Bridger Canyon Corridor Planning Study

March 2015

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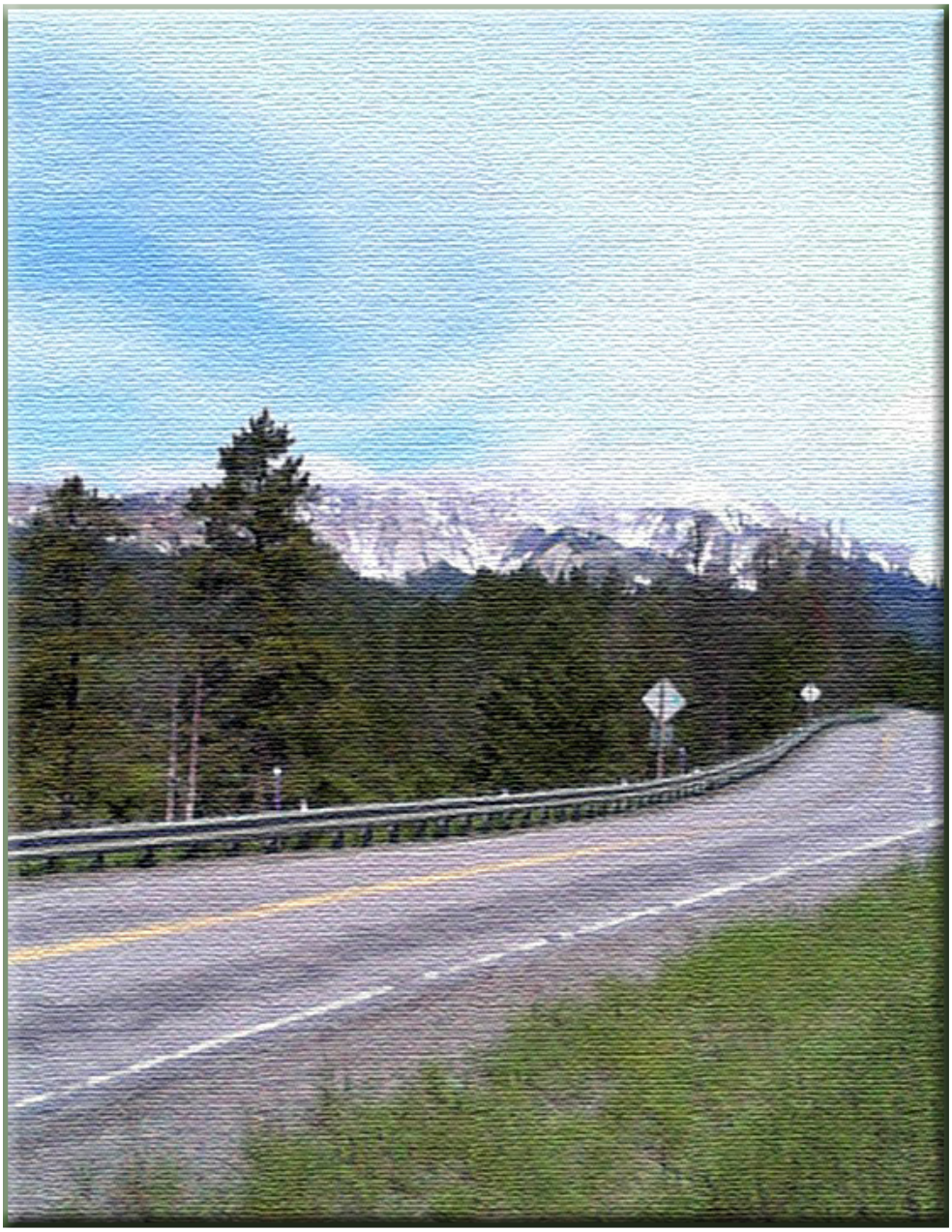

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Appendix A: Public and Agency Participation Materials (on CD)
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Appendix C: Environmental Scan Report (on CD)
Appendix D: Improvement Options Report (on CD)

Visit the study website at:

http://www.mdt.mt.gov/pubinvolve/bridger

Acknowledgments

The following individuals assisted in the development of the Bridger Canyon Corridor Planning Study.

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Abbreviations and Acronyms

AADT ..... Annual Average Daily Traffic
AASHTO ..... American Association of State Highway and Transportation Officials
ADA ..... Americans with Disabilities Act
APE ..... Area of Potential Effect
ARM ..... Administrative Rules of Montana
CAPS ..... Crucial Areas Planning System
CFR ..... Code of Federal Regulations
DEQ ..... Montana Department of Environmental Quality
DNRC ..... Montana Department of Natural Resources and Conservation
FAQs ..... Frequently Asked Questions
FHWA ..... Federal Highway Administration
FWP ..... Montana Fish, Wildlife & Parks
GNF ..... Gallatin National Forest
GO ..... General Obligation
HCM ..... Highway Capacity Manual
HSIP ..... Highway Safety Improvement Program
HUC ..... Hydrologic Unit Code
LOS ..... Level of Service
LOSS ..... Level of Service of Safety
LUST ..... Leaking Underground Storage Tank
LWCFA ..... Land and Water Conservation Fund Act
MAP-21 ..... Moving Ahead for Progress in the 21st Century Act
MBMG ..... Montana Bureau of Mines and Geology
MCA ..... Montana Code Annotated
MDT ..... Montana Department of Transportation
MEPA ..... Montana Environmental Policy Act
MNHP ..... Montana Natural Heritage Program
MPDES ..... Montana Pollutant Discharge Elimination System
mph ..... miles per hour
NEPA ..... National Environmental Policy Act
NHPA ..... National Historic Preservation Act
NHS ..... National Highway System
NRHP ..... National Register of Historic Places
NRIS ..... Natural Resource Information System
PROWAG ..... Public Rights-Of-Way Accessibility Guidelines
RP ..... Reference Post
RSID ..... Rural Special Improvement District
Section 4(f) ..... Section 4(f) of the 1966 Department of Transportation Act
Section 6(f) ..... Section 6(f) of the National Land and Water Conservation Funds Act
SFC ..... State Funded Construction
SFHA ..... Special Flood Hazard Area
SHPO ..... State Historic Preservation Office
SIAP ..... System Impact Action Process
SID ..... Special Improvement District
SPA ..... Montana Stream Protection Act
SPF ..... Safety Performance Function
STIP ..... State Transportation Improvement Program
STP ..... Surface Transportation Program
STPP ..... Surface Transportation Program Primary
STPS ..... Surface Transportation Program Secondary
STPU ..... Surface Transportation Program Urban
TA ..... Transportation Alternatives
TMDL ..... Total Maximum Daily Load
UPN ..... Unified Project Number
USACE ..... U.S. Army Corps of Engineers
USC ..... United States Code
USFWS ..... U.S. Fish and Wildlife Service
VMS ..... Variable Message Signage
WFLHD ..... Western Federal Lands Highway Division

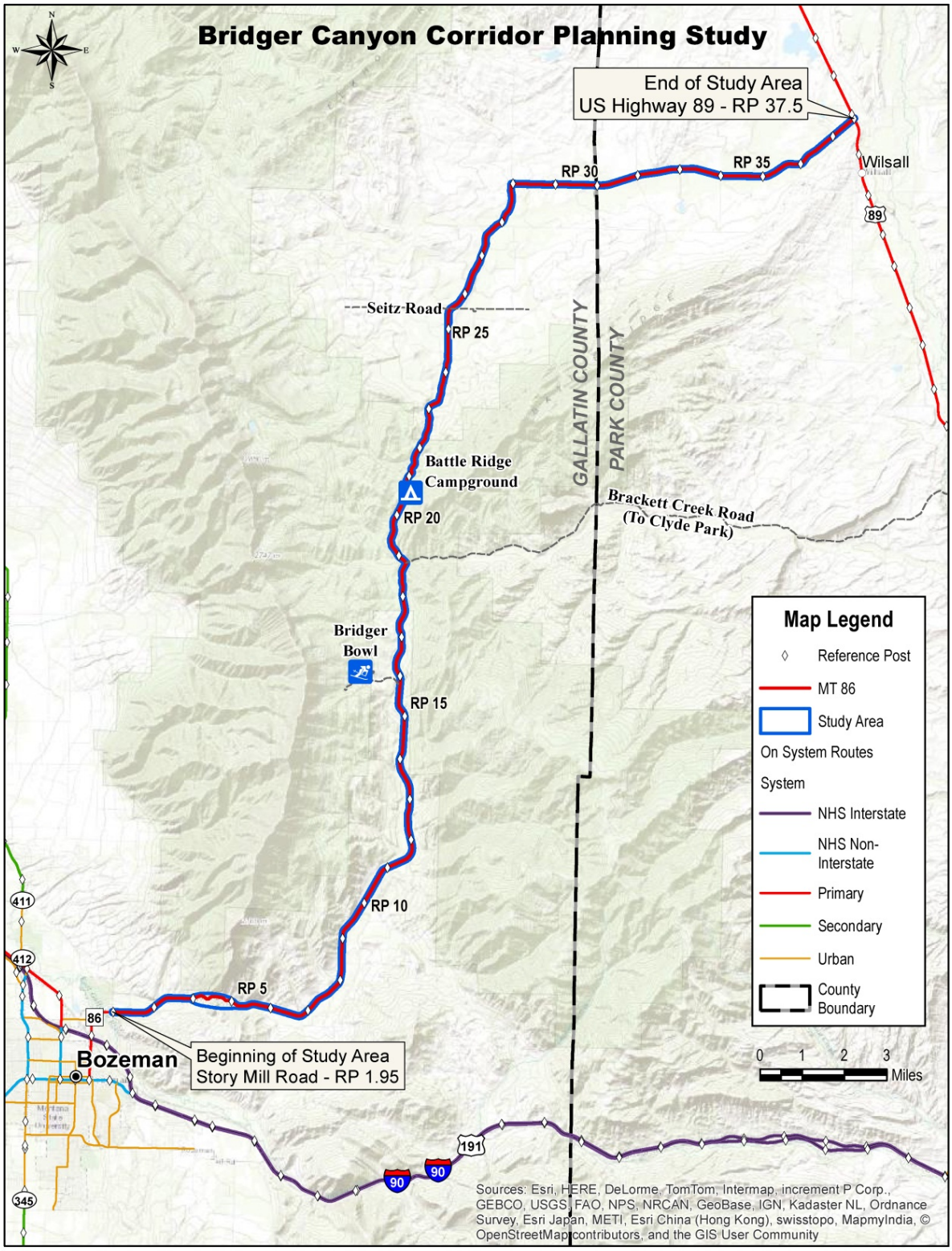
Executive Summary

The Montana Department of Transportation (MDT), in cooperation with Gallatin and Park Counties and the Federal Highway Administration (FHWA), initiated a corridor planning study on Montana Highway 86 (MT 86) between the intersection of Story Mill Road and the junction with United States Route 89 (US 89). MT 86 provides access to the Bridger Mountains, the Gallatin National Forest, downhill skiing at the Bridger Bowl ski area, and cross-county skiing at Bohart Ranch.

A corridor planning study is a planning-level assessment of a study area occurring before project-level environmental compliance activities under the National and Montana Environmental Policy Acts (NEPA/MEPA). The corridor study process is designed to determine what, if anything, can be done to improve the corridor and to facilitate a smooth and efficient transition from transportation planning to environmental review and potential project development. The process involves conducting a planning-level review of safety, operational, and geometric conditions and environmental resources within a corridor to identify needs and constraints. The process also allows for early coordination with members of the public, resource agencies, and other interested stakeholders. This planning process is distinct from a NEPA/MEPA environmental compliance document or design, right-of-way acquisition, or construction phases that occur during project development.

The study area is illustrated in Figure ES-1 and begins at the MT 86 intersection with Story Mill Road at Reference Post (RP) 1.95 just east of Bozeman, MT, and ends at the intersection with US 89 at RP 37.5 near Wilsall, MT. It includes the MT 86 corridor and a 300-foot buffer on both sides of the roadway (for a total buffer width of 600 feet) throughout the majority of the corridor. A buffer width ranging up to approximately 1,700 feet is included from approximate RP 4.0 to RP 5.0 to include a landslide and historic quarry at approximate RP 4.4.

Figure ES-1 Study Area



ES.1 Existing and Projected Conditions

Issues and concerns identified through review of existing and projected conditions are listed below.

- Bridges – Three bridges in the study corridor are candidates for repair.
- Bicycle and Pedestrian Facilities – There are no dedicated bicycle or pedestrian facilities directly adjacent to MT 86.
- Drainage Condition – Insufficient drainage was observed at RP 15.9, RP 23.4, and RP 26.8.
- Pavement Condition – Pavement deficiencies (including transverse cracking, longitudinal cracking, and/or subgrade/pavement failure) were identified at RP 6.7, RP 15.9, RP 23.4, RP 24.4, RP 26.8, RP 28.0.
- Rockfall Hazard – A slide near RP 4.4 is reported to be unstable and susceptible to continuous sloughing; an earthquake or heavy precipitation event could activate a slide event in this location.
- Horizontal Alignment – Thirty-eight curve locations do not meet current MDT design criteria.
- Vertical Alignment – One hundred twenty-eight curve locations do not meet current MDT design criteria.
- Clear Zones – The portion of the corridor from RP 4.0 to RP 24.0 intermittently contains unprotected slopes and inadequate clear zone distances.
- Crash History – Areas identified with high potential for crash reduction occur near RP 5, 9, 19, 21, 29, 30, and 36.
- Environmental Conditions – Physical, biological, social, and cultural features within the study area may be affected by potential improvements within the MT 86 corridor.

ES.2 Needs and Objectives

Needs and objectives for the Bridger Canyon Corridor Planning Study were developed based on existing and projected conditions within the corridor, input from the public and resource agencies, and coordination with the study advisory committee. Needs, objectives, and considerations are not listed in order of priority.

Need 1: Improve the safety of MT 86 for all users.

Objectives:
To the extent practicable:

- Improve roadway elements to meet current MDT design criteria.
- Identify strategies to address locations with high potential for crash reduction and other areas of safety concern.

Need 2: Maintain infrastructure assets in the corridor.

Objectives:
To the extent practicable:

- Address areas with inadequate drainage.
- Conduct appropriate maintenance and repair activities.

Other Considerations

- Local planning efforts for all modes, planned projects, and potential future development in the corridor.
- Wildlife movement and animal-vehicle conflicts.
- Scenic character of the corridor and potential adverse impacts to environmental resources that may result from improvement options.
- Funding availability.
- Temporary construction impacts.
- Construction feasibility and physical constraints.

ES.3 Improvement Options

This report outlines a range of improvement options MDT may consider for future implementation in the MT 86 corridor. Improvement options are intended to address corridor needs and objectives, which were identified through a review of existing and projected conditions within the corridor, input from the public and resource agencies, and coordination with the study advisory committee. Potential future improvements include short- and long-term options to address bridge repairs, curve geometry and roadway width, drainage issues, intersection sight distance and alignment, roadside safety, and traffic control in order to improve safety for MT 86 users and maintain MDT's infrastructure assets.

The study identifies a range of options MDT may consider for implementation in the MT 86 corridor in the future. MDT may elect to implement a single option or combine multiple options at the time a project is nominated. Table ES.1 lists improvement options identified for the Bridger Canyon corridor.

Table ES.1 Improvement Options Summary

Option Category	Option ID	Option Description	Locations	Planning-level Cost Estimate[1]	Potential Implementation Timeframe[2]	Potentially-impacted Resources	Anticipated ROW
Bridge Repairs	**Option 1**	Bridge Repairs	RP 7.8 (Stock Pass) RP 24.4 (Cache Creek) RP 26.8 (Carrol Creek) RP 28.0 (Flathead Creek)	$50,000 to $110,000 (per bridge)	Short-term to mid-term	Yes	No
Curve Geometry and Roadway Width	**Option 2.a**	Roadway Realignment at Slide Area[3]	RP 4.3 to RP 4.6 (slide area)	Reconstruction: $1,100,000 to $1,200,000	Long-term	Yes	No
	Option 2.b	Horizontal and Vertical Curve Improvements with Shoulder Widening	Location[3] / Horizontal / Vertical RP 4.1 to RP 5.1 ✓ ✓ RP 6.7 ✓ RP 8.0 ✓ RP 8.7 to RP 8.8 ✓ RP 9.0 to RP 9.1 ✓ ✓ RP 11.7 to RP 11.8 ✓ ✓ RP 12.0 ✓ RP 16.2 ✓ RP 16.5 to RP 16.8 ✓ RP 18.5 ✓ RP 18.7 to RP 18.8 ✓ ✓ RP 19.0 to RP 19.4 ✓ ✓ RP 20.2 ✓ RP 20.4 ✓ RP 20.6 ✓ RP 20.8 to RP 22.0 ✓ ✓ RP 22.8 to RP 23.8 ✓ ✓ RP 28.3 to RP 29.1 ✓ ✓ RP 29.7 to RP 30.0 ✓ RP 35.8 ✓	Average Reconstruction Cost: $360,000 to $390,000 per 0.1 mile	Mid-term to long-term	Yes	Yes
Drainage Corrections	**3**	Drainage Corrections	RP 23.4	$48,000 to $51,000	Short-term	Yes	No

Option Category	Option ID	Option Description	Locations	Planning-level Cost Estimate[1]	Potential Implementation Timeframe[2]	Potentially-impacted Resources	Anticipated ROW
Intersection Improvements	**Option 4.a**	Approach Sight Distance Mitigation	RP 4.2 ("M" Trailhead Parking Area)[3] RP 6.7 (Kelly Canyon Road)[3] RP 15.2 (Private Approach) RP 18.8 (Brackett Creek)[3] RP 22.7 (Private Approach)	$40,000 to $390,000 (per approach) $960,000 to $1,120,000 (total)	Mid-term	Yes	Yes
	Option 4.b	Intersection Realignment[3]	RP 18.8 (Brackett Creek) RP 28.8 (Muddy Creek Road)	$340,000 to $790,000 (per location)	Mid-term to Long-term	Yes	Yes
	Option 4.c	Turn Lanes[3]	RP 4.2 ("M" Trailhead) RP 6.7 (Kelly Canyon Road) RP 9.5 (Jackson Creek Road) RP 15.7 (Bridger Bowl) RP 18.8 (Brackett Creek) RP 20.5 (Battle Ridge Campground)	$900,000 to $1,100,000 (per location)	Mid-term to long-term	Yes	Yes
Roadside Safety	**Option 5.a**	Guardrail Improvements	As needed throughout corridor (including RP 4.0 to RP 24.0)	Varies depending on treatment and location	Short-term and as needed	No	No
	Option 5.b	Rockfall Hazard Mitigation and Maintenance	RP 4.4 RP 4.8 RP 5.2 RP 12.3 RP 12.4 RP 12.7 RP 16.0 RP 18.6 RP 19.0	RP 4.4: $740,000 to $800,000 All Others: Unknown	Mid-term to long-term	Yes	Yes
Traffic Control Devices	**Option 6.a**	Variable Message Signage	As needed throughout corridor (including RP 15.6 to RP 29.2 for bicycle usage and RP 6.0 to 10.0 for wildlife crossings)	Variable Message Signs: $15,000 to $35,000 (each)	Short-term	No	No
	Option 6.b	Static Wildlife Signage	RP 6.0 to 10.0 or as appropriate based on seasonal fluctuations in elk migration	$500 (per static sign)	Short-term	No	No

[1] Planning-level construction cost estimates are provided in 2014 dollars and are rounded for planning purposes. Cost estimates reflect contingency ranges to account for the high degree of unknown factors at the planning level. Costs associated with right-of-way acquisition, preliminary engineering, and construction engineering/inspection are included where appropriate. Refer to Appendix D for cost estimate spreadsheets.

[2] The potential implementation timeframe does not indicate when projects will be programmed. Project programming is based on available funding and other system priorities. Timeframes are defined as follows – Immediate: Implementation is currently ongoing or will be initiated in 2015; Short-term: Implementation is recommended within a 1- to 3-year period; Mid-term: Implementation is recommended within a 3- to 6-year period; Long-term: Implementation is recommended within a 6- to 20-year period.

[3] Locations are identified as high potential for crash reduction (LOSS IV).

ES.4 Conclusions and Next Steps

Development and implementation of appropriate combinations of improvement options will depend on funding availability, right-of-way needs, and other system priorities within the MDT Butte District. This corridor planning study indicates there are no major technical or environmental impediments to further development of recommended improvements.

As of this publication date, no funding has been dedicated to corridor improvements identified in this study. Development of a future project would require the following actions:

- identify and secure a funding source or sources;
- for MDT-led projects, follow MDT guidelines for project nomination and development, including a public involvement process and environmental documentation; and
- for projects that are developed by others and may impact MDT routes, coordinate with MDT via the System Impact Action Process (SIAP).

MDT will identify ways to address study recommendations as part of projects programmed within the next five years, and when prioritizing and programming projects for future years. In some cases, minor improvements (such as cleaning culverts to improve drainage) may be accomplished through routine maintenance activities as funds become available. Additionally, the District may incorporate select study recommendations into projects that are currently programmed for design and construction.

