


# US 2 - Badrock Canyon Corridor Planning Study



## Final Report

September 2012

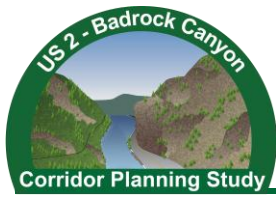
For:  
MONTANA  
**MDT**★  
DEPARTMENT OF TRANSPORTATION

By:  
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Visit the study website at:  
<http://www.mdt.mt.gov/pubinvolve/badrock>



## ACKNOWLEDGEMENTS

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## ABBREVIATIONS AND ACRONYMS

AADT	.....	Annual Average Daily Traffic
AASHTO	.....	American Association of State Highway and Transportation Officials
ACS	.....	American Community Survey
ADA	.....	Americans with Disabilities Act
ATR	.....	Automatic Traffic Recorder
BPA	.....	Bonneville Power Administration
CDP	.....	Census Designated Place
CLOMR	.....	Conditional Letter of Map Revision
CSKT	.....	Confederated Salish and Kootenai Tribes
DEQ	.....	Montana Department of Environmental Quality
EB	.....	Eastbound
EIS	.....	Environmental Impact Statement
FAQs	.....	Frequently Asked Questions
FEC	.....	Flathead Electric Cooperative, Inc.
FEIS	.....	Final Environmental Impact Statement
FEMA	.....	Federal Emergency Management Agency
FHWA	.....	Federal Highway Administration
FPPA	.....	Farmland Protection Policy Act
FWP	.....	Montana Fish, Wildlife & Parks
GIS	.....	Geographic Information System
GNESA	.....	Great Northern Environmental Stewardship Area
GNP	.....	Glacier National Park
HCM	.....	Highway Capacity Manual
HCS	.....	Highway Capacity Software
HSIP	.....	Highway Safety Improvement Program
LOMR	.....	Letter of Map Revision
LOS	.....	Level of Service
LWCF	.....	Land and Water Conservation Funds
MAP-21	.....	Moving Ahead for Progress in the 21 <sup>st</sup> Century Act
MCA	.....	Montana Code Annotated
MDT	.....	Montana Department of Transportation
MEPA	.....	Montana Environmental Policy Act
mph	.....	Miles Per Hour
MNHP	.....	Montana Natural Heritage Program
NEPA	.....	National Environmental Policy Act
NHPP	.....	National Highway Performance Program
NHS	.....	National Highway System
NRHP	.....	National Register of Historic Places
NRIS	.....	Natural Resource Information System
PM <sub>10</sub>	.....	Particulate Matter with a Diameter of 10 Micrometers or less
ROD	.....	Record of Decision
RP	.....	Reference Post
Section 4(f)	.....	Section 4(f) of the 1966 Department of Transportation Act
Section 6(f)	.....	Section 6(f) of the National Land and Water Conservation Funds Act
SEIS	.....	Supplemental Environmental Impact Statement
SFC	.....	State Funded Construction
SHPO	.....	State Historic Preservation Office
STIP	.....	State Transportation Improvement Program
TA	.....	Transportation Alternatives
TMDL	.....	Total Maximum Daily Load
US 2	.....	US Highway 2
USACE	.....	U.S. Army Corps of Engineers
USFS	.....	U.S. Forest Service
USFWS	.....	U.S. Fish and Wildlife Service
VMS	.....	Variable Message Sign
WB	.....	Westbound





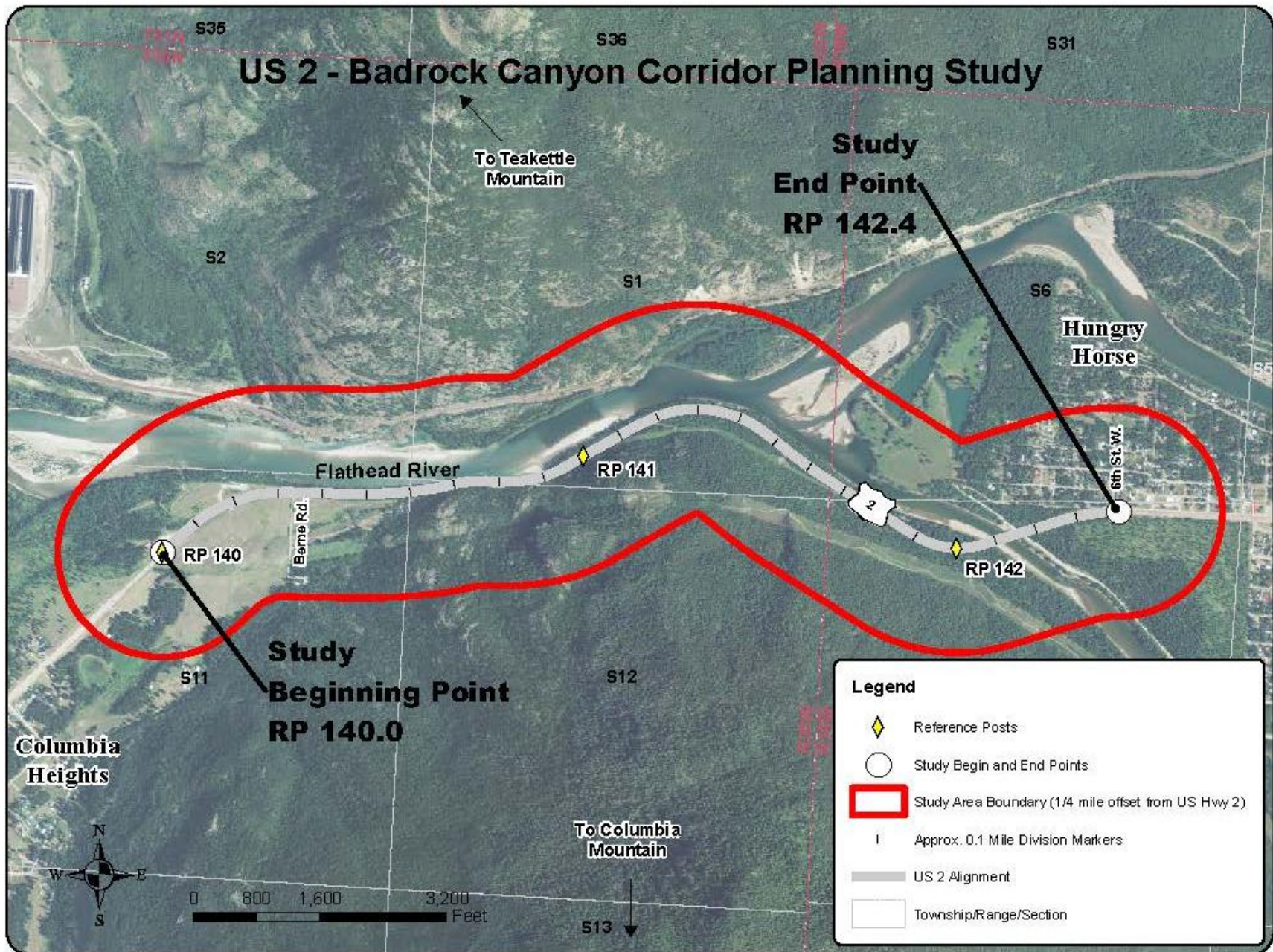
### **EXECUTIVE SUMMARY**

The Montana Department of Transportation (MDT), in cooperation with Flathead County, the City of Columbia Falls, the Confederated Salish and Kootenai Tribes (CSKT), and the Federal Highway Administration (FHWA), initiated the US 2 – Badrock Canyon Corridor Planning Study to assess U.S. Highway 2 (US 2) beginning east of Columbia Heights (Reference Post [RP] 140.0) and ending at the eastern edge of Hungry Horse (RP 142.4).

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

The study area is located within Sections 6 and 7, Township 30 North, Range 19 West, Montana Meridian and Sections 1, 2, 11 and 12, Township 30 North, Range 20 West, Montana Meridian, within Flathead County. Figure ES-1 illustrates the study area.

Figure ES-1 Study Area



Source: MDT, 2011; NRIS, 2011; DOWL HKM, 2011.



### ES.1 Existing and Projected Conditions

Within the study corridor, US 2 is a two-lane rural principal arterial highway. Issues and concerns identified through review of existing and projected conditions are listed below.

- **Physical Features**
  - The South Fork Flathead River Bridge is functionally obsolete and structurally deficient.
  - Guardrail end sections in the study corridor do not meet current MDT design standards.
  - Drainage issues (e.g., ponding and water flowing across the roadway) have been observed within the corridor.
  - Above-ground and buried utility lines occur in the corridor, including a 10-inch diameter high pressure natural gas transmission pipeline that generally runs along the south side of US 2 and is the only line serving the Flathead Valley area.
  - Rock outcroppings adjacent to the south side of US 2 create the potential for rock or debris to fall upon the roadway.
- **Geometric Conditions** – Horizontal/vertical curves and clear zones do not meet current MDT design standards.
- **Safety** – Crash statistics within the corridor are higher than statewide averages for similar facilities.
- **Operational Conditions** – Undesirable Level of Service (LOS) C or worse is anticipated by 2035 through the majority of corridor.
- **Environmental Conditions** – Prime and important farmlands, unstable geologic formations (including rock outcroppings overhanging US 2), surface water bodies (including a designated Recreational River), wetlands, hazardous material sites, floodplains, federally listed and sensitive wildlife species, cultural and archaeological resources, and Section 4(f) resources (including Berne Memorial Park) are located within the study corridor.

### ES.2 Corridor Needs and Objectives

Corridor needs and objectives were developed through a review of existing and projected conditions within the corridor, consideration of input from community members and resource agencies, and coordination with the study advisory committee, including representatives from the CSKT, Flathead County, Columbia Falls, and members of communities in proximity to Badrock Canyon (broadly referred to in this report as the “canyon community.” Corridor needs and objectives reflect MDT and community desires to improve the safety and operation of US 2 while minimizing adverse improvement impacts to sensitive resources where practicable, given corridor constraints and funding availability.





**Need 1: Improve the safety and operation of the US 2 roadway facility within the study area for all users, where practicable.**

*Objectives:*

- 1.a Improve roadway elements to meet current MDT design standards.
- 1.b Provide a South Fork Flathead River Bridge structure that meets current MDT design standards.
- 1.c Provide appropriate guardrail and signing based on current design guidelines.
- 1.d Provide appropriate drainage facilities throughout the corridor to minimize water and ice on the roadway.
- 1.e Provide desirable Level of Service (LOS) through the planning horizon year of 2035.
- 1.f Provide opportunities for non-motorized usage in the corridor.

**Need 2: Minimize adverse impacts from improvements to the environmental, historic, cultural, scenic and recreational characteristics of the corridor.**

*Objectives:*

- 2.a Minimize adverse impacts to the main stem and South Fork of the Flathead River and fisheries that may result from improvement options.
- 2.b Minimize adverse impacts to historic, cultural, and archaeological resources that may result from improvement options.
- 2.c Strive to maintain the scenic nature of the corridor with respect to view sheds and landscape features.
- 2.d Provide reasonable access to recreational sites in the corridor.
- 2.e Minimize conflicts with wild animals and facilitate wildlife movement.

**Other issues to be considered as part of the screening process:**

- Conflicts with utilities
- Construction feasibility
- Availability and feasibility of funding

### **ES.3 Improvement Options**

The US 2 – Badrock Canyon Corridor Planning Study confirmed the Columbia Heights-Hungry Horse Final Environmental Impact Statement (FEIS) findings that construction of a grade-separated structure, a tunnel, and new alignments north and south of the existing US 2 alignment are not reasonable options based on cost, constructability, impacts, right-of-way, and community support.

The planning study recommends reconstruction of the corridor along an optimized existing alignment with either a 3-2-3-4 or 4-2-4 lane configuration, using a two-lane cantilevered structure within the most constrained portion of the corridor and a four-lane bridge over the South Fork Flathead River. A two-lane cantilevered structure could be used to avoid rock excavation and minimize the roadway



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footprint within the narrowest part of the corridor. Shoulders and improved geometry are expected to improve safety throughout the corridor. A dedicated bicycle/pedestrian facility would improve non-motorized access in the corridor where feasible. A four-lane South Fork Flathead River Bridge would provide flexibility during the design life of the structure to allow future roadway widening, if necessary, through the corridor. The three- or four-lane sections at the eastern and western ends of the corridor would provide passing opportunities and allow vehicle queues to disperse before entering the most constrained area. The corridor is generally predicted to operate at an acceptable LOS A or B during most times of the year, narrowly exceeding the LOS C threshold during the peak hour of the peak season by 2035. Although this planning study confirms the FEIS findings that a four-lane configuration is needed to provide LOS B or better at all times of the day and year, a design exception may be considered to balance the need to improve corridor safety and operations with the need to minimize adverse impacts to resources in the corridor.

In the interim period before corridor wide reconstruction (Alignment 2), other short-, mid-, or long-term options could be implemented along the existing US 2 alignment (Alignment 1) to provide incremental improvements in safety and corridor access. Improvements would provide or enhance access management, bicycle/pedestrian facilities, drainage, parking, roadside safety, rockfall prevention, rumble strips, sight distance, a new South Fork Flathead River Bridge, traffic control, and wildlife passage. Several Alignment 1 improvements, including parking, rockfall prevention and a new South Fork Flathead River Bridge, are considered stand-alone options that would remain if Alignment 2 reconstruction is pursued at a later date. All other Alignment 1 options may need to be modified or replaced if Alignment 2 roadway reconstruction is pursued. Some of the identified Alignment 1 improvements represent substantial transportation system investments. If Alignment 1 improvements are forwarded from this study, compatibility with future corridor reconstruction should be considered.

Implementation of corridor improvement options is dependent on funding availability and other system priorities. Recommended timeframes for implementation are defined as follows:

- Short-term: Implementation recommended within 1- to 5-year period
- Mid-term: Implementation recommended within 6- to 10-year period
- Long-term: Implementation recommended within 11- to 20-year period

Table ES-1 provides a menu of recommended improvements for consideration in the corridor. Implementation of all options is not anticipated. Selection of some options may preclude implementation of others.



Table ES-1 Menu of Recommended Improvements

Recommended Improvement		Planning Level Estimate of Costs <sup>(4)</sup>	Recommended Implementation Timeframe <sup>(5)</sup>	
Alignment 1 Improvements	<b>Access Management<sup>(1)</sup></b>	Install Concrete Barrier	\$100,000 to \$150,000	Short-term
	<b>Bicycle / Pedestrian Facilities<sup>(1)</sup></b>	Construct Dedicated Bicycle/Pedestrian Facility	\$3.6M to \$6.6M	Mid-term to long-term
		Construct Bicycle/Pedestrian Overcrossing	\$1.0M to \$2.5M	
	<b>Drainage<sup>(1)</sup></b>	Install Culverts	\$4,000 to \$10,000 per location	Short-term to mid-term
		Re-grade Ditches	\$1,000 to \$15,000 per location	
		Install Valley Gutter	\$3,000 to \$5,000	
	<b>Parking<sup>(2)</sup></b>	Construct Parking Lot	\$400,000 to \$500,000	
	<b>Roadside Safety<sup>(1)</sup></b>	Install Guardrail with End Treatments	\$3,000 to \$5,000 per location	
	<b>Rockfall Prevention<sup>(2)</sup></b>	Install Wire Mesh Stabilization Fence	\$200,000 to \$1.0M per location	
	<b>Rumble Strips<sup>(1)</sup></b>	Install Shoulder and Centerline Rumble Strips	\$2,100 to \$2,700 per mile	
	<b>Sight Distance<sup>(1)</sup></b>	Remove Vegetation	\$9,000 to \$30,000	
	<b>South Fork Flathead River Bridge<sup>(2)</sup></b>	Reconstruct South Fork Flathead River Bridge	\$9.7M to \$27.3M	
	<b>Traffic Control<sup>(1)</sup></b>	Install Static Sign	\$500 to \$1,000 per location	
		Install Variable Message Sign	\$20,000 to \$250,000 per location	
<b>Wildlife Passage<sup>(1)</sup></b>	Wildlife Undercrossing	\$920,000 to \$1.1M		
<b>Roadway Reconstruction<sup>(3)</sup> (Alignment 2)</b>	Construct 3-2-3-4 Configuration	\$48.0M to \$86.6M	Long-term	
	Construct 4-2-4 Configuration	\$57.2M to \$90.9M	Long-term	

Source: DOWL HKM, 2012.

- (1) Improvements may need to be modified or replaced if Alignment 2 reconstruction is pursued at a later date. Stand-alone improvements could remain if Alignment 2 reconstruction is pursued at a later date.
- (3) Roadway reconstruction costs include replacement of the existing South Fork Flathead River Bridge with a new four-lane structure. Roadway reconstruction would be less costly if the South Fork Flathead River Bridge is replaced separately as part of an Alignment 1 improvement.
- (4) Costs reflect planning level estimates, and should not be considered an actual cost or encompassing all scenarios and circumstances. Estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Cost estimate tables are provided in Appendix D.
- (5) Recommended implementation timeframe does not indicate when projects will be programmed or implemented. Project programming is based on available funding and other system priorities. Short-term: Implementation is recommended within a 1- to 5-year period; Mid-term: Implementation is recommended within a 6- to 10-year period; Long-term: Implementation is recommended within a 11- to 20-year period.





### **ES.4 Conclusions and Next Steps**

This study evaluated existing and projected conditions, identified corridor needs and objectives, and recommended options to improve conditions within the US 2 – Badrock Canyon corridor. The report identifies potential improvement options, describes qualitative screening measures, and presents a planning level evaluation of options in the corridor. The findings and recommendations provided in this report could be used to streamline a future NEPA/MEPA effort if MDT pursues improvements within the corridor.

Reconstruction of the US 2 corridor would involve constructability challenges due to the proximity of the Flathead River, rock outcroppings, and buried utilities. Reconstruction would result in impacts to sensitive environmental and cultural resources in the corridor. NEPA/MEPA environmental compliance documentation would be required and improvement impacts would need to be identified and mitigated in coordination with permitting agencies. Environmental compliance documentation may also be required for some Alignment 1 improvements. Methods to avoid and minimize impacts would need to be identified during the project development process for improvement options forwarded from this study.

Implementation of improvement options will depend on funding availability and other system priorities. MDT has tentatively identified funding through the Bridge program for replacement of the South Fork Flathead River Bridge. There is currently no funding available for roadway reconstruction. At this time, funding for this level of improvement is highly unlikely over the short term, but may be available toward the end of the planning horizon depending on other projects underway in the Missoula District. Some smaller spot improvements may be fundable through other mechanisms or at the local level.



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# 1.0 INTRODUCTION

The Montana Department of Transportation (MDT), in cooperation with Flathead County, the City of Columbia Falls, the Confederated Salish and Kootenai Tribes (CSKT), and the Federal Highway Administration (FHWA), initiated the US 2 – Badrock Canyon Corridor Planning Study to assess 2.4 miles of U.S. Highway 2 (US 2) beginning east of Columbia Heights (Reference Post [RP] 140.0) and ending at the eastern edge of Hungry Horse (RP 142.4). The study area is located within Sections 6 and 7, Township 30 North, Range 19 West, Montana Meridian and Sections 1, 2, 11 and 12, Township 30 North, Range 20 West, Montana Meridian, within Flathead County. Figure 1-1 illustrates the study area.

