Old Highway 312 Corridor Study

Corridor Study Report

June 2016

DOWL

MONTANA MDT DEPARTMENT OF TRANSPORTATION

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Visit the study website at:
http://www.mdt.mt.gov/pubinvolve/hwy312/

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Abbreviations and Acronyms

ADT	Average Daily Traffic
AADT	Average Annual Daily Traffic
AC	Advisory Committee
ADA	Americans with Disabilities Act
AGR	Annual Growth Rate
AWF	Advanced Warning Flasher
BLM	United States Bureau of Land Management
BOR	United States Bureau of Reclamation
CHSP	Montana Comprehensive Highway Safety Plan
CMAQ	Congestion Mitigation and Air Quality Improvement Program
DEQ	Montana Department of Environmental Quality
ETW	Edge of Traveled Way
FAST	Fixing America's Surface Transportation Act
FEIS	Final Environmental Impact Statement
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program
FWP	Montana Fish, Wildlife, and Parks
GO	General Obligation
GWIC	Groundwater Information Center
HSIP	Highway Safety Improvement Program
HSSR	Highway State Special Revenues
HUC	Hydraulic Unit Code
LID	Low Impact Development
LOS	Level of Service
LOSS	Level of Service of Safety
LUST	Leaking Underground Storage Tank
MCA	Montana Code Annotated
MAP-21	Moving Ahead for Progress in the 21st Century Act
MBMG	Montana Bureau of Mines and Geology
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MPDES	Montana Pollutant Discharge Elimination System
MPH	Miles Per Hour
MRL	Montana Rail Link
MS4	Billings Municipal Separate Storm Sewer System
MSAT	Mobile Source Air Toxins
MUTCD	Manual on Uniform Traffic Control Devices
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NRCS	National Resource Conservation Service
PESC	Permanent Erosion and Sediment Control
PM	Particulate Matter
PROWAG	Public Rights-of-Way Accessibility Guidelines
RDM	MDT Road Design Manual
REMI	Regional Economic Models, Inc.
ROD	Record of Decision
ROW	Right-of-Way
RP	Reference Post

RSID	Rural Special Improvement District
SID	Special Improvement District
SOC	Species of Concern
SPF	Safety Performance Functions
STBGP	Surface Transportation Block Grant Program
STIP	Statewide Transportation Improvement Program
STPB	Surface Transportation Program Bridge
STPP	Surface Transportation Program Primary Highways
STPS	Surface Transportation Program Secondary Highways
STPU	Surface Transportation Program Urban Highways
TA	Transportation Alternatives
TMDL	Total Maximum Daily Load
TIP	Transportation Improvement Program
TWLT	Two-way Left-turn
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
UST	Underground Storage Tank
VPD	Vehicles Per Day

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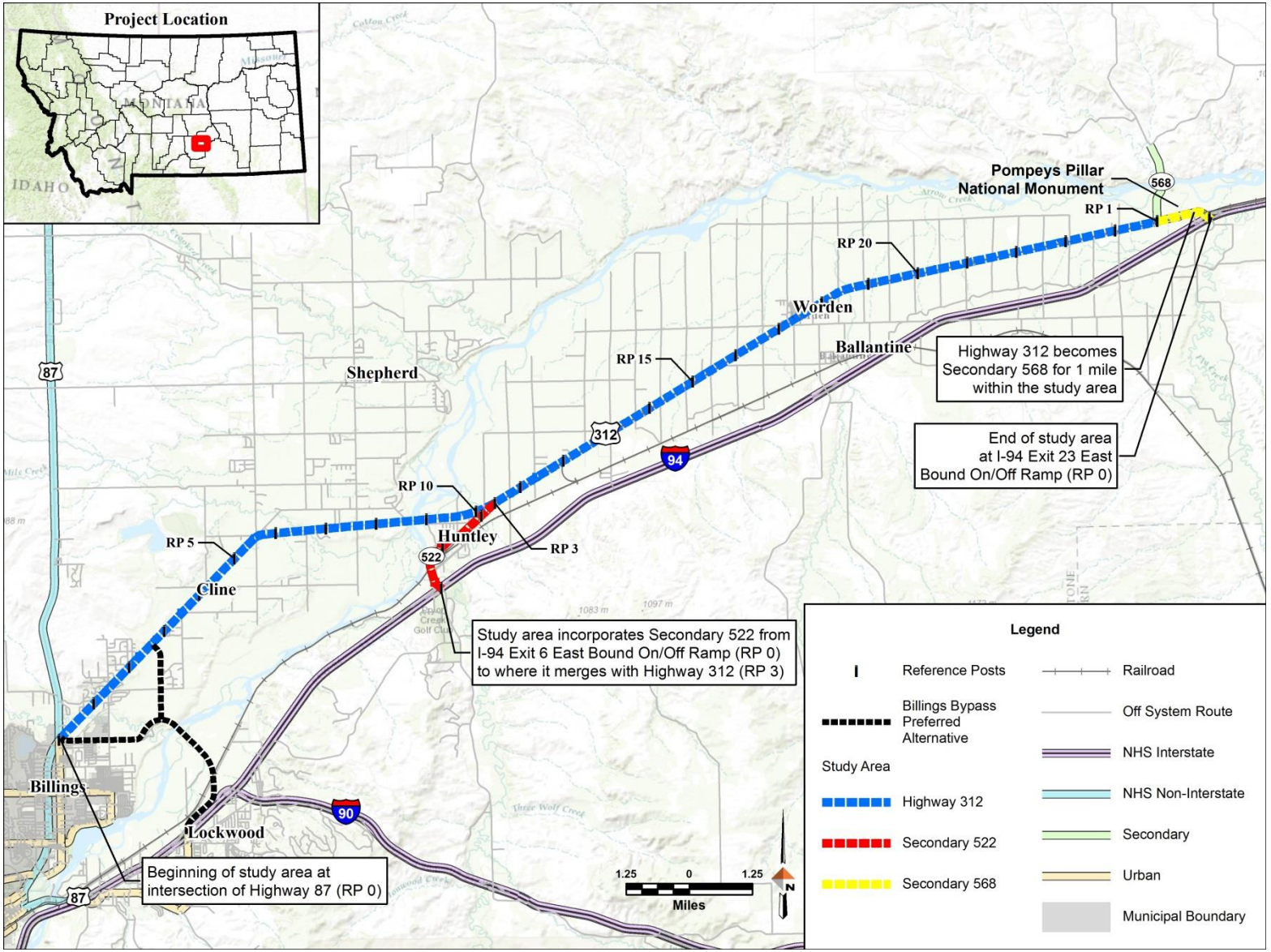
Executive Summary

In cooperation with the City of Billings, Yellowstone County, and the Federal Highway Administration (FHWA), the Montana Department of Transportation (MDT) conducted a corridor study to investigate options to address transportation needs in the Highway 312 corridor. The study area extends from the intersection of Highway 312 and US 87 to the Pompeys Pillar Interchange, and includes Secondary 522 from its intersection with Highway 312 to the I-94 Interchange.

This corridor study was 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 planning study process was designed to identify feasible transportation improvements and to facilitate a smooth and efficient transition from transportation planning to environmental review and potential project development. The process involved conducting a planning-level review of safety, operational, and environmental conditions to identify needs and constraints. It also allowed early coordination with members of the public, resource agencies, and other interested stakeholders. This process was separate from the NEPA/MEPA environmental compliance documentation, design, right-of-way acquisition, and construction phases of an individual project. Depending on needs and funding availability, improvement options may be forwarded from this planning-level study and developed into a project at a later date.

The study area illustrated in Figure ES-1.

Figure ES 1 Study Area



ES.1 Existing and Projected Conditions

Key findings identified through review of existing and projected conditions are listed below.

Delineation

- 10 public approaches along Highway 312 and Secondary 522 do not appear to have appropriate delineation.

Bridges

- Five bridges in the study area are candidates for rehabilitation/repair.

Bicycle and Pedestrian Facilities

- A crosswalk is located at Barkemeyer Park in Huntley and discontinuous sidewalks occur along Secondary 522 in Huntley.

Utilities

- Overhead and underground utilities occur throughout the study area.

Rail Facilities

- Two rail crossings intersect study area roadways, including an at-grade crossing on Secondary 522 at reference post (RP) 0.5 within Huntley, and a grade-separated crossing on Secondary 568 at RP 0.2.

Drainage Condition

- Insufficient drainage occurs along Secondary 522 and specifically at the Secondary 522 intersection with Nahmis Road near Barkemeyer Park.

Pavement Condition

- Rutting occurs in the wheel paths of Highway 312, Secondary 522, and Secondary 568.
- Transverse cracking occurs consistently along the entire corridor.
- The ride index for Secondary 568, 522, and the first 2.3 miles of Highway 312 is considered fair.

Horizontal Alignment

- Four of 13 curve locations do not meet current MDT design criteria.

Vertical Alignment

- Eleven of 37 curve locations do not meet current MDT design criteria.

Clear Zones

- Foreslopes and backslopes in the two-lane portions of the Highway 312, Secondary 568, and Secondary 522 corridors do not meet current MDT design criteria.
- Mature trees, unprotected bridge rails, culvert ends, and parallel irrigation ditches occur within the clear zone.
- Guardrail within the corridor is generally not compliant with current MDT design criteria.
- Several areas lack slope protection and have inadequate clear zone distance.

Crash History

- Areas identified as LOSS IV for both total crashes and severe crashes occur near RP 4, 6, 9, 12, and 15 along Highway 312, RP 0.5 along Secondary 568, and RP 0, 1, and 2 along Secondary 522.
- Multiple abnormal crash pattern types occur within the corridor.

Traffic Volumes and Operations

- Segments 2 and 3 currently operate at LOS D in 2015, and are projected to operate at LOS D or LOS E by 2035 (after construction of the Billings Bypass project).
- Intersections 1 (Highway 312 and Dover Road), 2 (Highway 312 and Hoskins Road), and 3 (Highway 312 and Shepherd Road/Vermillion Road) are projected to operate at LOS D by 2035 (after construction of the Billings Bypass project).

Environmental Conditions

- Physical, biological, social, and cultural features may be affected by potential improvements within the study area.

ES.2 Needs and Objectives

Needs and objectives for the Old Highway 312 Corridor Study were developed based on existing and projected conditions within the corridor (including planned projects), input from the public and resource agencies, and coordination with the study advisory committee (AC). Needs, objectives, and considerations are not listed in order of priority. These statements relate only to the highway corridor (including Highway 312 from RP 0.0 to RP 24.9, Secondary 568 from RP 0.0 to RP 1.0, and Secondary 522 from RP 0.0 to RP 3.0). They do not address the adjacent rail corridor(s).

Need 1: Improve safety within the highway corridor for all roadway users.

Objectives: To the extent practicable:

- Improve the safety of roadway and structure elements by meeting current design criteria.
- Identify strategies to address locations with high potential for crash reduction and other known safety concerns.

Need 2: Accommodate existing and projected roadway demands and consider operations within the highway corridor.

Objectives: To the extent practicable:

- Meet desirable levels of service on roadway segments and at intersections through the 2035 planning horizon.
- Consider regional, local, and seasonal travel patterns.

Need 3: Preserve and maintain highway infrastructure.

Objectives: To the extent practicable:

- Rehabilitate roadway surfacing and structures as needed to accommodate volume and mix of vehicles through the 2035 planning horizon.
- Address areas with inadequate drainage.

Other Considerations

- Local planning efforts, planned projects, and potential future development in the study area.
- Proximity to railroad, utility, irrigation, and other features within the highway corridor.
- Potential adverse impacts to environmental resources that may result from improvement options.
- Funding eligibility and availability.
- Temporary construction impacts.
- Construction feasibility and physical constraints.

ES.3 Improvement Options

This study outlines a range of improvement options MDT may consider for future implementation in the Highway 312 corridor. Potential future improvements include short- and long-term options to address roadway geometry, capacity and traffic operations, safety, pavement condition, pedestrian/bicycle accessibility, bridge condition, and drainage.

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 Highway 312 corridor.

Table ES 1 Summary of Individual Improvement Options

Option Category		Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Curve Improvements		**Option 1**	Highway 312 1.a: RP 4.7, 5.1, 5.2, 5.4, 5.5, 5.6 1.b: RP 24.7, 24.8 Secondary 522 1.c: RP 0.2 1.d: RP 1.3, 1.4 1.e: RP 3.0, 3.1 Secondary 568 1.f: RP 0.1	1.a: $1,960,000 to $2,130,000 1.b: $760,000 to $820,000 1.c: $570,000 to $620,000 1.d: $760,000 to $820,000 1.e: $760,000 to $820,000 1.f: $570,000 to $620,000	Mid-term to Long-term	Yes
Capacity Improvements	**Shoulder Widening**	**Option 2.a**	Highway 312 Segments 2 and 3 Entire Highway 312 Corridor (RP 0.0 to 24.9)	Segment 2: $440,000 to $480,000 Segment 3: $250,000 to $280,000 Entire Corridor: $3,140,000 to $3,410,000	Mid-term to Long-term	
	Three-lane Section	**Option 2.b**	Segment 2: Highway 312 RP 2.1 to 5.6, including bridge replacement at Seven Mile Creek (RP 2.70)	Segment 2: $3,200,000 to $3,500,000 Segment 3: $3,600,000 to $3,900,000	Mid-term to Long-term	
	Five-lane Section	**Option 2.c**	Segment 3: Highway 312 RP 5.6 to 7.4, including bridge replacement at Twelve Mile Creek (RP 6.57)	Segment 2: $7,000,000 to $7,600,000 Segment 3: $5,700,000 to $6,100,000	Mid-term to Long-term	

Option Category		Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Intersection Improvements	**Intersection Control**	**Option 3.a**	Dover Road (Highway 312 RP 1.3) Hoskins Road (Highway 312 RP 5.6) Shepherd Rd (Highway 312 RP 7.6)	Traffic Signal: $370,000 to $400,000 per intersection Roundabout (1-Lane): $1,200,000 to $1,300,000 per intersection Roundabout (2-Lane): $1,300,000 to $1,500,000 per intersection	Mid-term to Long-term	
Intersection Improvements	**Intersection Realignment**	**Option 3.b**	Northern Ave (Highway 312 RP 10.4)	$670,000 to $770,000	Short-term to Mid-term	
	Intersection Turn Lanes	**Option 3.c**	Select public intersections, potentially including: McIntyre Dr, Northern Ave, N 7th Rd, N 10th Rd, N 12th Rd, and N 15th Rd.	$540,000 to $590,000 per intersection	Short-term to Mid-term	
	Overhead Lighting	**Option 3.d**	Select public intersections where warranted, potentially including: Nahmis Ave, Northern Ave, and Custer Frontage Rd	$220,000 to $250,000 per intersection	Short-term to Mid-term	
Pavement Preservation		**Option 4**	Highway 312 (RP 0.0 to 2.3) Secondary 568 (RP 0.0 to 1.0) Secondary 522 (RP 0.0 to 3.0)	Highway 312: $1,800,000 to $2,000,000 Secondary 568: $470,000 to $510,000 Secondary 522: $1,400,000 to $1,600,000	Short-term to Long-term	No

Option Category		Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Roadside Safety Improvements	**Guardrail**	**5**	Select locations corridor-wide where warranted, including: Highway 312 RP 10.5, 12.2, 13.2, 16.6, 18.8, 20.2, 21.5 Secondary 522 RP 0.2	$20,000 per location	Short-term to Mid-term	
Pedestrian/Bicycle Improvements	**Sidewalks and ADA Features**	**Option 6**	Secondary 522 – Huntley Highway 312 – Worden	Secondary 522 – Huntley: $200,000 to $220,000 Highway 312 – Worden: $290,000 to $320,000	Mid-term to Long-term	
Traffic Control Devices and Safety/Warning Features	**Delineation**	**Option 7.a**	Select locations corridor-wide where warranted, including: Highway 312 RP 4.9, 7.2, 9.8, 17.5, 23.9, 24.0 Secondary 522 RP 0.1, 0.3, 0.4	$60 per approach	Short-term to Mid-term	
	Signing	**7.b**	US 87 (Highway 312 RP 0.0) Pompeys Pillar Intchg (RP S568 RP 0.0)	$550 to $3,500 per assembly	Short-term to Mid-term	
Traffic Control Devices and Safety/Warning Features	**Shoulder/ Centerline Rumble Strips**	**Option 7.c**	Select locations corridor-wide where warranted, including LOSS III/IV areas: Highway 312 RP 4-15 Secondary 522 RP 0-2 Secondary 568 RP 0.5	Highway 312: $77,500 to $84,600 Secondary 568: $7,100 to $7,800 Secondary 522: $14,200 to $15,500	Short-term to Mid-term	

Option Category	Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Bridge Improvements	**Option 8**	Highway 312 Seven Mile Creek (RP 2.70) Twelve Mile Creek (RP 6.57) Yellowstone River (RP 8.78) Custer Coulee (RP 12.15) Secondary 522 Huntley Canal (RP 0.36)	Seven Mile Creek: $60,000 to $65,000 Twelve Mile Creek: $260,000 to $290,000 Yellowstone River: $3,200,000 to $3,400,000 Custer Coulee: $60,000 to $70,000 Huntley Canal: $290,000 to $310,000	Mid-term to Long-term	Yes
Drainage Improvements	**Option 9**	Barkemeyer Park (S522 RP 0.9)	$1,000	Short-term to Mid-term	Yes

[1] Cost estimates are provided in 2015 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, utilities, preliminary engineering, and construction engineering/inspection are included where appropriate.

[2] Potential timeframe does not indicate when projects will be programmed or implemented. Project programming is based on available funding, the complexity and urgency of potential improvements, and other system priorities. Timeframes are defined as follows. Immediate: Implementation is currently ongoing or will be initiated in 2015; Short-term: Implementation could occur within a 1- to 3-year period; Mid-term: Implementation could occur within a 3- to 6-year period; Long-term: Implementation could occur within a 6- to 20-year period.

ES.4 Conclusions and Next Steps

MDT initiated this pre-NEPA/MEPA planning study in partnership with FHWA and in coordination with the City of Billings and Yellowstone County to better understand the study area's needs, objectives, constraints, and opportunities. The study examined roadway geometrics, crash statistics, land use and development patterns, physical and environmental constraints, and existing and projected operational characteristics for the study area.

Based on evaluation of existing and projected conditions within the study area, improvement options were identified to address short-term and long-term transportation needs within the 20-year planning horizon (2035). Individual improvements are intended to address roadway geometry, capacity and traffic operations, safety, pavement condition, pedestrian/bicycle accessibility, bridge condition, and drainage.

Individual options are concentrated on Highway 312 within segments 2 and 3, and on Secondary 522. MDT could consider combining individual improvement options in these locations to develop future projects addressing multiple elements. Improvements in segment 2 would extend the current five-lane roadway configuration within segment 1, and could be completed in conjunction or cooperation with the first phase of the Billings Bypass project. The first half mile of segment 2 could be completed with the first phase of the Billings Bypass Project since the Billings Bypass project will likely include intersection improvements to Highway 312. A major reconstruction of segment 2 is the logical first project to be considered because of the existing and anticipated growth in the Billings Heights and forecasted demand on Highway 312. The reconstruction of segment 3 could follow reconstruction of segment 2. Reconstruction of Secondary 522 could be completed independently from improvements on Highway 312.

Funding availability, right-of-way acquisition, and other MDT Billings District priorities will factor into any future implementation decisions. At this time, funding is not available to implement any of the improvement options identified by this study. Federal funding allocations for the MDT Billings District are committed through the federal fiscal year (FFY) 2019, with numerous unfunded projects extending beyond 2019. Future project development and implementation will require the following steps.

- Identify and secure funding.
- Follow appropriate MDT process for project nomination and development, including public involvement and environmental documentation.

Future projects resulting from this corridor study will be requried to comply with NEPA/MEPA depending if federal/state funds or a federal/state action is involved. The purpose and need statement for any future project should be consistent with the needs and objectives for this study. This corridor study will be used as the basis for determining impacts and subsequent mitigation for improvement options in future NEPA/MEPA documentation. Any project developed would have to comply with the Code of Federal Regulations Title 23 Part 771 and Adminsitrative Rules of Montana 18, subchapter 2, which set forth the requirements for documenting environmental impacts on highway projects. Additionally, traffic conditions and anticipated transportation demands should be confirmed as any projects are forwarded from the study.

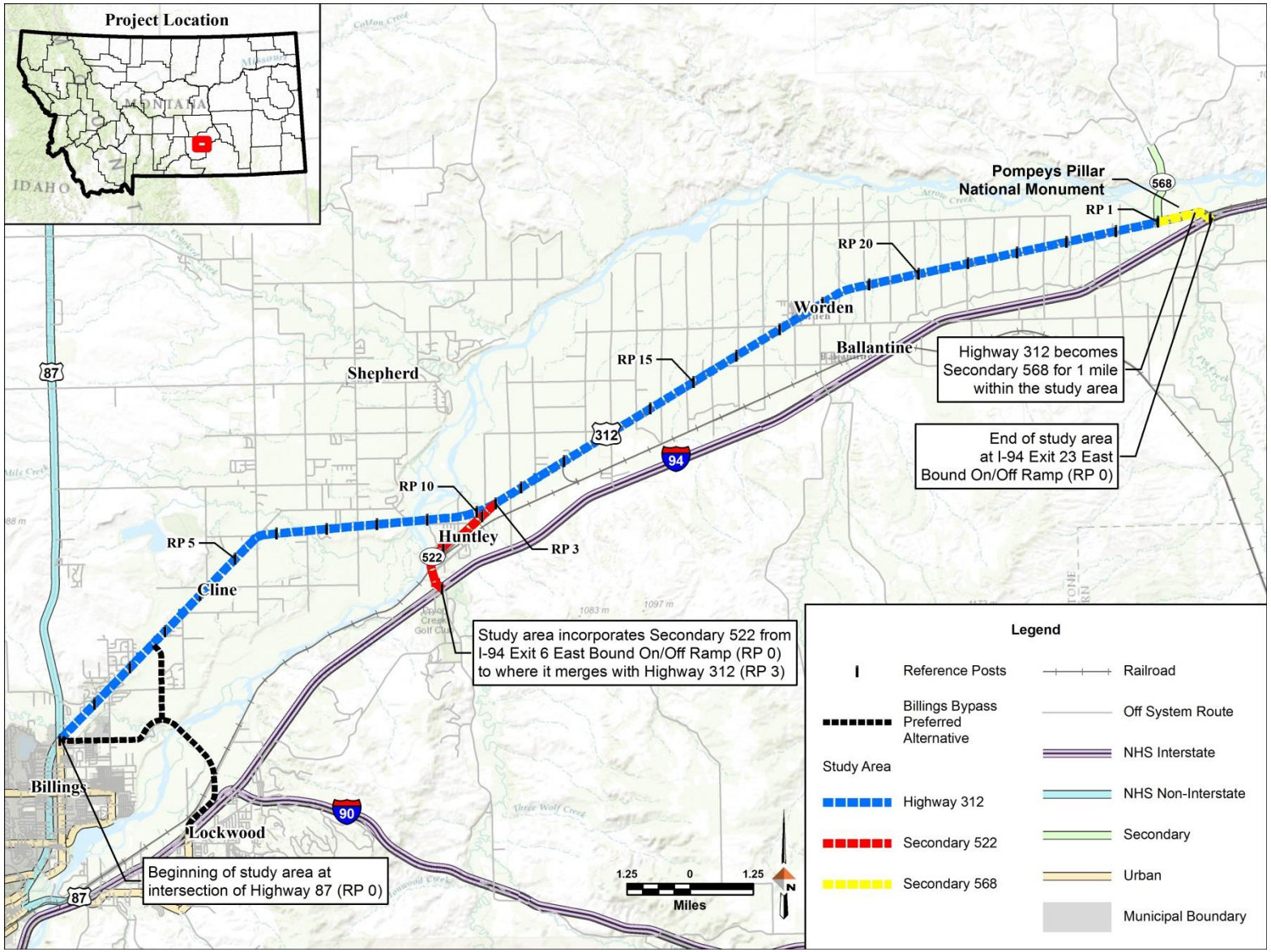
1.0 Introduction

MDT, in cooperation with the City of Billings, Yellowstone County, and the FHWA, conducted a corridor study to investigate potential improvements within the Highway 312 corridor. The area has experienced substantial growth in recent years, and the influx of commuters on the system has increased traffic and congestion. The purpose of the study was to develop a comprehensive long-range plan for managing the corridor and determining what, if anything, can be done to improve the corridor based on needs, public and agency input, and financial feasibility. The study was a collaborative process with local jurisdictions, agencies, FHWA, and the public to identify transportation needs and potential solutions given funding constraints.

