (Value)	Intersection Skew (degrees) (Points)	Intersection Within Curve (Value)	Intersection Within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Access Management (250 ft) (Value)	Access Management (250 ft) (Points)	K and A Crashes (Value)	K and A Crashes (Points)	Number of Approaches (Value)	Number of Approaches (Points)	KABCO PCR Level (Value)	KABCO PCR Level (Points)	Total Crashes	Right Angle, Rear-end, or Turning Crashes	Number of Paved Approaches	Major Street ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type
2017053432	Co Rd V13/URBANA AVE	150TH ST	**0**	< 1.5	**0**	90	**0**	No	**0**	330	**0**	10	**0**	0	**0**	0	**0**	3	**0**	Negligible	**0**	0	0	2	320	No	0	One-way stop
2017053468	Co Rd G15/110TH ST	Co Rd T38/GALESTON AVE	**0**	< 1.5	**0**	90	**0**	No	**0**	225	**0**	15	**0**	0	**0**	0	**0**	3	**0**	Negligible	**0**	0	0	2	210	No	0	One-way stop

Disclaimer: Throughout the SAP 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 to the project sheets were made. As such the information in this table may vary from final information presented on the project sheets. Priority locations selected for project sheets were selected in coordination with the County and may not align with the highest scoring locations.

APPENDIX D1

CURVE SAFETY COUNTERMEASURES

COUNTY PAVED ROADWAY CURVE COUNTERMEASURES

This appendix summarizes the **curve** safety countermeasures for consideration and provides detailed descriptions for each countermeasure from both the risk factor analysis as well as the additional potential improvements listed on the back side of the project sheets.

Systematic Countermeasures

The countermeasures in this section were included in the risk factor analysis and recommended on the curve project sheets based on the criteria described in **Section 5.1.2.**

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 lane departure crash. If the lanes were 12 feet or wider, new edgeline pavement markings of six inches were recommended; Research suggests that widening pavement markings from four to six inches in rural areas results in a crash modification factor (CMF) of 0.64 to 0.83. Otherwise, new four-inch pavement markings were recommended. Research suggests that installing new 4' pavement markings in rural areas results in a CMF of 0.61 to 0.74.

Pave Shoulder with Safety Edge

Constructing or increasing the width of an existing paved 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 0.82 to 0.9. At locations where paved shoulders are recommended, it is suggested 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 Federal Highway Administration (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 0.85 to 0.92. 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."

Edgeline Rumble Strips

Edgeline rumble strips 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 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.

Centerline Rumble Strips

CMFs of 0.55 to 0.91 represent the safety benefit from 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 provides an audible and tactile warning to drivers when crossing the centerline and can aid in the avoidance of some high-severity lane departure crashes on curves.

Curve Chevron Advanced Curve Warning or Advisory Speed Signs

This countermeasure includes the installation of Curve Chevron signs—static or dynamic—and Advisory Speed Signs to improve driver awareness and navigation through horizontal curves. As identified by the FHWA, these treatments are proven safety countermeasures that significantly reduce crash risks, particularly on rural and county roads. Chevron signs, especially when enhanced with retroreflective materials or deployed in sequential dynamic formats, can reduce fatal and injury crashes by up to 60 percent. Advisory Speed Signs complement these by clearly communicating safe travel speeds based on curve geometry, helping drivers adjust behavior in advance. Together, these low-cost, high-impact interventions provide continuous visual guidance, and improve nighttime and low-visibility navigation.

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. A 0.78 CMF has been documented as distance from roadside features was increased.

Location Specific Countermeasures

Safety improvements not included on the first page of the curve project sheet may still merit consideration at a specific location. There are a variety of other safety improvements that could be considered that were not included in the risk factor analysis due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at curves throughout the county. The following sections describe several other curve safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets.

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 horizontal alignment/advisory speed sign (W1-1a 36”x36”). This additional curve signage could be appropriate in some situations to provide further emphasis to the change in horizontal alignment of the roadway.

Retroreflective Strips on Chevron Signposts

The installation of retroreflective strips on signposts is currently under study by Iowa State University (InTrans) and the preliminary results are positive. This countermeasure includes the installation of retroreflective strips on the posts of curve chevron signs. The strips can increase the visibility of curve chevron signs and increase driver awareness of changes in horizontal alignment. Public response to this countermeasure has been very positive.

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 warning since transverse rumble strips in Iowa are typically installed prior to

stop-controlled intersections. Transverse rumble strips installed as a traffic calming device have seen CMFs of 0.66.

Superelevation Correction

The use of superelevation, where none exists, or the correction of existing superelevation, can provide a safety benefit, helping to keep vehicles within the travel lanes while negotiating a curve, particularly at high speeds. This countermeasure requires substantial reconstruction of a curve and could reduce the amount of friction needed for vehicles to remain on the roadway in wet or snowy conditions. This recommendation is site-specific and would need additional attention by the County Engineer in order to be implemented at a specific location.

High Friction Surface Treatment (HFST)

This countermeasure involves applying a thin layer of durable, polish-resistant aggregate—typically calcined bauxite—bonded with a high-strength resin to the pavement surface at horizontal curves. HFST dramatically improves pavement friction, especially in wet or high demand braking conditions, helping drivers maintain control and reduce stopping distances. Though curves make up only about 5 percent of U.S. roadway miles, they account for over 25 percent of fatal crashes, underscoring the need for targeted safety interventions. HFST has been shown to reduce injury and fatal crashes by approximately 50 percent. Its long service life, rapid installation, and minimal environmental impact make it a cost-effective solution for high-risk locations.

Speed Activated Flashers on Chevron Signs

This countermeasure includes the installation of speed activated flashers either as beacons or as LED lights around the border of curve chevron signs. This improvement can provide additional warning to drivers exceeding the suggested speed limit prior to a curved section of roadway. The flashers can increase the visibility of curve chevron signs and increase driver awareness of changes in horizontal alignment, specifically when they are exceeding a designated speed. Where speed activated flashers have been installed in combination with curve chevrons and curve warning signage, CMFs of 0.59 to 0.61 have been recorded.

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 along an embankment.

On-pavement Markings for Speed Control

This improvement includes painting 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 of observing their speed. Research has shown a CMF of 0.62 for additional in-lane pavement markings.

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.” Providing 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.