The purpose and need statement for any future project should be consistent with relevant needs and objectives contained in this study. Future projects involving federal and/or state actions would require compliance with NEPA/MEPA. This corridor planning study will be used as the basis for determining impacts and subsequent mitigation for future NEPA/MEPA documentation. Future projects must comply with CFR Title 23 Part 771 and ARM 18, sub-chapter 2, which set forth the requirements for documenting environmental impacts on highway projects.

1.0 Introduction

1.1 Scope of Study

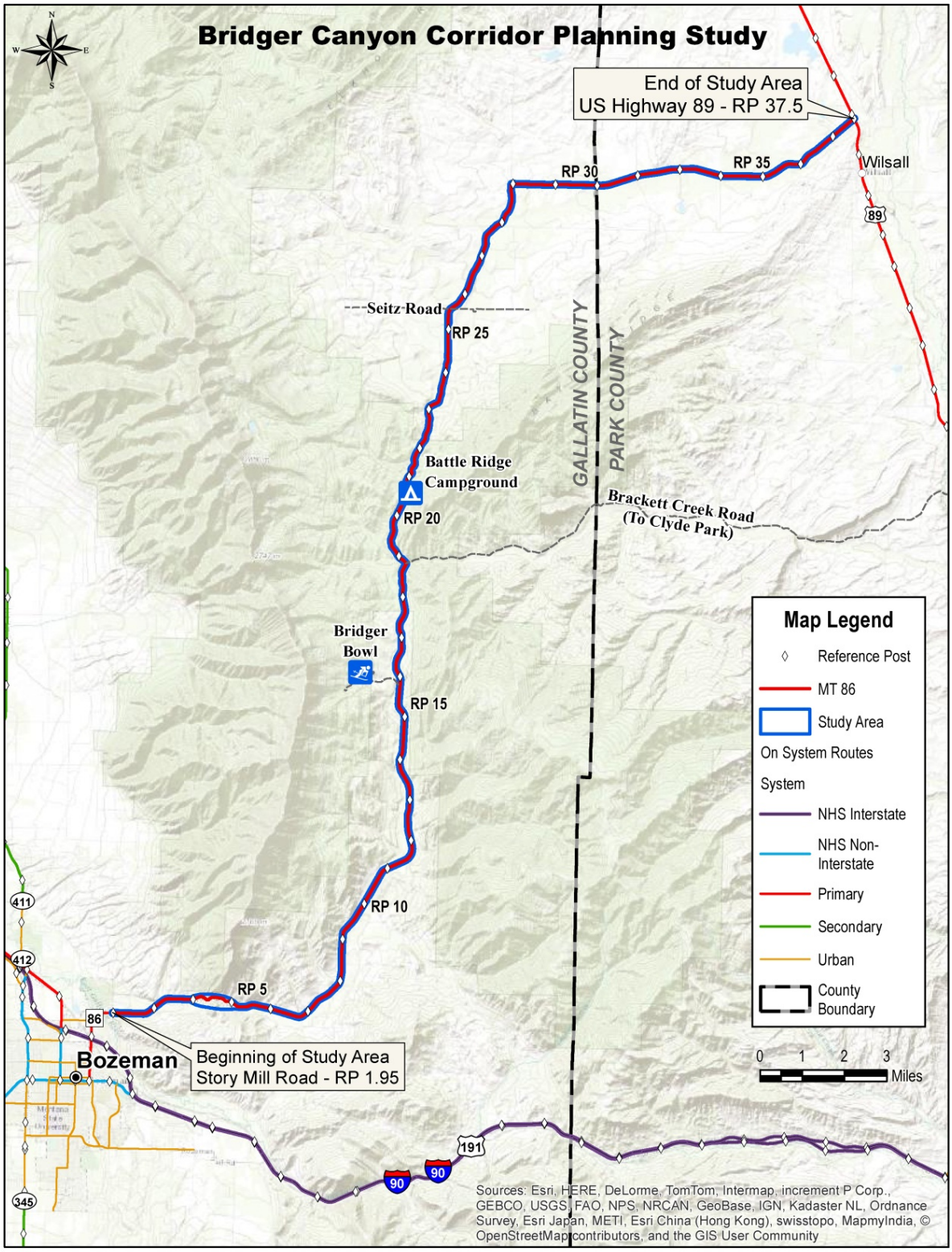
The Montana Department of Transportation (MDT), in cooperation with Gallatin and Park Counties and the Federal Highway Administration (FHWA), initiated a corridor planning study on Montana Highway 86 (MT 86) between the intersection of Story Mill Road and the junction with United States Route 89 (US 89).

Figure 1 illustrates the study area, which begins at the MT 86 intersection with Story Mill Road at Reference Post (RP) 1.95 just east of Bozeman, MT, and ends at the intersection with US 89 at RP 37.5 near Wilsall, MT. The study area includes the MT 86 corridor and a 300-foot buffer on both sides of the roadway (for a total buffer width of 600 feet) throughout the majority of the corridor. A buffer width ranging up to approximately 1,700 feet is included from approximate RP 4.0 to RP 5.0 to include a landslide and historic quarry at approximate RP 4.4.

1.2 Study Process

The study follows the 2009 *Montana Business Process to Link Planning and National and Montana Environmental Policy Act (NEPA/MEPA) Reviews*, MDT's guideline for conducting planning studies. This process facilitates a smooth and efficient transition from early transportation planning to project development and NEPA/MEPA environmental review. The planning process identifies needs and objectives; provides opportunities for early engagement with the public, stakeholders, and resource agencies; and identifies feasible improvement options. Early planning efforts simplify and streamline subsequent project development by identifying and avoiding fatal flaws. The findings and recommendations provided in this report can provide a basis for early screening, allowing exclusive focus on reasonable, feasible alternatives during the NEPA/MEPA process.

Figure 1 **Study Area**



2.0 Public and Agency Participation

Public involvement and consultation with federal, state, and local agencies are key elements in linking planning studies and subsequent NEPA/MEPA reviews. MDT invited resource agencies, stakeholders, and members of the public to participate throughout the planning process to provide input on needs, issues, concerns, and recommended improvement options. Specific outreach measures are described in the following sections. Additional information is provided in the *Public and Agency Participation Plan* developed for this study (Appendix A).

2.1 Study Website

A website (http://www.mdt.mt.gov/pubinvolve/bridger/) was developed to provide information about this study. Draft documents were posted for public review and comment during the planning process. Informational meeting announcements were posted to the website to encourage public involvement. Website links provided an opportunity for members of the public to post comments during the study process. A frequently asked questions (FAQs) page provided information about the planning process and public participation opportunities. Related links provided access to MDT's website homepage and a link to the *Montana Business Process to Link Planning Studies and NEPA/MEPA Reviews*.

2.2 Advisory Committee Meetings

A study advisory committee was established with representatives from MDT, FHWA, Gallatin County, and Park County. The committee met regularly during the study period to discuss progress, analysis methodologies and results, draft reports, and other issues and concerns. The committee served in an advisory role and reviewed study documentation before publication.

2.3 Public and Agency Involvement Activities

Informational Meetings

Two informational meetings were conducted for the planning study. Meetings were advertised in the Bozeman Daily Chronicle newspaper. A news release was issued to radio stations, newspapers, and other local media outlets before each meeting. Newsletters were provided at the informational meetings, and included information on study progress, upcoming participation opportunities, and available study documentation. Newsletters were also distributed to the study mailing list before each meeting. Materials from the two informational meetings, including advertisements, news releases, sign-in sheets, agendas, newsletters, presentations, meeting minutes, and written comments, are included in Appendix A.

First Informational Meeting

Forty-seven members of the public attended the first informational meeting held on October 23, 2014, at the Bridger Canyon Fire Hall located at 8081 Bridger Canyon Road, Bozeman, MT. The meeting began with an introduction of MDT representatives and local advisory committee members. The meeting continued with an overview of the MDT planning study process and key findings from the *Existing and Projected Conditions Report*, including transportation system conditions and environmental conditions. A discussion period was held following the presentation. Comment topics discussed during the meeting are summarized in Table 1. Additional information is provided in Appendix A.

Table 1 Summary of Comment Topics from Informational Meeting #1

Topic	Comments and Concerns
Geometric and Roadway Elements	o Improving curves may increase speeds in the corridor. o Shoulder and centerline rumble strips, turn lanes, and wider roadway shoulders were discussed.
Safety	o Near-miss crashes were discussed. o Posted speed limits are perceived to be too high. o Distracted driving (mobile device usage) was discussed, and meeting attendees inquired about a potential mobile device usage ban in the corridor.
Wildlife and Livestock Conflicts	o There are multiple locations where wild animals are known to cross. o Open range conditions in the northern portion of the corridor create potential conflicts with livestock. o Suggested wildlife mitigation strategies include wildlife crossing structures, fencing, and additional signage.
Bicycle Facilities	o Safety concerns for cyclists in the corridor were discussed. o Currently, there are no bicycle facilities in the corridor. o The presence of guardrail adjacent to narrow or nonexistent roadway shoulders contributes to perceived motorist/cyclist conflicts. o Maintenance and roadway design strategies to mitigate glass and other debris along shoulders were discussed.
Oil and Gas Exploration	o Meeting attendees expressed concern regarding impacts associated with potential oil and gas exploration in the Shields River Valley.

One written comment was received at the informational meeting, and 22 written comments were received following the meeting. Comment topics included concerns regarding bicycle and pedestrian safety, the rural character of the corridor, oil and gas development and potential growth in traffic volumes, mobile device usage, intersection safety, the slide area at RP 4.4, traffic speeds, guardrail, rumble strips, shoulders, wildlife movement and connectivity, and noise.

Second Informational Meeting

__ members of the public attended the second informational meeting held on April 2, 2015, at the Bridger Canyon Fire Hall located at 8081 Bridger Canyon Road, Bozeman, MT. The meeting began with an introduction of MDT representatives and local advisory committee members. The meeting continued with an overview of the MDT planning study process, existing and projected conditions, corridor needs and objectives, and improvement options. A discussion period was held following the presentation. Comment topics discussed during the meeting are summarized in Table 2. Additional information is provided in Appendix A.

Table 2 Summary of Comment Topics from Informational Meeting #2

Topic	Comments and Concerns
	o
	o

Resource Agency Meeting

Resource agencies were invited to a meeting on October 15, 2014, to discuss environmental resource issues and concerns within the study area. A copy of the invitation letter with a list of invited agencies is included in Appendix A. Representatives from MDT, U.S. Fish and Wildlife Service (USFWS), the Montana Fish, Wildlife and Parks (FWP), and the Gallatin County Planning Department attended the meeting. The meeting began with a presentation summarizing the planning study process and key findings from the *Existing and Projected Conditions Report* and the *Environmental Scan*. Following the presentation, agencies commented on Section 4(f) and Section 6(f) properties, animal-vehicle conflicts and potential mitigation, and potential fish crossing structures. Meeting minutes are provided in Appendix A.

Public and Agency Review Period

The public and agency review period for the draft corridor planning study extended from March 20, 2015, to April 17, 2015. ___ written comments were received during the review period. Table 3 provides a brief summary of comment topics. Written comments and MDT responses are presented in Appendix A.

Table 3 Summary of Review Period Comment Topics

#	Comment Date	First Name	Last Name	Agency	Comment Topic	Response
1						
2						
3						
4						

3.0 Local Planning

Planning documents that specifically relate to the Bridger Canyon corridor are summarized below. Additional plans are summarized in Appendix B.

Bridger Canyon General Plan and Development Guide – Bridger Canyon Bozeman, MT

The Bridger Canyon General Plan and Development Guide was prepared by the Gallatin County Land Use Planning staff for the Bridger Canyon Planning and Zoning Commission. The plan serves to guide future physical growth within the Bridger Canyon and to protect the natural beauty, open space, and agricultural character of the area. The following property owners' goals may apply to the Bridger Canyon Corridor Planning Study.

- Maintain continuous coordination and cooperation between citizens and public and semi-public agencies in operation in and around the canyon.
- Preserve and protect environmental qualities and resources.
- Maintain high water quality standards.
- Set limits on areas of high intensity recreational use based on access, sensitivity of surrounding uses, influence on water quality, traffic generation, fire hazard, and environmental effects.
- Insist on attention to vegetation, sanitation, wildlife habitat, erosion, and public safety concerns for new development.
- Plan elements of community design (e.g., roads and utilities) in consideration of environmental factors in addition to safety and engineering considerations.
- Design residences, commercial facilities, public buildings, and street signs to fit the rural character of the area.

Bridger Bowl Base Area Plan

The Bridger Bowl Base Area Plan was prepared by the Gallatin County Zoning Commission to guide decision making, and to set forth policy direction to respond to the special needs, problems, and future development of the base area. The Bridger Canyon Zoning Regulation provides the framework for the implementation of this plan. The following goals may apply to the Bridger Canyon Corridor Planning Study.

- Help control traffic within the limits of the two-lane Bridger Canyon Road.
- Conserve the natural resources within the base area and Bridger Canyon in general.

Gallatin National Forest - Forest Plan

The Gallatin National Forest (GNF) – Forest Plan was prepared by the United States Department of Agriculture – Forest Service for the Gallatin National Forest. The plan serves to guide all natural resource management activities and establishes management standards for the GNF. The plan describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management. The following GNF goals may apply to the Bridger Canyon Planning Study.

- Provide directional and interpretive signing for visitor information, as appropriate for the recreation setting.
- Provide forest visitors with visually-appealing scenery.
- Meet or exceed state of Montana water quality standards.
- Maintain and enhance fish habitat to provide for an increased fish population.
- Provide habitat for viable populations of all indigenous wildlife species and for increasing populations of big game animals.
- Provide sufficient habitat for recovered populations of threatened and endangered species (i.e., grizzly bear, bald eagle, and peregrine falcon).

- Strive to prevent any human-caused grizzly bear losses.
- Provide additional public access to National Forest lands.
- Provide a road and trail management program that is responsive to resource management needs.

Greater Bozeman Area Transportation Plan

The Greater Bozeman Area Transportation Plan serves as a blueprint for guiding existing and future transportation infrastructure in the city of Bozeman. The plan considers non-motorized transportation infrastructure equally as important as motorized transportation infrastructure. The plan attempts to balance the desire to address existing deficiencies while recognizing the importance to plan for future needs. The study area includes the Bozeman city limits, as well as substantial portions of unincorporated lands surrounding the city. These lands are generally located to the north and south of the city, and extend from an eastern limit of the Bridger Mountains to a western limit of the Gallatin River. A portion of the Bridger Canyon corridor falls within the Greater Bozeman Area Transportation Plan study limits. The plan conducted a "Greater Bozeman Area Bicycling and Walking Survey," which discusses "high priority" projects residents would like realized. Among the projects identified were "better connections to the 'M' Trail" and bike lane/shared use path and bike racks along MT 86. Other projects identified within the plan include greater transit service and wider roadway shoulders along MT 86.

Statewide Transportation Improvement Program (STIP) – 2014-2018

The Statewide Transportation Improvement Program (STIP) is developed in accordance with the requirements of Section 135 of 23 USC (United States Code). This STIP details projects that will address Montana's transportation needs for fiscal years 2014 through 2018. There are several MT 86 projects programmed in the current STIP that fall within the study area. Recent and planned projects are discussed in Section 6.0.

4.0 Existing and Projected Conditions

The *Existing and Projected Conditions Report* (Appendix B) and the *Environmental Scan* (Appendix C) provide a planning-level summary of transportation system features and physical, biological, social, and cultural characteristics to help the advisory committee identify issues, constraints, and opportunities within the study area. The following sections summarize key information from these reports.

4.1 Transportation System Conditions

The transportation system within the study corridor is discussed in terms of its features, geometric characteristics, crash history, access points, and traffic volumes and operational characteristics.

Physical Features and Characteristics

Corridor features were identified through field observation and a review of published statistics, documentation, GIS data, and MDT as-built drawings. A field review of the corridor was conducted on June 25, 2014, to assist in identifying existing conditions and constraints. Appendix B contains a photo log documenting conditions observed in the field.

Functional Classification and Roadway System

Functional classification is used to characterize public roads and highways in accordance with FHWA guidelines according to the type of service provided by the facility and the corresponding level of travel mobility and access to and from adjacent property. MT 86 is classified as a rural minor arterial on the primary system. Minor arterials provide service for trips of moderate

length, serve geographic areas that are smaller than their principal arterial counterparts, and offer connectivity to the principal arterial system. In a rural setting, such as this, minor arterials are typically designed to provide relatively high overall travel speeds, with minimum interference to through movement.[1]

Right-of-way

Right-of-way boundaries and widths have been estimated for the purpose of this study based on a review of available MDT as-built drawings, right-of-way plans, and cadastral information. Right-of-way widths vary throughout the corridor, ranging from a 30-foot to 200-foot offset in a single direction from the roadway centerline. Appendix B lists estimated right-of-way offset distances throughout the corridor.

Structures

The MDT Bridge Bureau identified 10 bridges within the study area. Currently, three of the 10 bridges are candidates for repair. Table 4 presents bridge data within the study area. A future project will remove and/or replace structures at RP 6.7, RP 8.1, RP 8.9, and RP 9.5.

Table 4 Bridge Data

RP	Feature Crossed	Year Built	Road Width (ft)	Length (ft)	Sufficiency Rating	Structure Condition	Field Review Remarks[(3)]	Guardrail Height (Center of Bolt)[(4)]
3.1	Bridger Creek	2005	38.7	84.5	85.7	Good	Good condition	21”
6.7[(1)]	Drainage	1939	27.0	12.0	61.6	Good	Damaged guardrail	20”
7.8	Stock Pass	1939	26.4	12.0	70.4	Fair[(2)]	Fair condition	18”
8.1[(1)]	Drainage	1939	26.3	12.0	65.4	Good	Good condition	21”
8.9[(1)]	Drainage	1939	26.3	12.0	64.8	Good	Good condition	23”
9.5[(1)]	Stock Pass/ Drainage	1939	26.3	12.0	64.8	Good	Damaged wing wall and abutment	21”
18.8	Brackett Creek	1953	28.0	20.0	58.8	Good	Good condition	22”
24.4	Cache Creek	1939	28.5	12.0	79.1	Fair[(2)]	Fair condition	20”
26.8	Carrol Creek	1986	22.3	12.0	68.9	Fair[(2)]	Damaged wing wall and pavement section near abutment	15”
28.0	Flathead Creek	1939	22.0	17.0	71.1	Good	Good condition	22”

Source: Information was obtained from MDT bridge shape files (inspections conducted in 2011), the 2014 MDT Existing Conditions Summary, DOWL June 2014 field review, and 2014 communication with MDT.

(1) Future project will remove and/or replace structures.

(2) Fair condition based on rating of 5 for superstructure (Stock Pass) or substructure (Cache Creek and Carrol Creek), indicating candidate for repair.

(3) Field review conducted by DOWL, June 2014.

(4) Field review conducted by DOWL, June 2014. Minimum guardrail height (center of bolt) is 20” for existing installations, and 23” for new installations.

[1] FHWA, Highway Functional Classification Concepts, Criteria and Procedures, 2013.

Bicycle and Pedestrian Facilities

There are no dedicated bicycle or pedestrian facilities directly adjacent to MT 86 in the study area. Shoulder widths vary throughout the corridor, ranging in width from zero to five feet, providing limited opportunity for non-motorized usage along the edge of the traveled way. The first 2.5 miles of the corridor provide connections to the Bozeman "M" Trail System and the Drinking Horse Mountain Trails. The Gallatin Valley Bicycle Club hosts weekly bicycle rides within the study area including traveling to the top of Battle Ridge Pass and to Wilsall, MT. Numerous cycling and outdoor websites promote the corridor as a destination for cycling. Multiple bicycle races and events are held in the corridor annually.

MDT staff reports that parking sometimes overflows onto the highway near the "M" trail and fish hatchery parking lots (RP 4.2), and at Bridger Bowl (RP 15.8), leading to pedestrians walking along MT 86.

Utilities

Utilities in the study area include underground telephone, underground cable television, underground natural gas, and overhead and underground electric power.

Air Service

There is no air service in the study area. The nearest airport is the Bozeman Yellowstone International Airport located in Belgrade.

Rail Service

There are no rail facilities located in the study area.

Transit

The Streamline transit service provides a shuttle bus to and from Bridger Bowl and Bohart Ranch with seasonal operation on Saturday and Sunday only.

Drainage Conditions

Drainage throughout the corridor is generally sufficient. Graded side slopes carry run-off to natural drainage conveyances through constructed ditches within the right-of-way or via natural drainage patterns formed by the topographic conditions of the adjacent lands. Culverts, situated at various locations throughout the corridor, convey water beneath MT 86.

Although drainage is generally sufficient, the roadway section is suffering in some areas due to excess water on the roadway, poor drainage, and saturated subgrade. Areas of insufficient drainage identified during the June 2014 field review are listed below.

- RP 15.9 – Standing water was noted in the ditch adjacent to the roadway.
- RP 23.4 – Standing water was noted adjacent to the roadway. The culvert extending under the roadway appears to be plugged and does not appear to meet minimum cover depths. Based on the deteriorated pavement, water likely saturates the subgrade at times.
- RP 26.8 - The pavement section above the bridge abutment is failing due to insufficient drainage.

