



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199



FINAL ENVIRONMENTAL IMPACT STATEMENT – MARCH 2014

APPENDIX I

ALTERNATIVES REPORT



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

Final Alternatives Report

Billings Bypass

September 2013

NCPD 56 (55) Control Number 4199

Differences in the impacts associated with Phase 1 and the Full Buildout of the Build Alternatives are minor based on the size of the project footprint, purchased ROW, and traffic impacts. As such, there have been no changes to the Billings Bypass Alternative Report between the Draft Environmental Impact Statement and the Final Environmental Impact Statement.



U.S. Department of Transportation
Federal Highway Administration



TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT NEEDS AND DESIGN OBJECTIVES	1
2.1	Summary of Purpose and Need.....	2
2.2	Design Objectives	3
3.0	ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS	3
3.1	Review Previously Identified Alternatives.....	5
	<i>Level 1 Screening</i>	5
3.2	Identify Range of Potential Alternatives	14
	<i>Level 2 Screening</i>	19
3.3	Identify Alternatives for Detailed Evaluation in the EIS	22
	<i>Design Standards</i>	22
	<i>Description of Alternatives Considered</i>	26
	<i>Level 3 Screening</i>	42
	<i>Updates to Level 3 Screening Results</i>	44
3.4	Alternatives to Be Carried Forward	45
	<i>Alignment Alternatives</i>	45
	<i>Intersection/Interchange Alternatives</i>	48
	<i>Typical Sections</i>	50

LIST OF APPENDICES

Appendix A: Screening Results

Appendix B: Typical Sections

Appendix C: Intersection Design Option Evaluation: Mary Street/US 87/Old Hwy 312/Bench Boulevard

LIST OF TABLES

Table 3.1	Previously Considered Alternatives Connecting Between the Interstate and Old Hwy 312.....	10
Table 3.2	Previously Considered Alternatives with No Connection Between the Interstate and Old Hwy 312	12
Table 3.3	New Potential Alternatives.....	14
Table 3.4	Design Standards Recommendations	23
Table 3.5	Design Standards of Preliminary Alternatives	51



LIST OF FIGURES

Figure 3.1 Initial Alternatives	6
Figure 3.2 Conceptual Alternatives.....	7
Figure 3.3 Preliminary Alternatives	8
Figure 3.4 Other Alternatives Evaluated.....	9
Figure 3.5 New Potential Alternatives	17
Figure 3.6 Alignment Corridor Segments	25
Figure 3.7 Existing Pinehills Interchange (I-90/I-94 junction)	27
Figure 3.8 Existing Johnson Lane Interchange	27
Figure 3.9 Interchange and Intersection Locations	28
Figure 3.10 Pinehills Option 1 – Full Directional Interchange	29
Figure 3.11 Pinehills Option 2 – Split Interchange	30
Figure 3.12 Johnson Lane Option 1 – Roundabouts	32
Figure 3.13 Johnson Lane Option 2 – Single-Point Urban Interchange.....	33
Figure 3.14 Johnson Lane Option 3 – Urban Interchange with Roundabouts.....	34
Figure 3.15 Johnson Lane Option 4 – Double Crossover Diamond with Traffic Signals.....	35
Figure 3.16 Johnson Lane Option 5 – Double Crossover Diamond with Roundabouts.....	36
Figure 3.17 Existing Signalized Intersection at Main Street-US 87-Old Hwy 312.....	37
Figure 3.18 Old Hwy 312 Connection – Option 1	38
Figure 3.19 Old Hwy 312 Connection – Option 2	39
Figure 3.20 Alternatives to be Carried Forward.....	46
Figure 3.21 Mary Street Option 1 Alternative – Carry Forward.....	52
Figure 3.22 Mary Street Option 2 Alternative – Carry Forward.....	53
Figure 3.23 Five Mile Road Alternative – Carry Forward.....	54



1.0 INTRODUCTION

The Montana Department of Transportation (MDT) in cooperation with the Federal Highway Administration (FHWA) intends to complete an Environmental Impact Statement (EIS) for the Billings Bypass project. The intent of the project is to improve mobility in the eastern area of Billings. The project limits extend from Interstate 90 (I-90) to Old Highway 312 (Old Hwy 312); a distance of approximately 3.5 miles. The project is referred to as Billings Bypass, NCPD 56(55), CN 4199.

This project was originally scoped as a bypass route north of Billings between I-90 and MT 3. The proposed facility was intended to function as part of the Camino Real International Trade Corridor route that currently uses congested urban routes as it passes through Billings. Funding constraints prompted MDT to coordinate with the local Policy Coordinating Committee (PCC) on potential approaches to proceed with the project. The PCC provided input that the project should be re-scoped to focus on the eastern segment of the proposed project between the interstate and Old Hwy 312. Based on this input, MDT reviewed the transportation needs in that area, as documented in local plans, and determined that physical barriers (Yellowstone River, railroad, rimrocks, and the interstate corridor) severely limit access and connectivity in the eastern area of Billings. Local Plans also identified the need for improved truck/commercial vehicle access to state highways serving the Billings area as a key transportation issue. MDT coordinated with local, state, and federal agencies and the public on revising the project purpose and need to address these issues. The new purpose and need is summarized below in section 2.1.

This document comprises the Conceptual Alternatives Report, which documents a range of alternatives for improving access and connectivity between I-90 and Old Hwy 312 based on public comments, data analysis, and the project purpose and need. The alternatives were developed with consideration of existing and future travel demand and mobility needs. The alternatives are broken into individual design elements consisting of typical sections, interchanges/intersections, and alignments. The project team has completed three levels of screening to identify the alternatives that best meet the purpose and need and design objectives of the project. The alternatives to be carried forward for detailed evaluation in the EIS are identified at the end of this report.

Three documents; the Draft Purpose and Need Chapter, the Design Standards Memorandum, and the Design Criteria Technical Memorandum, have been submitted to MDT and contain information used in the development of alternatives presented in this document.

2.0 PROJECT NEEDS AND DESIGN OBJECTIVES

During the project development process, regulatory agencies, an advisory committee established for this project, and the general public were asked to provide input on the proposed project. That input was used to develop the purpose and need and a series of design objectives, which are outlined below. The design objectives served as guidelines in the development of an initial range of alternatives. The purpose and need statement establishes the benchmark from which the project alternatives are evaluated. The “purpose” essentially states the reason for the project. The “need” presents the current and projected issues that the project must address.



2.1 SUMMARY OF PURPOSE AND NEED

The purpose of the proposed project is to improve access and connectivity between I-90 and Old Highway 312 to improve mobility in the eastern area of Billings. Four primary transportation needs are identified below:

- **Reduce physical barrier impacts to the transportation system.** The rimrocks, the Yellowstone River, the railroad, and I-90 create barriers for north-south connections in the Billings area, which affect local traffic and regional traffic. Reduction of physical barrier impacts to transportation is one of the key transportation goals for the region as documented in the Billings Urban Area Long-Range Transportation Plan (2009 Update). Both I-90 and United States Highway 87 (US 87) cross the Yellowstone River near downtown Billings, and the next river crossing is over nine miles north at Huntley. The challenging topography in the Billings area coupled with limited connections across the river, the railroad tracks, and the interstate, result in both local and regional north-south traffic being funneled through the US 87/Main Street corridor in the urban area of Billings.
- **Improve connectivity between Lockwood and Billings.** The segment of US 87 that crosses I-90 and the Yellowstone River serves as the only connection between Billings and Lockwood. The need for improved connectivity to Billings is documented in the Lockwood Community Plan (August 2006) and the Lockwood Transportation Study (November 2008).
- **Improve mobility to and from Billings Heights.** A survey completed for the Billings Heights Neighborhood Plan (2006) identified traffic issues as a key concern of residents, with one of the main traffic concerns being traveling to and from the Billings Heights neighborhood. This is also one of the key transportation issues for the region cited in the Billings Urban Area Long-Range Transportation Plan (2009 Update). The City of Billings Capital Improvement Plan (2006 – 2011) includes 16 projects that would address transportation issues in Billings Heights. Only one of these projects (the Billings Bypass EIS/Location Study) would address transportation system redundancy and mobility between Billings Heights and the interstate, which are limited by a lack of Yellowstone River crossings. Limited mobility to and from Billings Heights is also an issue affecting emergency response. Main Street is currently the only emergency route between downtown Billings and the Billings Heights neighborhood. Incidents affecting traffic operations on Main Street have been an impediment to emergency response, which is a concern expressed by the Yellowstone County Disaster and Emergency Services Department.
- **Improve truck/commercial vehicle access to and through Billings.** In the 1990s, the City of Billings and Yellowstone County began to pursue federal funds to study options for improving conditions on the segment of the Camino Real International Trade Corridor through Billings. After completion of the feasibility study in 2001, federal funds were appropriated for a bypass route connecting between I-90 and Montana State Highway 3 (MT 3) north of Billings. Although funding constraints prompted a reduction in the scope of the project, improved truck/commercial vehicle access to state highways and major facilities serving the Billings area is a need identified in the Billings Urban Area Long-Range Transportation Plan (2009 Update). The Billings Bypass project is intended to address that need, and the segment of this facility that would provide a connection between I-90 and Old Hwy 312 is included in the list of fiscally constrained long-range projects identified in the plan.



2.2 DESIGN OBJECTIVES

Roadway Functionality

- Design for NHS Principal Arterial standards.
- Incorporate access control measures that balance through mobility and local access needs.
- Consider existing and future land use in a context sensitive manner.
- At a minimum, provide service-level interchanges at the interstate.
- Locate the western terminus of the route so that it supports a future connection to US 87 and MT 3.

Yellowstone River Crossing

- Minimize impacts to the Yellowstone River and floodplain to the extent practicable.
- Locate the river crossing to provide flexibility for future expansion of the bridge.

Safety Considerations

- Improve emergency access to the Billings Heights.
- Provide grade-separated railroad crossings.
- Improve or maintain safety on connecting routes.
- Meet MDT standards based on the projected traffic volumes and vehicle mix.

Community and Environmental Considerations

- Maintain or improve traffic conditions in the eastern area of Billings.
- Accommodate crossings for planned bicycle/pedestrian routes documented in adopted local plans.
- Include pedestrian and bicycle facilities where appropriate along the proposed facility.
- Minimize social, environmental, and economic impacts to the extent practicable.

Cost Considerations

- Allow for phased construction to accommodate funding availability.
- Limit the use of frontage roads to areas where they are essential.
- Minimize supporting infrastructure costs.

3.0 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

As stated above, the project purpose, needs, and design objectives form a set of criteria by which alternatives for transportation improvements are developed and screened. Through the course of this project, a wide range of alternatives have been suggested, considered, and developed. The project team recognized that some of the alternatives developed prior to re-scoping the project might still be valid under the new purpose, needs, and design objectives. Additionally, some alternatives that were screened out under the previous purpose and needs might now be feasible given the new focus of the



project. For these reasons, the project team approached the process of developing and screening alternatives in three steps.

1. **Review previously identified alternatives:** The project team started the process of identifying potential alternatives by reviewing all of the previously identified alternatives. Because the scope of the original project was much larger, the project team isolated the relevant segment of the previously identified alternatives: the segment between the interstate and Old Hwy 312. Alignments that would provide a connection between the interstate and Old Hwy 312 were advanced for further consideration. Alternatives and segments of alternatives that did not make this connection were screened out because they would not meet the new purpose and needs.
2. **Identify range of potential alternatives:** The next step was to identify additional alternatives that might be feasible under the newly identified purpose and needs. Along with the alternatives advanced from the first level of screening, this collective set of potential alternatives was then compared to one another to determine how well they met the identified purpose and needs of the project. At this point, the criteria that could be used to screen the alternatives was limited because some alternatives were more developed than others. Some of the previously identified alternatives that were advanced had undergone preliminary design. Construction cost estimates and traffic volume projections had been developed for these alternatives. Other alternatives were still conceptual in nature. These included the alternatives that had been eliminated early in the original process and the newly identified alternatives. No cost estimates or traffic projections had been developed for these alternatives. Therefore, the comparison focused on potential benefits for mobility and connectivity as well as potential impacts to private property and natural and community resources. The alternatives that performed poorly by comparison were screened out. The remaining alternatives represented a wide range of alternatives including new potential roadway corridors, use of existing transportation corridors, and combinations of both.
3. **Identify alternatives for detailed evaluation in the EIS:** The alternatives advanced from the second level of screening were evaluated to identify the context of each potential corridor. The contextual elements used to define the character of each corridor included land use, zoning, and the type and speed of connecting routes. Segments within each corridor where design considerations would be different were identified. Based on this information, the project team assigned design standards by segment that would support the purpose and needs and promote development of context-sensitive solutions in each corridor. A conceptual level of design was completed for each alternative using the assigned design standards in order to develop construction cost estimates and traffic projections. This information was used to complete a more thorough preliminary screening of the alternatives. The alternatives that performed poorly by comparison were screened out. The remaining alternatives are recommended for more detailed evaluation in the EIS.

The intent of this approach to the alternatives development was to make as much use as possible of the earlier work completed for this project while providing for a thorough exploration of solutions based on the new purpose, needs, and objectives. The specific alternatives considered and the results of the alternatives screening in each step of the process is provided in this section.



3.1 REVIEW PREVIOUSLY IDENTIFIED ALTERNATIVES

Before the project was re-scoped, the project team had completed the alternatives development and screening process and identified the alternatives to be carried forward for detailed evaluation in the EIS. Two levels of screening had been completed resulting in three sets of alternatives.

- **Initial Alternatives:** These alternatives were identified by the public and the project team. Some of these alternatives were complete alignments between the I-90/I-94 corridor and MT 3 and others were more general concepts with less defined termini.
- **Conceptual Alternatives:** These alternatives were developed by the project team and included refined versions of the initial alternatives carried forward from the first level of screening. Each of these alternatives connected between the I-90/I-94 corridor and MT 3.
- **Preliminary Alternatives:** These alternatives were developed by the project team and included refined versions of the conceptual alternatives carried forward from the second level of screening. These alignments were split into three segments; east, central, and west.

The project team did not want to overlook suggested concepts for alternatives that were screened out under the old purpose and need. Therefore, all three sets of alternatives were reviewed. In many cases, early concepts were refined through the alternatives development process. The most refined version of each alternative is listed and described in Table 3.1. However, to provide a complete record of the alternatives development and screening process, the predecessors of each alternative, if any, are also identified in the table.

After the Preliminary Alternatives were developed and presented to the public, the project team evaluated additional alternatives based on comments from stakeholders and the public. These included three alternate connections to MT 3 (in the western segment) and four potential alignments using the Shepherd-Acton Road corridor. These alternatives are also listed in Table 3.1 and Table 3.2 accordingly.

LEVEL 1 SCREENING

As stated above, alignments that would provide a connection between the interstate and Old Hwy 312 were advanced to the Level 2 Screening for further consideration. For the alignments that connected between I-90 and MT 3, only the eastern segments between I-90 and Old Hwy 312 were advanced. These alternatives are listed in Table 3.1. Alternatives and segments of alternatives that did not make this connection were screened out because they would not meet the new purpose and needs. For alignments that connected between I-90 and MT 3, this includes the central segments (between Old Hwy 312 and US 87) and the western segments (between US 87 and MT). These alternatives and segments of alternatives are listed in Table 3.2 and shown in Figures 3.1 through 3.4.



Figure 3.1 Initial Alternatives

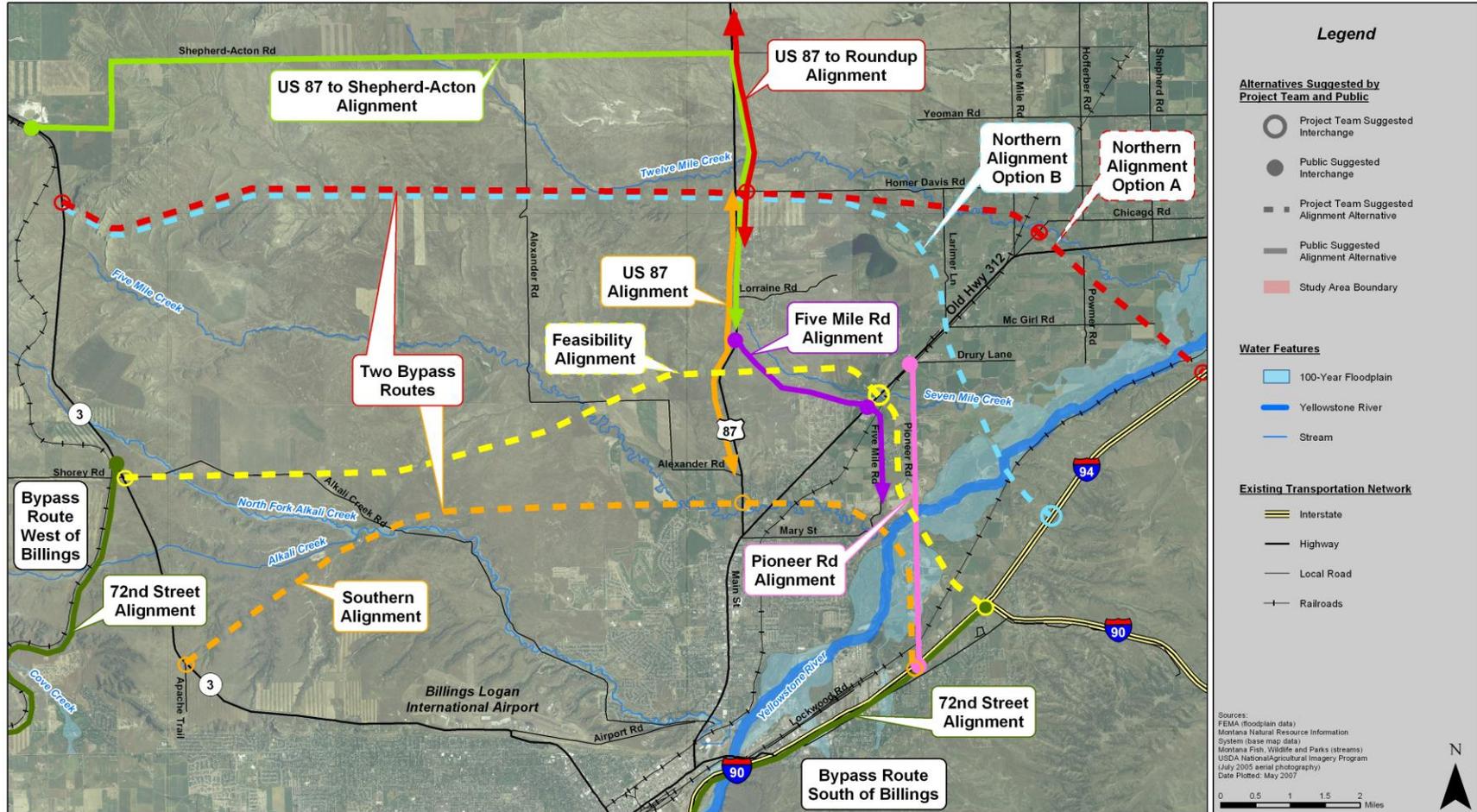




Figure 3.2 Conceptual Alternatives

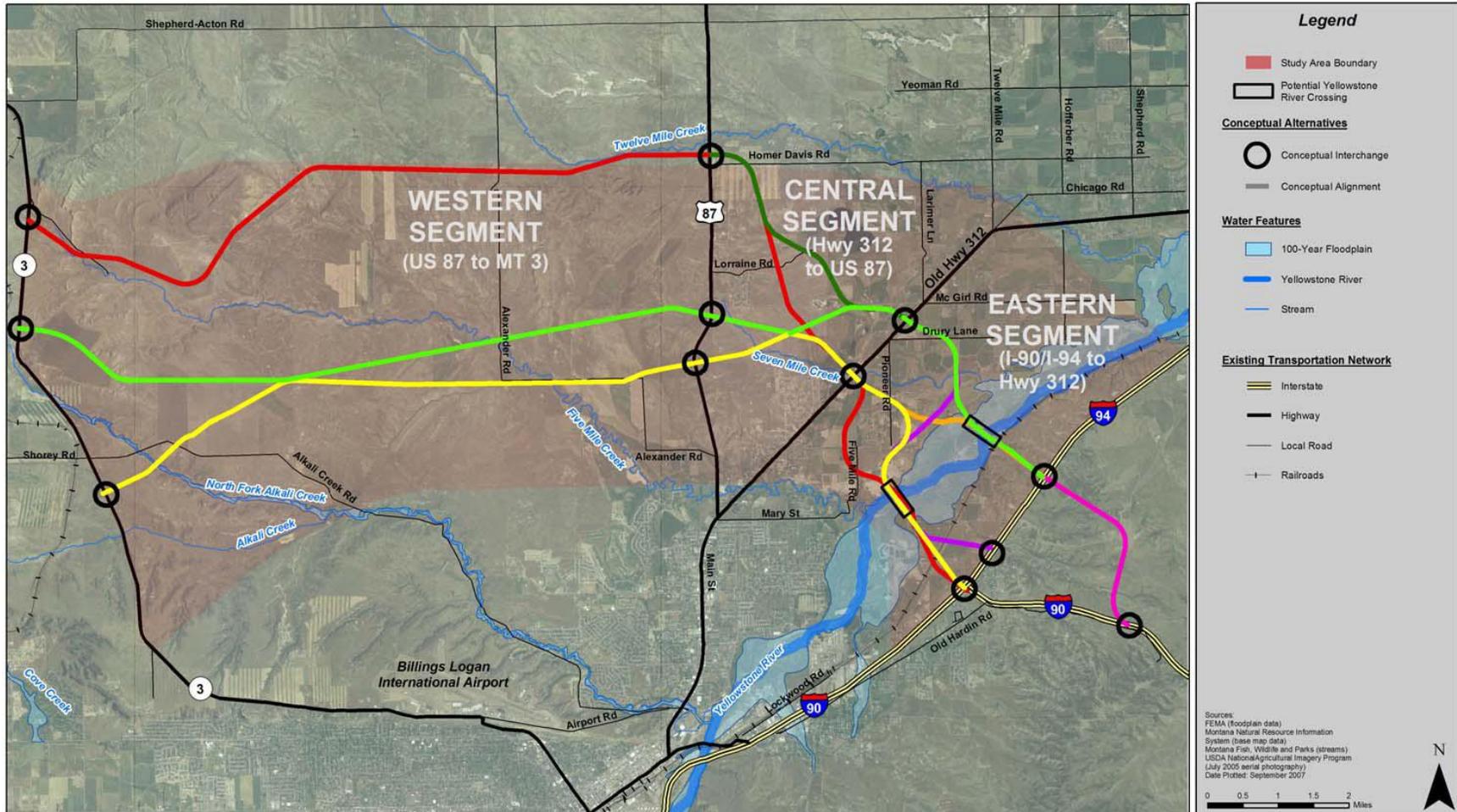




Figure 3.3 Preliminary Alternatives

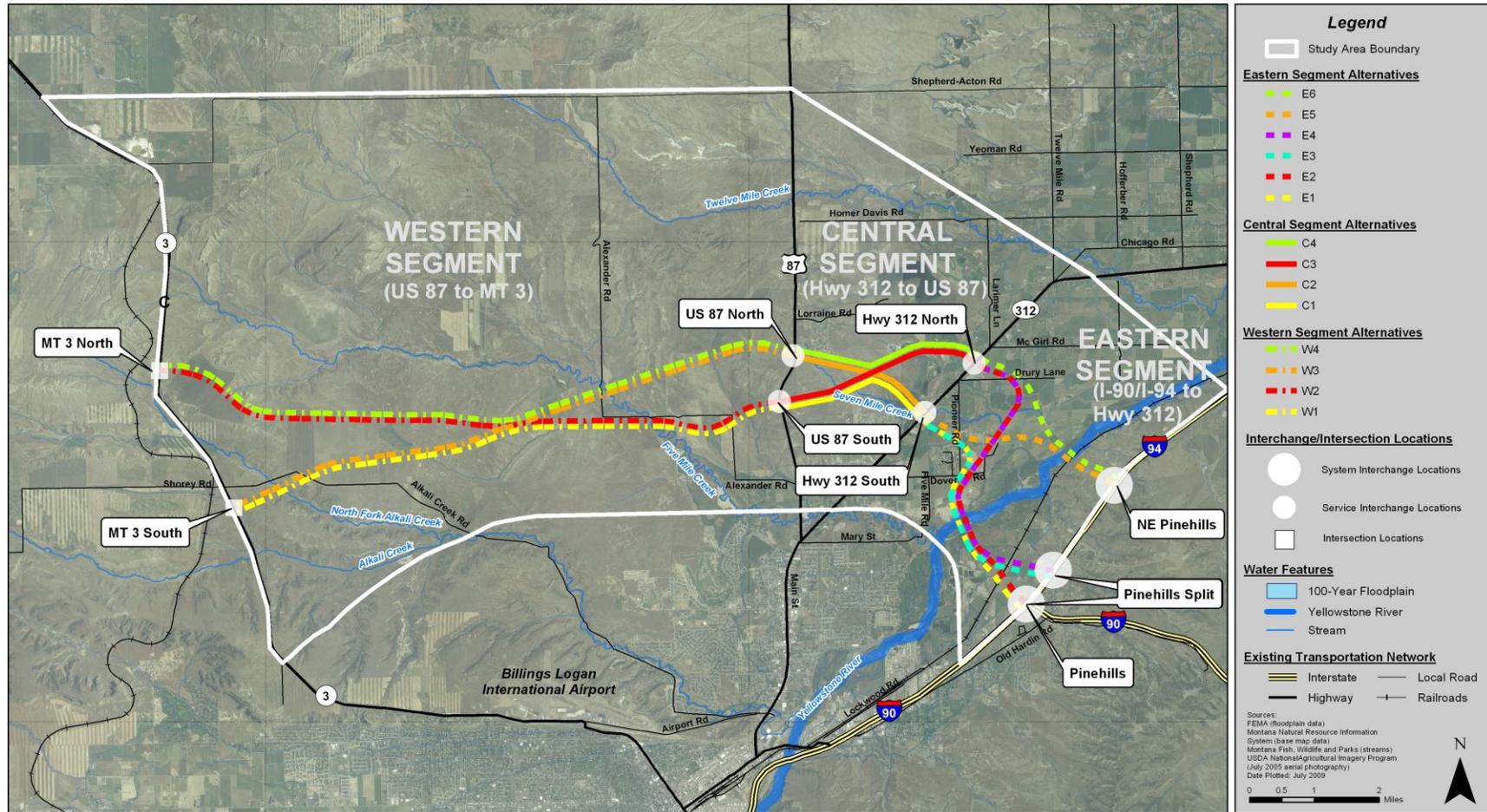




Figure 3.4 Other Alternatives Evaluated

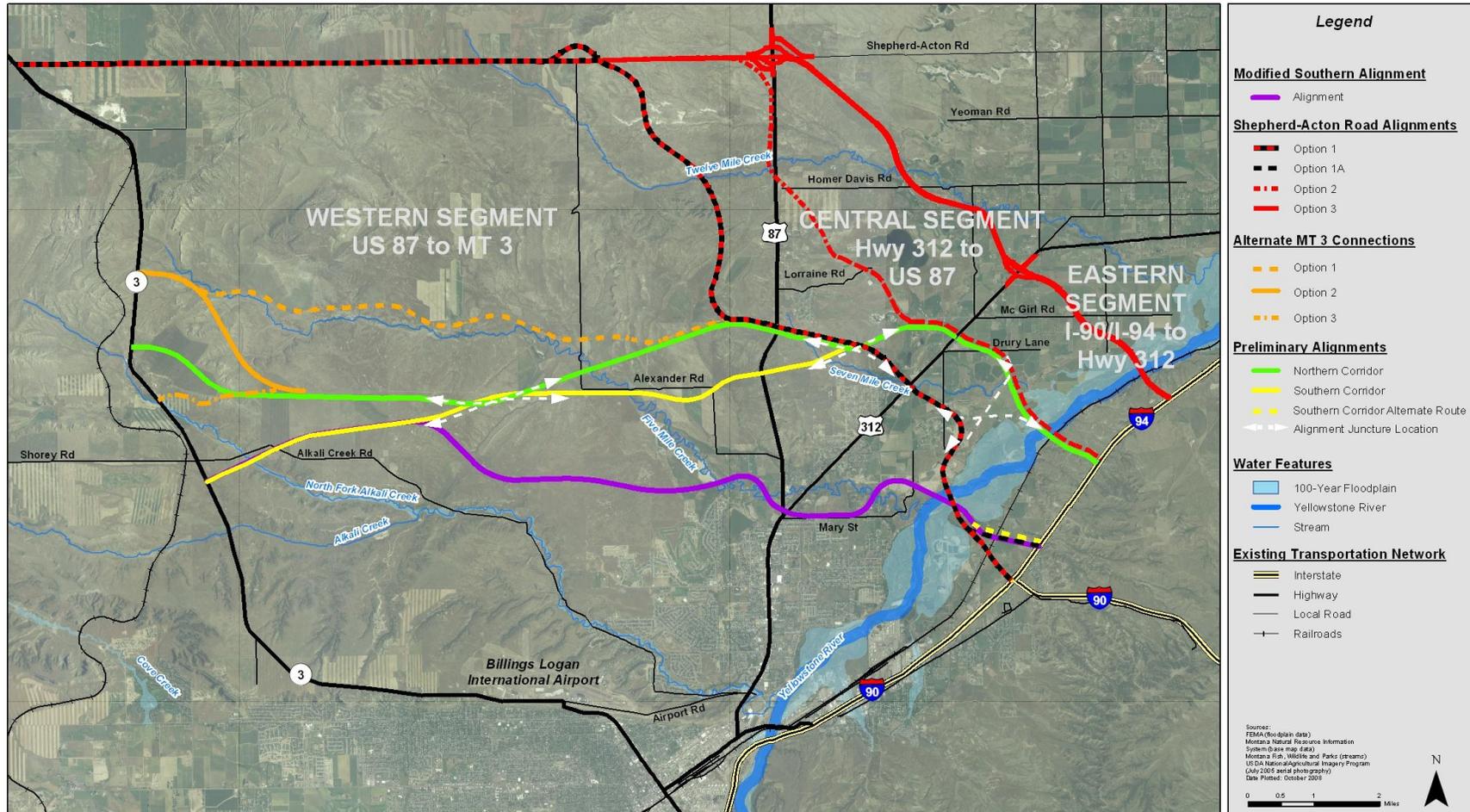




Table 3.1 Previously Considered Alternatives Connecting Between the Interstate and Old Hwy 312

Alternative Name	Source	Description of Alignment or Suggested Concept
Initial Alternatives		
Two Bypass Routes	Public	Two bypasses along the Southern Alignment and Northern Alignment – Option A.
Southern Alignment (Eastern Segment)	Project Team	From I-90 at the Johnson Lane interchange, proceed north across the Yellowstone River to approximately Mary Street, then west to Old Hwy 312 along the north side of Five Mile Creek.
Five Mile Road Alignment	Public	Proceed north along Five Mile Road to Old Hwy 312. The interchange connection was not specified.
Pioneer Road Alignment	Public	From I-90 at Johnson Lane, proceed north across the Yellowstone River and follow the Pioneer Road alignment to connect to Old Hwy 312 near Drury Lane.
Northern Alignment – Option A & Shepherd Acton Alignment – Option 3 (Eastern Segment)	Project Team	From I-94 approximately 4.5 miles from the existing I-90/I-94 interchange, proceed northwest across the river to Old Hwy 312. Note: These two alignments are identical in the eastern segment.
Bicycle Lane/Path	Public	Implement a bike lane or separated bike path into the bypass design. (This could be a component of any of the alternatives listed in this table.)
Conceptual Alternatives		
Modified Southern Alignment (Eastern Segment)	Advisory Committee	From I-94 approximately 0.5 miles north of the existing I-90/I-94 interchange, proceed west across the Yellowstone River north of Mary Street, cross the Five Mile Creek floodplain south to Mary Street, then follow Mary Street to connect to Old Hwy 312.
Red Alignment (Eastern Segment)	Project Team	See E1 under Preliminary Alternatives.
Yellow Alignment (Eastern Segment)	Project Team	See E1 under Preliminary Alternatives.
Purple Alignment (Eastern Segment)	Project Team	See E4 under Preliminary Alternatives.
Orange Alignment (Eastern Segment)	Project Team	See E5 under Preliminary Alternatives.
Green Alignment (Eastern Segment)	Project Team	See E6 under Preliminary Alternatives.