APPENDIX D2
CURVE PROJECT SHEETS

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 16

Project Name: Curve 3573 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

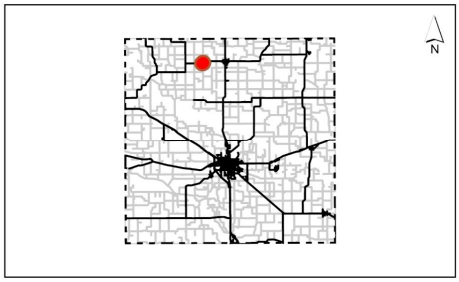
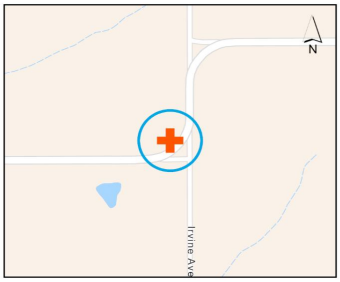
CURVE

Location Description

Road: **G5T**
Length (feet): **660** Length (Miles): **0.13**
Closest City: **New Sharon**
Project is within an Underserved Community?†: No
GPS ID: 3573

This curve is located within the following high scoring segment: GPS ID 6023

Project Location Maps

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,787	6
Curve Radius (ft)	496	4
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	142	1
Intersections | Driveways	2 | 0	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		**16**

Other Information	
Paved Shoulder	Yes
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	Yes
Centerline Rumble Strips	Yes
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	0
K and A Crashes	0
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	0
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.13**	**MILE**	**$ 6,000**	**$ 780**
Install 4" Retroreflective Centerline	**0.13**	**MILE**	**$ 3,000**	**$ 390**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0	MILE	$ 150,000	$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 7,170

Continued on back of this page.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 16

Project Name: Curve 3573 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3573

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 7,170
			Subtotal:	$ 7,170
			Mobilization: (% +/-)* 10%	$ 2,500
			Traffic Control: (% +/-) 5%	$ 466
			Contingency: (% +/-) 20%	$ 1,864
			Estimated Project Cost	**$ 12,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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 Kimley-Horn's judgment as a design professional familiar with the construction industry. 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. Kimley-Horn endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. The 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. No formal assessment was made for the improvement recommendations contained on this page. If in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of July 2024.

End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3403 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Location Description

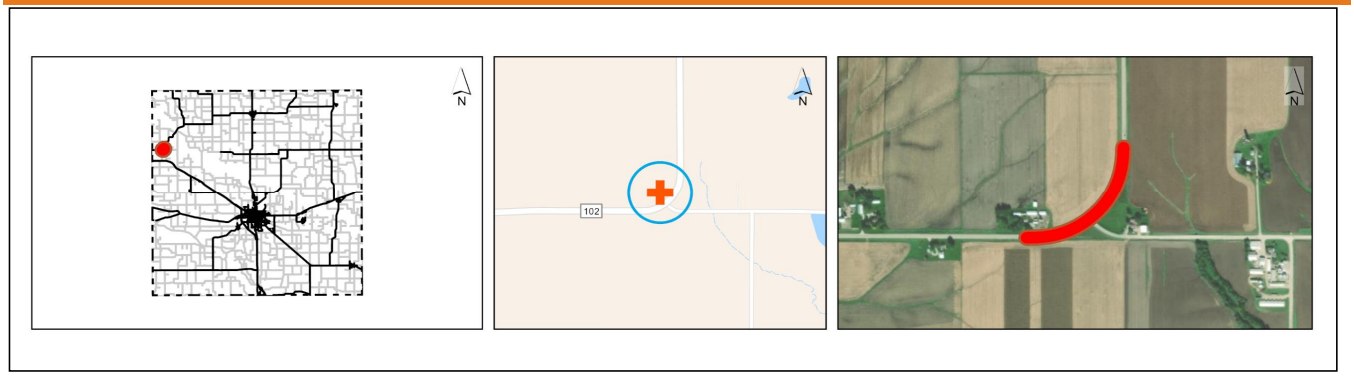
Road: **G5T**
Length (feet): **1,210** Length (Miles): **0.23**
Closest City: **Pella**

Project is within an Underserved Community?†: No

GPS ID: 3403

This curve is located within the following high scoring segment: GPS ID 6023

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,787	6
Curve Radius (ft)	785	3
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	107	1
Intersections | Driveways	1 | 1	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		**15**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	5
K and A Crashes	0
Lane Departure Crashes	3
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	333.3
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.23**	**MILE**	**$ 6,000**	**$ 1,380**
Install 4" Retroreflective Centerline	**0.23**	**MILE**	**$ 3,000**	**$ 690**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.23**	**MILE**	**$ 150,000**	**$ 34,500**
Install Edgeline Rumble Strips (Both Sides of Road)	**0.23**	**MILE**	**$ 5,000**	**$ 1,150**
Install Centerline Rumble Strips	**0.23**	**MILE**	**$ 2,000**	**$ 460**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 44,180

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Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3403 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3403

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 44,180
			Subtotal:	$ 44,180
			Mobilization: (% +/-)* 10%	$ 4,420
			Traffic Control: (% +/-) 5%	$ 2,280
			Contingency: (% +/-) 20%	$ 9,120
			Estimated Project Cost	**$ 60,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

Opinion of Probable Construction Cost Disclaimer:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3411 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Location Description

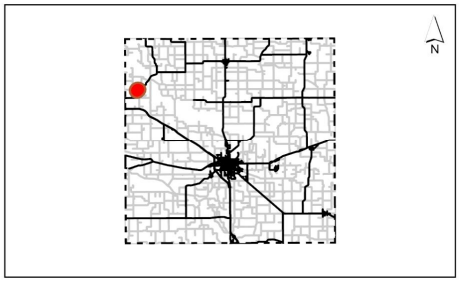
Road: **G5T**
Length (feet): **1,210** Length (Miles): **0.23**
Closest City: **Pella**

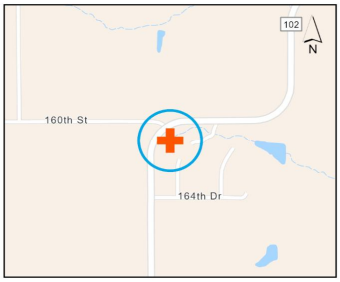
Project is within an Underserved Community?†: No

GPS ID: 3411

This curve is located within the following high scoring segment: GPS ID 6023

Project Location Maps





Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,787	6
Curve Radius (ft)	773	3
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	130	1
Intersections | Driveways	1 | 1	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		**15**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	1
K and A Crashes	0
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	66.7
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.23**	**MILE**	**$ 6,000**	**$ 1,380**
Install 4" Retroreflective Centerline	**0.23**	**MILE**	**$ 3,000**	**$ 690**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.23**	**MILE**	**$ 150,000**	**$ 34,500**
Install Edgeline Rumble Strips (Both Sides of Road)	**0.23**	**MILE**	**$ 5,000**	**$ 1,150**
Install Centerline Rumble Strips	**0.23**	**MILE**	**$ 2,000**	**$ 460**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 44,180

Continued on back of this page.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3411 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3411

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 44,180
			Subtotal:	$ 44,180
			Mobilization: (% +/-)* 10%	$ 4,420
			Traffic Control: (% +/-) 5%	$ 2,280
			Contingency: (% +/-) 20%	$ 9,120
			Estimated Project Cost	**$ 60,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

Opinion of Probable Construction Cost Disclaimer:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3428 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Location Description

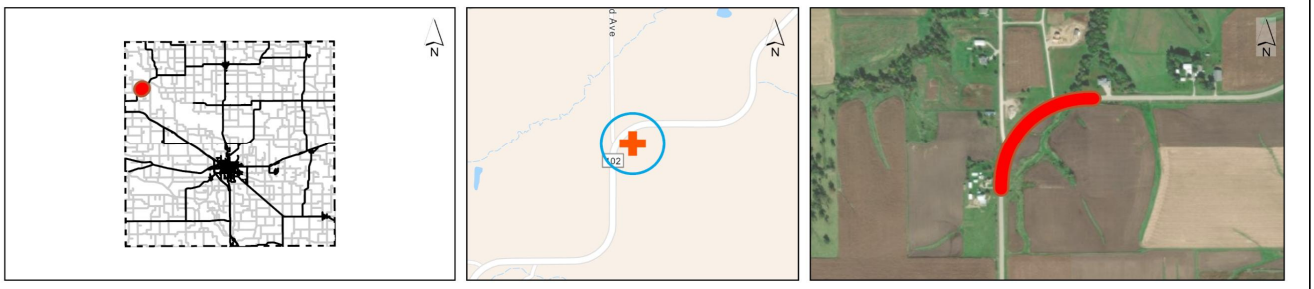
Road: **G5T**
Length (feet): **1,190** Length (Miles): **0.23**
Closest City: **Pella**