Pavement Conditions

The 2013 MDT Road Log indicates the MT 86 highway corridor is generally composed of 0.3 foot asphalt course overlying 1.0 foot of crushed base course. Overall, the pavement is in good condition throughout the corridor. Pavement deficiencies observed during the June 2014 field

review occur at approximate RP 6.7, 15.9, 23.4, 24.4, 26.8, and 28.0. MDT has received public comments indicating the portion of MT 86 near the Battle Ridge campground is sometimes slippery, and the portion near the landslide (RP 4.4) is sometimes icy.

Rockfall Hazard

A slide area near RP 4.4 has been the subject of investigation by Montana State University geologists and state highway personnel since the late 1950s. The rock face south of the original MT 86 alignment was undermined at its base due to the roadway cut slope and quarry operations, which removed material used for construction of the interstate highway and other roadways in the area. As a result of blasting and material removal, a landslide developed in the upper reaches of the quarry shortly after completion of quarrying operations. At that time, the toe of the slide was several feet above the ditchline of the roadway. During the spring of 1975, heavy precipitation and surface run-off re-activated the slide resulting in the movement of a considerable quantity of material onto the highway. In 1975, MT 86 traffic was redirected to the north via a detour route which is still in use today. The former MT 86 alignment is barricaded. Past studies have warned that the slide area is unstable and susceptible to continuous sloughing, and that an earthquake or heavy precipitation event could activate another slide event. MDT has also reported a minor slide on the north side of MT 86 east of the major slide, although no documentation was identified for the minor slide.

Figure 2 illustrates the major and minor slide locations. Additional slope stability evaluation may need to be conducted on slopes immediately adjacent to MT 86 for any improvements forwarded from this study.

Figure 2 Slide Area

Image source: Google, 2014.

MDT maintains the Montana Rockfall Hazard Rating System to better manage rock slope assets along Montana highways. A 2003-2005 MDT research program evaluated rockfall history and behavior throughout the state. "A"-rated sites indicate a high potential for rockfall hazard. Detailed ratings were completed at approximately 850 "A"-rated sites. The top 100 "A"-rated

sites were further evaluated, and conceptual designs and construction cost-to-cure estimates were prepared. The Rockfall Hazard Classification and Mitigation System report (MDT, 2005) lists nine sites within the Bridger Canyon corridor, located from approximately RP 4.4 to 19.1. "A" ratings were assigned to two of the nine sites, one of which (located at approximately RP 4.4) was ranked 36 out of the top 100 sites. The other "A"-rated site is located at approximately RP 15.9-16.0, where MDT identified a spring in the lower portion of the cut slope during an investigation of a pavement failure. Improvements adjacent to the nine sites listed in Table 5 will require an engineering analysis to determine if rockfall hazard mitigation is practicable.

Table 5 Rockfall Hazard Sites Within Bridger Canyon Corridor

RP Start	RP End	Side	Rating
004+0.370	004+0.450	Left	**A**
004+0.730	004+0.820	Left	B
005+0.120	005+0.210	Left	B
012+0.310	012+0.370	Right	B
012+0.410	012+0.470	Right	B
012+0.650	012+0.800	Right	B
015+0.930	016+0.030	Right	**A**
018+0.520	018+0.580	Right	B
018+0.930	019+0.100	Right	B

Source: Rockfall Hazard Classification and Mitigation System, 2005. Site at RP 4.4± ranked 36 out of top 100 sites statewide. "A"-rated sites received a detailed rating score greater than 350 points.

Geometric Characteristics

Design Criteria

The existing roadway alignment generally exhibits rolling terrain characteristics; however, portions of the corridor exceed maximum grades for rolling terrain and exhibit characteristics of a mountainous terrain. The design speed used for analysis of the MT 86 study corridor is 55 miles per hour (mph) in combination with a rolling terrain topography type from RP 1.95 to RP 15.63 and from RP 29.16 to RP 37.5. A design speed of 45 mph in combination with a mountainous terrain type was utilized from RP 15.64 to RP 29.15.

The posted speed limit within the corridor varies from 35 mph and 45 mph at the southern portion of the corridor near Bozeman, 60 mph through middle portions of the corridor, up to 70 mph (60 mph for trucks) in middle and northern portions of the corridor. Posted speed limits reflect 2014 speed study recommendations, which were approved by the Montana Transportation Commission on July 31, 2014, and have been implemented in the corridor. Advisory signing for several horizontal curves within the corridor range between 25 mph and 50 mph.

Roadway Width

Within the study area, MT 86 is a two-lane undivided highway with two 12-foot travel lanes and varying shoulder widths ranging from zero to five feet.

Horizontal Alignment

Horizontal alignment includes consideration of horizontal curvature, superelevation, curve type, and stopping and passing sight distance. Based on a review of available data, it appears that 38 of the 120 horizontal curves analyzed within the corridor do not meet current MDT design criteria for curve radius, superelevation, and stopping sight distance.

Vertical Alignment

Vertical alignment includes consideration of grade, vertical curve length, vertical curve type (either a sag curve or a crest curve), and K value. K value is the horizontal distance needed to produce a one percent change in gradient and is directly correlated to the roadway design speed and stopping sight distance. Available data indicates that 128 of the 229 vertical curves analyzed within the study boundaries do not meet current MDT design criteria.

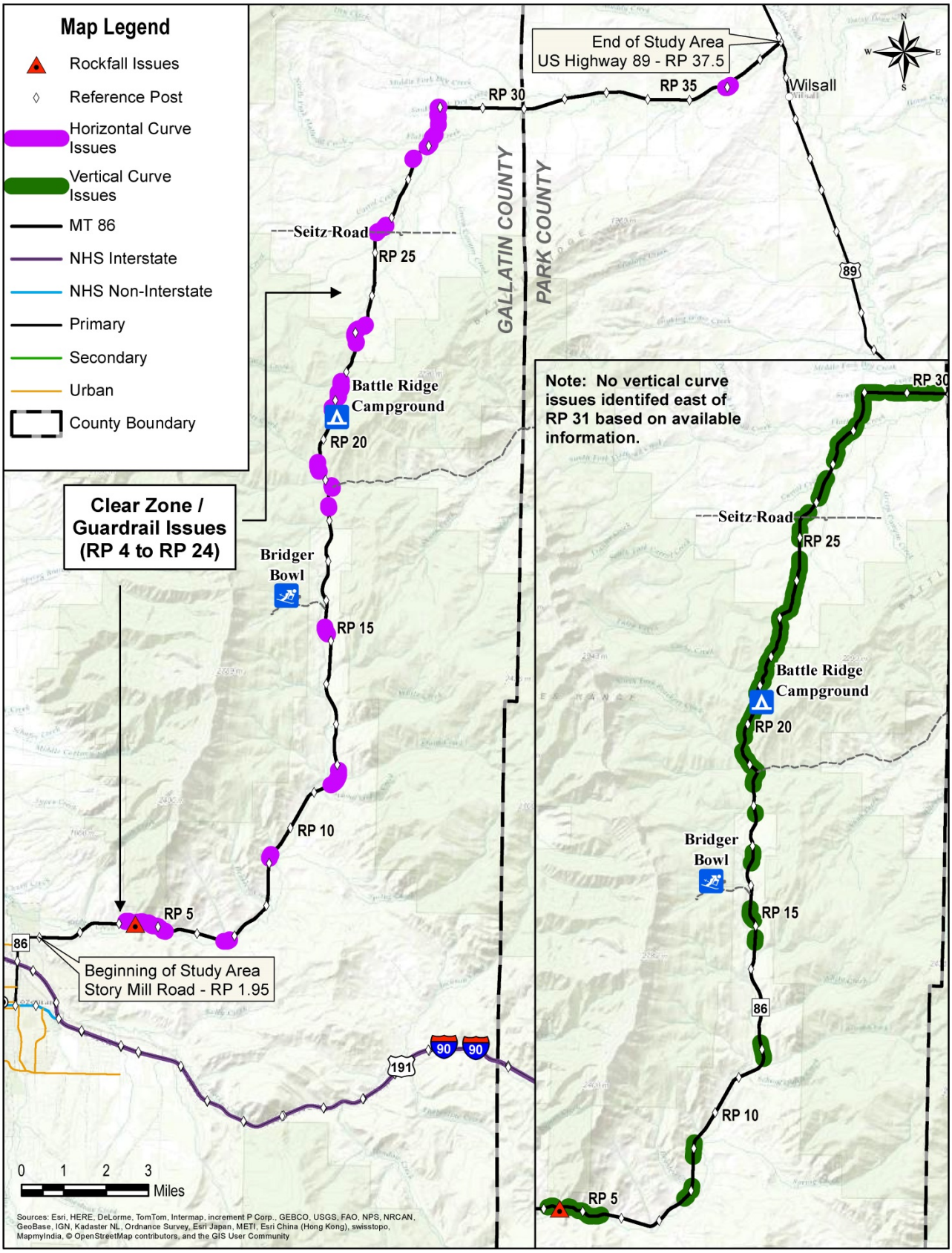
Clear Zones

The MDT Road Design Manual specifies an offset distance from the edge of the traveled way (ETW) to be free of any obstructions. The ETW is delineated by the white pavement marking located on the right-hand side of the travel lane. This offset distance, known as the "clear zone," includes the roadway shoulder and is defined based on design speed, annual average daily traffic (AADT), cut/fill slopes, and offsets from the ETW. During a field review, several areas were noted as lacking slope protection and containing inadequate clear zone distance intermittently from approximately RP 4.0 to RP 24.0.

Summary of Geometric Issues

Figure 3 presents the location of existing horizontal curve, vertical curve, and clear zone/guardrail issues within the corridor.

Figure 3 Geometric Issues



Crash History

MDT provided crash data for MT 86 from RP 1.95 to RP 37.5 for the five-year period from January 1, 2009, to December 31, 2013. During the five-year analysis period, a total of 173 crashes occurred on MT 86. As a result of the crashes in the corridor, a total of 59 injuries and 6 fatalities occurred during the analysis period.

A higher number of crashes, injuries, and fatalities occurred within the southern portion of the corridor from RP 1.95 to RP 21.5 compared to the northern portion of the corridor RP 21.5 to RP 37.5. This higher number of crashes in the southern portion of the corridor may be due to higher AADT volumes, higher number of ingress/egress points, and higher number of curves that do not meet current MDT horizontal geometric criteria compared to the northern portion of the corridor.

Roll-over and fixed-object crashes were the most common crash types and injury-related crash types, with 109 (63 percent) combined crashes and 35 (60 percent) combined injuries. Head-on type crashes were the majority of fatal crashes, at 3 out of 6, or 50 percent. Two roll-over type crashes and one right-angle type crash made up the remaining fatal crashes. The majority of crashes, injuries, and fatalities occurred during clear or cloudy weather conditions, dry road conditions, and daylight light conditions.

Contributing factors indicate the majority of crashes were a result of driver error, including driving under the influence of alcohol, careless driving, disregarding traffic mark/sign/signal, and improper passing. Excluding the 51 crashes without an identified contributing factor, only four crashes out of the remaining 122, or 3 percent were identified as weather, road, or light related.

Animal/Vehicle Conflicts

Wild animals were involved in 18 of 173 (10 percent) reported crashes. Reported crashes involving wild animals were dispersed throughout the corridor, with 10 out of 18 crashes occurring between RP 8.0 to RP 10.0.

A review of the MDT maintenance animal carcass database between January 1, 2009, and December 31, 2013, indicates at least 44 animal carcasses were collected throughout the length of the Bridger Canyon corridor. Carcass collections were concentrated between RP 1.75 and RP 12. This may be due to higher traffic volumes in this portion of the corridor, however carcass data may not accurately reflect animal-vehicle conflicts throughout the corridor, and not all carcasses result from vehicle collisions. Animal carcasses in areas along the corridor with steeper topography or denser roadside vegetation may have evaded collection by maintenance personnel due to a lack of visibility. These factors may affect collections reported in the MDT animal carcass database. Table 6 summarizes large mammal carcass collections during the five-year period.

Table 6 Large Mammal Carcasses (2009 – 2013)

Animal	Carcasses Collected	% by Species
Elk	1	2.3
Mule Deer	9	20.5
Other (Wild)	3	6.8
Whitetail Deer	31	70.4
Total	44	100

Source: MDT, 2013.

Whitetail deer (70.4 percent) accounted for the majority of carcasses collected along this portion of MT 86, followed by mule deer (20.5 percent). The majority (70.4 percent) of carcasses were collected between RP 1.95 and RP 11.5.

Level of Service of Safety

MDT has conducted an analysis to assess the magnitude of safety problems within the Bridger Canyon corridor through the use of safety performance functions (SPFs). An SPF reflects the relationship between traffic exposure measured in AADT and crashes per mile per year. SPF models provide an estimate of the normal expected crash frequency and severity for a range of AADT among similar facilities. MDT uses separate SPF models to assess crash frequency (i.e., the total number of crashes) and crash severity (i.e., only crashes involving an injury or fatality).

Information from the SPF models is used to assess the level of service of safety (LOSS) for corridor segments. LOSS categories listed in Table 7 represent the degree of deviation from the normal expected crash frequency and severity for a range of AADT, and the associated potential for crash reduction.

Table 7 Level of Service of Safety

Level of Service of Safety	Potential for Crash Reduction
LOSS I	Low potential for crash reduction
LOSS II	Low to moderate potential for crash reduction
LOSS III	Moderate to high potential for crash reduction
LOSS IV	High potential for crash reduction

Source: MDT, 2014.

Figure 4 presents total crash LOSS, which indicates deviations from the normal expected crash frequency. Figure 5 presents crash severity LOSS, which indicates deviations from the normal expected crash severity. Corridor segments identified as LOSS IV represent the highest deviation from normal expected conditions, and the highest potential for crash reduction. Areas identified as LOSS IV for both total crashes and severe crashes occur near RP 5, 9, 19, 21, 29, 30, and 36.

MDT has also prepared a Safety Assessment Report for the portion of the corridor from RP 2.7 to RP 5.0. The report noted that the frequency and severity of crashes in this portion of the corridor are occurring above the rate expected for this roadway type, indicating a high potential for crash reduction (LOSS IV).

Figure 4 Total Crash LOSS

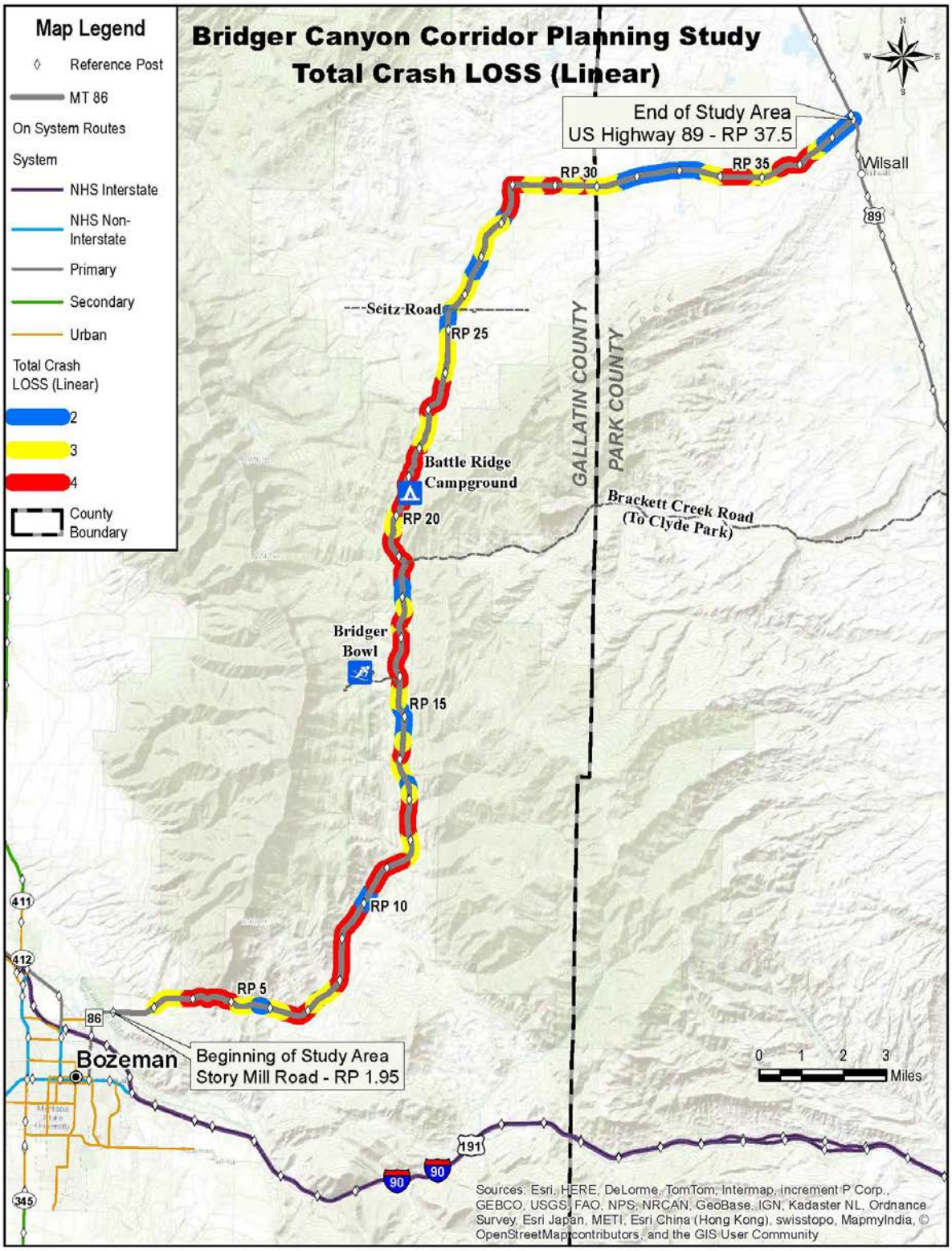
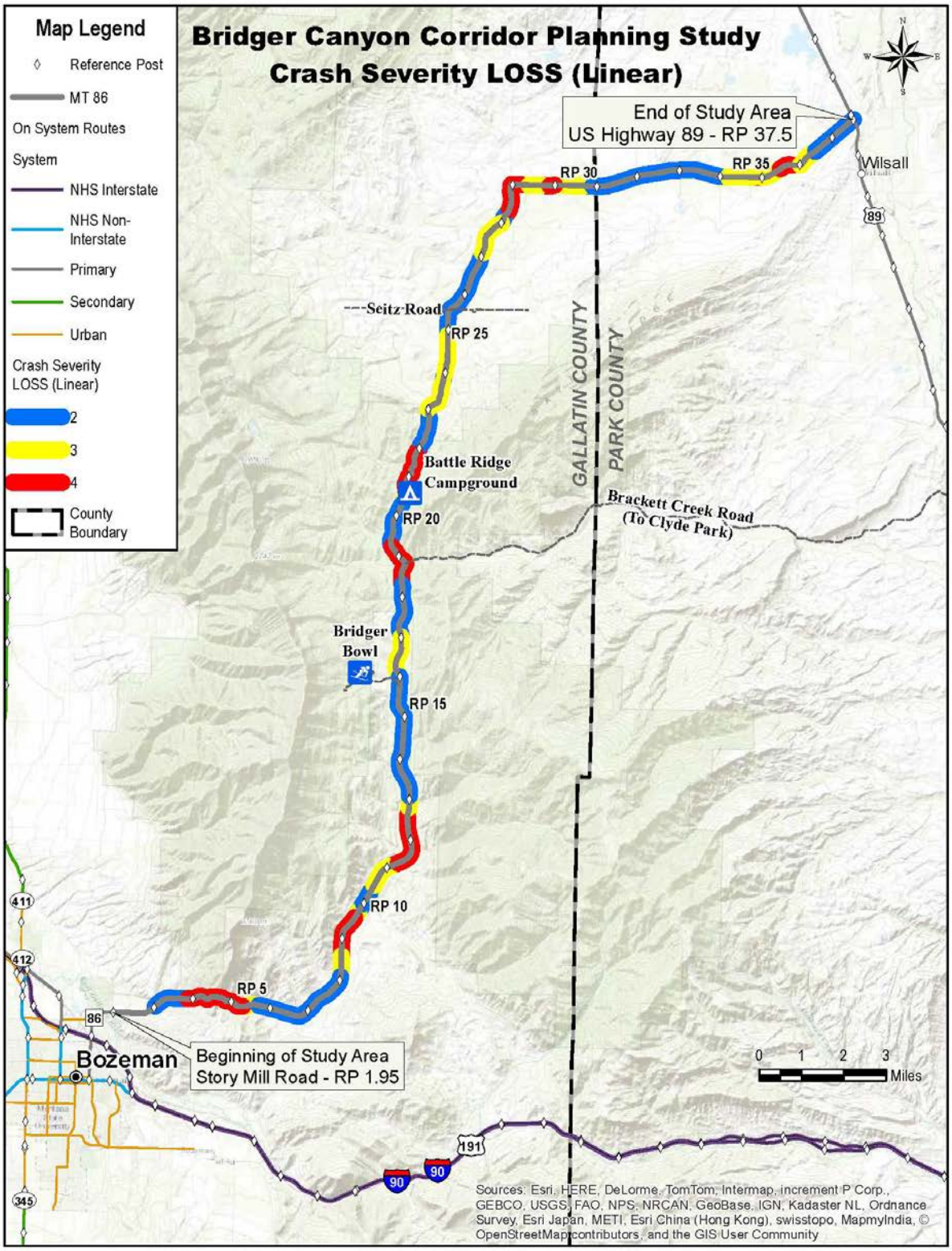


Figure 5 Crash Severity LOSS



Access Analysis

A total of 223 access points occur within the MT 86 corridor. Access point density is calculated by dividing the total number of unsignalized intersections and driveways on both sides of the roadway segment by the length of the segment in miles. Higher access point densities result in more potential conflicts on the road, decreasing the free flow speed of traffic. Lower access point densities allow for more orderly merging of traffic and present fewer challenges to drivers. Densities range from a low of 4.0 access points per mile on MT 86 in the northern portion of the corridor to a high of 10.0 access points per mile at the southern end of the corridor.