The study area is illustrated in Figure 1. It extends from the intersection of Highway 312 and US 87 to the Pompeys Pillar Interchange, and includes Secondary 522 from its intersection with Highway 312 to the I-94 Interchange.

This planning-level assessment of the study area occurred before project-level environmental compliance activities under the National and Montana Environmental Policy Acts (NEPA/MEPA). The planning study process was designed to identify potential transportation improvements and to facilitate a smooth and efficient transition from transportation planning to environmental review and potential project development. The process involved conducting a planning-level review of safety, operational, and environmental conditions to identify needs and constraints. It also allowed early coordination with members of the public, resource agencies, and other interested stakeholders. This process is separate from the NEPA/MEPA environmental compliance documentation, design, right-of-way (ROW) acquisition, and construction phases of an individual project. Depending on needs and funding availability, an improvement option may be forwarded from this planning-level study and developed into a project at a later date.

Figure 1 Study Area



2.0 Public and Agency Participation

Public involvement and engagement with federal, state, and local resource agency representatives are key elements in linking planning studies to future NEPA/MEPA reviews and processes. MDT invited resource agencies, stakeholders, and members of the public to participate in the planning process and provide input on needs, issues, concerns, and recommended improvement options. Through a series of meetings and coordination efforts by the AC, comments and input were gathered, indexed, and considered during the study process. Specific outreach methods are described in the following sections. Additional information is provided in Appendix A.

2.1 Study Website

A study website was hosted at http://www.mdt.mt.gov/pubinvolve/hwy312 to provide information about the study process. Draft documents were posted for public review and comment during the course of the study. The website also provided meeting minutes, information about how to submit comments, and a list of frequently asked questions which contained information about the process and public input opportunities. Related links provided access to the MDT homepage and the MDT's business process for conducting planning studies.

2.2 Advisory Committee Meetings

MDT, FHWA, Yellowstone County, the City of Billings, and local officials met regularly during the study period to discuss progress, methods, results, draft documents, public input, and other issues or concerns. The committee served in an advisory capacity and reviewed the study report and related documentation before publication. A full list of committee members may be found in the acknowledgments section of this report.

2.3 Public and Agency Involvement Activities

Two informational meetings were held for the planning study. A legal display ad was placed in the Billings Gazette and the Yellowstone County News, and a news release was sent to local radio, newspapers, and other local media outlets before each meeting. Newsletters were drafted and provided at the meetings and through an email to members of the public who had provided comment or requested to be included on the study mailing list. Newsletters contained information on study progress, the planning process, upcoming participation opportunities, and available study documentation. Materials from both meetings including advertisements, news releases, sign-in sheets, comment sheets, agendas, newsletters, presentations, and meeting minutes are included in Appendix A.

First Informational Meeting

Twenty-nine (29) members of the public attended an informational meeting held on Wednesday, October 14, 2015, at the Huntley Project High School at 1477 Ash Street in Worden, Montana. The meeting began with an introduction of MDT representatives and local AC members. Sarah Nicolai and Will Trimbath presented information regarding the corridor study planning process (emphasizing public involvement as an important component), existing and projected transportation conditions, environmental and cultural conditions, and the study schedule. A discussion period was held following the presentation; a summary of these comments is included in Table 1.

Table 1 Summary of Comment Topics from Informational Meeting #1

Topic	Comments
Pompeys Pillar Interchange	• Attendees perceive that the interchange is poorly signed.
Roundup Signage	• Attendees noted passenger vehicles and commercial trucks may become lost because of perceived inadequate signage near the intersection of US 87 and Highway 312.
Funding Sources	• Questions were asked about potential funding sources for future improvement projects.
Highway 312 Intersections	• Sight distance, congestion, lack of turn bays, and perceived safety issues were all presented as concerns at the following intersections: – Highway 312 and Northern Avenue (Huntley) – Highway 312 and Nahmis Avenue/Secondary 522 (Huntley) – Highway 312 and unpaved road (Huntley) – Highway 312 and 16th Road (Worden) – Highway 312 and 15th Road (Worden) – Highway 312 and McIntyre Drive (west of the Shepherd Road turnoff) – Highway 312 and N. 4th Road (at the Miller-Coors facility east of Huntley)
Visibility	• Attendees noted dust from the adjacent gravel road to the south limits visibility on Highway 312 from Worden to Huntley. • Intersections near the Yellowstone Bridge immediately west of Huntley have decreased visibility due to the height of bridge barriers.
Roadway Width and Geometry	• Attendees noted concerns with roadway widths at the following locations: – near the Custer Coulee railroad crossing at N. 4th Road, – along Secondary 522, and – on Highway 312 from Worden to Pompeys Pillar.
Relocations and Eminent Domain	• Attendees asked about the potential future need to relocate homes as many residences are less than 200 feet from the current Highway 312 roadway.

Twenty-one (21) written comments were received and addressed topics including the need for wider shoulders and turn bays, improvements at the Highway 312 intersections with Secondary 522 and 15th Road, rutting and drainage issues, safety, the need for bicycle and pedestrian facilities, high vehicular speeds and volumes, and truck/agricultural traffic. Copies of these comments are included in Appendix A.

Billings Policy Coordinating Committee Meeting

Doug Enderson of DOWL and Scott Walker of the Billings MPO provided a study update to the Billings Policy Coordinating Committee on April 19, 2016. The presentation is appended in Appendix A.

Second Informational Meeting

A second informational meeting was held on May 11, 2016, at the Huntley Project High School at 1477 Ash Street in Worden, Montana. Eighteen (18) members of the public attended. The meeting began with an introduction of MDT representatives and local AC members. Sarah Nicolai and Doug Enderson presented information regarding the corridor study planning process (emphasizing public involvement as an important component), existing and projected conditions, study needs and objectives, and improvement options identified within the study area. A

discussion period was held following the presentation; a summary of comments is included in Table 2.

Table 2 Summary of Comment Topics from Informational Meeting #2

Topic	Comments
Economic Impacts	• Attendees noted concerns about project effects on businesses and agriculture.
Intersection Improvements	• Concerns were expressed about intersection improvements affecting traffic flow and safety.
Roundabouts	• Members of the public requested clarification on the advantages and disadvantages of roundabouts.
Guardrail	• Questions arose about guardrail as it may decrease road width and increase difficulties for farm equipment and large trucks.
Funding and Classification	• Attendees asked about funding availability and anticipated timeline and feasibility for future projects.

Resource Agency Meeting

Resource agencies were invited to attend a meeting on October 15, 2015, at the Montana Department of Transportation Rail, Transit, and Planning Division in Helena, MT. The meeting focused on discussion of 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 of MDT, US Bureau of Land Management (BLM), US Fish and Wildlife Service, Yellowstone County Public Works, and DOWL attended in person or via teleconference. The meeting began with a presentation of the study process and findings from the *Existing and Projected Conditions Report* and the *Environmental Scan.* Following the presentation, agencies discussed Species of Concern (including Bald Eagles, Greater Sage-Grouse, Whooping Cranes, and Great Blue Herons), Pompeys Pillar National Monument visitation, and multimodal usage of the corridor. Meeting minutes with discussion of these topics and a list of attendees are contained in Appendix A.

Public and Agency Review Period

The public and agency review period for the draft corridor study report took place May 1, 2016, through May 31, 2016. Four (4) written comments were received during the review period addressing topics including the need for wider shoulders and turn bays, visibility and grade issues at specific intersections (including Nahmis Avenue and Frey Road), roadway geometrics, bicycle and pedestrian improvements, and permitting considerations. Written comments and MDT responses are presented in a comment matrix in Appendix A.

3.0 Local and Regional Planning

Local plans were reviewed to identify areas of relevance with this study. Summarizes are provided below.

Billings Exposition Gateway Concept Plan – 2013

This plan presents recommendations and implementation actions that can be used to guide future development within the Exposition Gateway planning area, which is located approximately three miles south of the Highway 312/US 87 intersection and is outside of the Old Highway 312 Corridor study area.

Billings Urban Area Long Range Transportation Plan – 2014

This plan provides the framework to guide the development and implementation of multimodal transportation system projects for the Billings Urban Area. The plan identifies short- and long-range planning goals to address expected population, land use, employment, and traffic needs. The area encompasses the City of Billings, as well as the planning area extending approximately 4.5 miles outside the city limits. A portion of Highway 312 from the US 87 intersection (RP 0) to the Barry Drive intersection (RP 2.1) falls within the area considered in the Long Range Transportation Plan. Public feedback as part of this plan identified deficiencies and needs at the Roundup Road (US 87)/Highway 312/Main Street intersection. The plan also discusses and takes into consideration the effects of the proposed Billings Bypass project. The Bypass Project will construct a new principal arterial connecting Interstate 90 east of Billings with Highway 312 and Highway 87.

Billings Urban Area Transportation Improvement Program (TIP), 2015-2019 (Draft)

The TIP is a short-range program of highway and transit projects in the Billings metropolitan planning area and is prepared by the Yellowstone County Board of Planning staff in cooperation with state and local agencies. The purpose of the TIP is to provide the mechanism for scheduling federal funds for surface transportation projects, indicating regional priorities, and demonstrating a short-range transportation vision for the area. The Bench Boulevard/US 87 intersection is listed in the TIP as a reconstruction project scheduled for 2015.

Heritage Trail Plan – The Greater Billings Non-Motorized Trail System – 2004

The Heritage Trail Plan is the non-motorized transportation element of the Billings Urban Area 2000 Transportation Plan and serves to update and supersede the former plan known as BikeNet. The Heritage Trail Plan is a multi-use trails plan that serves the Greater Billings community. The goal of the plan is to create trail links throughout Yellowstone County connecting communities, neighborhoods, natural and cultural features, commercial and employment centers, schools, and parks. The plan develops a vision, identity, and implementation strategy for the trail network in the Greater Billings Area. The plan identifies the portion of Highway 312 from the US 87 intersection (RP 0) to the Hoskins Road intersection (RP 5.6) as an arterial bikeway. The plan defines arterial bikeways as the least desirable routes for on-street bike travel but travel can usually be accommodated where sufficient pavement width exists and where no alternative route exists. The plan also identifies two potential multi-use trail routes that would intersect the portion of Highway 312 from US 87 (RP 0) to the Barry Drive intersection (RP 2.1).

Montana Comprehensive Highway Safety Plan (CHSP) – 2015

The CHSP identifies the top traffic safety problems on all of Montana's public roadways and includes a strategic focus on coordinating statewide efforts to reduce fatalities and incapacitating injuries. The plan is data driven and includes 10-year crash data trend analysis to determine emphasis areas with the greatest opportunity to reduce crashes. The CHSP identified four emphasis areas including roadway departure crashes, intersection crashes, impaired driving crashes, and crashes involving unrestrained occupants. The plan includes measureable objectives and identifies safety strategies and implementation steps to reduce emphasis area crashes. Improvement options identified as part of the Old Highway 312 Corridor Study consider and reflect the strategies for crash reduction within the identified emphasis areas.

Montana Statewide Transportation Improvement Program (STIP), 2015-2019

The STIP is developed in accordance with the requirements of Section 135 of 23 USC (United States Code). The STIP details projects that will address Montana's transportation needs for fiscal years 2015 through 2019. There are several projects programmed in the current STIP within the study area. Recent and planned projects are discussed in Section 2.0.

Shepherd Community Action Plan

This plan discusses actions of the Shepherd Community Committee, formed in 2002 to consider options for organizing as a community and identifying abilities to access local, state, and federal funds. One of the initial projects originated by the community was a survey among Shepherd residents to help identify projects and goals for Shepherd's future. Safety issues with Highway 312 were identified as a concern by the Shepherd Community. As a result of the community survey, the committee identified potential community-preferred projects to further investigate. The plan identified the installation of turn lanes and widening of Highway 312 from Billings to the Yellowstone River crossing as a potential roadway improvement. The plan also discussed the possibility of planting trees and flowers in the right-of-way easements at the intersection of Highway 312 and Shepherd Road (RP 7.6) as part of a welcome to the Shepherd Community.

Trail Asset Management Plan – Billings, Montana – 2011

This plan addresses management and maintenance of the trail systems within the City of Billings and Yellowstone County jurisdictions. The plan provides an overview of existing trails and trail maintenance activities, and identifies recommended maintenance activities and associated costs, funding opportunities, and implementation strategies. The plan does not outline any recommendations directly relevant to the Old Highway 312 Corridor Study.

TranPlan 21 – 2008

TranPlan 21 is Montana's federally-mandated statewide transportation plan. Originally adopted in 1995 and most recently amended in 2008, TranPlan 21 is an essential component of the continuing statewide planning process that develops and implements MDT policy goals and actions in cooperation with the public and Montana's transportation stakeholders.

TranPlan 21 establishes statewide transportation policies in six key areas within the federally-required 20-year planning horizon. These policy areas include:

- economic development,
- traveler safety,
- roadway system performance,
- access management/land use planning,
- bicycle and pedestrian transportation, and
- public transportation.

The Roadway System Performance Policy Paper noted improvements will be needed in response to traffic growth in certain corridors.

Yellowstone County and City of Billings Growth Policy Update – 2008

The Yellowstone County/City of Billings Growth Policy outlines existing conditions; issues, goals, and objectives; and implementation strategies relating to land use, economic development, aesthetics, natural resources, open space and recreation, transportation, public facilities and services, and cultural and historic resources. Transportation issues identified in the plan include safe and efficient traffic circulation around and through the City of Billings, deteriorated roadway conditions, and lack of adequate bicycle facilities.

4.0 Recent and Future Projects and Maintenance Efforts

Table 3 identifies recent and future projects within the study area.

Table 3 Recent and Future MDT Projects

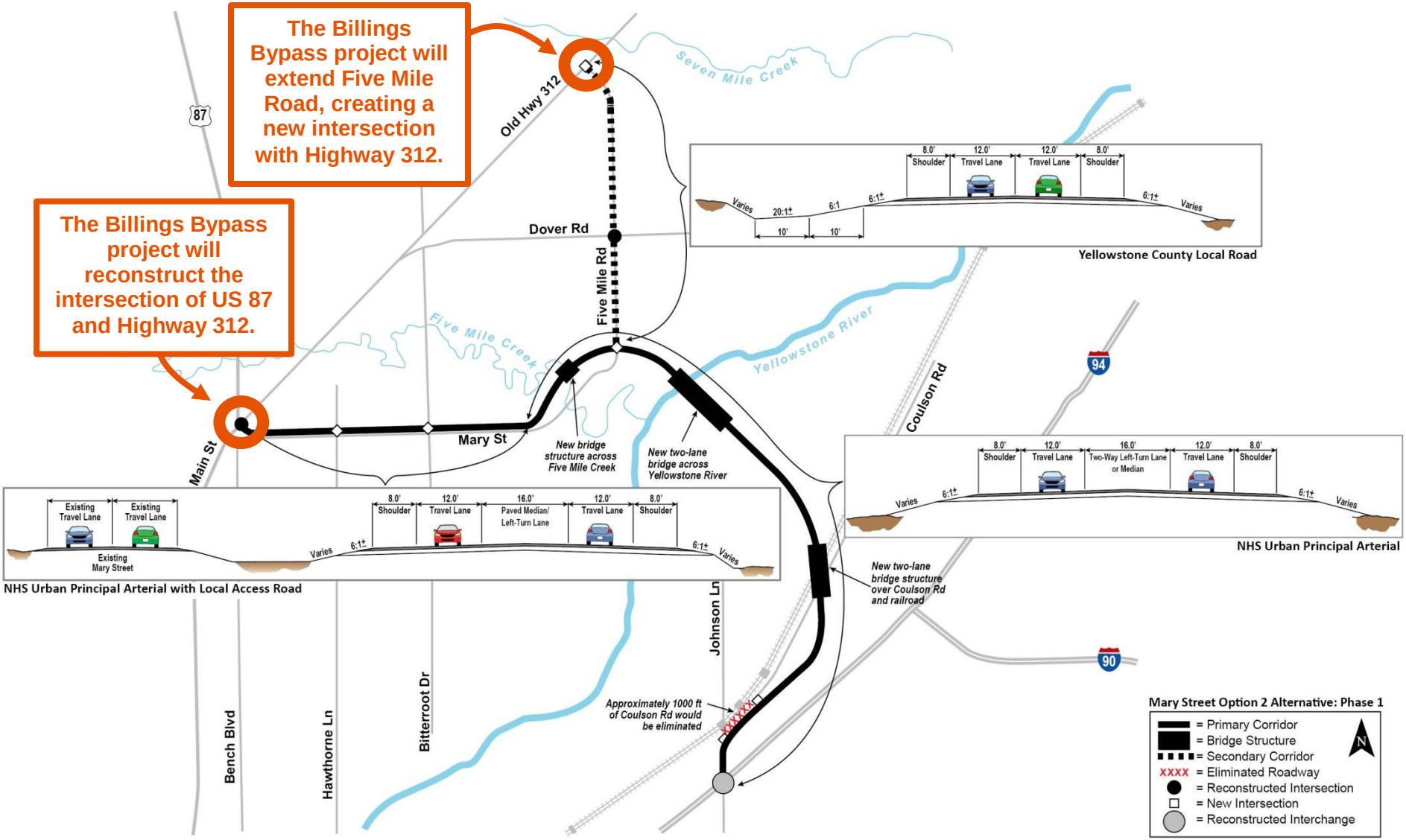
Route	UPN	Project Name	Fiscal Year (Construction Phase)	Project Scope
Highway 312	3438	Arrow Creek - NE of Hardin	2003	Box Culvert & Approaches
	4443	Safety Improvement – Old US 312	2003	Turn Lane, Widening, Bridges
	4678	D5 – Scour Protection	2003	Scour Protection
	5028	2001 – Safety Improvement – W of Huntley	2015	Left Turn, Flash, Sign, Approach
	5213	NE of Billings – NE	2003	Pavement Preservation, Bridge Rail and Guardrail Updates
	7960	2012 Scour Mitigation	2020	Scour Mitigation on 5 Structures
	8795	Fly Creek – Pompey's Pillar	2015	Bridge Replacement
Secondary 522	4669	Huntley Interchange – East	2004	Plant Mix Surfacing Overlay
	7690	Pryor Ck – 1 M S Huntley/MT 11-1	2011	Bridge Reconstruction
	8016	RR Xing – FAS 522 – Huntley	2015	Circuitry Upgrade of Existing Grade Crossing Signal System
Secondary 568	4004	BNRR – 2 KM W Pompey's Pillar	2003	Bridge Replacement
	5184	Pompey's Pillar Intch – West	2003	Pavement Preservation

Source: MDT, 2015. UPN: unified project number.

In addition to the projects noted above, the Billings Bypass project (NCDP 56(55)) will construct a new principal arterial connection for Interstate 90 east of Billings with Highway 312/US 87 northeast of Billings, connecting the unincorporated community of Lockwood with the Billings Heights neighborhood. The project is intended to improve access and connectivity between Interstate 90 and Highway 312/US 87, improve mobility in the eastern portion of Billings, relieve congestion, and reduce the physical barrier impacts to the transportation system through a new crossing of the Yellowstone River. A final environmental impact statement (FEIS) for the project was completed in March 2014, and a record of decision (ROD) was approved in July 2014. Engineering design began in 2015.

The project will consist of a new two-lane urban and rural arterial roadway to be constructed in phases, with accommodations to widen the facility to an ultimate four-lane section. Within the Highway 312 study area, the Bypass project will construct a new at-grade intersection at the intersection of Highway 312 and US 87. Additionally, a two-lane ancillary roadway will be extended along the existing Five Mile Road alignment, providing a secondary access to the Billings Bypass from Highway 312. Figure 2 illustrates the preferred alternative approved in the ROD, with red callouts indicating planned changes within the Highway 312 corridor.

Figure 2 Billings Bypass Preferred Alternative



Source: Billings Bypass ROD, 2014.

5.0 Existing and Projected Conditions

The *Old Highway 312 Corridor Study Existing and Projected Conditions Report* (Appendix B) and *Environmental Scan Report* (Appendix C) provide a planning-level summary of transportation system features and physical, biological, social, and cultural characteristics to help the AC identify issues, constraints, and opportunities within the study area. The following sections summarize key information from these reports.

5.1 Transportation System Conditions

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

Features

Transportation features were identified through field observation and a review of published statistics, documentation, Geographic Information System data, and MDT as-built drawings. A field review of the corridor was conducted on June 10, 2015, to assist in identifying existing conditions and constraints.

Functional Classification and Roadway System

Functional classification is used to characterize public roads and highways, consistent 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.

In addition to the relative level of access and mobility provided by a roadway, assessment of how a roadway functions takes into consideration speed limits, usage characteristics (such as average annual daily traffic (AADT) volumes), and connectivity with other roadway types. Highway system designation is based in part on the functional classification of the roadway.

Highway 312 is currently classified as an off-system (i.e., “X route”) rural minor arterial from the Highway 312 and US 87 intersection to approximately RP 1.75 and a rural major collector from RP 1.75 to RP 24.9. The entire lengths of Secondary 522 and Secondary 568 within the study area are classified as on-system rural major collectors.

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, minor arterials are typically designed to provide relatively high overall travel speeds, with minimum interference to through movement.

Major collectors in the rural setting typically serve intra-county travel, rather than statewide travel, and typically serve shorter trips compared to arterial routes. Trips along major collectors greater in length than intra-country travel will typically funnel motorists to the arterial system.

Although the majority of Highway 312 and the entire length of Secondary 522 are currently classified as major collectors, their current function and operating characteristics suggest they may be more appropriately classified as minor arterials. Specifically, Highway 312 from Billings to Huntley accommodates daily traffic volumes ranging from 11,800 to 4,900 vehicles and Secondary 522 serves 4,300 vehicles daily (as presented later in this report). These roadways serve commuter, recreational, and agricultural traffic and provide relatively high-speed travel

and connectivity between the urbanized area of Billings, the community of Huntley, and Interstate 94.

Rumble Strips and Delineation

Shoulder rumble strips were generally observed along Highway 312 in areas where the roadway has been widened and there is sufficient shoulder width. Shoulder rumble strips are not present along Secondary 522 and 568. There are no centerline rumble strips within the study area. Delineator condition is generally good and appears to meet MDT design criteria regarding spacing on tangent and curve roadway segments. The entire corridor has standard delineators, which is one of MDT's three delineator types. Delineator Design A is used for continuous delineation on the right shoulder of all routes. Delineator Designs C and F are used for curves based on the curve radius. Delineator Designs D and G are used at approaches with stop or yield signs for non-interstate and interstate ramps, respectively. Highway 312 and Secondary 522 have Design A, C, D, and F delineators spaced throughout the corridor, and Secondary 568 has Design G and F delineators. The curves within the study area appear to have correct delineators, however, there are a number of public approaches along Highway 312 and Secondary 522 that do not appear to have delineator Design D. These approaches include the following intersections.

Highway 312

- Lone Tree Trail, RP 4.9
- Shining Mountain Drive, RP 7.2
- Ivy Street, Sunrise Road, RP 9.8
- 1st Street (Worden, MT), RP 17.5
- 1st Street (Nibble, MT), RP 23.9
- Main Street (Nibble, MT), RP 24.0

Secondary 522

- Creekmore Road, RP 0.1
- North Canal Drive, RP 0.3
- South Canal Drive, RP 0.3
- Canal Drive Access Road, RP 0.4

Right-of-way

Estimated right-of-way boundaries vary from a minimum of 60 feet to a maximum of 260 feet within the corridor. Railroad closely parallels the study area along Secondary 522 within Huntley and Highway 312/Secondary 568 from Huntley to the I-94 interchange near Pompeys Pillar. Right-of-way within this portion of the study area may be part of an easement from the railroad property. Additional investigation regarding railroad easements may be necessary depending on the location of potential improvement options within the corridor.