Project is within an Underserved Community?†: No

GPS ID: 3428

This curve is located within the following high scoring segment: GPS ID 6023

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,787	6
Curve Radius (ft)	764	3
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	153	1
Intersections | Driveways	1 | 2	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		**15**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	1
K and A Crashes	0
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	66.7
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.23**	**MILE**	**$ 6,000**	**$ 1,380**
Install 4" Retroreflective Centerline	**0.23**	**MILE**	**$ 3,000**	**$ 690**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.23**	**MILE**	**$ 150,000**	**$ 34,500**
Install Edgeline Rumble Strips (Both Sides of Road)	**0.23**	**MILE**	**$ 5,000**	**$ 1,150**
Install Centerline Rumble Strips	**0.23**	**MILE**	**$ 2,000**	**$ 460**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 44,180

Continued on back of this page.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3428 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3428

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Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 44,180
			Subtotal:	$ 44,180
			Mobilization: (% +/-)* 10%	$ 4,420
			Traffic Control: (% +/-) 5%	$ 2,280
			Contingency: (% +/-) 20%	$ 9,120
			Estimated Project Cost	**$ 60,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3575 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Location Description

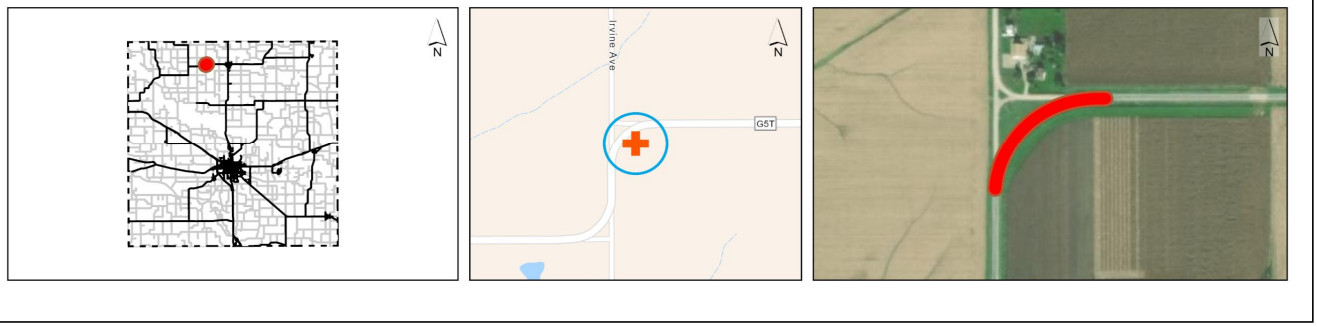
Road: **G5T**
Length (feet): **770** Length (Miles): **0.15**
Closest City: **New Sharon**

Project is within an Underserved Community?†: No

GPS ID: 3575

This curve is located within the following high scoring segment: GPS ID 6023

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,787	6
Curve Radius (ft)	510	3
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	137	1
Intersections | Driveways	2 | 0	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		**15**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	Yes
Centerline Rumble Strips	Yes
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	7
K and A Crashes	0
Lane Departure Crashes	7
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	715.5
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.15**	**MILE**	**$ 6,000**	**$ 900**
Install 4" Retroreflective Centerline	**0.15**	**MILE**	**$ 3,000**	**$ 450**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.15**	**MILE**	**$ 150,000**	**$ 22,500**
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 29,850

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Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 15

Project Name: Curve 3575 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3575

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 29,850
			Subtotal:	$ 29,850
			Mobilization: (% +/-)* 10%	$ 2,990
			Traffic Control: (% +/-) 5%	$ 1,632
			Contingency: (% +/-) 20%	$ 6,528
			Estimated Project Cost	**$ 41,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3444 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Location Description

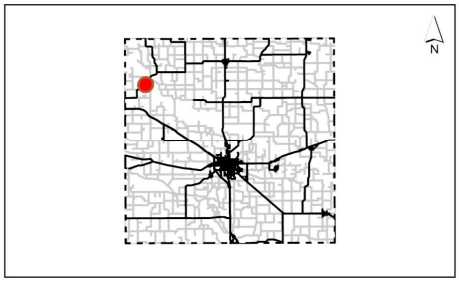
Road: **G5T**
Length (feet): **810** Length (Miles): **0.15**
Closest City: **Pella**

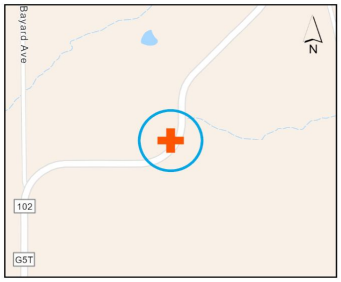
Project is within an Underserved Community?†: No

GPS ID: 3444

This curve is located within the following high scoring segment: GPS ID 6023

Project Location Maps





Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,787	6
Curve Radius (ft)	740	3
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	128	1
Intersections | Driveways	0 | 0	0
K or A Crash	1	2
Total Risk Factor Points (21 max)		**14**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	3
K and A Crashes	1
Lane Departure Crashes	3
Lane Departure K and A Crashes	1
Total Crash Rate (per HMVMT)	306.6
K and A Crash Rate (per HMVMT)	102.2

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.15**	**MILE**	**$ 6,000**	**$ 900**
Install 4" Retroreflective Centerline	**0.15**	**MILE**	**$ 3,000**	**$ 450**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.15**	**MILE**	**$ 150,000**	**$ 22,500**
Install Edgeline Rumble Strips (Both Sides of Road)	**0.15**	**MILE**	**$ 5,000**	**$ 750**
Install Centerline Rumble Strips	**0.15**	**MILE**	**$ 2,000**	**$ 300**
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 30,900

Continued on back of this page.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3444 on G5T
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3444

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 30,900
			Subtotal:	$ 30,900
			Mobilization: (% +/-)* 10%	$ 3,090
			Traffic Control: (% +/-) 5%	$ 1,602
			Contingency: (% +/-) 20%	$ 6,408
			Estimated Project Cost	**$ 42,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3692 on 170TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