MDT has received public comments that the Brackett Creek intersection is confusing due to the number and angle of intersection roadways. Figure 6 illustrates United States Forest Service routes and Brackett Creek Road intersecting MT 86 near RP 18.8.

Figure 6 Brackett Creek Intersection

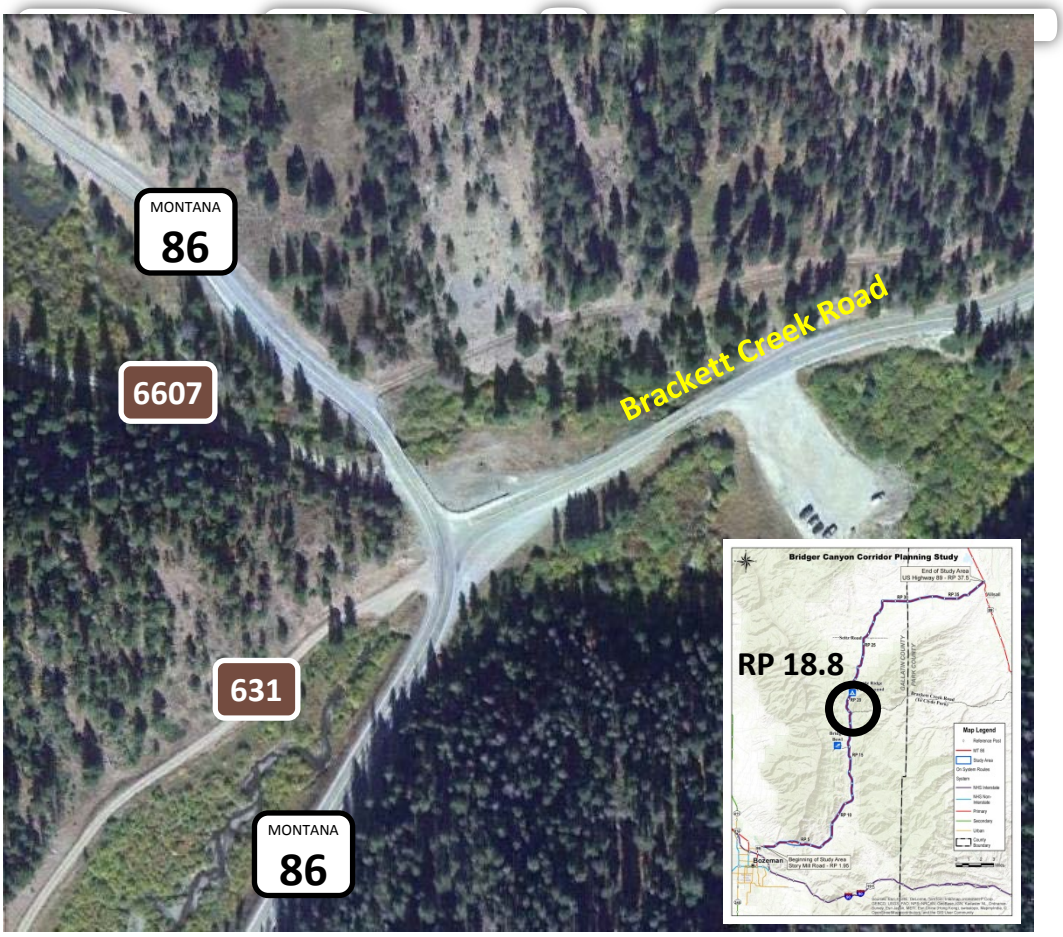


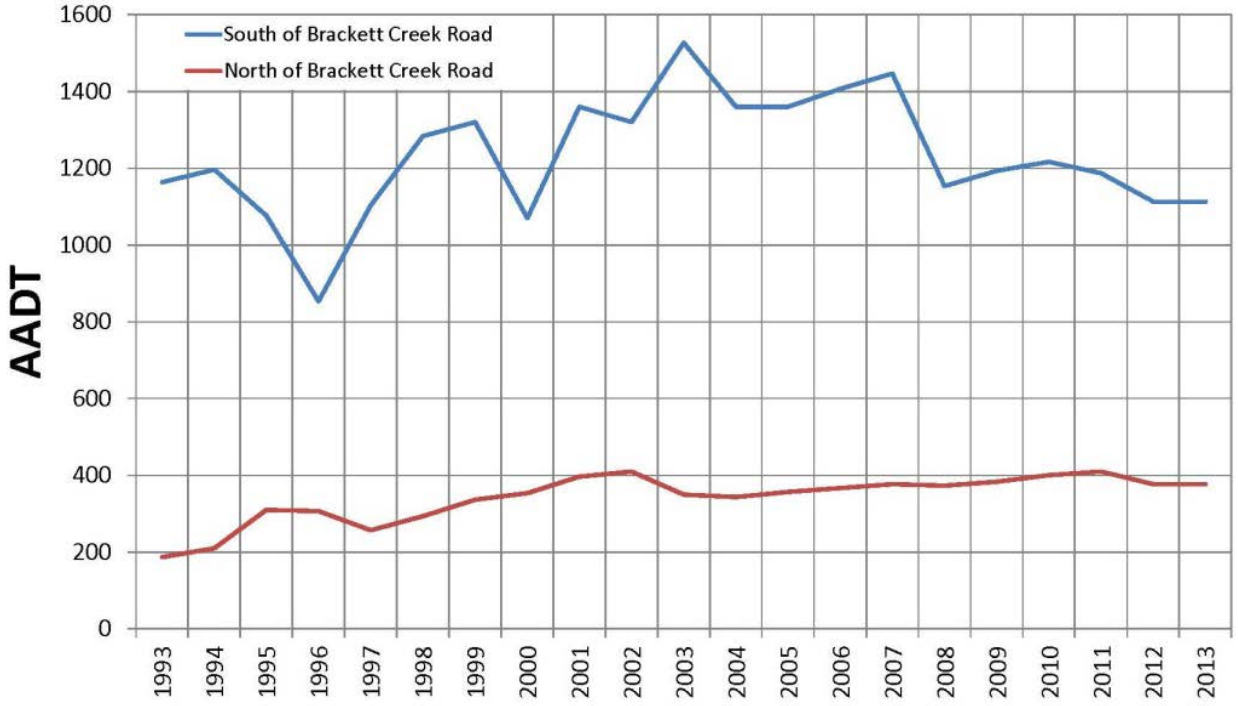
Image source: Google, 2014.

Traffic Volumes and Operations

Historic AADT Volumes

AADT is the total of all motorized vehicles traveling in both directions on a highway on an average day. Traffic count data within the MT 86 corridor was collected using short-term counters. Historic traffic volumes north and south of Brackett Creek Road are represented in Figure 7.

Figure 7 Historic Traffic Volumes



Source: MDT, 2014.

Existing Peak-hour Traffic Volumes

MDT collected traffic volumes from the previous short-term counters listed above in June 2014. Data from the June 2014 field count collection effort was used to identify the highest peak hour of the day (defined as the four consecutive 15-minute periods with the highest volumes during the count period). Peak-hour traffic volumes for the three study segments are listed in Table 8.

Table 8 Existing (2014) Peak Hour Volumes

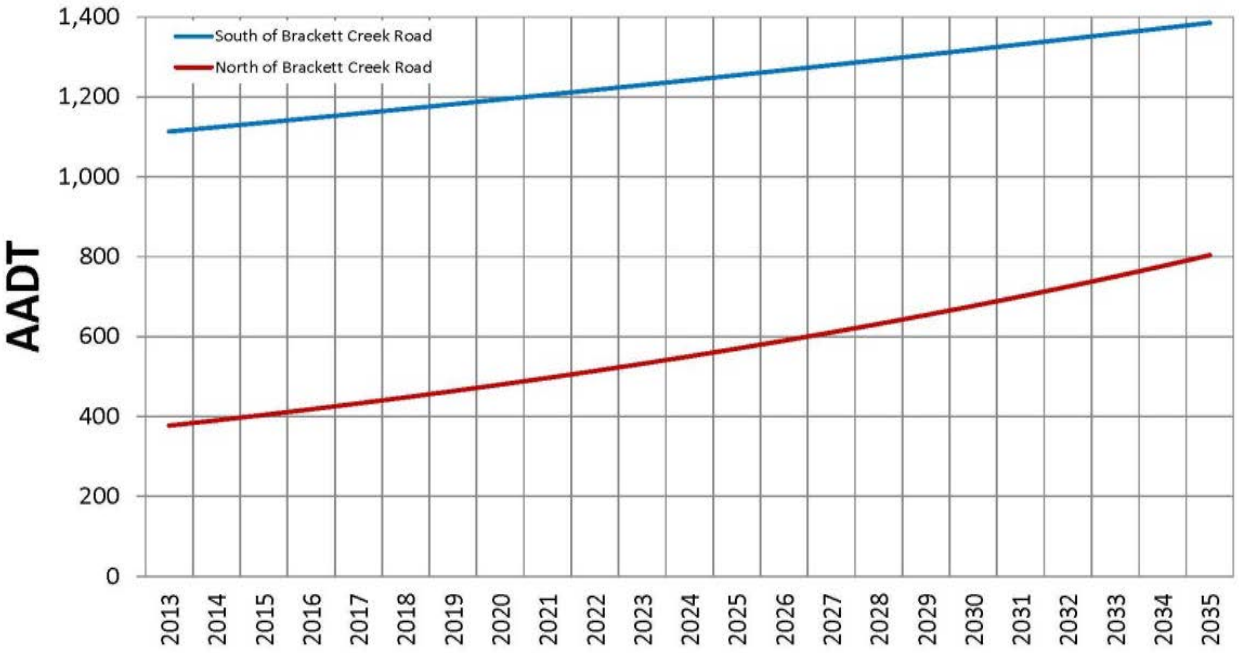
	Segment	Start RP	End RP	Peak Hour Volume (2014)
1	Story Mill Rd to Bridger Bowl Rd (northbound)	1.95	15.7	77
	Story Mill Rd to Bridger Bowl Rd (southbound)	15.7	1.95	72
2	Bridger Bowl Rd to Seitz Rd (northbound)	15.7	25.3	54
	Bridger Bowl Rd to Seitz Rd (southbound)	25.3	15.7	56
3	Seitz Rd to US 89 (northbound)	25.3	37.5	29
	Seitz Rd to US 89 (southbound)	37.5	25.3	27

Source: DOWL, 2014.

Growth Rates and Projected Traffic Volumes

MDT determined a 1.0 percent annual growth rate should be applied south of Brackett Creek Road and a 3.5 percent annual growth rate should be applied north of Brackett Creek Road. Projected AADT volumes are illustrated in Figure 8 and projected peak-hour volumes are presented in Table 9.

Figure 8 Projected AADT Volumes



Source: DOWL, 2014.

Table 9 Projected (2035) Peak Hour Volumes

	Segment	Start RP	End RP	Peak Hour Volume (2035)
1	Story Mill Rd to Bridger Bowl Rd (northbound)	1.95	15.7	95
	Story Mill Rd to Bridger Bowl Rd (southbound)	15.7	1.95	89
2	Bridger Bowl Rd to Seitz Rd (northbound)	15.7	23.3	67
	Bridger Bowl Rd to Seitz Rd (southbound)	23.3	15.7	69
3	Seitz Rd to US 89 (northbound)	23.3	37.5	60
	Seitz Rd to US 89 (southbound)	37.5	23.3	56

Source: DOWL, 2014.

Operational Characteristics

Traffic conditions on transportation facilities are commonly defined using the level of service (LOS) concept. The Highway Capacity Manual (HCM) 2010 defines LOS based on a variety of factors to provide a qualitative assessment of the driver's experience. Within the study corridor, MT 86 falls under the HCM classification of a Class II two-lane highway. Class II two-lane highways commonly pass through rugged or scenic areas where motorists do not necessarily expect to travel at high speeds.

For a Class II two-lane highway, six LOS categories ranging from A to F are used to describe traffic operations, with A representing the best conditions and F representing the worst. LOS F

exists whenever demand flow in one or both directions exceeds the capacity of the segment, operating conditions are unstable, and heavy congestion exists.

Table 10 presents the results of the operational analysis for existing (2014) and projected (2035) conditions. LOS values represent estimated operational conditions within each specified corridor segment.

Table 10 Class II Two-lane Highway Operational Analysis Results (2014 and 2035)

Segment		Start RP	End RP	2014 LOS	2035 LOS
1	Story Mill Rd to Bridger Bowl Rd (NB)	1.95	15.74	B	B
	Bridger Bowl Rd to Story Mill Rd (SB)	15.74	1.95	B	B
2	Bridger Bowl Rd to Seitz Rd (NB)	15.74	25.33	A	A
	Seitz Rd to Bridger Bowl (SB)	25.33	15.74	A	B
3	Seitz Rd to US 89 (NB)	25.33	37.50	A	A
	US 89 to Seitz Rd (SB)	37.50	25.33	A	A

Source: DOWL, 2014. PTSF: Percent time spent following.

The MDT Traffic Engineering Manual defines desirable operations for minor arterial facilities in rolling terrain as LOS B and in mountainous terrain as a LOS C. MT 86 currently operates at LOS B or better throughout the corridor, and is projected to operate at LOS B or better throughout the 2035 planning horizon.

4.2 Environmental and Physical Setting

The Bridger Canyon *Environmental Scan Report* (Appendix C) identifies environmental resource constraints and opportunities within the study corridor. Key information is summarized in the following sections.

Physical Environment

Soil Resources and Prime Farmland

Natural Resources Conservation Service (NRCS) soil surveys indicate the majority of the corridor is either prime farmland, farmland of state or local importance, or prime farmland if irrigated. Specifically, areas classified as prime farmland, prime farmland if irrigated, and farmland of state or local importance are located between RP 1 to RP 15 and RP 22.5 to RP 31.

Any forwarded improvement options that require right-of-way within identified farmlands and are supported with federal funds will require a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects completed by MDT and coordinated with NRCS. The NRCS uses information from the impact rating form to keep inventory of the prime and important farmlands within the state.

Geologic Resources

Numerous faults have been mapped within the study corridor. Most of these are old, inactive thrust faults. There are four main Quaternary (younger) faults surrounding the Bozeman area: the Central Park, Bridger, Gallatin Range, and the Elk Creek faults all with offset during the last 1.6 million years. The Bridger fault is the only fault located within the study area, and although concealed by surficial deposits, it most likely crosses the study corridor between RP 2.5 and 3.0. The northern portion of the Emigrant fault is located to the east of the study area near

Livingston and has had offset during the last 130,000 years. No faults have been identified near or within the study area that have had offset in the past 15,000 years.

Quaternary alluvium (Qal) is present along much of the corridor. Alluvium and other unconsolidated deposits in this area are typically described as a mixture of gravel, sand, silt, and clay. The presence of alluvium consisting predominantly of sand and potentially susceptible to liquefaction is possible, although unlikely. Bedrock along the study corridor consists of Cambrian- to Cretaceous-aged sedimentary rocks from RP 5 to RP 6. The bedrock along the remainder of the study corridor consists of Cretaceous-aged sedimentary rocks. Landslide deposits (Qls) are present in the area along the valley sides.

Improvements forwarded from the study should be prepared to advance borings to evaluate soils at the location work is anticipated to take place to ensure soil suitability.

Surface Waters

Named streams within the study area are listed below.

Brackett Creek	Fairy Creek	Olson Creek
Bridger Creek	Flathead Creek	North Fork Brackett Creek
Cache Creek	Lyman Creek	Place Creek
Carrol Creek	Maynard Creek	South Fork Brackett Creek
Dry Creek	Middle Fork Brackett Creek	Stone Creek
East Gallatin River	Muddy Creek	White Creek

A variety of additional surface waters, including unnamed streams, natural drainages, wetlands, and ponds are also present in the study area. Impacts to these surface waters may occur from improvements such as culverts under the roadway, placement of fill, or rip rap armoring of banks. Coordination with federal, state, and local agencies would be necessary to determine appropriate permits if improvement options are forwarded from this study, as any work within these waters may be regulated by the United States Army Corps of Engineers (USACE), the Montana Department of Fish, Wildlife and Parks (FWP), Montana Department of Natural Resources and Conservation (DNRC), and the Montana Department of Environmental Quality (DEQ). Impacts should be avoided and minimized to the maximum extent practicable. Stream and wetland impacts may trigger compensatory mitigation requirements of the USACE. In addition, forwarded improvement options may trigger the need to obtain coverage under the Montana Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity and comply with the requirements outlined in MDT's Storm Water Management Plan.

Total Maximum Daily Loads

The study area traverses the Gallatin River Watershed (hydrologic unit code [HUC] 10020008) and the Shields River Watershed (HUC 10070003).

DEQ lists Bridger Creek, East Gallatin River, and Stone Creek as having an impairment in the Draft 2014 Integrated 303(d)/305(b) Water Quality Report for Montana. These three water bodies are listed as Category 4A, defined as waters where all total maximum daily loads (TMDLs) required to rectify all identified threats or impairments have been completed and approved. Should improvement options be advanced, it will be necessary to consider DEQ TMDL standards and potential impacts to water quality within receiving streams and watersheds in the study area.

Wild and Scenic Rivers

None of the waterways within the study area carry a wild and scenic designation.

Groundwater

According to the Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC), there are 16,506 wells on record in Gallatin County, and 5,545 wells on record in Park County. Some of these wells are located within the study area. The newest well on record is from June 23, 2014, and the oldest well on record is from January 1860. The majority of wells within Gallatin County (approximately 10,075) are at a depth of 0 to 99 feet. In Park County, approximately half of the wells (2770) are at a depth of 0 to 99 feet. There are 76 statewide monitoring network wells in Gallatin County, and 19 in Park County. The wells in Gallatin and Park Counties have widely varying uses, with domestic wells being the most common. Impacts to existing wells will need to be considered if improvement options are forwarded from the study.

Wetlands

Wetlands were observed throughout the study area during the June 25, 2014, field review. Wetlands typically border streams that traverse or parallel the MT 86 corridor. Several large emergent and scrub/shrub wetland complexes border the riparian areas of Bridger Creek (RP 5.7 to RP 6.7), Carrol Creek (RP 26.8 to 27.4), South Fork Dry Creek (RP 29.2 to RP 29.7), Flathead Creek (RP 30.0 to RP 30.3), and Dry Creek (RP 32.6). Some of these wetland systems were well developed and provide ample wetland functions and values.

Future wetland delineations would be required if improvement options are forwarded from the study that could potentially impact wetlands. Future projects in the corridor would need to incorporate project design features to avoid and minimize adverse impacts to wetlands to the maximum extent practicable. Unavoidable impacts to wetlands must be compensated through mitigation in accordance with the USACE regulatory requirements and requirements of Executive Order 11990. Work within jurisdictional wetlands would require a Clean Water Act 404 permit from the USACE.

Floodplains and Floodways

Federal Emergency Management Agency-issued flood maps for Gallatin and Park Counties indicate that four floodplain zones exist within the study area at the following locations.

- Zone A: Special Flood Hazard Area (SFHA) - 100-Year Flood, No Base Flood Elevations Determined (RP 4.2 – RP 7.4 and RP-31.0 to 37.2);
- Zone AE: SFHA - 100-Year Flood, Base Flood Elevations Determined (RP 3.2);
- Zone AE: SFHA – 100-Year Flood, Stream Channel Plus Adjacent Floodplains (RP 3.2, RP 4.3); and
- Zone X: 500-Year Flood (RP 1.95 – RP 3.2).

If improvement options are forwarded from this study that result in the placement of fill within the regulatory floodplain, impacts to floodplains would need to be identified and evaluated. Project development could require coordination with Gallatin and Park Counties to minimize floodplain impacts and obtain necessary floodplain permits for project construction.

Irrigation

Irrigated grazing land exists in Gallatin and Park Counties adjacent to the study area. Depending on the improvement option(s) proposed during the corridor study, there is potential to impact irrigation facilities. Impacts to irrigation facilities should be avoided to the greatest extent practicable. Any future modifications to existing irrigation canals, ditches, or pressurized

systems would be redesigned and constructed in consultation with the owners to minimize impacts to agricultural operations.