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

Alternative Name	Source	Description of Alignment or Suggested Concept
Preliminary Alternatives		
E1 & Shepherd Acton Alignment – Option 1 (Eastern Segment) (E1 is a refined version of the eastern segment of the Feasibility Alignment and the Yellow Alignment)	Project Team	From the I-90/I-94 interchange, proceed northwest across the Yellowstone River near Mary Street, veer northeast to avoid existing development, then connect with Old Hwy 312 south of Seven Mile Creek. Note: E1 and the eastern segment of Shepherd Action Alignment – Option 1 are identical.
E2 (E2 is a refined version of the eastern segment of the Purple Alignment using an alternate eastern terminus)	Project Team	From the I-90/I-94 interchange, proceed northwest across the Yellowstone River near Mary Street, then northeast across Drury Lane to Old Hwy 312 north of Drury Lane.
E3 & Shepherd Acton Alignment– Option 1A (Eastern Segment) (E3 is a refined version of the eastern segment of the Yellow Alignment using an alternate eastern terminus)	Project Team	From I-94 approximately 0.5 miles north of the existing I-90/I-94 interchange, proceed west across the Yellowstone River near Mary Street, veer northeast to avoid existing development, then connect with Old Hwy 312 south of Seven Mile Creek. Note: E3 and the eastern segment of Shepherd Action Alignment – Option 1A are identical.
E4 (E4 is a refined version of the eastern segment of the Purple Alignment)	Project Team	From I-94 approximately 0.5 miles north of the existing I-90/I-94 interchange, proceed west across the Yellowstone River near Mary Street and northeast across Drury Lane to Old Hwy 312 north of Drury Lane.
E5 (E5 is a refined version of the eastern segment of the Orange Alignment)	Project Team	From I-94 approximately 2 miles north of existing I-90/I-94 interchange, proceed west across the Yellowstone River and west across Pioneer Road to Old Hwy 312 south of Seven Mile Creek.
E6 & Shepherd Acton Alignment– Option 2 (Eastern Segment) (E6 is a refined version of the eastern segment of the Green Alignment and the Northern Alignment – Option B)	Project Team	From I-94 approximately 2 miles north of existing I-90/I-94 interchange, proceed west across the Yellowstone River and northwest across Drury Lane to Old Hwy 312 north of Drury Lane. Note: E6 and the eastern segment of Shepherd Action Alignment – Option 2 are identical.



Table 3.2 Previously Considered Alternatives with No Connection Between the Interstate and Old Hwy 312

Alternative Name	Source	Description of Alignment or Suggested Concept
Initial Alternatives		
72 nd Street Alignment	Public	Follows I-90 south to 72 nd Street and north along railroad alignment to MT 3.
Bypass Route South of Billings	Public	Follows unidentified route south of the City of Billings.
Bypass Route West of Billings	Public	From MT 3, proceed west to I-90 at Laurel.
US 87 to Roundup Alignment	Public	Follow US 87 north to Roundup and Hwy 12 west to MT 3.
US 87 to Shepherd Acton Alignment	Public	Follow US 87 north to Shepherd Acton Road and west to MT 3.
US 87 Alignment	Public	Use US 87 through study area (refers to original study area).
Southern Alignment (Central and Western Segments)	Project Team	From Old Hwy 312 near Five Mile Creek, proceed west across Alkali Creek then southwest to MT 3 near Apache Trail.
Feasibility Alignment (Central and Western Segments)	Project Team	From Old Hwy 312 near Drury Lane, proceed southwest to US 87 and southwest across Five Mile Creek to MT 3 south of Shorey Road.
Northern Alignment – Option A (Central and Western Segments)	Project Team	From Old Hwy 312 near Twelve Mile Creek, proceed west to US 87 near Homer Davis Road and west to MT 3 about 1 mile south of Acton.
Northern Alignment – Option B (Central and Western Segments)	Project Team	From Old Hwy 312 near Drury Lane, proceed northwest to US 87 at Homer Davis Road and west to MT 3 south of Five Mile Creek.
Conceptual Alternatives		
Pink Alignment	Public	From I-90 east of the I-94 interchange, proceed northwest to I-94 two miles northeast of the Pinehills interchange.
Red Alignment (Central and Western Segments)	Project Team	From Old Hwy 312 south of Pioneer Road, proceed northwest to US 87 near Homer Davis Road and west to MT 3 about 1 mile south of Acton.
Modified Southern Alignment (Central and Western Segments)	Advisory Committee	From Old Hwy 312 near the I-87 interchange, veer north across Five Mile Creek to avoid existing development, and proceed northwest to connect to MT 3 south of Shorey Road.
Yellow Alignment (Central and Western Segments)	Project Team	From Old Hwy 312 just south of Pioneer Road, proceed west to US 87 approximately 1.3 miles south of Lorraine Road, and continue west and then south to MT 3 approximately 1 mile south of Shorey Road.



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

Alternative Name	Source	Description of Alignment or Suggested Concept
Green Alignment (Central and Western Segments)	Project Team	From Old Hwy 312 just north of Drury Lane, proceed west to US 87 approximately 0.5 miles south of Lorraine Road, then west and north to MT 3 approximately 3 miles north of Shorey Road.
Dark Green Alignment (Central Segment)	Project Team	From Old Hwy 312 north of Drury Lane, proceed northwest to US 87 near Homer Davis Road.
Preliminary Alternatives		
C1	Project Team	From Old Hwy 312 near Seven Mile Creek, proceed northwest across Seven Mile Creek and the BBAC Canal to avoid existing development, then southwest across Seven Mile Creek to US 87 approximately 1.3 miles south of Lorraine Road.
C2	Project Team	From Old Hwy 312 near Seven Mile Creek, proceed northwest across Seven Mile Creek and the BBAC Canal to avoid existing development, and connect to US 87 approximately 0.5 miles south of Lorraine Road.
C3	Project Team	From Old Hwy 312 north of Browns Lake, proceed west parallel to Cline Road, then southwest across the BBAC Canal to connect with US 87 approximately 1.3 miles south of Lorraine Road.
C4	Project Team	From Old Hwy 312 north of Browns Lake, proceed west parallel to Cline Road, then northwest to US 87 approximately 0.5 miles south of Lorraine Road.
W1	Project Team	From US 87 approximately 1.3 miles south of Lorraine Road, proceed west across Five Mile Creek, then southwest across North Folk Alkali Creek to MT 3 approximately 0.3 miles south of Shorey Road.
W2	Project Team	From US 87 approximately 1.3 miles south of Lorraine Road, proceed west across Five Mile Creek, then west to connect with MT 3 either 1.1, 2.1, or 3.1 miles north of Shorey Road.
W3	Project Team	From US 87 approximately 1.3 miles south of Lorraine Road, proceed southwest across Five Mile Creek and North Folk Alkali Creek to connect with MT 3 approximately 0.3 miles south of Shorey Road.
W4	Project Team	From US 87 approximately 1.3 miles south of Lorraine Road, proceed southwest across Five Mile Creek, then west to connect with MT 3 1.1, 2.1, or 3.1 miles north of Shorey Road.
Other Alternatives Evaluated		
Shepherd Acton Alignment – Option 1 (Central and Western Segments)	Project Team	From Old Hwy 312 just south of Pioneer Road, proceed northwest to US 87 approximately 0.5 miles south of Lorraine Road, then north across Twelve Mile Creek and follow Shepherd Acton Road west to MT 3.
Shepherd Acton Alignment – Option 1A (Central and Western Segments)	Project Team	From Old Hwy 312 just south of Pioneer Road, proceed northwest to US 87 approximately 0.5 miles south of Lorraine Road, then north across Twelve Mile Creek and follow Shepherd Acton Road west to MT 3.



Alternative Name	Source	Description of Alignment or Suggested Concept
Shepherd Acton Alignment – Option 2 (Central and Western Segments)	Project Team	From Old Hwy 312 just north of Drury Lane, proceed northwest to US 87 near Twelve Mile Creek, and follow US 87 north to Shepherd Action Road, then west along Shepherd Action Road to MT 3.
Shepherd Action Alignment – Option 3 (Central and Western Segments)	Project Team	From Old Hwy 312 north of McGirl Road, proceed northwest across Twelve Mile Creek to Shepherd Acton Road and west to MT 3 along Shepherd Acton Road.
Alternate MT 3 Connection – Option 1	Land Owner	From US 87 approximately 0.5 miles south of Lorraine Road, proceed west to MT 3 along the north side of Five Mile Creek.
Alternate MT 3 Connection – Option 2	Land Owner	From the W4 alignment, proceed northwest to MT 3 approximately 3.1 miles north of Shorey Road.
Alternate MT 3 Connection – Option 3	Land Owner	From the W4 alignment, proceed southwest to MT 3 approximately 1.1 miles north of Shorey Road.

3.2 IDENTIFY RANGE OF POTENTIAL ALTERNATIVES

As a second step in the process, the project team reviewed the alternatives advanced from the first level of screening and identified additional alternatives for improving access and connectivity between the interstate and Old Hwy 312. The Yellowstone River is a major constraint in this area and there are relatively few locations where a crossing would be feasible from a technical and cost perspective. There are multiple corridor options north and south of the river that could use the same river crossing location. Therefore, the project team identified potential alignment corridors north of the river and south of the river with the understanding that they could be mixed and matched to create many different alignment options between the interstate and Old Hwy 312 as shown in Figure 3.5. Table 3.3 lists the newly identified potential corridors north and south of the river. This step focuses on the alignments without consideration of typical sections or the type of connection to existing routes.

Table 3.3 New Potential Alternatives

Alternative Alignment	Source	Description of Alignment
No-Bridge Alternatives		
New I-90 Connection	Based on concept from 1969 Billings Urban Area Transportation Plan	From I-90, proceed north to the existing Main Street/US 87 alignment and follow the alignment north to the US 87/Old Hwy 312 intersection.



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

Alternative Alignment	Source	Description of Alignment
Improved US 87 Connection	Based on concept from 1969 Billings Urban Area Transportation Plan	From the existing I-90/US 87 interchange, proceed east across the Yellowstone River on the existing US 87 bridge structure, then follow the existing alignment of US 87/ Main Street to the US 87/Old Hwy 312 intersection.
I-94 to Old Hwy 312 Connection at Huntley	Project Team	From I-94 at Northern Avenue, proceed north along the existing Northern Avenue alignment across the railroad and continue northwest along the existing Nahmis Avenue alignment to Old Hwy 312. Veer west across the Yellowstone River on the existing Old Hwy 312 bridge structure.
New Alignment Corridors South of the Yellowstone River		
Piccolo Lane Alignment	Lockwood Transportation Plan	From I-90 at Piccolo Lane, proceed north adjacent to refinery to the Yellowstone River.
Johnson Lane Alignment – Option 1	Project Team	From the existing Johnson Lane interchange at I-90, proceed north to Coulson Road and follow Coulson Road northeast before proceeding west across the railroad and to the Yellowstone River.
Johnson Lane Alignment – Option 2	Project Team (based on suggestions from public)	From the existing Johnson Lane interchange at I-90, proceed north across railroad and along edge of Yellowstone River floodplain. This is based on earlier suggestions from the public to explore alternatives that would connect to I-90 at Johnson Lane.
NE Pinehills with Alternate River Crossing	Project Team	From approximately 2 miles north of the existing I-90/I-94 interchange, proceed northwest across the railroad and to the Yellowstone River. This is similar to E6, but crosses the river further north to avoid a historic battlefield site that was identified west of the river.
Alignment Corridors North of the Yellowstone River		
Rivers Edge Alignment	Lockwood Transportation Plan	From Old Hwy 312, proceed east along Mary Street and south along the rimrocks east of the Yellowstone River. Cross the Yellowstone River near the east side of the refinery.
Bitterroot Drive Alignment	Lockwood Transportation Plan	From Old Hwy 312, proceed east along Mary Street and south along Bitterroot Drive. Cross the Yellowstone River near the east side of the refinery.
Mary Street Alignment	Project Team	From Old Hwy 312, proceed east along Mary Street and across the Yellowstone River.
Legacy Lane Alignment	Project Team	From Old Hwy 312, between the Madsen and View Crest subdivisions, proceed south east and veer south between agricultural parcels 0.5 mile west of Five Mile Road. Veer southeast across Five Mile Creek and Mary Street and proceed east across the Yellowstone River.

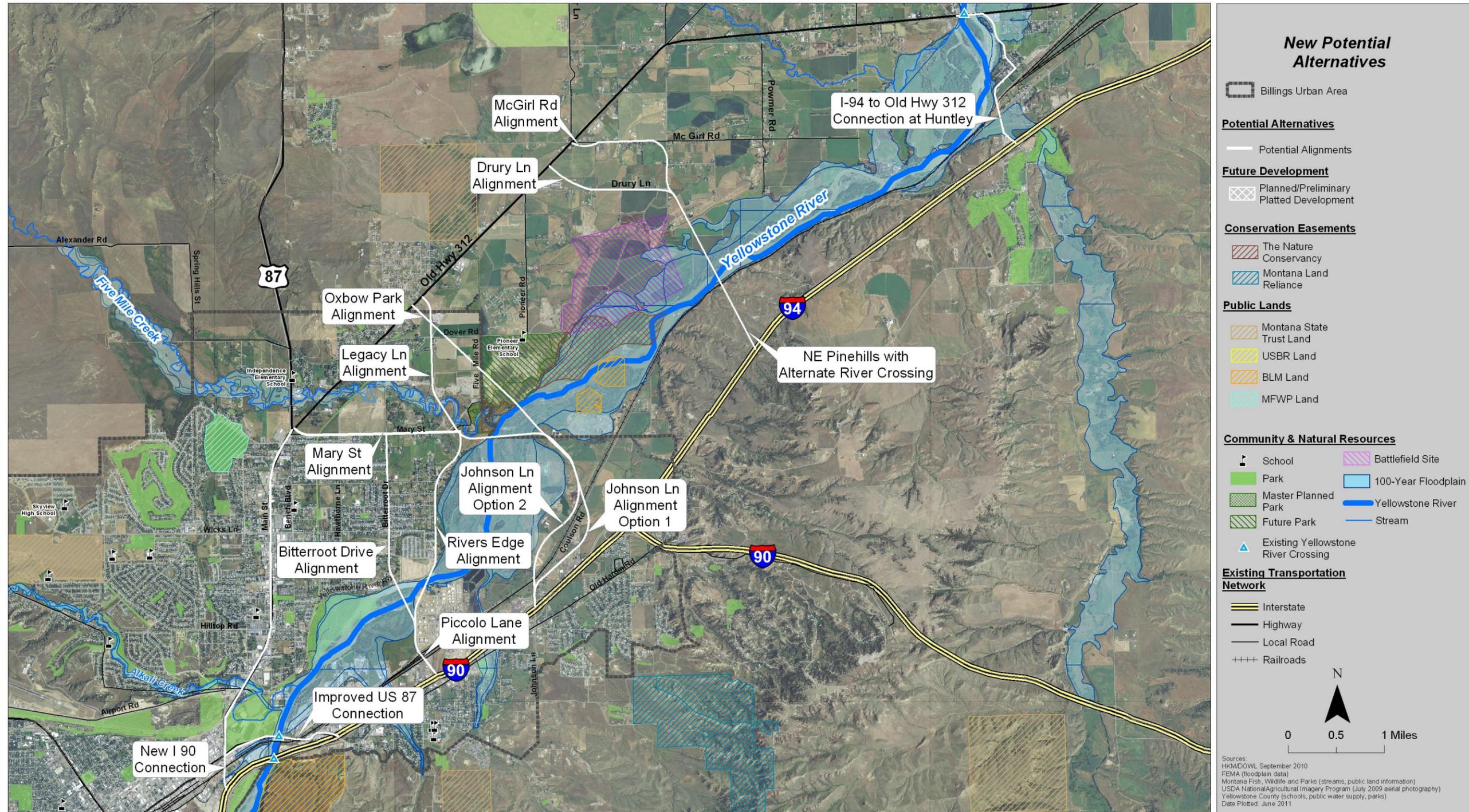


BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

Alternative Alignment	Source	Description of Alignment
Oxbow Park Alignment	Public	From Old Hwy 312, between the Madsen and View Crest subdivisions, proceed southeast through agricultural parcels and across the Yellowstone River.
Drury Lane Alignment	Project Team	From Old Hwy 312, proceed east along Drury Lane and southeast across the Yellowstone River.
McGill Road Alignment	Project Team	From Old Hwy 312, proceed east along McGill Road and southeast across the Yellowstone River.



Figure 3.5 New Potential Alternatives





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LEVEL 2 SCREENING

The project team compiled the old alternatives listed in Table 3.1 and the new alternatives listed in Table 3.3. As described above in Section 3.0 under Identify Range of Alternatives, these alternatives were screened to determine how well they met the identified purpose and needs of the project. Due to the large number of conceptual alternatives under consideration, this screening was completed in two parts.

Level 2A

The Level 2A screening was performed based on proposed alignments only. No design was completed for the alternatives at this point in the process. The screening criteria focused on evaluating key benefits related to the purpose and needs and cultural and floodplain impacts that could be a fatal flaw.

Key Benefits Related to the Purpose and Needs

- Reduce Physical Barrier Impacts – The rimrocks, the Yellowstone River, the railroad, and I-90 create barriers for north-south connections in the Billings area, which affect local traffic and regional traffic. The degree to which each alternative would reduce the impacts of these barriers was assessed. In general, provision of new routes traversing these barriers was assessed as a greater benefit than improvements to existing routes traversing these barriers.
- Improved Connectivity between Lockwood and Billings – To gauge how well the alternatives would improve connectivity between Lockwood and Billings, the project team measured route distances between common points to compare the proposed alternatives to the existing conditions. The two common points used were the Johnson Lane Interchange in Lockwood and the intersection of Wicks Lane and Main Street in Billings Heights (which is a common destination for commercial services). Alternatives with longer route distances were deemed to provide less benefit and received a lower rating.
- Improved Mobility between Billings Heights and the Interstate – There are two primary factors that currently impact mobility for Billings Heights residents: 1) there is only one route in and out of Billings Heights, and when this route is incapacitated, there are no alternate routes, and 2) the existing route is highly congested. To gauge how well the alternatives would improve mobility to and from the Billings Heights area, the project team assessed how the alternatives would improve the convenience and consistency with which people in Billings Heights could travel to and from their neighborhood.
- Improve Truck/Commercial Vehicle Access to and through Billings – Improved truck/commercial vehicle access to state highways and major facilities serving the Billings area is a need identified in the Billings Urban Area Long-Range Transportation Plan (2009 Update). The alternatives were assessed to determine how well they would support the plan for a future bypass route between I-90 and MT 3 north of Billings.

Potential Environmental and Community Impacts

- Cultural/Historic Sites – The National Register of Historic Places (NRHP) was reviewed to identify resources in the study area. Additionally, cultural surveys were completed in 2007 for areas along the Preliminary Alternatives identified under the original purpose and need for the project. No sites listed on the NRHP were identified in proximity to the conceptual alternatives

Alternatives Screened Out

- I-94 to Old Hwy 312 Connection at Huntley
- E5
- Jonson Ln Option 1 – E2/E4/
- E6
- Southern Alignment
- Drury Lane
- E2
- McGirl Rd
- E4
- Northern Alignment Option A

Level 2B

For the alternatives advanced from part one of the Level 2 screening, horizontal design was completed to facilitate development of travel time estimates and assessment of impacts to private property. For the alternatives involving new roadway alignments, two right-of-way widths (130 feet and 200 feet) were screened to provide a range of impacts for each alternative. Because the no-bridge alternatives focus on identifying improvements to the existing transportation network instead of identifying new transportation corridors across the Yellowstone River, right-of-way boundaries were developed to accommodate the improvements needed for each concept to achieve the purpose and needs. The screening criteria consisted of travel time benefits, private property impacts, and other potential issues that could be a fatal flaw.

- Travel Time Benefits – Travel times between Lockwood and Billings Heights were estimated to identify the reduction or increase in travel time on the proposed alignment in comparison to existing conditions. Travel time relates to the mobility and connectivity needs of the project.
- Right-of-way (ROW) impacts – Analysis was performed to determine the number of parcels and structures that would be impacted by the proposed ROW limits for each alternative.
- Other Potential Issues – The project team also reviewed available data to identify community resources that could be impacted by the alternatives. This included such resources as school, churches, cemeteries, parks and recreational facilities, and neighborhoods.

The potential for floodplain impacts was also carried forward as a screening criterion. The results of the Level 2B alternatives screening are summarized below. The detailed results of this screening are provided in Appendix A.

Alternatives Advanced to Level 3

- Johnson Ln Option 1 – Mary St 1
- Johnson Ln Option 2 – Mary St 1
- Johnson Ln Option 1 – Mary St 2
- Johnson Ln Option 2 – Mary St 2
- Johnson Ln Option 1 – Legacy Ln
- Johnson Ln Option 2 – Legacy Ln
- Johnson Ln Option 1 – Oxbow Park
- Johnson Ln Option 2 – Oxbow Park
- Johnson Ln Option 1 – Five Mile Rd
- Johnson Ln Option 2 – Five Mile Rd
- Johnson Ln Option 1 – E1/E3
- Johnson Ln Option 2 – E1/E3

Alternatives Screened Out Pending Field Data Collection

- Pinehills – Mary St 1
- Pinehills – Mary St 2
- Pinehills – Legacy Ln
- Pinehills – Five Mile Rd
- E1
- Pinehills Split – Mary St 1
- Pinehills Split – Mary St 2
- Pinehills Split – Legacy Ln
- Pinehills Split – Five Mile Rd
- E3

Alternatives Screened Out

- New I-90 Connection
- Improved US 87 Connection
- Piccolo-Bitterroot Drive
- Piccolo-River Edge
- Johnson Ln Option 1 – Pioneer Rd
- Johnson Ln Option 2 – Pioneer Rd
- Pinehills – Pioneer Rd
- Pinehills Split – Pioneer Rd

3.3 IDENTIFY ALTERNATIVES FOR DETAILED EVALUATION IN THE EIS

As a third step in the process, the alternatives advanced from the second level of screening were evaluated to identify the context of each potential corridor to apply design standards in a context-sensitive manner. A conceptual level of design was completed for each alternative using the assigned design standards in order to develop construction cost estimates and traffic projections. This information was used to complete a more thorough preliminary screening of the alternatives. This step focuses on identifying alternatives that meet the project design objectives and perform well against the transportation needs identified for the project. These alternatives are advanced for more detailed evaluation in the EIS.

DESIGN STANDARDS

A principal arterial with NHS rural and/or urban standards is proposed for this project. MDT has NHS design standards for urban and rural principal arterials, but only urban standards for non-NHS principal arterials. The NHS standards provide a good range of criteria that can be used to develop context-sensitive design. Generally, the NHS standards require flatter vertical grades, allow for higher speeds, and have wider roadway requirements and clear zone requirements as compared with the non-NHS standards. The wider typical section could result in higher assessment of impacts to adjacent land owners and surrounding natural resources; but clearing a wider swath provides MDT with more flexibility in the final design process.

The narrower typical section of non-NHS standards could help to minimize impacts to adjacent land owners and surrounding natural resources. However, if MDT deemed it necessary to design and construct the facility using NHS standards after completion of the EIS, a supplemental or new environmental document could be required. In addition, use of NHS standards is consistent with the purpose and needs for the project, which includes support of long-term planning for a future bypass



that would connect between the interstate and other NHS routes. Therefore, NHS standards were selected for completion of preliminary engineering and the EIS.

The MDT NHS Rural Principal Arterial – Flat Terrain design criteria was selected as the base design criteria for evaluation. Each alignment option was segmented based on factors such as the surrounding land use and zoning, whether it fell within or outside of the MPO or Urban Area Boundaries, and the speed and functional classification of connecting roads. The segments, as shown on Figure 3.6, were then evaluated individually to determine if the NHS Rural Principal Arterial design criteria for flat terrain could be accommodated, and if it was appropriate given the context of the surrounding area. Alternate standards were recommended for segments which could not accommodate the NHS Rural Principal Arterial design criteria without substantial impacts, and for segments where terrain, access needs, and safety warranted different design considerations. The resulting design standard recommendations are provided in Table 3.4.

Table 3.4 Design Standards Recommendations

Alternative Alignment	Segment	Design Standard Recommendations
Alignment Corridors South of the Yellowstone River		
Pinehills Alignment	P-1	NHS Rural Principal Arterial design criteria are recommended.
Pinehills Split Alignment	PS-1	NHS Rural Principal Arterial design criteria are recommended.
Johnson Lane Alignment	J-1	Industrial land use south of the railroad tracks warrants the NHS Urban Principal Arterial design criteria to minimize right-of-way impacts and optimize access along the route.
	J-1	Current and future commercial/industrial land use along this alignment warrants Urban Principal Arterial design criteria to minimize right-of-way impacts and optimize access along the route.
Alignment Corridors North of the Yellowstone River		
Mary Street Alignment	M1-a	The NHS Rural Principal Arterial – Rolling Terrain design criteria is recommended to minimize impacts to Five Mile Creek and existing residential homes. If this alignment is paired with either of the Johnson Lane alignment options, the Urban Principal Arterial criteria are recommended for consistency between J-1/J-2 and M-2.
	M1-b ¹	The NHS Rural Principal Arterial – Rolling Terrain design criteria is recommended to minimize impacts to Five Mile Creek and existing residential homes. If this alignment is paired with either of the Johnson Lane alignment options, the Urban Principal Arterial criteria are recommended for consistency between J-1/J-2 and M-2.
	M-2	Current and future residential land use along this alignment warrants Urban Principal Arterial design criteria to minimize right-of-way impacts and optimize access along the route. A frontage road is recommended to maintain access for property on the south side of Mary Street.



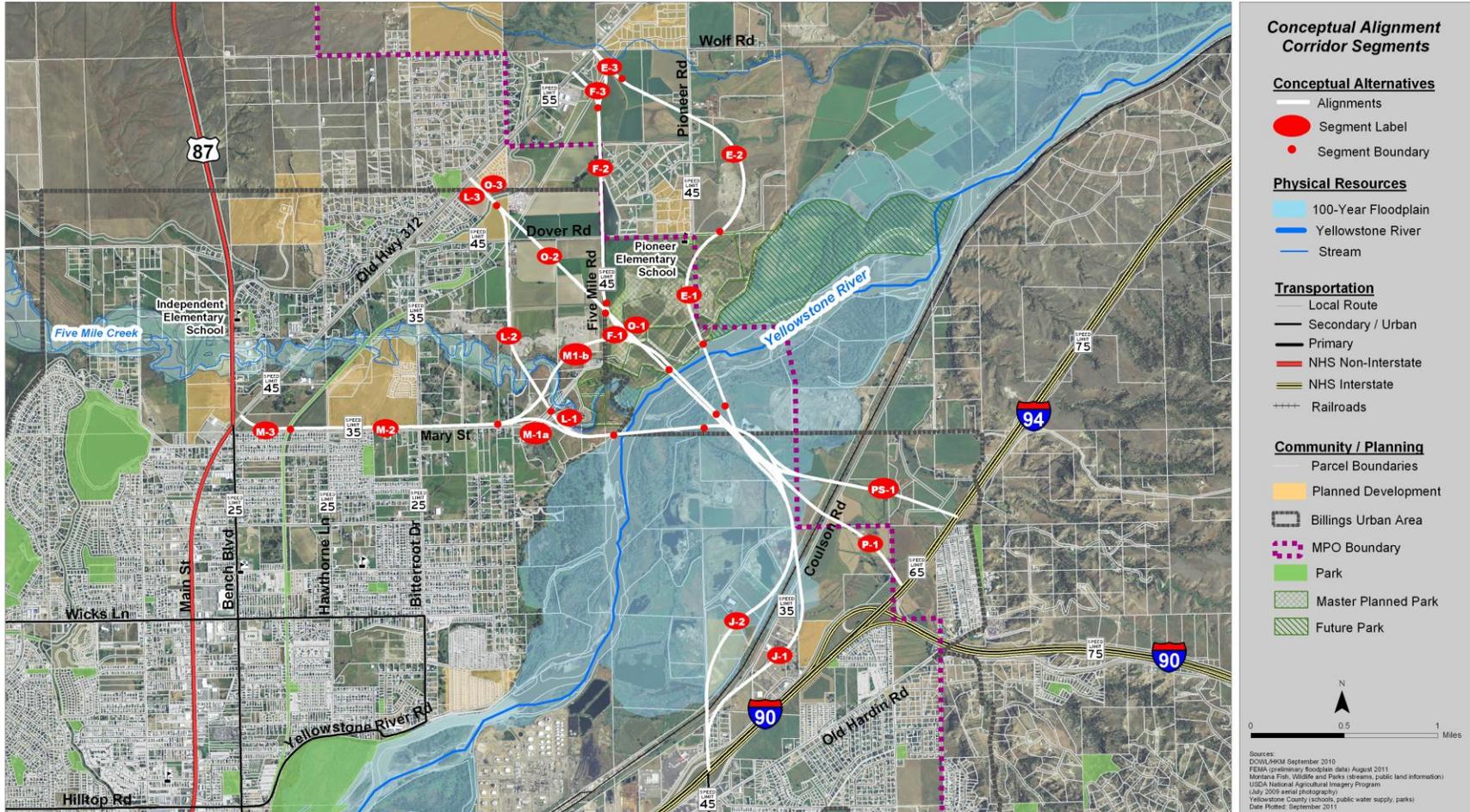
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Alternative Alignment	Segment	Design Standard Recommendations
	M-3	The NHS Urban Principal Arterial is recommended for this segment to minimize right-of-way impacts and improve safety through controlled speed at the transition to Old Hwy 312.
Legacy Lane Alignment	L-1	The NHS Rural Principal Arterial – Rolling Terrain design criteria is recommended to minimize right-of-way and floodplain impacts.
	L-2	NHS Rural Principal Arterial design criteria are recommended.
	L-3	The NHS Urban Principal Arterial is recommended for this segment to minimize right-of-way impacts and improve safety through controlled speed at the transition to Old Hwy 312.
Oxbow Park Alignment	O 1	NHS Rural Principal Arterial design criteria are recommended.
	O-2	NHS Rural Principal Arterial design criteria are recommended.
	O-3	The NHS Urban Principal Arterial is recommended for this segment to minimize right-of-way impacts and improve safety through controlled speed at the transition to Old Hwy 312.
Five Mile Road Alignment	F 1	NHS Rural Principal Arterial design criteria are recommended.
	F-2	NHS Rural Principal Arterial design criteria are recommended.
	F-3	The NHS Urban Principal Arterial is recommended for this segment to minimize right-of-way and property impacts and improve safety through controlled speed at the transition to Old Hwy 312.
E1/E3 Alignment	E 1	NHS Rural Principal Arterial design criteria are recommended.
	E-2	NHS Rural Principal Arterial design criteria are recommended.
	E-3	The NHS Urban Principal Arterial is recommended for this segment to minimize right-of-way impacts and improve safety through controlled speed at the transition to Old Hwy 312.