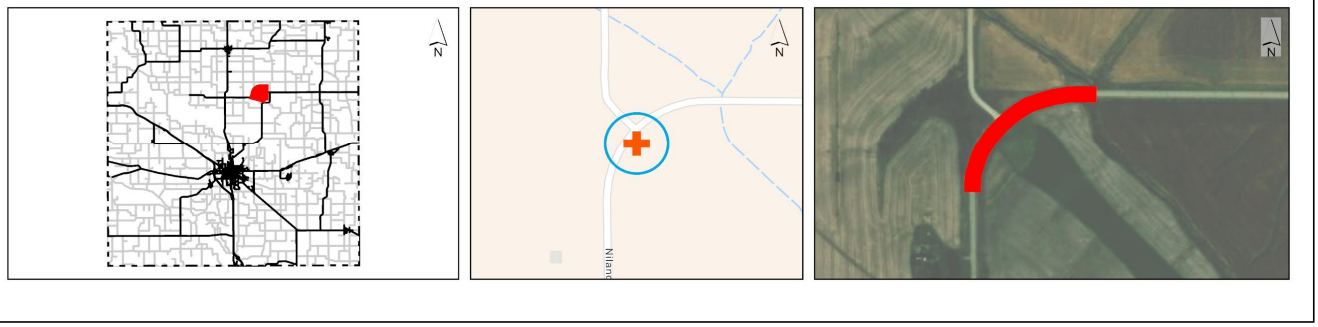
CURVE

Location Description

Road: **170TH STREET** | Project is within an Underserved Community?†: No | **GPS ID: 3692**
1 **1,100** Length (Miles): **0.21**
Closest City: **New Sharon**

This curve does not contain high scoring segments.

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	**385**	**3**
Curve Radius (ft)	**526**	**3**
Shoulder Width (ft)	**4**	**2**
Avg. Pavement Condition (IRI)	**130**	**1**
Intersections | Driveways	**1 | 0**	**3**
K or A Crash	**1**	**2**
Total Risk Factor Points (21 max)		**14**

Other Information	
Paved Shoulder	**No**
Shoulder Width (ft)	**4**
Speed Limit (mph)	**55**
Lane Width (ft)	**11.5**
Number of Lanes	**2**
Edgeline Rumble Strips	**No**
Centerline Rumble Strips	**No**
Existing Curve Chevrons	**Yes**

Crash Data, 2014-2023	
Total Crashes	**2**
K and A Crashes	**1**
Lane Departure Crashes	**2**
Lane Departure K and A Crashes	**1**
Total Crash Rate (per HMVMT)	**677.7**
K and A Crash Rate (per HMVMT)	**338.9**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	**0.21**	**MILE**	**$ 3,000**	**$ 630**
Install 6" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 6,000	$ -
Install 4" Retroreflective Centerline	**0.21**	**MILE**	**$ 3,000**	**$ 630**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.21**	**MILE**	**$ 150,000**	**$ 31,500**
Install Edgeline Rumble Strips (Both Sides of Road)	**0.21**	**MILE**	**$ 5,000**	**$ 1,050**
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 39,810

Continued on back of this page.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3692 on 170TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3692

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other: Install Centerline Rumble Strips	**0.21**	**MILE**	**$ 2,000**	**$ 420**
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ 420
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 39,810
			Subtotal:	$ 40,230
			Mobilization: (% +/-)* 10%	$ 4,030
			Traffic Control: (% +/-) 5%	$ 2,148
			Contingency: (% +/-) 20%	$ 8,592
			Estimated Project Cost	**$ 55,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

Opinion of Probable Construction Cost Disclaimer:
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Project Description Form Disclaimer:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3701 on 340TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

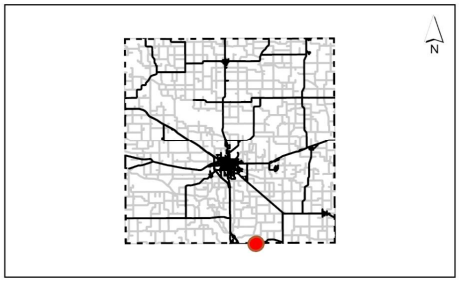
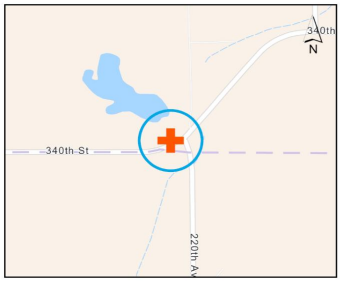
CURVE

Location Description

Road: **340TH STREET** Project is within an Underserved Community?†: No **GPS ID: 3701**
Length (feet): **590** Length (Miles): **0.11**
Closest City: **Eddyville**

This curve is located within the following high scoring segment: GPS ID 5999

Project Location Maps

Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	**720**	**5**
Curve Radius (ft)	**781**	**3**
Shoulder Width (ft)	**5**	**2**
Avg. Pavement Condition (IRI)	**126**	**1**
Intersections | Driveways	**2 | 0**	**3**
K or A Crash	**0**	**0**
Total Risk Factor Points (21 max)		**14**

Other Information	
Paved Shoulder	**No**
Shoulder Width (ft)	**5**
Speed Limit (mph)	**55**
Lane Width (ft)	**12**
Number of Lanes	**2**
Edgeline Rumble Strips	**Yes**
Centerline Rumble Strips	**Yes**
Existing Curve Chevrons	**Yes**

Crash Data, 2014-2023	
Total Crashes	**1**
K and A Crashes	**0**
Lane Departure Crashes	**1**
Lane Departure K and A Crashes	**0**
Total Crash Rate (per HMVMT)	**345.9**
K and A Crash Rate (per HMVMT)	**0**

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.11**	**MILE**	**$ 6,000**	**$ 660**
Install 4" Retroreflective Centerline	**0.11**	**MILE**	**$ 3,000**	**$ 330**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.11**	**MILE**	**$ 150,000**	**$ 16,500**
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 23,490

Continued on back of this page.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3701 on 340TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3701

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 23,490
			Subtotal:	$ 23,490
			Mobilization: (% +/-)* 10%	$ 2,500
			Traffic Control: (% +/-) 5%	$ 1,202
			Contingency: (% +/-) 20%	$ 4,808
			Estimated Project Cost	**$ 32,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

Opinion of Probable Construction Cost Disclaimer:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3704 on 340TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

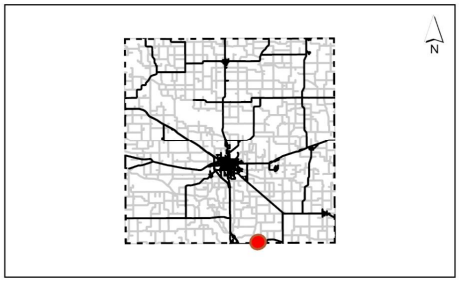
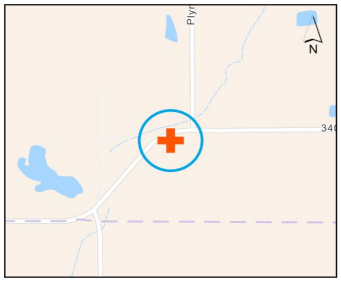
CURVE

Location Description

Road: **340TH STREET** Project is within an Underserved Community?†: No **GPS ID: 3704**
Length (feet): **760** Length (Miles): **0.14**
Closest City: **Eddyville**

This curve is located within the following high scoring segment: GPS ID 5999

Project Location Maps


Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	720	5
Curve Radius (ft)	893	3
Shoulder Width (ft)	5	2
Avg. Pavement Condition (IRI)	169	1
Intersections | Driveways	1 | 0	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		**14**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	Yes
Centerline Rumble Strips	Yes
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	0
K and A Crashes	0
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	0
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.14**	**MILE**	**$ 6,000**	**$ 840**
Install 4" Retroreflective Centerline	**0.14**	**MILE**	**$ 3,000**	**$ 420**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.14**	**MILE**	**$ 150,000**	**$ 21,000**
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 28,260