Air Quality

The study area is not located in a non-attainment area for any criteria pollutants designated by the United States Environmental Protection Agency. Additionally, there are no nearby non-attainment areas. Depending on the scope of improvements being considered along this corridor, an evaluation of mobile source air toxics may be required.

Hazardous Substances

Four underground storage tanks were identified within the corridor, all of which are classified as leaking underground storage tank sites. Additional investigation regarding the precise locations of the USTs may be warranted if improvement options are forwarded from this study. If leaking underground storage tanks (LUSTs) or contaminated soils are encountered, removal and cleanup will likely be required.

A single abandoned and inactive quarry site is located at approximate RP 4.4 along an abandoned portion of MT 86. A 1975 landslide associated with this quarry covered a portion of the MT 86 alignment, which is currently bordered with concrete barriers. MT 86 traffic was redirected to the north via a detour route which is still in use today. If improvements are proposed in this area, the quarry has the potential to affect project design and construction, and additional investigation may be necessary.

One hazardous waste handler was identified within the study area. According to the location indicated in the Natural Resource Information System (NRIS) database, the site is likely the USFWS Bozeman Fish Technology Center at RP 4.0. If improvements to MT 86 are proposed in this area, additional coordination may be required.

Biological Resources

Vegetation

A combination of conifer-dominated forests, cultivated crops, sagebrush steppe, and Rocky Mountain grasslands habitat dominate the land cover in the vicinity of the study area. Riparian woodland and shrub-dominated rangeland line the riparian corridors of the numerous creeks and drainages that transect the study area. North and east of RP 23, the study area is buffered by rangeland, grassland, and riparian wetlands bordering the low-gradient streams in the area. If improvement options are forwarded from the study, practices outlined in MDT's standard specifications should be followed to minimize adverse impacts to vegetation. Removal of mature trees and shrubs should be limited to the extent practicable.

Noxious Weeds

The Invaders Database System lists 262 exotic plant species and 49 noxious weed species in Gallatin County, and 144 exotic plant species and 32 noxious weed species in Park County, some of which may be present in the study area.

To reduce the spread and establishment of noxious weeds and to re-establish permanent vegetation, disturbed areas should be seeded with desirable plant species. If improvements are forwarded from the study, field surveys for noxious weeds should commence prior to any ground disturbance and coordination with Gallatin and Park County Control Boards should occur.

General Wildlife Species

Mammals

The study area is home to a variety of mammal species including white-tail deer, mule deer, elk, moose, black bear, mountain lion, gray wolf, and coyote. Other common mammals potentially occurring in the study area include porcupine, raccoon, striped skunk, badger, bobcat, red fox, beaver, muskrat, Richardson's ground squirrel, deer mouse, vole species, and a variety of bat species.

According to electronic mail communications between FWP and MDT, elk are plentiful in the southern portion of the study area, and local citizens have expressed concern about elk on the highway, especially in the winter months. Specifically, from RP 6 to RP 10 in the Kelly Canyon area, as well as near the intersection with Bridger Canyon Spur Road (RP 8.3) and Jackson Creek Road (RP 9.5), elk are frequently observed crossing the road in the winter months. The design and scoping of any future projects in this location should consider occupied habitat adjacent to and the movement of the elk herd across the highway during winter months relative to recreational traffic accessing the Bridger Bowl ski area.

Whitetail and mule deer are prevalent within the study area and the surrounding vicinity. In the morning hours (7 am to 9 am), numerous deer were observed crossing MT 86 during the June 25, 2014, field review. The majority of the deer were observed in the southern portion of the study area, from approximately RP 5 to RP 22.

Moose and black bear also inhabit the study area, with both species' habitat predominantly found from RP 5 to RP 22. Based on FWP input, moose are relatively abundant in the area, particularly in the areas of Kelly Canyon, Drinking Horse Reservoir, and Green Mountain. One moose was observed during the field review at approximate RP 28. FWP also reported several mountain lion harvested within a mile of MT 86.

If improvement options are forwarded from the study, wildlife crossing structures and other wildlife mitigation strategies should be explored during the project development process. Additional coordination with the FWP area wildlife biologist should be undertaken for local expertise on the wintering elk herd in the study area.

Amphibians and Reptiles

Amphibian species known to occur within the study area include, but are not limited to, the boreal chorus frog, American bullfrog, northern leopard frog, Columbia spotted frog, snapping turtle, painted turtle, rubber boa, gophersnake, and common gartersnake.

Birds

There are more than two hundred species of birds documented with the potential to occur and nest in the study area. These species include representative songbirds, birds of prey, waterfowl, owls, and shorebirds.

According to FWP, there are multiple bald eagle nests located in the general vicinity; however, none are located within the study area or within approximately five miles of the study area. While bald eagle nests are not found within the study area, information from the Montana Field Guide states, "numerous eagles have been observed migrating over Rogers Pass and the Bridger Mountains." Bald and golden eagles are protected under the Migratory Bird Treaty Act and managed under the Bald and Golden Eagle Protection Act, which prohibits anyone, without a

permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. Multiple nesting raptors have been observed in the northern portion of the corridor, specifically from RP 25 to RP 38. Any improvements forwarded from this study should consider potential constraints that may result from nesting/breeding periods of migratory birds and presence of bald and golden eagles nests.

Fisheries

Many perennial, intermittent, and ephemeral streams intersect the study area. Fish species commonly found within named streams in the study area vicinity include brook trout, brown trout, lake chub, longnose dace, longnose sucker, mottled sculpin, mountain sucker, mountain whitefish, rainbow trout, westslope cutthroat trout, white sucker, and Yellowstone cutthroat trout.

According to Montana Natural Heritage Program, the Brackett Creek and Flathead Creek drainages contain populations of genetically-pure Yellowstone cutthroat trout. Other unnamed stream crossings exist that could also support fish species within the study area. Fish passage and/or barrier opportunities should be considered in cooperation with resource agencies at affected drainages if improvements are forwarded from this study. Permitting from regulatory agencies for any future corridor improvements may also require incorporation of design measures to facilitate aquatic species passage.

Crucial Areas Planning System

The FWP Crucial Areas Planning System (CAPS) is a resource intended to provide non-regulatory information during early planning stages of projects, conservation opportunities, and environmental review. The finest data resolution within CAPS is at the square-mile section scale or water body. Use of these data layers at a more localized scale is not appropriate and may lead to inaccurate interpretations since the classification may or may not apply to the entire square-mile section. The CAPS system was consulted to provide a general overview of the study area.

The online CAPS mapping tool provides FWP general recommendations and recommendations specific to transportation projects for both terrestrial and aquatic species and habitat. These recommendations can be applied generically to possible future improvements carried forward from the study.

Threatened and Endangered Species

Table 11 presents the six threatened, proposed threatened, or candidate species listed as occurring in Gallatin and Park Counties.

Table 11 Threatened and Endangered Species in Gallatin and Park Counties

Species		Status
Wildlife Species	Greater sage-grouse	Candidate
	Sprague's pipit	Candidate
	Grizzly bear	Threatened
	Canada lynx	Threatened
Plant Species	Whitebark pine	Candidate
	Ute ladies'-tresses	Threatened

Source: USFWS, 2014.

All of the federally-listed species potentially occurring in Gallatin and Park Counties have occurrence buffers overlapping the study area. If improvements are forwarded from the study,

an evaluation of potential effects to federally-listed species will need to be completed during the project development process. As federal status of protected species changes over time, reevaluation of the listed status and afforded protection to each species should be completed prior to issuing a determination of effect relative to potential impacts.

Species of Concern

Table 12 lists species of concern in Gallatin and Park Counties with potential to occur in the study area based on presence of suitable habitat. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). State ranks may be followed by modifiers, such as B (breeding).

Table 12 Species of Concern Overlapping the Study Area

Animal Subgroup	Common Name	State Rank	Habitat Description
Amphibians	Western toad	S2	Wetlands, floodplain pools
Birds	Great blue heron	S3	Riparian forest
	Northern goshawk	S3	Mixed conifer forests
	Ferruginous hawk	S3B	Sagebrush grassland
	Great gray owl	S3	Conifer forest near open meadows
	Clark's nutcracker	S3	Conifer forest
	Brown creeper	S3	Moist conifer forests
	Veery	S3B	Riparian forest
	Sage thrasher	S3B	Sagebrush
	Brewer's sparrow	S3B	Sagebrush
	Sagebrush sparrow	S3B	Sagebrush
	Bobolink	S3B	Moist grasslands
	Cassin's finch	S3B	Drier conifer forest
Fish	Yellowstone cutthroat trout	S2	Mountain streams, rivers, lakes
	Westslope cutthroat trout	S2	Mountain streams, rivers, lakes
Mammals	Wolverine	S3	Boreal forest and alpine habitats
Invertebrates	Warm Spring Zaitzevian riffle beetle	S1	Springs
	Brown's microcylloepus riffle beetle	S1	Springs
Plants	Rocky Mountain twinpod	S3	Gravelly slopes/talus
	Small yellow lady's-slipper	S3S4	Fens and moist forest-meadows
	Slender wedgegrass	S3S4	Wet sites (low-elevation)

Source: MNHP, 2014.

Of particular note, the only known global population of the Warm Spring Zaitzevian riffle beetle occurs within the project area in spring and seepage habitat (total area = 35 square meters) in and along Bridger Creek where it flows through the USFWS-owned Bozeman Fish Technology Center. Because this is the only globally-known location of this species, every effort should be made to avoid disturbance to this beetle and its habitat. Any potential disturbance to the beetle or its habitat should be coordinated with Montana FWP and the USFWS.

Other sensitive species, including bald eagles, are not listed in Table 12, but have the potential to occur within the study area. A thorough field investigation for the presence and extent of these species should be conducted if improvement options are forwarded from this study. If present, special conditions to the project design or during construction should be considered to avoid or minimize impacts to these species.

Social and Cultural Resources

Population Demographics and Economic Conditions

Under NEPA/MEPA and associated implementing regulations, state and federal agencies are required to assess potential social and economic impacts resulting from proposed actions. FHWA guidelines recommend consideration of impacts to neighborhoods and community cohesion, social groups including minority populations, and local and/or regional economies, as well as growth and development that may be induced by transportation improvements. Demographic and economic information presented in this section is intended to assist in identifying human populations that might be affected by improvements within the study area.

Title VI of the United States Civil Rights Act of 1964, as amended (USC 2000(d)) and EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, require that no minority, or, by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. For transportation projects, this means that no particular minority or low-income person may be disproportionately isolated, displaced, or otherwise subjected to adverse effects. If a project is forwarded from the improvement option(s), environmental justice will need to be further evaluated during the project development process.

Table 13 summarizes population and demographic data for Gallatin and Park Counties based on 2010 Census data and includes Montana for comparison.

Table 13 2010 Census Data for Gallatin and Park Counties

		Gallatin	Park	Montana
Population	County	89,513	15,636	989,415
	Bozeman City	37,280		
	Belgrade City	7,389		
	Three Forks City	1,869		
	Livingston City		7,044	
	Clyde Park Town		288	
Race	White	97%	98%	89.4%
	Black or African American	0.3%	0.1%	0.4%
	American Indian & Alaska Native	2%	1%	6.3%
	Asian	1%	0.3%	0.6%
Ethnicity	Hispanic or Latino	2%	1%	2.9%

Source: U.S. Census Bureau, 2010.

Gallatin County's population increased by approximately 31 percent from 2000 to 2010, while the population of Park County remained relatively constant over the 10-year period. Regionally, the combined population from both counties shows an increase by a mean of 2 percent each year from 2000 to 2013. From 2012 to 2030, the region's population is projected to increase to approximately 158 percent of its 2000 population (with the addition of 25,000 people). This increase follows an upward trend of population growth typical throughout western Montana.

Gallatin and Park Counties' population ethnicity in 2010 is primarily white/Caucasian (97 percent and 98 percent, respectively), with American Indian and Alaska Native individuals comprising 1 to 2 percent of the population. A number of races make up the remainder of the population.

From 2006 to 2010, the United States Census Bureau indicated Gallatin County has approximately 42,467 employed individuals in the labor force, while Park County consisted of 5,172 employed individuals. For Gallatin County, the top fields of employment are public administration, followed by the arts, entertainment, recreation, and foods industry. For Park County the top fields of employment are the arts, entertainment, recreation, and foods industry, followed by public administration.

Unemployment in the Gallatin and Park County region has been similar to the statewide unemployment rate for the last decade. As the recession began in 2007 and unemployment increased, Montana, Gallatin County, and Park County all did relatively well in comparison to the nation as a whole with an unemployment rate below the national average. However, after 2007 Park County has continuously had a higher unemployment rate than the state average. Gallatin County has stayed below both the national and state average over time. The most recent unemployment figures from the state and federal labor departments suggest favorable current employment conditions in the study area. In 2013, the average unemployment rate for Gallatin County and Park County was 4.4 and 5.8 percent, respectively. Although Park County has a slightly higher rate than the Montana rate, both counties fall short of the national unemployment rate of 7.4 percent.

Land Ownership and Land Use

Ownership of land in the study area is predominantly private, with some interspersed state and federal owners. Specifically, the USFWS owns a parcel of land associated with the Bozeman Fish Technology Center from approximately RP 4.1 to RP 4.6, and, as part of the Gallatin National Forest, the USFS owns from approximate RP 18.4 to RP 19.5 and from RP 19.7 to RP 20.9. Additionally, state-owned land is located within the northern portion of the study area from RP 34.0 to RP 34.4. Much of the private land adjacent to MT 86 includes low- to moderate-intensity development.

Mixed land use arises from the varied land ownership throughout the study area. These land uses include commercial, industrial, crop/pasture, mine/quarry, mixed urban, and recreational. If improvements are forwarded from this study, land use adjacent to possible projects will need to be considered during design.

Recreational Resources

Bridger Canyon provides access to the Bridger Mountains and the Gallatin National Forest, and offers a variety of recreational opportunities, including hiking, downhill skiing at the Bridger Bowl ski area, cross-county skiing at Bohart Ranch, birding and wildlife viewing, cycling, snowshoeing, fishing, hunting, hiking, and camping.

The “M” trail is a popular recreation site offering hiking and biking trails in the Bridger Mountain Range which can be accessed year round. A small parking lot serves the overpopulated trail head. Bridger Bowl is an alpine ski area which also has insufficient parking for the number of people who use the area. The parking areas are often full causing parking to overflow across and/or onto the highway. The tight corridor and minimal shoulders adjacent to the “M” trail and Bridger Bowl Ski area causes a hazardous situation for vehicles parked along the roadway and pedestrians crossing the roadway.

Table 14 lists publically-owned recreational resources identified in the study area. These recreational areas may be protected under Section 4(f) of the U.S. Department of

Transportation Act of 1966, which was enacted to protect publically-owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Federally-funded transportation projects cannot impact these properties unless there are no feasible and prudent avoidance alternatives and all possible planning to minimize harm has occurred. Potential effects on recreational use would need to be considered in accordance with Section 4(f) if improvements are forwarded from this study.

Table 14 Potential Section 4(f) Recreational Resources

Resource	Approximate RP
Story Mill Spur Trail	1.95
Bozeman Fish Technology Center Trails (including College "M" Trailhead and Trail System)	4.2
Stone Creek USFS Access	11.7
Olson Creek USFS Access	14.3
USFS Battle Ridge Campground, Picnic Area, and USFS 500 Trailhead	20.5
Fairy Lake USFS Trailhead	21.6

Source: USFS, 2014.

According to FWP Land and Water Conservation Fund Act (LWCFA) Sites by County, no Section 6(f) resources were identified in the study area. To confirm the accuracy/completeness of the literature, additional coordination with FWP will be necessary if improvements are forwarded from this study.

Cultural Resources

A file search through the Montana State Historic Preservation Office revealed two historic properties located within 0.15 miles of the existing alignment (24GA1394 and 24GA0802). Table 15 lists the properties, their approximate locations, and National Register of Historic Places (NRHP) eligibility. An examination of the Montana Cadastral Survey information for the designated corridor indicates that at least 76 historic-age properties are located within 0.15 mile of the existing MT 86 alignment.

Table 15 Recorded Cultural Resource Sites

Site Name	Site No.	RP	Township	Range	Section	NRHP Eligibility
Flaming Arrow Ranch House & Office	24GA1394	15.3±	1N	7E	29	Listed
Sedan School	24GA0802	22.6±	2N	7E	3	Listed

Source: Montana State Historic Preservation Office (SHPO), 2014.

There are likely unrecorded archaeological sites within the project corridor. Based on an MDT field review on May 12, 2014, the east end of the project corridor has a higher likelihood of archaeological sites than the west end.

There is a high likelihood of encountering buried archaeological sites near the following stream crossings: Dry Creek, Carrol Creek, Fairy Creek, and Cache Creek. Brackett Creek, and Bridger Creek and its various tributaries, all have the potential to harbor buried archaeological deposits at MT 86 crossings. Tipi ring sites may be located where MT 86 approaches the valley wall of Flathead Creek. Tribal consultation will be necessary for the Battle Ridge Pass area.

If a project is forwarded from the corridor study, a cultural resource survey for unrecorded historic and archaeological properties within the area of potential conflict (APE) will need to be

completed during the project development process. Flexibility in design will be important to avoid and/or minimize impacts to significant sites in the study corridor.

Noise

Traffic noise may need to be evaluated for any future improvements to the Bridger Canyon corridor. Noise analysis is necessary for "Type I"-classified projects. If future roadway improvements are limited (e.g., the horizontal and vertical alignments are not changed and the highway remains a two-lane facility), then the project would not be considered a Type I project. If forwarded improvements include a substantial shift in the horizontal or vertical alignments, increasing the number of through lanes, providing passing lanes, or increasing traffic speed and volume, then the project would be considered a Type I project.

Type I projects require a detailed noise analysis, consistent with FHWA requirements and MDT policy, which includes measuring ambient noise levels at selected receivers and modeling design year noise levels using projected traffic volumes. Noise abatement measures would be considered for the project if noise levels approach or substantially exceed noise abatement criteria. The noise abatement measures must be considered reasonable and feasible prior to implementation.

Visual Resources

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness in landscape character), and landscape visibility (relative distance of seen areas) of a geographically defined view shed.

The landscape throughout the study area contains an array of biological, topographic, historic, ecological, and cultural resources in a relatively remote location. MT 86 serves as the access point to the Bridger Bowl ski area from Bozeman and the greater Gallatin valley. MT 86 also provides access to the Gallatin National Forest, with numerous trailheads, access points, and a campground accessed via the highway. While the area surrounding the corridor has been slightly developed, the rural and scenic landscape remains, offering aesthetically-pleasing views to residents and motorists.

A rock formation, known as "Maiden Rock," is located near RP 4.4 on the north side of MT 86. Some accounts indicate the named formation is a stone spire or pinnacle at the entrance to the canyon. A Museum of the Rockies archival photograph circa 1900 shows a formation that appears to resemble a maiden's head. Although the spire still remains, much of the larger formation was damaged or removed during blasting by road crews in the 1970s.

Evaluation of the potential effects on visual resources would need to be conducted if improvement options are forwarded from this study.

4.3 Summary of Corridor Issues and Constraints

Table 16 summarizes transportation system issues and environmental constraints in the corridor.

Table 16 Summary of Corridor Issues and Constraints

Category	Issues and Constraints
Transportation System Conditions	Bridges • Three bridges in the study corridor are candidates for repair. Bicycle and Pedestrian Facilities • There are no dedicated bicycle or pedestrian facilities directly adjacent to MT 86. Drainage Condition • Insufficient drainage occurs at RP 15.9, RP 23.4, and RP 26.8. Pavement Condition • Pavement deficiencies (including transverse cracking, longitudinal cracking, and/or subgrade/pavement failure) were identified at RP 6.7, RP 15.9, RP 23.4, RP 24.4, RP 26.8, RP 28.0. Rockfall Hazard • A slide near RP 4.4 is reported to be unstable and susceptible to continuous sloughing; an earthquake or heavy precipitation event could activate a slide event in this location. Horizontal Alignment • Thirty-eight curve locations do not meet current MDT design criteria. Vertical Alignment • One hundred twenty-eight curve locations do not meet current MDT design criteria. Clear Zones • The portion of the corridor from RP 4.0 to RP 24.0 contains unprotected slopes and inadequate clear zone distances. Crash History • Areas identified with high potential for crash reduction occur near RP 5, 9, 19, 21, 29, 30, and 36.
Category	**Issues and Constraints**
Environmental Conditions	Prime Farmland • Areas classified as prime farmland, prime farmland if irrigated, and farmland of state or local importance are located between RP 1 to RP 15 and RP 22.5 to RP 31. Surface Water Impairment • Bridger Creek, East Gallatin River, and Stone Creek are listed as impaired in the Draft 2014 Integrated 303(d)/305(b) Water Quality Report for Montana. Wetlands • Wetlands are located throughout the study area. • Several large emergent and scrub/shrub wetland complexes border the riparian areas of Bridger Creek (RP 5.7 to RP 6.7), Carrol Creek (RP 26.8 to 27.4), South Fork Dry Creek (RP 29.2 to RP 29.7), Flathead Creek (RP 30.0 to RP 30.3), and Dry Creek (RP 32.6). Floodplains • Mapped floodplain zones occur within the study area from RP 1.95 to RP 3.2, RP 4.2 to RP 7.4, and RP-31.0 to 37.2. Hazardous Substances • Four leaking underground storage tanks were identified within the study area. • A single abandoned and inactive quarry site is located at approximate RP 4.4.