¹The Mary Street Option 2 alignment was developed during the Level 2 Screening to address the long floodplain crossing for Mary Street Option 1.



Figure 3.6 Alignment Corridor Segments





DESCRIPTION OF ALTERNATIVES CONSIDERED

Typical Sections

Three typical sections are proposed for the project alternatives based on the design standards recommendations. The typical sections are not intended to comprise all instances within the various project corridors under consideration, but rather are intended to depict the typical sections on which the various roadway segments will be evaluated. Additional typical sections may be necessary as the project progresses. Graphic depictions of the typical sections may be found in Appendix B.

Elements common to all of the typical sections include the following:

- Two 12-foot wide travel lanes in each direction
- Paved shoulders
- Drainage channels and side slopes

The elements specific to each type of typical section are explained below:

NHS Rural Principal Arterial – Flat/Rolling Terrain

- Shoulders: 4-foot shoulders adjacent to median; 8-foot shoulders adjacent to right lane
- Median: 50-foot depressed median (including width of inside shoulders) with 6:1 slopes
- Width of Roadway: 114 feet
- Width of ROW: Minimum of 160 feet

NHS Urban Principal Arterial

- Shoulders: 8-foot shoulders adjacent to right lane
- Median: 16-foot two-way left turn lane
- Width of Roadway: 80 feet
- ROW: Minimum of 160 feet

NHS Urban Principal Arterial with Frontage Road

- Shoulders: 8-foot shoulders adjacent to right lane
- Median: 16-foot two-way left turn lane
- Frontage Road: two 12-foot travel lanes separated from mainline by ditch section with 6:1 slopes
- ROW: varies

Depending on the traffic volumes, segments of the roadway may be implemented in phases that would initially be only one lane in each direction with no center median or two-way left turn lane. However, the full right-of-way required for the build-out scenario would be acquired as part of this project.



Interchanges and Intersections

The interchange/intersection location options for the eastern and western project termini are shown in Figure 3.9. The type of intersection or interchange and the geometric layout needed at each connection point is influenced by the classification of the intersecting roads, the space available, the topography, and the operating needs.

At the interstate, the alternatives include a grade-separated interchange. There are two categories of grade-separated interchanges; system interchanges and service interchanges.

- System interchanges have high right-of-way requirements and are costly to construct, but they can accommodate high traffic volumes safely and provide an unimpeded connection between two routes. Drivers traveling between the interstate and the bypass would be able to do so without stopping or slowing down substantially.
- Service interchanges accommodate moderately high traffic volumes and maintain unimpeded traffic flow on the primary route. Traffic on the connecting route must slow down or stop.

Interstate Connection

Two locations for a connection to the interstate are under consideration: the Pinehills interchange (I-90/I-94 junction) and the Johnson Lane interchange. The existing Pinehills interchange is a system interchange (Figure 3.7) and the existing Johnson Lane interchange is a service interchange (Figure 3.8).

Figure 3.7 Existing Pinehills Interchange (I-90/I-94 junction)



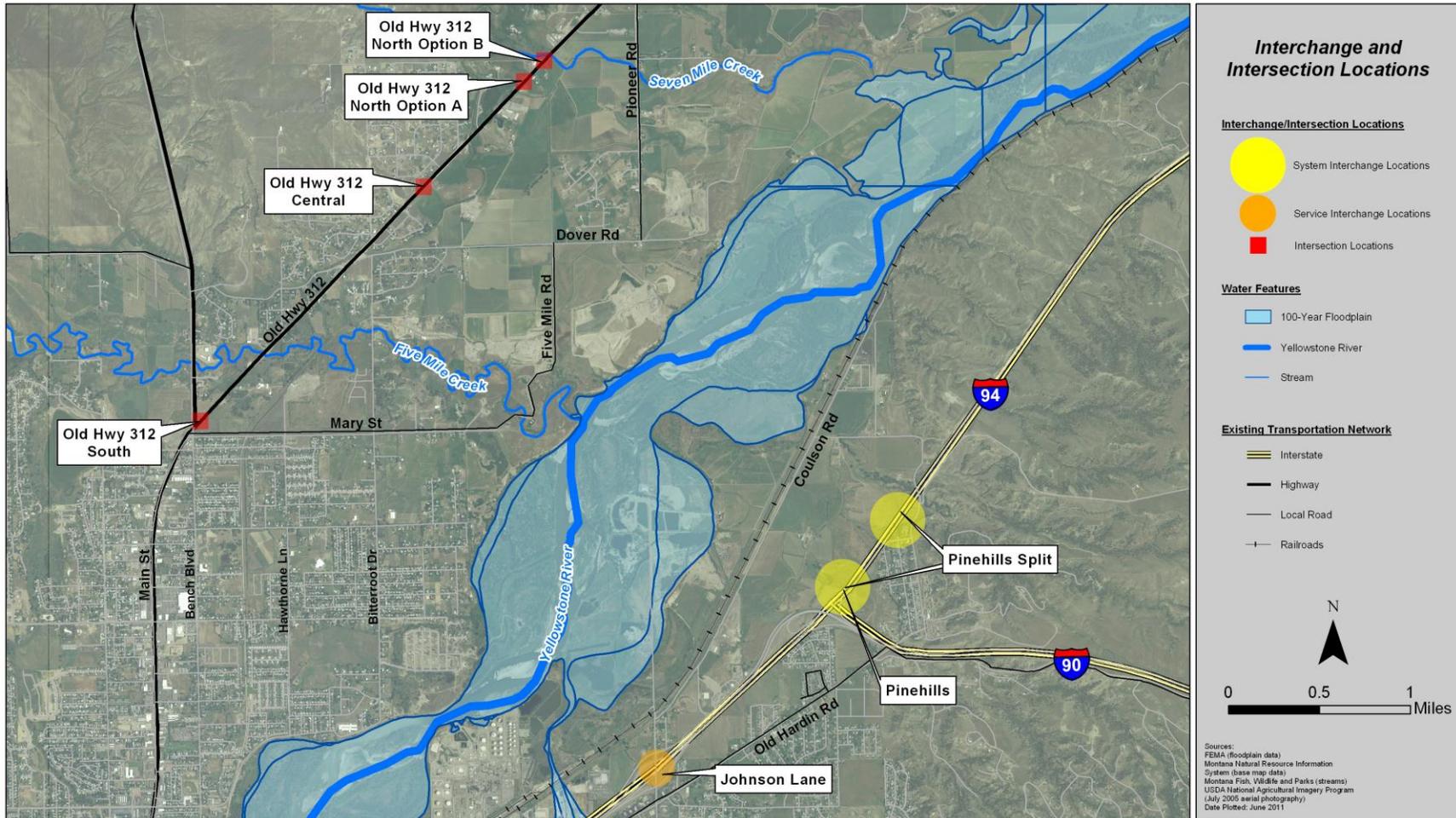
Figure 3.8 Existing Johnson Lane Interchange



At both locations, a complete reconstruction of the existing interchange would be necessary to implement the new arterial.



Figure 3.9 Interchange and Intersection Locations





Pinehills Interchange Options

Two options for reconstructing the existing Pinehills interchange are under consideration. The first option is to connect directly at the existing Pinehills interchange. This would require a full reconstruction of the interchange and realignment of I-90 and I-94 in the vicinity of the interchange. The design would provide for high speed movements on all ramps and would improve the continuity of I-90. A schematic of this interchange design is shown in Figure 3.10. The second option is to connect to the interstate using a split interchange design at the Pinehills interchange. This design retains the connection between I-90 and I-94 at the same location, but incorporates high speed ramps. The new arterial connection is offset to the north providing a direct connection to I-94 and a connection to I-90 via collector and distributor roads. This option would require a full reconstruction of the existing Pinehills interchange and minimal realignment of I-90 and I-94. The design would provide for high speed movements on all ramps and would improve the continuity of I-90. A schematic of this interchange design is shown in Figure 3.11.

Figure 3.10 Pinehills Option 1 – Full Directional Interchange

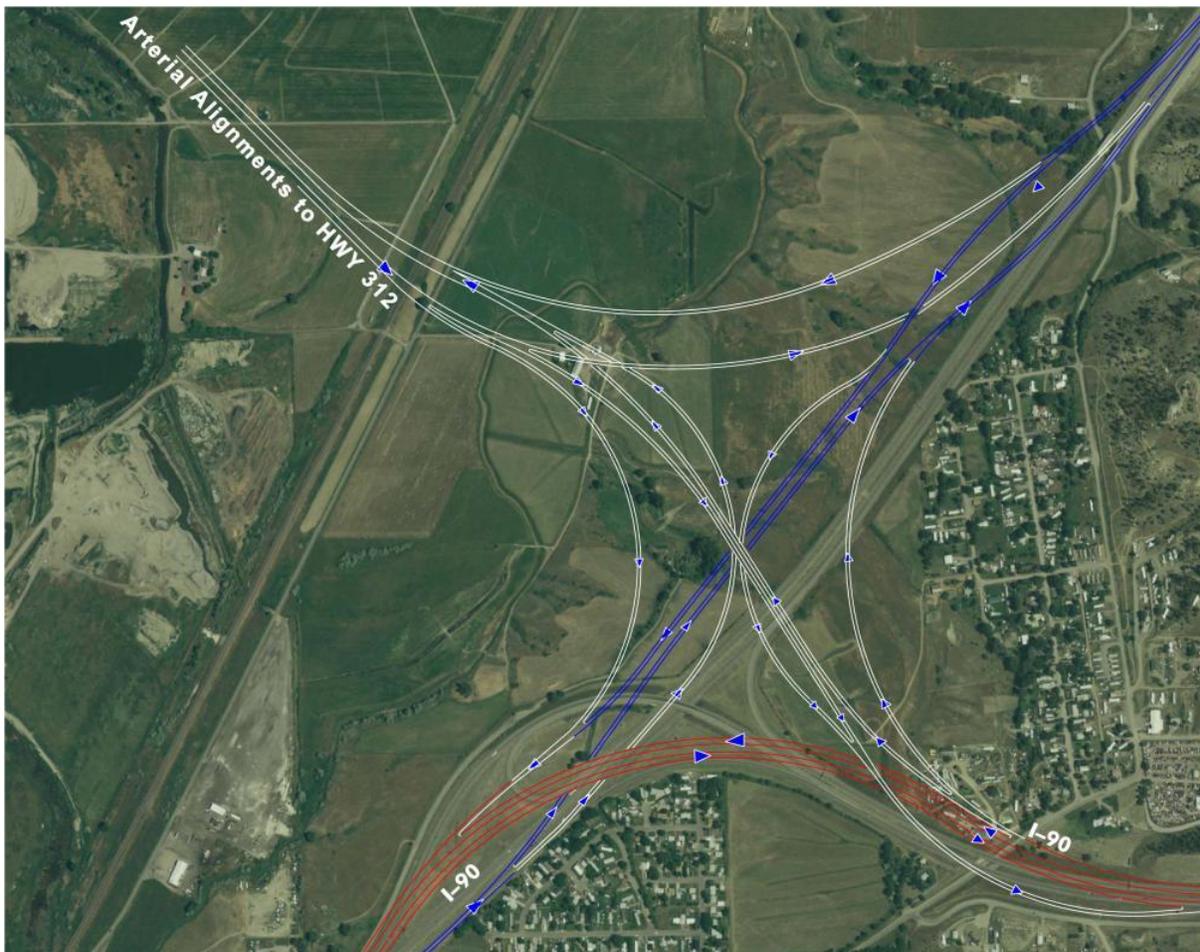




Figure 3.11 Pinehills Option 2 – Split Interchange



Johnson Lane Interchange Options

Five options for reconstructing the existing Johnson Lane interchange are under consideration. The *Preliminary Traffic Report* being prepared by Marvin & Associates will document the evaluation of these five options. Each of these options offers specific advantages and disadvantages that will be explained in the report. It is anticipated that any of these options could be a viable solution for reconstructing the Johnson Lane interchange and the specific solution for reconstructing this interchange will be evaluated further during final design.

Option 1 – Modified Diamond with Roundabouts

This option would modify the existing standard diamond interchange by replacing the signalized intersections at North Frontage Road, north access ramps, south access ramps, and Old Hardin Road with roundabouts. I-90 would be realigned slightly to the south and Johnson Lane would pass underneath the interstate via new I-90 structures. A schematic of this interchange design is shown in Figure 3.12.

Option 2 – Single-Point Urban Interchange

This option would implement a single-point urban interchange (SPUI) to replace the standard diamond interchange. The signalized intersections at North Frontage Road and Old Hardin Road would be reconstructed. This option could use signalized intersections or roundabouts at these locations. The north and south access ramps would be controlled by one signalized intersection below new I-90 structures. A schematic of this interchange design is shown in Figure 3.13.

Option 3 – Single-Point Urban Interchange with Roundabouts

This option would implement an urban interchange to replace the standard diamond interchange. The signalized intersections at North Frontage Road and Old Hardin Road would be reconstructed with roundabouts at these locations. The north and south access ramps would be controlled by one roundabout below new double-span I-90 structures. A schematic of this interchange design is shown in Figure 3.14.

Option 4 – Double Crossover Diamond with Traffic Signals

This option would implement a diverging diamond interchange to replace the standard diamond interchange. The signalized intersections at North Frontage Road and Old Hardin Road would be reconstructed. The north and south access ramps would be controlled by cross-over signalized intersections. I-90 would be realigned slightly to the south. Johnson Lane would pass below new I-90 structures. A schematic of this interchange design is shown in Figure 3.15.

Option 5 – Double Crossover Diamond with Roundabouts

This option would be similar to Option 4 except that the signalized intersections at North Frontage Road and Old Hardin Road would be reconstructed with roundabouts (Figure 3.16).



Figure 3.12 Johnson Lane Option 1 – Roundabouts

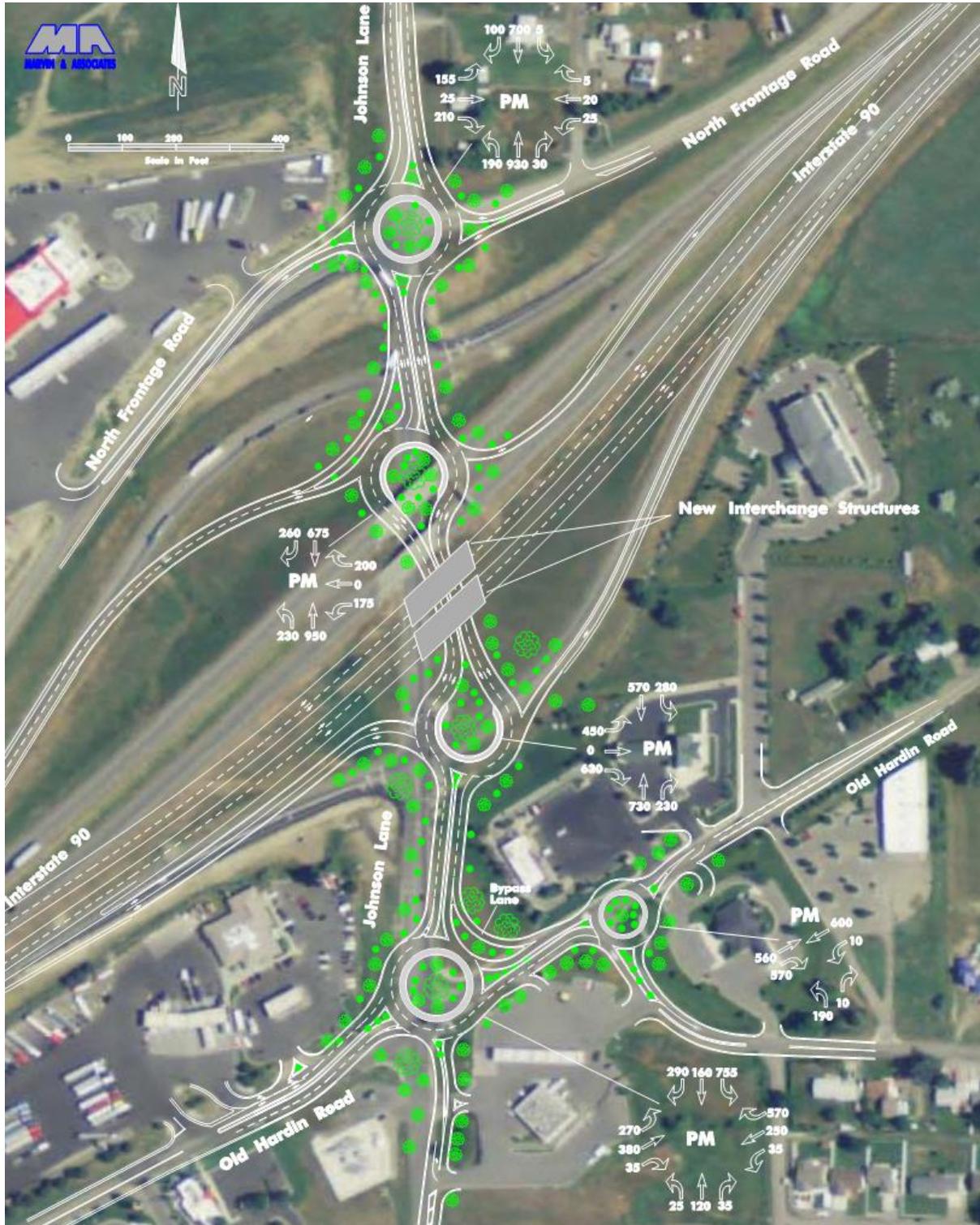




Figure 3.13 Johnson Lane Option 2 – Single-Point Urban Interchange





Figure 3.14 Johnson Lane Option 3 – Urban Interchange with Roundabouts

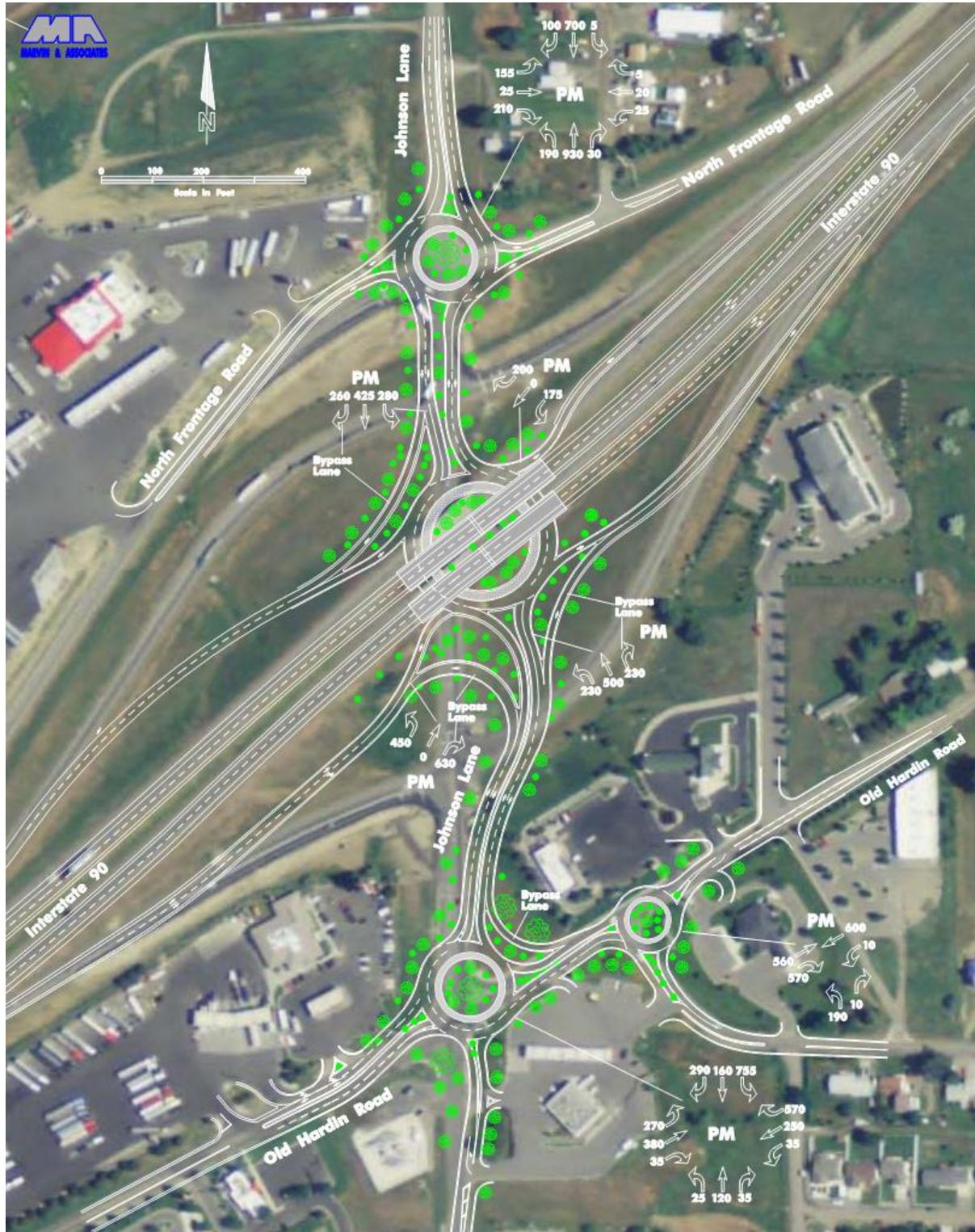




Figure 3.15 Johnson Lane Option 4 – Double Crossover Diamond with Traffic Signals

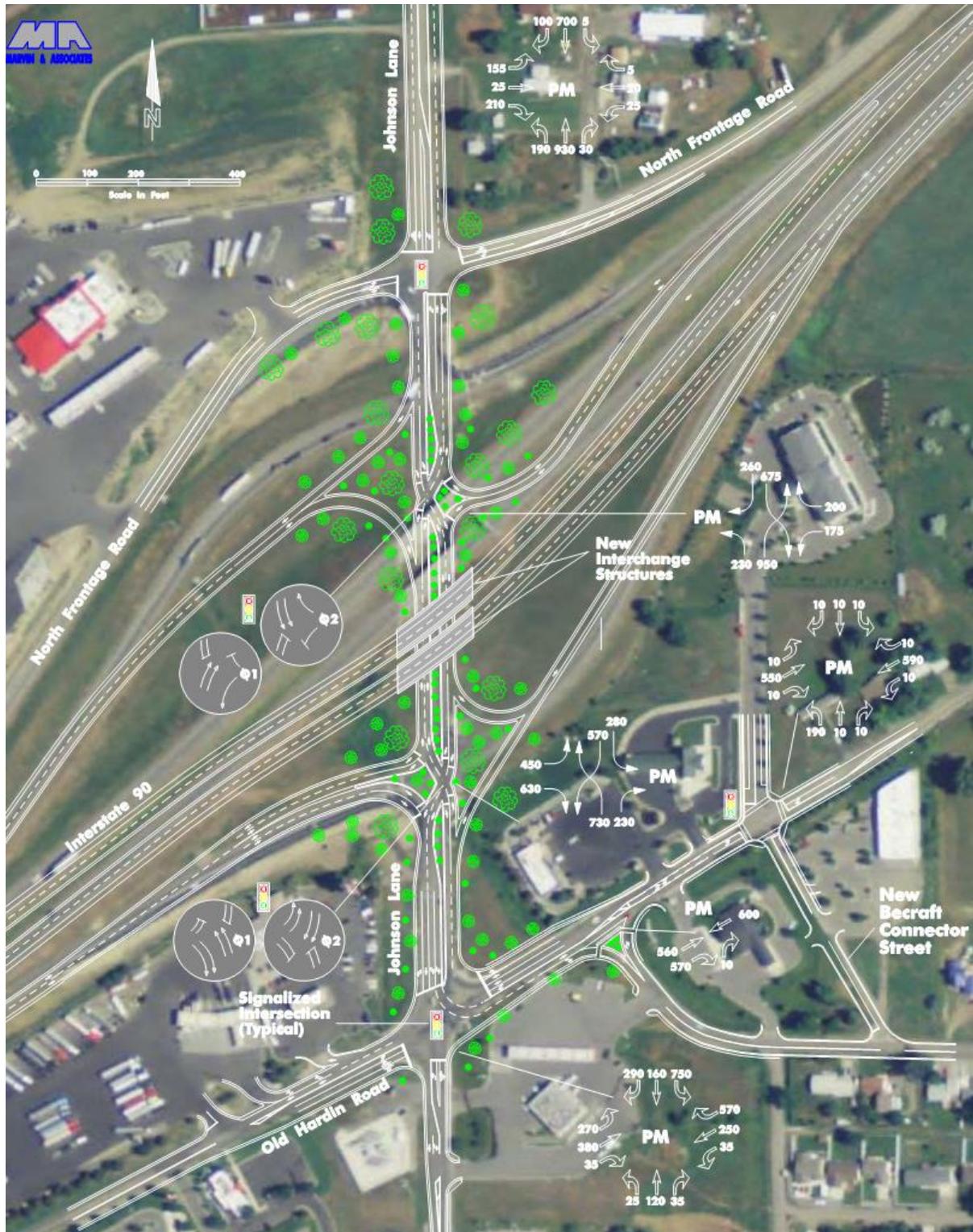
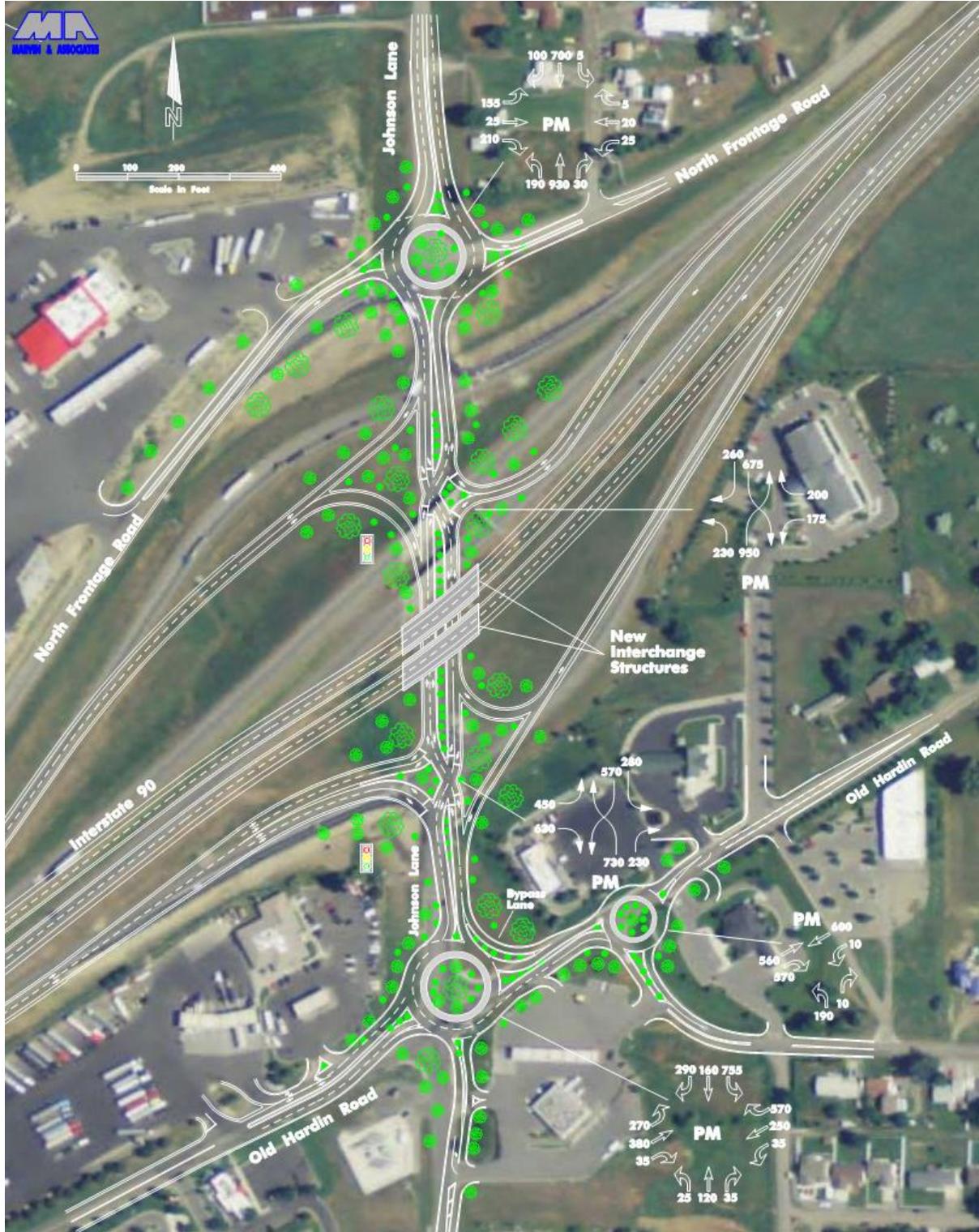




Figure 3.16 Johnson Lane Option 5 – Double Crossover Diamond with Roundabouts





Old Hwy 312 Connection

Four locations for a connection to Old Hwy 312 were considered as shown in Figure 3.9. A signalized T-intersection or a roundabout is proposed for the central and northern connection locations.