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Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3704 on 340TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3704

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 28,260
			Subtotal:	$ 28,260
			Mobilization: (% +/-)* 10%	$ 2,830
			Traffic Control: (% +/-) 5%	$ 1,582
			Contingency: (% +/-) 20%	$ 6,328
			Estimated Project Cost	**$ 39,000**

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

†Note on Underserved Communities Indicator:
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End of Project Description

Back Page

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3721 on 340TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

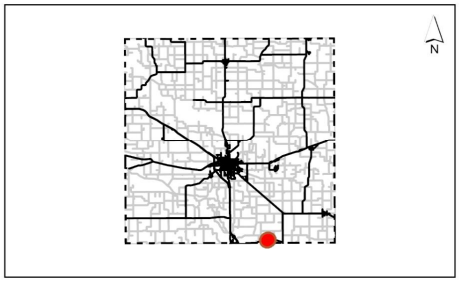
CURVE

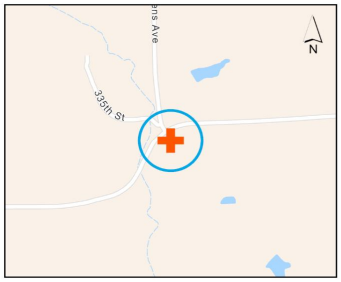
Location Description

Road: **340TH STREET** Project is within an Underserved Community?†: No **GPS ID: 3721**
Length (feet): **960** Length (Miles): **0.18**
Closest City: **Eddyville**

This curve is located within the following high scoring segment: GPS ID 5999

Project Location Maps





Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	720	5
Curve Radius (ft)	884	3
Shoulder Width (ft)	5	2
Avg. Pavement Condition (IRI)	147	1
Intersections | Driveways	1 | 0	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		**14**

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	Yes
Centerline Rumble Strips	Yes
Existing Curve Chevrons	Yes

Crash Data, 2014-2023	
Total Crashes	2
K and A Crashes	0
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	422.8
K and A Crash Rate (per HMVMT)	0

Opinion of Probable Cost (Countermeasure Selection Threshold Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0	MILE	$ 3,000	$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	**0.18**	**MILE**	**$ 6,000**	**$ 1,080**
Install 4" Retroreflective Centerline	**0.18**	**MILE**	**$ 3,000**	**$ 540**
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	**0.18**	**MILE**	**$ 150,000**	**$ 27,000**
Install Edgeline Rumble Strips (Both Sides of Road)	0	MILE	$ 5,000	$ -
Install Centerline Rumble Strips	0	MILE	$ 2,000	$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	$ 3,500	$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	**1**	**CURVE**	**$ 1,000**	**$ 1,000**
Clear and Grub (15 ft Both Sides of Road)	**1.00**	**CURVE**	**$ 5,000**	**$ 5,000**
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 34,620

Continued on back of this page.

Project Location Map Sources:
Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Kimley»Horn

Safety Action Plan
Project Description for Curve Improvements

Risk Factor Points: 14

Project Name: Curve 3721 on 340TH STREET
Agency Name: Mahaska County
Contact Name: Andrew McGuire
E-mail: mcguire@mahaskacountyia.gov

Date: 7/17/25
Prepared By: BL
Checked By: DJG

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 3721

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	$ 1,000	$ -
Retroreflective Strip on Chevron Sign Post		CURVE	$ 500	$ -
Transverse Rumble Strips Prior to Curve		CURVE	$ 5,000	$ -
Superelevation Correction		EA	$ 50,000	$ -
Install High Friction Surface Treatment (HFST) on Curve		CURVE	$ 60,000	$ -
Speed Activated Flasher on Chevron Sign		EA	$ 4,000	$ -
Guardrail		FOOT	$ 80	$ -
On-Pavement Marking for Speed Control		EA	$ 3,000	$ -
Post-Mounted Delineators		MILE	$ 5,000	$ -
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
			Additional Potential Improvements Subtotal:	$ -
			Project Selection Decision Tree Systemic Improvements Subtotal:	$ 34,620
			Subtotal:	$ 34,620
			Mobilization: (% +/-)* 10%	$ 3,470
			Traffic Control: (% +/-) 5%	$ 1,782
			Contingency: (% +/-) 20%	$ 7,128
			Estimated Project Cost	**$ 47,000**

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

†Note on Underserved Communities Indicator:
As part of the SS4A program an Underserved Community shares the same definition as an Area of Persistent Poverty (APP). According to the Bipartisan Infrastructure Law, an area is defined as an APP if it meets the following criteria: (A) the County consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: the 1990 decennial census, the 2000 decennial census; and the most recent (2023, for the purposes of this report) Small Area Income Poverty Estimates; OR (B) the Census Tract has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; OR (C) any territory or possession of the United States.

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 Kimley-Horn's judgment as a design professional familiar with the construction industry. 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. Kimley-Horn endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. The 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. No formal assessment was made for the improvement recommendations contained on this page. If in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of July 2024.