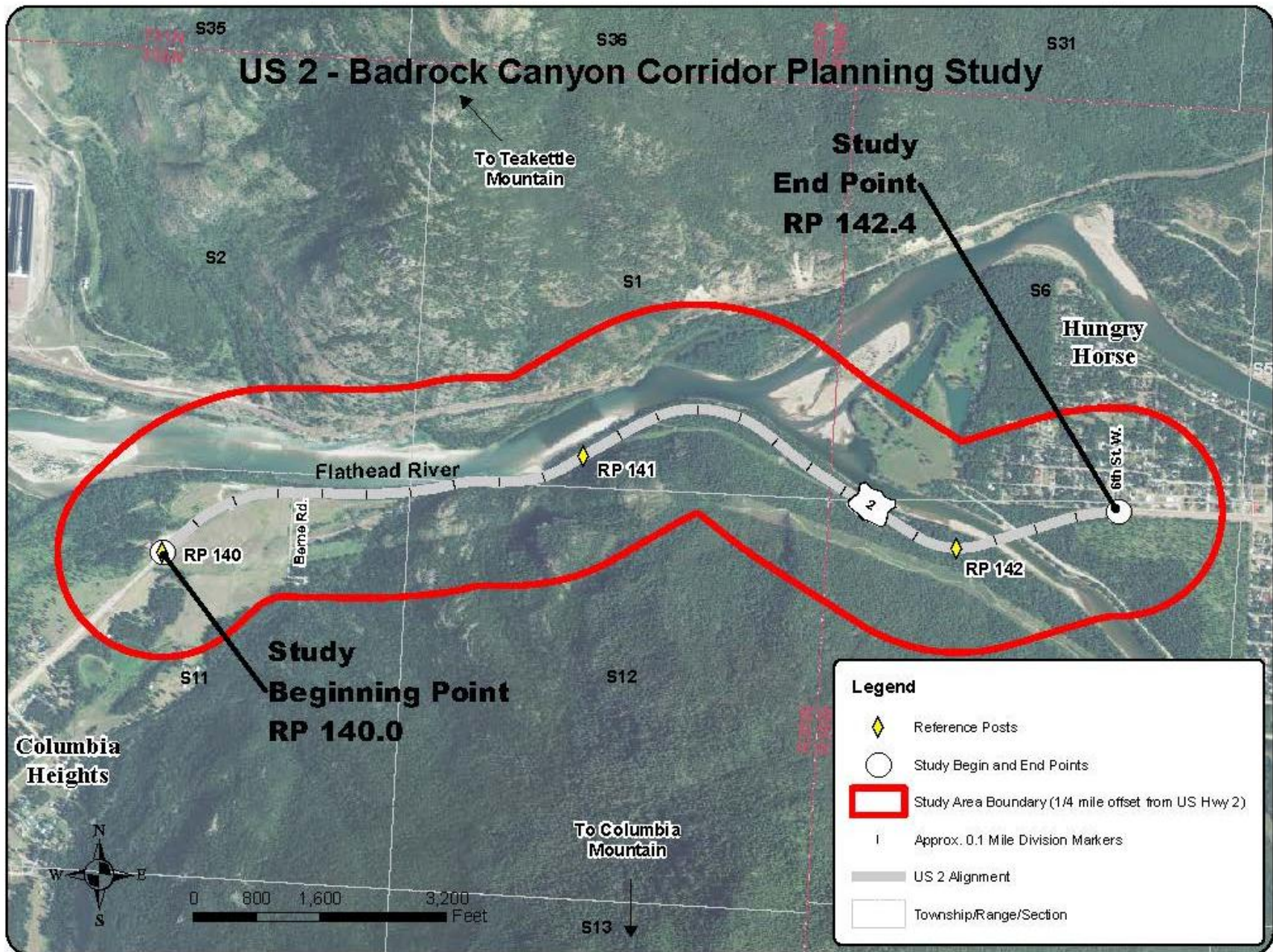
## 1.1 Study Process

The study follows the 2009 Montana Business Process to Link Planning and National and Montana Environmental Policy Act (NEPA/MEPA) Reviews, MDT’s guideline for conducting corridor planning studies. This process facilitates a smooth and efficient transition from early transportation planning to project development and NEPA/MEPA environmental review. The planning process identifies corridor needs and objectives; provides opportunities for early engagement with members of the public, stakeholders, and resource agencies; and identifies feasible improvement options.

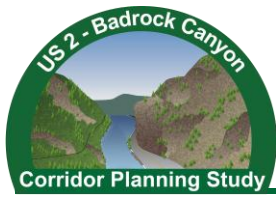
Early planning efforts simplify and streamline subsequent project development by identifying and avoiding fatal flaws. A planning study can provide a basis for early screening, allowing exclusive focus on reasonable, feasible alternatives during the NEPA/MEPA process. The findings and recommendations provided in this report can be used to streamline a future NEPA/MEPA effort if MDT pursues improvements in the corridor.



Figure 1-1 Study Area



Source: MDT, 2011; NRIS, 2011; DOWL HKM, 2011.



### 1.2 Previous Planning Efforts in US 2 – Badrock Canyon Corridor

In 1995, the Columbia Heights-Hungry Horse Final Environmental Impact Statement (FEIS) / Section 4(f) Evaluation was completed to assess the impacts of reconstructing 4.5 miles of US 2 from RP 138.3 to RP 142.7 between Columbia Heights and Hungry Horse in Flathead County, Montana. FHWA signed a Record of Decision (ROD) on the FEIS on December 22, 1995. The ROD approved Alternative 1, which entailed a four- and five-lane design for reconstruction of US 2. Pursuant to the FEIS, MDT initiated two reconstruction projects within the Columbia Heights-Hungry Horse corridor. The Columbia Heights-East project extended from RP 138.3 to RP 140.1, and the Hungry Horse-West project extended from RP 140.1 to RP 142.7.

In the years following completion of the Columbia Heights-Hungry Horse FEIS and ROD, Flathead County experienced substantial growth, which resulted in the need to update traffic volumes and accident rates. Federal and state regulations relevant to some of the project activities had changed. Additionally, other concerns were identified that required MDT to make minor design modifications or that had the potential to dictate new and more notable project design changes. Some of these design activities resulted in more accurate quantification of the environmental effects disclosed in the FEIS. Lastly, controversy surrounded the alternative approved in the ROD. For these reasons, MDT conducted an Environmental Re-evaluation of the FEIS and Section 4(f) Evaluation in 2002.

The Re-evaluation concluded the FEIS adequately described the impacts associated with reconstruction of US 2 within the limits of the Columbia Heights-East project. This reconstruction project widened US 2 from two travel lanes and narrow shoulders to four 12-foot travel lanes, a 14-foot center turn lane, and two eight-foot shoulders, with a total paved width ranging from 77 to 88 feet. This project was completed in 2004.

The Re-evaluation also concluded the FEIS adequately discussed the environmental effects of building a new bridge across the South Fork of the Flathead River (referred to in this report as the South Fork Flathead River Bridge). The Re-evaluation found the preferred alternative discussion in the FEIS and ROD did not adequately address environmental effects of reconstructing US 2 through Badrock Canyon (RP 140.1 to RP 141.2) on an alignment that minimized or totally avoided rock excavation near Berne Memorial Park (RP 140.9±). Since the Re-evaluation, additional information was identified regarding Native American cultural concerns in the area and potential impacts to a natural gas transmission pipeline. The Re-



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evaluation called for a Supplemental Environmental Impact Statement (SEIS) to be prepared for this segment of the corridor.

In early 2011, members of communities in proximity to Badrock Canyon (broadly referred to in this report as the “canyon community”) approached MDT regarding potential improvements to US 2 through Badrock Canyon. In lieu of preparing a SEIS at that time, MDT hosted an informational meeting in May 2011 to identify community concerns within the corridor. Based on comments provided during the meeting as well as written comments submitted during the comment period from May 12 to May 20, 2011, MDT determined there was local interest in pursuing further analysis of the corridor. This effort, referred to as Phase I, was completed in June 2011. Phase II entails completion of the corridor planning study for the portion of the US 2 corridor between RP 140.0 and RP 142.4.





## **2.0 PUBLIC AND AGENCY PARTICIPATION**

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

### **2.1 Study Website**

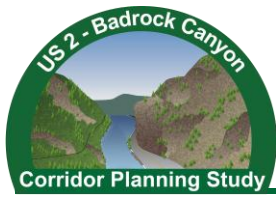
A study website (<http://www.mdt.mt.gov/pubinvolve/badrock>) was developed to provide information about this study. Draft documents were posted for public review and comment during the study process. Informational meeting announcements were posted to the website to encourage public involvement in the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

### **2.2 Public and Agency Involvement Activities**

Three informational meetings were conducted during Phase I and Phase II of the US 2 – Badrock Canyon Corridor Planning Study. Meetings were advertised in the Daily Inter Lake, Flathead Beacon, West Shore News, Hungry Horse News, and Whitefish Pilot newspapers. A press release was issued to radio stations, newspapers, and other local media outlets prior to each meeting. Newsletters provided information on corridor study progress, upcoming participation opportunities, and available study documentation and were available to attendees at the meetings. Newsletters were also distributed to the study mailing list before each meeting. Materials from the three informational meetings including advertisements, press releases, sign-in sheets, agendas, newsletters, presentations, meeting minutes, and written comments are included in Appendix A.

#### **2.2.1 First Informational Meeting**

Thirty-six members of the public attended the first informational meeting held during Phase I on May 12, 2011 in Columbia Falls. The meeting began with a PowerPoint presentation that provided an overview of the history of MDT’s efforts in the corridor and existing transportation and environmental conditions. The following topics were raised by multiple meeting attendees.



- Crash statistics may not reflect public perceptions of safety concerns due to unreported near miss crashes.
- The South Fork Flathead River Bridge is narrow and in need of replacement.
- A dedicated pedestrian/bicycle facility, additional signage, and lower speed limits are desired within the corridor.
- There are numerous physical constraints within the corridor, including the Flathead River, rock outcroppings, and riparian areas.

Additional information is provided in the Phase I Report (Appendix A).

### **2.2.2 Second Informational Meeting**

Forty-three members of the public attended the second informational meeting held during Phase II on April 10, 2012 in Hungry Horse. The informational meeting began with a PowerPoint presentation covering key findings from the Existing and Projected Conditions Report, including transportation system and environmental conditions. The presentation concluded with a summary of preliminary improvement concepts in the study corridor. The following topics were raised by multiple meeting attendees.

- Near miss crashes are a frequent occurrence. Horizontal and vertical curves pose safety concerns.
- There is an increase in traffic during summer months.
- Rock outcroppings, the Flathead River, riparian vegetation, scenic viewsheds, and the water source at Berne Memorial Park are valued resources in the corridor.
- The potential high cost of construction and funding availability present challenges for improvements in the corridor.
- A dedicated bicycle/pedestrian facility is desired.

### **2.2.3 Third Informational Meeting**

Twenty-three members of the public attended the third informational meeting held on August 28, 2012 in Hungry Horse. The informational meeting began with a PowerPoint presentation briefly summarizing existing and projected conditions, including transportation system conditions and environmental conditions. The presentation continued with a summary of the planning level screening process and recommended improvement options. The presentation concluded with a summary of possible next steps following completion of the corridor study. The following topics were raised by multiple meeting attendees.

- Safety should be the primary concern in the corridor.
- Crashes are primarily due to driver behavior, including driving too fast for conditions.
- Motorists may drive faster if the roadway is widened.
- Adding and dropping lanes may cause dangerous merging maneuvers.
- Access to Berne Park and the Flathead River should be maintained.



- A dedicated bicycle/pedestrian facility with barrier protection is desired.
- The scenic nature of the corridor should be preserved.
- Traffic should be maintained during construction to minimize impacts to businesses in Hungry Horse and Columbia Falls.
- Various improvements are supported, including a reconstructed two-lane roadway, a tunnel option, additional signage, overhead lighting, a lowered speed limit, a new South Fork Flathead River Bridge, and improvements at Berne Memorial Park.

### **2.2.4 Resource Agency Meeting**

Resource agencies were invited to a meeting on January 9, 2012 to discuss environmental resource issues and concerns within the corridor. Representatives from MDT, Montana Department of Environmental Quality (DEQ), U.S. Army Corps of Engineers (USACE), Glacier National Park (GNP), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and Montana Fish, Wildlife & Parks (FWP) attended the meeting. The presentation provided an overview of the corridor planning study process and key findings from the Existing and Projected Conditions Report and the Environmental Scan Report.

Agency representatives provided comments throughout the presentation. DEQ expressed concern regarding the proximity of the road to the Flathead River throughout the corridor. USFWS stated nests for peregrine falcons and bald eagles have been observed within ¼ mile of the study area and noted a wildlife underpass would be difficult to construct due to floodplain issues. USACE noted the Clean Water Act Section 404 permitting process requires consideration of the Least Environmentally Damaging Practicable Alternative.

Materials from the resource agency meeting, including the invitation letter, presentation, meeting minutes, and written agency comments, are included in Appendix A.

### **2.2.5 Public and Agency Comment Period**

The public and agency comment period for the Draft Corridor Planning Study extended from August 20, 2012 to September 14, 2012. Twenty written comments were received during the comment period. Written comments and responses are presented at the beginning of Appendix A.

## **2.3 Team Meetings**

A corridor study team was established with representatives from MDT, FHWA, Flathead County, CSKT, the City of Columbia Falls, and the canyon community. The team met regularly during the twelve-month study period to discuss study progress, analysis methodologies and results, draft reports, and other issues and concerns. The team served in an advisory role and reviewed study documentation before publication.



## 3.0 EXISTING CONDITIONS

### 3.1 Transportation System Conditions

This section discusses the highway transportation system within the study corridor including physical features, geometric characteristics, crash history to date, traffic volumes, and operational characteristics. Additional information is provided in the Existing and Projected Conditions Report (Appendix B).

#### 3.1.1 Physical Features and Characteristics

The corridor’s physical features and characteristics were identified through field observation and a review of published statistics, documentation, GIS databases, and MDT record drawings. A corridor field review was conducted in October 2011 to identify existing conditions and constraints.

##### **Functional Classification and Roadway System**

Functional classification is used to characterize public roads and highways in accordance with FHWA guidelines based on the type of service provided by the facility and the corresponding level of travel mobility and access to and from adjacent property. US 2 is functionally classified as a rural principal arterial. Arterials generally have higher design standards than other roads and many principal arterials have multiple lanes with some degree of access control.

US 2 is part of the National Highway System (NHS). The NHS includes highways Congress has determined to have the greatest national importance to transportation, commerce, and defense. Within the study area, US 2 is a two-lane highway serving the neighboring communities of Columbia Falls and Hungry Horse.

##### **Bridges**

A single bridge is located within the study area, crossing the South Fork of the Flathead River before entering Hungry Horse at RP 142.3. The MDT Bridge Bureau has determined the South Fork Flathead River Bridge is functionally obsolete and structurally deficient.

The term “functionally obsolete” indicates the bridge was built to standards no longer used today. The term “functionally obsolete” does not imply the bridge is unsafe. The bridge does not meet current MDT design standards for lane widths, shoulder widths, or approach geometry to serve current traffic demand.





## US 2 – Badrock Canyon Corridor Planning Study

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Bridges are considered structurally deficient if significant load carrying elements are found to be in poor condition due to deterioration or if they were designed using smaller loads than the current legal load limit. The term “structurally deficient” does not imply the bridge is unsafe. A structurally deficient bridge, when left open to traffic, typically requires higher levels of maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies.

The South Fork Flathead River Bridge is eligible for federal aid for replacement. Although the 2002 Re-evaluation concluded the FEIS adequately discussed the environmental effects of building a new four-lane bridge across the South Fork of the Flathead River, the South Fork Flathead River Bridge is included within this corridor study because it has not yet been replaced.

### **Guardrail**

W-beam style guardrail is currently in place on the north side of US 2 throughout much of the corridor. Guardrail end sections in the study corridor do not meet current MDT design standards, with the exception of the end section located at RP 141.4±.

### **Railroad Facilities**

A rail line owned and operated by BNSF Railway generally parallels the main stem of the Flathead River north of and across the river from US 2 throughout the length of the corridor.

### **Bicycle and Pedestrian Facilities**

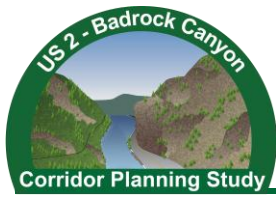
There are no dedicated bicycle or pedestrian facilities directly adjacent to US 2 within the study area. Bicycle and pedestrian usage data was not collected for this study.

### **Drainage Conditions**

Roadside ditches run adjacent to US 2, and culverts convey water beneath US 2 at various locations. MDT maintenance personnel have observed ice forming on the rock outcroppings adjacent to US 2 in winter months. During periods of snow melt, water ponds and flows across the roadway near RP 140.7± and RP 140.9±.

### **Utilities**

NorthWestern Energy owns and operates a 10-inch diameter high pressure natural gas transmission pipeline that generally runs along the south side of US 2 and is the only line serving the Flathead Valley area. In some locations, the line may be located directly under the road surface.



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Overhead power transmission lines owned by Flathead Electric Cooperative, Inc. (FEC) generally run south of and roughly parallel to US 2 through the canyon. An FEC electrical substation is located approximately 200 ft south of US 2 at RP 141.8±. Unpaved road approaches at RP 141.1± and RP 141.8± provide access to the FEC facilities.

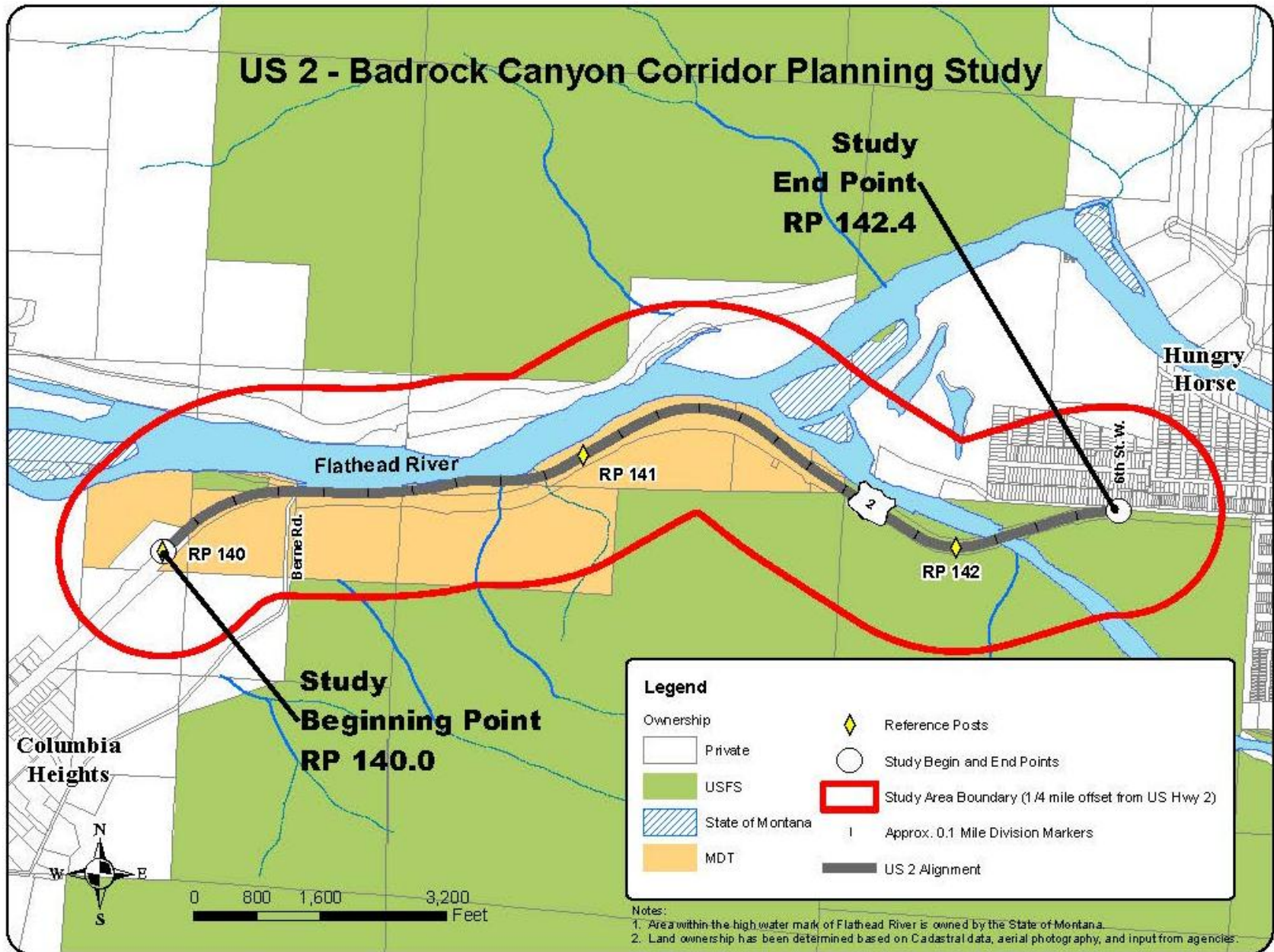
A high voltage transmission line owned and operated by Bonneville Power Administration (BPA) runs from Hungry Horse Dam along the ridgeline at the southerly study area margin.

AT&T owns and operates an underground fiber optic cable that generally runs along the south side of US 2.

### **Right-of-Way and Land Ownership**

Within the study area, US 2 is bordered by private lands, lands owned by MDT, and lands administered by USFS. MDT acquired a series of parcels south of US 2 between Berne Road (RP 140.3±) and Hungry Horse following completion of the 1995 FEIS. This acquisition provided MDT with right-of-way for roadway improvements and prevented the development of incompatible land uses along US 2. MDT also obtained an easement from USFS for portions of US 2 traversing USFS lands at the eastern end of the study corridor. Figure 3-1 illustrates land ownership within the corridor.

Figure 3-1 Land Ownership in Study Corridor



Source: NRIS, 2011; MDT, 2011; DOWL HKM, 2011, USFS 2012.



### 3.1.2 Geometric Characteristics and Roadway Elements

#### Design Criteria and Guidelines

The design speed used for analysis of the US 2 study corridor is 60 miles per hour (mph) in combination with rolling terrain. The posted speed limit within the corridor is 55 mph. The Existing and Projected Conditions Report (Appendix B) contains additional information regarding MDT design criteria for rural principal arterials.

#### Roadway Width

Within the study area, US 2 is a two-lane undivided highway with two 12-foot travel lanes and no shoulders.

#### Horizontal Alignment

Evaluation of horizontal alignment includes consideration of horizontal curvature, superelevation, curve type, and entering and passing sight distance. Nine of the 14 horizontal curves within the corridor do not meet current MDT design standards for a 60 mph design speed with regard to curve radius and stopping sight distance.

#### Vertical Alignment

Evaluation of vertical alignment includes consideration of grade, vertical curve length, vertical curve type, 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. Six vertical curves do not meet current MDT design standards for a 60 mph design speed.

### 3.1.3 Crash Analysis

MDT provided crash data for the portion of the US 2 corridor from RP 140.0 to 142.4 for the five-year period from January 1, 2006 to December 31, 2010. During this period, 77 crashes occurred within the corridor.