The southern connection option at Mary Street is more complex due to the number of existing streets that connect at this location. Main Street, Bench Boulevard, Mary Street, US 87, and Old Hwy 312 intersect at this location, which is currently controlled by a traffic signal (Figure 3.17).

Figure 3.17 Existing Signalized Intersection at Main Street-US 87-Old Hwy 312



This intersection would be reconfigured to accommodate the projected traffic and infrastructure changes associated with the project. Two concepts were evaluated for reconstructing this intersection to accommodate the Mary Street alignment alternatives.

Option A – Old Hwy 312 and Main Street Roundabouts

This concept would eliminate the existing signalized intersection and implement two new roundabouts (Figure 3.18). One roundabout would connect Main Street, US 87, Old Hwy 312, and the proposed arterial. The other roundabout would connect Mary Street and Bench Boulevard to Main Street.

Option B – Old Hwy 312 and Bench Boulevard Roundabouts

This concept would eliminate the existing signalized intersection and implement two new roundabouts (Figure 3.19). One roundabout would connect Main Street, US 87, Old Hwy 312, and the proposed



arterial. The other roundabout would connect Mary Street and Bench Boulevard to the main roundabout.

The evaluation of these two concepts is documented in a memorandum prepared by Marvin & Associates (Appendix C). The results of the evaluation indicate that Option A has 40% more right-angle traffic conflicts, half the reserve capacity, greater overall control delay, and would have slower corridor travel speeds than Option B. Additionally, Option A would route the major movement (Main Street to Old Hwy 312) through two roundabouts instead of one. Option B performs better overall and has the added benefit of segregating regional and local traffic.

Figure 3.18 Old Hwy 312 Connection – Option A





Figure 3.19 Old Hwy 312 Connection – Option B



Other Connections to the Existing Roadway Network

Additional connections to the existing roadway network between I-90 and Old Hwy 312 will be provided at locations where the alternative alignments cross public roads. These connections to the proposed arterial would be provided via at-grade intersections. At locations where the intersection would meet signal warrants in the design year (2035), both a signalized intersection and a roundabout will be considered.

Conceptual Alignments

As discussed previously, the Level 2 screening criteria focused on evaluating key benefits related to the purpose and needs and environmental and community impacts that could be a fatal flaw. Alignments with negligible mobility benefits or high environmental and community impacts were screened out in the process. Five corridors north of the Yellowstone River and four corridors south of the Yellowstone River were advanced to the conceptual alignments stage. Any of the alignments north of the Yellowstone River can be matched to any alignment south of the Yellowstone River to create multiple alignment options for connecting between the interstate and Old Hwy 312. Each alignment is discussed in more detail below.



Alignments South of Yellowstone River

Johnson Lane Alignment – Option 1

The Johnson Lane Option 1 alignment would provide a 2.42-mile long connection between I-90 and the Yellowstone River through land zoned for industrial and agricultural use. The connection to I-90 would be located at Johnson Lane, requiring the reconstruction of the existing interchange.

The alignment would proceed north from I-90 along Johnson Lane and follow the existing Coulson Road alignment northeast for approximately 0.3 mile. At this point, the alignment would veer off of that existing road alignment and continue northeast roughly along the boundaries of parcels with industrial use. The alignment would proceed north and then west over Coulson Road and the Montana Rail Link railroad toward the Yellowstone River traversing agricultural land.

This alignment would include an at-grade connection with Coulson Road approximately 0.35 mile northeast of Johnson Lane. The existing segment of Coulson Road between Johnson Lane and this new connection would be removed.

Johnson Lane Alignment – Option 2

The Johnson Lane Option 2 alignment would provide a 2.19-mile long connection between I-90 and the Yellowstone River through land zoned for industrial and agricultural use. The connection to I-90 would be located at Johnson Lane, requiring the reconstruction of the existing interchange.

The alignment would proceed north along the Johnson Lane alignment for approximately 0.13 mile, where it would cross over the Montana Rail Link railroad and continue along Johnson Lane for another 0.15 mile. It would then veer northeast off of the existing road alignment and continue along the edge of the Yellowstone River floodplain toward the Yellowstone River.

This alignment includes a reconfigured at-grade connection with Coulson Road at the existing intersection of Johnson Lane.

Pinehills Alignment

The Pinehills alignment would provide a 1.38-mile long connection between I-90 and the Yellowstone River through land zoned for industrial and agricultural uses. The connection to I-90 would be located at the junction of I-90/I-94, requiring reconstruction of the existing system interchange.

The alignment would proceed northwest over Coulson Road and the Montana Rail Link railroad toward the Yellowstone River traversing agricultural land. This alignment would include a grade-separated connection with Coulson Road approximately 0.5 mile northwest of I-90.

Pinehills Split Alignment

The Pinehills Split alignment would provide a 1.43-mile long connection between I-90 and the Yellowstone River through land zoned for industrial and agricultural uses. The connection to I-90 would be located at the junction of I-90/I-94, requiring reconstruction of the existing system interchange.



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NCPD 56(55)CN 4199

The alignment would proceed northwest over Coulson Road and the Montana Rail Link railroad toward the Yellowstone River, traversing agricultural land. This alignment would include a grade-separated connection with Coulson Road approximately 0.65 miles northwest of I-90.

Alignments North of Yellowstone River (including the river crossing)

Mary Street Alignment – Option 1

This alignment would provide a 2.51-mile long connection from Old Hwy 312 across the Yellowstone River through land zoned for residential, agricultural, and commercial use. The connection to Old Hwy 312 would be located near the intersection of Old Hwy 312 and Mary Street, requiring the reconstruction of the existing at-grade intersection.

The alignment would proceed east directly north of Mary Street for approximately 1.6 miles, and would be bordered by land with agricultural and residential uses along this section. The alignment would veer south across Mary Street and proceed southeast across an undeveloped parcel before crossing the Yellowstone River.

This alignment would include at-grade connections to Mary Street at four locations; Bench Boulevard, Hawthorne Lane, Bitterroot Drive, and approximately 1.6 miles east of Old Hwy 312 where the alignment would cross Mary Street. Mary Street would be used as a frontage road for local resident access.

Mary Street Alignment – Option 2

This alignment would provide a 2.76-mile long connection from Old Hwy 312 across the Yellowstone River through land zoned for residential, agricultural, and commercial use, as well as a tract of future park land.

This alignment would be identical to the Mary Street Alignment - Option 1 from Old Hwy 312 to approximately 0.5 mile before the Yellowstone River. At this point, it would veer to the north across Five Mile Creek and Five Mile Road. The alignment would then proceed southeast through a tract of future park land and continue across the Yellowstone River.

This alignment would include connections to Mary Street at three locations: Bench Boulevard, Hawthorne Lane, and Bitterroot Drive. The alignment would also connect with Five Mile Road north of Five Mile Creek. Mary Street would be used as a frontage road for local resident access.

Legacy Lane Alignment

This alignment would provide a 2.2-mile long connection from Old Hwy 312 across the Yellowstone River through land zoned for agricultural, residential, and commercial use.

The connection to Old Hwy 312 would be approximately 0.5 mile north of Dover Road, requiring the construction of a new at-grade intersection. The alignment would proceed south through agricultural land and connect to Dover Road with a new at-grade intersection approximately 0.57 mile east of Old Hwy 312. At this point, the alignment would continue south for approximately 0.5 mile, passing through agricultural land and along the boundaries of residential and commercial parcels. The



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NCPD 56(55)CN 4199

alignment would proceed southeast across Five Mile Creek, Five Mile Road, and a small parcel of undeveloped land before crossing the Yellowstone River.

Oxbow Park Alignment

This alignment would provide a 1.8-mile long connection from Old Hwy 312 across the Yellowstone River through land zoned for agricultural and commercial use, as well as a tract of future park land.

The connection to Old Hwy 312 would be located approximately 0.5 mile north of Dover Road, requiring the construction of a new at-grade intersection. The alignment would proceed southeast through agricultural and commercial land connecting to Dover Road with a new at-grade intersection 0.7 mile east of Old Hwy 312. The alignment would continue southeast connecting to Five Mile Road with a new at-grade intersection approximately 1.4 miles south of Old Hwy 312. After crossing Five Mile Road, the alignment would continue southeast through planned future park land before crossing the Yellowstone River.

Five Mile Road Alignment

For this alternative, there are two connection location options at Old Hwy 312. Depending on the location of its connection with Old Hwy 312, the Five Mile Road alignment would provide a either a 2.13 or 2.23-mile long connection from Old Hwy 312 across the Yellowstone River. It would cross land zoned for agricultural, commercial, and residential use, as well as a tract of future park land.

Either connection to Old Hwy 312 would be located approximately 1 mile north of Dover Road, requiring the construction of a new at-grade intersection. The alignment would proceed south to the existing intersection of Five Mile Road and Dover Road. From that location, the alignment would continue south along the Five Mile Road alignment before veering southeast through planned future park land and crossing the Yellowstone River.

E1/E3 Alignment

The E1/E3 alignment would provide a 2.42-mile long connection from Old Hwy 312 across the Yellowstone River through land zoned for agricultural, commercial, and residential use, as well as a tract of future park land.

The connection to Old Hwy 312 would be located approximately 1 mile north of Dover Road, requiring the construction of a new at-grade intersection. The alignment would proceed southeast through agricultural land and connect to Pioneer Road approximately 0.6 mile southeast of Old Hwy 312. At this point, the alignment would curve southwest through a parcel of commercial land and connect to Dover Road approximately 1.65 mile south of Old Hwy 312. The alignment would then continue southeast through planned future park land and across the Yellowstone River. This alignment would include connections with Pioneer Road and Dover Road.

LEVEL 3 SCREENING

Screening Criteria

For the Level 3 Screening process, alternatives were evaluated as complete alignments; i.e., each alignment option north of the Yellowstone River was paired with an alignment option south of the



Yellowstone River for a total of 24 complete alignments. The alignments were compared to each other using criteria from the Level 2 screening process, in addition to traffic data and construction cost estimates. These additional criteria are discussed in detail below. Alternatives that would provide similar benefits to other alternatives but with more impacts or higher cost were screened out.

Traffic Data

- Projected Average Daily Traffic (ADT) for 2035 – The traffic loadings on the proposed alternative alignments were projected by examining the directional traffic demand on the existing US 87 crossing of the Yellowstone River using turning movements counts at a number of key junctions and data from previous Origin-Destination studies.
- Origin-Destination – The preliminary traffic data was evaluated to identify the percentage of trips utilizing the proposed alternative alignments that were traveling to or from Billing Heights versus to or from the outlying area northeast of Billings.
- Project-Generated Traffic – Traffic patterns were evaluated to determine how the alternatives would affect traffic volumes on existing connecting streets.
- ADT Reduction on Main Street – Although reducing traffic congestion is not the purpose of this project, the potential benefits to Main Street were examined. For each alternative alignment, the reduction of traffic on Main Street was estimated.

Construction Cost Estimates

The project team estimated the construction costs for each alignment. The cost estimates include construction of the mainline, bridges, interchanges, and channel crossings, as well as right-of-way, preliminary engineering, construction engineering, mobilization, and an additional amount for contingency and miscellaneous items. Costs are provided in 2011 dollars.

Screening Analysis

The results of the Level 3 alternatives screening are summarized below. The detailed results of this screening are provided in Appendix A.

Alternatives Advanced to DEIS

- Johnson Ln Option 1 – Mary St 2
- Johnson Ln Option 1 – Five Mile Rd
- Johnson Ln Option 2 – Mary St 2
- Johnson Ln Option 2 – Five Mile Rd

Alternatives Screened Out Pending Field Data Collection

- Johnson Ln Option 1 – Mary St 1
- Johnson Ln Option 1 – E1/E3
- Johnson Ln Option 2 – Mary St 1
- Johnson Ln Option 2 – E1/E3
- Pinehills – Mary St 1
- Pinehills – Mary St 2
- Pinehills Split – Mary St 1
- Pinehills Split – Mary St 2



Alternatives Screened Out

- Johnson Ln Option 1 – Legacy Ln
- Johnson Ln Option 2 – Legacy Ln
- Johnson Ln Option 1 – Oxbow Park
- Johnson Ln Option 2 – Oxbow Park
- Pinehills – Legacy Ln
- Pinehills – Oxbow Park
- Pinehills – Five Mile Rd
- Pinehills Split – Legacy Ln
- Pinehills Split – Oxbow Park
- Pinehills Split – Five Mile Rd
- E1
- E3

UPDATES TO LEVEL 3 SCREENING RESULTS

Johnson Lane Option 2 Alignments – Screen Out

During the Level 3 Screening, no major differentiators were identified for the Johnson Lane Option 1 and Johnson Lane Option 2 alignments. Therefore, the project team recommended that both alignment options be carried forward for detailed evaluation in the DEIS. However, new information has altered the screening results. MDT decided to use the updated preliminary floodplain and floodway delineation from FEMA in place of the currently approved delineation from 1981. The updated delineation has a wider floodplain through the study area. Based on the updated delineation, Johnson Lane Option 2 Alignment would have substantial longitudinal floodplain encroachment.

The Level 3 Screening recommendation for four alternatives was “Screen Out Pending Field Work.” Resource specialists completed field studies along the proposed alternatives in July and August of 2011. The project team has updated the recommendations for these four alternatives as follows:

Mary Street Option 1 Alignment – Carry Forward

Based on the updated preliminary floodplain delineation described above, there would no longer be much, if any, difference between Mary Street Option 1 and Mary Street Option 2 with respect to potential floodplain impacts. Additionally, the other primary differentiator between these two options was cost. The values for this criteria may change when the hydraulic analysis is updated using the new preliminary model from FEMA.

E1/E3 Alignments – Screen Out

No fatal flaws were identified along the Five Mile Road Alignment, which provides more travel time savings than this alignment and would draw higher traffic volumes.

Pinehills Alignments – Screen Out

No fatal flaws were identified along the Johnson Lane Option 1 Alignment, which provides more travel time savings than this alignment with lower cost and fewer impacts.



Pinehills Split Alignments – Screen Out

No fatal flaws were identified along the Johnson Lane Option 1 Alignment, which provides more travel time savings than this alignment with lower cost and fewer impacts.

3.4 ALTERNATIVES TO BE CARRIED FORWARD

The alternatives to be carried forward for detailed evaluation in the DEIS are described below and summarized in Table 3.5.

ALIGNMENT ALTERNATIVES

The project team proposes the following alignment alternatives be carried forward for detailed analysis in the DEIS:

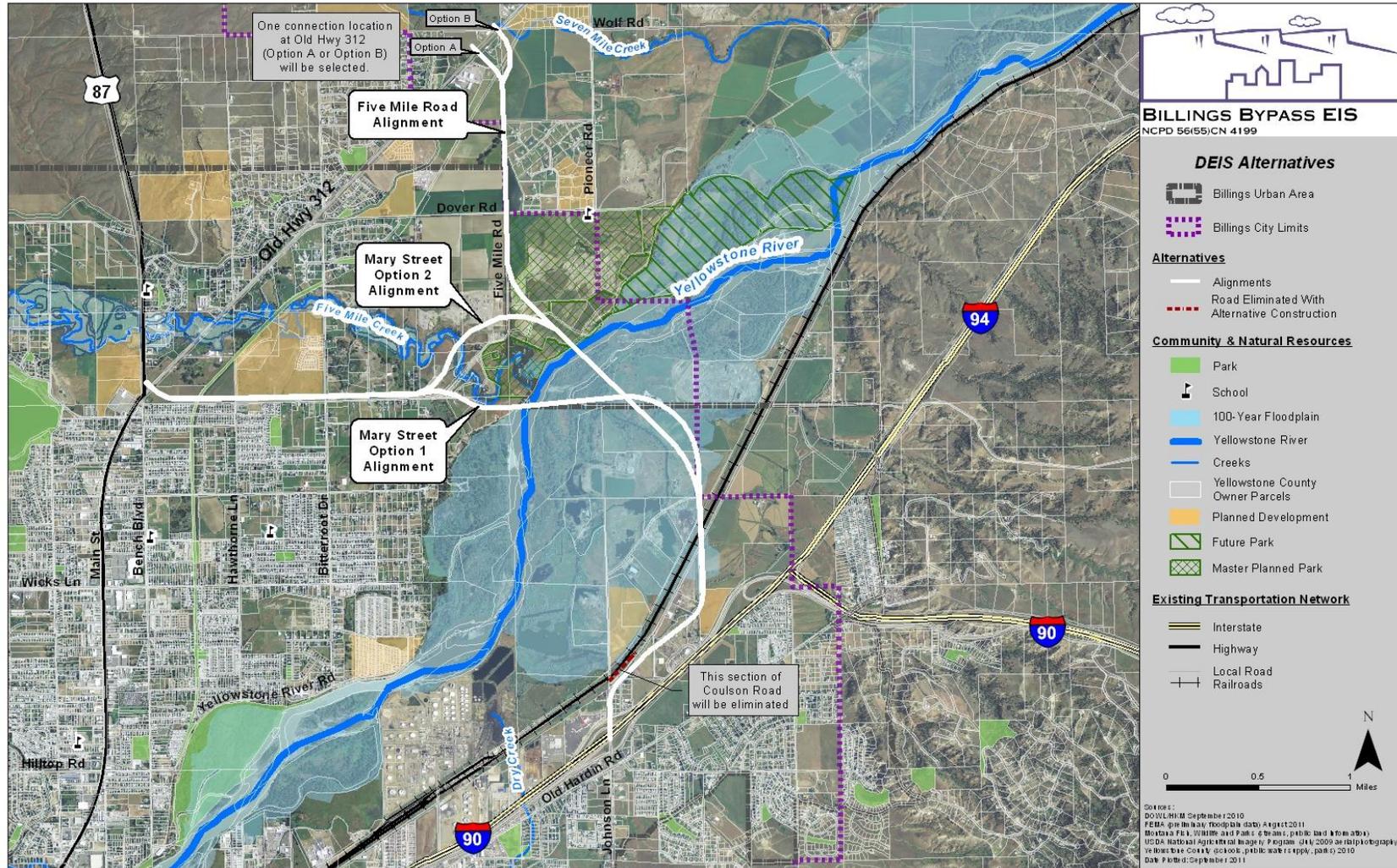
- Mary Street Option 1 Alignment
- Mary Street Option 2 Alignment
- Five Mile Road Alignment

Because the Johnson Lane Option 2 Alignment was screened out, all alignment options for the project would use the Johnson Lane Option 1 Alignment. Thus, this distinction will be dropped from the naming convention for the alternatives.

These alignment alternatives, as shown in Figure 3.20, perform well when measured against the transportation needs identified for the project. The preliminary screening has identified no major gaps in the cost or impact of these alternatives.



Figure 3.20 Alternatives to be Carried Forward





Recommended Secondary Corridor Improvements

The Level 3 screening included a preliminary analysis of traffic impacts to the existing street network that would be anticipated in the design year (2035) if any of these alternatives were to be implemented. Based on this information, additional improvements are recommended for existing roads north of the Yellowstone River to meet design objectives for operations and safety. Therefore, each alternative to be evaluated in the DEIS includes primary and secondary corridor improvements. The recommended secondary corridor improvements are shown in Figure 3.23, Figure 3.24, and Figure 3.25 and summarized below for each primary corridor:

Mary Street Option 1 Alignment

Improvements for Existing Roadway Connection between Mary Street and Five Mile Road

- Reconstruct to MDT standards for two-lane rural local road. This would include shoulder and slope improvements.

Improvements for Five Mile Road

- Reconstruct Five Mile Road to MDT standards for a two-lane rural local road. This would include shoulder and drainage improvements.
- Construct new segment of Five Mile Road between Dover Road and Old Hwy 312 using MDT standards for a two-lane rural local road.
- Four-way stop-control at the Five Mile Road and Dover Road intersection with left-turn lanes on Five Mile Road.
- Construct new at-grade intersection at Five Mile Road and Old Hwy 312 with westbound left-turn lane on Old Hwy 312 and northbound left-turn lane on Five Mile Road. Signal warrants would be met for this intersection requiring either signalization or a roundabout.

Mary Street Option 2 Alignment

Improvements for Five Mile Road

- Reconstruct Five Mile Road to MDT standards for a two-lane rural local road. This would include shoulder and drainage improvements.
- Construct new segment of Five Mile Road between Dover Road and Old Hwy 312 using MDT standards for a two-lane rural local road.
- Four-way stop-control at the Five Mile Road and Dover Road intersection with left-turn lanes on Five Mile Road.
- Construct new at-grade intersection at Five Mile Road and Old Hwy 312 with westbound left-turn lane on Old Hwy 312 and northbound left-turn lane on Five Mile Road. Signal warrants would be met for this intersection requiring either signalization or a roundabout.



Five Mile Road Alignment

Improvements for Existing Mary Street

- Reconstruct to City of Billings standards for urban arterial roadway. This would include the following improvements:
 - Two travel lanes with two-way left turn lane (based on projected traffic volumes)
 - Curb and gutter
 - Storm water collection
 - Bike lanes (based on recommendations in trails plan)
 - Intersection control, as necessary
 - Lighting at intersections (if signalized)
 - No lighting along corridor would be required unless requested by residents
 - Accommodations for the crossing at Kiwanis Trail
 - Pedestrian facility on both sides of the road
- Improvements for the US 87/old Hwy 312/Main Street intersection with Mary Street are needed to accommodate high demand for the Mary Street to/from Main Street movements. Improvements at this location are identified below under Interchanges and Intersections.
- The Bitterroot Drive intersection with Mary Street would meet signal warrants. Would require either a traffic signal with left-turn lanes on all approaches or a roundabout.

Improvements for Existing Roadway Connection between Mary Street and Five Mile Road

- Reconstruct to MDT standards for rural local road. This would include two travel lanes (based on projected traffic volumes) and shoulder and slope improvements.

INTERSECTIONS AND INTERCHANGES

Johnson Lane Interchange

The Johnson Lane interchange would be reconstructed to accommodate the traffic volumes projected under the Preferred Alternative for this project. Five potentially viable concepts for reconstructing the Johnson Lane interchange have been identified (see pages 32 through 37 of this report). The evaluation of these concepts will be presented in the *Preliminary Traffic Report* being prepared by Marvin & Associates. The specific solution for reconstructing this interchange will be evaluated further during final design.

US 87/Old Hwy 312/Main Street Intersection

The intersection configurations proposed at this location are shown in Figure 3.21 and 3.22.



Figure 3.21 Intersection Improvements for Mary Street Alternatives

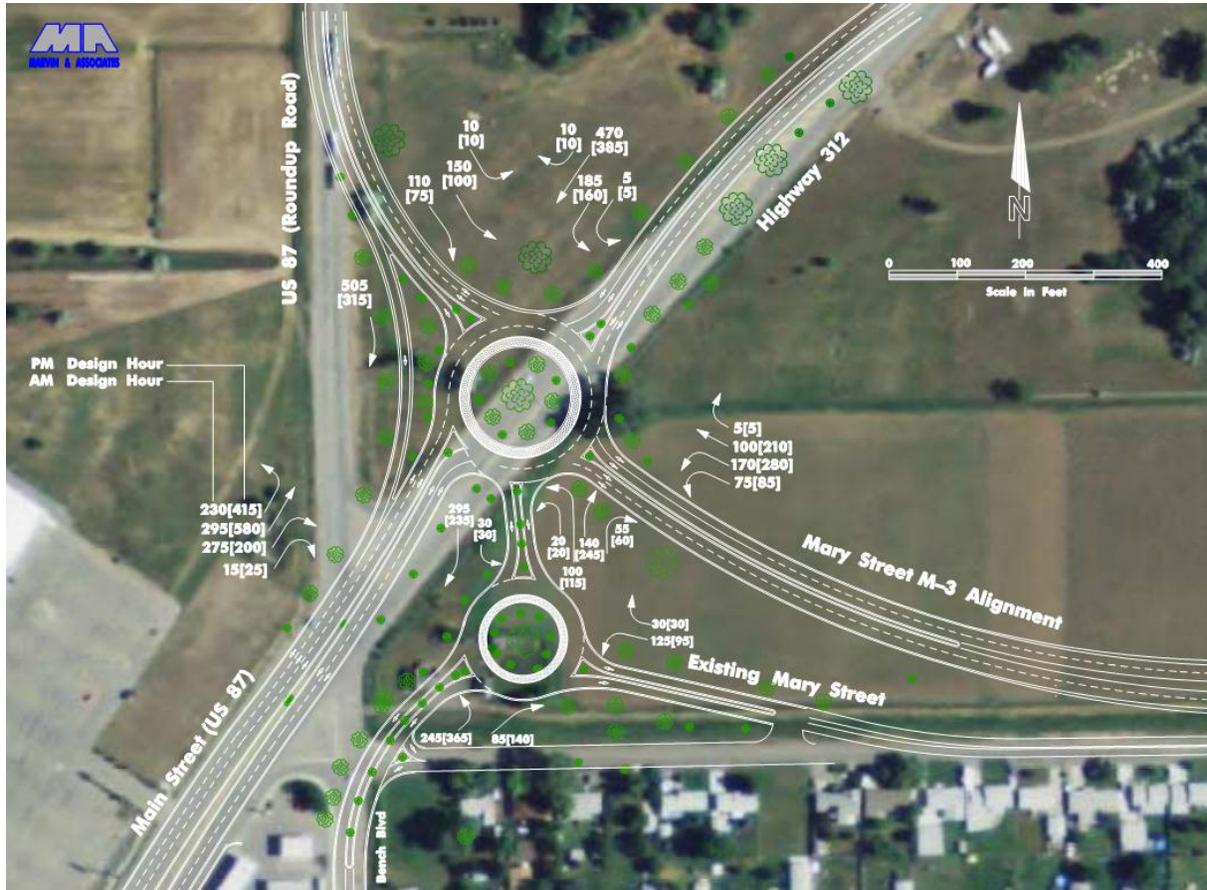
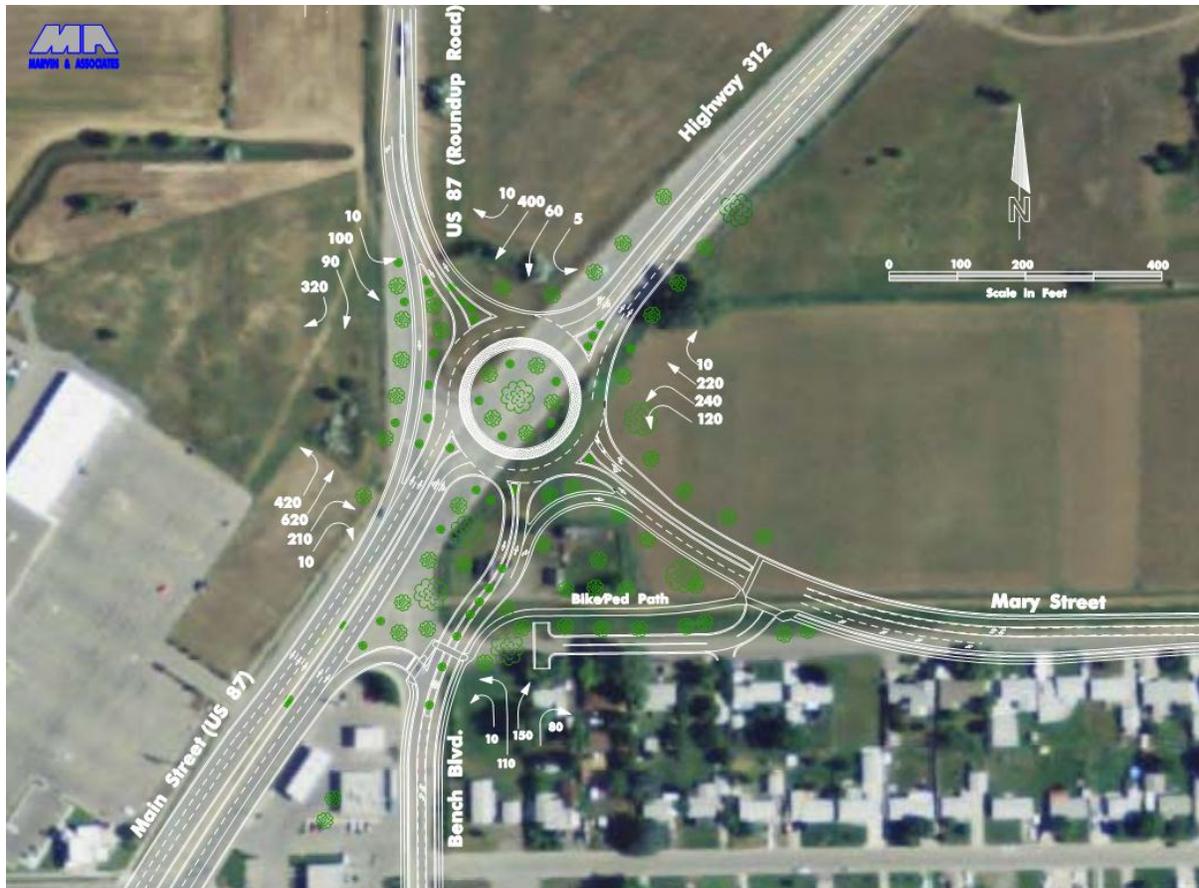




Figure 3.22 Secondary Corridor Intersection Improvements for Five Mile Road Alternative



Other Intersection Locations

Additional connections to the existing roadway network between I-90 and Old Hwy 312 will be provided at locations where the alternative alignments cross public roads. These connections to the proposed arterial would be provided via at-grade intersections. At locations where the intersection would meet signal warrants in the design year (2035), both a signalized intersection and a roundabout will be considered. The anticipated intersection configurations at project intersections are identified for each alternative in figures 3.23, 3.24, and 3.25.

TYPICAL SECTIONS

The typical sections to be used for the alignment options listed above are based on the design standards for each segment as identified in Table 3.5. Elements common to all of the typical sections include the following:

Primary Corridors

- Two 12-foot wide travel lanes in each direction



- Paved shoulders
- Drainage channels and side slopes

Secondary Corridors

- One 12-foot wide travel lane in each direction

The typical sections for primary and secondary corridors are graphically depicted in Appendix B.