End of Project Description

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APPENDIX D3

CURVE RISK FACTOR RANKING RESULTS

Mahaska County
Safety Action Plan
Curve Risk Factor Points

GPS ID	Paved Road	Length (ft)	Total Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Shoulder Width (ft) (Value)	Shoulder Width (Points)	Pavement Condition (Value)	Pavement Condition (Points)	Intersections | Driveways (Value)	Intersections | Driveways Risk (Points)	K and A Crashes (Value)	K and A Crashes Risk (Points)	Total Crashes	Paved Shoulder	Speed Limit (mph)	Lane Width (ft)	Rumble Strips	Existing Curve Chevrons
3573	G5T	658.5	**16**	1,787	**6**	496	**4**	3	**2**	142	**1**	2 | 0	**3**	0	**0**	0	No	55	12	Yes	Yes
3403	G5T	1213.7	**15**	1,787	**6**	785	**3**	3	**2**	107	**1**	1 | 1	**3**	0	**0**	5	No	55	12	No	Yes
3411	G5T	1210.7	**15**	1,787	**6**	773	**3**	3	**2**	130	**1**	1 | 1	**3**	0	**0**	1	No	55	12	No	Yes
3428	G5T	1192.3	**15**	1,787	**6**	764	**3**	3	**2**	153	**1**	1 | 2	**3**	0	**0**	1	No	55	12	No	Yes
3575	G5T	768.3	**15**	1,787	**6**	510	**3**	3	**2**	137	**1**	2 | 0	**3**	0	**0**	7	No	55	12	Yes	Yes
3444	G5T	812.4	**14**	1,787	**6**	740	**3**	3	**2**	128	**1**	0 | 0	**0**	1	**2**	3	No	55	12	No	Yes
3690	NILAND AVENUE	432.7	**14**	370	**3**	567	**3**	4	**2**	115	**1**	1 | 0	**3**	1	**2**	2	No	55	12	No	Yes
3692	170TH STREET	398.3	**14**	385	**3**	526	**3**	4	**2**	130	**1**	1 | 0	**3**	1	**2**	2	No	55	11.5	No	Yes
3701	340TH STREET	585.8	**14**	720	**5**	781	**3**	5	**2**	126	**1**	2 | 0	**3**	0	**0**	1	No	55	12	Yes	Yes
3704	340TH STREET	763.9	**14**	720	**5**	893	**3**	5	**2**	169	**1**	1 | 0	**3**	0	**0**	0	No	55	12	Yes	Yes
3721	340TH STREET	955.7	**14**	720	**5**	884	**3**	5	**2**	147	**1**	1 | 0	**3**	0	**0**	2	No	55	12	Yes	Yes
3451	G5T	641.4	**13**	1,787	**6**	843	**3**	3	**2**	133	**1**	0 | 1	**1**	0	**0**	1	No	55	12	No	Yes
3481	DEAN AVENUE	377.5	**13**	1,130	**5**	386	**4**	4	**2**	109	**1**	0 | 5	**1**	0	**0**	0	No	55	12	No	Yes
3603	INDIAN WAY	264.2	**13**	1,760	**5**	610	**3**	10	**0**	219	**2**	1 | 1	**3**	0	**0**	0	No	55	12	No	Yes
3426	G5T	660.8	**12**	1,787	**6**	789	**3**	3	**2**	169	**1**	0 | 0	**0**	0	**0**	1	No	55	12	No	Yes
3460	CORDOVA AVENUE	1620.5	**12**	1,130	**5**	1,017	**1**	4	**2**	117	**1**	1 | 0	**3**	0	**0**	0	No	55	12	No	Yes
3464	G5T	940.0	**12**	1,787	**6**	1,333	**1**	3	**2**	40	**0**	1 | 0	**3**	0	**0**	3	No	55	12	Yes	Yes
3465	110TH STREET	739.8	**12**	1,130	**5**	1,027	**1**	4	**2**	113	**1**	1 | 0	**3**	0	**0**	0	No	55	12	No	Yes
3470	DEAN AVENUE	825.2	**12**	1,130	**5**	1,033	**1**	4	**2**	104	**1**	1 | 0	**3**	0	**0**	0	No	55	12	No	Yes
3478	DEAN AVENUE	941.6	**12**	1,130	**5**	1,523	**1**	4	**2**	100	**1**	1 | 1	**3**	0	**0**	0	No	55	12	No	Yes
3527	105TH STREET	1312.4	**12**	330	**2**	852	**3**	3	**2**	217	**2**	1 | 0	**3**	0	**0**	0	No	55	12	Yes	Yes
3543	INDIAN WAY	468.8	**12**	620	**4**	901	**3**	5	**2**	68	**0**	1 | 0	**3**	0	**0**	0	No	55	11	No	Yes
3681	OSBURN AVENUE	167.4	**12**	860	**5**	274	**4**	6	**0**	90	**0**	1 | 0	**3**	0	**0**	6	No	55	12	No	No
3688	NILAND AVENUE	418.8	**12**	370	**3**	534	**3**	4	**2**	97	**1**	1 | 0	**3**	0	**0**	1	No	55	12	No	Yes
3718	340TH STREET	747.3	**12**	720	**5**	855	**3**	5	**2**	120	**1**	0 | 1	**1**	0	**0**	2	No	55	12	Yes	Yes
3483	G5T	219.8	**11**	1,787	**6**	920	**3**	3	**2**	38	**0**	0 | 0	**0**	0	**0**	1	No	55	12	Yes	Yes
3542	GALESTON AVENUE	545.5	**11**	483	**3**	855	**3**	5	**2**	79	**0**	1 | 0	**3**	0	**0**	2	No	55	11	No	Yes
3569	INDIAN WAY	721.2	**11**	620	**4**	1,464	**1**	5	**2**	112	**1**	1 | 2	**3**	0	**0**	3	No	55	11	No	Yes
3594	SUFFOLK ROAD	410.3	**11**	90	**0**	302	**4**	5	**2**	455	**2**	1 | 1	**3**	0	**0**	0	No	55	9	No	Yes
3687	175TH STREET	448.9	**11**	370	**3**	580	**3**	4	**2**	83	**0**	1 | 0	**3**	0	**0**	1	No	55	12	No	Yes
3696	OXFORD AVENUE	658.6	**11**	358	**3**	885	**3**	6	**0**	39	**0**	1 | 0	**3**	1	**2**	1	Yes	55	11	Yes	Yes
3473	DEAN AVENUE	978.1	**10**	1,130	**5**	1,536	**1**	4	**2**	100	**1**	0 | 1	**1**	0	**0**	1	No	55	12	No	Yes
3480	DEAN AVENUE	200.5	**10**	1,130	**5**	557	**3**	4	**2**	92	**0**	0 | 0	**0**	0	**0**	0	No	55	12	No	Yes
3578	INDIAN WAY	864.5	**10**	620	**4**	1,197	**1**	5	**2**	79	**0**	1 | 1	**3**	0	**0**	0	No	55	11	No	Yes
3587	INDIAN WAY	611.5	**10**	620	**4**	814	**3**	5	**2**	74	**0**	0 | 3	**1**	0	**0**	1	No	55	11	No	Yes
3745	340TH STREET	470.4	**10**	720	**5**	1,383	**1**	5	**2**	111	**1**	0 | 1	**1**	0	**0**	0	No	55	12	Yes	No
3661	MERINO AVENUE	240.4	**9**	330	**2**	584	**3**	4	**2**	242	**2**	0 | 0	**0**	0	**0**	0	No	45	10	No	Yes
3697	OXFORD AVENUE	1549.8	**9**	358	**3**	992	**3**	6	**0**	56	**0**	1 | 0	**3**	0	**0**	0	Yes	55	11	Yes	Yes
3826	URBANA AVENUE	827.0	**9**	328	**1**	1,702	**1**	4	**2**	191	**2**	2 | 1	**3**	0	**0**	0	No	55	12	No	No
3526	105TH STREET	520.1	**8**	330	**2**	1,195	**1**	3	**2**	322	**2**	0 | 1	**1**	0	**0**	0	No	55	12	Yes	Yes
3597	SUFFOLK ROAD	380.5	**8**	90	**0**	302	**4**	5	**2**	344	**2**	0 | 0	**0**	0	**0**	0	No	55	9	No	Yes
3602	JOINER AVENUE	830.2	**8**	500	**3**	1,883	**1**	6	**0**	107	**1**	1 | 0	**3**	0	**0**	1	No	45	12	No	No
3632	LINCOLN AVENUE	177.2	**8**	120	**0**	363	**4**	4	**2**	386	**2**	0 | 0	**0**	0	**0**	0	No	55	9	No	No
3633	LYNNDALE ROAD	359.4	**8**	220	**0**	363	**4**	4	**2**	174	**2**	0 | 0	**0**	0	**0**	0	No	55	9	No	No
3639	310TH STREET	513.0	**8**	652	**4**	1,603	**1**	5	**2**	40	**0**	0 | 1	**1**	0	**0**	1	No	55	11	Yes	No
3834	URBANA AVENUE	799.5	**8**	328	**1**	1,668	**1**	4	**2**	122	**1**	1 | 0	**3**	0	**0**	0	No	55	12	No	No
3839	URBANA AVENUE	1035.4	**8**	328	**1**	1,275	**1**	4	**2**	111	**1**	2 | 0	**3**	0	**0**	0	No	55	12	No	Yes
3842	VENTURA AVENUE	507.6	**8**	330	**2**	968	**3**	6	**0**	83	**0**	1 | 0	**3**	0	**0**	1	No	55	11	No	Yes
3846	URBANA AVENUE	750.3	**8**	328	**1**	1,241	**1**	4	**2**	166	**1**	1 | 0	**3**	0	**0**	0	No	55	12	No	Yes
3584	175TH STREET	1013.7	**7**	287	**0**	1,030	**1**	5	**2**	113	**1**	1 | 0	**3**	0	**0**	0	No	55	12	No	Yes
3628	310TH STREET	522.5	**7**	652	**4**	1,574	**1**	5	**2**	47	**0**	0 | 0	**0**	0	**0**	0	No	55	11	Yes	No
3642	LUMINARY LANE	266.6	**7**	125	**0**	415	**4**	8	**0**	288	**2**	0 | 2	**1**	0	**0**	0	No	55	9	No	No
3686	OXFORD AVENUE	500.7	**7**	358	**3**	1,580	**1**	6	**0**	56	**0**	1 | 2	**3**	0	**0**	0	Yes	55	11	No	Yes
3707	OXFORD AVENUE	1571.7	**7**	358	**3**	1,009	**1**	6	**0**	45	**0**	1 | 0	**3**	0	**0**	1	Yes	55	11	Yes	Yes
3749	RUTLEDGE AVENUE	545.8	**7**	456	**3**	1,284	**1**	4	**2**	163	**1**	0 | 0	**0**	0	**0**	2	No	55	12	No	No
3840	URBANA AVENUE	546.9	**7**	330	**2**	1,103	**1**	8	**0**	158	**1**	1 | 0	**3**	0	**0**	1	No	55	11	No	Yes
3546	220TH STREET	169.4	**6**	269	**0**	532	**3**	5	**2**	116	**1**	0 | 0	**0**	0	**0**	0	No	55	12	No	No
3844	URBANA AVENUE	722.9	**6**	328	**1**	1,675	**1**	4	**2**	149	**1**	0 | 1	**1**	0	**0**	0	No	55	12	No	No
3504	220TH STREET	446.4	**5**	269	**0**	559	**3**	5	**2**	60	**0**	0 | 0	**0**	0	**0**	0	No	55	12	No	Yes
3580	175TH STREET	1012.3	**5**	287	**0**	1,079	**1**	5	**2**	187	**2**	0 | 0	**0**	0	**0**	0	No	55	12	No	Yes
3679	OXFORD AVENUE	728.8	**5**	358	**3**	1,554	**1**	6	**0**	87	**0**	0 | 2	**1**	0	**0**	0	Yes	55	11	No	Yes
3832	URBANA AVENUE	1026.5	**5**	328	**1**	1,276	**1**	4	**2**	129	**1**	0 | 0	**0**	0	**0**	1	No	55	12	No	Yes
3838	URBANA AVENUE	806.3	**5**	328	**1**	1,670	**1**	4	**2**	146	**1**	0 | 0	**0**	0	**0**	0	No	55	12	No	No
3841	URBANA AVENUE	939.4	**5**	328	**1**	1,320	**1**	4	**2**	133	**1**	0 | 0	**0**	0	**0**	0	No	55	12	No	Yes
3830	URBANA AVENUE	1010.1	**4**	330	**2**	1,058	**1**	8	**0**	163	**1**	0 | 0	**0**	0	**0**	0	No	55	11	No	Yes
3835	URBANA AVENUE	1044.7	**4**	330	**2**	1,108	**1**	8	**0**	159	**1**	0 | 0	**0**	0	**0**	0	No	55	11	No	Yes
3849	VENTURA AVENUE	1097.1	**3**	330	**2**	1,030	**1**	6	**0**	85	**0**	0 | 0	**0**	0	**0**	0	No	55	11	No	Yes
3851	VENTURA AVENUE	670.3	**3**	330	**2**	1,385	**1**	6	**0**	77	**0**	0 | 0	**0**	0	**0**	3	No	55	11	No	Yes