Engineers assess crash rate, severity rate, and severity index to identify safety concerns. MDT defines the crash rate as a measure of total reported crashes per million vehicle miles of travel. The severity index provides a weighted assessment of crashes, with fatal crashes and crashes resulting in incapacitating injuries weighted more heavily than crashes resulting in less serious injuries or property damage only. The severity rate is calculated by multiplying the crash rate and severity index, providing a weighted measure of crashes per million vehicle miles of travel. Crash rate, severity rate, and severity index for the US 2 corridor are presented in Table 3.1.



**Table 3.1 Crash History Comparison (Statewide Average vs. US 2 Corridor)**

Criteria	Statewide Average for Rural Non-Interstate National Highway System (2006 – 2010)	US 2 Corridor RP 140.0 – 142.4 (2006 – 2010)	Comparison of US 2 Corridor to Statewide Average
Crash Rate (All Vehicles)	1.04	2.56	2.46 times higher
Severity Index (All Vehicles)	2.09	2.68	1.28 times higher
Severity Rate (All Vehicles)	2.18	6.86	3.15 times higher

Source: MDT, 2011.

The 2006 to 2010 crash rate for the US 2 corridor was nearly 2.5 times higher than the statewide average for similar facilities. The severity rate was more than three times higher than the statewide average during this time period.

Forty-five injuries and five fatalities occurred during the analysis period. All fatal crashes occurred at the western end of the study corridor (RP 140.0 – 140.5). Head-on crashes accounted for 10% (8 of 77) of all crashes in the corridor, which is considered a high percentage since the entire corridor is striped as a no-passing zone. Seven of eight (88%) head-on crashes occurred within the first half-mile of the corridor from RP 140.0 to RP 140.5.

From 2006 to 2010, eight reported crashes (10%) involved wild animals. Six of these eight reported crashes (75%) occurred in the first-half-mile of the corridor from RP 140.0 to 140.5. Additional unreported crashes involving wild animals may have occurred during this period. Maintenance data indicate 11 of 13 (85%) carcasses collected from 2006 to 2010 were recorded in the first half-mile of the corridor from RP 140.0 to 140.5.

### 3.1.4 Traffic Volumes

#### Traffic Characteristics and Travel Patterns

Typical users of US 2 include local residents, commuters, commercial truck drivers, recreational users, and tourists traveling to Glacier National Park and other regional attractions. The motorized vehicle mix includes automobiles, light trucks, recreational vehicles, delivery vans, transit and tour buses, school buses, motorcycles, and multi-axle trucks.

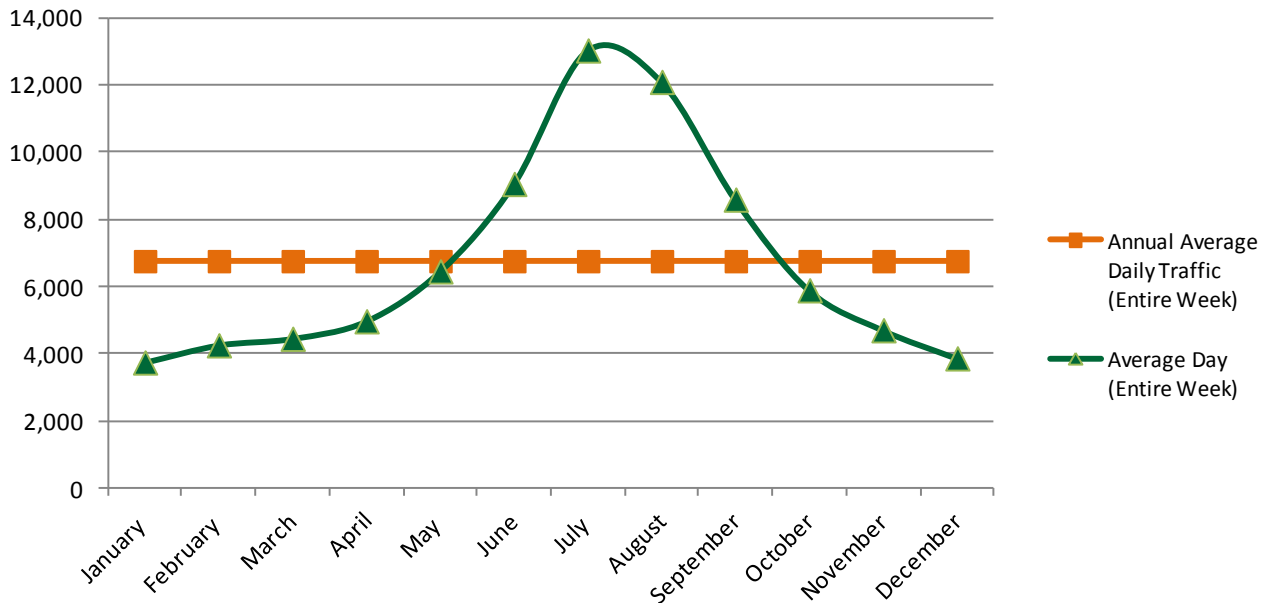




**Annual Average Daily Traffic Volumes**

Annual Average Daily Traffic (AADT) is the total of all motorized vehicles traveling in both directions on a highway on an average day. MDT operates an Automatic Traffic Recorder (ATR) west of the US 2 study corridor at RP 139.6. Figure 3-2 presents AADT volumes from this ATR location in 2010. The US 2 study corridor is traveled more heavily during summer months as compared to other months of the year, with an average of 13,036 and 12,100 vehicles per day traveling through the corridor in July and August, respectively. Higher summer volumes reflect recreational use of this route. The volumes represented in Figure 3-2 account for all vehicles, including domestic and international travelers.

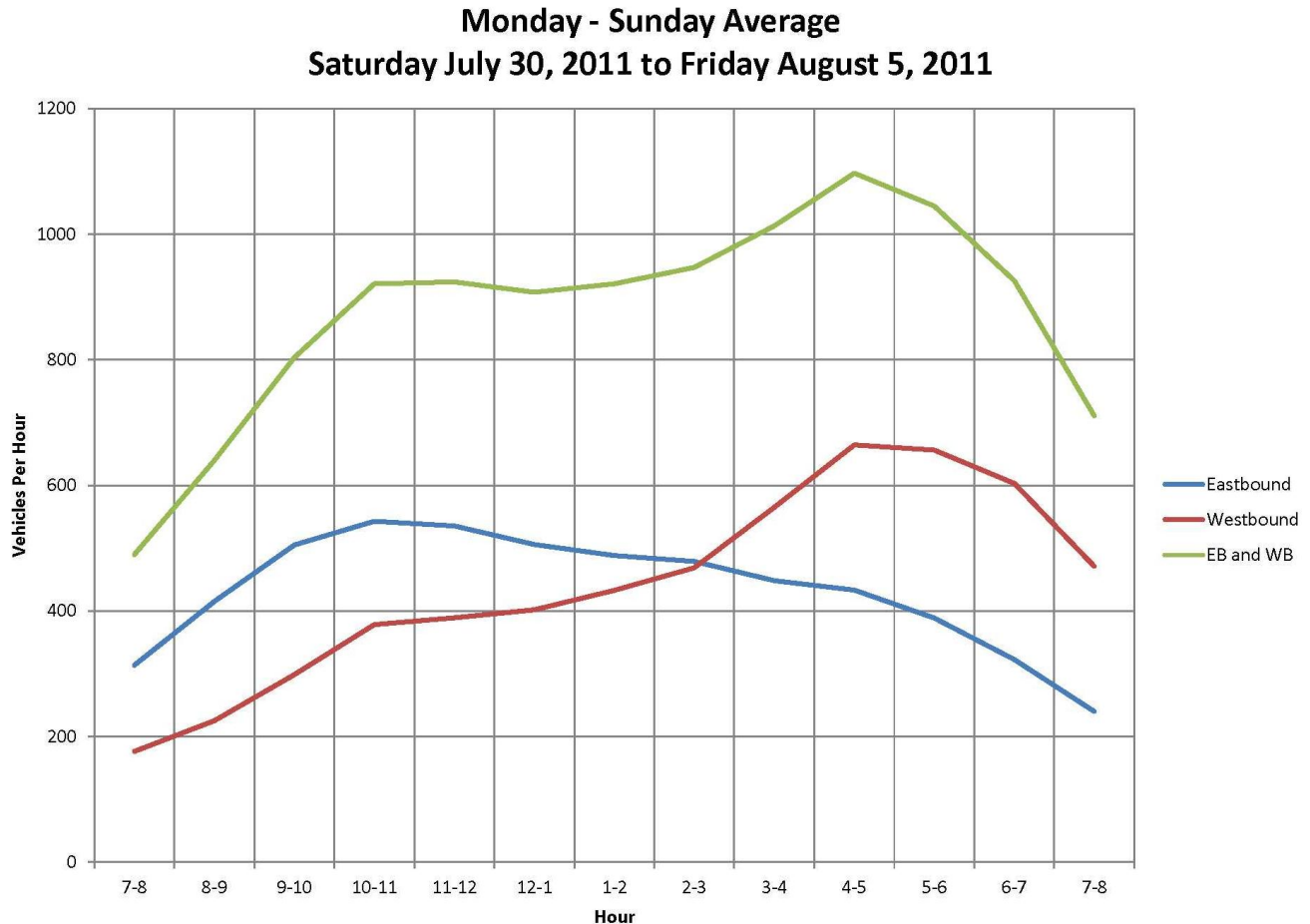
**Figure 3-2 ATR A-60 Average Daily & Annual Average Daily Volumes (2010)**



**Peak-Hour and Off-Peak Hour Traffic Volumes**

Field counts were collected during a one-week (seven-day) period beginning Saturday, July 30, 2011 and concluding Friday, August 5, 2011. Hourly traffic volumes between the hours of 7:00 a.m. and 8:00 p.m. are illustrated in Figure 3-3.

Figure 3-3 Peak Season Hourly Traffic Volumes (July 30, 2011 – August 5, 2011)



Data from the July/August field count collection effort was used to identify peak and off-peak hourly volumes. The July/August field count collection occurred during the peak season summer months when traffic volumes in the US 2 corridor are typically at their highest. A seasonal adjustment factor was applied to the respective month and day of the July/August counts to calculate annual average hourly traffic volumes.

### 3.1.5 Operational Characteristics

Operational conditions on transportation facilities are commonly assessed using the Level of Service (LOS) concept. The Highway Capacity Manual (HCM) 2010 defines LOS as a classification of performance measured on an A to F scale, with LOS A representing the best operating conditions from the traveler’s perspective and LOS F representing the worst.



Within the study corridor, US 2 is a Class II two-lane highway. Class II two-lane highways commonly pass through rugged or scenic areas where motorists do not necessarily expect to travel at high speeds. Six LOS categories ranging from A to F are used to describe traffic operations, with A representing the best conditions and F representing the worst. LOS F occurs when demand flow in one or both directions exceeds the capacity of the segment, operating conditions are unstable, and heavy congestion exists. Highway Capacity Software (HCS) Version 2010 was used to analyze LOS for the Class II two-lane US 2 highway corridor.

Table 3.2 presents the results of the Class II two-lane highway operational analysis for existing peak season and adjusted annual average (2011) conditions for an average week (Monday – Sunday). Results for morning, evening, and off-peak hours are reported. LOS values represent estimated operational conditions.

**Table 3.2 Class II Two-lane Highway Operational Analysis Results (2011)**

Time Period		LOS
Peak Season	AM Peak Hour	D
	Median Off-Peak Hour	D
	PM Peak Hour	D
Adjusted Annual Average	AM Peak Hour	C
	Median Off-Peak Hour	C
	PM Peak Hour	D

Source: DOWL HKM, 2011.

The MDT Traffic Engineering Manual identifies the minimum desirable LOS for a principal arterial facility in rolling terrain as LOS B. The US 2 corridor currently operates at an undesirable LOS C or LOS D, depending on the hour and season.

### **3.2 Demographic and Economic Conditions**

#### **3.2.1 Population Characteristics**

Flathead County has experienced strong population growth since the 1980s. Flathead County grew at a faster rate than the State of Montana and the United States during the 2000 to 2010 period, as presented in Table 3.3. Five of the six communities in the study area vicinity exceeded Flathead County’s growth rate during this period, while Hungry Horse declined in population.



**Table 3.3 Population Growth (2000 – 2010)**

Location	Population		Percent Growth	Compound Annual Growth Rate
	2000	2010		
United States	281,421,906	308,745,538	9.7%	0.93%
Montana	902,195	989,415	9.7%	0.93%
Flathead County	74,471	90,928	22.1%	2.02%
Kalispell	14,223	19,927	40.1%	3.43%
Whitefish	5,032	6,357	26.3%	2.36%
Columbia Falls City	3,645	4,688	28.6%	2.55%
Hungry Horse CDP	934	826	-11.6%	-1.22%
Martin City CDP	331	500	51.1%	4.21%
Coram CDP	337	539	59.9%	4.81%

Source: MDT, 2011; US Census Bureau, 2011. CDP = Census Designated Place

A greater percentage of people identify themselves as white, and American Indians account for a smaller percentage of the population in the study area vicinity and in Flathead County compared to statewide figures. Apart from the Census Designated Place (CDP) of Hungry Horse, the study area is sparsely populated with low numbers of racial minority populations.

**3.2.2 Employment and Income**

The largest income-generating industries in the county from 2008 to 2010 were non-resident travel, federal government, wood products, and other manufacturing. The area is a minor retail trade center for northwestern Montana. Shopping, medical, and entertainment establishments in Kalispell and Whitefish serve nearby communities.

According to the 2006-2010 American Community Survey (ACS) five-year estimates, the majority of residents in the immediate study area vicinity commuted to a location outside their place of residence using a motorized vehicle. Commuters generally drove alone, with mean travel time to work ranging from 13 to 24 minutes.

As of September 2011, Flathead County had a higher rate of unemployment than the state as a whole. Table 3.4 presents employment statistics for Flathead County and Montana.

**Table 3.4 Employment Statistics (2011)**

Area	Total Labor Force	Employed	Unemployed	Unemployment Rate
Montana	502,217	468,156	34,061	6.8
Flathead County	43,404	39,097	4,307	9.9

Source: MT Department of Labor and Industry, County Labor Force Statistics, September 2011.

Note: Data is not seasonally adjusted.





According to 2010 ACS estimates, 14.4% of the Flathead County population was living below the poverty level, approximately equivalent to the state poverty level of 14.6%. ACS estimates for the 2005-2009 period indicate 22.3% of the Hungry Horse civilian labor force was unemployed and approximately 36.4% earned an income below the poverty level.

### **Environmental Justice**

Minority and low-income persons likely live in the study corridor vicinity. If improvement options are forwarded from the study, environmental justice issues will need to be further evaluated during the project development process.

## **3.3 Environmental and Physical Setting**

An Environmental Scan Report was prepared to identify environmental resource constraints and opportunities within the study corridor. Information was gathered from previously published documents, websites, GIS databases, and a field review conducted on October 26, 2011. Key information is summarized in the following sections. Additional information is provided in the Environmental Scan Report (Appendix C).

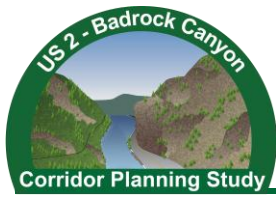
### **3.3.1 Physical Environment**

#### **Soil Resources and Prime Farmland**

Soils found within the study area have been classified as prime farmland if irrigated and farmland of statewide importance according to Section 4201 of the Farmland Protection Policy Act (FPPA) of 1981 (Title 7 United States Code, Chapter 73, Sections 4201-4209). If improvement options are forwarded from this study, a U.S. Department of Agriculture Natural Resource Conservation Service Farmland Conversion Impact Rating Form for Linear Projects (form CPA-106) would need to be completed to document any impacts to farmland.

#### **Geologic Features and Hazards**

Previous geotechnical studies have determined the US 2 study area is comprised of alluvial deposits immediately bordering the Flathead River, with glacial and fluvioglacial deposits spread further into outlying areas. Rock outcroppings bordering US 2 are comprised of quartzite, siltite, and argillite ranging from 25 to 60 feet in height. These rock outcrops exhibit tension cracks which may indicate long term instability. Fault lines are located to the east and west of the immediate study area. The US 2 corridor is located within an area of mid-range hazard for earthquake ground motions.



The bedding and joint structure of the rock outcrops within Badrock Canyon provide a potential for rock falls. If improvement options involving rock excavation are forwarded from this study, additional geotechnical analysis, including rock mapping and borings, would be needed to assess the stability of rock outcroppings in the study area.

### **Surface Water Impairment**

Surface water resources in the immediate study area include the main stem and South Fork of the Flathead River. The study area lies within the Flathead Lake watershed and the South Fork Flathead River watershed, both of which are listed in the DEQ 2010 Integrated 303(d)/305(b) Water Quality Report for Montana. Within the study area, the main stem of the Flathead River from its headwaters to Flathead Lake is listed as Category 3, which indicates waters for which there is insufficient data to assess the use support of any applicable beneficial use. No use support determinations have been made for the main stem as of the 2010 reporting cycle. The South Fork of the Flathead River from the Hungry Horse Dam to its mouth is listed as Category 4C, which indicates non-pollutant-related use impairment has been identified and Total Maximum Daily Loads (TMDLs) are not required. If improvement options are forwarded from this study, an updated water quality analysis may be required during the project development process.

### **Wild and Scenic Rivers**

Within the study area, the Middle Fork of the Flathead River upstream from its confluence with the South Fork of the Flathead River near Hungry Horse is designated as a Recreational River. Its values include recreation, scenery, historic sites, unique fisheries, and wildlife such as grizzly bears and wolves. A Management Corridor for the Middle Fork Recreational River segment has been designated and is administered by the USFS. If improvement options are forwarded from this study, MDT will coordinate with USFS during the project development process to identify potential effects on Middle Fork Flathead River and any measures needed to mitigate impacts to the Middle Fork Recreational River Corridor.

### **Groundwater**

There are two public water supplies and a number of domestic water supplies within the study area. The two public water supplies include the Hungry Horse County Water and Sewer District (located at the east end of the corridor in Hungry Horse) and the Crooked Tree Motel and RV Park system (also located at the east end of the corridor in Hungry Horse). Health-based



drinking water violations have occurred at each location, with the most recent violations occurring in 2009 and 2011.

### **Wetlands**

Five wetland areas were identified within the current study area based on delineations conducted in 2002. Most sites are considered moderately to highly disturbed due to fill placement, proximity to roads, hydrological alteration, and/or degradation associated with foot traffic and garbage placement.

A wetland verification/delineation was conducted in 2004. Wetland locations and non-wetland channel locations were generally identical to those mapped in 2002, with some minor border modifications where sites had expanded or decreased in size since 2002. The 2004 assessment determined the south riverbank is approximately 85% non-wetland, with the remaining 15% consisting of scattered two to four-foot wide wetland fringe from approximately Berne Memorial Park east to the study terminus. The remainder of the riverbank to the west study terminus is considered non-wetland. The 2004 report noted Wetland 4 adjacent to US 2 just east of Berne Road offers minor (0.1 to 0.2 acre) mitigation potential via expansion. If improvement options are forwarded from this study, updated wetland delineations conducted according to standard USACE procedures may be needed to verify wetland boundaries in the study area.

### **Floodplains**

Within the study corridor, the existing US 2 alignment encroaches into the 100-year floodplain for the main stem and South Fork of the Flathead River north of the current bridge crossing. Impacts to floodplains would need to be identified and evaluated for any improvement options forwarded from this study. Coordination with Flathead County would be conducted during the project development process to minimize floodplain impacts and obtain any necessary floodplain permits. Any increase in floodplain elevations within the study area may require a Letter of Map Revision (LOMR) and Conditional Letter of Map Revision (CLOMR) from the Federal Emergency Management Agency (FEMA).

### **Hazardous Materials**

The Montana Natural Resource Information System (NRIS) database identified a single leaking underground storage tank site at the eastern terminus of the study area at RP 142.4±.



**Air Quality**

The study area is not located within a nonattainment area for any air pollutant. The study corridor is located approximately 1.5 miles directly east of the Columbia Falls Nonattainment Area for Particulate Matter (PM<sub>10</sub>). If improvement options are forwarded from this study, an updated air quality analysis may be required based on current traffic volumes.

**3.3.2 Biological Resources**

**Fish and Wildlife**

A number of predators and furbearers are expected to occur in the study area vicinity, including coyotes, red fox, skunk, bobcat, black and grizzly bears, wolf, muskrat, mink, marten, and wolverine. Ungulate species expected to occur in the study area vicinity include white-tailed deer, mule deer, and elk. Moose are infrequently observed in the area, while white-tailed deer frequently use pastures and hay lands adjoining the right-of-way at the western end of the study area throughout the year, and often cross US 2 to access the river.

Fish species commonly found within the main stem and South Fork of the Flathead River in the vicinity of the study area include bull trout, lake trout, lake whitefish, largescale sucker, mountain whitefish, pygmy whitefish, rainbow trout, slimy sculpin, and westslope cutthroat trout.

**Threatened and Endangered Wildlife Species**

Table 3.5 lists threatened and candidate animal species expected to occur in Flathead County. The study area falls within federally designated Critical Habitat for bull trout and Canada lynx.

**Table 3.5 Threatened and Endangered Wildlife Species in Flathead County**

Category	Scientific Name	Common Name	Federal Status
Fish	<i>Salvelinus confluentus</i>	Bull Trout	Listed Threatened, Designated Critical Habitat
Mammal	<i>Ursus arctos horribilis</i>	Grizzly Bear	Listed Threatened
Mammal	<i>Lynx canadensis</i>	Canada Lynx	Listed Threatened, Designated Critical Habitat
Insect	<i>Lednia tumana</i>	Meltwater Lednian Stonefly	Candidate
Mammal	<i>Gulo gulo luscus</i>	Wolverine	Candidate

Source: USFWS, 2011.