Category	Issues and Constraints
Environmental Conditions	Fish and Wildlife • Elk are frequently observed crossing the road in the winter months from RP 6 to RP 10 in the Kelly Canyon area, as well as near the intersection with Bridger Canyon Spur Road (RP 8.3) and Jackson Creek Road (RP 9.5). Deer, moose, black bear, and mountain lion have also been observed in the corridor. • Brackett Creek and Flathead Creek drainages contain populations of genetically-pure Yellowstone cutthroat trout. • Four threatened, proposed threatened, or candidate animal species and 18 species of concern may occur in the study area. • The only known global population of the Warm Spring Zaitzevian riffle beetle occurs within the project area in and along Bridger Creek where it flows through the USFWS-owned Bozeman Fish Technology Center near RP 4.2. Vegetation • One threatened, one candidate, and three plant species of concern may occur in the study area. Recreational Resources • Six potential Section 4(f) recreational resources occur at RP 1.95, 4.2, 11.7, 14.3, 20.5, and 21.6. Cultural and Archaeological Resources • Two NRHP-listed historic properties are located within 0.15 miles of the existing alignment at RP 15.3 and 22.6. • Unrecorded historic-age properties and archaeological sites likely occur within the study area.

5.0 Recent and Future Projects and Maintenance Efforts

Recent MDT projects in the study area vicinity are listed below in letting date order.

Park County Line – West; UPN 7583 STPP 86-1(47)24; STPP 86-1(48)24
MT 86, RP 23.9 to 30.9, mill and fill, seal and cover with new pavement markings. Let date March 2013.

Legends at Bridger Creek II
Roadway widening, turn lane installation, new pavement markings, and signing from approximately RP 2.03 to RP 2.29.

Let in 2013. Table 17 lists planned construction and maintenance activities from 2014 through 2016 in RP order.

Table 17 Planned MDT Maintenance and Construction Activities

Begin RP	End RP	Const. Treatment 2014	Const. Treatment 2016	Maint. Treatment 2014	Maint. Treatment 2016
0.0	2.8	AC_Major Rehab	AC_Major Rehab	AC Reactive Maintenance	AC Reactive Maintenance
2.8	9.6	Do Nothing	AC Crack Seal & Cover	Do Nothing	AC Crack Seal & Cover
9.6	16.3	Do Nothing	AC Crack Seal & Cover	Do Nothing	AC Crack Seal & Cover
16.3	20.6	AC Thin Overlay	AC Thin Overlay	AC Thin Overlay	AC Thin Overlay
20.6	23.9	AC Thin Overlay	AC_Major Rehab	AC Thin Overlay	AC Reactive Maintenance
23.9	31.0	None	Do Nothing	None	Do Nothing
31.0	37.7	AC Thin Overlay	AC Thin Overlay	AC Thin Overlay	AC Thin Overlay

Source: Existing Conditions Summary (MDT, 2014). AC: Asphalt concrete.

Table 18 identifies projects listed in the 2014-2018 STIP within the MT 86 corridor in date and RP order.

Table 18 MDT STIP Projects 2014 – 2018

MDT Highway Program Project Name	Fiscal Year (Construction Phase)	Ref. Point	Project Length	Project Scope
SF-119-SIGNING GR N BOZEMAN; UPN 7857	2015	20.80	0.60	Guardrail, Skid Treatment
ROUSE-OAK/STORY MILL-BOZEMAN; UPN 4805	2016	0.85	1.13	Reconstruction
SF-129-SFTY IMPRV BRDGR CANYON; UPN 8028	2016	4.30	0.50	Safety
SF 109-G.R. NE OF BOZEMAN; UPN 7520	2016	6.50	0.46	Guardrail, Skid Treatment
BRIDGER CANYON; UPN 8112	2018	9.58	6.76	Overlay and Widen
Federal Lands Access Program Project Name	**Obligation Year**	**Begin Point**	**End Point**	**Project Scope**
MT DOT T 86(1) Bozeman to Bridger Mountains Trail	2015	Story Mill Rd.	"M" and Drinking Horse Mountain trail heads	Address pedestrian-bicycle/vehicle crashes on MT 86

Source: MDT STIP, 2014 – 2018.

The FHWA Western Federal Lands Highway Division (WFLHD) has prepared a feasibility memorandum (January 2015) describing potential alternatives for the Bozeman to Bridger Mountains Trail project. The trail project would include an at-grade crossing in the southern portion of the Bridger Canyon corridor. If a project is forwarded from the corridor study, coordination with WFLHD will be necessary.

6.0 Needs and Objectives

Needs and objectives for the Bridger Canyon Corridor Planning Study were developed based on existing and projected conditions within the corridor, input from the public and resource agencies, and coordination with the study advisory committee. Needs, objectives, and considerations are not listed in order of priority.

Need 1: **Improve the safety of MT 86 for all users.**

Objectives:
To the extent practicable:

- Improve roadway elements to meet current MDT design criteria.
- Identify strategies to address locations with high potential for crash reduction and other areas of safety concern.

Need 2: **Maintain infrastructure assets in the corridor.**

Objectives:
To the extent practicable:

- Address areas with inadequate drainage.
- Conduct appropriate maintenance and repair activities.

Other Considerations

- Local planning efforts for all modes, planned projects, and potential future development in the corridor.
- Wildlife movement and animal-vehicle conflicts.
- Scenic character of the corridor and potential adverse impacts to environmental resources that may result from improvement options.
- Funding availability.
- Temporary construction impacts.
- Construction feasibility and physical constraints.

7.0 Improvement Options

MT 86 improvements will be designed in accordance with state laws and standards. MDT has generally adopted AASHTO policies and Public Rights-of-Way Accessibility Guidelines (PROWAG) in compliance with the Americans with Disabilities Act (ADA). MDT design criteria and guidelines consulted for this study include the *Road Design Manual* (RDM), *Traffic Engineering Manual*, and *Environmental Manual*, among others.

MT 86 is classified as a rural minor arterial on the primary system (non-NHS). MDT geometric design criteria listed in the RDM specify 12-foot travel lanes for rural minor arterials. The RDM references the Route Segment Map to determine applicable total roadway width (including shoulders). The 2004 Route Segment Plan Map (non-NHS Primary) indicates a total MT 86 roadway width of 32 feet or greater from RP 1.95 to approximately RP 20, and a total roadway width of 28 feet or greater from approximately RP 20.0 to RP 38.0. Any potential deviation from the recommended roadway width in the Route Segment Plan must be evaluated by the Roadway Width Committee. The AASHTO *Policy on Geometric Design of Highways and Streets* recommends a minimum usable shoulder width of 6 feet for daily traffic volumes between 400 and 2000, and consideration of a minimum continuous usable shoulder width of 4 feet where bicyclists and pedestrians are to be accommodated.

7.1 Improvement Options Overview

Improvement options were identified in cooperation with the study advisory committee to address the needs and objectives for this study. Local planning documents and input from resource agencies and members of the public were also considered during identification of improvement options.

Improvement options are presented alphabetically by category. Planning-level cost estimates are listed in 2014 dollars for each improvement option. Estimates include anticipated costs associated with preliminary engineering, construction engineering/inspection, and right-of-way acquisition where appropriate. Cost estimates reflect contingency ranges to account for the high degree of unknown factors at the planning level.

Project Development Considerations

The following sections present a range of options MDT may consider for implementation in the MT 86 corridor in the future. MDT may elect to implement a single option or combine multiple options at the time a project is nominated. Should this corridor planning study lead to one or more projects, compliance with NEPA/MEPA will be required if federal or state funding or involvement occurs. This corridor planning study will be used as the basis for determining impacts and subsequent mitigation for improvement options in future NEPA/MEPA documentation. Any project developed will comply with CFR Title 23 Part 771 and ARM 18, sub-chapter 2, which set forth requirements for documenting environmental impacts on highway projects.

During the project development process, MDT will determine the need for and feasibility of including wildlife mitigation strategies based on the scope and location of a particular project. Specific strategies that may be appropriate in the Bridger Canyon corridor are listed below.

- Fencing modifications (including wildlife-friendly fencing and/or barrier fencing) will be considered to facilitate safe wildlife movement and alleviate animal-vehicle conflicts throughout the corridor. Fencing modifications would likely require the cooperation of adjacent landowners.
- Seasonal/variable message signage, and/or flashing lights and signage will be considered in conjunction with nominated projects as appropriate.
- Wildlife crossing structures will be evaluated where opportunistically feasible. These locations include topographical opportunities (e.g. gullies/gulches) in the canyon section where drainage features would require fill material or drainage structures. The potential may exist to install an oversized box or arch culvert to allow wildlife passage. Additionally, in the Shields River Valley where several older timber bridges may be replaced or rehabilitated, oversized bridges or box culverts may provide opportunities to encourage wildlife passage under the highway.

Specific wildlife mitigation measures will be considered during project-level analysis.

Potentially-impacted Resources and Associated Permitting

Improvement options forwarded from this study may impact the human and natural environment. Potentially-impacted resources include wetlands, streams, floodplains, cultural resources, threatened and endangered species, and protected farmlands. A list of permits associated with potentially-impacted resources within the Bridger Canyon corridor is presented in Table 19.

Table 19 Potentially-impacted Resources and Associated Permits

Permit/Authorization	Regulatory Entity	Potentially-impacted Resources
Clean Water Act (CWA) Section 401/404 Permit	USACE/DEQ	Wetlands, Streambed and Streambanks
Stream Protection Act (SPA) 124 Authorization	FWP	Streambed and Streambanks
Floodplain Development Permit	County Floodplain Administrator	Wetlands, Streambanks, Floodplains
Short-term Water Quality Standard for Turbidity (318 Authorization)	DEQ	Wetlands, Streambed and Streambanks, Floodplains
Montana Pollutant Discharge Elimination System (MPDES) General Permit for Storm Water Discharges Associated with Construction Activity	DEQ	Wetlands, Streambanks, Floodplains
National Historic Preservation Act (NHPA) Section 106 Coordination/Consultation	SHPO	Cultural Resources
Endangered Species Act (ESA) Section 7 Coordination/Consultation	USFWS	Threatened or Endangered Species
Farmland Conversion Coordination (CPA-106 Form)	NRCS	Protected Farmlands

If improvements are forwarded from this study, detailed analysis would be required during the project development process to quantify specific resource impacts and identify associated permits that may apply.

Future Implementation Timeframes

Implementation of improvement options is dependent on funding availability, construction feasibility, right-of-way needs, personnel resources, and other project delivery elements. Recommended timeframes for implementation are defined as follows.

- Short-term: Implementation is recommended within a 1- to 3-year period
- Mid-term: Implementation is recommended within a 3- to 6-year period
- Long-term: Implementation is recommended within a 6- to 20-year period
- As Needed: Implementation should occur based on observed need throughout the 2035 planning horizon

Responsibility for Implementation

The improvement options outlined in this report are intended for implementation by MDT. Additional efforts that may affect safety and operations in the corridor are the responsibility of others. As examples, speed limit enforcement, enactment of distracted driving ordinances, and regulation of development in the corridor would fall under the jurisdiction of state and local agencies including the Montana Highway Patrol and Gallatin and Park Counties. Any costs associated with improvements required to mitigate new development would be the responsibility of the developer.

7.2 Bridge Repairs

Bridge repairs are intended to address bridge elements that are in fair condition (as identified by MDT condition assessments) and where field review indicated localized failures in order to extend the life of the structures and improve safety.

Option 1 Bridge Repairs

Specific bridge repair locations are listed below.

- RP 7.8 (Stock Pass) – This structure was built in 1939 and is rated in fair condition for superstructure elements. Recommendations for the structure include removal of existing guardrail and installation of new guardrail to meet current design criteria. Additionally, this improvement would include a mill and overlay on the bridge deck

- RP 24.4 (Cache Creek) – This structure was built in 1939 and is rated in fair condition for substructure elements. Recommendations for the structure include removal of existing guardrail and installation of new guardrail to meet current design criteria. Additionally, this improvement would include a mill and overlay on the bridge deck.

- RP 26.8 (Carrol Creek) – This structure was built in 1986 and is rated in fair condition for substructure elements. A damaged wing wall and substantial erosion were noted on the structure during the field review. Recommendations for the structure include reconstruction of the bridge approach, reconstruction of the damaged wing wall, guardrail removal and replacement, and pavement rehabilitation (mill and overlay).

- RP 28.0 (Flathead Creek) – This structure was built in 1939 and is rated in good condition. However, transverse and longitudinal cracking is observable on pavement adjacent to and on top of the bridge. A mill and overlay of the bridge surface to extend the service life is recommended at the location.

Planning-level Cost Estimate

$50,000 to $110,000 per bridge

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources /Anticipated Right-of-Way
Potential impacts to streams, riparian wetlands, floodplains, protected species, cultural resources, protected farmlands, and utilities may result from this option. The need for additional right-of-way is not anticipated.

7.3 Curve Geometry and Roadway Width

There are a number of locations within the MT 86 corridor that do not meet current MDT design criteria for horizontal/vertical alignment and/or total roadway width. Where an existing roadway does not meet current MDT design criteria, it may not be cost effective to reconstruct the roadway to address geometric issues unless there are documented safety issues. The following options focus on areas identified by MDT as high potential for crash reduction – Level of Service of Safety (LOSS) IV for total crashes or for crash severity.

Option 2.a Roadway Realignment at Slide Area

The roadway segment from RP 4.3 to RP 4.6 contains several horizontal curves which do not meet current MDT design criteria. This location is identified as a high potential for crash reduction (LOSS IV). Due to the active landslide in the vicinity and natural features such as rock outcroppings and Bridger Creek, the placement of the horizontal alignment is restricted. Recommendations for this location include realignment of the roadway and relocation of landslide material currently covering a portion of the original MT 86 alignment.

Figure 9 illustrates one potential configuration, where MT 86 would follow an alignment between the original alignment and the current detour route. Other options could include a couplet (with one-way traffic along the original and detour routes), as well as other curve configurations.

Figure 9 RP 4.3 to RP 4.6 Roadway Realignment

Planning-level Cost Estimate
Reconstruction: $1,100,000 to $1,200,000

Recommended Implementation Timeframe
Long-term

Potentially-impacted Resources /Anticipated Right-of-Way

Potential impacts to streams, wetlands, floodplains, protected species, cultural resources, and utilities may result from this option. The need for additional right-of-way is not anticipated.

Option 2.b Horizontal and Vertical Curve Improvements with Shoulder Widening

The alignment of a highway is composed of vertical and horizontal elements. The vertical alignment includes straight (tangent) highway grades and the parabolic curves that connect these grades. The horizontal alignment includes the straight (tangent) sections of the roadway and the circular curves that connect their change in direction. Design criteria for horizontal and vertical curves are largely determined by the design speed of the roadway. Curve locations listed in Table 20 do not meet current MDT design criteria and are located in an area identified as high potential for crash reduction (LOSS IV).

Table 20 Curves Not Meeting Current Design Criteria Located in LOSS IV Area

Location	Horizontal	Vertical
RP 4.1 to RP 5.1	×	×
RP 6.7	×	
RP 8.0		×
RP 8.7 to RP 8.8		×
RP 9.0 to RP 9.1	×	×
RP 11.7 to RP 11.8	×	×
RP 12.0		×
RP 16.2	×	
RP 16.5 to RP 16.8		×
RP 18.5		×
RP 18.7 to RP 18.8	×	×
RP 19.0 to RP 19.4	×	×
RP 20.2		×
RP 20.4		×
RP 20.6		×
RP 20.8 to RP 22.0	×	×
RP 22.8 to RP 23.8	×	×
RP 28.3 to RP 29.1	×	×
RP 29.7 to RP 30.0		×
RP 35.8	×	

Listed curves are located within a LOSS IV roadway segment (total crashes and/or crash severity).

This improvement option would involve reconstruction and realignment of the roadway to comply with current MDT design criteria for horizontal and vertical curves in the listed locations, as well as shoulder widening to provide an appropriate total roadway width as determined during project development. Using information from Table 20, MDT could elect to nominate a project to address one or multiple curve locations through a corridor segment. Provision of consistent shoulder width through a corridor segment would provide the greatest benefit for safety and non-motorized usage.

Planning-level Cost Estimate (average)
$360,000 to $390,000 per 0.1 mile (including curve reconstruction and shoulder widening)

Recommended Implementation Timeframe
Mid-term to long-term

Potentially-impacted Resources /Anticipated Right-of-Way
Potential impacts to streams, wetlands, floodplains, protected species, cultural resources, protected farmlands, and utilities may result from this option. The need for additional right-of-way is anticipated.

7.4 Drainage Corrections

The design of subsurface drainage should be carried out as an integral part of the complete design of a highway, since inadequate subsurface drainage may have detrimental effects on the stability of slopes and pavement performance. However, certain design elements of the highway such as geometry, site soil conditions and properties of the drainage materials are required for the design of the subdrainage system. Thus, the procedure usually adopted for subsurface drainage design is first to determine the geometric and structural requirements of the highway based on standard design practice, and then to subject these to a subsurface drainage analysis to determine the requirements. In some cases, the subsurface drainage requirements determined from this analysis will require some changes in the original design.

Option 3 Drainage Corrections

Based on field observations, there are three drainage issues within the MT 86 corridor. At RP 15.9, standing water has been observed in the roadway ditch and adjacent to the roadway. This location is being addressed as part of a programmed overlay and widen project (UPN 8112000). Insufficient drainage at the bridge crossing Carrol Creek (RP 26.8) is addressed in improvement option 1.

At RP 23.4, standing water has been observed adjacent to the roadway. A culvert extending under the roadway appears to be plugged and appears to not meet minimum cover depths. Based on the deteriorated pavement, water likely periodically saturates the subgrade at this location. Installation of a new culvert and reconstruction of the subgrade and surface at this location is recommended.

Planning-level Cost Estimate
$48,000 to $51,000

Recommended Implementation Timeframe
Short-term

Potentially-impacted Resources/Anticipated Right-of-Way
Potential impacts to streams, riparian wetlands, floodplains, protected species, cultural resources, protected farmlands, and utilities may result from this option. The need for additional right-of-way is not anticipated.

7.5 Intersection Improvements

Current MDT design criteria note roadways should intersect at or as close to 90° as practicable. Skewed intersections are undesirable for several reasons:

- vehicular turning movements and sight distance are restricted;
- additional pavement and channelization may be required to accommodate large vehicle turning movements; and
- the exposure time for vehicles and pedestrians crossing the main traffic flow is increased.

Crash potential at an intersection can be reduced by providing appropriate sight distance to allow drivers an unobstructed view of the entire intersection at a distance great enough to permit control of the vehicle.

Additionally, turn lanes can be considered to provide a protected location for left-turning vehicles to wait for an acceptable gap in the opposing traffic stream, and remove decelerating right-turning vehicles from the through traffic lane to reduce the potential for collisions. Turn lanes may be appropriate at un-signalized intersections on two-lane highways that meet MDT guidelines for opposing and/or advancing volumes and percentage of turn movements, or where there is a crash trend involving turning vehicles.

Option 4.a Approach Sight Distance Mitigation

Laying back the slopes adjacent to the intersections listed below is recommended to improve sight distance.

- RP 4.2 [1] ("M" trailhead parking area)
- RP 6.7 [1] (Kelly Canyon Road)
- RP 15.2 (private approach)
- RP 18.8 [1] (Brackett Creek)
- RP 22.7 (private approach)

[1] Indicates area is located within a LOSS IV roadway segment (total crashes and/or crash severity). LOSS IV roadway segments are areas with a high potential for crash reduction.

Additionally, potential improvements at RP 18.8 (Brackett Creek) include installation of delineation to guide traffic along the primary route, and re-vegetation alongside the roadway to reduce confusion of travelers, as indicated in Figure 10.

Figure 10 Brackett Creek (RP 18.8) Sight Distance Improvements

Planning-level Cost Estimate
$40,000 to $390,000 (per approach)
$960,000 to $1,120,000 (total)

Recommended Implementation Timeframe
Mid-term to long-term

Potentially-impacted Resources/Anticipated Right-of-Way
Potential impacts to streams, wetlands, floodplains, protected species, cultural resources, protected farmlands, and utilities may result from this option. The need for additional right-of-way is anticipated.