Disclaimer: Throughout the SAP 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 to the project sheets were made. As such the information in this table may vary from final information presented on the project sheets. Priority locations selected for project sheets were selected in coordination with the County and may not align with the highest scoring locations.

Mahaska County
Safety Action Plan
Curve Risk Factor Points

GPS ID	Paved Road	Length (ft)	Total Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Shoulder Width (ft) (Value)	Shoulder Width (Points)	Pavement Condition (Value)	Pavement Condition (Points)	Intersections | Driveways (Value)	Intersections | Driveways Risk (Points)	K and A Crashes (Value)	K and A Crashes Risk (Points)	Total Crashes	Paved Shoulder	Speed Limit (mph)	Lane Width (ft)	Rumble Strips	Existing Curve Chevrons
3855	VENTURA AVENUE	663.7	**3**	330	**2**	1,338	**1**	6	**0**	66	**0**	0 | 0	**0**	0	**0**	0	No	55	11	No	Yes

Disclaimer: Throughout the SAP 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 to the project sheets were made. As such the information in this table may vary from final information presented on the project sheets. Priority locations selected for project sheets were selected in coordination with the County and may not align with the highest scoring locations.

APPENDIX E

UNPAVED ROADWAY COUNTERMEASURES

COUNTY UNPAVED ROADWAY COUNTERMEASURES

This appendix summarizes various unpaved road safety countermeasures for consideration and provides descriptions for each countermeasure.

Gravel Roads Construction & Maintenance Guide

Federal Highway Administration (FWHA) 2015

A thorough resource on unpaved roads is provided by the FHWA entitled: ***Gravel Roads Construction & Maintenance Guide***, which can be found at the following website: https://www.fhwa.dot.gov/construction/pubs/ots15002.pdf. This guide is quoted throughout this appendix. The guide includes detailed sections on the following topics:

- Routine Maintenance and Rehabilitation
- Drainage
- Surface Gravel
- Dust Control/Stabilization
- Innovations

The summary of the guide states: "The first and most basic thing to understand in road maintenance and construction is proper shape of the cross section. The road surface must have enough crown to drain water to the shoulder, but not excessive crown which impacts roadway safety." "When proper shape is established and good surface gravel is placed, many gravel road maintenance problems simply go away, and road users are provided the best possible service from gravel roads" (Gravel Roads Construction & Maintenance Guide, FHWA, 2015).

Unpaved Roadway Safety Countermeasures

The following sections provide general information on additional safety countermeasures for unpaved roadways.

Maintenance of Gravel

It is important to preserve and maintain a proper road crown (four to six percent) 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. According to the FHWA, "improper maintenance can lead to very quick deterioration of a gravel road, especially in wet weather". It is also important to perform preventive maintenance to ensure that high shoulders, secondary ditches, berms, or curbs do not form. Per the FHWA, "when a gravel road develops high shoulders, it restricts the surface water from draining into the designed ditch. This creates a serious safety hazard. The time spent in eliminating a high shoulder (secondary ditch) will result in a road that is easier to maintain afterwards."

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.