Structures

The MDT Bridge Bureau identified 12 structures within the study area (including both bridges and culverts). Of these, five are rated fair, indicating they are candidates for repair or rehabilitation (as presented in Table 4).

Table 4 Structure Data

Route	RP	Location	Feature Crossed	Year Built (Recon)	Main Span Material	Structure Condition
Highway 312	2.70	5M SW HUNTLEY	SEVEN MILE CREEK 168	1947	Wood or Timber	Fair
	6.57	2M W OF HUNTLEY	TWELVE MILE CREEK 169	1947	Wood or Timber	Fair
	8.78	HUNTLEY	YELLOWSTONE RIVER 170	1949	Steel continuous	Fair
	12.15	2M E OF HUNTLEY	CUSTER COULEE 171	1928 (1939)	Steel	Fair
Secondary 522	0.36	1M S HUNTLEY	HUNTLEY CANAL	1967	Prestressed concrete	Fair

Source: MDT Bridge Bureau, 2015. Fair: Candidate for repair or rehabilitation.

Bicycle and Pedestrian Facilities

Shoulder widths vary throughout the corridor, ranging from zero to eight feet, providing limited opportunity for non-motorized usage along the traveled way without encroaching into vehicle travel lanes.

The study area is promoted as part of the Lewis & Clark Trail Bicycle Route by the Adventure Cycling Association, a national bicycle-travel organization. Highway 312 and Secondary 568 are part of section 8, which stretches from Three Forks to Glendive. The City of Billings and Yellowstone County Planning and Community Services have also designated this section as an arterial bike route.

Discontinuous sidewalks occur along Secondary 522 in Huntley. A pedestrian crossing is located at Barkemeyer Park on Secondary 522 (RP 0.9). The pedestrian crossing does not meet current MDT and Manual on Uniform Traffic Control Devices (MUTCD) signing and pavement marking guidelines, including sign placement, sign sheeting type, and crosswalk pavement marking style. There are no other dedicated pedestrian facilities in the study area.

Utilities

Utilities in the study area include overhead and underground electrical distribution, overhead and underground copper communication, and underground fiber communication.

Air Service

Billings Logan International Airport is located two miles northwest of downtown Billings and is owned by the City of Billings. It is the second largest airport in Montana in both number of gates as well as annual enplanements. The National Plan of Integrated Airport Systems for 2011-2015 categorizes it as a primary commercial service airport. Federal Aviation Administration records indicate 387,368 passenger boardings (enplanements) in 2013.

Rail Service

BNSF Railway and Montana Rail Link (MRL) operate services adjacent to the study area. An MRL railroad parallels the southern side of Secondary 522 (RP 0.5 to 3.0) and Highway 312 (RP 10.4 to 12.0). The MRL line becomes a BNSF line at RP 12 of Highway 312. The BNSF

line parallels the southern side of Highway 312 from RP 12 to 24.9 and Secondary 568 from RP 1 to 0.2. Based on 2014 data from the Federal Railroad Administration, there are approximately 20 to 22 daily trains utilizing the MRL and BNSF track lines.

There are 25 railroad crossings located within and adjacent to the study area. Two of the 25 crossings intersect study area roadways. An at-grade crossing exists on Secondary 522 at RP 0.5 within Huntley and a grade-separated crossing exists on Secondary 568 at RP 0.2. The remaining 23 crossings are located on roadways adjacent to the study area.

Transit
There are no transit services in the study area. MET Transit provides service within the City of Billings boundary, but not within the study corridor.

Drainage Conditions
Drainage throughout the study area is generally sufficient along Highway 312 and Secondary 568. Highway runoff is directed to adjoining shoulders. Graded side slopes carry run-off to natural drainage conveyances through constructed ditches within the ROW or via natural drainage patterns formed by the topographic conditions of the adjacent lands.

One area of insufficient drainage was identified during the June 2015 field review. Standing water was noted on the Barkemeyer Park quadrant of the Secondary 522 and Nahmis Avenue intersection in Huntley. Evidence of standing water was also apparent along Secondary 522 throughout Huntley, especially on the north side of the road. Longitudinal grades and cross slopes are generally flat and no storm collection system exists to collect and transport storm water from the roadway.

Pavement Conditions
Rutting in the wheel paths of all three roadways was observed after a heavy rain event occurred at the time of the June 2015 field review. Rutting was generally worse within the two-lane sections of Highway 312 compared to the three- and five-lane sections. Rutting is estimated to be between ¼-inch and ½-inch in depth. Highway 312 appeared to have recently been chip sealed within the project limits.

Additionally, transverse cracking occurs consistently along the entire corridor. The transverse cracking is spaced sporadically (150- to 200-foot intervals) on Highway 312 and Secondary 568, while Secondary 522 averages transverse cracking every 75 to 100 feet.

MDT uses multiple criteria on a good/fair/poor scale to assess pavement conditions. The ride index for Secondary 568, 522, and the first 2.3 miles of Highway 312 is considered fair. All other categories are rated good for these roadways.

Geometric Characteristics

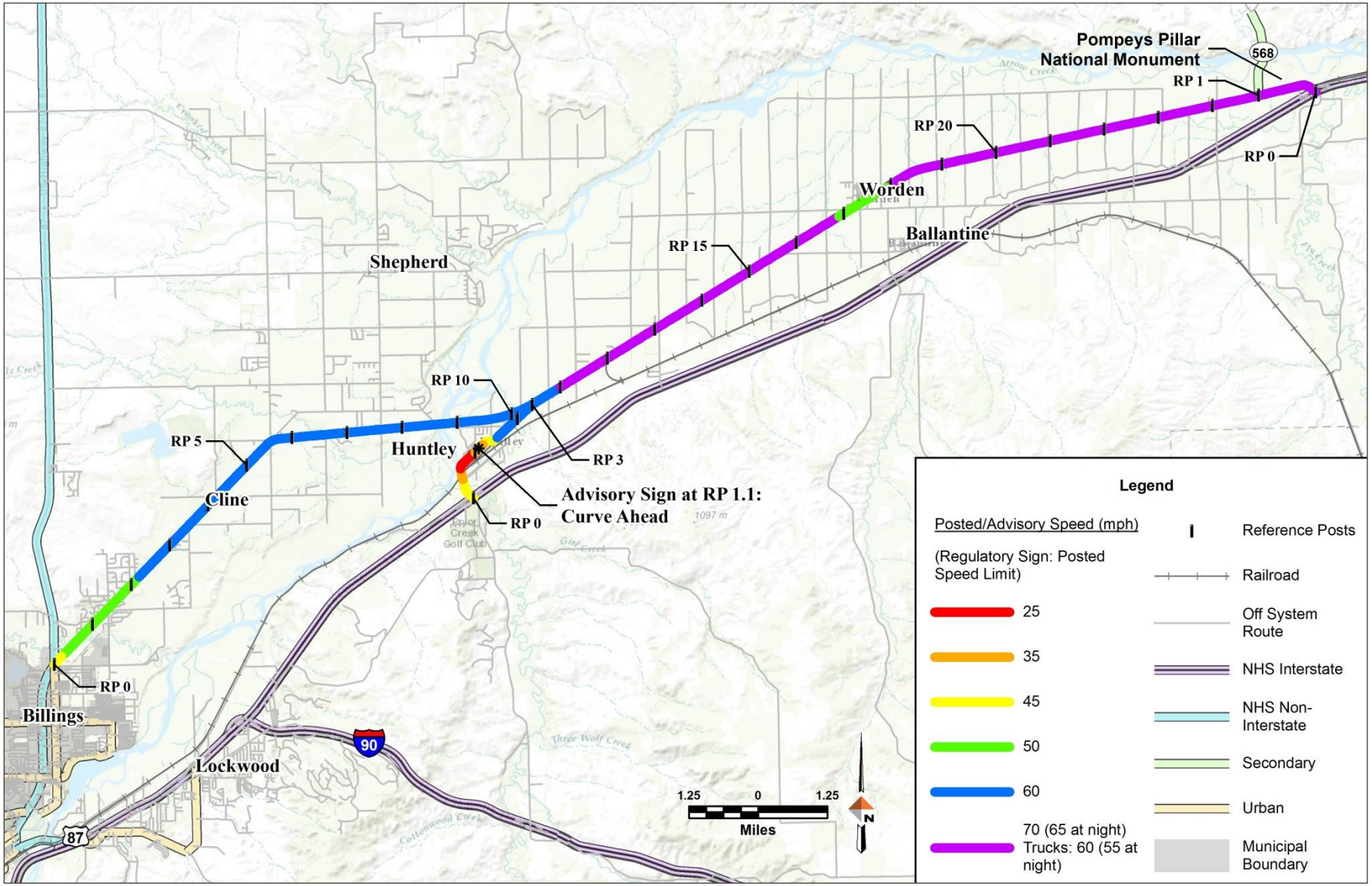
Design Criteria
Geometric design criteria used for rural minor arterial and rural collector roadways are provided in the MDT Road Design Manual (RDM) (*Chapter 12 – Geometric Design Tables*). Chapters 8-10 in the RDM were also consulted for guidance regarding horizontal and vertical alignments. MDT has generally adopted American Association of State Highway and Transportation Officials (AASHTO) policies and Public Rights-of-Way Accessibility Guidelines (PROWAG) in compliance with the Americans with Disabilities Act (ADA).

The existing roadway alignment generally exhibits level terrain characteristics throughout the study area. Based on current functional classifications, a design speed of 60 miles per hour (mph) in combination with rural minor arterial and rural collector design criteria was utilized for Highway 312 and Secondary 568. A design speed of 60 mph in combination with rural collector design criteria was utilized to evaluate the majority of Secondary 522, with the exception of the portion from approximately RP 0.4 to RP 1.2 where the roadway leads into and out of Huntley, which was analyzed using a 30 mph design speed for an urban collector. Although Secondary 522 is classified as a rural collector, Huntley exhibits urban characteristics reinforced by posted speed limits varying from 25 to 35 mph within the community.

The posted speed limit on Highway 312 and Secondary 568 is primarily 60 to 70 mph (55 to 65 mph at night) and 50 to 60 mph (45 to 55 mph at night) for trucks. The posted speed limit for Secondary 522 varies from 25 mph to 60 mph with a 30 mph advisory sign for one of the horizontal curves on Secondary 522.

In 2000, a speed zone study was conducted on Highway 312 between the intersection with US 87 (RP 0.0) and the intersection with Secondary 522 (approximate RP 10.4). The study recommended a 55 mph speed limit east of the 45 mph zone until a distance 300 feet east of the intersection with Barry Drive (approximate RP 2.1), and a 65 mph speed limit continuing east until a distance 3,100 feet east of the intersection with Secondary 522. Posted speed limits are currently 5 mph higher than the 2000 speed study recommendations.

Figure 3 Posted Speed Limits and Advisory Signing



Lane Configuration and Roadway Width

Highway 312 begins as a four-lane divided highway at its intersection with US 87 (Bench Boulevard/Roundup Road, RP 0.0) with 12-foot travel lanes, 8-foot shoulder widths, and a painted median. A painted median transitions into a 14-foot two-way left-turn (TWLT) lane approximately 750 east of the study beginning point, providing a five-lane section until the Highway 312 intersection with Barry Drive (RP 2.1). The remaining Highway 312 corridor is a two-lane undivided highway with 12-foot travel lanes and 2-foot shoulder widths, with intermittent three-lane sections where turn bays are provided at major intersecting roadways (at RPs 3.5, 4.2, 5.6, and 7.6). Secondary 568 and Secondary 522 are also two-lane undivided highways.

Eight-foot shoulders exist on Highway 312 along the four-lane and five-lane sections from the Highway 87 intersection (RP 0) to the Barry Drive intersection (RP 2.1), and at the three-lane Highway 312 intersections with:

- Pioneer Road/Drury Lane (RP 3.5),
- Cline Road/McGirl Road/Larimer Lane (RP 4.2),
- Hoskins Road/12 Mile Road (RP 5.6), and
- Shepherd Road/Vermillion Road (RP 7.6).

Four-foot shoulders exist on Secondary 568 within the guardrail and bridge barrier limits from RP 0.4 to RP 0. Shoulder widths vary throughout the Secondary 522 corridor, ranging from zero to 24 feet. Shoulders within the Huntley area are eight to 24 feet and provide on-street parallel parking to business and park patrons adjacent to Secondary 522. Eight-foot shoulders extend from the southern Huntley area to the I-94 Interchange.

Horizontal Alignment

Horizontal alignment is a measure of the degree of turns and bends in the road, and includes consideration of horizontal curvature, superelevation, curve type, and entering and passing sight distance. Based on MDT design criteria and a review of available data from MDT as-built drawings, four of the 13 horizontal curves within the corridor do not meet current MDT design criteria for curve radius, stopping sight distance, and/or curve length.

Vertical Alignment

Vertical alignment is a measure of the elevation change on a roadway, and 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 11 of the 37 vertical curves analyzed within the study boundaries do not meet current MDT design criteria.

Passing Zones

Passing zones are periodically provided within the corridor in locations with sufficient passing sight distance. Passing sight distance is defined as the minimum sight distance required to safely complete a passing maneuver. Passing opportunities are limited by the frequency of oncoming vehicles (opposing flow rate), including large vehicles.

Clear Zones

The MDT RDM specifies an offset distance from the edge of 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, AADT, horizontal curvature, the slope

of cut / fill sections, and offsets from the ETW. The slopes and dimensions within the clear zone provide a recovery area for vehicles exiting the traveled way. If the dimensions specified in the RDM cannot be achieved, a roadway barrier may be warranted.

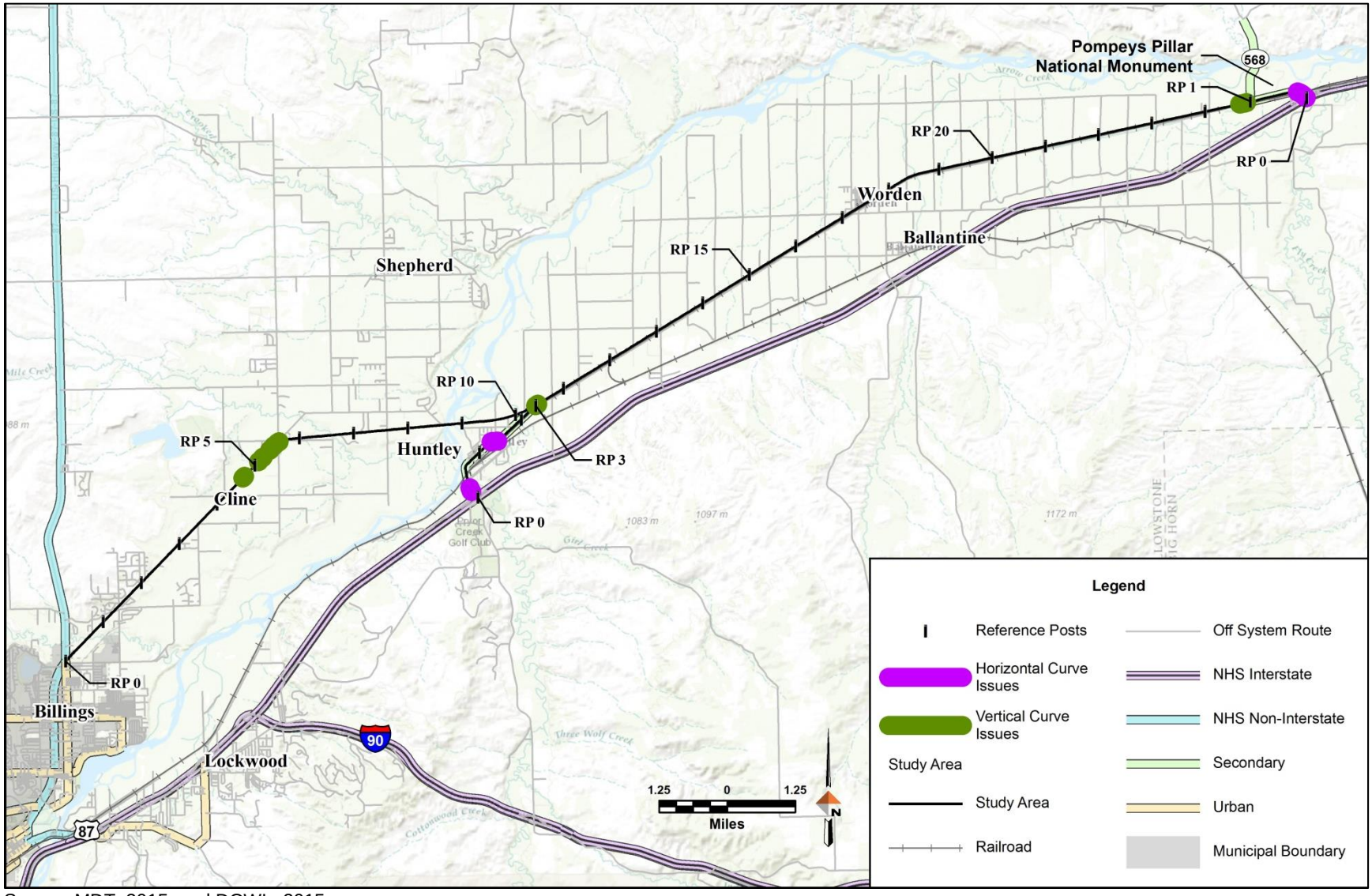
Cut and fill slopes in the five-lane and three-lane sections appeared to meet current MDT design criteria; however, foreslopes and backslopes in the two-lane portions do not meet current criteria. Fill slopes throughout the two-lane sections are generally 4:1 and cut sections are 4:1 v-ditches. Mature trees, unprotected bridge rails, culvert ends, and parallel irrigation ditches were observed within the clear zone.

Apart from a few dented locations, the majority of guardrail within the corridor appears to be in good condition. During the field review, it was determined that guardrail within the corridor is generally not compliant with current MDT design criteria for guardrail. There were several areas that were noted as lacking slope protection and with inadequate clear zone distance.

Summary of Geometric Issues

Figure 4 presents the location of existing horizontal and vertical curve issues within the corridor.

Figure 4 Geometric Issues



Source: MDT, 2015, and DOWL, 2015.

Crash History

MDT provided crash data for Highway 312, Secondary 568, and Secondary 522 within the study area for the ten-year period from January 1, 2005, to December 31, 2014. During the ten-year analysis period, a total of 577 crashes occurred on Highway 312, Secondary 568, Secondary 522, and minor approach roads to the study area. As a result of the crashes in the corridor, a total of 328 injuries and 6 fatalities occurred during the analysis period.

Rear-end, fixed-object, right angle, roll over, and wild animal crashes were the most common crash types with 477 (83 percent) combined crashes, 275 (84 percent) combined injuries, and 6 (100 percent) combined fatalities.

Of the people involved in crashes within the study area, 109 (10 percent) did not use any type of restraint and 68 (9 percent) were under the influence of medication, drugs, or alcohol;

The majority of crashes, injuries, and fatalities occurred during clear or cloudy weather conditions, dry road conditions, and daylight light conditions.

Wild animals were involved in 44 of 577 (8 percent) reported crashes. Reported crashes involving wild animals were concentrated along the western portion of the corridor from Billings to Huntley, with 38 out of 44 crashes (86 percent) occurring between RP 0 to RP 10.0 (Highway 312) and RP 0 to 3 (Secondary 522).

MDT provided carcass data for Highway 312, Secondary 568, and Secondary 522 within the study area for the ten-year period from January 1, 2005, to December 31, 2014. A review of the data indicates nine whitetail deer and four mule deer carcasses were collected within the study area. Carcass collections were concentrated between RP 21 and 24.5 on Highway 312. Carcass data may not accurately reflect animal-vehicle conflicts throughout the corridor, and not all carcasses result from vehicle collisions.

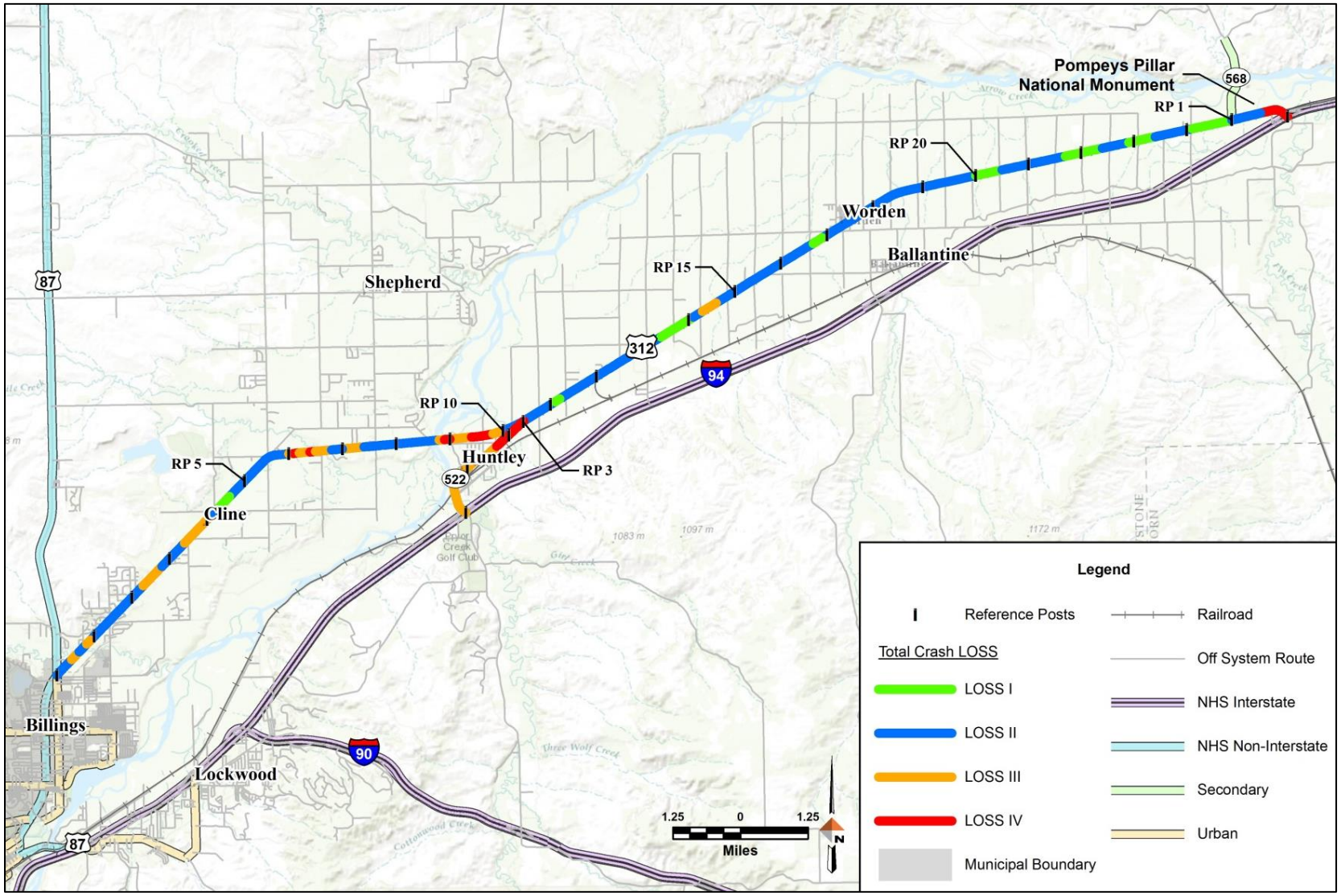
Level of Service of Safety

MDT conducted an analysis to assess the magnitude of safety problems within the Highway 312, Secondary 568, and Secondary 522 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) within a corridor. LOSS categories 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.