If improvement options are forwarded from this study, consultation with USFWS will be required and an updated evaluation of potential impacts to all endangered, threatened,





proposed, or candidate species will need to be completed during the project development process.

**Wildlife and Fish Species of Concern**

Table 3.6 lists the animal species of concern documented by the Montana Natural Heritage Program (MNHP) within Township 30 North, Range 19 West, Sections 6 and 7 and Township 30 North, Range 20 West, Sections 1, 11, and 12 in Flathead County as of October 2011 and confirmed during a resource agency meeting on January 9, 2012. Each species is assigned a state rank ranging from S1 (greatest concern) to S5 (least concern). Species previously listed in Table 3.5 are not repeated in Table 3.6.

**Table 3.6 Animal Species of Concern in Study Area Vicinity**

Group Name	Scientific Name	Common Name	State Rank
<b>Mammals</b>	<i>Martes pennanti</i>	Fisher	S3
<b>Birds</b>	<i>Falco peregrinus</i>	Peregrine Falcon	S3
	<i>Haliaeetus leucocephalus</i>	Bald Eagle	S3
<b>Fish</b>	<i>Oncorhynchus clarkii lewisi</i>	Westslope Cutthroat Trout	S2
	<i>Prosopium coulteri</i>	Pygmy Whitefish	S3
<b>Invertebrates</b>	<i>Prophysaon humile</i>	Smoky Taildropper	S2S3

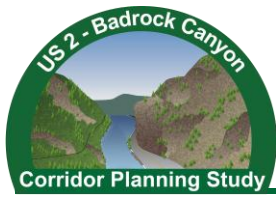
Source: MNHP, 2011.

If improvement options are forwarded from this study, an updated evaluation of potential impacts to all species of concern will need to be completed during the project development process.

**Wildlife Movement and Traffic Concerns**

The Great Northern Environmental Stewardship Area (GNESA) group has identified and mapped wildlife movement areas of concern in this corridor. The group has identified Badrock Canyon as a key conservation area. Several locations within the study corridor are known wildlife crossing points for white-tailed deer, sheep, black bear, and mountain lion.

The majority (75%, or 6 out of 8) of crashes involving wild animals during the period 2006 to 2010 occurred in the first-half-mile of the corridor from RP 140.0 to RP 140.5 west of the canyon. Similarly, maintenance data indicate 11 of 13 carcasses (85%) collected from 2006 to 2010 were recorded in the first half-mile of the corridor from RP 140.0 to 140.5. No carcasses were observed during field surveys in 2004 and 2011 that might indicate usage or movement patterns or conflict points with vehicles.



During the project development process, MDT will coordinate with FWP to determine what measures may be needed to address wildlife crossings within the corridor.

**Vegetation**

There are a number of distinct land types in the corridor, including wetlands, riparian communities, and upland communities. Vegetation communities include disturbed right-of-way and pasture, coniferous forest, mixed conifer/deciduous forest, and cottonwood forest.

**Threatened and Endangered Plant Species**

Table 3.7 presents threatened and candidate plant species expected to occur in Flathead County.

**Table 3.7 Threatened and Endangered Plant Species in Flathead County**

Category	Scientific Name	Common Name	Federal Status
Flowering plant	<i>Silene spaldingii</i>	Spalding's catchfly	Listed Threatened
Conifers and Cycads	<i>Pinus albicaulis</i>	Whitebark pine	Candidate

Source: USFWS, 2011.

If improvement options are forwarded from the study, an evaluation of potential impacts to all endangered, threatened, proposed, or candidate plant species will need to be conducted during the project development process.

**Plant Species of Concern**

Table 3.8 lists the plant species of concern documented by the MNHP within Township 30 North, Range 19 West, Sections 6 and 7 and Township 30 North, Range 20 West, Sections 1, 11, and 12 in Flathead County as of October 2011.

**Table 3.8 Plant Species of Concern in Study Area Vicinity**

Group Name	Scientific Name	Common Name	State Rank
Ferns and Fern Allies	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort	SH
	<i>Botrychium sp.</i>	Moonworts	S1S3
Flowering Plants - Dicots	<i>Castilleja cervina</i>	Deer Indian Paintbrush	SH
	<i>Cirsium brevistylum</i>	Short-styled Thistle	S1S2
	<i>Lathyrus bijugatus</i>	Latah Tule Pea	S1
Bryophytes	<i>Aloina brevirostris</i>	Aloina moss	S1
	<i>Grimmia brittoniae</i>	Britton's dry rock moss	S2

Source: MNHP, 2011.



If improvement options are forwarded from the corridor study, MNHP should be contacted to determine if any new plant species of concern have been documented in the study area and on-site surveys may need to be completed during the project development process to determine any potential impacts to listed plant species of concern.

### **Noxious Weeds**

There are 32 noxious weeds and three regulated plant species designated by the Montana Statewide Noxious Weed List (effective September 2010). Spotted knapweed is commonly found between Columbia Heights and Badrock Canyon and can also be found along the existing US 2 right-of-way at the South Fork Flathead River crossing.

If improvement options are forwarded from the study, the study area will need to be surveyed for noxious weeds during the project development process. Any construction activities resulting from a forwarded improvement option will abide by the MDT Roadside Vegetation Management Plan – Integrated Weed Management Component. County Weed Control Supervisors will be contacted prior to any construction activities regarding specific measures for weed control.

### **3.3.3 Social and Cultural Resources**

#### **Cultural and Archaeological Resources**

Three known cultural features exist in Badrock Canyon, including the historic Tote Road (24FH583), a pre-contact archaeological site (24FH760), and the Badrock Canyon cultural landscape.

The western and eastern termini of the Tote Road are located several hundred feet south of the current US 2 alignment. The middle portion of the Tote Road arcs further south on the lower slopes of Columbia Mountain. The Tote Road is considered eligible for listing on the National Register of Historic Places (NRHP).

Site 24FH760 is an archaeological site located both north and south of the current roadway and is considered eligible for listing on the NRHP.

The CSKT consider the entire Badrock Canyon to have special historical and cultural significance. To date, the canyon has not been evaluated for eligibility for listing on the NRHP.



If improvement options are forwarded from the study, additional archaeological testing would be necessary to establish the nature and significance of materials discovered in proximity to Site 24FH760. Additional assessment may also be needed to determine the canyon’s eligibility for listing on the NRHP as a cultural landscape. Consultation with the CSKT and State Historic Preservation Office (SHPO) would be required to identify mitigation measures for any unavoidable impacts to cultural and archaeological resources.

### **Recreational Resources**

The US 2 – Badrock Canyon corridor serves as a gateway to a variety of recreational opportunities. US 2 is the only route accessing the West Glacier entrance to Glacier National Park. Dispersed recreational opportunities on public lands in the study area vicinity include hunting, hiking, fishing, cross country skiing, floating, berry picking, and camping.

In 1953, the Simpson family conveyed a 100-foot-wide strip of land to the State Highway Commission for use as “a roadside park (including use of a part thereof as a Port of Entry station) and for a highway right of way.”<sup>1</sup> This area is known as Berne Memorial Park and is used by hikers and picnickers.

Anglers, boaters, and other recreational users access the Flathead River throughout the study area. A designated river access site is located at the west end of the corridor near RP 140.2 on USFS land. Vehicles can enter the site directly from US 2 to access a parking area and boat ramp. Dispersed access sites are located along the highway corridor, primarily from Berne Memorial Park upstream to the South Fork Flathead River Bridge. A rock outcropping known as Fisherman’s Rock is located directly adjacent to the Flathead River north of US 2 and Berne Memorial Park. An unpaved pullout near RP 141.4 provides access from US 2 to the river. A small frontage road under the South Fork Flathead River Bridge near RP 142.1 also provides river access.

Two USFS trails can be accessed from US 2 in the study area. The trailhead for the Columbia Mountain trail is located at the western end of the study area and may be accessed from US 2 via Berne Road or Monte Vista Drive. A second trail leading to Fawn Lake can be accessed by an unpaved road that joins US 2 near the South Fork Flathead River Bridge.

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<sup>1</sup> Following execution of the bargain and sale deed, the Port of Entry station was located west of the canyon closer to Columbia Falls.





Impacts to recreational access will need to be identified during the project development process if improvement options are forwarded from this study.

**Section 4(f) Resources**

The FEIS evaluated 11 properties located within the general corridor for their eligibility as Section 4(f) resources. Of these, only Berne Memorial Park and the Tote Road were determined eligible for Section 4(f) protection.

Since that time, additional cultural, archaeological, and recreational resources have been identified in the corridor. Known and potential Section 4(f) resources within the study area are listed in Table 3.9.

**Table 3.9 Known and Potential Section 4(f) Resources within the Study Area**

Name	Type of 4(f) Resource
Tote Road	Historic
Archaeological Site (24FH760)	Historic
Other potential archaeological site(s) near Site 24FH760	Historic
Badrock Canyon Cultural Landscape	Historic
Berne Memorial Park	Recreational
Columbia Mountain Trailhead	Recreational
Fawn Lake Trailhead	Recreational

Source: DOWL HKM, 2011.

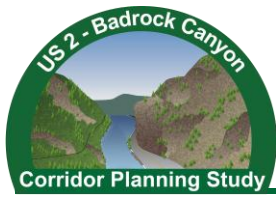
If improvement options forwarded from this study use Section 4(f) resources, a Section 4(f) evaluation would be needed to demonstrate there are no feasible and prudent alternatives to such use and all possible measures to minimize harm have been incorporated.

**Section 6(f) Resources**

There are no Land and Water Conservation Fund (LWCF) sites located within the study area.

**Noise**

Badrock Canyon is relatively undeveloped, although there are a number of residential and commercial developments at the western and eastern ends of the study area near Columbia Heights and Hungry Horse. Berne Memorial Park may be considered a sensitive noise receptor. If improvement options are forwarded from the study, a noise analysis may need to be conducted.



## US 2 – Badrock Canyon Corridor Planning Study

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### **Visual Resources**

The western end of the study area is characterized by gently rolling terrain bordered by steep mountains. Teakettle Mountain to the north and Columbia Mountain to the south are dominant visual features. Extending on either side of US 2, grasslands and pasturelands are interspersed with stands of cottonwoods, aspens, and conifers. Moving east into Badrock Canyon, US 2 is bordered by the Flathead River to the north and the lower slopes of Columbia Mountain to the south. Railroad tracks are visible across the river to the north. Steep rock outcroppings serve as the dominant visual element in the Berne Memorial Park vicinity. Thick forest cover extends on both sides of US 2 east of Berne Memorial Park to Hungry Horse and generally obstructs views of the river in this area. If improvement options are forwarded from this study, further evaluation of the potential effects on visual resources would need to be conducted.



## 4.0 PROJECTED CONDITIONS

This section discusses projected highway transportation system conditions within the study corridor, including anticipated future growth rates, traffic volumes, and operational characteristics. Additional information is provided in the Existing and Projected Conditions Report (Appendix B).

### 4.1 Growth Rate and Projected Traffic Volumes

A compound annual growth rate of 1.5% was selected for projecting future traffic volumes based on historical data from the past 20 years. Using this growth rate, AADT volumes are projected to increase to approximately 9,800 vehicles per day by 2035. Hourly 2035 traffic volumes are projected to increase by approximately 42% from 2011 hourly traffic volumes.

### 4.2 Projected Operational Characteristics

Table 4.1 presents the results of the operational analysis for projected (2035) conditions.

**Table 4.1 Projected Operational Analysis Results (2035)**

Time Period		LOS
Peak Season	AM Peak Hour	D
	Median Off-Peak Hour	D
	PM Peak Hour	E
Adjusted Annual Average	AM Peak Hour	C
	Median Off-Peak Hour	C
	PM Peak Hour	D

Source: DOWL HKM, 2012.

The MDT Traffic Engineering Manual defines desirable operations for a principal arterial facility in rolling terrain as LOS B. The US 2 corridor is projected to operate at an undesirable LOS C to LOS E, depending on the hour and the season.



## 5.0 NEEDS AND OBJECTIVES

Needs and objectives for the US 2 – Badrock Canyon Corridor Planning Study were developed through a review of existing and projected conditions within the corridor, consideration of input from the public and resource agencies, and coordination with the study advisory committee, including representatives from the CSKT, Flathead County, Columbia Falls, and the canyon community. Corridor needs and objectives reflect MDT and community desires to improve the safety and operation of the US 2 facility while minimizing adverse improvement impacts to sensitive resources in the corridor where practicable given corridor constraints and funding availability.

**Need 1: Improve the safety and operation of the US 2 roadway facility within the study area for all users, where practicable.**

*Objectives:*

- 1.a Improve roadway elements to meet current MDT design standards.
- 1.b Provide a South Fork Flathead River Bridge structure that meets current MDT design standards.
- 1.c Provide appropriate guardrail and signing based on current design guidelines.
- 1.d Provide appropriate drainage facilities throughout the corridor to minimize water and ice on the roadway.
- 1.e Provide desirable Level of Service (LOS) through the planning horizon year of 2035.
- 1.f Provide opportunities for non-motorized usage in the corridor.

**Need 2: Minimize adverse impacts from improvements to the environmental, historic, cultural, scenic and recreational characteristics of the corridor.**

*Objectives:*

- 2.a Minimize adverse impacts to the main stem and South Fork of the Flathead River and fisheries that may result from improvement options.
- 2.b Minimize adverse impacts to historic, cultural, and archaeological resources that may result from improvement options.
- 2.c Strive to maintain the scenic nature of the corridor with respect to view sheds and landscape features.
- 2.d Provide reasonable access to recreational sites in the corridor.
- 2.e Minimize conflicts with wild animals and facilitate wildlife movement.

**Other issues to be considered as part of the screening process:**

- Conflicts with utilities
- Construction feasibility
- Availability and feasibility of funding





## 6.0 IMPROVEMENT OPTIONS

This section discusses improvement options identified within the study corridor. Additional information is provided in the Improvement Options Report (Appendix D).

### 6.1 Background

Alternatives identified in the FEIS were used as a starting point for the US 2 – Badrock Canyon Corridor Study. The FEIS initially considered transportation system management, transit, alternate routes, reconstruction of the existing alignment, tunnel construction, construction of a grade-separated facility, and closing US 2.

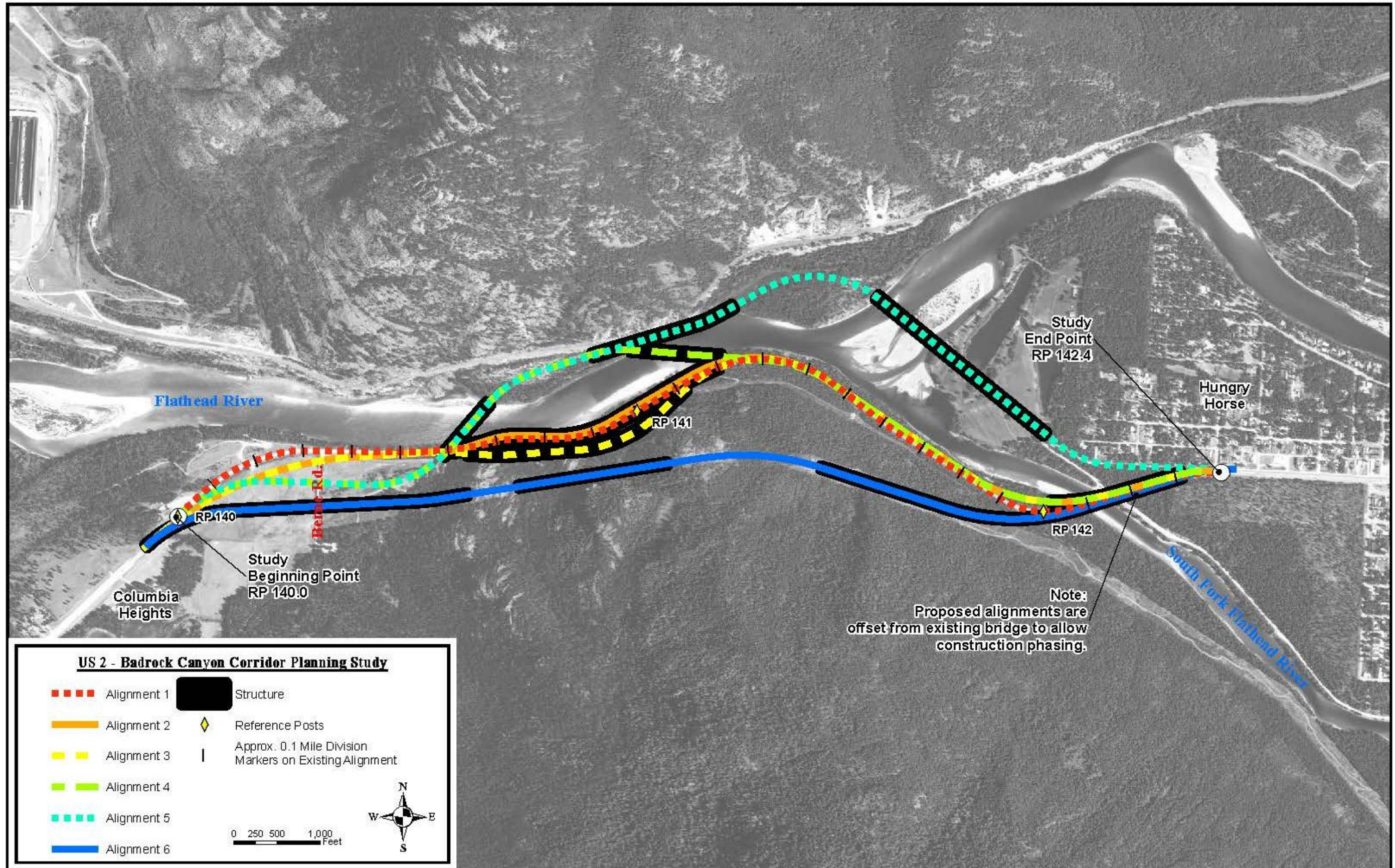
The FEIS identified reconstruction of the existing US 2 alignment as the only reasonable alternative due to considerations including constructability, cost, and ability to improve conditions in the corridor. The FEIS analyzed several roadway configurations to reconstruct the existing US 2 alignment, including an improved two-lane highway, a two-lane highway with a center left-turn lane, an undivided four-lane highway, and a four-lane highway with a center left-turn lane. A four-lane configuration involving rock excavation in Badrock Canyon was recommended throughout the corridor (with a center left-turn lane from Columbia Heights to Berne Road) based on anticipated traffic projections at that time, which indicated four travel lanes would be needed for the highway to operate at an acceptable LOS B in the FEIS design year of 2010.

### 6.2 Alignment Identification

The US 2 – Badrock Canyon Corridor Planning Study team identified six potential alignments to improve safety and operations for US 2 corridor users while minimizing impacts to corridor resources to the extent practicable. Figure 6-1 illustrates potential alignments, with required structures indicated in black.

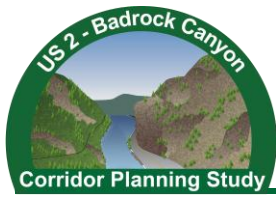


Figure 6-1 Potential Alignments





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### **6.2.1 Alignment 1 (Existing Alignment)**

Alignment 1 would follow the existing US 2 alignment and would involve no modifications to current roadway geometry. Existing horizontal and vertical curves failing to meet current MDT design standards would remain, and the roadway would continue to have two travel lanes with minimal shoulders throughout the corridor. Improvements would be implemented to provide or enhance access management, bicycle/pedestrian facilities, drainage, parking, roadside safety, rockfall prevention, rumble strips, sight distance, traffic control, and wildlife passage. The existing South Fork Flathead River Bridge would be replaced with a new two-lane or four-lane structure due to its classification as functionally obsolete and structurally deficient.

### **6.2.2 Alignment 2 (Optimized Existing Alignment)**

Alignment 2 would generally follow the existing US 2 alignment, although it would include modifications to horizontal/vertical geometry and other roadway elements to meet current MDT design standards where practicable. A new elevated or at-grade structure would be needed in the most constrained portion of the corridor (RP 140.6± to RP 141.2±) to avoid rock excavation. An elevated structure would be constructed above the elevation of the existing US 2 roadway, while an at-grade structure would be constructed at approximately the current roadway elevation. US 2 would be reconstructed as a two-lane facility with shoulders; a combination of two-lane, three-lane, and/or four-lane sections; or a four-lane facility. A new two-lane or four-lane bridge would be constructed to replace the existing South Fork Flathead River Bridge, depending on the lane configuration selected for this alignment.

### **6.2.3 Alignment 3 (Tunnel Alignment)**

Alignment 3 would generally follow the existing US 2 alignment at the western and eastern ends of the corridor (RP 140.0± to RP 140.6± and RP 141.2± to RP 142.4±). It would be reconstructed as a four-lane roadway and would include modifications to horizontal/vertical alignments and other roadway elements to meet current MDT design standards where practicable. A two-lane or four-lane tunnel would extend through the mountain south of US 2 from RP 140.6± to RP 141.2± to bypass the most constrained portion of the corridor. Within this segment, a two-lane tunnel could serve as part of a couplet to accommodate eastbound (EB) volumes with the existing US 2 roadway serving westbound (WB) traffic. For a couplet scenario, a new structure would be needed along the existing US 2 alignment to avoid rock cuts. Alternately, a four-lane tunnel could accommodate EB and WB traffic, and the existing US 2 facility could continue to be maintained as a local roadway to provide access to Berne Memorial Park and the Flathead River. For both configurations, a new four-lane bridge would



be constructed to replace the existing South Fork Flathead River Bridge and tie into the four existing travel lanes in Hungry Horse.