Major Rehabilitation

"At certain intervals, virtually every gravel road requires some major rehabilitation" (FHWA, 2015). This countermeasure involves not only reshaping the road surface, but the shoulder, foreslope and ditches. It is important that the redeveloped cross section be uniform, and that good drainage is provided, prior to replacing the surface gravel – failure to provide proper

drainage or crown in the road surface can lead to corrugation or washboarding, which can lead to loss of vehicle control.

The use of electronic slope controls has proven useful in gravel road maintenance, rehabilitation, and basic reconstruction. It is recommended that the county consider installing electronic slope controls on existing equipment to create a proper profile for new surfaces more efficiently.

Upgrade Signs

The following countermeasures relate to potential sign upgrades on the unpaved roadway system.

Stop 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) has crash modification factors (CMFs) from 0.75 to 0.91. This improvement increases the visibility of the signs, giving drivers more time to react to the stop-controlled condition.

Curve Chevron

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 on their paved system, along curves located on their unpaved system. Installing curve chevron signs has CMFs ranging from 0.75 to 0.96, and when installed in combination with other advance warning signage, has CMFs ranging from 0.59 to 0.61.

Advance Curve Warning Signs and Speed Advisory Plaques

Providing advance warning of unexpected changes in horizontal alignment in conjunction with curve chevron signs has reported CMFs ranging from 0.59 to 0.61.

Delineate Roadside Hazards with Retroreflective Markers

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

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 Highway Safety Manual (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.

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.

Driveway Entrance Policy

It is recommended by the FHWA that, "to reduce maintenance problems [at driveways along unpaved roadways], [counties should] implement a permitting process. It should address the proper control of grade to match road edge, adequate width, and drainage."

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. Per the FHWA, "there is yet another great benefit of mowing [clearing and grubbing]; by removing the standing vegetation, drifting snow will not be trapped on the roadway, resulting in drastically reduced snow removal costs."

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.

APPENDIX F
WORKSHOP MATERIALS

County Safety Workshop

WHAT IS A SAFETY ACTION PLAN (SAP)?

A Safety Action Plan (SAP) is a document that provides local governments the means to make strategic roadway safety improvements. The plan will identify the most significant roadway safety concerns in your community and outline the projects and strategies to address them. In addition to assisting local practitioners in understanding crash trends within their jurisdiction, a SAP will also be a locally focused plan for practitioners to make informed, prioritized safety decisions.

WHAT IS SAFE STREETS AND ROADS FOR ALL (SS4A)?

The Safe Streets and Roads for All (SS4A) discretionary grant program was established by the Bipartisan Infrastructure Law (BIL) and has $5M in appropriated funds for the 5-year period from 2022 to 2026. This federal grant supports local jurisdictions planning, infrastructure, behavioral, and operational initiatives to prevent death and serious injury for all roadway users, with an emphasis on equity to improve roads and streets under local ownership.

WHAT ARE THE BENEFITS OF A SAP?

- The results will allow local jurisdictions to apply for SS4A funding
- Strengthens a community's approach to eliminating roadway fatalities and serious injuries
- Focus on all of the five Es of safety (Enforcement, Engineering, Emergency Response, Education and Everyone)
- Provides the opportunity to prioritize safety improvements and justify investment decisions in coordination with various partner agencies.

DRIVER-RELATED EMPHASIS AREAS

YOU ARE INVITED TO PARTICIPATE, WE NEED YOUR HELP!

While engineering improvements can make the roads safer, they cannot prevent motor vehicle crashes alone. Because a high percentage of crashes are a result of driver-related factors, making roadways safer requires individuals representing the Es of safety (education, emergency medical services, engineering, and enforcement) to be involved. Each discipline has a unique perspective on improving traffic safety while also remaining connected to the other disciplines. The success of your SAP relies on input from roadway safety stakeholders as your input will help define driver-related countermeasures to improve safety in your county.

WORKSHOP INFORMATION:

When:

8:30am - 11:30am
Thursday September 19, 2024

Location:

Contact:

Andrew McGuire
641-672-2897
amcguire@keokukcounty.iowa.gov

Kimley»Horn

MAHASKA COUNTY STAKEHOLDER WORKSHOP SIGN-IN SHEET

Date/Time: September 19, 2024, 8:30 AM - 11:30 AM

Location: Mahaska County Engineer Office, 2074 Old Hwy. 163, Oskaloosa, IA 52577

Initials	Name	Agency/Role	E-Mail	Phone Number
	Benjamin Boeke	Oskaloosa Police Department		641-673-3201
✓	Carter Brehm		brehm@mahaskacountyia.gov	641-672-2897
	Alan Carmichael	Oskaloosa Police Dept.		
	Paula Falconer	Olive Tree Family Resources Inc.	pfalconerotfr@gmail.com	
	Mike Fisher	Oskaloosa	Fisherm@oskycsd.org	641-673-8345
✓	David Giacomin	Kimley-Horn	david.giacomin@kimley-horn.com	775-200-1981
	Curt Grandia	Mahaska County Veteran's Affairs	Veteran@mahaskacountyia.gov	641-673-7727
	Mark Groenendyk	Mahaska County Board of Supervisors	supervisors@mahaskacountyia.gov	641-673-3469
	Dave Gute	Fremont-Mills	dgute@fmtabor.org	712-629-2325
	Adam Haroldson	Oskaloosa Fire Department		
SMH	Shane Hochstetler	LT Leon	shochstetler@ltleon.com	515-422-7016

MAHASKA COUNTY STAKEHOLDER WORKSHOP SIGN-IN SHEET

Date/Time: September 19, 2024, 8:30 AM - 11:30 AM

Location: Mahaska County Engineer Office, 2074 Old Hwy. 163, Oskaloosa, IA 52577

Initials	Name	Agency/Role	E-Mail	Phone Number
	Jason Marlow	Public Resource Officers	marlow@dps.state.ia.us	319-505-7410
AJM	Andrew McGuire	County Engineer	amcguire@keokukcounty.iowa.gov	641-672-2897
	Logan Nord	Oskaloosa Police Dept.	lnord@oskaloosaiowa.org	
	Andrew Ritland	Mahaska County Attorney	attorney@mahaskacountyia.gov	641-673-9819
	Lindsey Schroeder	ICEA	lindsey.schroeder@iceasb.org	319-230-8444
	Josh Stevens	Mahaska County Emergency Management	jstevens@mahaskaema.com	641-672-1209
	Russell Van Renterghem	Sheriff's Office	sheriff@mahaskacountyia.gov	641-673-4322
	Scott Vaughan	Oskaloosa Fire Department		641-673-3541
	Tim Veiseth	North Mahaska	veisetht@nmwarhawks.org	641-637-4187 ext. 1654
	Steve Wanders	Mahaska County Board of Supervisors	supervisors@mahaskacountyia.gov	641-673-3469
C.W.	Chuck Webb	Mahaska County Board of Supervisors	supervisors@mahaskacountyia.gov	641-673-3469

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Initials	Name	Agency/Role	E-Mail	Phone Number
E,D	ERIC DURSKY	MAHASKA COUNTY PUBLIC HEALTH	SANITARIAN@ MAHASKA COUNTY IA.GOV	641-660-3419
MG	MITCH GIBB	MAHASKA COUNTY ENGINEER	gibb@mahaskacountyia.gov	641-670-0684
MR.	Mike Rodwell	Mahaska. County	rodwell@mahaskacountyia.gov	641-672-2897