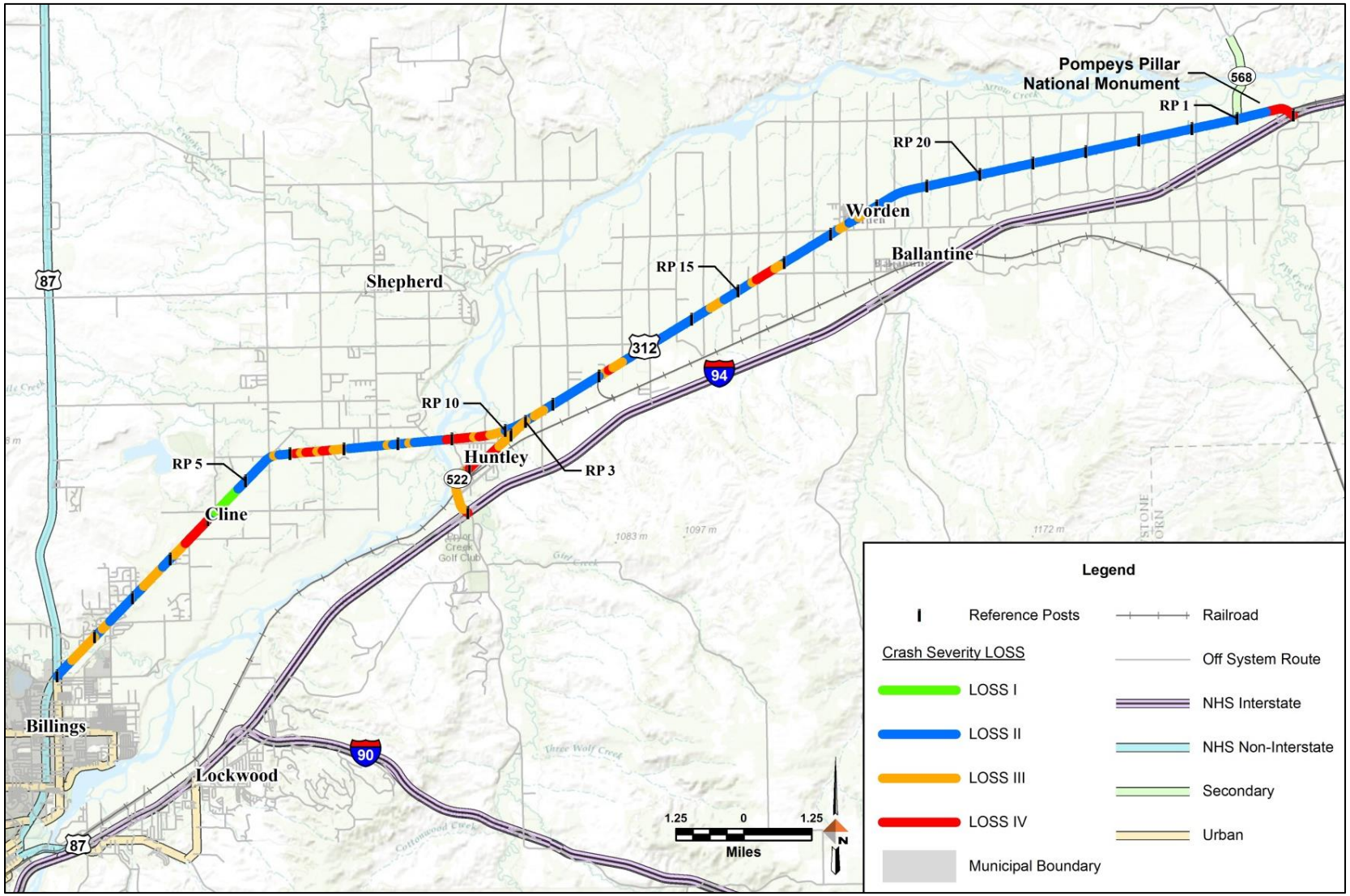
Figure 5 presents total crash LOSS, which indicates deviations from the normal expected crash frequency. Figure 6 presents crash severity LOSS, which indicates deviations from the normal expected crash severity. Portions of the corridor identified as LOSS IV represent the highest deviation from normal expected conditions, and the highest potential for crash reduction. Areas identified as LOSS IV for both total crashes and severe crashes occur near RP 4, 6, 9, 12, and 15 along Highway 312, RP 0.5 along Secondary 568, and RP 0, 1, and 2 along Secondary 522.

Figure 5 Total Crash LOSS



Source: MDT, 2015, and DOWL, 2015.

Figure 6 Crash Severity LOSS



Source: MDT, 2015, and DOWL, 2015.

If a safety problem is identified within a corridor, the LOSS concept describes its magnitude in terms of frequency and severity. The nature of the safety problem may be determined, in part, through pattern recognition techniques. MDT conducted an analysis of the Highway 312, Secondary 522, and Secondary 568 corridors to identify abnormal crash patterns compared to normative patterns generally correlating to a range of AADT volumes on Montana highways. Abnormal patterns indicate a higher crash type frequency compared to normal expected crash frequency.

Abnormal crash patterns identified within the study corridor include single vehicle, off road right, overturning, guardrail, total fixed objects, no adverse weather, dry road, no apparent contributing factor, injury, two vehicles, off road left, broadside, rear end, other fixed object, unknown crash type, daylight, and alcohol involved.

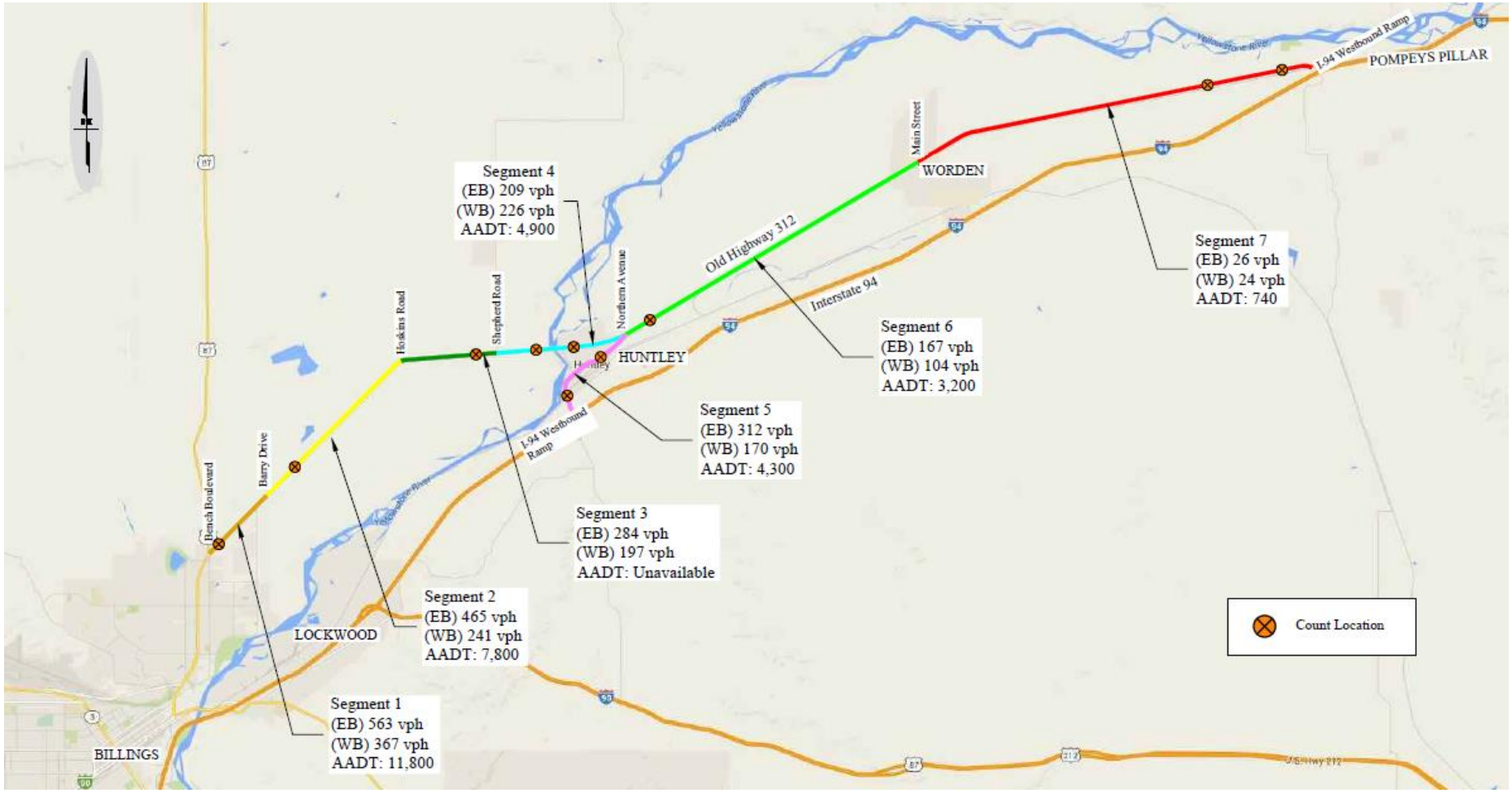
Traffic Volumes and Operations

2015 Volumes and Analysis

MDT collected traffic data for study segments and intersections in June and July, 2015. MDT seasonal adjustment factors were applied to the 2015 counts to provide a better representation of traffic conditions on an average day.

Peak-hour directional traffic volumes were calculated for each segment. Figure 7 presents study segments, traffic count site locations, 2015 peak-hour directional traffic volumes (from 2015 counts), and 2015 AADT (forecasted from 2014 AADT by applying a growth factor). Peak-hour turning movement volumes were used for intersection analysis.

Figure 7 2015 Existing Year Peak Hour Directional Volumes



Source: MDT, 2015, and DOWL, 2015.

The operational effectiveness of the roadway is generally described in terms of level of service (LOS). LOS describes the quality of traffic operations and is graded from A to F, with LOS A representing free-flow conditions and LOS F representing heavily-congested conditions. MDT targets LOS C in the design year. Table 5 presents 2015 LOS for each study segment. Segment 2 and segment 3 operate at LOS D in 2015. All other study segments operate at LOS C or better.

Existing traffic capacities for the study intersections were determined using peak-hour volumes. All of the study intersections are stop controlled, with the major road having free movement. MDT targets LOS C in the design year. Table 5 presents LOS for the worst intersection approach in 2015. All study intersections are operating at an acceptable level in 2015.

Table 5 2015 Peak-hour Segment and Intersection LOS

Segment	Direction	LOS	Intersection		Worst Approach	LOS
1	Eastbound	A	1	Highway 312 and Dover Road	NB	C
	Westbound	A	2	Highway 312 and Hoskins Road	NB	B
2	Eastbound	D	3	Highway 312 and Shepherd Rd/Vermillion Rd	SB	B
	Westbound	C	4	Highway 312 and Nahmis Avenue	NB	B
3	Eastbound	D	5	Secondary 522 and Nahmis Avenue	NB	C
	Westbound	D	6	Secondary 522 and I-94 WB Ramp	WB	B
4	Eastbound	C	7	Secondary 522 and I-94 EB Ramp	EB	B
	Westbound	C	8	Highway 312 and Northern Avenue	NB	A
5	Eastbound	B	9	Highway 312 and Main Street/S 15th Road	NB	B
	Westbound	B	10	Highway 312 and I-94 WB Ramp	SB	A
6	Eastbound	B	11	Highway 312 and I-94 EB Ramp	EB	A
	Westbound	B	12	I-94 WB Ramp and Custer Frontage Road	NB	A
7	Eastbound	B				
	Westbound	B				

Source: DOWL, 2015. Highlighted cells indicate segments operating below target LOS.

2035 Forecasts and Analysis – With Billings Bypass Project

Annual growth rates (AGRs) were determined based on historic AADT at count sites within the study area. An AGR for each count location was determined by plotting historic AADT on a chart, and placing an exponential best-fit trend line through those points. Based on these growth rates, an average growth rate of 1.8% was determined as the growth rate for this study. Future year traffic volumes were calculated by projecting existing year volumes using the 1.8% AGR.

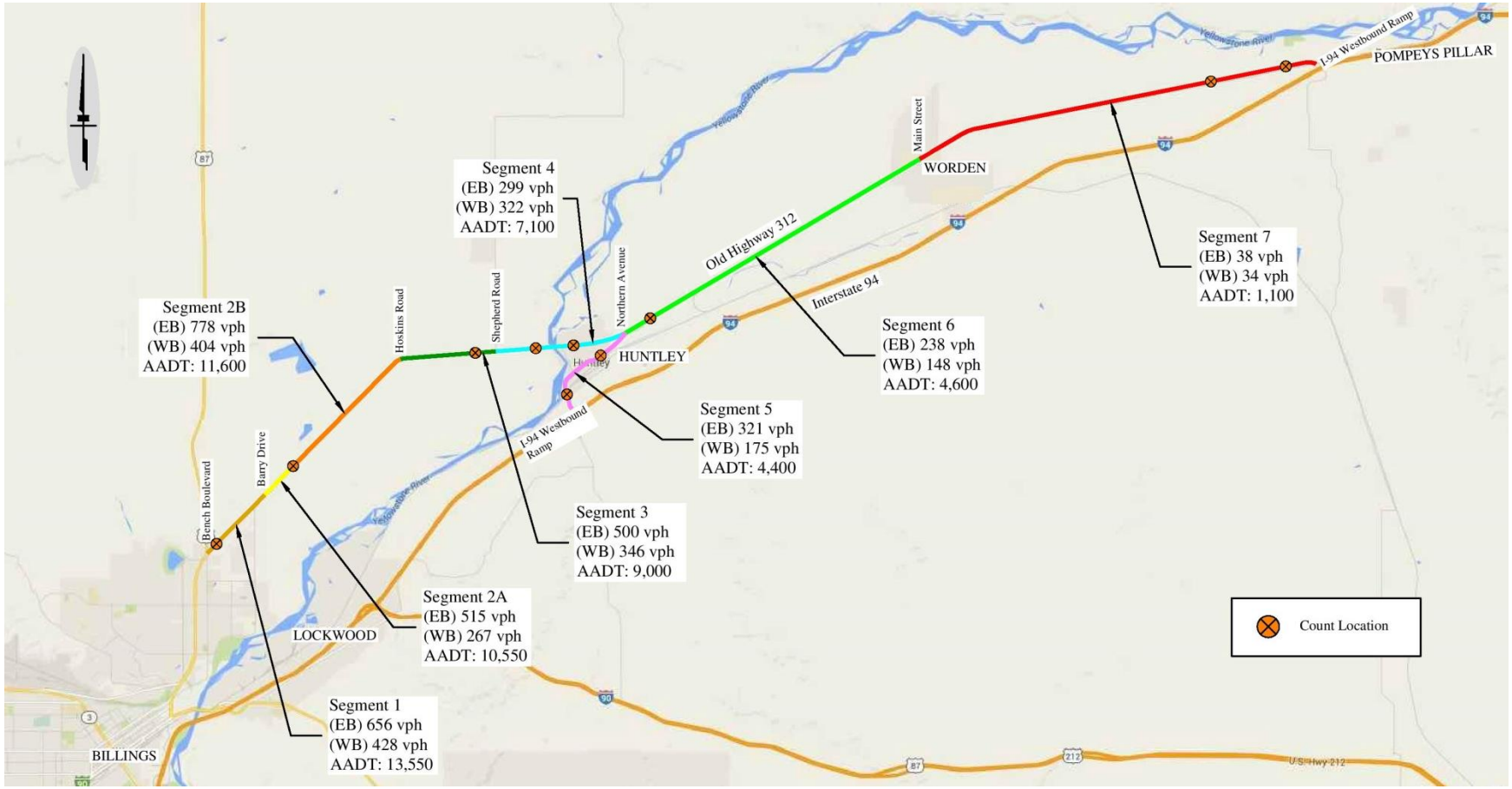
Forecasted traffic from the August 2013 Billings Bypass FEIS was referenced to adjust the forecasted traffic volumes and account for expected changes in traffic patterns resulting from the Billings Bypass project. The FEIS provides 2035 no build and full buildout traffic volume forecasts for Old Highway 312 from US 87 to just east of the proposed Five Mile Road intersection. It was assumed that drivers in the Shepherd area that currently route through Huntley and along Secondary 522 to reach I-94 west towards Billings will instead access the Billings Bypass via the Five Mile Road extension that will connect with Old Highway 312. Based on the Billings Bypass FEIS, 2035 average daily traffic (ADT) volumes east of Five Mile Road are assumed to increase by 1,700 vehicles per day (vpd) when the Billings Bypass is constructed. Since the 1,700 vpd are assumed to originate from the Shepherd area, traffic from

Shepherd Road to I-94 west via Nahmis Road is expected to decrease by the same amount when the Billings Bypass is constructed.

The percent change in ADT between the no-build and build scenarios in the FEIS was multiplied by the 2035 forecasted traffic volumes, based on location, to estimate forecasted 2035 traffic volumes for the Billings Bypass scenario for this study.

Roadway segments 4, 6, 7, and study intersections 8 through 12 were assumed to be unaffected by Billings Bypass. Figure 8 shows the expected 2035 peak-hour directional traffic volumes and AADT with the Billings Bypass. For the purpose of this analysis, roadway segment 2 was split at the new Five Mile Road intersection that will be constructed with the Billings Bypass project. As a result of the Billings Bypass project, traffic volumes are expected to decrease on roadway segments 1, 2A, 5, and study intersections 1, 4, 5, 6, and 7, and increase on roadway segments 2B, 3, and study intersections 2 and 3.

Figure 8 2035 Peak Hour Directional Volumes with Billings Bypass



Source: MDT, 2015, and DOWL, 2015.

Table 6 shows the LOS at the study segments during the 2035 peak-hour period with the Billings Bypass project. Segments 2A, 2B, and 3 are expected to operate at LOS D in 2035, and study intersections 1, 2, and 3 are expected to operate at LOS D or worse in 2035. All other study segments and intersections are expected to operate at LOS C or better.

Table 6 2035 Peak-hour Segment and Intersection LOS with Billings Bypass

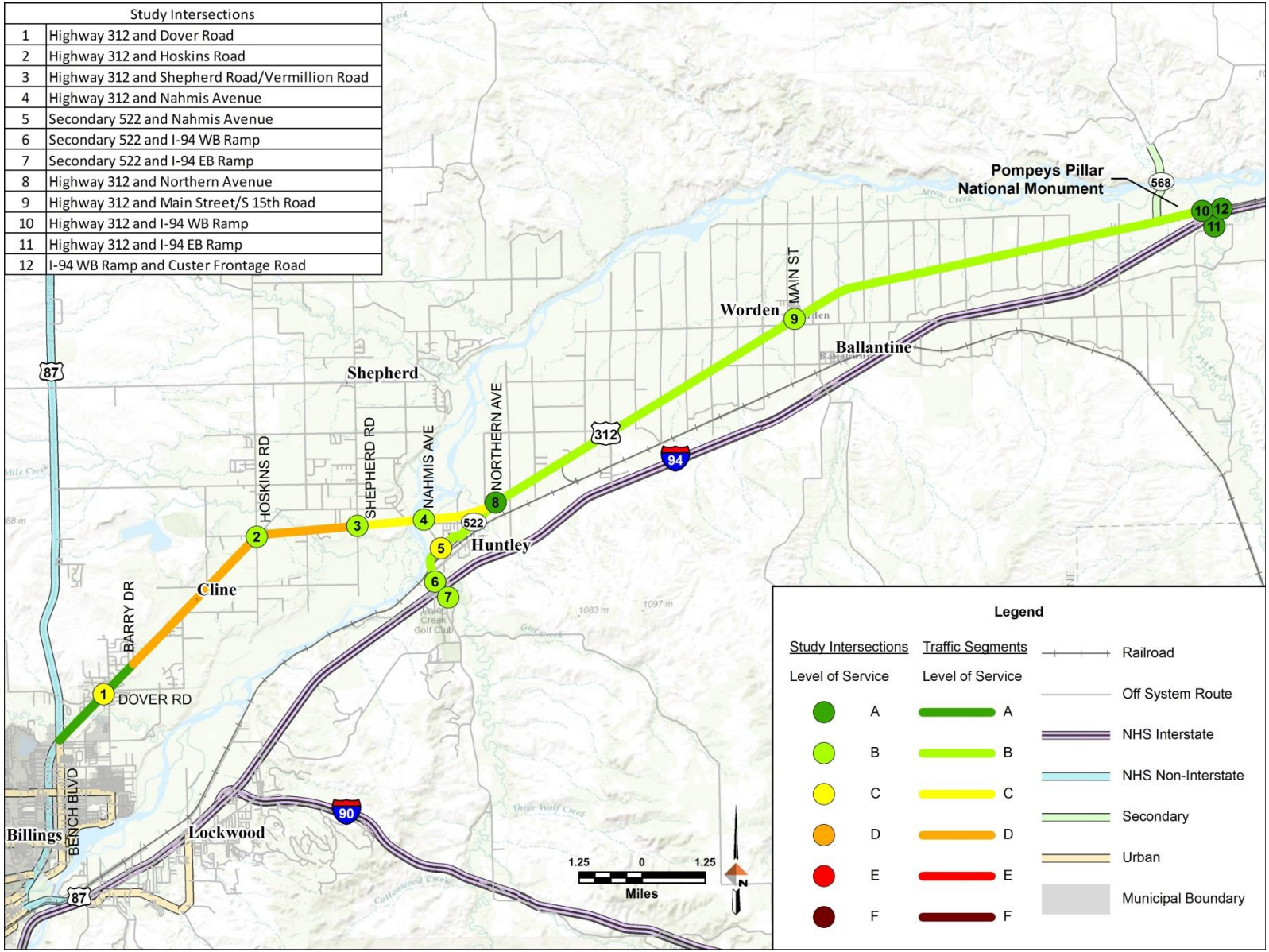
Segment	Direction	LOS	Intersection		Worst Approach	LOS
1	Eastbound	A	1	Highway 312 and Dover Road	NB	D
	Westbound	A	2	Highway 312 and Hoskins Road	NB	D
2A	Eastbound	D	3	Highway 312 and Shepherd Rd/Vermillion Rd	SB	D
	Westbound	D	4	Highway 312 and Nahmis Avenue	NB	B
2B	Eastbound	E	5	Secondary 522 and Nahmis Avenue	NB	C
	Westbound	D	6	Secondary 522 and I-94 WB Ramp	WB	B
3	Eastbound	D	7	Secondary 522 and I-94 EB Ramp	EB	C
	Westbound	D	8	Highway 312 and Northern Avenue	NB	B
4	Eastbound	C	9	Highway 312 and Main Street/S 15th Road	NB	B
	Westbound	C	10	Highway 312 and I-94 WB Ramp	SB	A
5	Eastbound	B	11	Highway 312 and I-94 EB Ramp	EB	A
	Westbound	B	12	I-94 WB Ramp and Custer Frontage Road	NB	A
6	Eastbound	C				
	Westbound	C				
7	Eastbound	B				
	Westbound	B				

Source: DOWL, 2015. Highlighted cells indicate segments operating below target LOS.