### **6.2.4 Alignment 4 (Partial Canyon Bypass Alignment)**

Alignment 4 would cross to the north side of the main stem of the Flathead River at RP 140.6± and rejoin the existing alignment at RP 141.2±, bypassing the most constrained portion of the existing alignment. Within this segment, the existing US 2 roadway could continue to be maintained as a local roadway to provide access to Berne Memorial Park and the Flathead River. The new four-lane US 2 facility would meet current MDT design standards where practicable. Alignment 4 would include two new four-lane bridges crossing the main stem of the Flathead River, and a new four-lane bridge crossing the South Fork of the Flathead River.

### **6.2.5 Alignment 5 (Full Canyon Bypass Alignment)**

Alignment 5 would cross to the north side of the main stem Flathead River at RP 140.6± and rejoin the existing alignment at the far eastern end of the corridor (RP 142.4±), bypassing the majority of the existing alignment. Within this portion of the corridor, the existing US 2 roadway could continue to be maintained as a local roadway providing access to Berne Memorial Park and the Flathead River. The new four-lane US 2 facility would meet current MDT design standards where practicable. Alignment 5 would include three new four-lane bridges crossing or paralleling the main stem of the Flathead River. The new alignment could tie into the west end of River Junction Road before intersecting the existing US 2 alignment in Hungry Horse.

### **6.2.6 Alignment 6 (Southern Alignment)**

Alignment 6 would depart from the existing alignment at the western end of the corridor (RP 140.0±) to traverse over the mountainous terrain south of US 2, and rejoin the existing alignment at RP 142.4±. Within this portion of the corridor, the existing US 2 roadway could continue to be maintained as a local roadway to provide access to Berne Memorial Park and the Flathead River. The new four-lane US 2 facility would meet current MDT design standards where practicable. Three lengthy elevated structures would be needed to span the steep topography, and a new four-lane bridge would replace the existing South Fork Flathead River Bridge.

## **6.3 Alignment Screening**

A qualitative screening process was developed to evaluate the range of alignments at a pre-NEPA/MEPA planning level. To be considered viable and pass the screening, an alignment must





be reasonable and practicable in terms of cost, constructability, level of community support, degree of impacts to sensitive resources, and right-of-way acquisition requirements. Screening criteria and results are described in more detail below.

**6.3.1 Cost**

An option can be screened from further consideration at the pre-NEPA/MEPA planning level if it would not be feasible due to excessive costs. An estimated cost may be deemed unreasonable if it is substantially greater than costs for other options that meet corridor needs and objectives. Very high cost projects are not practicable or feasible due to difficulties in securing funding. Planning level cost estimates for each alignment are presented in Table 6.1.

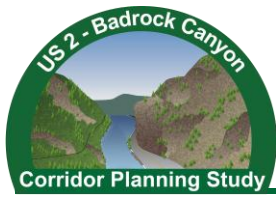
**Table 6.1 Planning Level Cost Estimates – Alignments**

Alignment	Planning Level Estimate of Costs <sup>(1)</sup>
<b>Alignment 1</b> (Existing Alignment)	Spot Improvements: \$500 to \$6.6M South Fork Flathead River Bridge Reconstruction: \$9.7M to \$27.3M
<b>Alignment 2</b> (Optimized Existing Alignment)	US 2 Reconstruction: \$35.9M to \$177.0M
<b>Alignment 3</b> (Tunnel Alignment)	US 2 Reconstruction / New Construction: \$399.0M to \$558.0M
<b>Alignment 4</b> (Partial Canyon Bypass Alignment)	US 2 Reconstruction / New Construction: \$70.1M to \$86.4M
<b>Alignment 5</b> (Full Canyon Bypass Alignment)	US 2 Reconstruction / New Construction: \$89.5M to \$110.0M
<b>Alignment 6</b> (Southern Alignment)	US 2 Reconstruction / New Construction: \$307.0M to \$379.0M

Source: DOWL HKM, 2012.

<sup>(1)</sup> Estimates for Alignment 1 indicate range of costs for potential spot improvements and reconstruction of the South Fork Flathead River Bridge. Estimates for Alignments 2 through 6 encompass reconstruction or construction of new alignments within the corridor, including replacement of the existing South Fork Flathead River Bridge, where appropriate. Cost ranges reflect various spot improvements, structures, lane configurations, and contingencies. Cost estimates include two- and four-lane configurations for Alignment 2 and a four-lane configuration for a new US 2 facility (Alignments 3, 4, 5, and 6). Cost estimates are provided in 2012 dollars and reflect anticipated construction costs only. Estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Planning level estimates should not be considered an actual cost encompassing all scenarios and circumstances. Cost estimate tables are provided in Appendix D.

Alignment 1 is expected to be the least costly alignment. Alignments 2, 4, and 5 are expected to range in cost from \$35.9 million to \$177.0 million, depending on the required number of river crossings, lane configurations, and the types of structures involved in construction or reconstruction of US 2. Alignments 3 and 6 are expected to range in cost from \$307.0 to \$558.0 million, nearly two to more than three times higher than the next most costly alignment. For this reason, Alignments 3 and 6 are considered not feasible from a cost perspective.



### 6.3.2 Constructability

Constructability challenges in the US 2 – Badrock Canyon corridor would include retaining walls or bridge piers within or adjacent to the Flathead River; mobilizing construction equipment, maintaining traffic, and providing adequate emergency vehicle access within the most constrained portion of the corridor (RP 140.6± to RP 141.2±); and addressing buried utility lines adjacent to US 2. Project level analysis would be needed to determine if temporary or permanent relocation of buried utilities would be required for construction of Alignments 2 and 3.

Tension cracking along rock outcroppings south of US 2 would likely create complications related to Alignment 3 tunnel construction. The mountainous terrain south of US 2 would pose considerable challenges for construction of Alignment 6. Alignments 3 and 6 are not feasible from a constructability standpoint due to potential geotechnical risks associated with blasting and/or tunneling through unstable rock formations and steep terrain south of the existing alignment.

### 6.3.3 Potentially Impacted Resources

Alignments were identified to minimize impacts to sensitive environmental and cultural resources and adjacent land areas to the extent practicable. Despite these efforts, replacement of the South Fork Flathead River Bridge, reconstruction of the existing US 2 alignment, and/or construction of new alignments would result in unavoidable impacts within the corridor.

All alignments would require permitting through USACE, FWP, DEQ, and the Flathead County Floodplain Administrator. Construction of Alignment 3 and 6 could create a risk of impacting the water source at Berne Memorial Park. Alignments 4 and 5 would require new river crossings, which could result in Flathead River impacts that may be difficult to permit. Alignments 3, 4, 5, and 6 would result in or would create a risk of unreasonable impacts to corridor resources.

### 6.3.4 Right-of-Way Acquisition / Easements

All alignments would require DNRC land use licenses or easements for replacement of the South Fork Flathead River Bridge and/or construction of new bridges crossing the Flathead River. Alignments 1, 2, 3, 4, and 6 would require USFS easements where roadway widening and modifications to horizontal and vertical elements would extend outside existing MDT rights-of-way. Alignments 4, 5, and 6 would require unreasonable quantities of new right-of-way from private landowners and coordination with the railroad and utilities.



### **6.3.5 Community Support**

During the Phase I and Phase II corridor planning study efforts, community members and CSKT representatives expressed support for maintaining or generally following the existing alignment (Alignments 1 and 2). Support was expressed for spot improvements, replacement of the South Fork Flathead River Bridge, and roadway reconstruction to improve corridor safety and operations, while minimizing impacts to sensitive environmental and cultural resources. There was some interest in tunnel options and potential alignments to the north and south of the existing US 2 roadway (Alignments 3, 4, 5, and 6), although community members and CSKT representatives were generally less supportive of new alignments.

### **6.3.6 Screening Summary - Alignments**

Alignments 1 and 2 are advanced, with additional discussion in Section 6.4. Based on failure to meet criteria relating to cost, constructability, resource impacts, right-of-way acquisition / easements, and community support, Alignments 3, 4, 5 and 6 are eliminated from further consideration and will not be discussed further in this report. Table 6.2 summarizes the alignment screening. Orange shading indicates failure to pass a screening criterion, with specific failing elements highlighted in black.

Table 6.2 Screening Summary – Alignments

Criteria	Alignment 1 Existing	Alignment 2 Optimized Existing	Alignment 3 Tunnel	Alignment 4 Partial Canyon Bypass	Alignment 5 Full Canyon Bypass	Alignment 6 Southern Alignment
<b>Planning Level Estimate of Costs<sup>(1)</sup></b>	<i>Spot Improvements</i> \$500 to \$6.6M <i>South Fork Flathead River Bridge Reconstruction</i> \$9.7 to \$27.3M	<i>US 2 Reconstruction</i> \$35.9M to \$177.0M	<i>US 2 Reconstruction / New Construction</i> <b>\$399.0M to \$558.0M</b>	<i>US 2 Reconstruction / New Construction</i> \$70.1M to \$86.4M	<i>US 2 Reconstruction / New Construction</i> \$89.5M to \$110.0M	<i>US 2 Reconstruction / New Construction</i> <b>\$307.0M to \$379.0M</b>
<b>Constructability Challenges<sup>(2)</sup></b>	<ul style="list-style-type: none"> <li>South Fork Flathead River Bridge reconstruction</li> <li>Traffic delays during construction</li> </ul>	<ul style="list-style-type: none"> <li>South Fork Flathead River Bridge reconstruction</li> <li>Mobilization of materials and equipment into constrained area</li> <li>Traffic delays during construction</li> <li>Conflicts with utilities</li> </ul>	<ul style="list-style-type: none"> <li><b>Geotechnical risks</b></li> <li>South Fork Flathead River Bridge reconstruction</li> <li>Mobilization of materials and equipment into constrained area</li> <li>Traffic delays during construction</li> <li>Conflicts with utilities</li> </ul>	<ul style="list-style-type: none"> <li>New river crossings</li> <li>South Fork Flathead River Bridge reconstruction</li> <li>Mobilization of materials and equipment into constrained area</li> <li>Traffic delays during construction</li> </ul>	<ul style="list-style-type: none"> <li>New river crossings</li> <li>Mobilization of materials and equipment into constrained area</li> <li>Traffic delays during construction</li> </ul>	<ul style="list-style-type: none"> <li><b>Steep terrain</b></li> <li><b>Geotechnical risks</b></li> <li>South Fork Flathead River Bridge reconstruction</li> <li>Mobilization of materials and equipment into constrained area</li> <li>Conflicts with utilities</li> </ul>
<b>Potentially Impacted Resources<sup>(2)</sup></b>	<ul style="list-style-type: none"> <li>Impacts to multiple resources adjacent to existing alignment</li> </ul>	<ul style="list-style-type: none"> <li>Impacts to multiple resources adjacent to existing alignment</li> </ul>	<ul style="list-style-type: none"> <li><b>Risk of impacts to water source at Berne Memorial Park</b></li> <li>Impacts to multiple resources adjacent to existing alignment</li> </ul>	<ul style="list-style-type: none"> <li><b>New river crossings</b></li> <li>Impacts to multiple resources adjacent to existing alignment</li> <li>Impacts to multiple resources along new alignment</li> </ul>	<ul style="list-style-type: none"> <li><b>Risk of impacts to water source at Berne Memorial Park</b></li> <li>Impacts to multiple resources adjacent to existing bridge and along new alignment</li> </ul>	
<b>Right-of-Way (RW) Acquisition / Easements</b>	<ul style="list-style-type: none"> <li>DNRC easement at river crossing</li> <li>USFS easement at RP 140.2± and at eastern end of corridor</li> </ul>			<ul style="list-style-type: none"> <li><b>New RW throughout much of corridor</b></li> <li><b>Railroad involvement</b></li> <li>DNRC easements at river crossings</li> <li>USFS easement at eastern end of corridor</li> </ul>	<ul style="list-style-type: none"> <li><b>New RW throughout majority of corridor</b></li> <li><b>Railroad involvement</b></li> <li>DNRC easements at river crossings</li> </ul>	<ul style="list-style-type: none"> <li><b>New RW throughout majority of corridor</b></li> <li><b>Utility involvement</b></li> <li>DNRC easement at river crossing</li> <li>USFS easement at eastern end of corridor</li> </ul>
<b>Community Support<sup>(3)</sup></b>	More Support	More Support	More Support	<b>Less Support</b>	<b>Less Support</b>	<b>Less Support</b>
<b>Recommendation</b>	<b>Advance</b>	<b>Advance</b>	<b>Eliminate from Further Consideration</b>	<b>Eliminate from Further Consideration</b>	<b>Eliminate from Further Consideration</b>	<b>Eliminate from Further Consideration</b>

Source: DOWL HKM, 2012. Note: Shading indicates failure to meet criteria.

<sup>(1)</sup> Estimates indicate capital construction costs for spot improvements; reconstruction of existing alignment, including existing South Fork Flathead River Bridge; and/or construction of new alignment. Alignment 1 includes a two-lane configuration (with a two-lane South Fork Flathead River Bridge). Alignment 2 includes two-, three-, and four-lane configurations (with a two- or four-lane South Fork Flathead River Bridge). Alignments 3 through 6 include a four-lane configuration (with a four-lane South Fork Flathead River Bridge, where appropriate). Planning level estimates should not be considered an actual cost encompassing all scenarios and circumstances. Estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Cost estimate tables are provided in Appendix 2.

<sup>(2)</sup> Planning level summary does not provide a comprehensive list of issues. Further analysis would be required during project development.

<sup>(3)</sup> Indication of community support is based on feedback provided during informational meetings held in Columbia Falls and Hungry Horse and written comments submitted during the study.



## 6.4 Alignments Advanced

### 6.4.1 Alignment 1

This section identifies potential improvements that could be implemented along the existing US 2 alignment (Alignment 1) before roadway reconstruction throughout the corridor.

#### **Access Management**

Berne Memorial Park attracts members of the public and visitors wishing to access picnic areas and the Flathead River. Safety improvements at Berne Memorial Park could include vehicle turn lanes or median treatments to limit turning movements into and out of the park. A median barrier could be constructed at Berne Memorial Park that would only allow EB right-in and right-out movements and eliminate safety issues associated with left-turn movements. Concrete barrier could also be placed adjacent to the Berne Memorial Park parking area to designate a single point of access.

#### **Potential Locations**

RP 140.8± to RP 141.0± (South Side of US 2)

#### **Planning Level Cost Estimate**

\$100,000 to \$150,000

#### **Recommended Implementation Timeframe**

Short-term

#### **Potentially Impacted Resources and Right-of-Way Requirements**

Impacts to Section 4(f) recreational resources may occur. Additional study would be needed to quantify specific impacts.

#### **Bicycle/Pedestrian Facilities**

Community members expressed support for improved pedestrian and bicycle access within the study corridor. Currently, the roadway's narrow or non-existent shoulders do not encourage non-motorized use. A bi-directional path could be constructed near or immediately adjacent to the existing roadway, providing a dedicated facility for non-motorized users. The facility could be constructed to the north or south of the existing roadway, although a facility to the south may minimize the need for crossings by providing access to Berne Memorial Park and connecting to existing trail systems. Portions of the dedicated facility could be implemented before roadway reconstruction throughout the corridor. Due to physical constraints including the Flathead River and rock outcroppings, a dedicated facility within the most constrained portion of the corridor would need to be designed and implemented in coordination with roadway reconstruction.





An elevated pedestrian bridge could be constructed to allow access across US 2. The structure would need to incorporate ramps and landings in compliance with the Americans with Disabilities Act (ADA). The required ramp and landing dimensions may be difficult to accommodate given physical constraints within the corridor.

The specific location of a dedicated bicycle/pedestrian facility, the potential need for crossings in the corridor, and compatibility with roadway reconstruction would need to be determined during project development.

### **Potential Locations**

Dedicated Bicycle/Pedestrian Facility: Throughout Corridor (North or South Side of US 2)  
Bicycle/Pedestrian Overcrossing: RP 140.8± (North & South Sides of US 2)

### **Planning Level Cost Estimate**

Dedicated Bicycle/Pedestrian Facility: \$3.6 million to \$6.6 million (entire corridor)  
Bicycle/Pedestrian Overcrossing: \$1.0 million to \$2.5 million per location

### **Recommended Implementation Timeframe**

Mid- to long-term

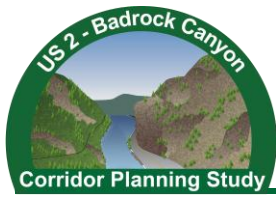
### **Potentially Impacted Resources and Right-of-Way Requirements**

Impacts to the Flathead River, wetland areas, floodplains, fish and wildlife species and habitat, farmlands, vegetation, Section 4(f) cultural/archaeological resources and recreational resources, geologic features, and visual resources may occur. Additional study would be needed to quantify specific impacts. Environmental permitting would be required.

### **Drainage**

Based on field observations and previous reports, there are a number of drainage issues within the constrained portion of the corridor. Surface water ponding occurs seasonally near Berne Memorial Park due to a flat roadway cross slope, the lack of drainage ditches, and plugged or buried culverts. One of the areas of concern lies east of the park, directly below the east rock overhang. This area frequently collects water from melting ice and snow on the rock ledge, at times creating icy conditions on the roadway below.

Plugged or buried culverts could be replaced to improve drainage conditions in the canyon. New ditches or concrete valley gutters could be constructed adjacent to the edge of pavement on US 2 at the Berne Memorial Park parking lot to maximize the amount of collected surface water. Additional drainage features could also be incorporated along the east rock overhang to remove standing water from the roadway.



### **Potential Locations**

Install Culverts: RP 140.8±, RP 141.1±, RP 141.2±, and RP 142.0± (North & South Sides of US 2)

Re-grade Ditches: RP 140.8±, RP 140.9±, and RP 141.8± (South Side of US 2)

Install Valley Gutter: RP 141.0± (South Side of US 2)

### **Planning Level Cost Estimate**

Install Culverts: \$4,000 to \$10,000 per location

Re-grade Ditches: \$1,000 to \$15,000 per location

Install Valley Gutter: \$3,000 to \$5,000

### **Recommended Implementation Timeframe**

Short-term

### **Potentially Impacted Resources and Right-of-Way Requirements**

None

### **Parking**

The parking area at the existing fishing access site at RP 140.2± could be further developed to provide additional parking opportunities and river access within the corridor. The parking area could be linked to the dedicated bicycle/pedestrian facility discussed above to allow non-motorized users to park their vehicles at the western end of the corridor and walk or bicycle through the corridor. Coordination with USFS would be required.

### **Potential Location**

RP 140.2±

### **Planning Level Cost Estimate**

\$400,000 to \$500,000

### **Recommended Implementation Timeframe**

Short-term

### **Potentially Impacted Resources and Right-of-Way Requirements**

Impacts to vegetation, Section 4(f) recreational resources, and visual resources may occur. Additional study would be needed to quantify specific impacts.

### **Roadside Safety**

Guardrail issues were observed during the field investigation conducted for this study. W-beam guardrail is the primary guardrail style used in the corridor. Some end treatments were observed with one-way departure terminal sections adjacent to two-lane traffic. These end sections could be updated to standard terminal sections, reducing the severity of possible crashes.



### **Potential Locations**

RP 140.3±, RP 141.9±, and RP 142.3± (North & South Sides of US 2)

### **Planning Level Cost Estimate**

\$3,000 to \$5,000 per location

### **Recommended Implementation Timeframe**

Short-term

### **Potentially Impacted Resources and Right-of-Way Requirements**

None

### **Rockfall Prevention**

Community members and MDT maintenance personnel have described incidents involving rocks and debris falling onto the roadway from adjacent rock outcroppings. Two possible rockfall prevention options were considered for this study. Additional options could be considered at the project level.

Wire mesh netting could be installed on rock outcroppings south of US 2 at RP 140.7± (west of Berne Memorial Park) and RP 141.1± (east of Berne Memorial Park). The netting would provide protection from rocks and debris that may fall onto the roadway. Alternately, rock bolts could be installed in the areas noted above. Rock bolts could be drilled into the rock outcroppings and backfilled with grout to secure the rock face, reducing the likelihood of falling rocks while minimizing visual impacts. Additional geotechnical investigations may be needed during the project development process to determine the feasibility of these options. Potential cultural or visual mitigation measures are not included in the planning level cost estimate listed below.

### **Potential Locations**

RP 140.7± and RP 141.1± (South Side of US 2)

### **Planning Level Cost Estimate**

\$200,000 to \$1.0 million per location

### **Recommended Implementation Timeframe**

Short-term

### **Potentially Impacted Resources and Right-of-Way Requirements**

Impacts to Section 4(f) cultural/archaeological resources, geologic features, and visual resources would occur. Additional study would be needed to quantify specific impacts.