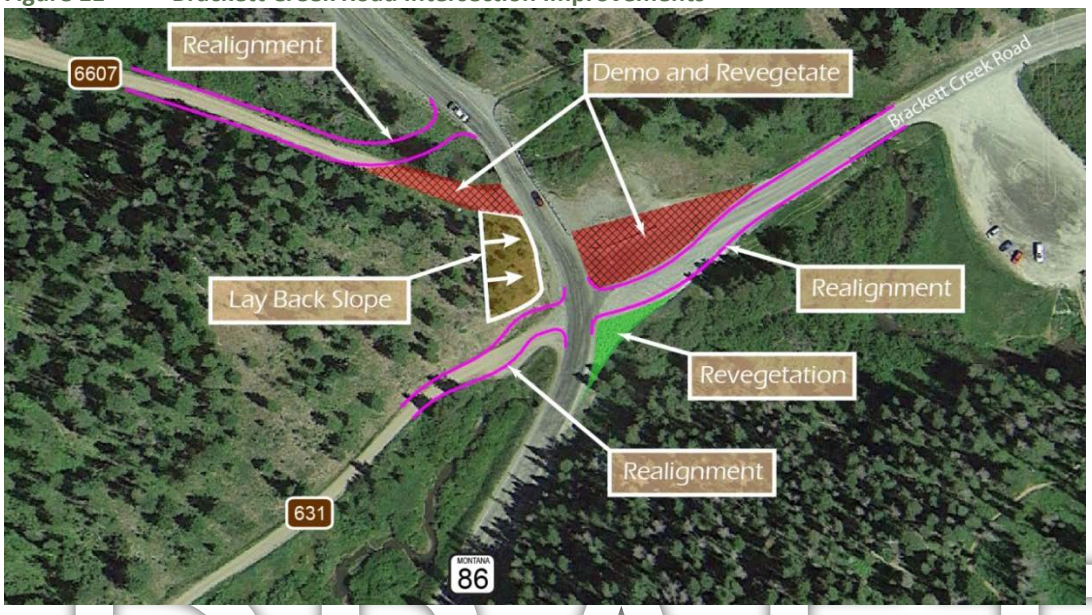
Option 4.b Intersection Realignment

MDT design guidance notes intersection angles should not exceed 30° from perpendicular at maximum. Intersections with a skew greater than 30° may require geometric improvements, including realignment. The best alignment for an at-grade intersection is when the intersecting roads meet at right or nearly right angles (90°). This alignment is superior to acute-angle alignments. Less road area is required for turning at the intersection, there is a lower exposure time for vehicles crossing the main traffic flow, and visibility limitations (particularly for trucks) are not as serious as those at acute-angle intersections.

A number of intersecting roads within the study corridor are aligned to MT 86 at an angle greater than 30° from perpendicular. Realignment of these intersections is recommended to improve sight distance and accommodate passenger vehicle and large vehicle turning movements. Recommended intersection realignment locations are listed below.

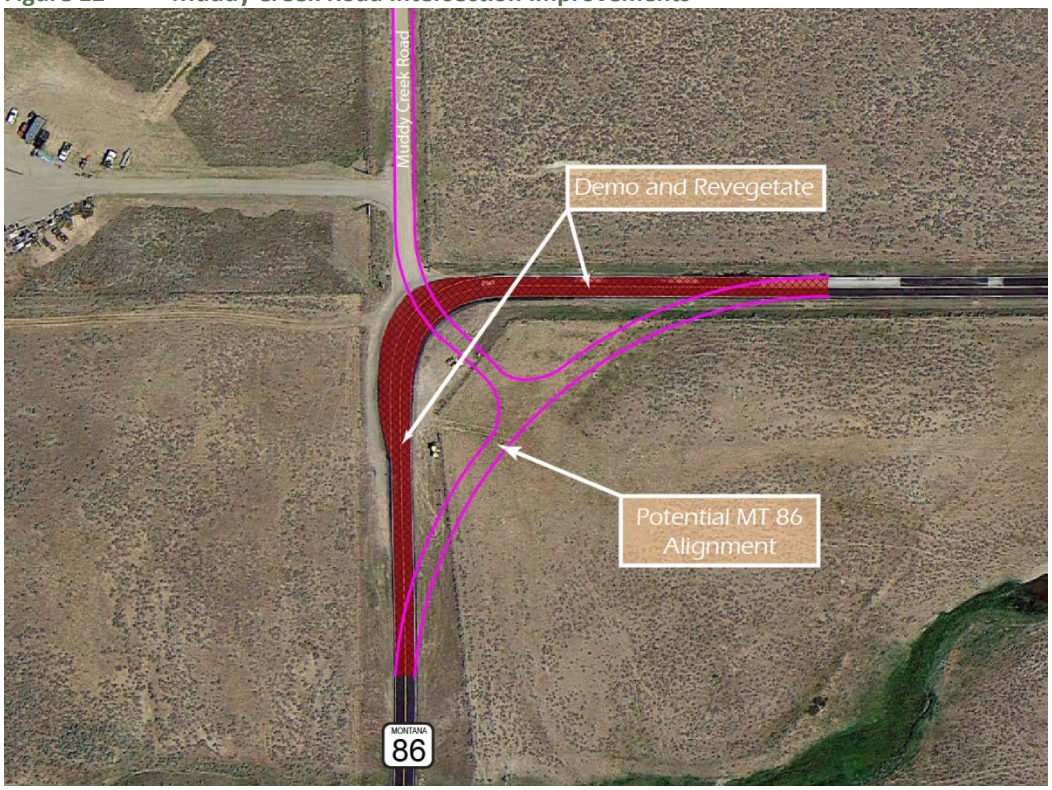
- RP 18.8 – Brackett Creek Road
  This improvement builds upon the previously-discussed option 4.a. Improvements include slope flattening to improve site distance between approaches; installation of delineation to guide traffic along the primary route; re-vegetation alongside the roadway to reduce confusion of travelers; and realignment of approaches to provide additional distance between approaches and to improve alignment in relation to each other and to the primary route. These improvements are depicted in Figure 11.

Figure 11 Brackett Creek Road Intersection Improvements



- <u>RP 28.8 – Muddy Creek Road</u>
  This improvement includes realignment of the primary route to improve the horizontal alignment and realignment of the intersection in relation to the primary route (approximately 90 degrees). Improvements are depicted in Figure 12.

Figure 12 Muddy Creek Road Intersection Improvements



<u>Planning-level Cost Estimate</u>
$340,000 to $790,000 (per location)

Recommended Implementation Timeframe
Mid-term to long-term

Potentially-impacted Resources /Anticipated Right-of-Way
Potential impacts to streams, wetlands, floodplains, protected species, cultural resources, protected farmlands, and utilities may result from improvements to the Brackett Creek Road intersection. Potential impacts to protected species, sensitive cultural resources, protected farmlands, and utilities may result from improvements to the Muddy Creek Road intersection. The need for additional right-of-way is anticipated for both intersections.

Option 4.c Turn Lanes
The following locations were identified as intersections where a turn lane may improve safety.

- RP 4.2 [1] ("M" Trailhead)
- RP 6.7 [1] (Kelly Canyon Road)
- RP 9.5 [1] (Jackson Creek Road)
- RP 15.7 [1] (Bridger Bowl Road)
- RP 18.8 [1] (Brackett Creek Road)
- RP 20.5 [1] (Battle Ridge Campground Road)

[1] Indicates area is located within a LOSS IV roadway segment. LOSS IV roadway segments are areas with a high potential for crash reduction.

An example left-turn lane typical section shown in Figure 13 assumes widening (shown in red) on both sides of the existing MT 86 roadway (shown in white) to achieve a desired road width. Figure 14 depicts a plan view of a left-turn lane layout. A traffic study would be required before installing a turn lane at the locations identified in this study.

Figure 13 Left-turn Lane Typical Section

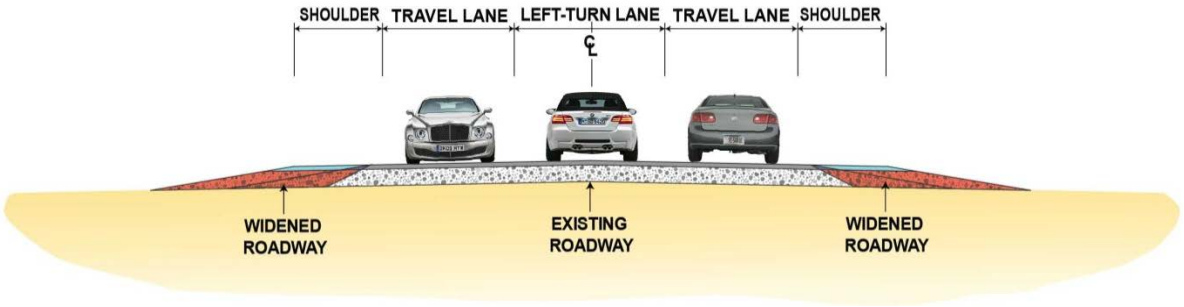
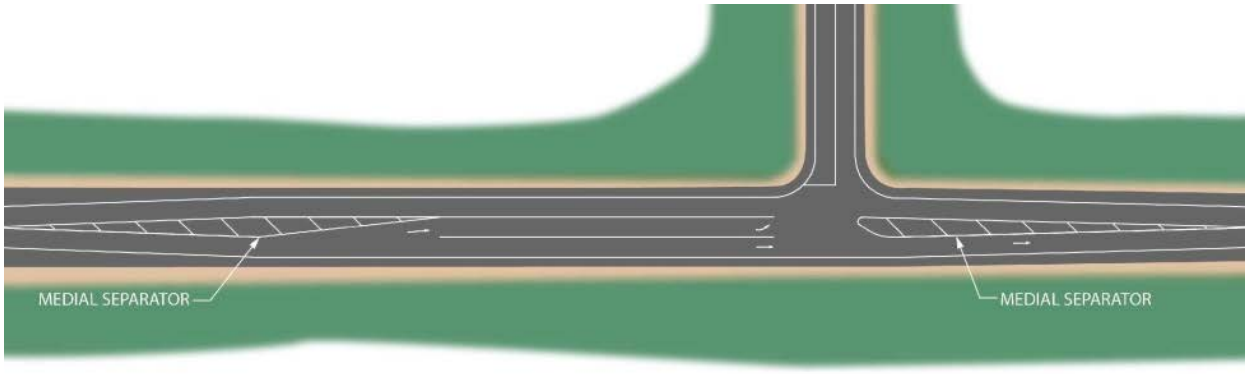


Figure 14 Left-turn Lane Plan View



Planning-level Cost Estimate
Construction: $900,000 to $1,100,000 per location

Recommended Implementation Timeframe
Mid-term to long-term

Potentially-impacted Resources/Anticipated Right-of-Way
Resource, utility, and right-of-way impacts are not anticipated.

7.6 Roadside Safety

The safest roadside is flat and free of obstructions or steep slopes. The RDM specifies an offset distance from the ETW to be free of any obstructions. The ETW is delineated by the white pavement marking located on the right-hand side of the travel lane. This offset distance, known as the "clear zone," includes the roadway shoulder and is defined based on design speed, AADT, and the slope and offset of cut/fill sections from the ETW.

Roadside ditches can present a hazard if an errant vehicle cannot easily travel its slopes, regain control, and return to the traveled way. An errant vehicle leaving the roadway may not be able to safely negotiate a critical slope (also called a non-traversable slope). Depending on encroachment conditions, a vehicle on a critical slope may overturn. For most embankment heights, fill slopes steeper than 3:1 are considered critical. A non-recoverable slope can be safely traversed, although an errant vehicle may not be able to return to the roadway. Slopes greater than or equal to 3:1 and less than 4:1 are considered traversable but non-recoverable.

When steep side slopes occur adjacent to a roadway, the hazardous condition ideally should be eliminated by providing slopes and dimensions specified in current MDT design criteria. Oftentimes, this is not practicable due to economic, environmental, or drainage conditions. If steep side slopes cannot be flattened due to these reasons, it may be necessary to shield the hazard with a roadway barrier such as guardrail, depending on the fill section height. Cut slopes and blunt objects also present a hazard, and may warrant protection.

Option 5.a Guardrail Improvements

Guardrail is a longitudinal barrier placed on the outside of sharp curves and in locations with high fills. Its main function is to prevent vehicles from leaving the roadway and to offer protection against objects within the clear zone. Guardrail placement is evaluated where embankments are higher than 8 feet and where shoulder slopes are greater than 4:1. Shapes commonly used include the W beam, cable rail, and the box beam. The weak post system provides for the post to collapse on impact, with the rail deflecting and absorbing the energy upon impact. Field review conducted for this study identified unprotected slopes and inadequate clear zone distances intermittently from RP 4.0 to RP 24.0. Additionally, some of the existing guardrail in the corridor does not meet current design criteria, including height and end treatments. Installation of compliant guardrail is recommended as needed throughout the corridor.

Planning-level Cost Estimate
Cost will vary depending on treatment and location.

Recommended Implementation Timeframe
Short-term and as needed throughout planning horizon

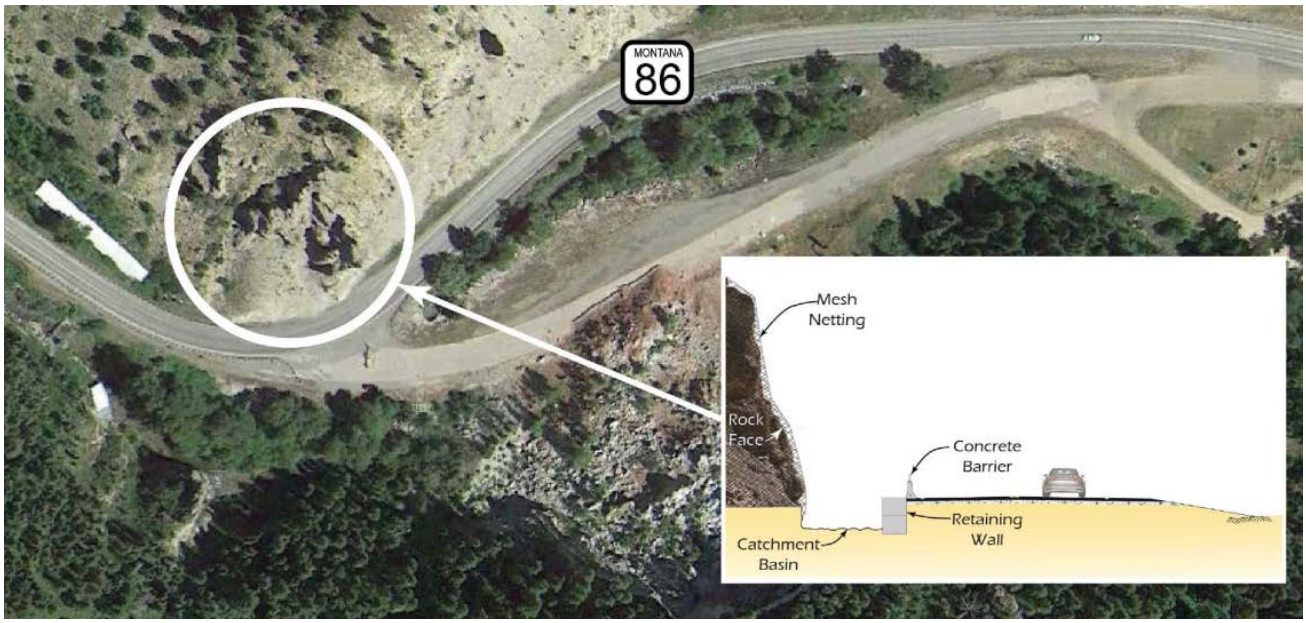
Potentially-impacted Resources /Anticipated Right-of-Way
Impacts to wetlands, streams, floodplains, sensitive species, cultural resources, protected farmlands, and utilities may result from this option. The need for additional right-of-way is anticipated.

Option 5.b Rockfall Hazard Mitigation

The 2005 MDT *Rockfall Hazard Classification and Mitigation System* report identified nine locations within the MT 86 corridor with a moderate to high potential to develop a hazardous situation. One of these nine sites (at approximately RP 4.4 north of MT 86) was rated 36 out of the top 100 sites statewide.

A potential rockfall mitigation strategy at RP 4.4 (north) would entail construction of a catchment basin and mesh netting along the slope. The netting would contain falling rock and prevent disturbance of the roadway. The rock would fall into the catchment basin which would hold the material until maintenance operations and removal occurred. Figure 15 illustrates this potential rockfall mitigation strategy.

Figure 15 Rockfall Mitigation at RP 4.4 (North)



Additional investigation and appropriate mitigation is recommended at the remaining eight sites.

- RP 4.7
- RP 5.1
- RP 12.3
- RP 12.4
- RP 12.7
- RP 15.9
- RP 18.5
- RP 18.9

Planning-level Cost Estimate

Mitigation: $740,000 to $800,000 (RP 4.4 north); Unknown (other locations)

Recommended Implementation Timeframe

Mid-term to long-term

Potentially-impacted Resources /Anticipated Right-of-Way

Impacts to wetlands, streams, floodplains, sensitive species, cultural resources, protected farmlands, and utilities may result from this option. The need for additional right-of-way is anticipated.

7.7 Traffic Control Devices

Traffic control devices are used to promote highway safety and efficiency through the orderly movement of all road users. Traffic control devices notify drivers of regulations and provide warning and guidance to promote efficient operation and minimize crash occurrences.

Option 6.a Variable Message Signage

Portable variable message signage (VMS) can be used for various purposes to notify the traveling public of information pertaining to the roadway. Messages displayed on the variable message signs may include, but are not limited to, wildlife hazards, traffic conditions, road conditions, and cyclists on the roadway.

Variable message signage could be considered from RP 6.0 to RP 10.0 where wildlife crossings are known to occur. Variable message signage may also be beneficial within the mountainous portion of the MT 86 corridor (approximately RP 15.6 to RP 29.2) where bicycle traffic and limited sight distance have been noted.

Planning-level Cost Estimate
$15,000 to $35,000 each

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources/Anticipated Right-of-Way
Resource, utility, and right-of-way impacts are not anticipated

Option 6.b Static Wildlife Signage

The study area is home to a variety of mammal species including white-tail deer, mule deer, elk, moose, black bear, mountain lion, gray wolf, and coyote. According to communications between FWP and MDT, elk are plentiful in the southern portion of the study area, especially in the winter months. From RP 6.0 to RP 10.0 in the Kelly Canyon area, as well as near the intersection with Bridger Canyon Spur Road (RP 8.3) and Jackson Creek Road (RP 9.5), elk are frequently observed crossing the road in the winter months. This option would entail the installation of seasonal static signage between RP 6.0 and RP 10.0.

Planning-level Cost Estimate
$500 per sign

Recommended Implementation Timeframe
Short-term

Potentially-impacted Resources /Anticipated Right-of-Way
Resource, utility, and right-of-way impacts are not anticipated.

7.8 Summary of Improvement Options

This report outlines a range of improvement options MDT may consider for future implementation in the MT 86 corridor. Improvement options are intended to address corridor needs and objectives, which were identified through a review of existing and projected conditions within the corridor, input from the public and resource agencies, and coordination with the study advisory committee. Figure 16 and Table 21 summarize recommended improvement options for the MT 86 corridor.