Traffic Operations Summary

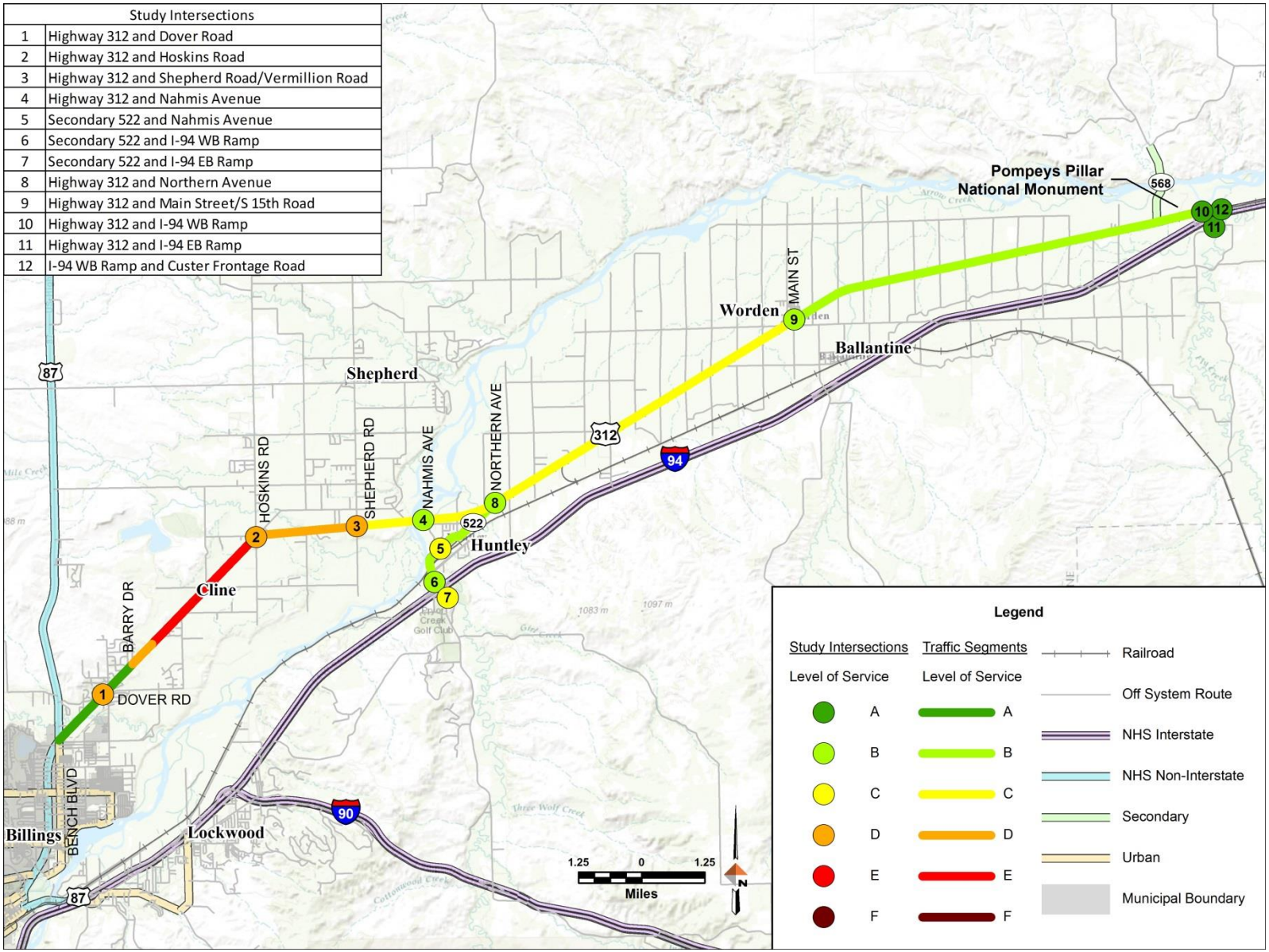
Segment and intersection LOS results for 2015 (existing) and 2035 forecasted with the Billings Bypass project are shown in Figures 9 and 10.

Figure 9 2015 Operations



Source: DOWL, 2015.

Figure 10 2035 Operations (with the Billings Bypass Project)



Source: DOWL, 2015.

5.2 Environmental Conditions

The *Old Highway 312 Corridor Study Environmental Scan Report* was prepared in support of the study to identify environmental resource constraints and opportunities within the study area. Information was gathered in February 2015 from previously-published documents, websites, and GIS data. Additionally, a field review was conducted in June 2015. The following sections summarize key information from the report. Information may have changed since the time it was originally obtained. Environmental conditions should be confirmed at the time any projects are forwarded from the study.

Physical Environment

Soil Resources and Prime Farmland

Soil surveys of the study area from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) indicate the presence of farmland of state or local importance, or prime farmland if irrigated within the study area. The actual percentage of the study area comprised of farmland of state or local importance or prime farmland if irrigated is low. Additionally, some of the areas previously designated as prime farmland may have been subsequently developed.

Any forwarded improvement options that require ROW 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

The western portion of the corridor from the junction with US Highway 87 to the area around Huntley initially traverses colluvium and alluvial fan deposits of silty clay related to the Cretaceous Judith River Formation. This formation consists of a light colored sandstone, gray siltstone, sandy shale, greenish-gray clay, with some lignite beds. With the exception of the alluvial deposits associated with crossings of Twelve Mile Creek and the Yellowstone River, the majority of the material is Pleistocene alluvial gravel terraces (cobbles and pebbles with minor amounts of sand and silt) approximately 50 to 90 feet above the present elevation of Yellowstone River. There are clasts or mixed rock fragments present. They are mainly composed of granitic igneous rocks, granitic gneiss, schist, and quartzite, with much less limestone and sandstone. From Huntley, the corridor continues over terrace deposits as noted above, as well as alluvial fan deposits consisting of gravel, sand, silt, and clay deposited in fans by modern streams.

The majority of soils along the corridor are silts, fine silty sands, and clays. Specific to the existing road alignment of Highway 312, the soils exhibit moderate to high corrosion potential for steel, and low to moderate corrosion potential for concrete. Frost susceptibility of these soil types is low to moderate. In addition, the soil types that will be encountered during excavation will likely be moisture-sensitive soils that can adversely affect construction as well as the long-term viability of the roadway. These soils are sensitive to scour, which is the erosion of soil from around the base of bridge pier abutments due to the flow of air, ice, or water. Embankment construction, which is the placement of compacted materials for a roadway or structure to be built on this corridor, will likely require foundation reinforcement due to the moisture sensitivity of the soils present.

These types of soils can create revegetation challenges. The clay heavy soil reacts in extremes to either the lack of or presence of moisture. The design of future projects forwarded from the study should consider including permanent erosion and sediment control (PESC) measures to extent practicable to help the soils stay in place long enough for the plants and grasses to take hold and revegetate the project. Native plant and grass types that can live in soils with higher silt and/or clay content should be chosen.

Improvements brought forward from the study will be subject to more detailed geotechnical analysis. Part of this detailed analysis may involve taking advance borings to evaluate soil characteristics at exact project locations. This is standard procedure for the majority of MDT road projects. The design of any improvements should take into consideration specific requirements that come from the detailed analysis.

Surface Waters

The following named streams occur within the study area: Five Mile Creek, Seven Mile Creek, Twelve Mile Creek, Yellowstone River, Pryor Creek, and Arrow Creek. A variety of additional surface waters, including unnamed streams, natural drainages, wetlands, and ponds are present in the study area. Impacts to these surface waters could occur from improvements such as culverts under the roadway, placement of fill, or rip rap armoring of banks. The United States Army Corps of Engineers (USACE), the Montana Fish, Wildlife and Parks (FWP), and the Montana Department of Environmental Quality (DEQ) all regulate portions of work within surface waters. Coordination with federal, state, and local agencies would be necessary to determine the appropriate permits based on choice of improvement options forwarded from this study. Impacts should be avoided and minimized to the maximum extent practicable. Stream and wetland impacts may trigger compensatory mitigation requirements of the USACE. Construction of forwarded improvement options may trigger the need to obtain coverage under the Montana Pollutant Discharge Elimination System (MPDES) General Permit for Storm Water Discharges Associated with Construction Activity.

Total Maximum Daily Loads

The study area is located in the Middle Yellowstone Watershed (hydrologic unit code [HUC] 10070007). DEQ lists both the Yellowstone River (MT43Q001_011) and Pryor Creek (MT43E001_010) as having impairments in the Draft 2014 Integrated 303(d)/305(b) Water Quality Report for Montana. Both water bodies are characterized as Category 5, defined as waters where one or more applicable beneficial uses are impaired or threatened, and a total maximum daily load (TMDL) is required to address the factors causing the impairment or threat. At this time, the TMDL for these two water bodies is not completed. For the Yellowstone River inside the study area, two probable sources of impairment are agriculture and irrigated crop production. Two possible other causes are industrial and municipal point source discharges, which could be a result of release of water from wastewater treatment systems. Probable sources of impairment for Pryor Creek are flow alterations from water diversions, and irrigated crop production. Currently the probable sources of impairments are not listed as being associated with road construction activities. If improvement options are advanced from this study, it will be necessary to reevaluate the 303(d)/305(b) integrated report for changes to listed impairments along with possible completed TMDLs.

Storm Water

The western end of corridor is located within the Billings Municipal Separate Storm Sewer System (MS4) area. Under the current Small MS4 General Permit, new development or redevelopment projects greater than or equal to one acre in size must implement, when practicable, low impact development (LID) practices that infiltrate, evapo-transpire, or capture

for reuse the runoff generated from the first half-inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation.

The City of Billings, Yellowstone County, and MDT all manage MS4 programs that overlap the study area. Each program has specific requirements based on their individual storm water management plans. Information on the MS4 programs including specific requirements for the individual programs can be located on the respective permit holder's storm water website, which can be found in the references section at the end this document. These and other MS4 issues will need to be further evaluated during any future project design. The current MS4 permit is in the process of being reissued and MDT has applied for an Individual MS4 permit. As such, it is likely the permit requirements will be slightly different in the future.

Wild and Scenic Rivers

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

Groundwater

According to the Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC), there are 13,184 wells on record in Yellowstone County. A portion of these wells are located within the study area. The newest well on record is from February 10, 2015, and the oldest well on record is from January 1881. Approximately 80 percent (10,463) of wells within Yellowstone County are at a depth of 0 to 99 feet. There are 40 statewide monitoring network wells in Yellowstone County. The wells in Yellowstone County have widely varying uses, with domestic wells being the most common, followed by stock water wells.

Wells can be a costly item to mitigate if they are not avoided. Mitigation of a well usually involves drilling a new well for the owner in a new location that will not be impacted by the potential project. Well costs are based on per foot price; the deeper and higher volume needed results in a higher cost.

In addition to private wells, three public water supply wells are located inside the buffer zone, two of which are in the community of Huntley. DEQ requires a 100-foot isolation zone around all public water supply wells to prevent the introduction of potential pollutant sources. Public water supply wells can also be deeper and require a higher volume of water to be discharged. This can translate into more costly well replacement, along with affecting a larger number of users compared to a private well if impacted. For any future roadway improvements on the corridor, MDT will take measures to avoid adverse impacts to public water supply wells. Impacts to existing domestic wells will also be considered if improvement options are forwarded from the study.

Wetlands

Potential wetland areas identified within the study area are primarily in the vicinity of Five Mile Creek, Seven Mile Creek, Twelve Mile Creek, and the Yellowstone River. A few natural drainages and channelized waters are also present in the study area and may have associated wetlands.

Future wetland delineations would be required if improvement options are forwarded from the study that could potentially impact wetlands. Future projects in the study area 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/or requirements of

Executive Order 11990. Work within jurisdictional wetlands would require a Clean Water Act 404 permit from the USACE.

Floodplains and Floodways

The delineated 100-year flood plains that cross through the corridor study area buffer are on Five Mile Creek, Yellowstone River bridge and roadway immediately west of Huntley, Pryor Creek bridge on Secondary 522, and Yellowstone River for approximately the last mile of the corridor's eastern terminus (Bundy Road area).

Roadway improvements or developments could involve placement of fill within the regulatory floodplain and would require a floodplain permit. Project development would require coordination with Yellowstone County to minimize floodplain impacts and obtain necessary floodplain permits for project construction.

Irrigation

Irrigated agriculture land exists in Yellowstone County within the study area. Depending on the improvement option(s) proposed during the study, there is potential to impact irrigation facilities. Impacts to irrigation facilities should be avoided when practicable. Future modifications to existing irrigation canals, ditches, or pressurized systems could require redesigning and constructing in consultation with the owners to minimize impacts to agricultural operations. If there is impact to irrigation structures, there could be additional costs above typical project costs associated with the redesign, or moving of the irrigation structure(s). Water resources survey maps indicate an abundance of water rights and agricultural land use throughout study area. As such, a large number of irrigation structures are not easily identified at the high-level review conducted for this study. A more in-depth review for irrigation structures should occur at the project development stage to identify possible impacts.

The communities of Huntley and Worden were established as a result of the Bureau of Reclamation's (BOR) Huntley Irrigation Project. The Huntley Irrigation Project is currently managed by BOR to provide water for agricultural purposes in the corridor and the surrounding area. In addition to the Huntley Irrigation Project's associated ditches and canals, the Billings Bench Water Association Irrigation System owns main canals and lateral ditches within the corridor. Currently 30,000 acres of alfalfa and other hay crops, sugar beets, silage, irrigated pasture, and small grains are watered from the Huntley Project waters. The portion of the canal that crosses Pryor Creek has been rebuilt three times because of flooding, evidencing the importance of these structures to the surrounding areas.

These canals are of high importance to the areas surrounding the corridor and will need to be considered as part of the design process if the MDT forwards projects in the corridor.

Air Quality

The study area is not located in a non-attainment area for any criteria pollutant. Additionally, there are currently no non-attainment areas nearby, although carbon monoxide and sulfur dioxide were historically ambient air quality concerns in Billings. As a result, special design considerations will not be required in future project design to accommodate National Ambient Air Quality Standards (NAAQS) non-attainment issues.

Depending on the scope of improvements considered in the study area, an evaluation of mobile source air toxics (MSATs) may be required. MSATs are compounds emitted from highway vehicles and off-road equipment, which are known or suspected to cause cancer or other serious health and environmental effects.

Hazardous Substances

There are no abandoned mine sites, landfills, National Priorities List sites, hazardous waste handling facilities, oil and gas production wells, or toxic release inventory sites identified within the study area.

There are three active and 55 closed underground storage tank (UST) sites located in or adjacent to the study area. These UST sites are concentrated in Billings, Huntley, and Worden. However, there are several rural UST sites located throughout the study area. It is unlikely that a closed UST site will affect project development. However, project activities occurring in the vicinity of an active UST site may warrant additional soil/groundwater investigations or special provisions. Additional investigation regarding the precise locations of the USTs may need to take place depending on what improvement options are forwarded from this study.

There are nine active Leaking Underground Storage Tank (LUST) sites and 15 resolved LUST sites located in or adjacent to the study area. There are also LUST sites concentrated in Billings, Huntley, and Worden. However, there are several rural LUST sites located throughout the study area. It is unlikely that a resolved LUST site will affect project development. If project activities occur near an active LUST site, further investigation and possible remediation may be necessary. This could create additional costs associated with a forwarded improvement.

Two crude oil pipelines owned by Phillips 66 cross Highway 312 within approximately the first three miles of the study area, just northeast of the City of Billings. A third crude oil pipeline is located adjacent to the study area south of Highway 312, between Huntley and Worden. If improvements are proposed in these areas, additional research and coordination with the owners should occur to identify pipeline locations and what, if any, potential conflicts exist.

Two remediation response sites are located adjacent to the study area. The Cenex Pipeline Huntley is an eight-inch diameter petroleum product pipeline located approximately one mile northeast of Huntley, and would require further review to verify current conditions and boundaries of the remediation site. The Jones Junction Fueling Facility is an inactive, temporary railroad fueling facility located three miles northeast of Huntley. It has been delisted and should not influence potential projects forwarded from this study.

None of the hazardous substance sites identified in the study area vicinity are expected to be substantial impediments for future project design. Although it is unlikely that any of these sites will substantially impact projects forwarded from the study, any projects overlapping one of these sites should incorporate a soil survey. If contaminated soils are present, a special provision regarding handling contaminated soils is recommended to be included in project documentation. In addition, contaminated soils could result in the need for remediation.

Biological Resources

Vegetation

Dominant land-cover types in the study area are Big Sagebrush Steppe, Cultivated Fields, and Great Plains Mixed Prairie. Lands adjacent to the corridor study area include cultivated fields and developed human land use in the form of low-density residential, roads, and some commercial land. Highway 312 crosses Five Mile Creek, Seven Mile Creek, Twelve Mile Creek, Arrow Creek, and the Yellowstone River; these drainages provide wetland and riparian vegetation along the corridor. All land types in the project area are either moderately or highly disturbed.

If improvement options are forwarded from the study, practices outlined in MDT standard specifications should be followed to minimize adverse impacts to vegetation and facilitate establishment of final stabilization of disturbed areas. Removal of mature trees and shrubs should be limited to the extent practicable.

Noxious Weeds

The Invaders Database System lists 147 exotic plant species and 14 noxious weed species in Yellowstone County, some of which may be present in the study area. Yellowstone County has weed management criteria in place that can be found on their website (http://www.co.yellowstone.mt.gov/publicworks/weed/).

If improvements are forwarded from the study, field surveys for noxious weeds should take place prior to any ground disturbance and coordination with Yellowstone County Weed Board should occur. Proposed projects should incorporate the practices outlined in MDT standard specifications to minimize adverse impacts.

General Wildlife Species

Mammals

Wildlife species inhabiting or traversing the project study area are typical of those that occur in moderately developed areas of south central Montana. Since many species in this area are habituated to somewhat disturbed areas, species present in this area are predominantly, though not exclusively, generalists.

Game species mapped by FWP include Antelope and White-tailed Deer. The study area is home to a variety of unmapped mammal species including Mule Deer, Mountain Lion, and Coyote. Other common mammals potentially occurring in the study area include Porcupine, Raccoon, Striped Skunk, Beaver, Badger, Bobcat, Red Fox, Northern River Otter, Muskrat, Desert Cottontail, Bushy-tailed Woodrat, Western Harvest Mouse, House Mouse, Deer Mouse, Hayden's Shrew, Prairie Vole, Montane Vole, Least Chipmunk, Eastern Fox Squirrel, Eastern Gray Squirrel, Richardson's Ground Squirrel, Big Brown Bat, Long-eared Myotis, and Silver-haired Bat.

White-tailed and Mule Deer account for the majority of the recorded wildlife mortality. In addition one Mountain Lion, one Raccoon, one domestic dog, and four unidentified animal carcasses were recorded in the MDT Maintenance Animal Incident Database.

If improvement options are forwarded from the study, the need for and viability of wildlife crossing mitigation measures should be considered during the project development process.

Amphibians and Reptiles

Amphibian and reptile species known to occur within the study area include, but are not limited to, the Boreal Chorus Frog, Northern Leopard Frog, Woodhouse's Toad, Plains Gartersnake, and Terrestrial Gartersnake. Any improvements forwarded from the study should take into consideration and minimize impacts to amphibian and reptile habitat where practicable.

Birds

Forty species of birds have been documented with the potential to occur and nest in the study area. An additional 58 species have been documented during the winter in the general vicinity of the study area. These species include representative songbirds, birds of prey, waterfowl, owls,

and shorebirds. Of the listed birds, many are tree and shrub nesters, which may constrain the ability to remove trees or structures within the study area. Game birds present in the study area include Wild Turkey and Ring-necked Pheasant.

There are no known Bald Eagle or Golden Eagle nests within the buffer zone of the study area. However, there are known Bald Eagle nests along this stretch of the Yellowstone River. The required half-mile buffer areas around these nests do not overlap the study area. This area is not typical Golden Eagle habitat so presence of Golden Eagle nests is unlikely.

Any improvements forwarded from this study should consider potential constraints that may result from nesting/breeding periods of migratory birds and presence of unknown or future Bald and Golden Eagles nests. Any work that involves the disturbance or removal of trees or structures associated with nesting birds will need to schedule this work to take place outside of the typical nesting season of April 15 to August 15.

Fisheries

There are four aquatic resources listed as possessing warm water fishery resources in the study area. The largest is the Yellowstone River, which is listed as a high-value fishery resource and managed as a warm/cool fishery by FWP. Fish species commonly occurring within the Yellowstone River within the study area are Brown Trout, Channel Catfish, Common Carp, Emerald Shiner, Fathead Minnow, Flathead Chub, Goldeye, Longnose Sucker, Mountain Sucker, River Carpsucker, Sauger, Shorthead Redhorse, Smallmouth Bass, Stonecat, Western Silvery Minnow, and White Sucker. Twenty-four additional fish species have been recorded for this stretch of the Yellowstone River, but are considered rare.

The other three aquatic resources are listed as limited fisheries. Of the three, Arrow Creek and Five Mile Creek are managed as trout fisheries while Twelve Mile Creek has an undesignated management classification. All of the streams have other fish species listed as common, rare, or unknown for varying reaches of the stream.

Fish passage and/or barrier opportunities should be considered at affected drainages if improvements are forwarded from this study. Permitting from regulatory agencies for any future study area improvements may also require incorporation of design measures to facilitate aquatic species passage.

Threatened and Endangered (T&E) Species

Three species documented in Yellowstone County are protected under the Endangered Species Act (ESA) administered by the United States Fish and Wildlife Service. These species include: Black-footed Ferret (*Mustela nigripes*), listed endangered; Whooping Crane (*Grus americana*), listed threatened; and Red Knot (*Calidris canatus rufa*), listed threatened.

The original Environmental Scan report listed the Greater Sage-Grouse (*Centrocercus urophasianus*) as a candidate species under the ESA, which was later removed from the ESA list of threatened, endangered and candidate species on September 22, 2015. MDT will follow the stipulations for the conservation of Greater Sage-Grouse contained in the State of Montana-Office of the Governor-Executive Order No. 12-2015 “Executive Order Amending and Providing for the implementation of the Montana Sage Grouse Conservation Strategy”.

If improvements are forwarded from the study, an evaluation of potential effects to T&E 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

There are twelve Montana Species of Concern (SOC) recorded within the boundaries of the study corridor, including the Greater Sage-Grouse, Great Blue Heron, Bobolink, Loggerhead Shrike, Pinyon Jay, Spiny Softshell, Snapping Turtle, Greater Short-horned Lizard, Sauger, Spotted Bat, Hoary Bat, and Little Brown Myotis. These species have the potential to occur and breed in the study area based on presence of suitable habitat.

The "Montana Strategy to address threats to the Sage-Grouse in Montana" should be taken into consideration if habitat for the Greater Sage-Grouse could be impacted. A thorough field investigation for the presence and extent of SOC should be conducted if improvement options are forwarded from this study. If present, special conditions that apply to the project design and/or during construction such as timing restrictions should be considered to avoid or minimize impacts to these species.

Social and Cultural Resources

Population Demographics and Economic Conditions

An initial review of both City of Billings and Yellowstone County's currently-available growth and planning documents was conducted. This review did not identify any constraints for future forwarded projects.

2013 Census data indicates Yellowstone County ranks 1st out 56 for total county population in Montana. A large share of the population in Yellowstone County (70.7 percent) resides within the City of Billings. Ethnicity within Yellowstone County is primarily White/Caucasian (91.5 percent). American Indian Reservations are located within a short distance of Yellowstone County, which may contribute to the American Indian population at just over four percent, almost identical to the City of Billings. Hispanic or Latino individuals comprise just over five percent of the population.

According to the United States Census Bureau's estimate, Yellowstone County had a population of 154,162 people in 2013, and was the most populous county in Montana. Billings, the largest city in the state, had a population of 109,059. All population projections are based on Regional Economic Models, Inc. (REMI) forecasts of net migration and natural growth.

Over the last 25 years, Yellowstone County has experienced consistent population growth. Yellowstone County's population is expected to surpass 190,000 by the year 2030 if growth continues at its current pace. Population growth in Yellowstone County has outpaced Montana over the last 15 years and that trend is projected to continue.

Some of Billings' growth can be attributed to the boom in the oil industry in the Bakken shale play. Billings is the closest urban area with a population over 100,000 people to the Bakken oil boom and many of its services support the Bakken and other energy development. Also, Billings serves as an economic hub for much of Montana and Wyoming and even parts of the Dakotas.

The Yellowstone County median age is 38.3, which is slightly lower than the state average of 39.8 years. Yellowstone County has a higher percentage of people under the age of 18, and a lower percentage over the age of 65 than the state average, resulting in a slightly younger population in Yellowstone County relative to the state.

Yellowstone County demonstrates a strong labor market, which is expected to continue. As of December 2014, Yellowstone County's unemployment rate was a low 3%. Job orders through the Billings Job Service numbered 641 in January 2013, 997 in January 2014, and 944 in January 2015. Typically, employers requesting job orders through the Job Service represent about 25% of total available jobs in the market. Overall, these factors illustrate a high demand for labor in Billings and Yellowstone County. High demand for labor often means increased wages for workers and more economic activity in general.