### **Rumble Strips**

Application of shoulder and centerline rumble strips on two-lane highways has been shown to reduce the incidence and severity of roadway departure crashes. Shoulder and centerline rumble strips commonly consist of parallel grooves cut into the roadway. Shoulder and centerline rumble strips in combination with appropriate pavement markings can alert drowsy, inattentive, or impaired drivers who unintentionally stray across the roadway centerline or off the edge of the roadway. The audible sound and physical vibration alert drivers, improving driver reaction and increasing the likelihood for a safe return to the travel lane. Centerline rumble strips can also assist drivers in identifying lane delineations during low visibility conditions. Continuous application of shoulder and centerline rumble strips is recommended within the US 2 corridor.

#### **Potential Locations**

Throughout corridor

#### **Planning Level Cost Estimate**

\$2,100 to \$2,700 per mile

#### **Recommended Implementation Timeframe**

Short-term

#### **Potentially Impacted Resources and Right-of-Way Requirements**

None

### **Sight Distance**

Trees and shrubs limit sight distance for motorized users in several locations within the corridor. Clearing, grubbing, and tree trimming could improve safety by increasing sight distance around tight horizontal curves.

#### **Potential Locations**

RP 140.9±, RP 141.3±, and RP 142.0± (North & South Sides of US 2)

#### **Planning Level Cost Estimate**

\$9,000 to \$30,000 per location

#### **Recommended Implementation Timeframe**

Short-term

#### **Potentially Impacted Resources and Right-of-Way Requirements**

Impacts to the wetland areas, wildlife species and habitat, vegetation, and visual resources may occur. Additional study would be needed to quantify specific impacts.



### **South Fork Flathead River Bridge**

The South Fork Flathead River Bridge is classified as functionally obsolete and structurally deficient. In the interim period before roadway reconstruction occurs in the corridor, MDT could pursue bridge replacement to provide a safe and functional structure crossing the South Fork of the Flathead River. As supported by future NEPA/MEPA efforts, MDT could initially replace the existing South Fork Flathead River Bridge with a new two-lane bridge. Ultimately, a single four-lane bridge or dual two-lane bridges are recommended to transition into the four existing travel lanes in Hungry Horse and allow flexibility during the design life of the structure. A four-lane bridge (or two two-lane structures) would allow MDT to consider roadway widening within the corridor without the need to replace the bridge(s). A dedicated bicycle/pedestrian facility on the north or south side of the bridge could tie into existing trail systems and a new dedicated non-motorized facility throughout the corridor. Compatibility with other corridor improvements would need to be considered during project development.

#### **Potential Location**

RP 142.1±

#### **Planning Level Cost Estimate**

\$9.7 to \$27.3 million depending on lane configuration

#### **Recommended Implementation Timeframe**

Short- to mid-term

#### **Potentially Impacted Resources and Right-of-Way Requirements**

Impacts to the Flathead River, wetland areas, floodplains, fish and wildlife species and habitat, farmlands, vegetation, cultural/archaeological resources, recreational resources, and visual resources may occur. Additional study would be needed to quantify specific impacts. Environmental permitting would be required.

### **Traffic Control**

Community members expressed support for additional static warning signs and/or variable message signs (VMS). Static signage could include miscellaneous warning signs such as turning roadway signs and share the road signs installed adjacent to the edge of the travel way or on overhead poles. Overhead static signs could also include warning beacons to further warn travelers. Permanent or temporary VMS could be installed within the corridor to warn motorists of safety concerns, such as falling rocks, icy roads, or accidents and inform motorists of bicycle/pedestrian use in the canyon. Two VMS styles currently utilized on Montana highways include small temporary signs mounted on portable trailers and larger permanent signs on metal poles, both placed adjacent to the roadway. A third VMS style incorporates





overhead metal pole structures spanning the roadway. The overhead style is typically used on Interstate or multi-lane facilities, but could be adjusted to fit a narrower roadway. All three VMS systems are capable of being controlled via manual entry or via remote radio connectivity.

### **Potential Locations**

Static sign: RP 140.0±, RP 140.2±, RP 140.4±, RP 140.6±, RP141.0±, RP 141.1±, and RP 142.4± (North & South Sides of US 2)

Variable message sign: RP 140.0±, RP 142.3± (North & South Sides of US 2)

### **Planning Level Cost Estimate**

Static sign: \$500 to \$1,000 per location

Variable message sign: \$20,000 to \$250,000 per location

### **Recommended Implementation Timeframe**

Short-term

### **Potentially Impacted Resources and Right-of-Way Requirements**

None

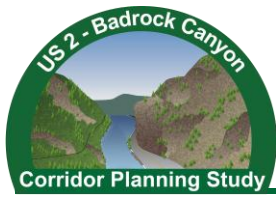
### **Wildlife Passage**

The US 2 corridor lies in proximity to national forest land and the Flathead River. Wildlife species migrate between mountain ranges to the north and south, creating potential safety issues for motorized vehicles. In a written comment submitted to MDT, USFWS noted Badrock Canyon is a known wildlife movement area. USFWS requested consideration of measures to facilitate wildlife movement while improving highway safety.

In an effort to reduce animal-vehicle conflicts, wildlife crossing options were evaluated to determine the appropriate type and location within the corridor. Based on known wildlife movements, a crossing would likely provide the greatest benefit at the western end of the corridor (RP 140.0± to RP 140.4±) before the corridor narrows. At-grade, elevated, and below-grade concepts were analyzed. At-grade fencing could be used to direct wildlife to a designated below-grade crossing point. A below-grade crossing would be preferred over an elevated option due to lower anticipated costs and reduced visual impacts. A preliminary analysis of survey data collected during the FEIS effort indicates a wildlife undercrossing could be constructed at the western end of the corridor without altering the current roadway grade. Planning level cost estimates do not reflect roadway grade alterations. This planning level determination would need to be confirmed during the project development phase.

### **Potential Location**

RP 140.2± (North & South Sides of US 2)



### **Planning Level Cost Estimate**

\$920,000 to \$1.1 million

### **Recommended Implementation Timeframe**

Short- to mid-term

### **Potentially Impacted Resources and Right-of-Way Requirements**

Impacts to floodplains, farmlands, vegetation, and visual resources may occur. Additional study would be needed to quantify specific impacts.

## **6.4.2 Alignment 2**

### **Structure Types**

Alignment 2 would widen the existing US 2 roadway to meet current MDT design standards where practicable. This would entail, at a minimum, shoulders. Alignment 2 improvements could also include additional travel lanes and a dedicated left-turn bay at Berne Memorial Park. The need for a structure within the most constrained portion of the corridor (140.6± to RP 141.2±) was identified in an effort to accommodate roadway widening while avoiding cutting or blasting the face of rock outcroppings.

Rock cutting/blasting activities are undesirable for several reasons. First, the rock in Badrock Canyon is known to be unstable. The Badrock outcroppings exhibit multiple tension cracks, some as wide as two feet running parallel to US 2. The MDT Geotechnical Section has noted these tension cracks increase the potential for large scale failure if the rock face is cut or blasted.

Secondly, the CSKT consider the entire Badrock Canyon to have special historical and cultural significance, and the canyon cliffs are extremely important to CSKT members. In part due to new information about historical/archaeological and Section 4(f) resources identified after completion of the FEIS, the Re-evaluation found the FEIS did not adequately assess an alignment that would minimize or totally avoid rock excavation near Berne Memorial Park.

Lastly, community members and CSKT representatives have expressed strong support for maintaining the water feature at Berne Memorial Park. In their comments to MDT, USACE noted springs are an important aquatic resource in the state of Montana. Additional study would be needed to determine if cutting or blasting the rock would result in impacts to the water source at Berne Memorial Park.



For these reasons, at-grade and elevated structure options were identified to allow roadway widening while avoiding impacts to the canyon rock face. These options are described in more detail below.

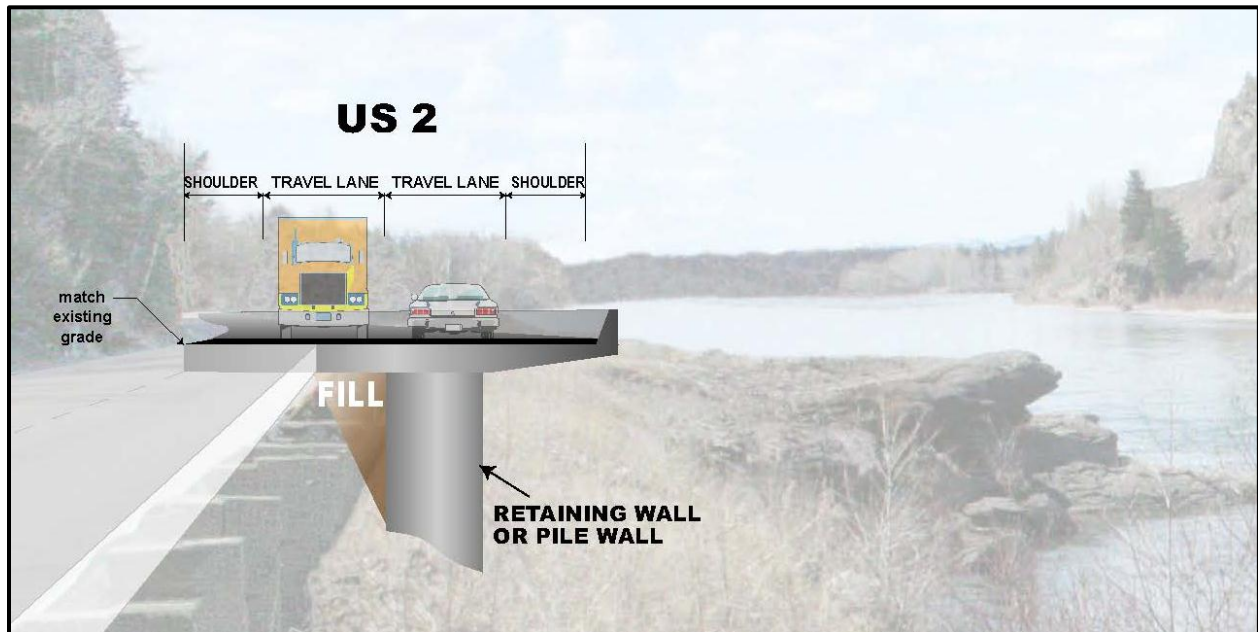
### Cantilevered Structure

A cantilevered structure could be used to widen the roadway without impacting the rock outcrops within Badrock Canyon. Roadway widening could occur in the direction of the Flathead River, with the cantilevered structure extending over the water body. The structure would require retaining walls or pile walls within the floodplain to support traffic loads and a thickened reinforced concrete slab serving as the road surface. The roadway would remain at or close to its existing grade. Access to Berne Memorial Park could be maintained, although access to the Flathead River may be restricted where the cantilevered structure would extend over the existing river bank.

A transition from the at-grade roadway typical section to the cantilevered section would be required. The cantilevered section would incorporate concrete barrier rail adjacent to the Flathead River, matching new metal guardrail adjacent to the pavement section.

The cantilevered structure would vary in width depending on the number of travel lanes associated with Alignment 2. An example of a two-lane cantilevered structure is illustrated in Figure 6-2. Figures illustrating additional cantilevered structure variations are included in Appendix D.

Figure 6-2 Two-Lane Cantilevered Structure



Source: DOWL HKM, 2012.

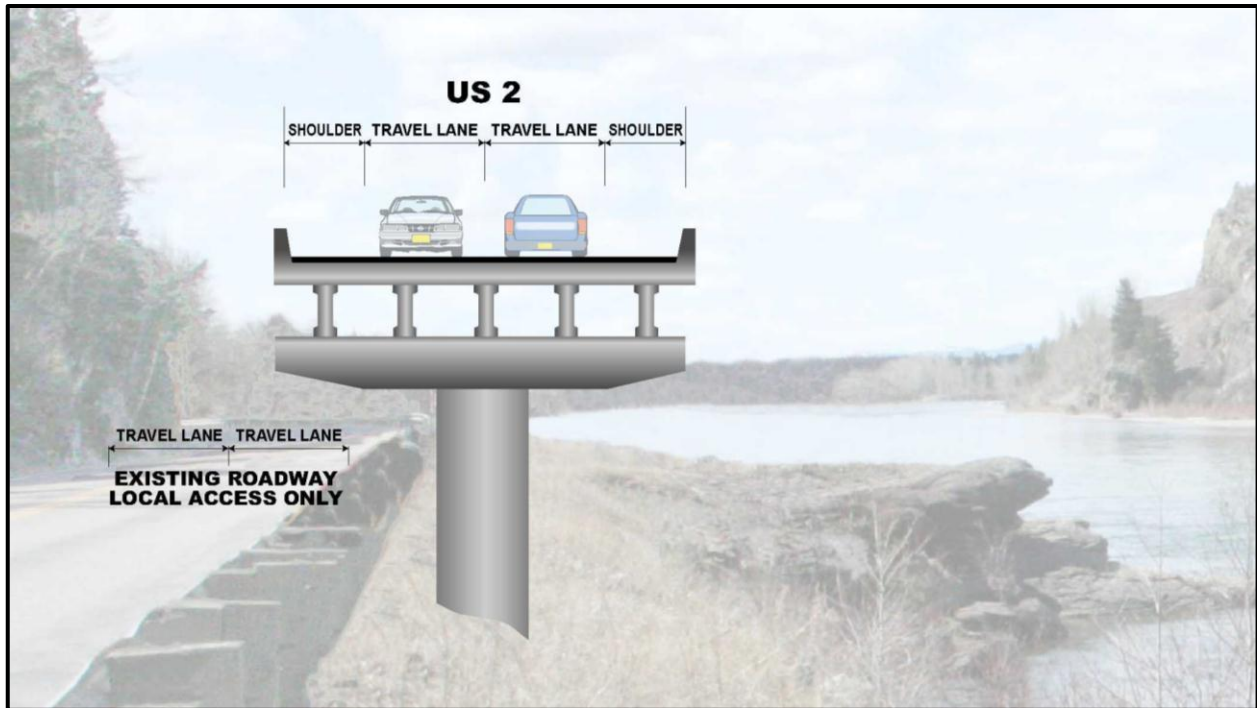
### Elevated Structure

An elevated structure could be constructed above the current US 2 roadway grade to avoid impacting the rock outcrops. The elevated structure could be constructed using precast concrete decking sitting atop concrete piers. Piers would be placed north of the existing US 2 roadway within the floodplain. The existing US 2 roadway could remain in place to provide local access to Berne Memorial Park and the Flathead River.

A transition from the at-grade roadway typical section to the elevated section would be required. Retaining walls could be used to raise the paved section and transition to the elevated structure while minimizing the footprint at ground level.

The elevated structure would vary in width depending on the number of travel lanes. An example of a two-lane elevated structure is illustrated in Figure 6-3. Figures illustrating additional elevated structure variations are included in Appendix D.

Figure 6-3 Two-Lane Elevated Structure



Source: DOWL HKM, 2012.

**Structure Screening**

Cost

Table 6.3 presents planning level cost estimate ranges for cantilevered and elevated structures.

**Table 6.3 Planning Level Cost Estimates – Structures**

Structure Type	Planning Level Estimate of Costs <sup>(1)</sup>
Cantilevered Structure & Transition Sections	\$22.0M to \$63.9M
Elevated Structure & Transition Sections	\$71.5M to \$138.0M

Source: DOWL HKM, 2012.

<sup>(1)</sup> Cost estimates are provided in 2012 dollars and reflect anticipated construction costs only. Costs reflect planning level estimates, and should not be considered an actual cost encompassing all scenarios and circumstances. Cost estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Cost estimate tables are provided in Appendix D.

The planning level cost estimate for a cantilevered structure and transition sections within the most constrained portion of the corridor (140.6± to RP 141.2±) ranges from \$22.0 million for a two-lane structure to \$63.9 million for a four-lane structure.





An elevated structure and transition sections within the most constrained portion of the corridor (140.6± to RP 141.2±) is estimated to range from \$71.5 million for a two-lane structure to \$138.0 million for a four-lane structure, two to three times the low and high cost estimates for a cantilevered structure, respectively. For this reason, the cost of an elevated structure is not considered practicable.

Community Support

Community members were somewhat supportive of a cantilevered structure that would maintain access to Berne Memorial Park. Less support was expressed for an elevated structure as it would eliminate direct access to Berne Memorial Park from US 2. Concern was also expressed that an elevated structure would block views of the canyon and create wintertime maintenance difficulties.

Screening Summary – Alignment 2 Structures

Table 6.4 summarizes the structure screening. Orange shading indicates failure to pass a screening criterion. Based on failure to meet criteria relating to cost and community support, elevated structure options are eliminated from further consideration and will not be discussed further in this report. A cantilevered structure is advanced, with additional discussion of potential Alignment 2 options provided later in this chapter.

**Table 6.4 Screening Summary –Structures (Alignment 2)**

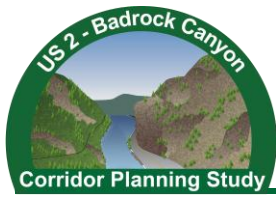
Criteria	Alignment 2	
	Cantilevered Structure (RP 140.6± to RP 141.2±)	Elevated Structure (RP 140.6± to RP 141.2±)
Planning Level Estimate of Costs <sup>(1)</sup>	\$22.0M to \$63.9M	\$71.5M to \$138.0M
Community Support <sup>(2)</sup>	More Support	Less Support
Recommendation	Advance	Eliminate from Further Consideration

Source: DOWL HKM, 2012.

Note: Shading indicates failure to meet criteria.

<sup>(1)</sup> Estimates indicate capital construction costs for cantilevered and elevated structures within the most constrained portion of the corridor (RP 140.6± to RP 141.2±). Costs reflect planning level estimates, and should not be considered an actual cost encompassing all scenarios and circumstances. Estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Cost ranges include two-lane, three-lane, and four-lane structures and transitions sections only and do not include costs for reconstruction of the entire corridor. Cost estimate tables are provided in Appendix D.

<sup>(2)</sup> Indication of community support is based on feedback provided during informational meetings held in Columbia Falls and Hungry Horse and written comments submitted during the study.



### Lane Configurations

Lane configurations considered for Alignment 2 are presented in the following sections. Configurations include two-lane, three-lane, and four-lane segments.

All options would include shoulders in accordance with current MDT and American Association of State Highway and Transportation (AASHTO) guidelines. Shoulder width has also been shown to affect safety performance. Shoulders allow errant vehicles to correct their path and return to the travel lane without leaving the paved surface. Shoulders provide an opportunity for vehicles to pull over in emergency situations and enable speed limit enforcement by providing locations for law enforcement officers to pull over speeding drivers. A wider top width can also improve sight distance, allowing drivers to detect objects and animals in the roadway.

A dedicated WB left-turn bay at Berne Memorial Park (RP 140.9±) could be incorporated in any of the lane configurations. A left-turn bay would allow upstream traffic to continue without delay and provide an exclusive lane from which to wait for a gap in opposing traffic to safely execute a left turn.

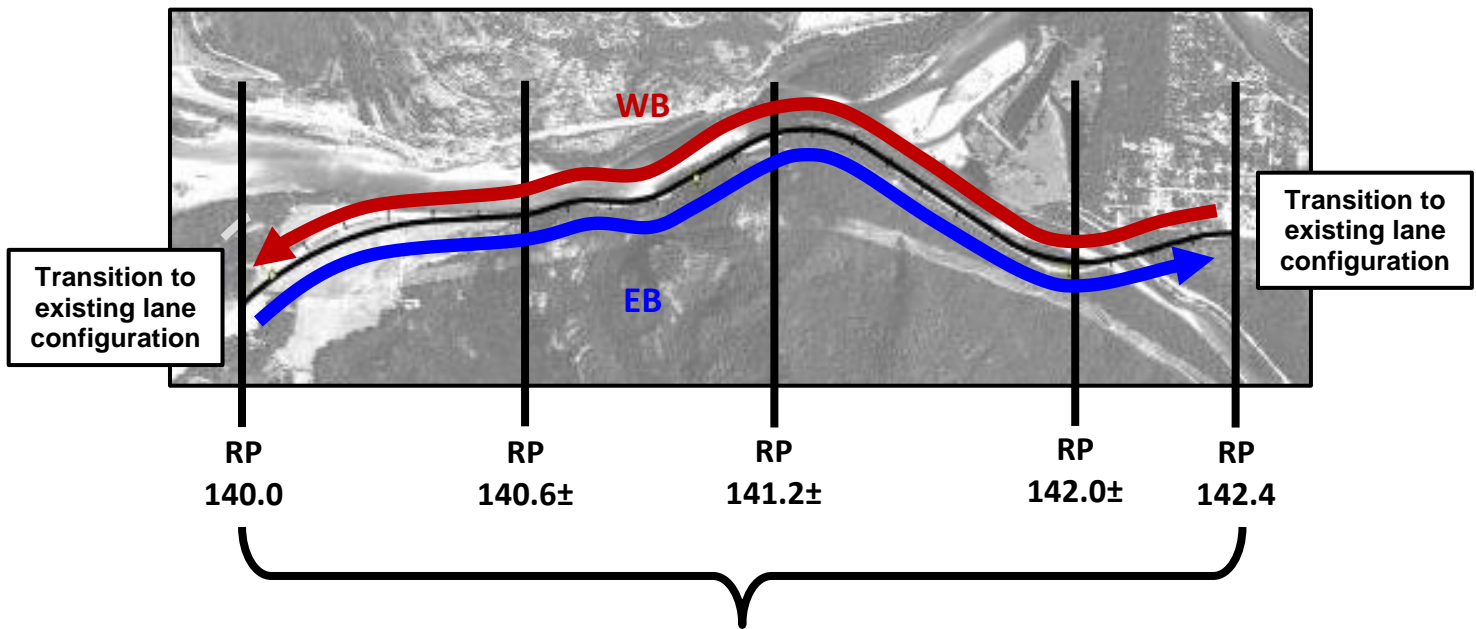
A dedicated bicycle/pedestrian facility could also be incorporated with any of the lane configurations. The facility could be constructed to the north or south of the existing roadway, although a facility to the south may minimize the need for crossings by providing access to Berne Memorial Park and connecting to existing trail systems.