Table 3.5 Design Standards of Preliminary Alternatives

Proposed Alignment	Primary Corridor		Secondary Corridor	
	Alignment Segments	Design Standards	Corridor to be Improved	Design Standards
Mary Street Option 1	J1	NHS Urban Principal Arterial	Connection between Mary Street and Five Mile Road	MDT rural local road
	M1a			
	M2	NHS Urban Principal Arterial with Frontage Road ¹	Five Mile Road and extension of Five Mile Road	MDT rural local road
	M3			
Mary Street Option 2	J1	NHS Urban Principal Arterial	Five Mile Road and extension of Five Mile Road	MDT rural local road
	M1b			
	M2	NHS Urban Principal Arterial with Frontage Road ¹		
	M3			
Five Mile Road	J1	NHS Urban Principal Arterial	Mary Street	City of Billings urban arterial roadway
	F1	NHS Rural Principal Arterial		
	F2	NHS Rural Principal Arterial	Connection between Mary Street and Five Mile Road	MDT rural local road
	F3	NHS Urban Principal Arterial		

¹ The existing Mary Street would serve as the frontage road to the new principal arterial. Aside from minor intersection improvements, no improvements of existing Mary Street are anticipated.



Figure 3.23 Mary Street Option 1 Alternative – Carry Forward

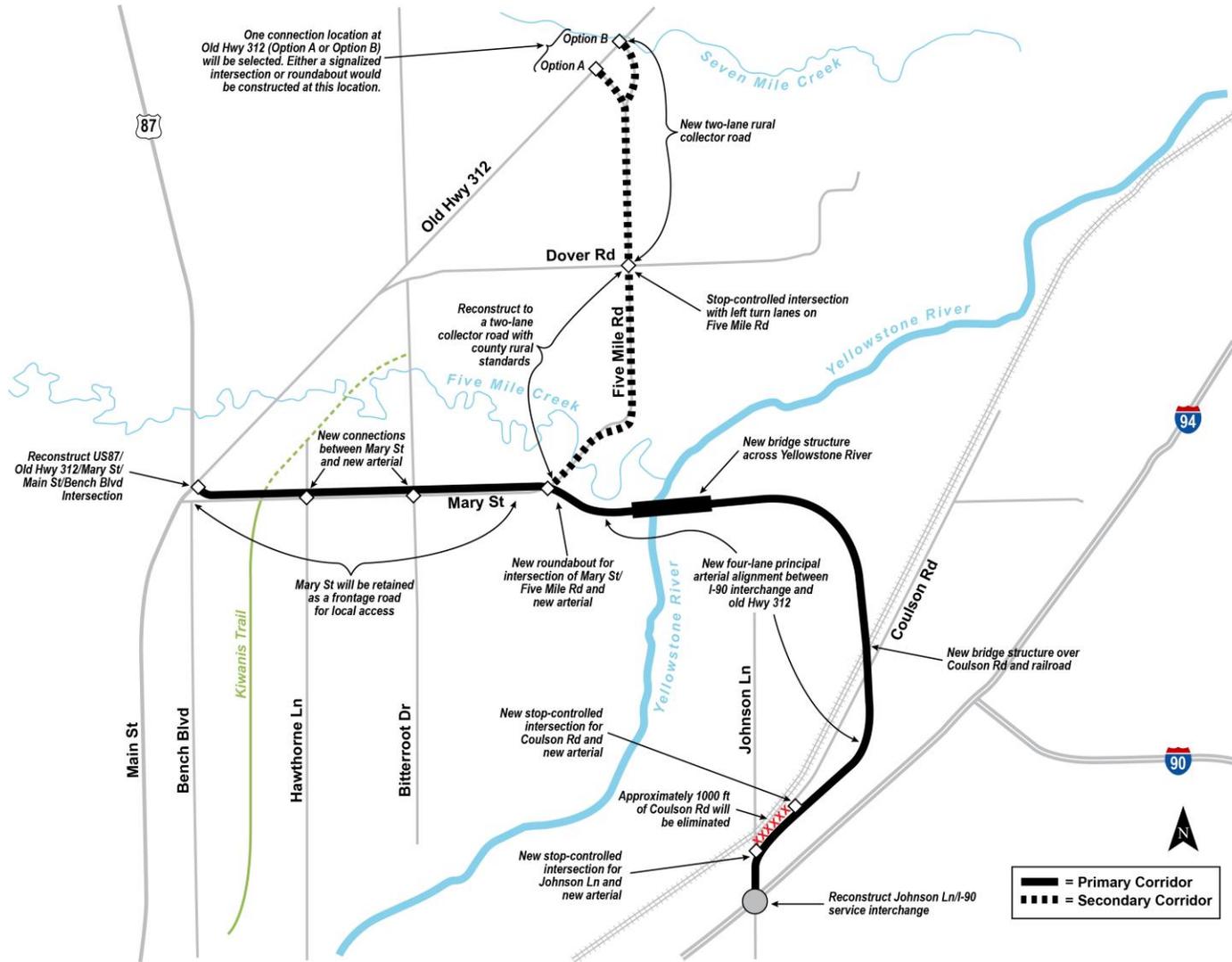




Figure 3.24 Mary Street Option 2 Alternative – Carry Forward

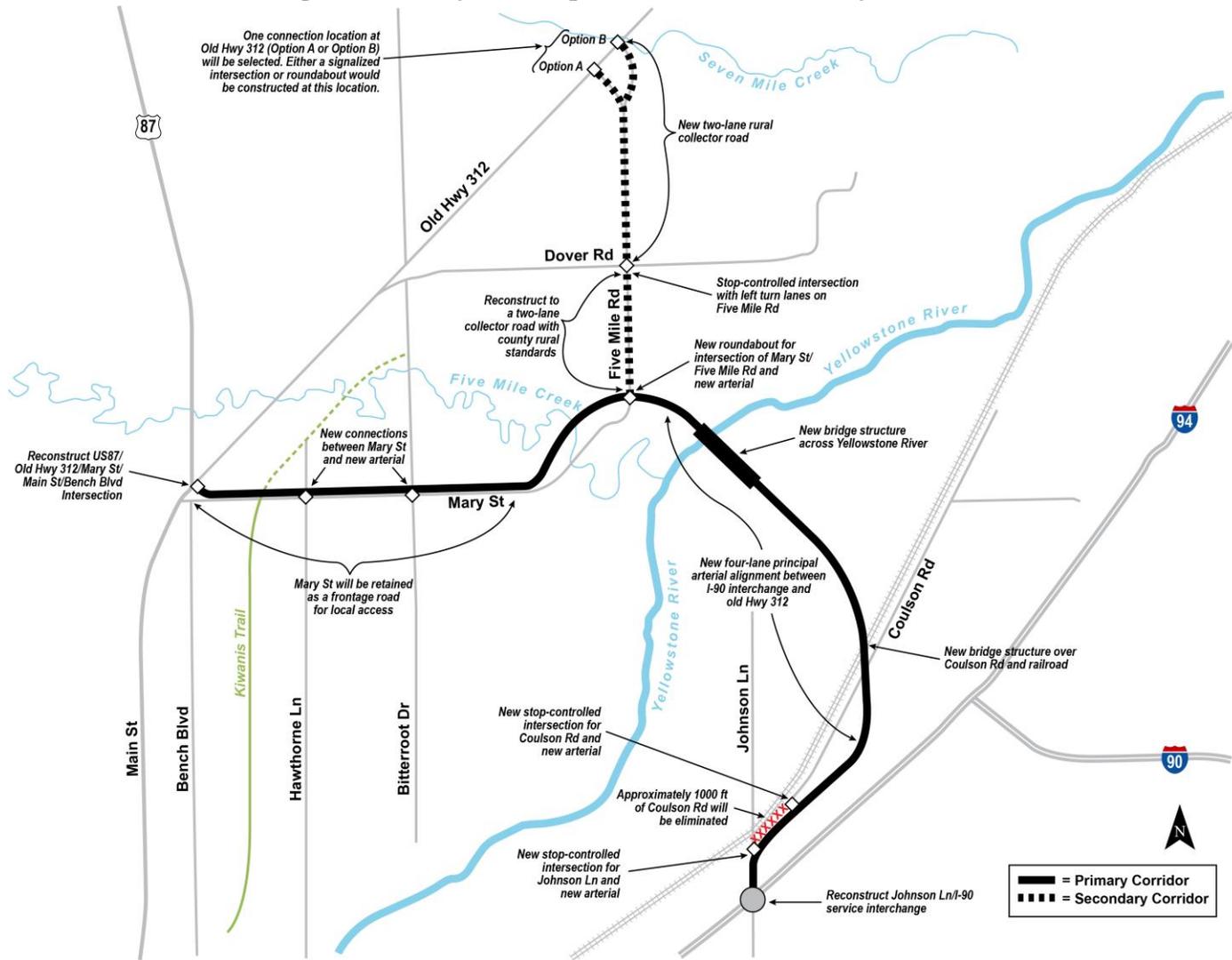
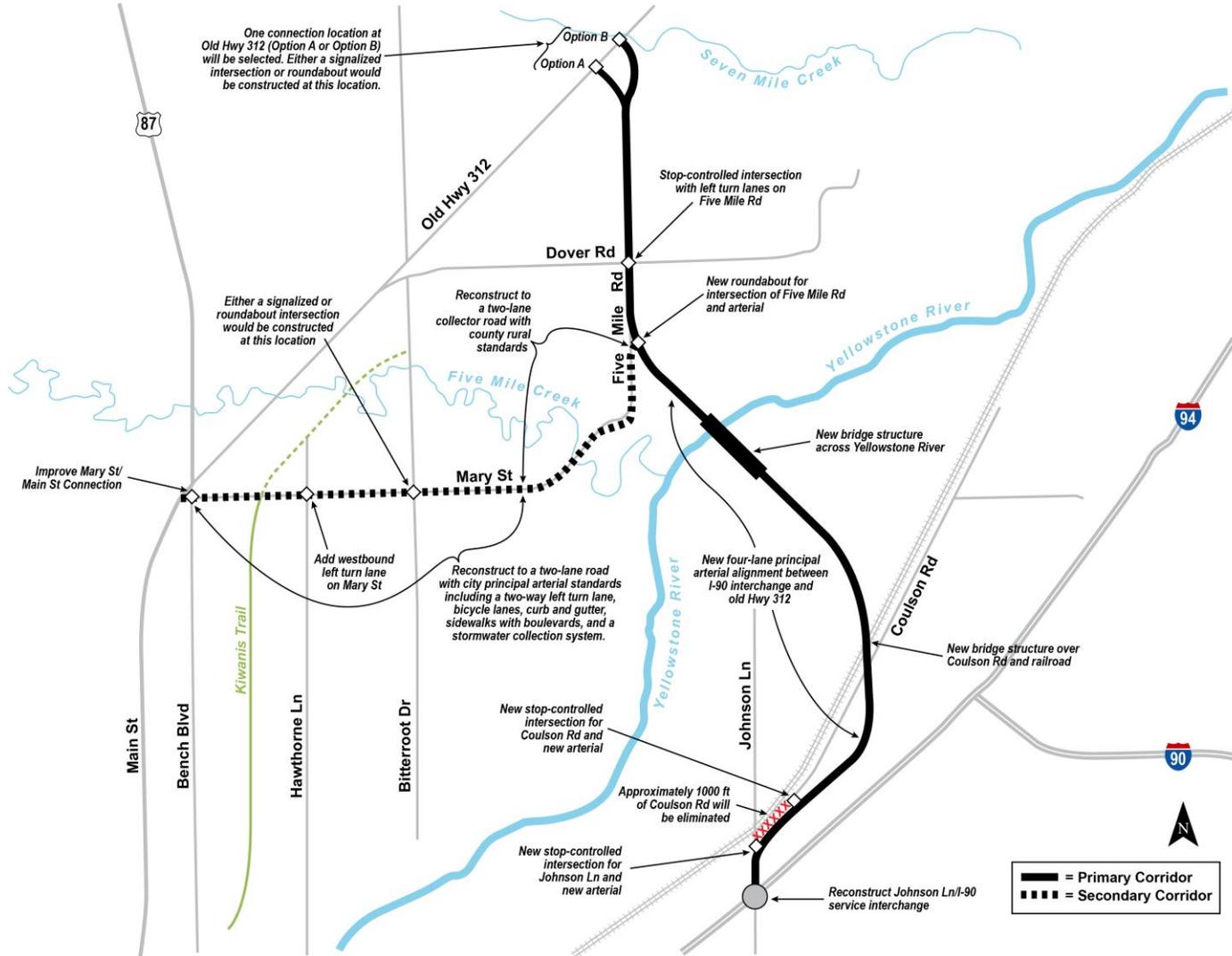




Figure 3.25 Five Mile Road Alternative – Carry Forward





BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

Appendix A: Screening Results

Billings Bypass

October 2011

NCPD 56 (55) Control Number 4199



U.S. Department of Transportation
Federal Highway Administration



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

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Billings Bypass Level 2A Screening Results

Alternative Alignments	Screening Factors						Results
	How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)				Environmental Issues		Preliminary Recommendation
	1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to MT 3 north of Billings)	1. Cultural/Historic Sites	2. Floodplain impacts (linear feet across or adjacent to floodplain)	
No-Bridge Alternatives							
New I 90 Connection	MODERATE (New connection traversing I-90 and railroad)	HIGH (0.4 miles longer than existing route)	MODERATE (Would provide an alternate connection to I-90 and improvements to the Main Street corridor)	MODERATE (Bypasses a portion of existing route and improves most congested area of existing route)	No data available	600 ft (plus 2-3 acres of encroachment between railroad and I-90)	ADVANCE TO NEXT LEVEL OF SCREENING
Improved US 87 Connection	POOR (Does not reduce physical barrier impacts)	HIGH (0 miles longer than existing route)	MODERATE TO POOR (Would not provide an alternate route, but would improve the Main Street corridor)	MODERATE to POOR (Improves most congested area of existing route)	No data available	600 ft (assumes no impacts at existing US 87 crossing of the Yellowstone River)	ADVANCE TO NEXT LEVEL OF SCREENING
I-94 to Old Hwy 312 Connection at Huntley	POOR (Does not reduce physical barrier impacts)	POOR (12.6 miles longer than existing route)	POOR (No mobility benefits for Billings Heights)	POOR (Route does not provide access to or through Billings)	No data available	4250 ft	SCREEN OUT (Route does not reduce physical barrier impacts because it uses an existing corridor. Connectivity and mobility benefits would be negligible because the interstate and Old Hwy 312 connections are too far north of the urban area and the route does not provide access to or through Billings)
Alternatives Originating from Piccolo Lane							
Piccolo - Bitterroot Drive	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.3 miles shorter than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access to and through Billings with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for atleast 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No data available	2800 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Piccolo - River Edge	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.3 miles shorter than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access to and through Billings with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for atleast 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No data available	2000 feet (could result in longitudinal encroachment)	ADVANCE TO NEXT LEVEL OF SCREENING
Alternatives Originating from Johnson Lane							
Johnson Ln Option 1 - Mary St 1	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.2 miles shorter than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No data available	2400 feet	ADVANCE TO NEXT LEVEL OF SCREENING

Billings Bypass Level 2A Screening Results

Alternative Alignments	Screening Factors						Results
	How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)				Environmental Issues		Preliminary Recommendation
	1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to MT 3 north of Billings)	1. Cultural/Historic Sites	2. Floodplain impacts (linear feet across or adjacent to floodplain)	
Johnson Ln Option 1 - Mary St 2	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.2 miles longer than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No data available	2100 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - Legacy Ln	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.5 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No data available	2700 ft (could result in longitudinal encroachment)	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - Oxbow Park	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.2 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No data available	1700 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - Five Mile Rd ¹	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (2.1 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No data available	1600 ft	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - Pioneer Rd ²	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (3.2 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 1.6 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues (no surveys for west half of route)	1800 ft	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - E1/E3	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (2.3 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues	1800 ft	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - E2/E4	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (4.3 miles longer than existing route)	MODERATE to POOR (Would provide an alternate route with Old Hwy 312 connection 2.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	Impacts historic Battlefield Site	1800 ft	SCREEN OUT (Would impact a historic battlefield site; connectivity and mobility benefits would be negligible because the connection to Old Hwy 312 is too far north of the urban area)

Billings Bypass Level 2A Screening Results

Alternative Alignments	Screening Factors						Results
	How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)				Environmental Issues		
	1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to MT 3 north of Billings)	1. Cultural/Historic Sites	2. Floodplain impacts (linear feet across or adjacent to floodplain)	Preliminary Recommendation
Johnson Ln Option 2- Mary St 1	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.1 miles shorter than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No data available	2400 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2- Mary St 2	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.3 miles longer than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No data available	2100 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2 - Legacy Ln	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.6 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No data available	2700 ft (could result in longitudinal encroachment)	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2- Oxbow Park	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.3 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No data available	1700 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2 - Five Mile Rd ²	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (2.2 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No data available	1600 ft	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2 - Pioneer Rd	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (3.3 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 1.6 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues (no surveys for west half of route)	1800 ft	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2 - E1/E3	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (2.5 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues	1800 ft	ADVANCE TO NEXT LEVEL OF SCREENING

Billings Bypass Level 2A Screening Results

Alternative Alignments	Screening Factors						Results
	How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)				Environmental Issues		
	1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to MT 3 north of Billings)	1. Cultural/Historic Sites	2. Floodplain impacts (linear feet across or adjacent to floodplain)	Preliminary Recommendation
Johnson Ln Option 2 - E2/E4	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (4.5 miles longer than existing route)	MODERATE to POOR (Would provide an alternate route with Old Hwy 312 connection 2.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues	1800 ft	SCREEN OUT (Would impact a historic battlefield site; connectivity and mobility benefits would be negligible because the connection to Old Hwy 312 is too far north of the urban area)
Southern Alignment	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.5 miles shorter than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No identified issues (no surveys for majority of route)	7200 ft (could result in longitudinal encroachment)	SCREEN OUT (This alignment is very similar to the Johnson Ln Option 2 - Mary St 1 alignment, but would have more floodplain impacts, potential 4(f) impacts, and would not allow for future connection to US 87.)
Alternatives Originating from Pinehills							
Pinehills - Mary St 1	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.3 miles longer than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No identified issues (no data for west half of route)	2400 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills - Mary St 2	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.6 miles longer than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No identified issues (no data for west half of route)	2100 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills - Legacy Ln	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.8 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90 and I-94)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No identified issues (no data for west half of route)	2400 ft (could result in longitudinal encroachment)	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills - Oxbow Park	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.3 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90 and I-94)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No data available	1700 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills - Five Mile Rd ¹	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (2.5 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues (no data for west half of route)	1600 ft	ADVANCE TO NEXT LEVEL OF SCREENING

Billings Bypass Level 2A Screening Results

Alternative Alignments	Screening Factors						Results
	How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)				Environmental Issues		
	1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to MT 3 north of Billings)	1. Cultural/Historic Sites	2. Floodplain impacts (linear feet across or adjacent to floodplain)	Preliminary Recommendation
Pinehills - Pioneer Rd ²	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (3.4 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 1.6 miles outside of Billings urban limits and new access to I-90 and I-94)	HIGH (Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No Data Available	1800 ft	ADVANCE TO NEXT LEVEL OF SCREENING
E1 ³	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (2.8 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues	1800 ft	ADVANCE TO NEXT LEVEL OF SCREENING
E2 ⁴	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (4.9 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	Impacts historic Battlefield Site	1800 ft	SCREEN OUT (Would impact a historic battlefield site; connectivity and mobility benefits would be negligible because the connection to Old Hwy 312 is too far north of the urban area)
Alternatives Originating from Pinehills Split							
Pinehills Split - Mary St 1	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (0.9 miles longer than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No identified issues (no data for west half of route)	2400 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills Split - Mary St 2 ⁵	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.2 miles longer than existing route)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	No identified issues (no data for west half of route)	2100 feet	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills Split - Legacy Ln	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (2.5 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90 and I-94)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No identified issues (no data for west half of route)	2400 ft (could result in longitudinal encroachment)	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills Split - Oxbow Park	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (1.9 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0 - 0.2 miles outside of Billings urban limits and new access to I-90 and I-94)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	No identified issues	1700 feet	ADVANCE TO NEXT LEVEL OF SCREENING

Billings Bypass Level 2A Screening Results

Alternative Alignments	Screening Factors						Results
	How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)				Environmental Issues		
	1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to MT 3 north of Billings)	1. Cultural/Historic Sites	2. Floodplain impacts (linear feet across or adjacent to floodplain)	Preliminary Recommendation
Pinehills Split - Five Mile Rd ¹	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (3.1 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues (no data for west half of route)	1600 ft	ADVANCE TO NEXT LEVEL OF SCREENING
Pinehills Split - Pioneer Rd ²	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (4 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 1.6 miles outside of Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No Data Available	3200 ft	ADVANCE TO NEXT LEVEL OF SCREENING
E3 ⁶	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	MODERATE (3.6 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues	1800 ft	ADVANCE TO NEXT LEVEL OF SCREENING
E4 ⁷	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (5.6 miles longer than existing route)	MODERATE to POOR (Would provide an alternate route with Old Hwy 312 connection 2 miles outside of Billings urban limits and new access to I-90 and I-94)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	Impacts historic Battlefield Site	1800 ft	SCREEN OUT (Would impact a historic battlefield site; connectivity and mobility benefits would be negligible because the connection to Old Hwy 312 is too far north of the urban area)
Alternatives Originating from NE Pinehills							
Drury Ln	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (5.6 miles longer than existing route)	POOR (Would provide an alternate route with Old Hwy 312 connection 2 miles outside of Billings urban limits and new access to I-94 within vicinity of I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues (no surveys for majority of route)	1900 ft	SCREEN OUT (Connectivity benefits would be negligible because the interstate and Old Hwy 312 connections are too far north of the urban area)
McGill Rd	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (6.1 miles longer than existing route)	POOR (Would provide an alternate route with Old Hwy 312 connection 2.5 miles outside of Billings urban limits and new access to I-94 within vicinity of I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No identified issues (no surveys for majority of route)	1900 ft	SCREEN OUT (Connectivity benefits would be negligible because the interstate and Old Hwy 312 connections are too far north of the urban area)
Northern Alignment Option A ⁸	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (9.8 miles longer than existing route)	POOR (Would provide an alternate route with Old Hwy 312 connection 2.5 miles outside of Billings urban limits and new access to I-94 within vicinity of I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	No data available	2000 ft	SCREEN OUT (Connectivity benefits would be negligible because the interstate and Old Hwy 312 connections are too far north of the urban area)

Billings Bypass Level 2A Screening Results

Alternative Alignments	Screening Factors						Results
	How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)				Environmental Issues		
	1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to MT 3 north of Billings)	1. Cultural/Historic Sites	2. Floodplain impacts (linear feet across or adjacent to floodplain)	Preliminary Recommendation
E5 ⁹	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (4.5 miles longer than existing route)	MODERATE (Would provide an alternate route with Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-94 within vicinity of I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	Impacts historic Battlefield Site	2700 ft	SCREEN OUT (Would impact a historic battlefield site; connectivity benefits would be negligible because the interstate connection is too far north of the urban area)
E6 ¹⁰	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	POOR (7 miles longer than existing route)	POOR (Would provide an alternate route with Old Hwy 312 connection 2 miles outside of Billings urban limits and new access to I-94 within vicinity of I-90)	HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)	Impacts historic Battlefield Site	2700 ft	SCREEN OUT (Would impact a historic battlefield site; connectivity benefits would be negligible because the interstate and Old Hwy 312 connections are too far north of the urban area)

¹ Refined version of an alignment using Five Mile Road that was initially suggested by the public. The Red conceptual alternative was a refinement of this suggestion, but was screened out because it did not perform as well as a similar conceptual alignment.

² Refined version of an alignment using Pioneer Road that was initially suggested by the public but was screened out because a system interchange could not be constructed at Johnson Lane due to its proximity to the I-90/I-94 interchange.

³ E1 is a refined version of the following alternatives: conceptual Red and Yellow Alignments, initial Feasibility Alignment. Shepherd-Acton Alignment Option 1 used the same alignment in the eastern segment as E1.

⁴ E2 is a refined version of the conceptual Purple Alignment.

⁵ Pinehills Split - Mary St 2 is a refined version of the Modified Southern Alignment

⁶ E3 is a refined version of the conceptual Yellow Alignment. Shepherd-Acton Alignment Option 1A used the same alignment in the eastern segment as E3.

⁷ E4 is a refined version of the conceptual Purple Alignment.

⁸ Shepherd-Acton Alignment Option 3 used the same alignment in the eastern segment as Northern Alignment Option A.

⁹ Refined version of conceptual Orange Alignment.

¹⁰ E6 is a refined version of the following alternatives: conceptual Light Green Alignment, initial Northern Alignment Option B. Shepherd-Acton Alignment Option 2 used the same alignment in the eastern segment as E6.

Billings Bypass Level 2B Screening Results

Alternatives	Screening Factors					Preliminary Recommendation
	Travel Time Benefits	ROW Impacts		Potential Floodplain Impacts	Other Potential Issues	
	Reduction in travel time between Lockwood and Billings Heights	Number of parcels impacted	Number of structures impacted	Linear feet across or adjacent to floodplain		
No-Bridge Alternatives						
New I 90 Connection	4 % - 11%	112	39	600 feet (plus 2 to 3 acres of potential encroachment to the Yellowstone River floodplain between I-90 and railroad)	Could impact Coulson Park (Section 6(f) resource and potential Section 4(f) resource) Could impact 130-ft diameter oil storage unit Could require elevation of 1st Ave North / US 87 / Main St intersection requiring major access reconfigurations for 9th St and 10th St May cause conflicts with major utilities requiring relocations and potentially a separate utility corridor May require reconstruction of Alkali Creek pedestrian underpass	SCREEN OUT This alternative does not provide more travel time benefit than other alternatives under consideration and would have substantial impacts to commercial properties along the Main Street corridor.
Improved US 87 River Crossing	6% - 8% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	157	50	600 feet (assumes no impact to the Yellowstone River floodplain along the existing US 87 crossing)	May cause conflicts with major utilities requiring relocations and potentially a separate utility corridor May require reconstruction of Alkali Creek pedestrian underpass	SCREEN OUT This alternative provides negligible travel time benefits while causing substantial impacts to commercial properties in Lockwood and along the Main Street corridor.
Alternatives Originating from Piccolo Lane						
Piccolo - Bitterroot Drive	39% - 49%	101/106	29/69	2500 feet	Would impact a side channel of the Yellowstone River that parallels the western edge of the refinery Would impact a trailer park (potential EJ issues are unknown) Would impact a cemetery along Bitterroot Drive	SCREEN OUT This alternative has substantial impacts to residential properties and the Yellowstone River
Piccolo - River Edge	37% - 41%	68/69	16/29	2000 feet (could result in longitudinal encroachment)	Would impact a portion of refinery Would impact a side channel of the Yellowstone River that parallels the western edge of the refinery Would impact a trailer park that is currently under construction (potential EJ issues are unknown) Would route a new roadway through an established residential neighborhood.	SCREEN OUT This alternative would impact the refinery and would substantially impact an established neighborhood and the Yellowstone River
Alternatives Originating from Johnson Lane						
Johnson Ln Option 1 - Mary St 1	4% - 29%	52/56	3/6	2400 feet	Would impact existing industrial uses south of Coulson Road	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - Mary St 2	1% - 26%	52/56	6/9	2100 feet	Would impact existing industrial uses south of Coulson Road Traverses the area masterplanned for Dover Park (currently in private ownership)	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - Legacy Ln	3% - 28%	56/59	5/8	2900 feet	Would impact existing industrial uses south of Coulson Road	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1- Oxbow Park	4% - 29%	44/56	6/9	1700 feet	Would impact existing industrial uses south of Coulson Road Traverses the area masterplanned for Dover Park (currently in private ownership)	ADVANCE TO NEXT LEVEL OF SCREENING

Billings Bypass Level 2B Screening Results

Alternatives	Screening Factors				Other Potential Issues	Preliminary Recommendation
	Travel Time Benefits	ROW Impacts		Potential Floodplain Impacts		
	Reduction in travel time between Lockwood and Billings Heights	Number of parcels impacted	Number of structures impacted	Linear feet across or adjacent to floodplain		
Johnson Ln Option 1 - Five Mile Rd	11% - 18% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	47/51	3/4	1700 feet	Would impact existing industrial uses south of Coulson Road Impacts and active gravel mine operation	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 1 - Pioneer Rd	14% - 26% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	59/62	14/21	1800 feet	Would impact existing industrial uses south of Coulson Road Impacts and active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT The Johnson Ln Option 1 - Five Mile Rd alignment provides similar travel time benefits with fewer private property impacts
Johnson Ln Option 1 - E1/E3	1% - 11% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	41/44	3/4	1800 feet	Traverses the area masterplanned for Dover Park (currently in private ownership) Would impact an active gravel mine operation	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2- Mary St 1	8% - 33%	45/47	1/5	2400 feet	Traverses a parcel platted for future development and would impact a pond and a composting operation north of the railroad.	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2- Mary St 2	5% - 30%	44/46	3/7	2100 feet	Traverses a parcel platted for future development and would impact a pond and a composting operation north of the railroad. Traverses the area masterplanned for Dover Park (currently in private ownership)	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2 - Legacy Ln	7% - 32%	49/50	3/7	2900 feet	Traverses a parcel platted for future development and would impact a pond and a composting operation north of the railroad.	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2- Oxbow Park	8% - 33%	39/51	6/9	1700 feet	Traverses a parcel platted for future development and would impact a pond and a composting operation north of the railroad. Traverses the area masterplanned for Dover Park (currently in private ownership)	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2 - Five Mile Rd	15% - 22% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	40/41	1 / 3	1700 feet	Traverses a parcel platted for future development and would impact a pond and a composting operation north of the railroad. Would impact an active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	ADVANCE TO NEXT LEVEL OF SCREENING
Johnson Ln Option 2 - Pioneer Rd	18% - 20% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	52/53	12/19	1800 feet	Traverses a parcel platted for future development and would impact a pond and a composting operation north of the railroad. Would impact an active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT The Johnson Ln Option 2 - Five Mile Rd alignment provides similar travel time benefits with fewer private property impacts

Billings Bypass Level 2B Screening Results

Alternatives	Screening Factors					Preliminary Recommendation
	Travel Time Benefits	ROW Impacts		Potential Floodplain Impacts	Other Potential Issues	
	Reduction in travel time between Lockwood and Billings Heights	Number of parcels impacted	Number of structures impacted	Linear feet across or adjacent to floodplain		
Johnson Ln Option 2 - E1/E3	5% - 15% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	34/35	1 / 3	1800 feet	Traverses a parcel platted for future development and would impact a pond and a composting operation north of the railroad. Would impact an active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	ADVANCE TO NEXT LEVEL OF SCREENING
Alternatives Originating from Pinehills						
Pinehills - Mary St 1	15% - 23% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	78/79	26/26	2400 feet	Impacts a potential EJ population near the interchange	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills - Mary St 2 ¹	12% - 20% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	77/78	27/27	2100 feet	Impacts a potential EJ population near the interchange Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills - Legacy Ln	14% - 22% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	82/82	26/26	2900 feet	Impacts a potential EJ population near the interchange	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills - Oxbow Park	15% - 23% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	69/69	26/26	1700 feet	Impacts a potential EJ population near the interchange Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills - Five Mile Rd	2% - 13% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	73/73	23/25	1700 feet	Impacts a potential EJ population near the interchange Impacts and active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills - Pioneer Rd	8% for southeastern areas of Lockwood (no benefit for NE or western areas of Lockwood)	105/105	36/42	1800 feet	Impacts a potential EJ population near the interchange Would impact an active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT The Pinehills - Five Mile Rd alignment provides similar travel time benefits with fewer private property impacts
E1	little to no travel time benefit	67/67	25/25	1800 feet	Impacts a potential EJ population near the interchange Would impact an active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²

Billings Bypass Level 2B Screening Results

Alternatives	Screening Factors					Preliminary Recommendation
	Travel Time Benefits	ROW Impacts		Potential Floodplain Impacts	Other Potential Issues	
	Reduction in travel time between Lockwood and Billings Heights	Number of parcels impacted	Number of structures impacted	Linear feet across or adjacent to floodplain		
Alternatives Originating from Pinehills Split						
Pinehills Split - Mary St 1	2% - 13% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	103/104	27/27	2400 feet	Impacts a potential EJ population near the interchange	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills Split - Mary St 2	0% - 10% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	102/103	28/28	2100 feet	Impacts a potential EJ population near the interchange Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills Split - Legacy Ln	1% - 12% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	107/107	27/27	2900 feet	Impacts a potential EJ population near the interchange	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills Split - Oxbow Park	2% - 13% for eastern areas of Lockwood (no benefit for western areas of Lockwood)	94/94	27/27	1700 feet	Impacts a potential EJ population near the interchange Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills Split - Five Mile Rd	3% for southeastern areas of Lockwood (no benefit for NE or western areas of Lockwood)	98/98	24/26	1700 feet	Impacts a potential EJ population near the interchange Impacts and active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²
Pinehills Split - Pioneer Rd	little to no travel time benefit	130/130	37/43	1800 feet	Impacts a potential EJ population near the interchange Would impact an active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT The Pinehills Split - Five Mile Rd alignment provides similar travel time benefits with fewer private property impacts
E3	little to no travel time benefit	92/92	26/26	1800 feet	Impacts a potential EJ population near the interchange Would impact an active gravel mine operation Traverses the area masterplanned for Dover Park (currently in private ownership)	SCREEN OUT PENDING FIELD DATA COLLECTION²

¹ Pinehills Split-Mary St 2 is a refined version of the Modified Southern Alignment

² Alternatives using these interchange locations would not provide as much travel time benefit as the Johnson Lane or Piccolo Lane alternatives and would have substantially more impacts than the other interchange locations. Additionally, the surrounding neighborhoods are likely comprised of EJ populations and these alternatives could result in a disproportionately high impact. However, these are the only interchange locations that have been designed and field-studied. Without this level of design and data for the other interchange locations under consideration, it could be risky to screen the Pinehills and Pinehills Split out at this point in time.