Retail and wholesale trade, finance and insurance, transportation and warehousing, and utilities are slightly more predominant in the County than the rest of Montana, although the County's large size influences the industry trends of Montana as a whole. Nonetheless, Billings is a retail, transportation, and finance hub for much of central and eastern Montana as well as northern Wyoming.

The County's largest industry is comprised of educational services, health care, and social assistance, which is 1.6 percentage points less than the state's share. According to a December 2014 article in the Billings Gazette, health care alone accounts for approximately 20% of Billings' total wages, and health care employment is expected to increase by 3,700 jobs in the next seven years according to the University of Montana's Bureau of Business and Economic Research.

Yellowstone County's median household income is $51,342, well above the state median of $46,230, an indicator that points to a strong economy in Yellowstone County. Yellowstone County's poverty rate of 12.3%, compared to 15.2% for Montana, also confirms the vitality of the Billings area economy. According to the University of Montana's Bureau of Business and Economic Research, nonfarm earnings are projected to grow between 2.4 and 2.8 percent annually from 2015 to 2018 in Yellowstone County. In 2013 and 2014, these numbers were 1.3 and 1.1 percent, respectively.

In summary, Yellowstone County and Billings weathered the 2008 recession relatively well and have experienced strong growth and performance in many areas of the economy. A slowdown in oil development in the Bakken region due to low oil prices or other factors could potentially impact the Billings economy but as of spring 2015, oil prices are on the rise which may spur renewed energy development. Billings' diverse economy is well positioned for continued growth. A reflection of this growth may also be seen in the suburbs surrounding Billings including the communities of Huntley and Worden, which are both within the study area. Investigation should take place to determine the possibility of low-income person(s) being disproportionately isolated, displaced, or otherwise subjected to adverse effects by any forwarded improvements on a project-by-project basis.

Land Ownership and Land Use

Ownership of land in the study area is predominantly private, with some interspersed state and federal owners, including FWP, MDT, Montana State Trust lands, BLM, and the BOR. Much of the private land throughout the study area is residential or agricultural. Commercial land use is seen at a higher frequency closer to the vicinity of the City of Billings.

Mixed land use arises from the varied land ownership throughout the study area. These land uses include commercial, industrial, crop/pasture, and mixed urban. Even though there is a large amount of privately-owned land in the study area, the need to purchase ROW for possible improvements is minimal as most improvements brought forward would not require ROW. If the scope of possible projects requires purchasing ROW, land acquisition costs will depend on the

per acre price at the time of purchase. If improvements are forwarded from this study, land use at and adjacent to possible projects will need to be considered during design to determine overall project costs.

Potential Section 4(f) Recreational Resources and 6(f) Resources

Several potential Section 4(f) recreational resources could be impacted from possible improvements within the buffer of the study area. These include:

- Lewis and Clark Trail, (RP 0.0 on Secondary 658);
- Pompey's Pillar, (658, RP 0.6);
- BLM public land hunting access and picnic area (658, RP 0.6 and 0.7); and
- Barkemeyer Park (522, RP 1.1).

The Lewis and Clark Trail crosses Highway 312 where it becomes Secondary 658 for one mile on the eastern end of the study area. The trail crosses the study area at an overpass over the BNSF railroad near the intersection of Secondary 658 and Interstate 94.

The most prominent resource in the corridor is Pompeys Pillar National Monument, which has land that crosses into the study area buffer zone. Acquiring ROW from this potential Section 4(f) site would need to go through a formal evaluation process which could add time and cost to a project. There are also two BLM hunting access sites adjacent to Pompeys Pillar that would likely be subject to the same Section 4(f) evaluation process.

Secondary 522 through Huntley is adjacent to Barkemeyer Park on the southeastern side of the road. The park contains a flag and memorial plaque, playground, picnic benches, and volleyball court.

At the time potential future improvements are forwarded to a project, reevaluation of possible Section 4(f) resources should take place. Efforts should be made with projects advanced from the study to avoid adverse impacts to ROW acquisitions from these recreational resources.

There are no Section 6(f) resources directly within the buffer or adjacent to the study area. If improvement options are forwarded from this corridor study, a reevaluation of Section 6(f) resources should take place to determine if any new Section 6(f) resources are present. As general guidance, converting these resources to a non-recreational purpose can be a difficult and time-consuming task and should be avoided if practicable.

Cultural Resources

Eleven historic properties are located within 0.15 miles of the existing alignments, including irrigation, rail, bridge, and battlefield features as well as the Pompeys Pillar National Monument. All of the sites have been previously recorded and their NRHP status established.

An aerial examination of the study area indicates there are likely unrecorded historic properties along the entire length of the corridor. There are also likely historic age buildings and other segments of the abandoned Billings & Central Montana Railroad paralleling the route between Billings and Huntley.

Direct and indirect impacts (such as visual, noise, and access impacts) to eligible or listed properties would need to be considered if improvements options are carried forward. If an improvement option is forwarded from the corridor study, a cultural resource survey for unrecorded historic and archaeological properties within the APE will need to be completed during the project development process.

Noise

Evaluation of traffic noise may need to occur for any future improvements in the study area. Noise analysis is necessary for Type I projects, which involve a substantial shift in the horizontal or vertical alignments, increase the number of through lanes, provide passing lanes, or increase traffic speed and volume.

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. If noise levels approach or substantially exceed noise abatement criteria for the project, noise abatement measures may be necessary. A number of possible abatement measures available for consideration include but are not limited to the following:

- alternating the horizontal or vertical alignment;
- constructing noise barriers such as sound walls or earthen berms; and/or
- decreasing traffic speed limits.

Noise abatement measures must be considered reasonable and feasible prior to implementation. Construction activities in the study area may cause localized, short-duration noise impacts. These impacts can be minimized by using standard MDT specifications for the control of noise sources during construction.

Visual Resources

Yellowstone County is located in south central Montana, and is the most populated county in Montana, resulting in a higher percentage of residential areas and anthropogenic features. The study corridor extends to the east from Billings leading to a moderately level agricultural setting, with the Yellowstone River meandering along Highway 312 just west of the community of Huntley.

Throughout the City of Billings, sandstone outcroppings are visible in the distance. The Rimrocks sometimes referred to as the “Rims” are a valued visual resource to many of the local residents. Topography surrounding the study area and the actual locations of the Rimrock outcroppings varies. Future improvements forwarded from this study should take into consideration the impact to scenic views of the Rimrocks.

At the east end of the corridor, Pompeys Pillar juts 150 feet from the ground, creating a visual interest against the flat land surrounding it. Future improvements forwarded from this study should take into consideration the impact to scenic views of Pompeys Pillar. The landscape in the study area predominantly presents itself as a typical central Montana environment with scattered agricultural fields and intermixed urbanization.

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

5.3 Local Facilities, Services, and Amenities

Schools and Colleges

The Huntley Project School District serves students living in the communities of Worden, Ballantine, Huntley and Pompeys Pillar. The district consists of three schools within the study area. Huntley Project Elementary serves grades K-6. Huntley Project Junior High serves grades 7-8. Huntley Project High School serves grades 9-12.

Hospitals

There are no hospitals located within the study area.

Fire Department

Two volunteer fire stations are located within the study area. The Shepherd Volunteer Fire Station is located on Highway 312 and the Worden Volunteer Fire Department is located along Secondary 522.

Recreational Opportunities

Yellowstone County and the Billings area offer a variety of year-round outdoor activities including fishing, boating, and swimming in the summer. In the winter, snowmobiling, ice-skating, and cross-country skiing are popular.

Three FASs are accessed from Highway 312 within the area of study. These include Gritty Stone, Voyagers Rest, and Bundy Bridge FAS. Eagle Rock Golf Course is also accessed from Highway 312 via Larimer Lane. Two parks including Barkemeyer Park located on Secondary 522 and Osborne Park located on Highway 312 are located within the study area. The Huntley Rodeo Facility is located along Secondary 522.

6.0 Needs and Objectives

Needs and objectives for the Old Highway 312 Corridor Study were developed based on existing and projected conditions within the corridor (including planned projects), input from the public and resource agencies, and coordination with the study AC. Needs, objectives, and considerations are not listed in order of priority. These statements relate only to the highway corridor (including Highway 312 from RP 0.0 to RP 24.9, Secondary 568 from RP 0.0 to RP 1.0, and Secondary 522 from RP 0.0 to RP 3.0). They do not address the adjacent rail corridor(s).

Need 1: Improve safety within the highway corridor for all roadway users.

Objectives: To the extent practicable:

- Improve the safety of roadway and structure elements by meeting current design criteria.
- Identify strategies to address locations with high potential for crash reduction and other known safety concerns.

Need 2: Accommodate existing and projected roadway demands and consider operations within the highway corridor.

Objectives: To the extent practicable:

- Meet desirable levels of service on roadway segments and at intersections through the 2035 planning horizon.
- Consider regional, local, and seasonal travel patterns.

Need 3: Preserve and maintain highway infrastructure.

Objectives: To the extent practicable:

- Rehabilitate roadway surfacing and structures as needed to accommodate volume and mix of vehicles through the 2035 planning horizon.
- Address areas with inadequate drainage.

Other Considerations

- Local planning efforts, planned projects, and potential future development in the study area.
- Proximity to railroad, utility, irrigation, and other features within the highway corridor.
- Potential adverse impacts to environmental resources that may result from improvement options.
- Funding eligibility and availability.
- Temporary construction impacts.
- Construction feasibility and physical constraints.

7.0 Improvement Options

7.1 Individual Improvement Options

This section presents individual improvement options. Unless otherwise noted, each option (and its associated cost estimate) only includes the elements listed in the option description. In some cases, options could be grouped together to form a more comprehensive future project within the corridor. Section 7.4 discusses potential option combinations within corridor segments.

Option 1 Curve Improvements

A total of four horizontal curves and eleven vertical curves within the study area do not meet current MDT design criteria for horizontal and/or vertical alignment. 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 LOSS analysis conducted for this study indicates deviations from the normal expected safety performance, with LOSS I indicating a low potential for crash reduction and LOSS IV indicating a high potential for crash reduction. Six curve locations that do not meet current MDT design criteria are located in an area identified as LOSS IV. These curves along with the corresponding MDT design criteria are shown in Table 7.

Table 7 Curves Not Meeting Current Design Criteria Located in LOSS IV Area

Approximate Location		Horizontal		Vertical	
		Current Radius (ft)	Minimum Radius (ft)	Current K-value	Minimum K-value
Secondary 568	RP 0.1*	1008	1200	-	-
Secondary 522	RP 0.2	674	1200	-	-
	RP 1.3	193	1200	-	-
	RP 1.4	193	1200	-	-
	RP 3.0	-	-	16	151
	RP 3.1	-	-	94	136

Source: MDT and DOWL, 2015. Listed curves are located within a LOSS IV roadway segment (for total crashes and/or crash severity). *This curve was designed for and meets criteria for 45 mph design speed.

The remaining nine curves located on Highway 312 that do not meet current MDT design criteria are identified as LOSS II, which indicates a low to moderate potential for crash reduction.

Table 8 Curves Not Meeting Current Design Criteria Located in LOSS II Area

Approximate Location		Vertical	
		Current K-value	Minimum K-value
Highway 312	RP 4.7	31	151
	RP 4.7	95	136
	RP 5.1	60	151
	RP 5.2	48	151
	RP 5.4	59	136
	RP 5.5	62	136
	RP 5.6	53	151
	RP 24.7	104	136
	RP 24.8	146	151

Source: MDT and DOWL, 2015.
Listed curves are located within a LOSS II roadway segment (for total crashes and/or crash severity).

The curve improvement option would involve reconstruction and realignment of the roadway to comply with current MDT design criteria for horizontal and vertical curves listed in the tables above. It would improve the horizontal curves listed in the Table 7 to meet MDT's design criteria of a minimum 1200-foot curve radius and recommended minimum 900-foot curve length. The curve radii and lengths would be increased to provide more sight distance around the curves, allowing motorists to detect potential hazards from a farther distance. As approximately 20.5% of the total number of crashes involved a fixed object within the corridor, improving these curves to allow for more sight distance could potentially reduce fixed-object crashes in these areas.

Additionally, this option would reconstruct vertical curves listed in Tables 7 and 8 to meet MDT design criteria for minimum K-value. K-value is the horizontal distance needed to produce a one percent change in gradient, which is the difference in slope between the two grades, and is directly correlated to the design speed and stopping sight distance.

Using the information from Tables 7 and 8, MDT could elect to nominate a project to address one or multiple curve locations through a corridor segment, with priority given to areas identified as LOSS IV. Curves in proximity were grouped for the purpose of estimating costs for this option,

Planning-level Cost Estimate

The following estimates assume obliteration of existing road and construction of new road at the existing roadway width.

Highway 312
- 1.a (RP 4.7 to RP 5.6): Approximately $1,960,000 to $2,130,000
- 1.b (RP 24.7 to RP 24.8): Approximately $760,000 to $820,000

Secondary 522
- 1.c (RP 0.2): Approximately $570,000 to $620,000
- 1.d (RP 1.3 to RP 1.4): Approximately $760,000 to $820,000
- 1.e (RP 3.0 to RP 3.1): Approximately $760,000 to $820,000

Secondary 568
- 1.f (RP 0.1): Approximately $570,000 to $620,000

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 2.a Shoulder Widening
MDT geometric design criteria listed in the RDM specify 12-foot travel lanes for rural minor arterials. The AASHTO *Policy on Geometric Design of Highways and Streets* recommends a minimum usable shoulder width of 8 feet on rural arterials with AADT volumes over 2000.

For rural collectors, MDT geometric design criteria for roadway width vary according to traffic volumes. The RDM recommends a total roadway width (including travel lanes and shoulders) of 40 feet for AADT volumes over 3000, which corresponds to the majority of the Highway 312 corridor. Segment 7 from Worden to the Pompeys Pillar Interchange exhibits AADT volumes that fall into the RDM range from 300 to 999, corresponding to a total recommended roadway width of 28 feet. For all roadway types, AASHTO recommends consideration of a minimum continuous usable shoulder width of four feet on both sides of roadways where bicyclists and pedestrians are to be accommodated. Additional width may be appropriate based on vehicle speeds, traffic composition, and the presence of obstructions such as guardrail.

There is generally zero feet of shoulder width within Highway 312 segments 2 and 3. As the roadway is currently lacking in shoulder width, non-motorized users such as bicyclists must share the travel lane with vehicles. Non-motorized users decrease the roadway capacity under these circumstances where there is only one non-passing travel lane in each direction.

Widening the shoulders along this portion of the corridor to eight feet on both sides of the road would allow non-motorized users to travel via shoulders. Capacity is anticipated to increase as vehicles would no longer be hindered by slower-moving users. Capacity in the year 2035 for roadway segments 2 and 3 on Highway 312 was analyzed and is presented in Table 9. LOS for westbound traffic in segments 2A, 2B, and 3 is anticipated to improve by one letter ranking, while LOS is expected to remain constant for eastbound traffic with the additional shoulder width.

Table 9 Capacity Analysis for Widened Shoulders (2035 with Billings Bypass)

Segment	Direction	No-build LOS	Widen Shoulders LOS
2A (Barry Dr. to 5 Mile Rd.)	Eastbound	D	D
	Westbound	D	C
2B (5 Mile Rd. to Hoskins Rd.)	Eastbound	E	E
	Westbound	D	C
3 (Hoskins Rd. to Shepherd Rd.)	Eastbound	D	D
	Westbound	D	C

Source: DOWL 2015.
Note: Capacity analysis was performed for the year 2035 and assumes construction of the Billing Bypass project.

In addition to segments 2 and 3, shoulder widening could be considered throughout the entire Highway 312 corridor. AASHTO recommends provision of continuous shoulders to offer refuge for drivers and bicyclists at all points along the traveled way. A continuous shoulder would provide the full safety and operational benefit throughout the corridor.

Slope flattening could also be considered in conjunction with shoulder widening to increase roadside safety. Side slopes within the entire corridor are currently non-compliant with MDT design criteria. A slope flattening project could be cost effectively addressed at the time of shoulder widening (as opposed to a separate, stand-alone project).

Planning-level Cost Estimate
The following estimates assume the addition of eight-foot shoulders to the existing highway alignment and slope flattening where appropriate. Bridge widening is not included; shoulder tapering would need to be provided at bridge approaches.

Highway 312 Segment 2: Approximately $440,000 to $480,000

Highway 312 Segment 3: Approximately $250,000 to $280,000

Highway 312 Entire Corridor (RP 0.0 to 24.9): Approximately $3,140,000 to $3,410,000

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. Additional right-of-way may be needed.

Option 2.b Three-lane Section (Single-direction Passing Lane)
Highway 312 segments 2 and 3 have select areas striped as passing zones where crossing into the opposite lane to pass slow-moving vehicles is allowed. The addition of a designated passing lane within these areas would allow vehicles an opportunity to pass slower vehicles without crossing into the opposing lane, thereby increasing roadway capacity. Passing lane lengths can vary from less than one mile long to several miles long. A one-mile passing lane provides adequate distance for faster vehicle to pass slower moving vehicles. As such, the addition of a one-mile passing lane was analyzed for each direction of each segment for this planning-level analysis.

Table 10 presents the results of the passing lane analysis for segments 2 and 3. LOS is expected to increase to an acceptable LOS C or better, when compared to the no-build alternative, for both directions of segments 2 and 3 with the addition of one-mile-long passing lanes for each direction in each segment. However, modifications to roadway geometrics, reducing the number of access points, and roadway widening would be required to accommodate the increased passing lanes. Because some segments are still anticipated to operate at LOS C in 2035, this option may not be cost effective.

Table 10 Capacity Analysis for One Mile Passing Lane (2035 with Billings Bypass)

Segment	Direction	No-build LOS	1-Mile Passing Lane LOS
2A (Barry Dr. to 5 Mile Rd.)	Eastbound	D	B
	Westbound	D	B
2B (5 Mile Rd. to Hoskins Rd.)	Eastbound	E	C
	Westbound	D	C
3 (Hoskins Rd. to Shepherd Rd.)	Eastbound	D	C
	Westbound	D	C

Source: DOWL 2015.
Note: Capacity analysis was performed for the year 2035 and assumes construction of the Billing Bypass project.

At high-volume access points within the segments, a four-lane section with one travel lane in each direction, a single passing lane, and a center TWLT lane could be considered to improve the safety of left-turn maneuvers and avoid left-turning vehicles stopped in the passing lane. MDT could consider the need for a center turn lane at the time of a future project in consideration of access point volumes and speeds.

Planning-level Cost Estimate

Segment 2

Approximately $3,200,000 to $3,500,000 to add one 12-foot lane to the existing highway alignment for segment 2. The addition of a one-mile passing lane in each direction with tapers will nearly consume the full segment length of 3.5 miles. This estimate includes replacement of the Seven Mile Creek Bridge.

Segment 3

Approximately $3,600,000 to $3,900,000 to add one 12-foot lane to the existing highway alignment for segment 3. The addition of a one-mile passing lane a one-mile passing lane in each direction with tapers will consume the full segment length of 2.0 miles. This estimate includes the replacement of the Twelve Mile Creek Bridge.

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. Additional right-of-way may be needed.

Option 2.c Five-lane Section (Dual-direction Passing Lane and Center Turn Lane)

Highway 312 segments 2 and 3 are currently configured with a single travel lane in each direction, and limited areas striped as passing zones. Reconstructing these highway segments to provide two travel lanes in each direction would increase the roadway capacity. In addition to supplementing mainline travel lanes, a roadway reconstruction project would address elements such as bridge replacement, curve geometry, shoulder widening, and any needed intersection improvements occurring within the defined widening limits.

Table 11 presents the results of the analysis of a four-lane section. LOS A is expected for all directions and segments analyzed in comparison to the no-build alternative.

Table 11 Capacity Analysis for Four-lane Expansion (2035 with Billings Bypass)

Segment	Direction	No-build LOS	4- Lane LOS
2A (Barry Dr. to 5 Mile Rd.)	Eastbound	D	A
	Westbound	D	A
2B (5 Mile Rd. to Hoskins Rd.)	Eastbound	E	A
	Westbound	D	A
3 (Hoskins Rd. to Shepherd Rd.)	Eastbound	D	A
	Westbound	D	A

Source: DOWL 2015.
Note: Capacity analysis was performed for the year 2035 and assumes construction of the Billing Bypass project.

A five-lane section with two travel lanes in each direction and a center TWLT lane at higher-volume approach roadways is recommended to improve the safety of left-turn maneuvers and avoid left-turning vehicles stopped in the travel lane. A five-lane roadway section for segments 2 and 3 would be consistent with the five-lane section currently provided in segment 1.

Planning-level Cost Estimate

Segment 2

Approximately $7,000,000 to $7,600,000 to add two 12-foot travel lanes and a 14-foot center turn lane to the existing highway alignment for Segment 2. This estimate includes replacement of the Seven Mile Creek Bridge.

Segment 3

Approximately $5,700,000 to $6,100,000 to add two 12-foot travel lanes and a 14-foot center turn lane to the existing highway alignment for Segment 3. This estimate includes the replacement of the Twelve Mile Creek Bridge.

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 3.a Intersection Control

Three Highway 312 intersections are anticipated to operate at LOS D by the year 2035 (assuming construction of the Billings Bypass project). LOS describes the quality of traffic operations and is graded from A to F, with LOS A representing free-flow conditions and LOS F representing heavily-congested conditions. LOS C or better is typically desired for optimal traffic flow. The following three locations were analyzed for alternative intersection control.

- Intersection 1 – Highway 312 and Dover Road (RP 1.3)
- Intersection 2 – Highway 312 and Hoskins Road (RP 5.6)
- Intersection 3 – Highway 312 and Shepherd Road (RP 7.6)

Intersection capacities were analyzed using Synchro Studio 9 software based on HCM 2010 methodologies. For each intersection, no-build, traffic signal, and roundabout alternatives were analyzed.

To enable compatibility with Option 2.d which would provide a four-lane section on Highway 312, intersection improvement options include both two-lane and four-lane scenarios for stop-controlled and roundabout conditions. Attachment 1 illustrates the intersection alternatives at the Dover Road, Hoskins Road, and Shepherd Road intersections.

Analysis results for all alternatives are shown in Table 12. Under the no-build alternative, all three intersections are expected to operate at LOS D or worse. Under the traffic signal and roundabout alternatives, all intersections are expected to operate at LOS A.

Table 12 Intersection Control Improvement Alternative

Intersection	Location	Alternative	Control Type	Worst Movement	Delay (sec)	LOS
[1] Dover Road & Highway 312	RP 1.3	No-build	TWSC	NBL/NBR	25.7	D
		Signal	Signal	WBL/WBR	5.0	A
		Roundabout (2-Lane)	Yield	WBL/WBR	7.0	A
[2] Hoskins Road & Highway 312	RP 5.6	No-build	TWSC	NBL/NBT/NBR	25.0	D
		Signal*	Signal	SBL/SBT/SBR	5.0	A
		Roundabout (1-Lane)	Yield	EB	9.9	A
		Roundabout (2-Lane)	Yield	EB	6.0	A
[3] Shepherd Road & Highway 312	RP 7.6	No-build	TWSC	SBT/SBL	41.9	E
		Signal*	Signal	SBR	5.4	A
		Roundabout (1-Lane)	Yield	EB	9.4	A
		Roundabout (2-Lane)	Yield	EB	6.1	A

Source: DOWL 2015. TWSC: two-way stop control; NBL/NBT/NBR: Northbound left/Northbound through/Northbound right; WBL/WBR: Westbound left/Westbound right; SBL/SBT/SBR: Southbound left/Southbound through/Southbound right; EB: Eastbound
* Speed limit = 55 mph so HCM 2010 methodologies could be used
Note: For 1-lane roundabout, all approaches have one lane for each direction. For 2-lane roundabout, major road approaches have two lanes for each direction, and minor road approaches have one lane for each direction.