Appropriate transitions would be needed at both ends of the corridor to tie into existing lane configurations in Columbia Heights and Hungry Horse.

#### Two-Lane Configuration

The US 2 facility could be reconstructed along Alignment 2 with a single travel lane in each direction through the corridor. The reconstructed roadway would meet current MDT design standards where practicable, including shoulders throughout the study area and a new two-lane bridge replacing the existing South Fork Flathead River Bridge. Figure 6-4 illustrates a two-lane configuration. Typical section figures are provided in Appendix D.

Figure 6-4 Two-Lane Configuration



**2 Travel Lanes Throughout Corridor**

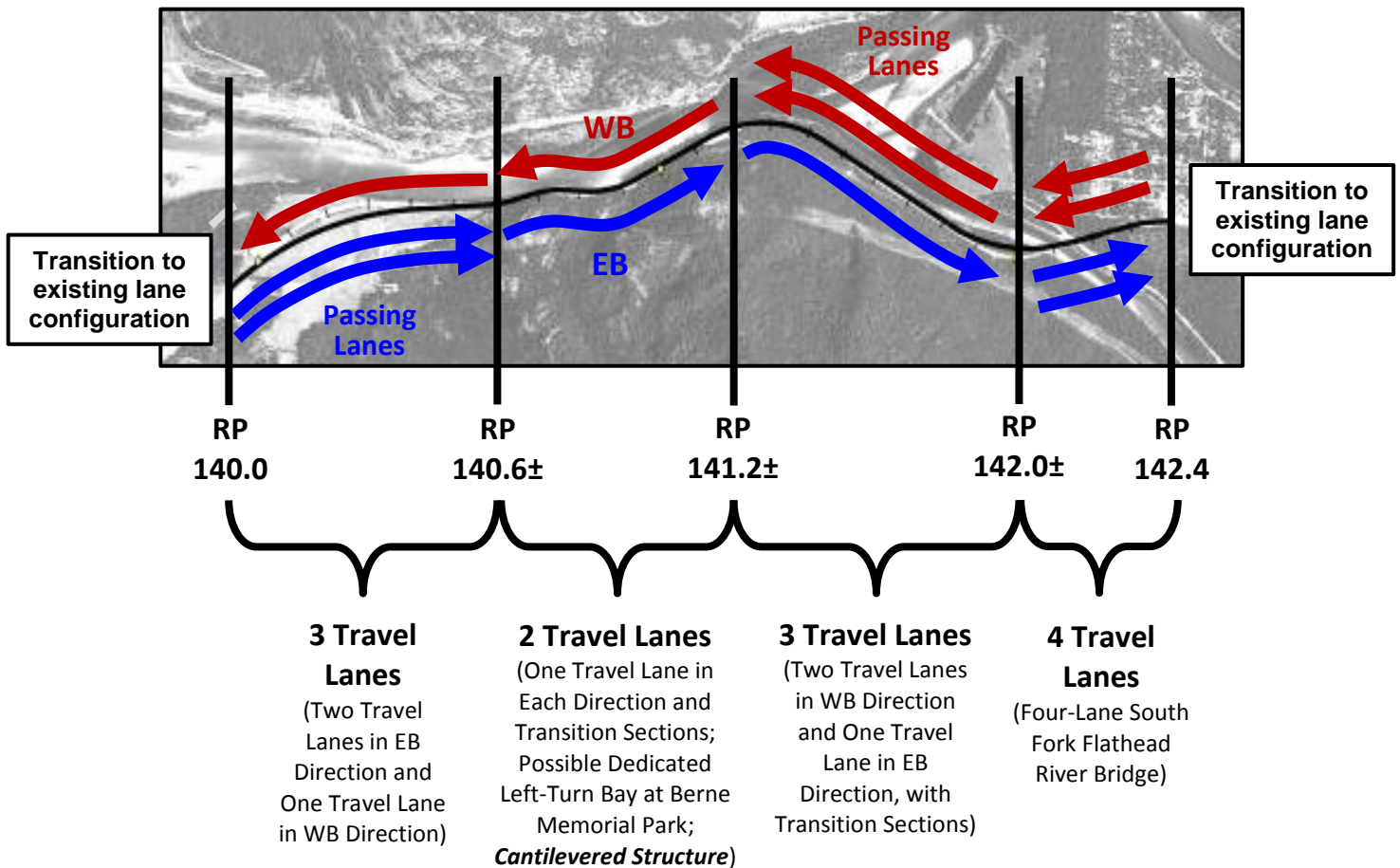
(One Travel Lane in Each Direction; *Cantilevered Structure* from RP 140.6± to RP 141.2±; Two-Lane South Fork Flathead River Bridge)

Three-Lane / Two-Lane Configuration with Four-Lane South Fork Flathead River Bridge

A combination of three-lane and two-lane sections was identified to improve passing opportunities while minimizing potential impacts. Passing opportunities (two travel lanes in the same direction) would be provided before traffic enters the most constrained portion of the corridor (RP 140.6± to RP 141.2±). Passing lanes would be provided in the EB direction from RP 140.0 to RP 140.6± and from RP 141.2± to RP 142.0± in the WB direction. A single travel lane would be provided in the opposing direction of travel in these locations. One travel lane in each direction (with transition sections) would be provided to minimize the roadway footprint from RP 140.6± to RP 141.2±.

A new four-lane South Fork Flathead River Bridge would connect to the four existing travel lanes within Hungry Horse. A four-lane bridge would allow MDT to consider further roadway widening within the corridor during the design life of the structure without the need to replace the bridge. Figure 6-5 illustrates the 3-2-3-4 configuration.

Figure 6-5 3-2-3-4 Configuration

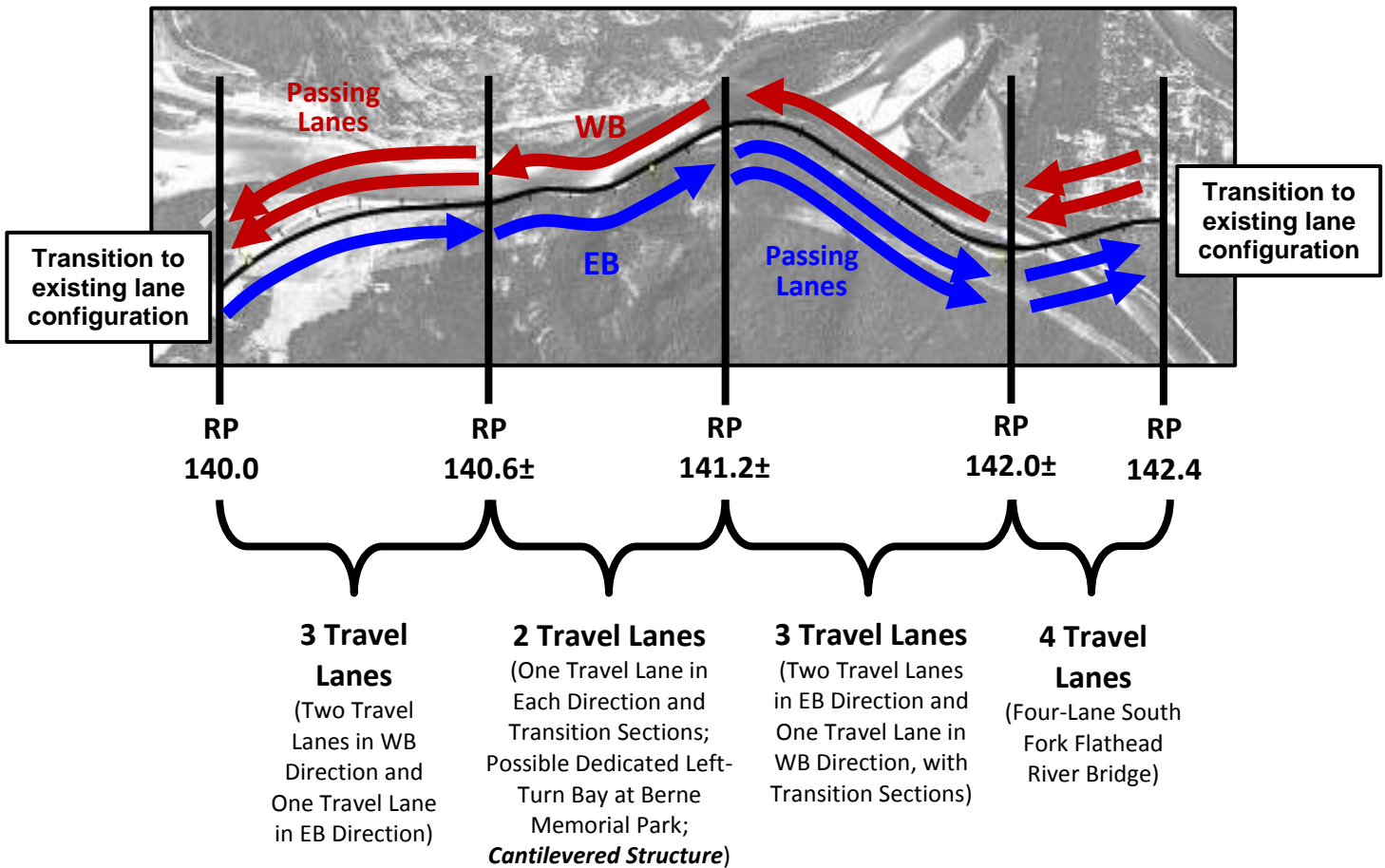


Reverse Three-Lane / Two-Lane Configuration with Four-Lane South Fork Flathead River Bridge

A reverse 3-2-3-4 configuration was identified that would provide passing lanes after traffic volumes exit the most constrained portion of the corridor (RP 140.6± to RP 141.2±). Passing lanes would be provided from RP 140.0 to RP 140.6± in the WB direction and from RP 141.2± to RP 142.0± in the EB direction. All other features of the 3-2-3-4 configuration would remain the same. This configuration would provide passing lanes after (i.e., heading away from) the most constrained portion of the corridor with the intent of potentially providing safer transitions from one-lane to two-lane sections.

As with the 3-2-3-4 configuration, a new four-lane South Fork Flathead River Bridge would be constructed to allow flexibility during the design life of the structure. Figure 6-6 illustrates the reverse 3-2-3-4 configuration.

Figure 6-6 Reverse 3-2-3-4 Configuration

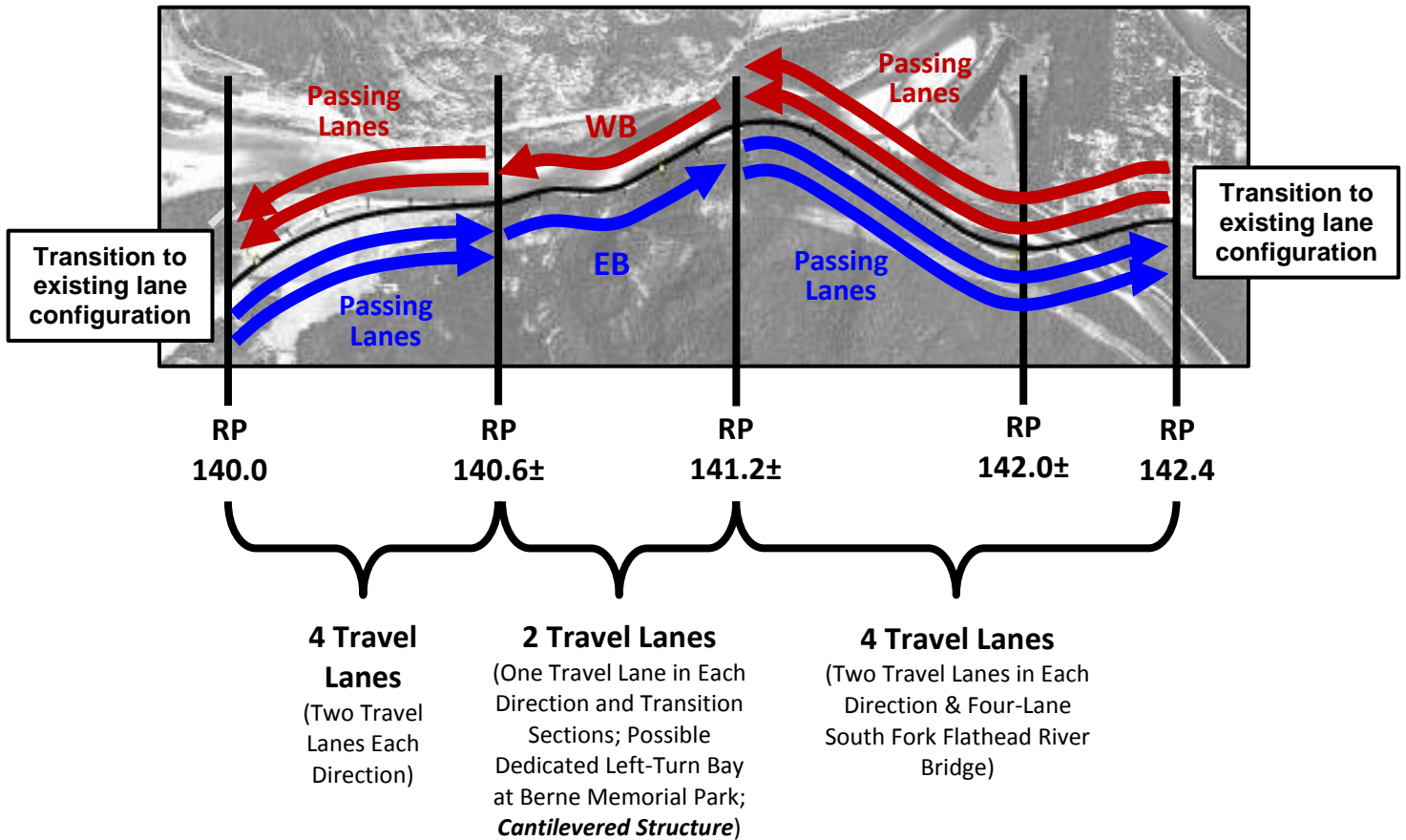


Four-Lane / Two-Lane Configuration

A 4-2-4 configuration was identified to improve passing opportunities while minimizing potential resource impacts. A 4-2-4 would provide four travel lanes on the western end (140.0 to 140.6±) and eastern end (RP 141.2± to RP 142.4) of the corridor, while providing two travel lanes through the most constrained portion of the corridor (RP 140.6± to RP 141.2±). A four-lane South Fork Flathead River Bridge would be provided with this configuration. Figure 6-7 illustrates the 4-2-4 configuration.



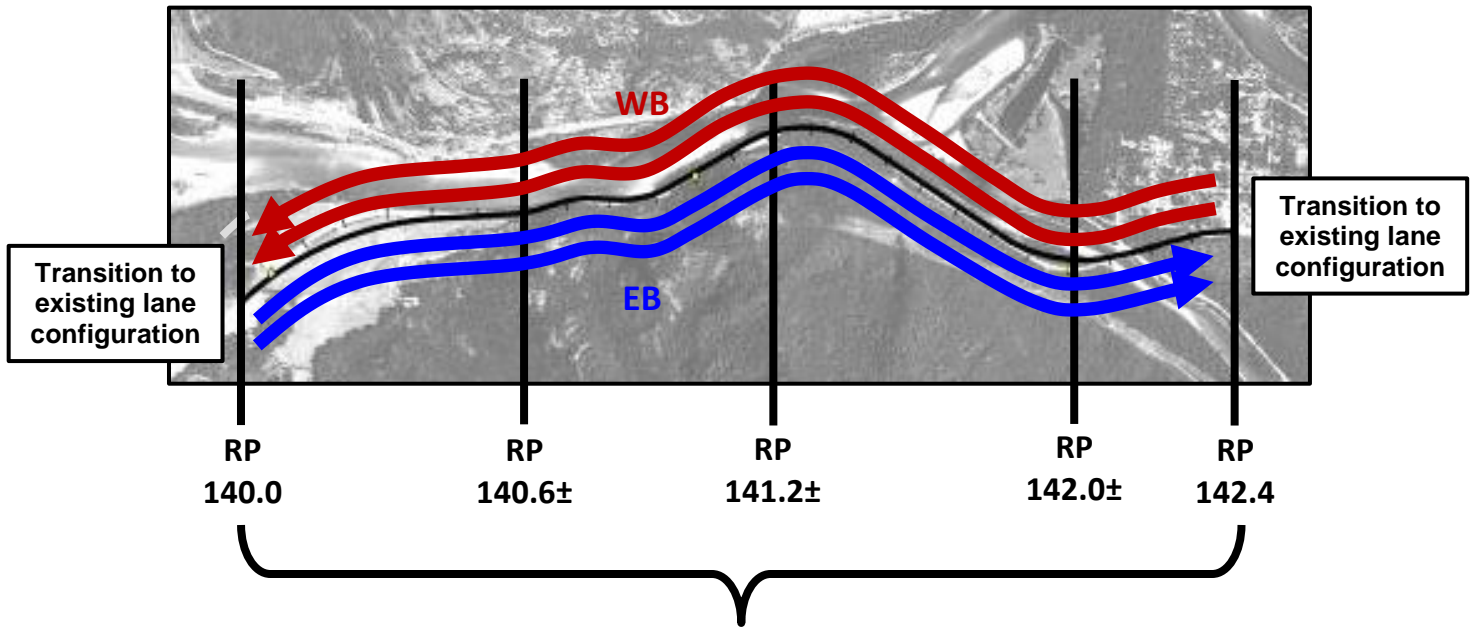
Figure 6-7 4-2-4 Configuration



Four-Lane Configuration

A configuration with four travel lanes throughout the corridor was identified to provide corridor-wide safety and operational improvements. Figure 6-8 illustrates a four-lane configuration.

Figure 6-8 Four-Lane Configuration



**4 Travel Lanes Throughout Corridor**

(Two Travel Lanes in Each Direction; *Cantilevered Structure* from RP 140.6± to RP 141.2±; Four-Lane South Fork Flathead River Bridge)

**Lane Configuration Screening**

Cost

Table 6.5 provides planning level cost estimates for each lane configuration. All estimates include a cantilevered structure within the most constrained portion of the corridor (RP 140.6± to RP 141.2±).



**Table 6.5 Planning Level Cost Estimates for Alignment 2 Lane Configurations**

Configuration <sup>(1)</sup>	Planning Level Estimate of Costs <sup>(2)</sup>
Two-Lane Configuration	\$35.9M to \$59.1M
3-2-3-4 Configuration	\$48.0M to \$86.8M
Reverse 3-2-3-4 Configuration	\$48.0M to \$86.8M
4-2-4 Configuration	\$57.2M to \$90.9M
Four-Lane Configuration	\$64.6M to \$110.2M

Source: DOWL HKM, 2012.

<sup>(1)</sup> Cantilevered structure included within most constrained portion of corridor (RP 140.6± to RP 141.2±).

<sup>(2)</sup> Estimates indicate capital construction costs for roadway reconstruction, including replacement of the existing South Fork Flathead River Bridge and construction of a dedicated bicycle/pedestrian facility. Costs reflect planning level estimates, and should not be considered an actual cost encompassing all scenarios and circumstances. Estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Cost estimate tables are provided in Appendix D.

Operations

HCS was used to analyze potential lane configurations. Additional information regarding this operational analysis is included in Appendix D.

A two-lane configuration with shoulders would provide no improvement in LOS compared to the existing two-lane configuration.

A 3-2-3-4 configuration is predicted to improve corridor operations by at least one LOS value in both directions during peak and off-peak hours of the day. The corridor is predicted to operate at a desirable LOS A or B during most times of the year, and narrowly exceed the LOS C threshold in the peak season during the AM peak hour in the EB direction and the PM peak hour in the WB direction by 2035.

A reverse 3-2-3-4 configuration is predicted to improve corridor operations by at least one LOS value in locations where passing lanes are provided. No improvement would be provided in locations without passing lanes.

A 4-2-4 configuration would provide operational benefits throughout the corridor by giving vehicles an opportunity to pass at each end of the corridor in WB and EB directions.

Constructing a four-lane highway is predicted to provide LOS A throughout the entire corridor within the 2035 planning horizon.

Table 6.6 presents a summary of predicted operational analysis results in 2035.