Figure 16 Summary of Improvement Options

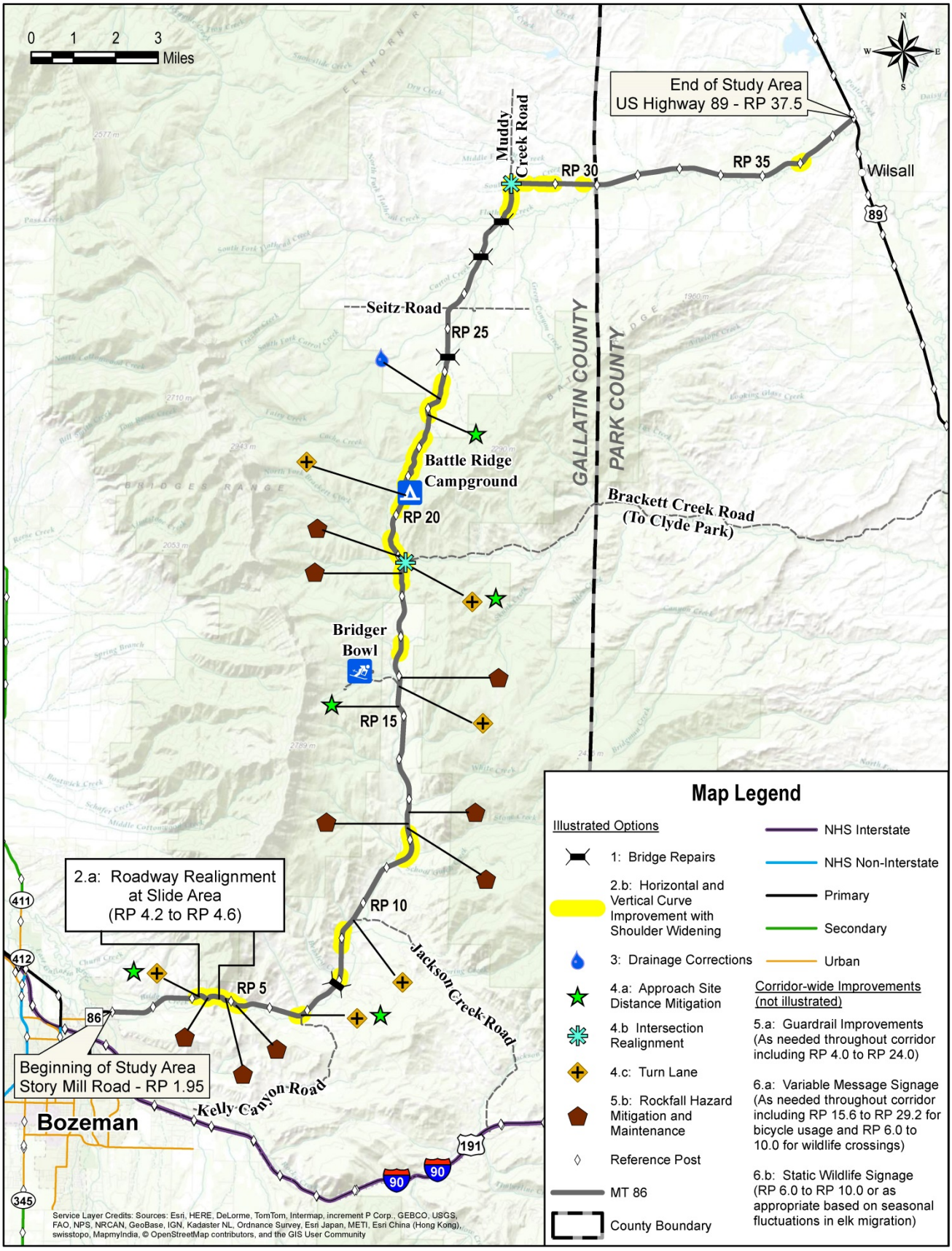


Table 21 Improvement Options Summary

Option Category	Option ID	Option Description	Locations	Planning-level Cost Estimate[1]	Potential Implementation Timeframe[2]	Potentially-impacted Resources	Anticipated ROW
Bridge Repairs	Option 1	Bridge Repairs	RP 7.8 (Stock Pass) RP 24.4 (Cache Creek) RP 26.8 (Carrol Creek) RP 28.0 (Flathead Creek)	$50,000 to $110,000 (per bridge)	Short-term to mid-term	Yes	No
Curve Geometry and Roadway Width	Option 2.a	Roadway Realignment at Slide Area[3]	RP 4.3 to RP 4.6 (slide area)	$1,100,000 to $1,200,000	Long-term	Yes	No
	Option 2.b	Horizontal and Vertical Curve Improvements with Shoulder Widening	Location[3] / Horizontal / Vertical RP 4.1 to RP 5.1 ✓ ✓ RP 6.7 ✓ RP 8.0 ✓ RP 8.7 to RP 8.8 ✓ RP 9.0 to RP 9.1 ✓ ✓ RP 11.7 to RP 11.8 ✓ ✓ RP 12.0 ✓ RP 16.2 ✓ RP 16.5 to RP 16.8 ✓ RP 18.5 ✓ RP 18.7 to RP 18.8 ✓ ✓ RP 19.0 to RP 19.4 ✓ ✓ RP 20.2 ✓ RP 20.4 ✓ RP 20.6 ✓ RP 20.8 to RP 22.0 ✓ ✓ RP 22.8 to RP 23.8 ✓ ✓ RP 28.3 to RP 29.1 ✓ ✓ RP 29.7 to RP 30.0 ✓ RP 35.8 ✓	Average Reconstruction Cost: $360,000 to $390,000 per 0.1 mile	Mid-term to long-term	Yes	Yes
Drainage Corrections	3	Drainage Corrections	RP 23.4	$48,000 to $51,000	Short-term	Yes	No

Option Category	Option ID	Option Description	Locations	Planning-level Cost Estimate[1]	Potential Implementation Timeframe[2]	Potentially-impacted Resources	Anticipated ROW
Intersection Improvements	Option 4.a	Approach Sight Distance Mitigation	RP 4.2 ("M" Trailhead Parking Area)[3] RP 6.7 (Kelly Canyon Road)[3] RP 15.2 (Private Approach) RP 18.8 (Brackett Creek)[3] RP 22.7 (Private Approach)	$40,000 to $390,000 (per approach) $960,000 to $1,120,000 (total)	Mid-term	Yes	Yes
	Option 4.b	Intersection Realignment[3]	RP 18.8 (Brackett Creek) RP 28.8 (Muddy Creek Road)	$340,000 to $790,000 (per location)	Mid-term to Long-term	Yes	Yes
Intersection Improvements	Option 4.c	Turn Lanes[3]	RP 4.2 ("M" Trailhead) RP 6.7 (Kelly Canyon Road) RP 9.5 (Jackson Creek Road) RP 15.7 (Bridger Bowl) RP 18.8 (Brackett Creek) RP 20.5 (Battle Ridge Campground)	$900,000 to $1,100,000 (per location)	Mid-term to long-term	Yes	Yes
Roadside Safety	Option 5.a	Guardrail Improvements	As needed throughout corridor (including intermittently from RP 4.0 to RP 24.0)	Varies depending on treatment and location	Short-term and as needed	No	No
	Option 5.b	Rockfall Hazard Mitigation and Maintenance	RP 4.4 RP 4.8 RP 5.2 RP 12.3 RP 12.4 RP 12.7 RP 16.0 RP 18.6 RP 19.0	RP 4.4: $740,000 to $800,000 All Others: Unknown	Mid-term to long-term	Yes	Yes
Traffic Control Devices	Option 6.a	Variable Message Signage	As needed throughout corridor (including RP 15.6 to RP 29.2 for bicycle usage and RP 6.0 to 10.0 for wildlife crossings)	$15,000 to $35,000 (each)	Short-term	No	No
	Option 6.b	Static Wildlife Signage	RP 6.0 to 10.0 or as appropriate based on seasonal fluctuations in elk migration	$500 (per static sign)	Short-term	No	No

[1] Planning-level construction cost estimates are provided in 2014 dollars and are rounded for planning purposes. Cost estimates reflect contingency ranges to account for the high degree of unknown factors at the planning level. Costs associated with right-of-way acquisition, preliminary engineering, and construction engineering/inspection are included where appropriate. Refer to Appendix D for cost estimate spreadsheets.

[2] The potential implementation timeframe does not indicate when projects will be programmed. Project programming is based on available funding and other system priorities. Timeframes are defined as follows – Immediate: Implementation is currently ongoing or will be initiated in 2015; Short-term: Implementation is recommended within a 1- to 3-year period; Mid-term: Implementation is recommended within a 3- to 6-year period; Long-term: Implementation is recommended within a 6- to 20-year period.

[3] Locations are identified as high potential for crash reduction (LOSS IV).

8.0 Potential Funding Sources

This chapter identifies potential sources of funding that could be used to finance future improvements in the Bridger Canyon corridor. As of this publication date, no funding has been dedicated to corridor improvements identified in this study.

8.1 Federal Funding Programs

MDT administers a number of programs funded from federal sources. The Highway and Transportation Funding Act of 2014 extended surface transportation programs, including federal-aid highway programs, under the Moving Ahead for Progress in the 21st Century Act (MAP-21) from October 1, 2014, through May 31, 2015. As future improvements are considered, funding eligibilities and categories will need to be evaluated under future funding guidelines.

Each year, in accordance with Montana Code Annotated (MCA) § 60-2-127, the Montana Transportation Commission allocates a portion of available federal-aid highway funds for projects located on the various systems in the state. The following sections summarize relevant federal transportation funding categories received by the state through Titles 23-49 of the U.S. Code. To receive project funding under these programs, projects must be included in the State Transportation Improvement Program (STIP), where relevant.

Surface Transportation Program

Surface Transportation Program (STP) funds are federally apportioned to Montana and allocated by the Montana Transportation Commission to various programs including the Surface Transportation Program Primary Highways (STPP), Surface Transportation Program Secondary Highways (STPS), and the Surface Transportation Program Urban Highways (STPU).

Surface Transportation Program – Primary (STPP)[2]

Federal and state funds available under this program are used to finance transportation projects to preserve, restore, or reconstruct highways and bridges on the state-designated Primary Highway System. The Primary Highway System includes highways that have been functionally classified by the MDT as either principal or minor arterials and that have been selected by the Transportation Commission to be placed on the Primary Highway System [MCA 60-2-125(3)].

Primary funds are distributed statewide [MCA 60-3-205] to each of MDT's five financial districts based on the land area, population, road mileage, and bridge square footage within the district. The Commission distributes STPP funding based on system performance. The federal share for STPP projects is 86.58 percent and the remaining 13.42 percent is funded by the state from the Highway State Special Revenue Account. Eligible activities include construction, reconstruction, rehabilitation, resurfacing, restoration and operational improvements. The Transportation Commission establishes priorities for the use of Primary funds and projects are let through a competitive bidding process.

[2] State funding program developed to distribute federal funding within Montana.

Surface Transportation Program –Bridge Program (STPB)[3]

The federal and state funds available under this program are used to finance bridge projects for on-system and off-system routes in Montana. Title 23 U.S.C. requires that a minimum amount (equal to 15 percent of Montana's 2009 federal Bridge Program apportionment) be set aside for off-system bridge projects. The remainder of the Bridge Program funding is established at the discretion of the state. Bridge Program funds are primarily used for bridge rehabilitation or reconstruction activities on Primary, Secondary, Urban or off-system routes. Projects are identified based on bridge condition and performance metrics.

Highway Safety Improvement Program (HSIP)

HSIP funds are federally apportioned to Montana and allocated to safety improvement projects identified in the strategic highway safety improvement plan by the Montana Transportation Commission. Projects described in the state strategic highway safety plan must correct or improve a hazardous road location or feature, or address a highway safety problem. The Montana Transportation Commission approves and awards projects under this funding category, which are let through a competitive bidding process. Generally, the federal share for the HSIP projects is 91.24 percent and the state is responsible for 8.76 percent.

Transportation Alternatives Program

The Transportation Alternatives (TA) program requires MDT to obligate 50 percent of the funds within the state based on population, using a competitive application process, while the remaining 50 percent may be obligated in any area of the state. The federal share for these projects is 86.58 percent, and the state is responsible for the remaining 13.42 percent, which is typically funded through the HSSR account. Funds may be obligated for projects submitted by:

- local governments;
- transit agencies;
- natural resource or public land agencies;
- school district, schools, or local education authority;
- tribal governments; or
- other local government entities with responsibility for recreational trails for eligible use of these funds.

Eligible categories include:

- on-road and off-road trail facilities for pedestrians and bicyclists, including ADA improvements;
- historic preservation and rehabilitation of transportation facilities;
- archeological activities relating to impacts for a transportation project;
- any environmental mitigation activity, including prevention and abatement to address highway related stormwater runoff and to reduce vehicle/animal collisions including habitat connectivity;
- turnouts, overlooks, and viewing areas;
- conversion/use of abandoned railroad corridors for trails for non-motorized users;
- inventory, control, and removal of outdoor advertising;

[3] State funding program developed to distribute federal funding within Montana.

- vegetation management in transportation right-of-way for safety, erosion control, and controlling invasive species;
- construction, maintenance and restoration of trails, development and rehabilitation of trailside and trailhead facilities;
- development and dissemination of publications and operation of trail safety and trail environmental protection programs;
- education funds for publications, monitoring and patrol programs and for trail-related training;
- planning, design, and construction of projects that will substantially improve the ability of students to walk and bicycle to school; and
- non-infrastructure-related activities to encourage walking and bicycling to school, including public awareness campaigns and outreach to press and community leaders, traffic education and enforcement in the vicinity of schools, student sessions on bicycle and pedestrian safety, health, and environment, and training.

The state and any MPOs required to obligate TA funds must develop a competitive process to allow eligible applicants an opportunity to submit projects for funding. MDT's process emphasizes safety, ADA, relationships to state and community planning efforts, existing community facilities, and project readiness.

Federal Lands Access Program (FLAP)

The Federal Lands Access Program was created by the "Moving Ahead for Progress in the 21st Century Act" (MAP-21) to improve access to federal lands. WFLHD administers the funds, not MDT. However, MDT is an eligible applicant for the funds.

The program is directed towards public highways, roads, bridges, trails, and transit systems that are under state, county, town, township, tribal, municipal, or local government jurisdiction or maintenance and provide access to federal lands. The FLAP funds improvements to transportation facilities that provide access to, are adjacent to, or are located within federal lands. The program supplements state and local resources for public roads, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators. Program funds are subject to the overall federal-aid obligation limitation. Funds are allocated among the states using a statutory formula based on road mileage, number of bridges, land area, and visitation.

The following activities are eligible for consideration on under the FLAP:

1) preventive maintenance, rehabilitation, restoration, construction, and reconstruction;
2) adjacent vehicular parking areas;
3) acquisition of necessary scenic easements and scenic or historic sites;
4) provisions for pedestrian and bicycles;
5) environmental mitigation in or adjacent to federal land to improve public safety and reduce vehicle-wildlife mortality while maintaining habitat connectivity;
6) construction and reconstruction of roadside rest areas, including sanitary and water facilities; and
7) operation and maintenance of transit facilities.

Proposed projects must be located on a public highway, road, bridge, trail or transit system that is located on, is adjacent to, or provides access to federal lands for which title or maintenance responsibility is vested in a state, county, town, township, tribal, municipal, or local government.

Projects are funded in Montana at a ratio of 86.58% federal funds and 13.42% non-federal matching funds. Funding is authorized and allocated for each state under U.S.C. Title 23, Chapter 2, MAP-21, Division A, Title I, Subtitle A, Section 1119 distribution formula.

Congressionally-directed or Discretionary Funds

Congressionally-directed funds may be received through highway program authorization or annual appropriations processes. These funds are generally described as "demonstration" or "earmark" funds. Discretionary funds are typically awarded through a federal application process or Congressional direction. If a locally-sponsored project receives these types of funds, MDT will administer the funds in accordance with the Montana Transportation Commission Policy #5 – "*Policy resolution regarding Congressionally-directed funding: including Demonstration Projects, High Priority Projects, and Project Earmarks.*"

8.2 State Funding Sources

State Fuel Tax

The State of Montana assesses a tax of $0.27 per gallon on gasoline and $0.2775 on clear diesel fuel used for transportation purposes. According to state law, each incorporated city and town within the state receives an allocation of the total tax funds based upon:

1) the ratio of the population within each city and town to the total population in all cities and towns in the state, and
2) the ratio of the street mileage (exclusive of the federal-aid interstate and primary systems) within each city and town to the total street mileage in all incorporated cities and towns in the state.

State law also establishes that each county be allocated a percentage of the total tax funds based upon:

1) the ratio of the rural population of each county to the total rural population in the state, excluding the population of all incorporated cities or towns within the county and state;
2) the ratio of the rural road mileage in each county to the total rural road mileage in the state, less the certified mileage of all cities or towns within the county and state; and
3) the ratio of the land area in each county to the total land area of the state.

For state fiscal year 2015, Gallatin County will receive $319,340.99, and Park County will receive $108,357.24 in state fuel tax funds. The amount varies annually.

All fuel tax funds allocated to city and county governments must be used for the construction, reconstruction, maintenance, and repair of rural roads or city streets and alleys. The funds may also be used for the share that the city or county might otherwise expend for proportionate matching of federal funds allocated for the construction of roads or streets that are part of the primary, secondary or urban system.

Priorities for the use of these funds are established by each recipient jurisdiction.

State Funded Construction

The State Funded Construction (SFC) program is funded entirely from the state highway special revenue account and provides funding for projects that are not eligible for federal funding programs. This program requires no matching funds. Funding from this source depends on availability and need.

This program funds projects to preserve the condition and extend the service life of highways. Highways must be maintained by the state to be eligible for these funds. MDT staff nominates the projects based on pavement preservation needs. MDT Districts establish priorities and the Montana Transportation Commission approves the program.

8.3 Local Funding Sources

Local governments generate revenue through a variety of sources. Typically, several local transportation programs exist for budgeting purposes and to disperse revenues. These programs are tailored to fulfill specific transportation functions to provide particular services. The following text summarizes programs that could be used to finance transportation improvements by Gallatin and Park counties.

Road Fund

County road funds provides for the construction, maintenance, and repair of county roads outside the corporate limits of cities and towns. Revenue for these funds comes from intergovernmental transfers (i.e., state gas tax apportionment and motor vehicle taxes) and a mill levy assessed against county residents living outside cities and towns. County road fund monies are used primarily for maintenance, with little allocated for new road construction. Only a small percentage of the total miles on the county road system is located in the study area. Projects eligible for financing through this fund would compete for available revenues on a countywide basis.

Bridge Fund

Bridge funds provide financing for engineering services, capital outlays, and necessary maintenance for bridges on off-system and secondary routes within the county. These monies are generated through intergovernmental fund transfers (i.e., vehicle licenses and fees), and a countywide mill levy.

Capital Improvement Funds

Counties may use capital improvement funds to finance major capital improvements to county infrastructure (MCA 7-6-616). A capital improvement fund must be formally adopted by the governing body. Major road construction projects are generally eligible for this type of funding.

Rural Special Improvement District

Counties may establish a Rural Special Improvement District (RSID) to administer and distribute funds for specified projects (MCA 7-12-2102). Bonds may be issued by local government to cover the cost of a proposed transportation improvement. Revenue to pay for the bonds may be raised through assessments against property owners in the designated district.

Special Bond Funds

A special bond fund may be established by counties on an as-needed basis for a particularly expensive project. Voters must approve a special bond fund.

8.4 Private Funding Sources

Private financing of roadway improvements may be available in the form of right-of-way donations and cash contributions. In some cases, the private sector has recognized that better access and improved facilities can be profitable due to increased land values and commercial development possibilities. Several forms of private financing for transportation improvements used in other parts of the United States are described in this section.

Cost Sharing

In a cost-sharing scenario, the private sector pays some of the operating and capital costs for constructing transportation facilities required by development actions.

Transportation Corporations

These private entities are non-profit, tax-exempt organizations under the control of state or local government. They are created to stimulate private financing of highway improvements.

Road Districts

These are areas created by a petition of affected landowners, enabling issuance of bonds for financing local transportation projects.

Private Donations

The private donation of money, property, or services to mitigate identified development impacts is the most common type of private transportation funding. Private donations are effective in areas where financial conditions do not permit a local government to implement a transportation improvement.

General Obligation Bonds

The sale of general obligation (GO) bonds could be used to finance a specific set of major highway improvements. A GO bond sale, subject to voter approval, would provide the financing initially required for major improvements to the transportation system. This funding method is advantageous because when the bond is retired, the obligation of the taxpaying public is also retired. State statutes limiting the level of bonded indebtedness for cities and counties restrict the use of GO bonds. The present property tax situation in Montana, and adverse citizen responses to proposed tax increases by local government, suggests that the public may not be receptive to the use of this funding alternative.

Local Improvement District

This funding option is applicable to counties wishing to establish a local improvement district for road improvements. While similar to RSID, this funding option is more streamlined, thus benefiting counties.

Impact Fees

Local governments may impose impact fees as part of the private development approval process to fund public infrastructure improvements required to serve new developments (MCA 7-6-1601). Impact fees can be used to fund additional service capacity for transportation facilities, including roads, streets, bridges, rights-of-way, traffic signals, and landscaping. The amount of the impact fee must be reasonably related to the development's share of the cost of infrastructure improvements made necessary by the new development.

9.0 Conclusions and Next Steps

In cooperation with Gallatin and Park Counties and FHWA, MDT conducted a corridor planning study on MT 86 between the intersection of Story Mill Road (RP 1.95) east of Bozeman and the junction with US 89 at RP 37.5 near Wilsall, MT. The purpose of the study was to identify potential improvement options that address corridor needs, objectives, constraints, and opportunities determined through feedback from the public, stakeholders, and resource agencies. The study examined geometric characteristics, crash history, land uses, physical constraints, environmental resources, and existing and projected operational characteristics of the MT 86 corridor.

Following a planning-level review of publically-available information on environmental resources and existing infrastructure, coupled with focused outreach with the public, stakeholders, and resource agencies, multiple improvement options were identified with varying implementation timeframes. Potential future improvements include short- and long-term options to address bridge repairs, curve geometry and roadway width, drainage issues, intersection sight distance and alignment, roadside safety, and traffic control in order to improve safety for MT 86 users and maintain MDT's infrastructure assets. Development and implementation of appropriate combinations of improvement options will depend on funding availability, right-of-way needs, and other system priorities within the MDT Butte District. This corridor planning study indicates there are no major engineering or environmental impediments to further development of recommended improvements.

As of this publication date, no funding has been dedicated to corridor improvements identified in this study. Development of a future project would require the following actions:

- identify and secure a funding source or sources;
- for MDT-led projects, follow MDT guidelines for project nomination and development, including a public involvement process and environmental documentation; and
- for projects that are developed by others and may impact MDT routes, coordinate with MDT via the System Impact Action Process (SIAP).

MDT will identify ways to address study recommendations as part of projects programmed within the next five years, and when prioritizing and programming projects for future years. In some cases, minor improvements (such as cleaning culverts to improve drainage) may be accomplished through routine maintenance activities as funds become available. Additionally, the District may incorporate select study recommendations into projects that are currently programmed for design and construction.

The purpose and need statement for any future project should be consistent with relevant needs and objectives contained in this study. Future projects involving federal and/or state actions would require compliance with NEPA/MEPA. This corridor planning study will be used as the basis for determining impacts and subsequent mitigation for future NEPA/MEPA documentation. Future projects must comply with CFR Title 23 Part 771 and ARM 18, sub-chapter 2, which set forth the requirements for documenting environmental impacts on highway projects.