As shown above, both signalized and roundabout configurations are viable intersection control solutions to meet the target LOS C based on 2035 peak-hour traffic volumes. These options would alter Highway 312 traffic flows, which are currently uninterrupted.

A roundabout configuration could be expected to operate with slightly less delay during peak periods, and reduced severity and frequency of crashes compared to a signalized configuration. However, a roundabout would create undesirable delay for through traffic on Highway 312 during off-peak periods whereas a signalized intersection could rest in green for mainline through traffic during off-peak periods. A traffic signal at this location could offer more flexibility in the intersection operation by allowing more green time to the Highway 312 movements that

are higher in priority for regional traffic and less green time to minor-leg movements that are lower in priority.

MDT considers installation of advance warning flashers (AWFs) at signalized intersections to assist motorists in making safer driving decisions when approaching traffic signals in select locations. AWFs are installed based on demonstrated addressable need in locations with limited sight distance, operating speeds in excess of 60 mph, and other safety or operational factors. MDT could consider providing AWFs at the time a traffic signal is installed in accordance with MUTCD and MDT Traffic Engineering Manual guidelines if warranted based on an engineering study.

The need for a traffic signal would require an analysis of applicable warrants contained in the *Manual on Uniform Traffic Control Devices* (MUTCD) and other factors relating to intersection safety and operation. Assuming construction of the Billings Bypass project, projected 2035 traffic volumes for the three intersections listed in Table 12 are anticipated to approach the threshold for the peak-hour warrant. An engineering and traffic study would need to consider the site's physical characteristics and traffic conditions to determine if a traffic signal, roundabout, or AWF is justified at these locations.

Planning-level Cost Estimate

The following estimates assume installation of the specified control at each existing intersection with no other geometric improvements or AWFs. Roundabout estimates include cost for approach legs.

Traffic Signal: Approximately $370,000 to $400,000
Roundabout (1-Lane): Approximately $1,200,000 to $1,300,000
Roundabout (2-Lane): Approximately $1,300,000 to $1,500,000

Recommended Implementation Timeframe

Mid-term to long-term

Potentially-impacted Resources/Anticipated Right-of-Way

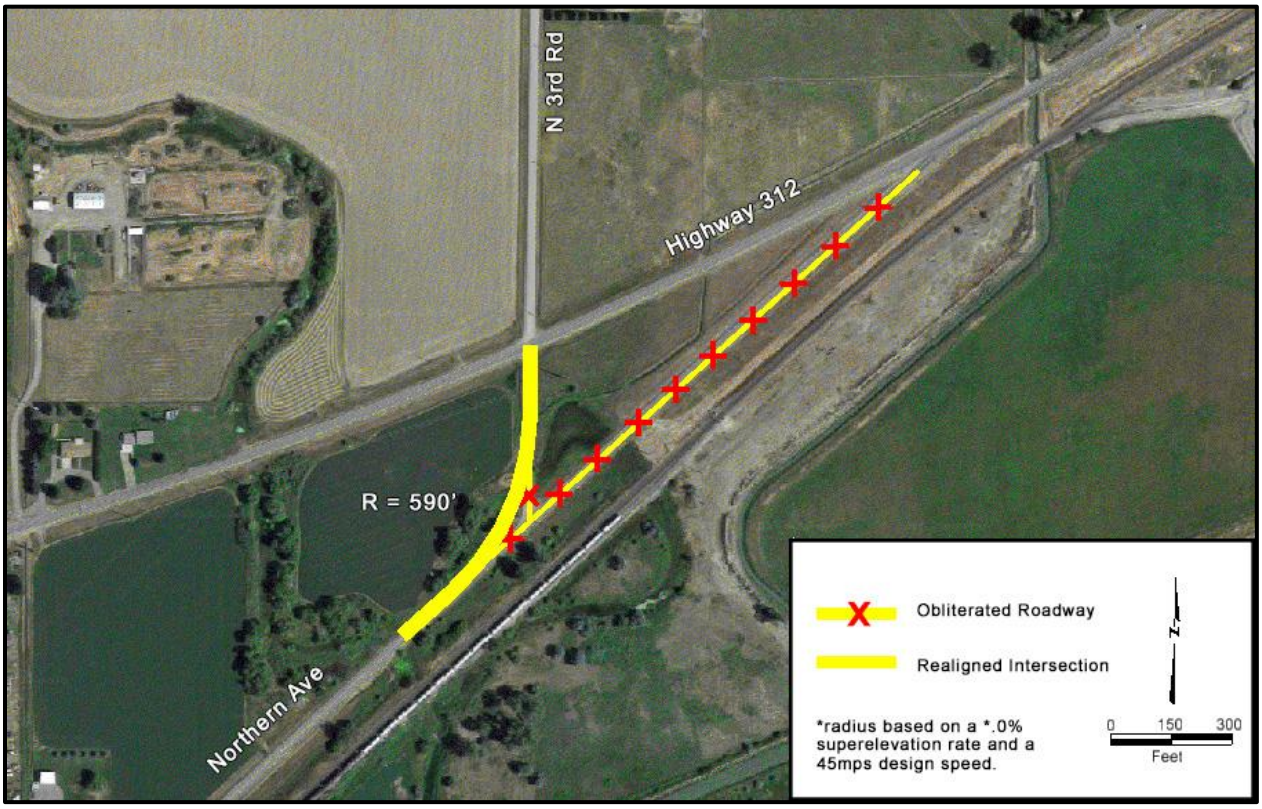
Potential impacts to streams, wetlands, floodplains, protected species, cultural resources, protected farmlands, and utilities may result from this option. The need for additional right-of-way is anticipated.

Option 3.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°). Right angle intersection alignments require less pavement area at the intersection for turning maneuvers, 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.

Northern Avenue at RP 10.4 is aligned to Old Highway 312 at an angle greater than 30° from perpendicular. Realignment of this intersection is recommended to improve sight distance and accommodate passenger vehicle and large vehicle turning movements. Realigning the intersection at Northern Avenue to a T-intersection at the existing N. 3rd Avenue intersection as illustrated in Figure 11 could improve safety performance associated with visibility limitations.

Figure 11 Northern Avenue Realignment



Source: DOWL, 2016.

The intersection at Northern Avenue is currently operating at LOS B, with a delay of 10.1 seconds on the worst approach (northbound lane). This indicates that the quality of traffic operations at this intersection is generally free-flowing. A traffic analysis performed using Synchro Studio 9 software shows that LOS is anticipated to remain unchanged with the realignment of this intersection assuming the same intersection control method, two-way stop control on Northern Avenue, is utilized. Intersection analysis results comparing the no-build and realigned intersection alternative are shown in Table 13.

Table 13 Intersection Realignment Improvement Alternative

Intersection	Location	Alternative	Intersection Control	Worst Approach	Delay (s)	Level of Service
Northern Ave & Highway 312	RP 10.4	No-build	TWSC	Northbound	10.1	B
		T-intersection*	TWSC	Northbound	10.3	B

Source: DOWL, 2015. TWSC: two-way stop control.
* Assumed 5 vehicles per hour for both northbound and eastbound lanes.

Planning-level Cost Estimate
Approximately $670,000 to $770,000 to realign Secondary 522 to intersect Highway 312 at the current intersection of Highway 312 and North 3rd Road.

Recommended Implementation Timeframe
Short-term to mid-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 3.c Intersection Turn Lanes
Turn lanes can improve traffic congestion, operating efficiency, and safety at intersections by separating turning vehicles from through movements. MDT follows guidelines for right-turn and left-turn lanes outlined in the MDT *Traffic Engineering Manual*. Based on these guidelines, exclusive turn lanes may be considered for public intersections on multi-lane highways, on the major roadway at any signalized intersection, on the major roadway at unsignalized intersections on two-lane highways with volumes that meet specified criteria, at any intersection where a capacity analysis determines a turn lane is necessary to meet the target LOS, and where a crash trend or sight distance restrictions involve turning vehicles.

Three of the 12 intersections analyzed for this study are projected to operate at LOS D in 2035 with construction of the Billings Bypass project. Of these, Intersection 2 (Hoskins Road at RP 5.6) and Intersection 3 (Shepherd Road at RP 7.6) already provide mainline left-turn lanes on Highway 312. Additional lanes on Highway 312 at Intersection 1 (Dover Road at RP 1.3) were not considered for safety reasons due to this location's close proximity to Independent Lane. Turn lanes on minor legs are not anticipated to sufficiently improve operations to meet the target LOS C at these intersections. Accordingly, turn lanes on the minor legs of these three intersections are not considered viable stand-alone improvements. The need for turn lanes should be reconsidered if MDT installs a traffic signal or widens Highway 312 in these locations.

Members of the public requested consideration of turn lanes at several additional intersections with Highway 312, including Northern Avenue (Secondary 522), N 3rd Road, N 15th Road, N 16th Road, McIntyre Drive, and N 4th Road. These locations were not defined as study intersections for this effort (and therefore traffic volumes and operational analysis results are not available). The intersections of Northern Avenue, N 7th Road, N 10th Road, N 12th Road, N 15th Road, and McIntyre Drive with Highway 312 are classified as LOSS III or IV for total crash and/or crash severity.

It is recommended that MDT consider turn lanes at public intersections within the corridor as warranted based on continued observation of safety performance, traffic operations, and adjacent development, and in accordance with the turn-lane guidelines provided in the MDT *Traffic Engineering Manual*. Turn lane widening in segments 2 and 3 conducted in the short- to mid-term could be incorporated into future roadway widening projects.

Planning-level Cost Estimate
Approximately $540,000 to $590,000 to construct left-turn lanes in both directions at each existing intersection with minor geometric improvements to the intersecting road to achieve a perpendicular intersection. Turn lane mitigation needed to serve future development may be the responsibility of the developer.

Recommended Implementation Timeframe
Short-term to mid-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 3.d Overhead Lighting
The MDT Traffic Engineering Manual recommends consideration of overhead lighting in locations with high vehicle-to-vehicle interactions, including roadways with numerous driveways, substantial commercial or residential development, and a high percentage of large vehicles. Extending overhead lighting outside community limits in the corridor to select public intersections would help improve visibility in these locations.

The percent of total crashes due to areas without lighting was 25.8% during the years 2005 to 2014. For a highway facility to be considered for lighting, the lighting system must be both economically feasible and justified based on applicable criteria. Installation of lighting at intersections could be justified by one or more of the following conditions:

- the intersection design incorporates raised channelization;
- within a three-year period, the intersection exhibits five or more correctable crashes attributable to lack of lighting during the hours of darkness;
- the intersection meets at least one-half of the requirements necessary to warrant signalization; and/or
- the intersection is located in an unlighted area within 1,000 feet of an existing lighted area.

Select public approaches where LOSS, or crash reduction potential, is high may fulfill one or more of the conditions mentioned above. Three intersections along Highway 312 that may warrant overhead lighting include Nahmis Avenue, Northern Avenue, and Custer Frontage Road, which occur in areas identified as LOSS IV.

Planning-level Cost Estimate
Approximately $220,000 to $250,000 per intersection to construct overhead lighting at the existing intersection without any other geometric improvements. Approximately an additional $50,000 would be needed at the Custer Frontage Road to energize a lighting circuit since the nearest power supply is approximately 300 feet from the intersection and across the railroad right-of-way. MDT could consider alternative sources of power (such as solar panels) and associated limitations (including storage capacity, cost, and design life).

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources/Anticipated Right-of-Way
No impacts to resources are anticipated to result from this option. The need for additional right-of-way is not anticipated.

Option 4 Pavement Preservation
Rutting occurs in the wheel paths of Highway 312, Secondary 522, and Secondary 568. Within the two-lane sections of Highway 312, rutting was generally observed to be worse compared to the three- and five-lane sections. The rutting in the roadway was estimated to be between ¼-inch and ½-inch in depth. Transverse cracking consistently occurs along the entire corridor. The transverse cracking is spaced sporadically (150- to 200-foot intervals) on Highway 312 and Secondary 568, while on Secondary 522, transverse cracking averages approximately every 75

to 100 feet. The ride index for Secondary 568, 522, and the first 2.3 miles of Highway 312 are considered fair. The ride index is used to measure ride experience and characteristics for the traveling public.

A pavement overlay would strengthen the pavement in areas where the ride index is considered fair. An overlay of a roadway involves laying a specified thickness of either Portland cement or asphalt over an existing pavement. For this corridor, the estimated overlay thickness would be approximately 0.2 feet (2.4 inches) based on the characteristics of the roadway within the corridor. Overlays should typically be applied to pavements that are still in good condition (and do not require milling) as the overlay needs to be able to bind to the existing pavement. Because the roadways within the corridor are generally in good condition, an overlay would be a good option to preserve and extend their service life.

Planning-level Cost Estimate
The following estimates assume overlay of the existing roadway with a 0.2-foot lift.

Highway 312 (RP 0.0-2.3): Approximately $1,800,000 to $2,000,000
Secondary 568 (RP 0.0-1.0): Approximately $470,000 to $510,000
Secondary 522 (RP 0.0-3.0): Approximately $1,400,000 to $1,600,000

Recommended Implementation Timeframe
Short-term to long-term

Potentially-impacted Resources/Anticipated Right-of-Way
No impacts to resources are anticipated to result from this option. The need for additional right-of-way is not anticipated.

Option 5 Guardrail
Guardrail is a longitudinal barrier placed on the outside of sharp curves and in locations with steep slopes. Its main function is to prevent vehicles from leaving the roadway and to offer protection against hazards 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 due to impact. Installation of compliant guardrail is recommended as needed throughout the corridor.

Side slopes along the roadway throughout the entire corridor are currently noncompliant with MDT design criteria. Although the slopes are noncompliant, placement of guardrail along the entire corridor is impracticable and not economically feasible.

Specific locations within the corridor where new guardrail may be warranted are listed in Table 14. Locations recommended for improvements to existing guardrail (associated with bridges) are included in Option 8.

Table 14 Guardrail Locations

Guardrail Location (RP)		Side	Feature Requiring Protection
Highway 312	10.5	RT & LT	Creek
	13.2	RT & LT	Creek
	16.6	RT & LT	Creek
	18.8	RT & LT	Creek
	20.2	RT & LT	Creek
	21.5	RT & LT	Creek
Secondary 522	0.2	RT & LT	Bridge/Creek

Source: DOWL 2015. RT: right; LT: left.

The features requiring protection are potentially hazardous obstacles within the clear zone of the roadway. The clear zone is the distance which should adequately provide a clear recovery space for the majority of drivers who run off the road. Installing guardrail in these areas where warranted would provide protection against the hazardous obstacles.

Planning-level Cost Estimate
Approximately $20,000 per location (given unit cost of $40 per linear foot for standard W-beam guardrail including bridge approach sections and terminal sections, with a typical obstruction in the study corridor requiring approximately 500 feet of guardrail per location).

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources/Anticipated Right-of-Way
No impacts to resources are anticipated to result from this option. The need for additional right-of-way is not anticipated.

Option 6 Pedestrian/Bicycle Improvements
An option to widen and pave shoulders along the corridor is discussed in Option 2.a. Please refer to Option 2.a for further discussion regarding the widening and paving of roadway shoulders.

Construction of sidewalk and Americans with Disabilities Act (ADA) features is recommended in two locations along the corridor. The first location is along Secondary 522 in Huntley. This option would consist of installing sidewalk along the north side of Secondary 522 in the most concentrated area of residential development in Huntley spanning from southwest of the intersection of Secondary 522 and Shopis Avenue to the intersection of Secondary 522 and Noopis Avenue. There is some existing sidewalk on the north side of Secondary 522 in Huntley. These facilities should be evaluated to ensure existing sidewalks and any new improvements are continuous and meet PROWAG requirements. Sidewalk intersections with existing approaches would need to be reconstructed with PROWAG-compliant curb ramps, and cross-slope and running-slope requirements would be met on all portions of newly-constructed sidewalk. The construction of additional sidewalk in these areas is recommended to improve pedestrian safety and provide continuous pedestrian access.

The second location for sidewalk improvements is an existing road/rail crossing in Worden. The crossing is located at the intersection of Highway 312 and Main Street (becoming South 15th Street south of Highway 312). The current sidewalk ends at the corner of the southern-most

building located on the west side of Main Street. The improvement option would extend sidewalk and crossing facilities across Highway 312 and the railroad and intersect with the park located on the south side of Worden. Sidewalk and crossing improvements would be constructed in accordance with PROWAG. The construction of additional sidewalk and crossing improvements in this area is recommended to improve pedestrian safety and provide easier access to existing park facilities.

Planning-level Cost Estimate
Secondary 522 – Huntley
Approximately $200,000 to $220,000 to install missing sidewalk and replace damaged/inaccessible sidewalk. This estimate is based on a cursory survey of the existing sidewalk within the defined limits. Additional investigation would be needed to develop a more accurate cost estimate.

Highway 312 – Worden, Main Street to South 15th Street crossing
Approximately $290,000 to $320,000 to install sidewalk and crossing features within the defined limits. This estimate is based on a cursory survey of the existing sidewalk within the defined limits. Additional investigation would be needed to develop a more accurate cost estimate. A partnership with the county may be appropriate to fund this improvement.

Recommended Implementation Timeframe
Mid-term to long-term

Potentially-impacted Resources/Anticipated Right-of-Way
No impacts to resources are anticipated to result from this option. Additional right-of-way may be needed.

Option 7.a Delineation
Throughout the corridor, delineators are generally in good condition and appear to meet MDT design criteria regarding spacing on tangent and curve roadway segments. The entire corridor has standard delineators, which is one of MDT's three delineator types. Delineator Design A is used for continuous delineation on the right shoulder of all routes. Delineator Designs C and F are used for curves based on the curve radius. Delineator Designs D and G are used at approaches with stop or yield signs for non-interstate and interstate ramps, respectively. Highway 312 and Secondary 522 have Design A, C, D, and F delineators spaced throughout the corridor, and Secondary 568 has Design G and F delineators. The curves within the study area appear to have correct delineators, however, there are a number of public approaches along Highway 312 and Secondary 522 that do not appear to have the delineator Design D. These approaches include the intersections shown in Table 15.

Table 15 Intersections without Appropriate Delineators

Location		RP
Highway 312	Lone Tree Trail	4.9
	Shining Mountain Drive	7.2
	Ivy Street, Sunrise Road	9.8
	1st Street (Worden, MT)	17.5
	1st Street (Nibble, MT)	23.9
	Main Street (Nibble, MT)	24.0
Secondary 522	Creekmore Road	0.1
	North Canal Drive	0.3
	South Canal Drive	0.3
	Canal Drive Access Road	0.4

Source: DOWL 2015.

Planning-level Cost Estimate
Approximately $60 per approach (at a unit cost of approximately $30 per delineator)

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources/Anticipated Right-of-Way
No impacts to resources are anticipated to result from this option. The need for additional right-of-way is not anticipated.

Option 7.b Signing
Specialty guide signs and route marker signs are used to inform motorists of intersecting routes, direct them to cities/towns or destinations, and generally provide information that will assist travel along highways.

Members of the public noted that the intersection of Highway 312 and US 87 (Highway 312 RP 0.0) and the Pompeys Pillar Interchange (Highway 568 RP 0.0) are confusing to motorists. Drivers unfamiliar with these areas may miss the appropriate turnoff to their intended destination of Roundup, Interstate 94, or the Pompeys Pillar National Monument. Warning signs could also be placed in advance of higher-volume intersections to notify motorists of upcoming approach roadways. Improved signage could be used to assist and inform drivers in these locations.

Planning-level Cost Estimate
Route Marker Assembly: $550 per assembly (including sheet aluminum sign panel(s), wood or perforated steel post, breakaway devices, concrete foundation)

Guide Sign Assembly: $3,500 per assembly (including sheet aluminum increment sign panel(s), structural steel posts, breakaway devices, concrete foundation)

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources/Anticipated Right-of-Way
No impacts to resources are anticipated to result from this option. The need for additional right-of-way is not anticipated.

Option 7.c Shoulder/Centerline Rumble Strips
Shoulder and centerline rumble strips are not present within the study area. Constructing shoulder and/or centerline rumble strips along highways in the study area could help prevent run-off the road, fixed object, roll-over, and crossover crashes as rumble strips. The audible sound and physical vibration resulting from rumble strips alerts drivers, improves driver reaction, and increases the likelihood for a safe return to the travel lane. To reduce initial construction costs, rumble strips could be placed in select areas classified as LOSS IV including areas near RP 4, 6, 9, 12, and 15 on Highway 312; RP 0.5 on Secondary 568; and RP 0, 1, and 2 on Secondary 522. The rumble strips would be constructed to standards as shown in the MDT Detailed Drawing numbers 411-02 and 411-05. MDT could consider combining installation of rumble strips with shoulder widening as described in option 2.a. Consideration of rumble strips in areas with less than four-foot shoulders would require coordination with the MDT rumble strip committee.

Planning-level Cost Estimate
Shoulder rumble strips are approximately $1,600 per mile ($800 per strip per mile), and centerline rumble strips are $2,700 per mile. Prices shown for each segment include shoulder and centerline rumble strips between the reference posts.

Highway 312 - RP 4.0 to RP 15.0: Approximately $77,500 to $84,600
Secondary 568 RP 0.0 to RP 1.0: Approximately $7,100 to $7,800
Secondary 522 RP 0.0 to 2.0: Approximately $14,200 to $15,500

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources/Anticipated Right-of-Way
The need for additional right-of-way is not anticipated. Noise analysis would need to be conducted for rumble strip placement near noise receptors.

Option 8 Bridge Improvements
Minor rehabilitation is recommended as a stand-alone improvement for the five bridge locations listed below. Full bridge replacement would be addressed if MDT pursued roadway reconstruction (as described in option 2.c).

- Seven Mile Creek (Highway 312 RP 2.70) – This structure was built in 1947 and is rated in fair condition. 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.

- Twelve Mile Creek (Highway 312 RP 6.57) – This structure was built in 1947 and is rated in fair condition. 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.

- Yellowstone River (Highway 312 RP 8.78) – This super-span structure was built in 1949 and is rated in fair condition. Recommendations for the structure include removal of

existing approach/departure guardrail, installation of new guardrail before and after the bridge to meet current design criteria, and replacement of existing barrier rail. Additionally, this improvement would include bridge deck surface improvements.

- Custer Coulee (Highway 312 RP 12.15) – This structure was built in 1928, reconstructed in 1939, and is rated in fair condition. Recommendations for the structure include reconstructing the Custer Coulee railing as there are multiple areas where cracking is observable in addition to noticeable erosion on the structure.

- Huntley Canal (Secondary 522 RP 0.36) – This structure was built in 1967 and is rated in fair condition. Recommendations for the structure include removal of existing guardrail and installation of new guardrail to meet current design criteria. Additionally, this improvement would include bridge deck surface improvements.

Planning-level Cost Estimate
Seven Mile Creek (Highway 312 RP 2.70): Approximately $60,000 to $65,000
Twelve Mile Creek (Highway 312 RP 6.57): Approximately $260,000 to $290,000
Yellowstone River (Highway 312 RP 8.78): Approximately $3,200,000 to $3,400,000
Custer Coulee (Highway 312 RP 12.15): Approximately $60,000 to $70,000
Huntley Canal (Secondary 522 RP 0.36): Approximately $290,000 to $310,000

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, and utilities may result from this option. The need for additional right-of-way is not anticipated.

Option 9 Drainage Improvements
Minor drainage issues currently occur on Secondary 522. The most severe drainage issues were observed near the intersection of Nahmis Road near Barkemeyer Park at approximately RP 0.9. Standing water was observed in the roadway ditch adjacent to the roadway in this area. A motor grader or skid steer loader is sufficient to effectively reshape the shoulder promote positive drainage away from the road surface and subgrade.

Planning-level Cost Estimate
Approximately $1,000 (assuming hourly rates for equipment and operator of $250 per hour, for a 4-hour period including mobilization)

Recommended Implementation Timeframe
Short-term to mid-term

Potentially-impacted Resources/Anticipated Right-of-Way
Potential impacts to Barkemeyer Park (a potential Section 4(f) resource) may result from this option. The need for additional right-of-way is not anticipated.