Billings Bypass Level 3 Screening for the Johnson Lane Interchange

Alignment Alternatives from the Johnson Lane Interchange

Screening Factors	Johnson Ln Interchange - Mary St Alignment Option 1 (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Mary St Alignment Option 2 (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Legacy Ln Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Oxbow Park Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Five Mile Rd Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - E1 / E3 Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)
Traffic (2035)						
1. ADT - South of River	15,900 / 16,000	15,900 / 15,600	15,900 / 15,700	12,900 / 12,500	13,000 / 12,500	12,000 / 11,900
2. ADT - North of River (north of connection to existing street network)	11,300 / 11,500	10,700 / 10,500	between 4,000 and 4,400	between 200 and 350	between 4,300 and 5,000	100
3. O/D Billing Heights	75%	71%	72%	67% / 65%	62% / 61%	55% / 56%
4. O/D Outlying NE Region	25%	29%	28%	33% / 35%	38% / 39%	45% / 44%
5. ADT increase on connecting streets (project-generated traffic)	Mary Street = 0 Bitterroot Drive = 500 Pioneer Road = 4,000 Dover Road = 4,000 Five Mile Road = 4,000	Mary Street = 0 Bitterroot Drive = 500 Pioneer Road = 4,500 Dover Road = 4,500 Five Mile Road = 4,500	Mary Street = 11,400 Dover Road = 200	Mary Street = 8,500 Pioneer Road = 4,100 Dover Road = 4,200 Five Mile Road = 4,200	Mary Street = 7,800 Dover Road = 300 Five Mile Road = 7,800	Mary Street = 6,600 Pioneer Road = 4,700 Dover Road = 7,000 Five Mile Road = 6,600
6. ADT reduction on Main Street (south of Hilltop Road)	-12,600	- 12, 200	-13,000	-9,300	-9,500	- 8,700
7. Travel Time Savings (between Lockwood and Billings Heights)	28% - 33% - eastern areas of Lockwood 8% - 13% - western areas of Lockwood (J1 - 3 - 4% less savings)	25% - 30% - eastern areas of Lockwood 5% - 9% - western areas of Lockwood (J1 - 3 - 5% less savings)	27% - 32% - eastern areas of Lockwood 7% - 11% - western areas of Lockwood (J1 - 3 - 4% less savings)	28% - 33% - eastern areas of Lockwood 8% - 13% - western areas of Lockwood (J1 - 3 - 4% less savings)	15% - 22% - eastern areas of Lockwood no savings - western areas of Lockwood (J1 - 3 - 4% less savings)	5% - 15% - eastern areas of Lockwood no savings - western areas of Lockwood (J1 - 3 - 4% less savings)
Safety and Operations						
1. Operations	Outlying northeast traffic would use Pioneer Road, Dover Road, and Five Mile Road to and from the new river crossing.	Outlying northeast traffic would use Pioneer Road, Dover Road, and Five Mile Road to and from the new river crossing.	Billings Heights traffic would use Mary Street to and from the new river crossing.	Traffic would use Pioneer Road, Dover Road, Five Mile Road, and Mary Street to and from the new river crossing. The segment of this alignment between Five Mile Road and Old Hwy 312 would have less than 400 ADT.	Billings Heights traffic would use Mary Street and Five Mile Road to and from the new river crossing.	Traffic would use Pioneer Road, Dover Road, Five Mile Road, and Mary Street to and from the new river crossing. The segment of this alignment between Dover Road and Old Hwy 312 would have less than 100 ADT.
2. Safety		Could replace the existing connection between Five Mile Road and Mary Street, which is curvilinear and does not meet current standards for sight distance and operating speeds.		Intersects Five Mile Road and Dover Road at a skew; would require introducing reverse curves at both locations or realignment of Five Mile Road and Dover Road to improve safety.		Intersects Pioneer Rd at a skew; would require introducing reverse curves at this location or realignment of Pioneer Road to improve safety.
Construction/ROW Cost						
1. Mainline	\$ 80.1 M	\$ 69.3 M	See Note 1 \$ 90.5 M	See Note 2 \$ 59.8 M	See Note 3 \$ 59.7 M	See Note 4 \$ 69.1 M
2. Interchange	\$ 16.7 M	\$ 16.7 M	\$ 16.7 M	\$ 16.7 M	\$ 16.7 M	\$ 16.7 M
3. Total Cost	\$ 96.8 M	\$ 86.0 M	\$ 107.3 M	\$76.5 M	\$ 76.5 M	\$ 85.8 M
Private Property Impacts						
1. Number of privately-owned parcels impacted	83 / 79	83 / 78	59 / 55	47 / 42	56 / 56	54 / 50
2. Number of primary structures impacted? (residences and businesses)	6 / 7	9 / 9	4 / 5	6 / 6	6 / 6	7 / 6
3. Number of secondary structures impacted? (out-buildings and un-occupied structures)	10 / 8	11 / 8	7 / 5	7 / 4	7 / 4	3 / 4
Constructability						
1. Interchanges	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified
2. Alignments	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified
Environmental						
1. Floodplain impacts (linear feet across or adjacent to floodplain)	2400 feet	2100 feet	2900 feet	1700 ft	1700 ft	1800 ft
2. Other potential issues.	Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses a parcel platted for future development north of Dover Road. May result in a longitudinal floodplain encroachment along Five Mile Creek. Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses a parcel platted for future development north of Dover Road. Traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - would impact a pond north of the railroad.	Traverses the area masterplanned for Dover Park (currently in private ownership) Would impact active gravel operation north of Yellowstone River. Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.

Billings Bypass Level 3 Screening for the Johnson Lane Interchange

Alignment Alternatives from the Johnson Lane Interchange

Screening Factors	Johnson Ln Interchange - Mary St Alignment Option 1 (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Mary St Alignment Option 2 (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Legacy Ln Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Oxbow Park Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - Five Mile Rd Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)	Johnson Ln Interchange - E1 / E3 Alignment (Johnson Ln Option 1 / Johnson Ln Option 2)
How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)						
1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)
2. Improve connectivity between Lockwood and Billings (based on estimated travel time)	HIGH	HIGH	HIGH	HIGH	MODERATE (Improvement for eastern areas of Lockwood only)	MODERATE to POOR (Improvement primarily for SE area of Lockwood; little to no benefit for other areas of Lockwood.)
3. Improve mobility to and from Billings Heights (based on estimated travel time)	HIGH	HIGH	HIGH TO MODERATE (Little to no travel time savings for SW area of Billings Heights)	HIGH TO MODERATE (Little to no travel time savings for SW area of Billings Heights)	HIGH TO MODERATE (No travel time savings for SW area of Billings Heights)	HIGH TO MODERATE (No travel time savings for SW area of Billings Heights)
4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to US 87 and MT 3 north of Billings)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	MODERATE TO POOR (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	MODERATE TO POOR (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	HIGH (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 is possible through currently undeveloped land west of Old Hwy 312)	HIGH (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 is possible through currently undeveloped land west of Old Hwy 312)
Conclusions based on screening analysis						
Recommendation	Screen Out Pending Field Work Similar benefits to Mary St Alignment Option 2, but with higher cost and more floodplain impact	Carry forward for detailed evaluation	Screen Out Similar benefits to other alternatives, but more costly with more floodplain impacts; the Old Hwy 312 connection location performs poorly for support of future planning for a connection to US 87 and MT 3	Screen Out Low traffic volumes between Old Hwy 312 and Five Mile Rd; poor geometrics at connecting routes; the Old Hwy 312 connection location performs poorly for support of future planning for a connection to US 87 and MT 3	Carry forward for detailed evaluation	Screen Out Pending Field Work Provides the same connection to Old Hwy 312 as the Five Mile Road Alignment, but provides less travel time savings. The segment between Old Hwy 312 and Dover Road is redundant to Pioneer Road and would draw very little traffic.

**Billings Bypass Level 3 Screening for the Pinehills Interchange
Alignment Alternatives from the Pinehills Interchange**

Screening Factors	Pinehills Interchange - Mary St Alignment (Mary St Alignment Option 1 / Mary St Alignment Option 2)	Pinehills Interchange - Legacy Ln Alignment	Pinehills Interchange - Oxbow Park Alignment	Pinehills Interchange - Five Mile Rd Alignment	Pinehills Interchange - E1 / E3 Alignment
Traffic (2035)					
1. ADT - South of River	14,600 / 13,600	13,600	10,200	10,300	10,000
2. ADT - North of River (north of connection to existing street network)	10,400 / 9,00	between 3,500 and 3,900	between 200 and 350	between 3,900 and 4,400	100
3. O/D Billing Heights	75% / 71%	71%	63%	57%	52%
4. O/D Outlying NE Region	25% / 29%	29%	37%	43%	48%
5. ADT increase on connecting streets (project-generated traffic)	Mary Street = 0 Bitterroot Road = 500 Pioneer Road = 3,700 /4,100 Dover Road = 3,700 /4,100 Five Mile Road = 3,700 /4,100	Mary Street = 9,700 Dover Road = 200	Mary Street = 6,500 Pioneer Road = 3,600 Dover Road = 3,700 Five Mile Road = 3,700	Mary Street = 5,900 Dover Road = 300 Five Mile Road = 5,900	Mary Street =5,200 Pioneer Road = 4,200 Dover Road = 5,500 Five Mile Road = 5,200
6. ADT reduction on Main Street	-12,000 / -11,000	-11,700	-8,000	-8,000	-7,600
7. Travel Time Savings (between Lockwood and Billings Heights)	15% - 23% - eastern areas of Lockwood no savings - western areas of Lockwood (2 - 4% less savings with Mary St Option B)	14% - 22% - eastern areas of Lockwood no savings - western areas of Lockwood (with connection to Mary Street)	15% - 23% - eastern areas of Lockwood no savings - western areas of Lockwood (with connection to Mary Street)	2% - 13% - eastern areas of Lockwood no savings - western areas of Lockwood (with connection to Mary Street)	little to no travel time savings (with connection to Mary Street)
Safety and Operations					
1. Operations	Outlying northeast traffic would use Pioneer Road, Dover Road, and Five Mile Road to and from the new river crossing.	Billings Heights traffic would use Mary Street to and from the new river crossing.	Traffic would use Pioneer Road, Dover Road, Five Mile Road, and Mary Street to and from the new river crossing. The segment of this alignment between Five Mile Road and Old Hwy 312 would have less than 400 ADT.	Billings Heights traffic would use Mary Street and Five Mile Road to and from the new river crossing.	Traffic would use Pioneer Road, Dover Road, Five Mile Road, and Mary Street to and from the new river crossing. The segment of this alignment between Dover Road and Old Hwy 312 would have less than 100 ADT.
2. Safety	Mary St Option 2 could replace the existing connection between Five Mile Road and Mary Street, which is curvilinear and does not meet current standards for sight distance and operating speeds.		Intersects Five Mile Road and Dover Road at a skew; would require introducing reverse curves at both locations or realignment of Five Mile Road and Dover Road to improve safety.		Intersects Pioneer Rd at a skew; would require introducing reverse curves at this location or realignment of Pioneer Road to improve safety.
Construction/ROW Cost					
1. Mainline	\$ 71.0 M / \$ 60.2 M	See Note 1 \$ 81.5 M	See Note 2 \$ 50.7 M	See Note 3 \$ 50.7 M	See Note 4 \$ 60.0 M
Construction					
ROW					
2. Interchange	\$ 81.3 M	\$ 81.3 M	\$ 81.3 M	\$ 81.3 M	\$ 81.3 M
Construction					
ROW					
3. Total Cost	\$152.3 M / \$141.6 M	\$ 162.8 M	\$ 132.0 M	\$ 132.0 M	\$ 141.4 M
Private Property Impacts					
1. Number of privately-owned parcels impacted	87 / 86	63	50	59	57
2. Number of primary structures impacted? (residences and businesses)	16 / 17	14	14	14	14
3. Number of secondary structures impacted? (out-buildings and un-occupied structures)	20 / 19	17	15	15	15
Constructability					
1. Interchanges	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified
2. Alignments	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified
Environmental					
2. Floodplain impacts (linear feet across or adjacent to floodplain)	2400 feet / 2100 feet	2900 feet	1700 feet	1700 feet	1800 ft
3. Other potential issues.	Mary St Option 2 - traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Rd. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses a parcel platted for future development north of Dover Rd. May result in a longitudinal floodplain encroachment along Five Mile Creek. Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Rd. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses a parcel platted for future development north of Dover Rd. Traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Rd. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Rd. Johnson Lane Option 2 - would impact a pond north of the railroad.	Traverses the area masterplanned for Dover Park (currently in private ownership) Would impact active gravel operation north of Yellowstone River. Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Rd. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.
How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)					
1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)
2. Improve connectivity between Lockwood and Billings (based on estimated travel time)	MODERATE (No travel time savings for western areas of Lockwood)	MODERATE (No travel time savings for western areas of Lockwood)	MODERATE (No travel time savings for western areas of Lockwood)	MODERATE (No travel time savings for western areas of Lockwood)	POOR (Little to no travel time savings)
3. Improve mobility to and from Billings Heights (based on estimated travel time)	MODERATE (Little to no travel time savings for southern areas of Billings Heights)	MODERATE (Little to no travel time savings for southern areas of Billings Heights)	MODERATE (Little to no travel time savings for southern areas of Billings Heights)	MODERATE TO POOR (Benefits primarily NE Billings Heights; little to no benefit for other areas of Billings Heights)	POOR (Little to no travel time savings)

Billings Bypass Level 3 Screening for the Pinehills Interchange

Alignment Alternatives from the Pinehills Interchange

Screening Factors	Pinehills Interchange - Mary St Alignment (Mary St Alignment Option 1 / Mary St Alignment Option 2)	Pinehills Interchange - Legacy Ln Alignment	Pinehills Interchange - Oxbow Park Alignment	Pinehills Interchange - Five Mile Rd Alignment	Pinehills Interchange - E1 / E3 Alignment
4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to US 87 and MT 3 north of Billings)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	MODERATE (Provides new truck/commercial vehicle access. Future connection to MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	MODERATE (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	HIGH (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 is possible through currently undeveloped land west of Old Hwy 312)	HIGH (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 is possible through currently undeveloped land west of Old Hwy 312)
Conclusions based on screening analysis					
Recommendation	Screen Out Pending Field Work Mary Street options using Johnson Lane Interchange provide more travel time savings with lower costs and fewer private property impacts. However, without field data for the Johnson Lane Interchange and alignments, it could be risky to screen this alternative out at this point in time.	Screen Out Similar benefits to other Pinehills Interchange alternatives, but more costly with more floodplain impacts; the Old Hwy 312 connection location performs poorly for support of future planning for a connection to US 87 and MT 3; 52% more costly than Johnson Ln Interchange - Legacy Ln Alignment, but has less travel time benefit and higher private property impacts.	Screen Out Travel time savings is marginal; low traffic volumes between Old Hwy 312 and Five Mile Rd; poor geometrics at connecting routes; the Old Hwy 312 connection location performs poorly for support of future planning for a connection to US 87 and MT 3; 73% more costly than Johnson Ln Interchange - Oxbow Park Alignment with less travel time savings and higher private property impacts; The Old Hwy 312 connection location performs poorly for support of future planning for a connection to US 87 and MT 3.	Screen Out Travel time benefits are very limited - other alternatives provide more benefit with lower costs and fewer impacts	Screen Out Travel time benefits are very limited - other alternatives provide more benefit with lower costs and fewer impacts

**Billings Bypass Level 3 Screening for the Pinehills Split Interchange
Alignment Alternatives from the Pinehills Split Interchange**

Screening Factors	Pinehills Split Interchange - Mary St Alignment (Mary St Alignment Option 1 / Mary St Alignment Option 2)	Pinehills Split Interchange - Legacy Ln Alignment	Pinehills Split Interchange - Oxbow Park Alignment	Pinehills Split Interchange - Five Mile Rd Alignment	Pinehills Split Interchange - E1 / E3 Alignment
Traffic (2035)					
1. ADT - South of River	9,800 / 8,700	12,000	8,300	8,500	8,200
2. ADT - North of River (north of connection to existing street network)	6,000 / 4,300	between 3,100 and 3,300	between 200 and 350	between 3,500 and 4,000	100
3. O/D Billing Heights	67% / 55%	63%	60%	53%	47%
4. O/D Outlying NE Region	33% / 45%	37%	40%	47%	53%
5. ADT increase on connecting streets (project-generated traffic)	Mary Street = 0 Bitterroot Drive = 500 / 800 Pioneer Road = 3,300 / 3,700 Dover Road = 3,300 / 3,700 Five Mile Road = 3,300 / 3,700	Mary Street = 8,800 Dover Road = 100	Mary Street = 5,000 Pioneer Road = 3,200 Dover Road = 3,300 Five Mile Road = 3,300	Mary Street = 4,500 Dover Road = 300 Five Mile Road = 4,500	Mary Street = 3,800 Pioneer Road = 3,800 Dover Road = 4,200 Five Mile Road = 3,800
6. ADT reduction on Main Street	- 8,000 / -6,900	-8,000	-7,000	-7,000	- 6,600
7. Travel Time Savings (between Lockwood and Billings Heights)	2% - 13% - eastern areas of Lockwood no savings - western areas of Lockwood (2 - 4% less savings with Mary St Option 2)	1% - 12% - eastern areas of Lockwood no savings - western areas of Lockwood (with connection to Mary Street)	2% - 13% - eastern areas of Lockwood no savings - western areas of Lockwood (with connection to Mary Street)	3% - SE areas of Lockwood no savings - NE & western areas of Lockwood (with connection to Mary Street)	Little to no travel time savings (with connection to Mary Street)
Safety and Operations					
1. Operations	Outlying northeast traffic would use Pioneer Road, Dover Road, and Five Mile Road to and from the new river crossing.	Billings Heights traffic would use Mary Street to and from the new river crossing.	Traffic would use Pioneer Road, Dover Road, Five Mile Road, and Mary Street to and from the new river crossing. The segment of this alignment between Five Mile Road and Old Hwy 312 would have less than 400 ADT.	Billings Heights traffic would use Mary Street and Five Mile Road to and from the new river crossing.	Traffic would use Pioneer Road, Dover Road, Five Mile Road, and Mary Street to and from the new river crossing. The segment of this alignment between Dover Road and Old Hwy 312 would have less than 100 ADT.
2. Safety	Mary St Option 2 could replace the existing connection between Five Mile Road and Mary Street, which is curvilinear and does not meet current standards for sight distance and operating speeds.		Intersects Five Mile Road and Dover Road at a skew; would require introducing reverse curves at both locations or realignment of Five Mile Road and Dover Road to improve safety.		Intersects Pioneer Rd at a skew; would require introducing reverse curves at this location or realignment of Pioneer Road to improve safety.
Construction/ROW Cost					
1. Mainline Construction	\$71.4 M / \$60.7 M	See Note 1 \$ 81.9 M	See Note 2 \$ 51.1 M	See Note 3 \$ 51.1 M	See Note 4 \$ 60.5 M
2. Interchange Construction	\$ 62.7M	\$ 62.7M	\$ 62.7M	\$ 62.7M	\$ 62.7 M
3. Total Cost	\$ 134.1 M / \$123.4 M	\$ 144.6 M	\$ 113.8 M	\$ 113.8 M	\$ 123.2 M
Private Property Impacts					
1. Number of privately-owned parcels impacted	112 / 111	88	75	84	82
2. Number of primary structures impacted? (residences and businesses)	17 / 18	15	15	15	15
3. Number of secondary structures impacted? (out-buildings and un-occupied structures)	18 / 17	15	13	13	13
Constructability					
1. Interchanges	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified
2. Alignments	No issues identified	No issues identified	No issues identified	No issues identified	No issues identified
Environmental					
1. Floodplain impacts (linear feet across or adjacent to floodplain)	2400 feet / 2100 feet	2900 feet	1700 feet	1700 feet	1800 ft
2. Other potential issues.	Mary St Option 2 - traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses a parcel platted for future development north of Dover Road. May result in a longitudinal floodplain encroachment along Five Mile Creek. Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses a parcel platted for future development north of Dover Road. Traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.	Traverses the area masterplanned for Dover Park (currently in private ownership) Johnson Lane Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Lane Option 2 - would impact a pond north of the railroad.	Traverses the area masterplanned for Dover Park (currently in private ownership) Would impact active gravel operation north of Yellowstone River. Johnson Ln Option 1 - would impact existing industrial uses south of Coulson Road. Johnson Ln Option 2 - traverses a parcel platted for future development and would impact a pond north of the railroad.

**Billings Bypass Level 3 Screening for the Pinehills Split Interchange
Alignment Alternatives from the Pinehills Split Interchange**

Screening Factors	Pinehills Split Interchange - Mary St Alignment (Mary St Alignment Option 1 / Mary St Alignment Option 2)	Pinehills Split Interchange - Legacy Ln Alignment	Pinehills Split Interchange - Oxbow Park Alignment	Pinehills Split Interchange - Five Mile Rd Alignment	Pinehills Split Interchange - E1 / E3 Alignment
How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)					
1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)
2. Improve connectivity between Lockwood and Billings (based on estimated travel time)	MODERATE (No travel time savings for western areas of Lockwood)	MODERATE to POOR (Benefits primarily SE Lockwood; little to no travel time savings for other areas of Lockwood)	MODERATE to POOR (Benefits primarily SE Lockwood; little to no travel time savings for other areas of Lockwood)	POOR (Little to no travel time savings)	POOR (Little to no travel time savings)
3. Improve mobility to and from Billings Heights (based on estimated travel time)	MODERATE (Little to no travel time savings for southern areas of Billings Heights; marginal benefits for NW Billings Heights)	MODERATE (Little to no travel time savings for southern areas of Billings Heights; marginal benefits for NW Billings Heights)	MODERATE (Little to no travel time savings for southern areas of Billings Heights; marginal benefits for NW Billings Heights)	MODERATE TO POOR (Benefits primarily NE Billings Heights; little to no benefit for other areas of Billings Heights)	POOR (Little to no travel time savings)
4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to US 87 and MT 3 north of Billings)	HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)	MODERATE (Provides new truck/commercial vehicle access. Future connection to US 87 MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	MODERATE (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 would require the bypass route to follow Old Hwy 312 approximately 1 mile northeast (out of direction) due to the Five Mile Creek floodplain and existing residential development)	HIGH (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 is possible through currently undeveloped land west of Old Hwy 312)	HIGH (Provides new truck/commercial vehicle access. Future connection to US 87 and MT 3 is possible through currently undeveloped land west of Old Hwy 312)
Conclusions based on screening analysis					
Recommendation	Screen Out Pending Field Work Mary Street options using Johnson Ln Interchange provide more travel time savings with lower costs and fewer private property impacts. However, without field data for the Johnson Lane Interchange and alignments, it could be risky to screen this alternative out at this point in time.	Screen Out Travel time benefits are marginal; 35% more costly than Johnson Ln Interchange - Legacy Ln Alignment, but has less travel time benefit and higher private property impacts; the Old Hwy 312 connection location performs poorly for support of future planning for a connection to US 87 and MT 3	Screen Out Travel time benefits are marginal; low traffic volumes between Old Hwy 312 and Five Mile Road; poor geometrics at connecting routes; 49% more costly than Johnson Ln - Oxbow Park Alignment, but has less travel time benefit and higher private property impacts; the Old Hwy 312 connection location performs poorly for support of future planning for a connection to US 87 and MT 3	Screen Out Travel time benefits are very limited - other alternatives provide more benefit with lower costs and fewer impacts	Screen Out Travel time benefits are very limited - other alternatives provide more benefit with lower costs and fewer impacts



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

Appendix B: Typical Sections Billings Bypass

October 2011

NCPD 56 (55) Control Number 4199



U.S. Department of Transportation
Federal Highway Administration

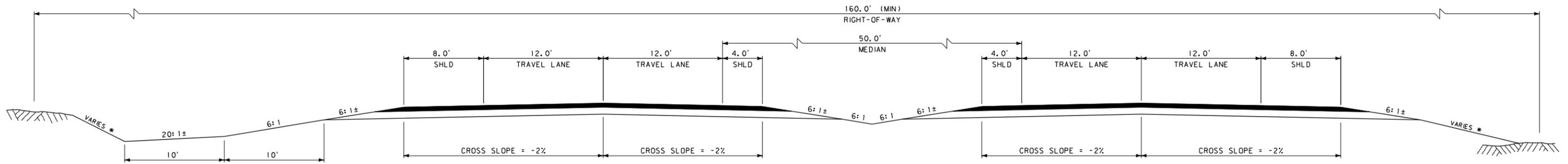


BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

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NHS RURAL PRINCIPAL ARTERIAL

DESIGN SPEED: 70 MPH (FLAT TERRAIN), 60 MPH (ROLLING TERRAIN)

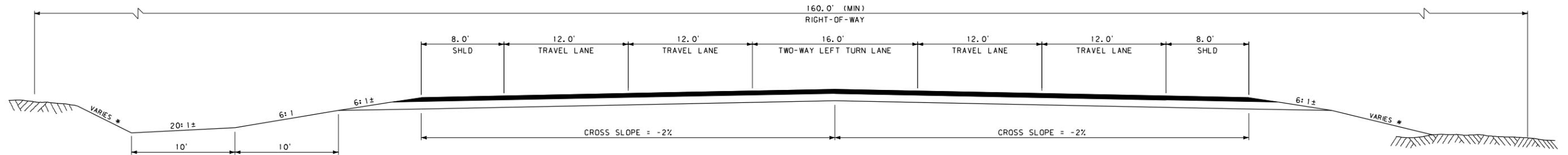


* FILL SLOPES	
0' - 10'	6:1
10' - 20'	4:1
20' - 30'	3:1
OVER 30'	2:1

* BACK SLOPES	
0' - 5'	5:1
5' - 10'	4:1
10' - 15'	3:1
15' - 20'	2:1
OVER 20'	1.5:1

NHS URBAN PRINCIPAL ARTERIAL

DESIGN SPEED: 55 MPH

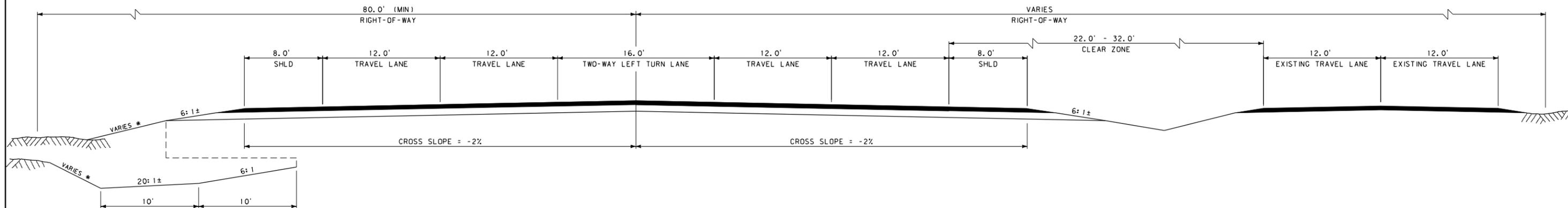


* FILL SLOPES	
0' - 10'	6:1
10' - 20'	4:1
20' - 30'	3:1
OVER 30'	2:1

* BACK SLOPES	
0' - 5'	5:1
5' - 10'	4:1
10' - 15'	3:1
15' - 20'	2:1
OVER 20'	1.5:1

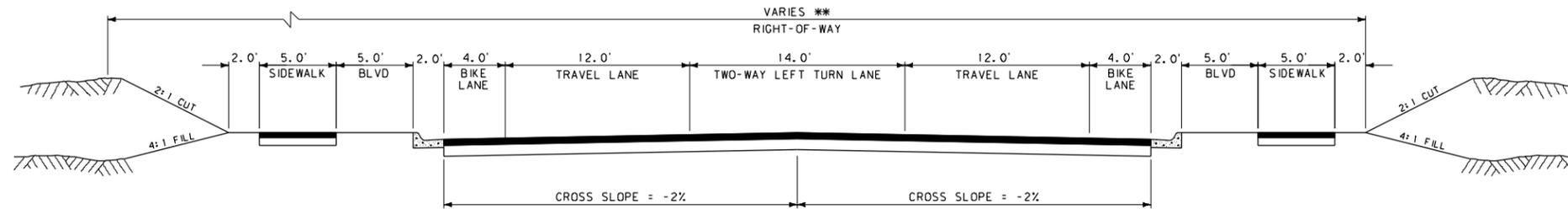
NHS URBAN PRINCIPAL ARTERIAL WITH FRONTAGE ROAD

DESIGN SPEED: 55 MPH



SECONDARY CORRIDOR IMPROVEMENTS

MARY STREET CITY OF BILLINGS - PRINCIPAL ARTERIAL PROJECTED 2035 ADT = 9500 VPD

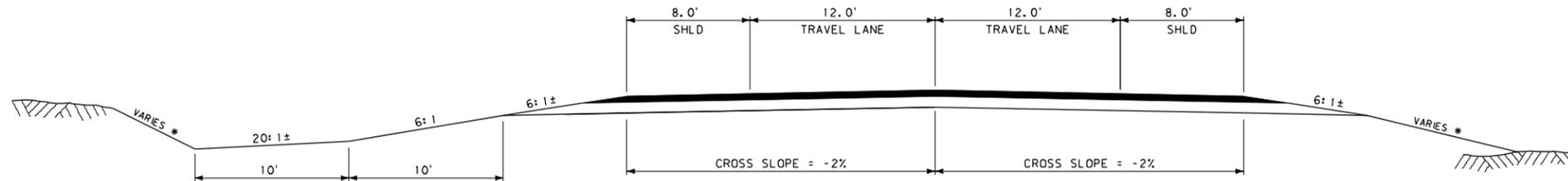


** PER CURRENT CITY OF BILLINGS SUBDIVISION REGULATIONS:
PRINCIPAL ARTERIAL = 130'
MINOR ARTERIAL = 100'

* FILL SLOPES	
0' - 10'	6:1
10' - 20'	4:1
20' - 30'	3:1
OVER 30'	2:1

* BACK SLOPES	
0' - 5'	5:1
5' - 10'	4:1
10' - 15'	3:1
15' - 20'	2:1
OVER 20'	1.5:1

FIVE MILE ROAD RURAL COLLECTOR ROAD DESIGN SPEED: 60 MPH (FLAT TERRAIN) PROJECTED 2035 ADT = 5100 VPD



DOWL HKM



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

**Appendix C: Intersection Design Option
Evaluation: Mary Street/US 87/Old Hwy
312/Bench Boulevard
Billings Bypass
October 2011
NCPD 56 (55) Control Number 4199**





BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

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Mary Street Alignment – US87/312/Bench Intersection Design Option Evaluation

Option A - Main Street Roundabouts

Option A involves two 230' diameter roundabouts on the Main Street/Highway 312 corridor. The first roundabout would include Main Street Bench Boulevard and Mary Street (existing). This would allow a direct connection of Bench Blvd with Main Street and provide a US 87 southbound slip ramp. Traffic flow between Bench and US 87 would be routed thru both roundabouts. The second roundabout, located northeast of the Main/Bench roundabout, would include the Mary Street Alternative/HWY 312/US 87 intersection approaches.