Table 6.6 Summary of Projected Operational Analysis Results (2035)

Analysis Period		2-Lane Configuration <sup>(1)</sup>	3-2-3-4 Configuration <sup>(2)</sup>		Reverse 3-2-3-4 Configuration <sup>(2)</sup>			4-2-4 Configuration <sup>(2)</sup>		4-Lane Configuration		
Peak Season	AM Peak Hour EB	D	A	to	C	A	to	D	A	to	B	A
	AM Peak Hour WB	D	A	to	B	A	to	D	A	to	B	A
	Median Off-Peak Hour EB	D	A	to	B	A	to	D	A	to	B	A
	Median Off-Peak Hour WB	D	A	to	B	A	to	D	A	to	B	A
	PM Peak Hour EB	D	A	to	B	A	to	D	A	to	B	A
	PM Peak Hour WB	E	A	to	C	A	to	E	A	to	C	A
Adjusted Annual Average	AM Peak Hour EB	C	A	to	B	A	to	C	A	to	B	A
	AM Peak Hour WB	C	A		A	to	C	A		A	A	
	Median Off-Peak Hour EB	C	A	to	B	A	to	C	A	to	B	A
	Median Off-Peak Hour WB	C	A	to	B	A	to	C	A	to	B	A
	PM Peak Hour EB	C	A		A	to	C	A		A	A	
	PM Peak Hour WB	D	A	to	B	A	to	D	A	to	B	A

Source: DOWL HKM, 2012.

<sup>(1)</sup> Analysis results for two-lane configuration assume the entire corridor would remain striped as a no passing zone.

<sup>(2)</sup> For 3-2-3-4, Reverse 3-2-3-4, and 4-2-4 configurations, range of LOS values indicates variance depending on number of lanes within each corridor segment.

Note: LOS values for all configurations indicate predicted operations without a WB left-turn bay at Berne Memorial Park (RP 140.9±). A left-turn bay would provide marginal operational improvements only for WB traffic volumes. Appendix D includes HCS analysis worksheets indicating projected operations with and without a WB left-turn bay at Berne Memorial Park.



### Level of Anticipated Impact

A two-lane configuration would provide the smallest footprint and would result in the least impact throughout the corridor. The 3-2-3-4 and reverse 3-2-3-4 configurations would be more impactful than a two-lane configuration, although the roadway would still be limited to two travel lanes to minimize impacts in the most constrained portion of the corridor (140.6± to RP 141.2±). Similarly a 4-2-4 configuration would be slightly more impactful, while still minimizing impacts within the narrowest part of the corridor. A four-lane configuration throughout the corridor would have the widest footprint and would result in the greatest level of impact.

### Community Support

Community members were generally supportive of a two-lane configuration throughout the corridor, noting this configuration would result in the fewest impacts and maintain the existing corridor character. Some community members were somewhat supportive of three-lane / two-lane configurations and a 4-2-4 configuration as these could provide operational and safety benefits while minimizing impacts within the most constrained portion of the corridor. Community members did not favor a four-lane configuration throughout the corridor. Potential improvements in corridor safety and operations provided by four travel lanes throughout the corridor were not perceived to justify additional impacts to resources resulting from a wider footprint.

### Screening Summary

Table 6.7 summarizes the lane configuration screening. Orange shading indicates failure to pass a screening criterion. Based on failure to meet criteria relating to cost, operations, anticipated level of impact, and community support, the two-lane, reverse 3-2-3-4, and four-lane configurations are eliminated from further consideration and will not be discussed further in this report. 3-2-3-4 and 4-2-4 lane configurations are advanced.





Table 6.7 Screening Summary – Lane Configurations (Alignment 2)

Criteria	Alignment 2 <sup>(1)</sup>				
	2 Lanes Throughout Corridor	3-2-3-4	Reverse 3-2-3-4	4-2-4	Four Lanes Throughout Corridor
Planning Level Estimate of Costs <sup>(2)</sup>	\$35.9M to \$59.1M	\$48.0M to \$86.8M	\$48.0M to \$86.8M	\$57.2M to \$90.9M	\$64.6M to \$110.2M
Operations Anticipated LOS - 2035 <sup>(3)</sup>	C to E	A to C <sup>(4)</sup>	A to E <sup>(5)</sup>	A to C <sup>(4)</sup>	A
Level of Anticipated Impact <sup>(6)</sup>	Least Impacts	Moderate Impacts			Most Impacts
		Less		More	
Community Support <sup>(7)</sup>	Most Support	Some Support	Some Support	Some Support	Least Support
Recommendation	Eliminate from Further Consideration	Advance	Eliminate from Further Consideration	Advance	Eliminate from Further Consideration

Source: DOWL HKM, 2012.

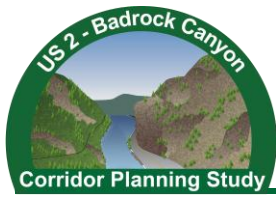
Note: Shading indicates failure to meet criteria.

- <sup>(1)</sup> Cantilevered structure included within the most constrained portion of corridor (RP 140.6± to RP 141.2±).
- <sup>(2)</sup> Estimates indicate capital construction costs for roadway reconstruction, including replacement of the existing South Fork Flathead River Bridge and construction of a dedicated bicycle/pedestrian facility. Costs reflect planning level estimates, and should not be considered an actual cost encompassing all scenarios and circumstances. Estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Cost estimate tables are provided in Appendix D.
- <sup>(3)</sup> LOS ranges reflect values within the AM and PM peak hour and median off-peak hour during peak season and adjusted annual average conditions. Additional detail is provided in Appendix D.
- <sup>(4)</sup> Configurations narrowly exceed the LOS C threshold during the peak hour of the peak season; LOS A and B are anticipated throughout the rest of the year.
- <sup>(5)</sup> Reverse 3-2-3-4 improves LOS for the direction of travel outside of and heading away from the most constrained portion of the corridor (as indicated by LOS A), but does not improve LOS before or within the most constrained portion of the corridor (as indicated by LOS E).
- <sup>(6)</sup> Level of anticipated impact is based on lane configuration footprint. Further analysis would be required during project development to identify specific impacts.
- <sup>(7)</sup> Indication of community support is based on feedback provided during informational meetings held in Columbia Falls and Hungry Horse and written comments submitted during the study.

### 6.4.3 Summary of Recommended Improvement Options

The US 2 – Badrock Canyon Corridor Planning Study confirmed FEIS findings that construction of a grade-separated structure, a tunnel, and new alignments north and south of the existing US 2 alignment are not reasonable options based on cost, constructability, impacts, right-of-way, and community support screening criteria.

The planning study recommends reconstruction of the corridor along Alignment 2 (Optimized Existing Alignment) with either a 3-2-3-4 or 4-2-4 configuration, using a two-lane cantilevered structure within the most constrained portion of the corridor (RP 140.6± to RP 141.2±) and a four-lane South Fork Flathead River Bridge. A two-lane cantilevered structure could be used to



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avoid rock excavation and minimize the roadway footprint within the narrowest part of the corridor. Shoulders and improved geometry are expected to reduce safety concerns throughout the corridor. A dedicated bicycle/pedestrian facility would improve non-motorized access in the corridor. A four-lane South Fork Flathead River Bridge would provide flexibility during the design life of the structure to allow future roadway widening if necessary through the corridor. The three- or four-lane sections at the eastern and western ends of the corridor would provide passing opportunities and allow vehicle queues to disperse before entering the most constrained area. The corridor is generally predicted to operate at an acceptable LOS A or B during most times of the year, narrowly exceeding the LOS C threshold during the peak hour of the peak season by 2035. Although this planning study confirms FEIS findings that a four-lane configuration is needed to provide LOS B or better at all times of the day and year, a design exception could be considered to balance the need to improve corridor safety and operations with the need to minimize adverse impacts to resources in the corridor.

In the interim period before corridor wide reconstruction (Alignment 2), other short-, mid-, or long-term options could be implemented along the existing US 2 alignment (Alignment 1) to provide incremental improvements in safety and corridor access. Several Alignment 1 improvements, including parking, rockfall prevention and a new South Fork Flathead River Bridge, are considered stand-alone options that would remain if Alignment 2 reconstruction is pursued at a later date. All other Alignment 1 options may need to be modified or replaced if Alignment 2 roadway reconstruction is pursued. Some of the identified Alignment 1 improvements represent substantial transportation system investments. If Alignment 1 improvements are forwarded from this study, compatibility with future corridor reconstruction should be considered.

Implementation of corridor improvement options is dependent on funding availability and other system priorities. Recommended timeframes for implementation are defined as follows:

- Short-term: Implementation recommended within 1- to 5-year period
- Mid-term: Implementation recommended within 6- to 10-year period
- Long-term: Implementation recommended within 11- to 20-year period

Table 6.8 provides a menu of recommended improvements for consideration in the corridor. Implementation of all options is not anticipated. Selection of some options may preclude implementation of others.

Table 6.8 Menu of Recommended Improvements

Recommended Improvement		Possible Locations	Planning Level Estimate of Costs <sup>(4)</sup>	Recommended Implementation Timeframe <sup>(5)</sup>	Potentially Impacted Resources / RW Requirements	
Alignment 1 Improvements	<b>Access Management<sup>(1)</sup></b>	Install Concrete Barrier	RP 140.8± to RP 141.0± (South Side of US 2)	\$100,000 to \$150,000	Short-term	No
	<b>Bicycle/Pedestrian Facilities<sup>(1)</sup></b>	Construct Dedicated Bicycle/Pedestrian Facility	Throughout Corridor (North or South Side of US 2)	\$3.6M to \$6.6M	Mid-term to long-term	Yes
		Construct Bicycle/Pedestrian Overcrossing	RP 140.8± (North & South Sides of US 2)	\$1.0M to \$2.5M		Yes
	<b>Drainage<sup>(1)</sup></b>	Install Culverts	RP 140.8±; RP 141.1±; RP 141.2±; RP 142.0± (North & South Sides of US 2)	\$4,000 to \$10,000 per location	Short-term to mid-term	No
		Re-grade Ditches	RP 140.8±; RP 140.9±; RP 141.8± (South Side of US 2)	\$1,000 to \$15,000 per location		No
		Install Valley Gutter	RP 141.0± (South Side of US 2)	\$3,000 to \$5,000		No
	<b>Parking<sup>(2)</sup></b>	Construct Parking Lot	RP 140.2± (North Side of US 2)	\$300,000 to \$500,000		Yes
	<b>Roadside Safety<sup>(1)</sup></b>	Install Guardrail with End Treatments	RP 140.3±; RP 141.9±; RP 142.3± (North & South Sides of US 2)	\$4,000 to \$5,000 per location		No
	<b>Rockfall Prevention<sup>(2)</sup></b>	Install Wire Mesh Stabilization Fence	RP 140.7±; RP 141.1± (South Side of US 2)	\$200,000 to \$1.0M per location		Yes
	<b>Rumble Strips<sup>(1)</sup></b>	Install Shoulder and Centerline Rumble Strips	Throughout Corridor	\$2,100 to \$2,700 per mile		No
	<b>Sight Distance<sup>(1)</sup></b>	Remove Vegetation	RP 140.9±; RP 141.3±; RP 142.0± (North & South Sides of US 2)	\$9,000 to \$30,000		Yes
	<b>South Fork Flathead River Bridge<sup>(2)</sup></b>	Reconstruct South Fork Flathead River Bridge	RP 142.1	\$9.7M to \$27.3M		Yes
	<b>Traffic Control<sup>(1)</sup></b>	Install Static Sign	RP 140.0±; RP 140.2±; RP 140.4±; RP 140.6±; RP 141.0±; RP 141.1±; RP 142.4± (North & South Sides of US 2)	\$500 to \$1,000 per location		No
		Install Variable Message Sign	RP 140.0±; RP 142.3± (North & South Sides of US 2)	\$20,000 to \$250,000 per location		No
	<b>Wildlife Passage<sup>(1)</sup></b>	Wildlife Undercrossing	RP 140.2± (North & South Sides of US 2)	\$920,000 to \$1.1M		Yes
<b>Roadway Reconstruction<sup>(3)</sup> (Alignment 2)</b>	Construct 3-2-3-4 Configuration	Throughout Corridor	\$48.0M to \$86.8M	Long-term		Yes
	Construct 4-2-4 Configuration	Throughout Corridor	\$57.2M to \$90.9M	Long-term		Yes

Source: DOWL HKM, 2012.

<sup>(1)</sup> Improvements may need to be modified or replaced if Alignment 2 reconstruction is pursued at a later date.

<sup>(2)</sup> Stand-alone improvements could remain if Alignment 2 reconstruction is pursued at a later date.

<sup>(3)</sup> Roadway reconstruction costs include replacement of the existing South Fork Flathead River Bridge with a new four-lane structure. Roadway reconstruction would be less costly if the South Fork Flathead River Bridge is replaced separately as part of an Alignment 1 improvement.

- <sup>(4)</sup> Costs reflect planning level estimates, and should not be considered an actual cost or encompassing all scenarios and circumstances. Estimates do not include potential costs associated with right-of-way acquisition, utility relocation, preliminary engineering, or operations and maintenance. Cost estimate tables are provided in Appendix D.
- <sup>(5)</sup> Recommended implementation timeframe does not indicate when projects will be programmed or implemented. Project programming is based on available funding and other system priorities. Short-term: Implementation is recommended within a 1- to 5-year period; Mid-term: Implementation is recommended within a 6- to 10-year period; Long-term: Implementation is recommended within a 11- to 20-year period.



## 7.0 OTHER ONGOING MDT EFFORTS

In response to a written request received from Flathead County, MDT is currently conducting an engineering and traffic investigation along US 2 from Kalispell to West Glacier called a spot speed study to measure speeds at specific locations. As part of this process, MDT examines physical roadway characteristics, crash data, and traffic data, including the speed at which the majority of traffic is moving. MDT may recommend a special speed zone if the operating character of the roadway deviates from normal conditions addressed by general statutory speed regulation. MDT will prepare a report detailing its findings and recommendations and will submit the report for consideration by the Transportation Commission. If the Transportation Commission determines that a speed limit is greater or less than is reasonable and safe for the roadway under current operational and environmental conditions, it may set a special speed limit for the US 2 corridor.





## 8.0 POTENTIAL FUNDING SOURCES

MDT administers a number of programs that are funded from state and federal sources. Because US 2 is a designated federal-aid highway system, there are potential funding programs that may be used to fund all or portions of any future improvements.

Each year, in accordance with 60-2-127, Montana Code Annotated (MCA), the Montana Transportation Commission allocates a portion of available federal-aid highway funds for construction purposes and for projects located on the various systems in the state as described throughout this chapter.

### 8.1 Federal Funding Sources

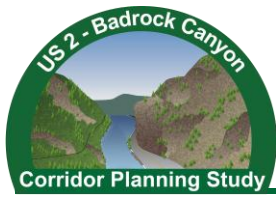
The following summary of major federal transportation funding categories received by the state through the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21) signed into law July 6, 2012 includes state developed implementation/sub-programs that may be potential sources for any projects developed along US 2 in the study area. In order to receive project funding under these programs, projects must be included in the State Transportation Improvement Program (STIP).

#### 8.1.1 National Highway Performance Program (NHPP)

The National Highway Performance Program (NHPP) provides funding for the National Highway System (NHS), including the Interstate System and National Highways system bridges. The purpose of the NHS is to provide an interconnected system of principal arterial routes which serve major population centers, international border crossings, intermodal transportation facilities and other major travel destinations; meet national defense requirement; and serve interstate and interregional travel. The NHS includes all Interstate routes, a large percentage of urban and rural principal arterials, the defense strategic highway network, and strategic highway connectors.

##### Allocations and Matching Requirements

NHPP funds are federally apportioned to Montana and allocated based on system performance by the Montana Transportation Commission. The federal share for non-Interstate NHS projects is 86.58% and the state is responsible for the remaining 13.42%. The state share is funded through the Highway State Special Revenue Account.



### Eligibility and Planning Considerations

Activities eligible for NHPP funding include construction, reconstruction, resurfacing, restoration, and rehabilitation of segments of the NHS roadway; construction, replacement, rehabilitation, preservation and protection of bridges on the NHS; and projects or part of a program supporting national goals for improving infrastructure condition, safety, mobility, or freight movements on the NHS. Operational improvements as well as highway safety improvements are also eligible. Other miscellaneous activities that may qualify for NHS funding include bikeways and pedestrian walkways, environmental mitigation, restoration and pollution control, infrastructure based intelligent transportation systems, traffic and traveler monitoring and control, and construction of intra or inter-city bus terminals serving the NHS. The Transportation Commission establishes priorities for the use of NHPP funds and projects are let through a competitive bidding process. US 2 is on the NHS.

The US 2 – Badrock Canyon corridor is located in the Missoula District, which is anticipated to receive an average of about \$38.0 million annually of NHPP funds during the next five years. There are several hundred million dollars of previously committed project priorities within the Missoula District. Given the estimated range of planning level costs of \$48.0 to \$90.9 million to reconstruct an optimized alignment of US 2 with either a 3-2-3-4 or 4-2-4 configuration and a cantilevered structure in the most constrained portion of the corridor (RP 140.6± to RP 141.2±), NHPP funding for this level of improvement is highly unlikely over the short term, but may be available toward the end of the planning horizon depending on other NHS needs within the Missoula District.

### 8.1.2 Transportation Alternatives Program

The Transportation Alternatives (TA) program requires MDT to obligate 50% of the funds within the state based on population, using a competitive application process, while the other 50% may be obligated in any area of the state. Funds may be obligated for projects submitted by:

- Local governments
- Transit agencies
- Natural resource or public land agencies
- School district, schools, or local education authority
- Tribal governments
- Other local government entities with responsibility for recreational trails for eligible use of these funds



### Eligibility and Planning Considerations

Eligible categories include:

- On-road and off-road trail facilities for pedestrians and bicyclists, including ADA improvements
- Historic preservation and rehabilitation of transportation facilities
- Archeological activities relating to impacts for a transportation project
- Any environmental mitigation activity, including prevention and abatement to address highway related stormwater runoff and to reduce vehicle/animal collisions including habitat connectivity
- Turnouts, overlooks and viewing areas
- Conversion/use of abandoned railroad corridors for trails for non-motorized users
- Inventory, control, and removal of outdoor advertising
- Vegetation management in transportation right of way for safety, erosion control, and controlling invasive species
- Construction, maintenance and restoration of trails, development and rehabilitation of trailside and trailhead facilities
- Development and dissemination of publications and operation of trail safety and trail environmental protection programs
- Education funds for publications, monitoring and patrol programs and for trail-related training
- Planning, design, and construction of projects that will substantially improve the ability of students to walk and bicycle to school
- Non-infrastructure-related activities to encourage walking and bicycling to school, including public awareness campaigns and outreach to press and community leaders, traffic education and enforcement in the vicinity of schools, student sessions on bicycle and pedestrian safety, health, and environment, and training

### Competitive Process

The state and any Metropolitan Planning Organizations required to obligate TA funds must develop a competitive process to allow eligible applicants an opportunity to submit projects for funding. As a new program and process under MAP-21, the competitive process will be developed as soon as possible.

### 8.1.3 Highway Safety Improvement Program (HSIP)

#### Allocations and Matching Requirements

HSIP funds are apportioned to Montana for allocation to safety improvement projects identified in the strategic highway safety improvement plan as approved by the Commission. Projects described in the state strategic highway safety plan must correct or improve a



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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. Due to limited HSIP funding, projects are ranked using a benefit to cost ratio and only those projects with the highest ratios receive funding. Generally, the federal share for the HSIP projects is 90% and the state is responsible for 10%.



## 9.0 CONCLUSIONS AND NEXT STEPS

This study evaluated existing and projected conditions, identified corridor needs and objectives, and recommended options to improve conditions within the US 2 – Badrock Canyon corridor. The report identifies potential improvement options; describes qualitative screening measures, including cost, constructability, impact, right-of-way, and community support criteria; and presents a planning level evaluation of options in the corridor. The findings and recommendations provided in this report could be used to streamline a future NEPA/MEPA effort if MDT pursues improvements within the corridor.

Reconstruction of the corridor is recommended for long-term consideration within the 2035 planning horizon. Reconstruction is recommended along an optimized existing alignment with either a 3-2-3-4 or 4-2-4 configuration using a two-lane cantilevered structure within the most constrained portion of the corridor and a four-lane bridge over the South Fork Flathead River. Phasing may be appropriate to allow funding identification for construction of shorter segments within the corridor. Replacement of the existing South Fork Flathead River Bridge with a new four-lane bridge could be pursued first, followed by reconstruction of the western (RP 140.0 to RP 140.6±) and eastern (141.2± to RP 142.0±) ends of the corridor with three- or four-lane sections. The most constrained portion of the corridor (RP 140.6± to RP 141.2±) could be addressed last using a two-lane cantilevered structure.

In the interim period before corridor wide reconstruction (Alignment 2), other short-, mid-, or long-term options could be implemented along the existing US 2 alignment (Alignment 1) to provide incremental improvements in safety and corridor access. Some of the identified Alignment 1 improvements represent substantial transportation system investments. If Alignment 1 improvements are forwarded from this study, compatibility with future corridor reconstruction should be considered.

Reconstruction of the US 2 corridor would involve constructability challenges due to the proximity of the Flathead River, rock outcroppings, and buried utilities. Reconstruction would result in impacts to sensitive environmental and cultural resources in the corridor. NEPA/MEPA environmental compliance documentation would be required and improvement impacts would need to be identified and mitigated in coordination with permitting agencies. Environmental compliance documentation may also be required for some Alignment 1 improvements. Methods to avoid and minimize impacts would need to be identified during the project development process for improvement options forwarded from this study.





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Implementation of improvement options will depend on funding availability and other system priorities. MDT has tentatively identified funding through the Bridge program for replacement of the South Fork Flathead River Bridge. There is currently no funding available for roadway reconstruction. At this time, funding for this level of improvement is highly unlikely over the short term, but may be available toward the end of the planning horizon depending on other projects underway in the Missoula District. Some smaller spot improvements may be fundable through other mechanisms or at the local level.