7.2 Options Considered But Not Forwarded

Increased Passing Zones

The available amount of roadway striped as a passing zone within segments 2 and 3 ranges from 36% to 69%. Additional passing zones would provide more opportunities for vehicles to pass slower vehicles, resulting in increased roadway capacity. An iterative process was used to determine the percentage of additional passing zone required to increase the capacity of the road so that it would operate at an acceptable LOS C or better. The passing zone percentage for each study segment was increased by small increments until the passing zone occupied the full segment or LOS C was achieved. Some segments would require as little as a 13 percent increase in passing zone length to meet desired LOS, while other segments are still anticipated to operate below LOS C with full-length passing zones.

LOS is expected to increase by one level for both directions of segments 2 and 3 when compared to the no-build alternative with additional passing zone percentages. However, modifications to roadway geometrics and a reduction in the number of access points would be required to accommodate increased passing zones. As a result, this alternative is not considered viable as a stand-alone alternative.

Separated Shared Use Path

A shared use path is physically separated from motorized vehicular traffic, and provides an alternative to on-road facilities. Users are generally non-motorized and may include bicyclists, pedestrians, and other recreational activity users. A shared use path may be placed within highway right-of-way or within an independent right-of-way. Since the majority of shared use paths are used by pedestrians, any path located in the public right-of-way must be designed in compliance with ADA requirements as provided in PROWAG.

The option of a shared use path adjacent to Highway 312 was mentioned in multiple written comments submitted for this study. Comments noted the recreational benefits of bicycle/pedestrian connectivity between Billings and the Pompeys Pillar area. Based on recent projects, it was estimated that construction of a shared use path could cost upwards of $250,000 per mile if constructed within the existing MDT right-of-way. Construction of a shared use path outside of the existing MDT right-of-way would provide a facility physically separated from motorized vehicle traffic. Resource impacts resulting from construction of a separated shared use path could be substantial. Impacts to wetlands and other natural resources would be likely, requiring mitigation and permitting through natural resource agencies. Right-of-way acquisition would be another constraining element. Construction of a separated path would require coordination with numerous land owners within the corridor, and long-term maintenance agreements. Due to cost, resource impacts, maintenance, and right-of-way factors, and in consideration of MDT's primary mission to serve transportation needs (as opposed to recreational needs), the construction of a shared use path within the corridor is not recommended as a potential improvement option for MDT to pursue at this time. A recreational shared use path could be pursued by community members using public-private partnerships and alternative sources of funding.

7.3 Summary of Individual Improvement Options

This report outlines a range of improvement options MDT may consider for future implementation in the Highway 312 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 AC. Table 16 and Figure 12 summarize individual improvement options within the Highway 312 corridor.

Table 16 Summary of Individual Improvement Options

Option Category		Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Curve Improvements		**Option 1**	Highway 312 1.a: RP 4.7, 5.1, 5.2, 5.4, 5.5, 5.6 1.b: RP 24.7, 24.8 Secondary 522 1.c: RP 0.2 1.d: RP 1.3, 1.4 1.e: RP 3.0, 3.1 Secondary 568 1.f: RP 0.1	1.a: $1,960,000 to $2,130,000 1.b: $760,000 to $820,000 1.c: $570,000 to $620,000 1.d: $760,000 to $820,000 1.e: $760,000 to $820,000 1.f: $570,000 to $620,000	Mid-term to Long-term	Yes
Capacity Improvements	**Shoulder Widening**	**Option 2.a**	Highway 312 Segments 2 and 3 Entire Highway 312 Corridor (RP 0.0 to 24.9)	Segment 2: $440,000 to $480,000 Segment 3: $250,000 to $280,000 Entire Corridor: $3,140,000 to $3,410,000	Mid-term to Long-term	Yes
	Three-lane Section	**Option 2.b**	Segment 2: Highway 312 RP 2.1 to 5.6, including bridge replacement at Seven Mile Creek (RP 2.70)	Segment 2: $3,200,000 to $3,500,000 Segment 3: $3,600,000 to $3,900,000	Mid-term to Long-term	Yes
	Five-lane Section	**Option 2.c**	Segment 3: Highway 312 RP 5.6 to 7.4, including bridge replacement at Twelve Mile Creek (RP 6.57)	Segment 2: $7,000,000 to $7,600,000 Segment 3: $5,700,000 to $6,100,000	Mid-term to Long-term	Yes

Option Category		Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Intersection Improvements	**Intersection Control**	**Option 3.a**	Dover Road (Highway 312 RP 1.3) Hoskins Road (Highway 312 RP 5.6) Shepherd Rd (Highway 312 RP 7.6)	Traffic Signal: $370,000 to $400,000 per intersection Roundabout (1-Lane): $1,200,000 to $1,300,000 per intersection Roundabout (2-Lane): $1,300,000 to $1,500,000 per intersection	Mid-term to Long-term	Yes
Intersection Improvements	**Intersection Realignment**	**Option 3.b**	Northern Ave (Highway 312 RP 10.4)	$670,000 to $770,000	Short-term to Mid-term	Yes
	Intersection Turn Lanes	**Option 3.c**	Select public intersections, potentially including: McIntyre Dr, Northern Ave, N 7th Rd, N 10th Rd, N 12th Rd, and N 15th Rd.	$540,000 to $590,000 per intersection	Short-term to Mid-term	Yes
	Overhead Lighting	**Option 3.d**	Select public intersections where warranted, potentially including: Nahmis Ave, Northern Ave, and Custer Frontage Rd	$220,000 to $250,000 per intersection	Short-term to Mid-term	No
Pavement Preservation		**Option 4**	Highway 312 (RP 0.0 to 2.3) Secondary 568 (RP 0.0 to 1.0) Secondary 522 (RP 0.0 to 3.0)	Highway 312: $1,800,000 to $2,000,000 Secondary 568: $470,000 to $510,000 Secondary 522: $1,400,000 to $1,600,000	Short-term to Long-term	No

Option Category		Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Roadside Safety Improvements	**Guardrail**	**5**	Select locations corridor-wide where warranted, including: Highway 312 RP 10.5, 12.2, 13.2, 16.6, 18.8, 20.2, 21.5 Secondary 522 RP 0.2	$20,000 per location	Short-term to Mid-term	No
Pedestrian/Bicycle Improvements	**Sidewalks and ADA Features**	**Option 6**	Secondary 522 – Huntley Highway 312 – Worden	Secondary 522 – Huntley: $200,000 to $220,000 Highway 312 – Worden: $290,000 to $320,000	Mid-term to Long-term	No
Traffic Control Devices and Safety/Warning Features	**Delineation**	**Option 7.a**	Select locations corridor-wide where warranted, including: Highway 312 RP 4.9, 7.2, 9.8, 17.5, 23.9, 24.0 Secondary 522 RP 0.1, 0.3, 0.4	$60 per approach	Short-term to Mid-term	No
	Signing	**7.b**	US 87 (Highway 312 RP 0.0) Pompeys Pillar Intchg (RP S568 RP 0.0)	$550 to $3,500 per assembly	Short-term to Mid-term	No
Traffic Control Devices and Safety/Warning Features	**Shoulder/ Centerline Rumble Strips**	**Option 7.c**	Select locations corridor-wide where warranted, including LOSS III/IV areas: Highway 312 RP 4-15 Secondary 522 RP 0-2 Secondary 568 RP 0.5	Highway 312: $77,500 to $84,600 Secondary 568: $7,100 to $7,800 Secondary 522: $14,200 to $15,500	Short-term to Mid-term	No

Option Category	Option ID	Potential Locations	Planning Cost Estimate[1]	Potential Timeframe[2]	Potentially Impacted Resources & Anticipated ROW/Permitting
Bridge Improvements	**Option 8**	Highway 312 Seven Mile Creek (RP 2.70) Twelve Mile Creek (RP 6.57) Yellowstone River (RP 8.78) Custer Coulee (RP 12.15) Secondary 522 Huntley Canal (RP 0.36)	Seven Mile Creek: $60,000 to $65,000 Twelve Mile Creek: $260,000 to $290,000 Yellowstone River: $3,200,000 to $3,400,000 Custer Coulee: $60,000 to $70,000 Huntley Canal: $290,000 to $310,000	Mid-term to Long-term	Yes
Drainage Improvements	**Option 9**	Barkemeyer Park (S522 RP 0.9)	$1,000	Short-term to Mid-term	Yes

[1] Cost estimates are provided in 2015 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, utilities, preliminary engineering, and construction engineering/inspection are included where appropriate.

[2] Potential timeframe does not indicate when projects will be programmed or implemented. Project programming is based on available funding, the complexity and urgency of potential improvements, and other system priorities. Timeframes are defined as follows. Immediate: Implementation is currently ongoing or will be initiated in 2015; Short-term: Implementation could occur within a 1- to 3-year period; Mid-term: Implementation could occur within a 3- to 6-year period; Long-term: Implementation could occur within a 6- to 20-year period.

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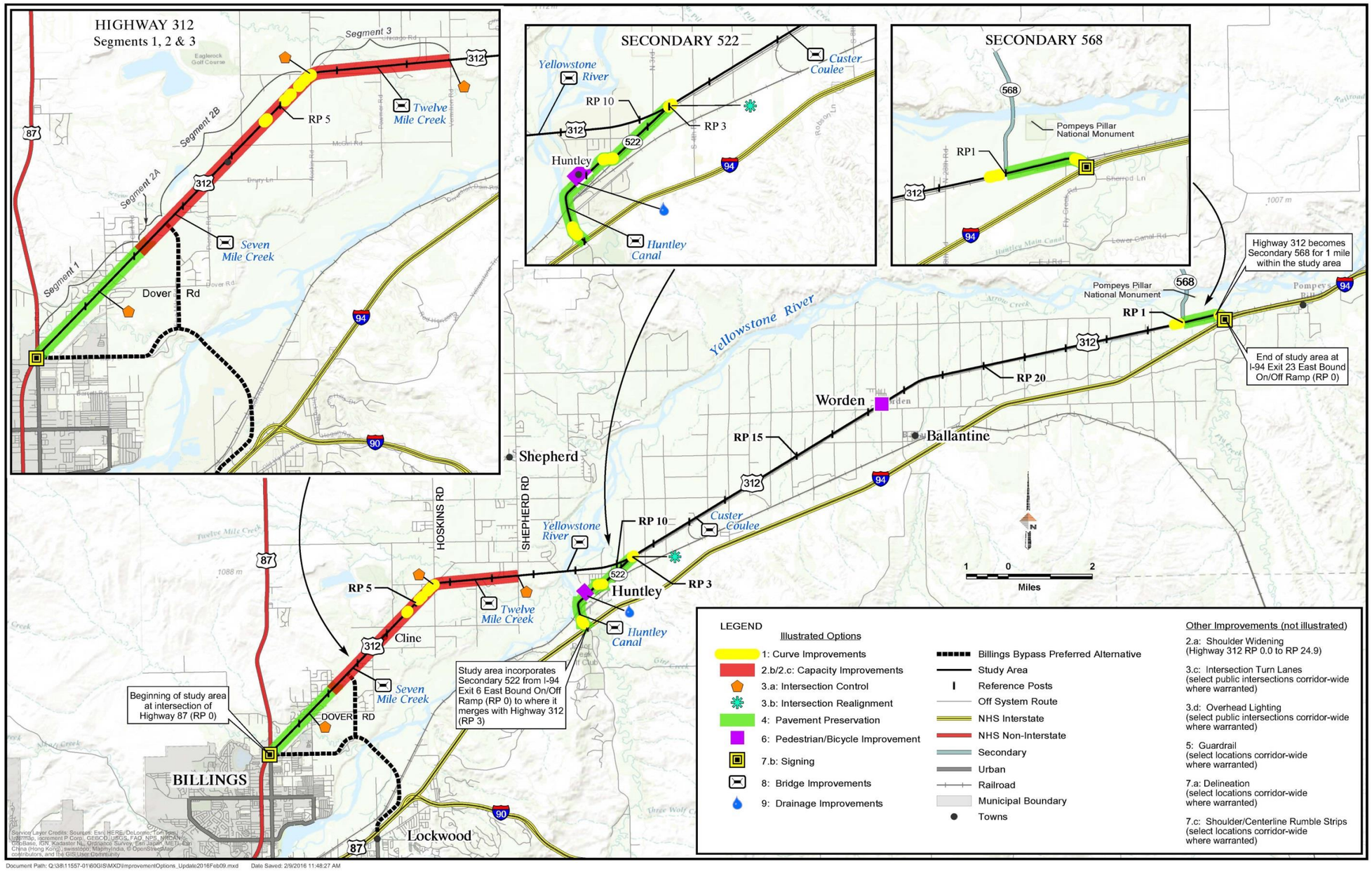
Figure 12 Summary of Individual Improvement Options



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7.4 Combined Options for Future Project Development

Individual improvement options are concentrated on Highway 312 within segments 2 and 3, and on Secondary 522. MDT could consider combining individual improvement options in these locations to develop future projects addressing multiple elements. This method would save time and money by reducing mobilization efforts and address capacity and safety deficiencies simultaneously. The following sections describe potential project development considerations and associated costs.

Segment 2
A future reconstruction project within Highway 312 segment 2 could widen the roadway to a five-lane section (with two travel lanes in each direction and a continuous center turn lane), provide widened shoulders and side slopes meeting current design criteria, address vertical curve issues west of Hoskins Road, replace the Seven Mile Creek bridge, and address intersection control at the Highway 312/Hoskins Road intersection. Safety measures such as segment-wide rumble strips and roadway lighting at major approaches could also be included.

The combined planning-level cost estimate for this project ranges from $12,900,000 to $14,000,000.

Segment 3
A future reconstruction project within Highway 312 segment 3 could widen the roadway to a five-lane section (with two travel lanes in each direction and a center turn lane at major approaches), provide widened shoulders and side slopes meeting current design criteria, replace the Twelve Mile Creek bridge, and address intersection control at the Highway 312/Hoskins Road intersection and the Highway 312/Shepherd Road intersection. Safety measures such as segment-wide rumble strips and roadway lighting at major approaches could also be included.

The combined planning-level cost estimate for this project ranges from $10,700,000 to $11,600,000.

Secondary 522
A future reconstruction project on Secondary 522 could address pavement condition, provide sidewalks in Huntley, address horizontal and vertical curve issues, widen shoulders, and realign the Northern Avenue intersection with Highway 312.

The combined planning-level cost estimate for this project ranges from $12,100,000 to $13,100,000.

Phasing Considerations
The first phase of the Billings Bypass project is anticipated to be constructed in 2018 and includes the extension of Five Mile Creek Road to connect with Highway 312 near RP 2.6 within segment 2 of the study area. Improvements in segment 2 would essentially extend the current five-lane roadway configuration within segment 1, and could be completed in conjunction or cooperation with the first phase of the Billings Bypass project. The first half mile of segment 2 could be completed with the first phase of the Billings Bypass Project since the Billings Bypass project will likely include intersection improvements to Highway 312.

A major reconstruction of segment 2 is the logical first project to be considered because of the existing and anticipated growth in the Billings Heights and forecasted demand on Highway 312.

The reconstruction of segment 3 could follow reconstruction of segment 2. Reconstruction of Secondary 522 could be completed independently from improvements on Highway 312.

8.0 Potential Funding Sources

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

8.1 Federal Funding Programs

MDT administers a number of programs funded from federal sources. The Fixing America's Surface Transportation Act (FAST Act) was signed into law on December 4, 2015, and authorizes federal transportation funding for FFYs 2016 through 2020. As future improvements are considered, funding eligibilities and categories will need to be evaluated under future funding guidelines.

Each year, in accordance with 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 STIP, where relevant.

Surface Transportation Block Grant Program

Surface Transportation Block Grant Program (STBGP) 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), the Surface Transportation Program Urban Highways (STPU), and the Surface Transportation Program – Bridge Program (STPB), as well as several set-aside programs including Transportation Alternatives (TA). The federal share for projects funded through these programs is 86.58% with the non-federal share typically funded through Highway State Special Revenue (HSSR).

Primary Highway System (STPP)[1]

Federal and state funds available under this program are used to finance transportation projects on the state-designated Primary Highway System. The Primary Highway System includes highways that have been functionally classified by MDT as either principal or minor arterials and that have been selected by the Montana 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 five financial districts. The Commission distributes STPP funding based on system performance. STP Primary funds may be used for a wide range of transportation improvement projects and activities, ranging from roadway reconstruction and rehabilitation, to bridge construction and inspection, to highway and transit safety infrastructure, environmental mitigation, carpooling, and bicycle and pedestrian transportation facilities.

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

If the functional classification of Highway 312 (from Billings to Huntley) and Secondary 522 were changed from major collector to minor arterial, these roadways could be considered for inclusion on the Primary Highway System and may be eligible for funds under this program.

Secondary Highway System (STPS)[2]

The Federal and State funds available under this program are used to finance transportation projects on the state-designated Secondary Highway System. The Secondary Highway System includes any highway that is not classified as a local route or rural minor collector and that has been selected by the Montana Transportation Commission to be placed on the Secondary Highway System. Funding is distributed by formula and is utilized to resurface, rehabilitate and reconstruct roadways and bridges on the Secondary System.

Secondary funds are distributed statewide (MCA 60-3-206) to each of five financial districts, based on a formula, which takes into account the land area, population, road mileage and bridge square footage. Federal funds for secondary highways must be matched by non-federal funds. Eligible activities for the use of Secondary funds fall under three major types of improvements, including reconstruction, rehabilitation, and pavement preservation. The reconstruction and rehabilitation categories are allocated a minimum of 65% of the program funds with the remaining 35% dedicated to pavement preservation. Secondary funds can also be used for any project that is eligible for STP under Title 23, U.S.C. Priorities are identified in consultation with the appropriate local government authorizes and approved by the Montana Transportation Commission.

Highway 312, Secondary 522, and Secondary 568 are eligible for funds under this program given their current minor arterial and major collector classifications.

Bridge Program (STPB)

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.

Transportation Alternatives (TA) Program

The 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 multiple entities, including:

- local governments;
- transit agencies;
- natural resource or public land agencies;
- school district, schools, or local education authority;
- tribal governments; or

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

- other local government entities with responsibility for recreational trails for eligible use of these funds.

Eligible activities include on-road and off-road trail facilities for pedestrians and bicyclists, including ADA improvements, among many others.

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.

TA funds could be used to help finance sidewalk improvements within the community of Huntley and at the existing road/rail crossing in Worden.

Highway Safety Improvement Program (HSIP)

HSIP funds are apportioned to Montana for allocation to safety improvement projects approved by the Commission and are consistent with the strategic highway safety improvement plan. 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 Commission approves and awards the projects which are let through a competitive bidding process. Generally, the Federal share for the HSIP projects is 90% with the non-Federal share typically funded through the HSSR account. HSIP funds could be used to finance safety improvements within the study corridor.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

Federal funds available under this program are used to finance transportation projects and programs to help improve air quality and meet the requirements of the Clean Air Act. Montana's air pollution problems are attributed to CO and particulate matter (PM10 and PM2.5).

CMAQ funds are federally apportioned to Montana and allocated to various eligible programs by formula and by the transportation Commission. As a minimum apportionment state, a federally required distribution of CMAQ funds goes to projects in Missoula since it was Montana's only designated classified air quality non-attainment area. The remaining, non-formula funds, referred to as "flexible CMAQ," are directed primarily to areas of the state with emerging air quality issues through various state programs. The Transportation Commission approves and awards both formula and non-formula projects on MDT right-of-way. Infrastructure and capital equipment projects are let through a competitive bidding process. Of the total funding received, 86.58 percent is federal, and 13.42 percent in non-federal match that the state provides for projects on state highways and local governments for local projects.

In general, eligible activities include transit improvements, traffic signal synchronization, bicycle pedestrians projects, intersection improvements, travel demand management strategies, traffic flow improvements, air-quality equipment purchases, and public fleet conversions to cleaner fuels. At the project level, the use of CMAQ funds is not constrained to a particular system (i.e., primary, urban, and National Highway System). A requirement

for the use of these funds is the estimation of the reduction in pollutants resulting from implementing and program/project. These estimates are reported yearly to FHWA.

CMAQ funds could be used to help finance sidewalk improvements within the community of Huntley and at the existing road/rail crossing in Worden.

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. Western Federal Lands 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. 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 for FLAP funding:

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.
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.

FLAP funds could be used to finance projects on Secondary 568 to provide improved access to the Pompeys Pillar National Monument.

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 Programs

State Special Revenue/State Funded Construction

The State Funded Construction Program, which is funded entirely with state funds from the Highway State Special Revenue Account, provides funding for projects that are not eligible for federal funds. This program is totally state funded, requiring no match.

This program funds projects to preserve the condition and extend the service life of highways. Eligibility requirements are that the highways be maintained by the state. MDT staff nominates the projects based on pavement preservation needs. The District's establish priorities and the Transportation Commission approves the program.

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 2016, Yellowstone County will receive $__ 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.

8.3 Local Funding Programs

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 Richland County.

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.

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 Programs

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 (GO) Bonds

The sale of 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.

Multi-Jurisdictional Special District

This funding option was authorized by the State Legislature in 1985. This process requires the establishment of a special district, somewhat like a Special Improvement District (SID), but which has the flexibility to extend across city and county boundaries. Through this funding mechanism, an urban transportation district could be established to fund a specific highway improvement that crosses municipal boundaries. This type of fund is structured similarly to an SID and uses bonds backed by local government that are issued to cover the cost of a proposed improvement. Revenue to pay for the bonds would be raised through assessments against property owners in the service district.

9.0 Conclusions and Next Steps

MDT initiated this pre-NEPA/MEPA planning study in partnership with FHWA and in coordination with the City of Billings and Yellowstone County to better understand the study area's needs, objectives, constraints, and opportunities. The study examined roadway geometrics, crash statistics, land use and development patterns, physical and

environmental constraints, and existing and projected operational characteristics for the study area.

Based on evaluation of existing and projected conditions within the study area, improvement options were identified to address short-term and long-term transportation needs within the 20-year planning horizon (2035). Individual improvements are intended to address roadway geometry, capacity and traffic operations, safety, pavement condition, pedestrian/bicycle accessibility, bridge condition, and drainage. Individual options are concentrated on Highway 312 within segments 2 and 3, and on Secondary 522. MDT could consider combining individual improvement options in these locations to develop future projects addressing multiple elements.

The first phase of the Billings Bypass project is anticipated to be constructed in 2018 and includes the extension of Five Mile Creek Road to connect with Highway 312 near RP 2.6 within segment 2 of the study area. Improvements in segment 2 would essentially extend the current five-lane roadway configuration within segment 1, and could be completed in conjunction or cooperation with the first phase of the Billings Bypass project. The first half mile of segment 2 could be completed with the first phase of the Billings Bypass Project since the Billings Bypass project will likely include intersection improvements to Highway 312.

A major reconstruction of segment 2 is the logical first project to be considered because of the existing and anticipated growth in the Billings Heights and forecasted demand on Highway 312. The reconstruction of segment 3 could follow reconstruction of segment 2. Reconstruction of Secondary 522 could be completed independently from improvements on Highway 312.

Funding availability, right-of-way acquisition, and other MDT Billings District priorities will factor into any future implementation decisions. At this time, funding is not available to implement any of the improvement options identified by this study. Federal funding allocations for the MDT Billings District are committed through FFY 2019, with numerous unfunded projects extending beyond 2019. Future project development and implementation will require the following steps.

- Identify and secure funding.
- Follow appropriate MDT process for project nomination and development, including public involvement and environmental documentation.

Future projects resulting from this corridor study will be requried to comply with NEPA/MEPA depending if federal/state funds or a federal/state action is involved. The purpose and need statement for any future project should be consistent with the needs and objectives for this study. This corridor study will be used as the basis for determining impacts and subsequent mitigation for improvement options in future NEPA/MEPA documentation. Any project developed would have to comply with the Code of Federal Regulations Title 23 Part 771 and Adminsitrative Rules of Montana 18, subchapter 2, which set forth the requirements for documenting environmental impacts on highway projects. Additionally, traffic conditions and anticipated transportation demands should be confirmed as any projects are forwarded from the study.