Option B – Bench-Mary Roundabout

Option B also involves two roundabouts. One is a 280' diameter roundabout at the Main Street/US87/312 intersection and the other is a single lane roundabout that would be located south of the larger roundabout at an intersection with Bench and Mary Street. The single lane roundabout would connect to the major roundabout as a fifth approach leg. Access from US 87 to Bench would be more direct, while the connection between Main Street and Bench/Mary would be more circuitous. A southbound US 87 slip ramp would also be provided with this alternative.

Capacity Analysis Summary

The attached capacity analysis summary illustrates the main differences between the two options. While the overall Level of service (LOS) is about the same for both alternatives, the volume/capacity ratios indicates that Option B has approximately twice as much reserve capacity with a v/c ratio approximately half that of Option A. Both options have one movement that would operate a LOS C, except that in the case of Option A, delay on the Bench approach during the peak pm hour would be within 2 seconds of being LOS D while the Mary Alternative approach in the PM hour is within 2 seconds delay of being at LOS B. Overall control delay for Option A is also 55% greater than for Option B. The greatest maximum queue would be 345' on the Bench NB approach for Option A and only 156' for the Mary Alternative approach during the pm hour. This is especially significant since the Option A Bench approach would have a number of access conflicts near the intersection while the Option B Mary Alternative alignment would not.

Corridor Travel Speeds

The highest volume and highest speed corridor at this intersection is and would be the Main Street/HWY 312 corridor. The attached travel speed calculations indicate that Option A would have an average travel speed of 17.7 mph thru a 1,300' long test segment, while Option B would have an average travel speed of 24.9 mph. Thus, Option B would move traffic 40% faster thru this segment of the corridor which currently operates with average travel speeds in excess of 45 mph.

Conflicts

The total number of right angle traffic conflicts were calculated for both alternatives and it was determined that Option A would have 40% more right angle traffic conflicts than Option B.

Truck Traffic

The major truck/commercial traffic movements at this intersection involve the Main Street – US 87 corridor and the second highest would be the Main Street-HWY 312 corridor. Option A requires all truck traffic, except for the SB US 87 slip ramp traffic, to traverse two roundabouts, while Option B only requires trucks to enter one roundabout. Option B also, isolates local passenger car traffic from the main truck routes and therefore provides superior conditions for local traffic access and circulation.

Recommendations

Based on the above noted evaluation of each option's safety and efficiency, it appears that Option B provides a superior operating environment for the major traffic flows and allows a natural segregation of short and long trip traffic. This is significant because short and long trip traffic characteristics can be significantly different. Option B would provide less traffic delay, especially for truck traffic, on US 87 which is an NHS route. Thus, it is recommended that final design should incorporate the basic concepts illustrated in Option B and strive to improve on the location and geometric design features of this concept.



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

FINAL ENVIRONMENTAL IMPACT STATEMENT – MARCH 2014

ATTACHMENT 1

FIVE MILE CREEK ALTERNATIVES SCREENING TECHNICAL MEMORANDUM - REVISED



BILLINGS BYPASS EIS
NCPD 56(55)CN 4199

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DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE: July 19, 2013
TO: Fred Bente
Montana Department of Transportation
FROM: Ron Bockelman, Kacey Meis
SUBJECT: **Five Mile Creek Alternatives Screening Memorandum Update**
PROJECT: 4199 - Billings Bypass
COPIES: Tom Gocksch, Katie Potts, Stefan Streeter, Gary Neville, Alan Woodmansey, Brian Hasselbach

This memorandum is an update to the February 15, 2012 technical memorandum documenting the alternatives development and screening process for two alignments suggested in June 2011 by the public subsequent to the completion of the alternatives screening process. Two landowners along Mary Street, both of whom voiced concerns about proximity impacts associated with the proposed roadway project, suggested alternate alignments that would avoid or mostly avoid the Mary Street corridor. The suggestion by both landowners was to route the new facility along the north side of Five Mile Creek through the land currently being used for gravel operations. One landowner suggested a connection to Old Hwy 312 north of Five Mile Creek. The other landowner suggested an alignment that would veer south using the old Billings and Central Montana Railway (BCMR) corridor to connect with Mary Street at the intersection of Main Street, US 87, and Old Hwy 312. The two alignment suggestions, which were called North Five Mile Creek and South Five Mile Creek, were developed and screened using the same criteria used to screen other alternatives throughout the project. Figure 1 at the end of this memo depicts the alignment alternatives.

Public and stakeholder interest in the Five Mile Creek Alternatives increased after the August 2012 release of the Draft Environmental Impact Statement (DEIS). Based on this interest, MDT directed the consultant team to revise the Five Mile Creek Alternatives Screening Memorandum to include more detailed information on the screening results. The analysis presented in the February 15, 2012 memorandum is reiterated and expanded upon in this memorandum.

SUMMARY OF ALTERNATIVES DEVELOPMENT PROCESS

This project was originally scoped as a bypass route north of Billings between I-90 and MT 3. Funding constraints prompted MDT to coordinate with the local Policy Coordinating Committee (PCC) on potential approaches to proceed with the project. The PCC provided input that the project should be re-scoped to focus on the eastern segment of the proposed project between the interstate and Old Hwy 312. Based on this input, MDT reviewed the transportation needs in that area, as documented in local plans, and determined that physical barriers (Yellowstone River, railroad, rimrocks, and the interstate corridor) severely limit access and connectivity in the eastern area of Billings. Local plans also identified the need for improved truck/commercial vehicle access to state highways serving the Billings area as a key transportation issue. MDT coordinated with local, state, and federal agencies and the public on revising the project purpose and need to address these issues.

Through the course of this project, a wide range of alternatives have been suggested, considered, and developed. Because the scope of the original project was much larger than the current scope, many of the early alternatives

extended far beyond the limits of the current project or were completely outside the current study area. Some of the early alternatives fell partially within the current study area. The project team recognized that some of the alternatives developed prior to re-scoping the project might still be valid under the new purpose, needs, and design objectives. Additionally, some alternatives that were screened out under the previous purpose and needs might now be feasible given the new focus of the project. For these alternatives, the project team isolated the relevant segment, the eastern segment between the interstate and Old Hwy 312, and these segments were advanced for further consideration even if they were screened out during the original project.

MDT identified additional alternatives that might be feasible under the revised purpose and need and smaller study area. The identified alternatives included looking at both improving existing routes over the river, and constructing new routes along the river, or a combination of both. This wide range of alternatives was based on previous studies; input gathered from the public, agencies, and the Billings Bypass Advisory Committee (BBAC); and concepts identified by the Billings Bypass EIS project team.

Stakeholder input was also used to identify a set of design objectives that served as guidelines in the development of alternatives. Design objectives included considerations such as roadway functionality, safety, the community and environment, the Yellowstone River crossing, and cost. Cross sections were developed based on projected traffic volumes. At the interstate, connections at both existing and new interchange locations were considered, and multiple interchange configurations were developed. For intersections requiring signalization, roundabouts were also considered. Alternatives were further refined, as appropriate, using the purpose and need statement, design objectives, and data analysis.

SUMMARY OF ALTERNATIVES SCREENING PROCESS

The National Environmental Policy Act (NEPA) requires the Federal Highway Administration (FHWA) and Montana Department of Transportation (MDT) to identify the environmental, social, and economic effects of their proposed actions. The transportation needs of the public must also be taken into account. Although some resources, such as wetlands or Section 4(f) protected properties, are subject to more restrictive regulations than other resources, no single screening factor may take preference during the planning and decision-making processes. Equal consideration must be given to environmental, community, financial, and technical factors in selecting an alternative that best represents the overall public interest.

In order to determine which alternatives would best meet the project purpose and needs while minimizing impacts to the community and environment, the project team completed a three-step screening process. Screening criteria included: key benefits related to the purpose and needs; cultural, environmental, and private property impacts; traffic projections; and construction cost estimates. In order to be carried forward for detailed evaluation in the DEIS, alternatives had to meet all of the design objectives. Screening criteria were developed based on the identified needs in order to measure the effectiveness of each alternative. These criteria generally increase in detail at each level of screening. During the initial alternatives screening, the screening process was applied to more than 60 alternatives and resulted in the identification of three alternatives for detailed evaluation in the DEIS; Mary Street Option 1, Mary Street Option 2, and Five Mile Road. This three-step screening process was applied to the Five Mile Creek alternatives with the same rigor.

Level 1 Screening

The Level 1 screening reviewed all of the alignments identified by the public and the project team between 2006 and 2009 during the original project. Because the scope of the original project was much larger than the current scope, many of the early alternatives extended far beyond the limits of the current project or were completely outside the current study area. These alternatives, or the segments of these alternatives not providing a connection between the interstate and Old Hwy 312, were screened out in the Level 1 screening because they would not meet the current purpose and need. Some of the early alternatives fell partially within the current study area. For these alternatives, the project team isolated the relevant segment, the eastern segment between the interstate and Old Hwy 312, and these segments were advanced for further consideration even if they were screened out during the original project.

Level 2 Screening

The revised purpose and need statement and the design objectives formed a set of criteria by which additional alternatives could be developed and screened. The Level 2 screening evaluated the alignments that were carried forward from the Level 1 screening, as well as those additional alignments identified by the project team between 2009 and 2011. Over 60 alternatives were identified or carried forward into the Level 2 Screening, which was conducted in two steps due to the large number of alternatives under consideration.

Level 2A

This step was performed based on proposed alignments only. No design was completed for the alternatives at this point in the process. The screening criteria focused on evaluating key benefits related to the purpose and needs of the project and cultural and floodplain impacts that could be a fatal flaw. Alignments that met the purpose and needs and had no fatal flaws identified were advanced to the Level 2B screening. Alignments that did not meet the purpose and needs or had fatal flaws identified were screened out.

Level 2B

For the alternatives advanced from Level 2A to Level 2B, horizontal design was completed to facilitate development of travel time estimates to measure improved mobility and assessment of impacts to private property to measure community impacts. Applicable roadway functionality criteria were taken into consideration during the horizontal design process, such as designing for NHS Principal Arterial Standards and incorporating access control measure that balance through mobility and local access needs. All alternatives were required to maintain connections to the local street network as part of the design criteria for this screening.

Screening criteria at this level consisted of travel time benefits, impacts to privately-owned property, and other potential issues that could be a fatal flaw, i.e., negative effects that could not be offset by benefits from other factors. Alignments that provided a beneficial impact and did not have any fatal flaws were advanced to the Level 3 screening. Alignments that did not provide benefits or had fatal flaws were screened out.

Level 3 Screening

The Level 3 Screening evaluated the remaining alignments against each other using the screening criteria from Level 2 plus projected traffic volumes and estimated construction costs. This step focused on identifying alternatives that met the full set of design objectives and performed well against the transportation needs identified for the project. Alternatives that would provide benefits similar to other alternatives but with more

impacts or higher cost were screened out at this level. The remaining alignments were carried forward for detailed evaluation in the Draft Environmental Impact Statement.

FIVE MILE CREEK ALTERNATIVES SCREENING PROCESS

Given the point in time that the Five Mile Creek alternatives were suggested, some of the screening criteria were analyzed concurrently in order to facilitate the screening process. For example, the Level 2A and Level 2B environmental screening criteria were considered at the same time. Level 2B traffic safety and operations and Level 3 traffic volumes were also analyzed concurrently. This did not impact the analysis or results and only served to expedite the screening process.

Additionally, since the project team had already narrowed alignment options south of the river down to Johnson Lane Option 1 when the North Five Mile Creek and South Five Mile Creek alternatives were suggested, both of these alternatives would use that alignment south of the Yellowstone River. The segment of these alignments north of the Yellowstone River are described below and depicted in Figure 1, Five Mile Creek Alternative Alignments Map, at the end of this memo.

North Five Mile Creek Alternative

From the Yellowstone River northeast of the confluence of Five Mile Creek, the alignment would proceed west approximately 1.8 miles along the north side of the Five Mile Creek floodplain, traversing a gravel mining operation and intersecting nearly perpendicular to Bitterroot Drive. West of Bitterroot Drive, the alignment would curve towards and connect with Old Hwy 312 approximately 0.4 mile south of Dover Road.

North Five Mile Creek Alternative Design Criteria and Constraints

The following design criteria and constraints were considered when developing the North Five Mile Creek Alternative:

- Design standards equal to all other alternatives considered for the Billings Bypass project, including design speed, superelevation rates, lane configuration, and right-of-way (ROW)
- Perpendicular or near perpendicular intersections with crossing roadways
- To the extent possible, reduce or limit impacts to Five Mile Creek by situating the alternative north of the creek
- To the extent possible, reduce or limit impacts to structures
- As recommended by public comment, locate the alternative alignment within the gravel mine to reduce impacts to adjacent properties

South Five Mile Creek Alternative

From the Yellowstone River northeast of the confluence of Five Mile Creek, the alignment would proceed west approximately 1.6 miles along the north side of the Five Mile Creek floodplain, traversing a gravel mining operation and intersecting nearly perpendicular to Bitterroot Drive. West of Bitterroot Drive, the alignment would curve southwest to cross Five Mile Creek at a narrow and nearly perpendicular crossing, roughly following the old BCMR railroad corridor for approximately 0.6 mile. The alignment would then cross the old railroad corridor and proceed west to connect with Old Hwy 312 at the intersection with US 87 and Main Street. The alignment would be situated north of the existing Mary Street.

South Five Mile Creek Alternative Design Criteria and Constraints

The following design criteria and constraints were considered when developing the Five Mile Creek South alternative:

- Design standards equal to or similar to the current alignment alternatives under consideration, including design speed, superelevation rates, lane configuration, and ROW
- Perpendicular or near perpendicular intersections with crossing roadways
- To the extent possible, reduce or limit impacts to Five Mile Creek by situating the alternative away from the creek and associated floodplain
- To the extent possible, cross Five Mile Creek and the associated floodplain as close to perpendicular as possible while minimizing impacts to the floodplain and avoiding longitudinal encroachment to the floodplain
- To the extent possible, reduce or limit impacts to structures, including the City of Billings Five Mile Creek sanitary sewer lift station along Bitterroot Drive
- As recommended by public comment, locate the alternative alignment within the gravel mine and along the old railroad corridor to reduce impacts to adjacent properties

While it would be possible for the proposed alternative to generally follow the alignment of the old railroad corridor, the alignment was not developed in this manner for the following reasons:

- An alignment following the old railroad corridor north of Mary Street towards Old Hwy 312 would require a low speed curve to provide a perpendicular intersection, and would likely require maximum superelevation rates
- To minimize impacts to the Five Mile Creek and associated floodplain, the alignment was adjusted to cross the creek as close to perpendicular as possible. An alignment coincident to the old railroad alignment would produce additional impacts to the floodplain and would require a longer structure to span the floodplain. There would also likely be longitudinal impacts to the floodplain
- The old BCMR railroad corridor is a historic site and a designated park resource. Section 106 of the National Historic Preservation Act and Section 4(f) of the Department of Transportation Act would apply
 - The recently completed Cultural Resource Inventory documents this old railroad corridor as the Billings and Montana Central Railway, which meets eligibility criteria for listing on the National Register of Historic Places. The overall integrity of the feature is poor to fair, but portions of the grade can be discerned just northeast of Mary Street.
 - The City of Billings purchased this former railroad corridor between Mary Street and Bitterroot Drive and designated it as park land for future use in extending the Kiwanis Trail

ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

Alternatives Development

The centerline of each alignment was established using National Highway System (NHS) urban principal arterial standards. An assumed ROW width of 100 feet either side of the centerline was applied for each alignment. This width depicts an assumed maximum ROW width to estimate potential impacts for screening purposes and is consistent with assumptions for other alternatives considered for this project.

Screening Criteria

Criteria used for the preliminary screening of all project alternatives included the following:

- Level 1

- Provide a connection between I-90 and Old Hwy 312
- Level 2A:
 - Key measures related to the purpose and need:
 - Reduce physical barrier impacts caused by I-90, the railroad, the Yellowstone River, and the Rimrocks
 - Improve connectivity between Lockwood and Billings (based on estimated travel time)
 - Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)
 - Improve truck/commercial vehicle access to and through Billings (allow for a future connection to US 87 and MT 3 north of Billings)
 - Potential for environmental impacts including: known historic / Section 6(f) sites (recreational resources purchased with Land and Water Conservation funds) and floodplain impacts
- Level 2B:
 - Potential for environmental impacts including: major impacts to existing commercial/industrial operations, and conflicts with planned future land use
 - Potential impact to Section 4(f) resources
 - Traffic safety and operations
 - ROW impacts (number of parcels impacted and number of structures impacted)
- Level 3:
 - Traffic volumes
 - ROW impacts (number of parcels impacted and number of structures impacted)
 - Construction cost

These criteria were used to compare the Five Mile Creek alternatives against the alternatives evaluated in the DEIS: No Build Alternative, Mary Street Option 1, Mary Street Option 2, and Five Mile Road.

LEVEL 1 SCREENING RESULTS

Because the study area for this project was originally much larger (between I-90 and MT 3), the Level 1 screening for the revised purpose and need was a simple exercise in eliminating the previously considered alternatives that were not consistent with the re-scoped project; i.e., did not provide a connection between I-90 and Old Hwy 312. Because both of the Five Mile Creek alternatives provide this connection, they were carried to the next level of screening.

Table 1. Purpose and Need Screening Results (Level 2A)

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
How well does the alignment meet the project purpose and need? (HIGH, MODERATE, POOR)						
1. Reduce physical barrier impacts (I-90, railroad, Yellowstone River, rimrocks)	POOR (Does not reduce physical barrier impacts)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)	HIGH (New connection traversing I-90, railroad, and Yellowstone River)
2. Improve connectivity between Lockwood and Billings (comparison of existing and proposed route between the Johnson interchange and the intersection of Main Street and Wicks Lane)	POOR (No improvement, existing route serves as the basis for other comparisons)	HIGH (0.2 miles shorter than existing route)	HIGH (0.2 miles longer than existing route)	MODERATE (2.1 miles longer than existing route)	HIGH (0.5 miles longer than existing route)	HIGH (0.5 miles longer than existing route)
3. Improve mobility to and from Billings Heights (improve access to interstate and provide transportation system redundancy)	POOR (Would not provide an alternative route)	HIGH (Would provide an alternative route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Would provide an alternate route with Old Hwy 312 connection in Billings urban limits and new access to I-90)	MODERATE (Would provide an alternate route with an Old Hwy 312 connection 0.8 - 1.0 miles outside of Billings urban limits and new access to I-90)	HIGH (Would provide an alternate route with an Old Hwy 312 connection in Billings urban limits and new access to I-90)	HIGH (Would provide an alternative route with Old Hwy 312 connection in Billings urban limits and new access to I-90)

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
<p>4. Improve truck/commercial vehicle access to and through Billings (allows for future connection to US 87 and MT 3)</p>	<p>POOR (Does not improve or avoid existing congested route. Does not provide opportunity for a future extension west to MT 3.)</p>	<p>HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)</p>	<p>HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)</p>	<p>HIGH (Provides new truck/commercial vehicle access. Future connection to MT 3 is possible through currently undeveloped land west of Old Hwy 312)</p>	<p>MODERATE (Provides new truck/commercial vehicle access. A future extension west to MT 3 would require that the bypass route follow Old Hwy 312 approximately 0.8 mile south (out of direction) due to the Five Mile Creek floodplain and existing residential development)</p>	<p>HIGH (Provides new truck/commercial vehicle access with direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north for at least 1.5 miles due to the Five Mile Creek floodplain and existing residential development)</p>

PURPOSE AND NEED SCREENING RESULTS (LEVEL 2A)

- **Reduce Physical Barrier Impacts** – The rimrocks, the Yellowstone River, the railroad, and I-90 create barriers for north-south connections in the Billings area, which affect local traffic and regional traffic. The degree to which each alternative would reduce the impacts of these barriers was assessed. In general, provision of new routes traversing these barriers was assessed as a greater benefit than improvements to existing routes traversing these barriers.
 - North Five Mile Creek Alternative – Because this alternative would provide a new connection traversing I-90, the railroad, and the Yellowstone River, it was given a rating of “high” for this criterion. This is comparable to the “high” rating given to the DEIS alternatives.
 - South Five Mile Creek Alternative – Because this alternative would provide a new connection traversing I-90, the railroad, and the Yellowstone River, it was given a rating of “high” for this criterion. This is comparable to the “high” rating given to the DEIS alternatives.
- **Improved Connectivity between Lockwood and Billings** – To gauge how well the alternatives would improve connectivity between Lockwood and Billings, the project team measured route distances between common points to compare the proposed alternatives to the existing conditions. The two common points used were the Johnson Lane Interchange in Lockwood and the intersection of Wicks Lane and Main Street in Billings Heights (which is a common destination for commercial services). Alternatives with longer route distances were deemed to provide less benefit and received a lower rating.
 - North Five Mile Creek Alternative – This alternative would provide a route approximately 0.5 miles longer than the existing route. Because this route would be less than 1 mile longer than the existing route, this alternative received a “high” rating for this criterion. This is comparable to the “high” rating given to the Mary Street Option 1 and Mary Street Option 2 alternatives and more favorable than the “moderate” rating received by the Five Mile Road Alternative.
 - South Five Mile Creek Alternative – This alternative would provide a route approximately 0.5 miles longer than the existing route. Because this route would be less than 1 mile longer than the existing route, this alternative received a “high” rating for this criterion. This is comparable to the “high” rating given to the Mary Street Option 1 and Mary Street Option 2 alternatives and more favorable than the “moderate” rating received by the Five Mile Road Alternative.
- **Improved Mobility between Billings Heights and the Interstate** – There are two primary factors that currently impact mobility for Billings Heights residents: 1) there is only one route in and out of Billings Heights, and when this route is compromised or closed, there are no alternate routes, and 2) the existing route is highly congested. To gauge how well the alternatives would improve mobility to and from the Billings Heights area, the project team assessed how the alternatives would improve the convenience and consistency with which people in Billings Heights could travel to and from their neighborhood.
 - North Five Mile Creek Alternative – This alternative would provide an alternate route with an Old Hwy 312 connection in Billings urban limits, and would provide new access to I-90; therefore, it was given a “high” rating for this criterion. This is comparable to the “high” rating given to the Mary Street Option 1 and Mary Street Option 2 alternatives and more favorable than the “moderate” rating received by the Five Mile Road Alternative.

- South Five Mile Creek Alternative – This alternative would provide an alternate route with an Old Hwy 312 connection in Billings urban limits, and would provide new access to I-90; therefore, it was given a “high” rating for this criterion. This is comparable to the “high” rating given to the Mary Street Option 1 and Mary Street Option 2 alternatives and more favorable than the “moderate” rating received by the Five Mile Road Alternative.
- **Improve Truck/Commercial Vehicle Access to and through Billings** – Improved truck/commercial vehicle access to state highways and major facilities serving the Billings area is a need identified in the Billings Urban Area Long-Range Transportation Plan (2009 Update). The alternatives were assessed to determine how well they would support the plan for a future bypass route between I-90 and MT 3 north of Billings.
 - North Five Mile Creek Alternative – Although this alternative would improve commercial/truck access to Billings, the western terminus location for this alternative performs poorly for support of future planning for a connection to US 87 and MT 3. The North Five Mile Creek Alternative would connect to Old Hwy 312 across from the Sunny Slope subdivision approximately 0.85 mile north of the intersection of US 87, Main Street, and Old Hwy 312. A future extension west to US 87 from this location would impact eight existing residential parcels requiring a full acquisition for seven of the homes. As a result, a future bypass connection to US 87 would likely require out-of-direction travel south on Old Hwy 312 to the intersection with US 87. For these reasons, this alternative was given a “moderate” rating for this criterion. This is less favorable than the “high” rating given to the DEIS alternatives.
 - South Five Mile Creek Alternative – This alternative would provide new truck/commercial vehicle access with a direct connection to US 87. A future extension west to MT 3 would require that the bypass route follow US 87 north from the North Five Mile Creek and South Five Mile Creek connection locations for at least 1.5 miles, due to the Five Mile Creek floodplain and existing residential development. This alternative was given a “high” rating for this criterion. This is comparable to the “high” rating given to the DEIS alternatives.

The Five Mile Creek alternatives performed similarly to the DEIS alternatives and would meet the project purpose and need, so they were carried forward for additional screening.

Table 2. Environmental Issues Screening Results (Level 2A and Level 2B)

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
Environmental Issues						
1. Cultural/Historic/Section 4(f) Sites Potentially Impacted	None	4 NRHP-eligible resources	4 NRHP-eligible resources	4 NRHP-eligible resources	3 NRHP-eligible resources	4 NRHP-eligible resources
2. Floodplain Impacts (Linear feet across or adjacent to floodplain)	0 feet	7800 feet	6850 feet	6850 feet	6500 feet	6700 feet
Other Potential Issues	None	Impact to existing industrial use south of Coulson Road	Impact to existing industrial use south of Coulson Road; Traverses the area master planned for Dover Park (currently in private ownership)	Impact to existing industrial use south of Coulson Road; Traverses the area master planned for Dover Park (currently in private ownership)	Impact to existing industrial use south of Coulson Road; Impact to active gravel mine operation east of Five Mile Road; Traverses area master planned for Dover Park.	Impact to existing industrial use south of Coulson Road; Impact to active gravel mine operation east of Five Mile Road; Traverses area master planned for Dover Park; Substantial impact to park corridor for Kiwanis Trail extension (Section 4(f) resource)

ENVIRONMENTAL ISSUES SCREENING RESULTS (LEVEL 2A AND LEVEL 2B)

- **Cultural/Historic Sites** – Because this project is considered a federal undertaking, Section 106 of the National Historic Preservation Act applies, which requires federal agencies to take into account the effects of their actions on historic properties in the study area. Implementation of the proposed alternatives could affect historic properties; therefore, a review of cultural resource inventories was conducted in 2007, 2009, and 2011. Four sites were determined to be eligible for listing on the National Register of Historic Places (NHRP), with concurrence from the State Historic Preservation Office. The four sites were overlaid on a map with the alternative construction footprints to identify which sites could be potentially affected by each alternative. At this level of screening, no determination was made as to whether the impacts would constitute an Adverse Effect, No Adverse Effect, or No Historic Properties Affected; only the potential for effect was identified.
 - North Five Mile Creek Alternative – This alternative could potentially impact all four of the historically eligible sites: Coulson Ditch (Site 24YL0272), Northern Pacific Railway Mainline (Site 24YL277), Billings Bench Water Association Canal (Site 24YL0161), and Billings and Central Montana Railroad (Site 24YL1592). This is comparable to the four historically eligible sites potentially affected by the DEIS alternatives.
 - South Five Mile Creek Alternative – This alternative could potentially impact all four of the historically eligible sites: Coulson Ditch (Site 24YL0272), Northern Pacific Railway Mainline (Site 24YL277), Billings Bench Water Association Canal (Site 24YL0161), and Billings and Central Montana Railroad (Site 24YL1592). This is comparable to the four historically eligible sites potentially affected by the DEIS alternatives.
- **Floodplain Impacts** – Floodplains are “any land area susceptible to being inundated by flood waters from any source.” Floodplains are important to consider when planning new infrastructure such as roads and bridges, to ensure that the constructed resources will be protected. It is also important to preserve floodplains for natural processes of handling storm flows. Federal agencies are required to avoid direct or indirect support of floodplain development whenever a practicable alternative exists. The potential linear impact to floodplains was estimated using data provided by the Federal Emergency Management Agency overlaid with the alternative centerline and measured using Geographic Information Systems (GIS). Floodplain impacts were identified prior to the development of alternative footprints; as such, the information is presented in linear feet rather than acres.
 - North Five Mile Creek Alternative – This alternative would impact up to approximately 6,500 linear feet across or directly adjacent to the Yellowstone River and Five Mile Creek floodplains. This would be less impact than the DEIS alternatives.
 - South Five Mile Creek Alternative – This alternative would impact up to approximately 6,700 linear feet across or adjacent to the Yellowstone River and Five Mile Creek floodplains. This would be less impact than the Mary Street Option 1 Alternative and a similar impact to the Mary Street Option 2 and Five Mile Creek alternatives.
- **Other Potential Issues** – The alternatives were evaluated to identify any additional issues or negative effects that could not be offset by benefits from other factors, regarded as fatal flaws. Alternatives that have fatal flaws cannot be considered viable alternatives, even if they reduce impacts to a particular resource.

- North Five Mile Creek Alternative – No fatal flaws were identified for this alternative; however, some of the potential issues identified included: impacts to existing industrial use south of Coulson Road, impacts to the active gravel mine operation east of Five Mile Road, and the alignment traverses the area master planned for Dover Park. These potential issues were identical in nature to those identified for the DEIS alternatives, although the North Five Mile Creek Alternative would have a greater impact on the active gravel mine operation.
- South Five Mile Creek Alternative – Some of the potential issues identified for this alternative included: impacts to existing industrial use south of Coulson Road, impacts to the active gravel mine operation east of Five Mile Road, alignment traverses the area master planned for Dover Park, and there would be substantial impacts to the park corridor for the Kiwanis Trail extension (a Section 4(f) resource). These potential issues were identical in nature to those identified for the DEIS alternatives, with the exception of the impacts to the Kiwanis Trail extension, which would likely be greater than a *de minimis* Section 4(f) classification.

The North Five Mile Creek alternative performed similarly to the DEIS alternatives and is recommended to be carried forward in the screening process. The South Five Mile Creek alternative also performed similarly to the DEIS alternatives with the exception of the substantial impacts to the park corridor for the Kiwanis Trail extension. Additional Section 4(f) screening was conducted because completion of a formal Section 4(f) Evaluation would require additional time, expense, and mitigation, which potentially is a fatal flaw in the context of the screening process. The implications of these impacts are discussed in the following section, Section 4(f) Screening Results.

Table 3. Section 4(f) Screening Results (Level 2B)

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
Section 4(f) Impacts						
Existing Kiwanis Trail: Acres Impacted (Approximate)	None	0.2 acre	0.2 acre	0.2 acre	No impact	0.2 acre
Planned Kiwanis Trail: Acres Impacted (Approximate)	None	0.4 acre	0.4 acre	0.2 acre	0.3 acre	4.75 acre

SECTION 4(F) SCREENING RESULTS (LEVEL 2B)

Section 4(f) was a special provision included in the Department of Transportation Act of 1966. Section 4(f) states that the Secretary of the U.S. Department of Transportation “shall not approve any transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state or local significance, or land of an historic site of national, state or local significance, as determined by the federal, state or local officials having jurisdiction over the park area, refuge or site unless a determination is made that:

- There is no prudent or feasible alternative to using that land: and
- The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife or waterfowl refuge, or historic site resulting from that use.”

An assessment of the Section 4(f) resources in the study area identified publicly owned parks and recreation areas including recreation trails, wildlife and waterfowl refuges, and significant historic sites. Of the identified Section 4(f) resources, one existing trail (Kiwanis Trail) and one planned trail (Kiwanis Trail Extension) could be impacted by the DEIS alternatives and the South Five Mile Creek Alternative. These trails are described below and depicted in Figure 2 at the end of this memo.

- **Kiwanis Trail:** The Kiwanis Trail is an existing off-street multi-use trail under the jurisdiction of the City of Billings. The trail is a component of the Jim Dutcher Trail and runs approximately 1.95 miles south from Mary Street to Two Moon Park, following the abandoned Billings and Central Montana Railroad tracks.
- **Kiwanis Trail Extension:** The *Billings Area Bikeway and Trail Master Plan* (2011) identifies plans to extend the Kiwanis Trail from the northern terminus past Five Mile Creek to Bitterroot Drive.

Correspondence with the City of Billings Parks and Recreation Department in December of 2011 and July of 2013 indicated their concurrence that the existing Kiwanis Trail and the planned Kiwanis Trail Extension are considered significant resources and are protected by Section 4(f). Although the DEIS alternatives would cross the Kiwanis Trail Extension, those crossings are perpendicular and impacts to the future trail would be negligible.

- North Five Mile Creek Alternative – The North Five Mile Creek alternative would not impact the existing Kiwanis Trail. This alternative would cross the planned Kiwanis Trail extension at a skew and would impact approximately 0.3 acre near the proposed trail termination. Although 0.3 acre is a lesser impact than the DEIS alternatives, the DEIS alternatives would cross the proposed trail extension perpendicularly, which is preferable to skewed crossings. Skewed crossings have limited sight distance, creating hazards for recreationists. The impact of this alternative would be minimal and would not substantially impair the intended use of the trail.
- South Five Mile Creek Alternative – The South Five Mile Creek Alternative would not impact the existing Kiwanis Trail. This alternative would impact approximately 45 percent of the length of this planned trail corridor and would cross the trail at a skew three times. Without mitigation, the impacts associated with this alternative would substantially impair the intended use of the trail. The City of Billings indicated their preference would be to maintain the proposed Kiwanis Trail as an off-street facility rather than incorporate it alongside a roadway. If mitigation efforts included implementing an adjacent multi-use trail between Bitterroot Drive and Mary Street, the character of the Kiwanis Trail would be changed and the trail could no longer be categorized as an off-street recreation facility. Modifying the roadway design to avoid impacts to this trail would not be feasible for the reasons discussed under the South Five Mile Creek Alternative Design Assumptions section.

Given that other feasible and prudent alternatives exist with similar or lesser impacts to the environment and community, the South Five Mile Creek Alternative impacts to the Section 4(f) resource were considered substantial, given the likelihood that this alternative would require preparation of a complete Section 4(f) Evaluation. However, traffic analysis was recommended for both Five Mile Creek alternatives at this stage in order to identify the traffic operations and safety and the impacts to the transportation system.

Table 4. Traffic Screening Results (Level 2B and Level 3)

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
Safety and Operations						
1. Operations	Continued congestion along primary roadway corridors through Billings and Billings Heights, including Main Street, Bench Boulevard, and US 87 from 1st Avenue to the I-90 Lockwood interchange	Outlying northeast traffic would use Pioneer Road, Dover Road, and Five Mile Road to and from the new river crossing	Outlying northeast traffic would use Pioneer Road, Dover Road, and Five Mile Road to and from the new river crossing	Billings Heights traffic would use Mary Street and Five Mile Road to and from the new river crossing	Outlying northeast traffic would use Mary Street to and from the new river crossing	Outlying northeast traffic would use Pioneer Road, Dover Road, and Five Mile Road to and from the new river crossing; Billings Heights East traffic would use Mary Street to and from the new river crossing
2. Safety	No issues identified	No issues identified	Could replace the existing connection between Five Mile Road and Mary Street, which is curvilinear and does not meet current standards for sight distance and operating speeds	No issues identified	No issues identified	No issues identified

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
Year 2035 Average Daily Traffic on New Alignment						
1. At Yellowstone River crossing (shared point by all alternatives)	(No alignment in this location)	15,900	15,600	13,000	15,300	15,500
2. East of Old Hwy 312 to Bitterroot Drive	(No alignment in this location)	9,400	9,000	(No alignment in this location)	100	7,180
3. East of Bitterroot Drive to Yellowstone River	(No alignment in this location)	11,550	10,900	No alignment in this location)	400	7,380
Year 2035 Average Daily Traffic Increase on Connecting Streets						
Existing Mary Street (West of Bitterroot Drive)	2,800	1,950	1,950	8,800	11,400	4,100
Existing Mary Street (East of Bitterroot Drive)	1,000	1,000	1,000	8,800	10,650	3,950
Bitterroot Drive (South of Mary Street)	2,800	4,200	4,050	4,050	4,050	4,100
Dover Road (West of Five Mile Road)	2,100	2,300	2,300	2,300	2,100	2,100
Five Mile Road	500	4,050	4,350	4,400	4,370	4,370
Bench Blvd (South of Mary Street)	8,500	5,700	5,200	5,500	6,400	6,700
Main Street (South of US 87)	29,500	27,100	28,000	28,500	28,000	27,750

TRAFFIC SCREENING RESULTS (LEVEL 2B AND LEVEL 3)

- North Five Mile Creek Alternative – Although the North Five Mile Creek alternative would attract an average daily traffic (ADT) volume of approximately 15,300 vehicles to the new river crossing, only 400 ADT would use the new alignment between Five Mile Road and Old Hwy 312. For Billings Heights traffic, the travel time between the Yellowstone River and Old Hwy 312 would be longer than using Mary Street. Because Mary Street would provide a quicker route, most of the traffic would use Mary Street instead of the North Five Mile Creek Alternative. In comparison with the DEIS alternatives, this alternative would see negligible usage and could be considered a redundant facility between Old Hwy 312 and Five Mile Road.
- South Five Mile Creek Alternative – For most traffic with an origin/destination in the eastern area of Billings Heights, Mary Street would be a quicker route to/from the new river crossing. Therefore, traffic on Mary Street would increase substantially. It is anticipated that safety improvements for horizontal curves, shoulders, and slopes would be needed on Mary Street east of Bitterroot Drive; these improvements would be similar to those identified as secondary corridor improvements for the Five Mile Road Alternative. Coordination with the City of Billings would be needed to confirm the level of improvements.

For traffic with an origin/destination in outlying areas northeast of Billings, traveling Pioneer Road would be a quicker route to and from the new river crossing than using the South Five Mile Creek Alternative. However, Pioneer Road would not be able to accommodate the additional traffic generated by the South Five Mile Creek Alternative without improvements to the existing roadway. Costs associated with the improvements would most likely be greater than the costs associated with improving Five Mile Road to accommodate the same volume of traffic. Therefore, this alternative would require the same secondary improvements proposed under the Mary Street Option 1 and Mary Street Option 2 alternatives, including an extension of Five Mile Road to Old Hwy 312.

All of the DEIS alternatives would require secondary corridor improvements to *either* Mary Street or Five Mile Road to achieve operations and safety objectives. If the South Five Mile Creek alternative were constructed, secondary corridor improvements would be required to *both* the existing Mary Street corridor and Five Mile Road because of the increase in traffic volumes on these connecting routes. Construction would be required for three routes, as opposed to two routes for the DEIS alternatives.

INITIAL SCREENING CONCLUSIONS

- North Five Mile Creek Alternative – The North Five Mile Creek Alternative performs very poorly for traffic operations in comparison to the DEIS alternatives. Between Five Mile Road and Old Hwy 312, the new North Five Mile Creek corridor would only attract approximately 3.5 percent to 3.6 percent of the trips that the Mary Street Option 1 and Mary Street Option 2 alternatives would attract, respectively. Because this alternative would draw very little traffic west of Five Mile Road and would perform poorly in support of a future connection to US 87 and MT 3, it is recommended to be screened out at this stage in the screening process, with no further analysis required.
- South Five Mile Creek Alternative – The South Five Mile Creek Alternative would require construction of two secondary corridors, as opposed to the one secondary corridor required by each of the DEIS alternatives. However, this alternative otherwise performs similarly for traffic operations as the DEIS alternatives. The results of the traffic screening and potential impacts to the Section 4(f) resource, though

considered to be substantial, would not preclude this alternative from further consideration. Additional analysis consistent with that performed for the DEIS alternatives was warranted. The South Five Mile Creek Alternative footprint (including secondary corridors) was used to identify ROW impacts and develop the costs associated with construction of the alternative and associated improvements to the existing network. This additional analysis is discussed in the following sections, Right-of-Way Screening Results and Construction Costs.

Table 5. Right-of-Way Screening Results (Level 2B)

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
Total Right-of-Way Impacts (200 ft. footprint)						
Privately-owned Parcels Directly Impacted	None	110	94	112	Alternative Screened Out	129
Privately-owned Acres Required for ROW Acquisition (Approximate)	None	171 acre	174 acre	139 acre	Alternative Screened Out	212 acre
Right-of-Way Residential Impacts (Direct / Potential)						
Impacts North of Yellowstone River	None	4/3	3/3	2/2	Alternative Screened Out	3/2
Impacts South of Yellowstone River	None	5/2	5/2	5/2	Alternative Screened Out	5/2
Total Impacts	None	14	13	11	Alternative Screened Out	12

RIGHT OF WAY SCREENING RESULTS (LEVEL 2B)

ROW impacts and property acquisitions were estimated based on the total construction footprint. Total ROW acquisition is a calculation of the privately-owned acreage within the construction footprint of any one alternative. If the construction footprint conflicted with an existing structure, that structure was assumed to be directly impacted. If a minimum setback could not be accommodated between an existing structure and the proposed ROW line, that structure was considered to be potentially impacted. These impacts may be avoidable during final design.

In addition, access constraints could trigger property acquisitions. Private accesses to the new road would need to be evaluated on a case-by-case basis during final design. An attempt would be made to preserve access in some manner. If access could not be preserved, it would be considered a full ROW impact and the entire property would be purchased by MDT. Access constraints were identified as direct or potential impacts depending on the configuration of the property and proximity to the ROW line.

- South Five Mile Creek Alternative
 - The South Five Mile Creek alternative would impact 17 - 35 more private parcels than the DEIS alternatives, because it would require acquisition of ROW for secondary corridor improvements along both the Mary Street and Five Mile Road in addition to the ROW required for the new roadway. The South Five Mile Creek Alternative footprint would also require the acquisition of approximately 38 more acres to 73 more acres of private property than the DEIS alternatives for the same reason.
 - South of the Yellowstone River all of the alternatives would share the same alignment; as such, the direct and potential residential impacts would be identical in this location: five direct impacts and two potential impacts.
 - North of the Yellowstone River, the South Five Mile Creek Alternative would have similar impacts to residential properties in comparison with the DEIS alternatives.
 - Three residential structures would be directly impacted. This is comparable to the four and three residential structures directly impacted by the Mary Street Option 1 and Mary Street Option 2 alternatives, respectively, and greater than the two structures directly impacted by the Five Mile Road Alternative.
 - Two residential structures would potentially be impacted, although these impacts are more likely to be avoidable in final design. This is comparable to the three residential structures potentially impacted by the Mary Street Option 1 and Mary Street Option 2 alternatives, and identical to the two residential structures potentially impacted by the Five Mile Road Alternative.

The ROW impacts of the South Five Mile Creek Alternative are greater than those of the DEIS alternatives and the impacts to residential structures are roughly equivalent to the DEIS alternatives. Specifically, the direct impacts to residential structures are identical to those of the preliminary preferred alternative, Mary Street Option 2 Alternative. Each of these alternatives would directly impact three homes; the South Five Mile Creek Alternative would simply shift the impacts from one landowner to another landowner. The potential impacts, which may be avoidable during final design, are very similar.

Although three potential impacts to residential structures are identified for both the Mary Street Option 1 and Mary Street Option 2 alternatives, this is a conservative estimate and no more than two would occur. One

potentially impacted structure is located to the south of the Mary Street / Bitterroot Road intersection and another is located to the north. All of the intersection configuration options identified to minimize impacts at this intersection would impact one but not both of these structures. Thus the total potential impact for the footprint of either Mary Street Option 1 or Mary Street Option 2 is actually two structures and is equivalent to the South Five Mile Creek potential impact.

Given the overall impacts to residential property and the minor disparity in potential residential structure impacts, the South Five Mile Creek Alternative does not provide any measureable benefit over the preliminary preferred alternative or the Mary Street Option 1 Alternative. The Five Mile Road Alternative would be preferable over the South Five Mile Creek Alternative under this screening measure.

Table 6. Construction Costs (Level 3)

Screening Factors	No Build Alternative	Mary Street Option 1 Alternative	Mary Street Option 2 Alternative	Five Mile Road Alternative	North Five Mile Creek Alternative	South Five Mile Creek Alternative
Construction Costs						
Costs in 2012 dollars, not adjusted for inflation	None	\$121,000,000	\$110,000,000	\$109,900,000	Alternative Screened Out	\$129,000,000

Costs in **Table 6** were taken from January 2012 estimates based on preliminary roadway design and 2011 ROW costs. The costs are for the four-lane principal arterial alignment in 2035 and include: the Johnson Lane interchange; intersections; the BNSF Railroad, Yellowstone River, and Five Mile Creek bridge crossings; and secondary corridor(s). Costs did not include phasing considerations.

- South Five Mile Creek Alternative – Costs associated with construction of the South Five Mile Creek Alternative would be approximately \$8 million to \$19 million greater than construction costs for any of the alternatives forwarded for consideration in the DEIS. These additional costs result from the need to incorporate secondary corridor improvements along the Mary Street corridor and the Five Mile Road corridor. As previously discussed under the Traffic Screening Results section, these improvements would be necessary because of the increase in traffic volumes on these connecting routes. The South Five Mile Creek alternative would require three routes, as opposed to two routes for the DEIS alternatives.

SUMMARY AND CONCLUSIONS

The Five Mile Creek alternatives performed similarly in many respects to the alternatives carried forward for detailed evaluation in the DEIS. However, the screening identified at least two issues for each of the Five Mile Creek alternatives that would make the alternatives impracticable.

North Five Mile Creek Alternative

- **Redundant to Existing Routes Between Five Mile Road and Old Hwy 312** – This alternative would attract very little traffic to the new alignment between Five Mile Road and Old Hwy 312 in comparison to the DEIS alternatives. Most of the traffic would use Mary Street instead of the North Five Mile Creek

Alternative. Therefore, this alternative could be considered a redundant facility between Old Hwy 312 and Five Mile Road. During the December 13, 2012 BBAC meeting, participants suggested disconnecting Mary Street from the proposed alternative as a means of hindering traffic from using Mary Street instead of the North Five Mile Creek alternative alignment. However, a key objective of the purpose and need and design criteria for the development of the project is to maintain connections with the existing local street network. Severing the proposed connection between Mary St. and the North Five Mile Creek alignment would conflict with this key objective.

- **Poor Western Terminus Location** – The western terminus location for this alternative performs poorly for support of future planning for a connection to US 87 and MT 3. A future extension west to US 87 from this location would impact a residential subdivision, requiring full acquisition for seven of the homes. As a result, a future bypass connection to US 87 would likely require out-of-direction travel south on Old Hwy 312 to the intersection with US 87.

Because this alternative would draw very little traffic west of Five Mile Road and would perform poorly in support of a future connection to US 87 and MT 3, the recommendation is to screen out this alternative from further consideration and not to estimate ROW impacts and construction costs. The Oxbow Park and Legacy Lane alternatives were screened out in the Level 3 Screening for these same reasons.

South Five Mile Creek Alternative

- **More Traffic Impacts to Existing Routes** – All of the DEIS alternatives would require secondary corridor improvements to *either* Mary Street or Five Mile Road to achieve operations and safety objectives. Construction of the South Five Mile Creek alternative would require the same secondary improvements to *both* of these routes.
- **Potential for Greater Impact to Section 4(f) Resource** – This alternative would substantially impact up to 45 percent of the proposed Kiwanis Trail Extension, a significant park resource under the jurisdiction of the City of Billings. Section 4(f) prohibits the approval of “any transportation program or project requiring the use of publicly owned land of a public park...or land of an historic site of national, state or local significance, as determined by the federal, state or local officials having jurisdiction over the park area” if a prudent or feasible alternative exists.
- **Greater ROW Impacts** – The ROW impacts of the South Five Mile Creek Alternative are greater than those of the DEIS alternatives. The South Five Mile Creek Alternative would require the acquisition of approximately 38 more acres to 73 more acres of private property. The South Five Mile Creek Alternative direct impacts to residential structures are identical to those of the preliminary preferred alternative, Mary Street Option 2 Alternative, and the potential impacts are very similar. Given the overall impacts to residential property and the minor disparity in potential residential structure impacts, the South Five Mile Creek Alternative does not provide any measureable benefit over the preliminary preferred alternative and would provide only a marginable benefit over the Mary Street Option 1 Alternative.
- **Greater Construction Costs** – Costs associated with construction of the South Five Mile Creek alternative would be approximately \$8 million to \$19 million greater than construction costs for any of the alternatives forwarded for consideration in the DEIS. These additional costs result from the need to incorporate secondary corridor improvements along both the Mary Street and Five Mile Road corridors.

Although this alternative would provide similar benefits as the alternatives to be evaluated in the DEIS, it would have greater ROW impacts, greater impacts to a Section 4(f) resource, and would cost approximately \$8 million

Fred Bente
July 19, 2013
Page 25

to \$19 million more. Thus, it is recommended that this alternative be screened out from further consideration. The Legacy Lane Alternative was screened out in the Level 3 Screening for similar reasons.

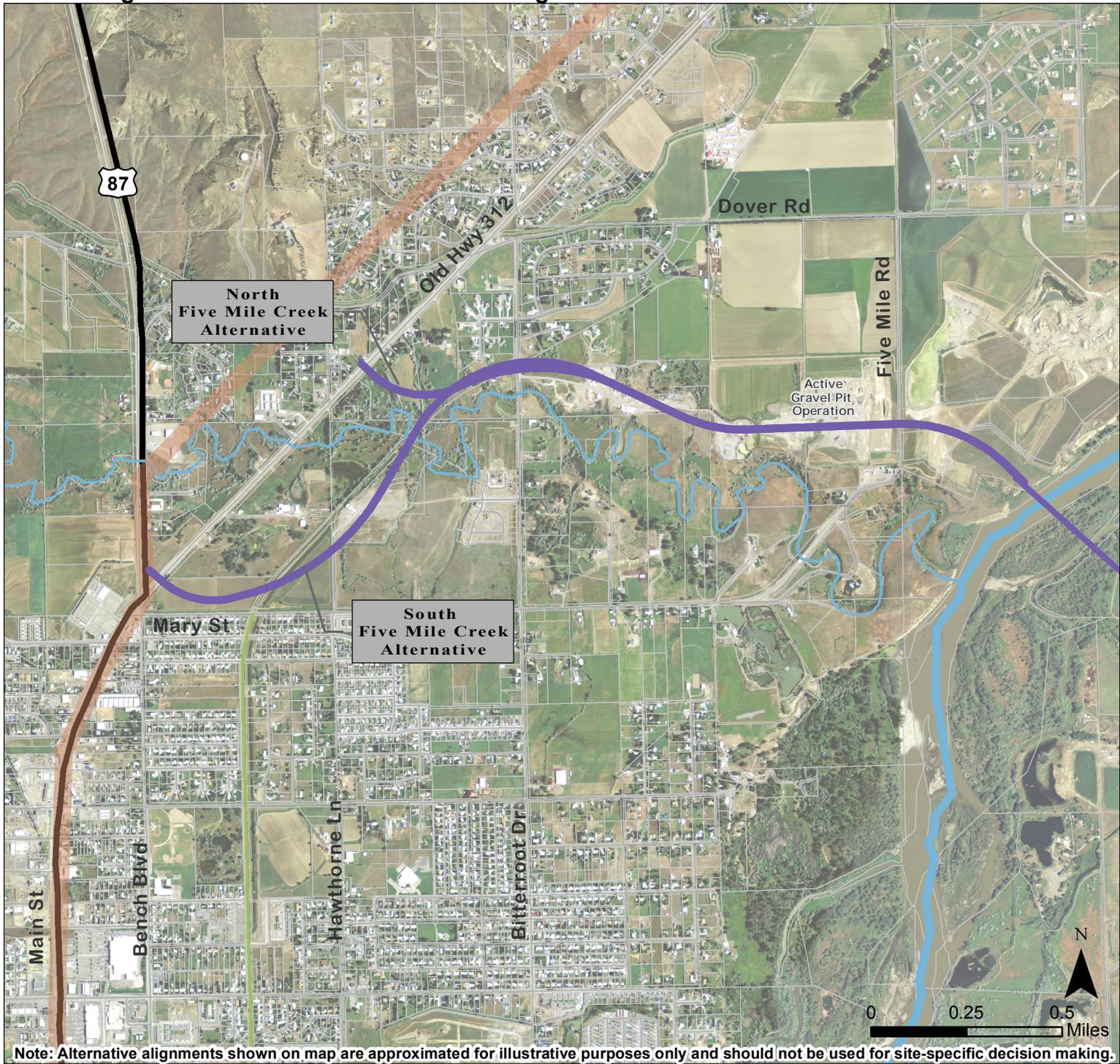
Attachments/Enclosures: Five Mile Creek Screening Memo Figures

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Figure 1: Five Mile Creek Alternative Alignments

-  Study Area
-  Alternative Alignments
- Existing Transportation Network**
-  Interstate
-  Highway
-  Local Route
-  Railroad
- Base Map Information**
-  Park
-  100-Year Floodplain
-  Yellowstone River
-  Stream
-  Parcel Boundaries

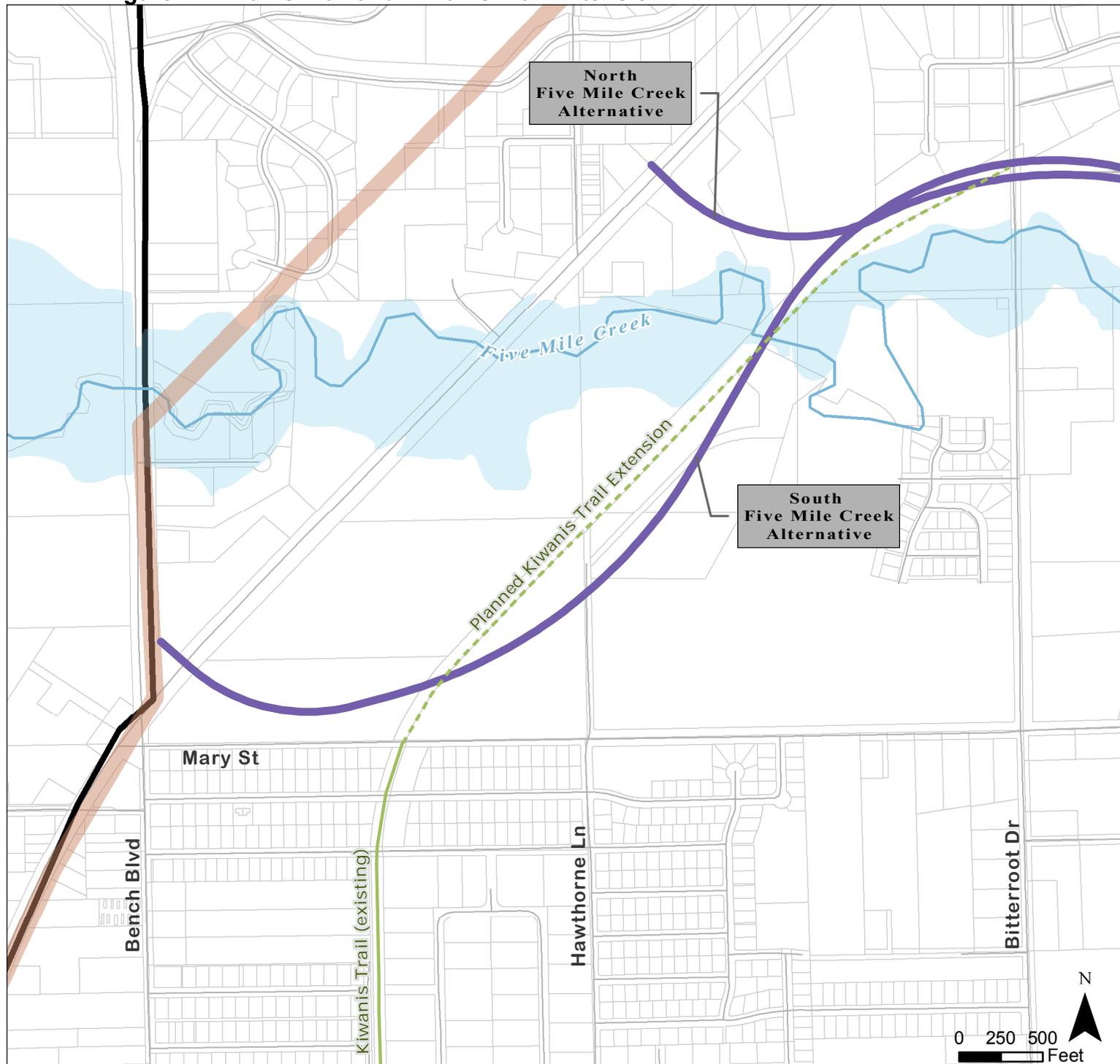


Note: Alternative alignments shown on map are approximated for illustrative purposes only and should not be used for site-specific decision making.



Figure 2: Kiwanis Trail and Kiwanis Trail Extension

-  Study Area
 -  Alternative Alignments
 -  Parcel
 -  Existing Multi-Use Trail
 -  Proposed Multi-Use Trail
- Existing Transportation Network**
-  Interstate
 -  Highway
 -  Local Route
 -  Railroad
- Water Features**
-  100-Year Floodplain
 -  Yellowstone River
 -  Stream



Sources: DOWL/HKM September 2010, FEMA (preliminary floodplain data) August 2011, Montana Fish, Wildlife and Parks (streams, public land information), DEA Field Investigations, USDA National Agricultural Imagery Program (July 2009 aerial photography), Yellowstone County (schools, public water supply, parks) 2010

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