



Alternatives Analysis

for

STPP 78-1(8)0

Red Lodge - Northwest

(CN 4890)

in

Carbon County, Montana

December 2007



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1.0 HISTORY AND BACKGROUND

In October 2005, the Montana Department of Transportation (MDT) began the process of preparing a Categorical Exclusion for proposed roadway safety improvements along Montana 78 outside Red Lodge, Montana. Initially MDT intended to focus on the area between Reference Post (RP) 0.0 and RP 5.1±. This portion of the roadway has poor geometry; the majority of both the horizontal curves and nearly half of the vertical curves along this portion of the roadway do not meet MDT's Geometric Design Criteria for Minor Arterials in rolling terrain. MDT explored several options to correct deficiencies in the area in question, including a potential bypass route.

MDT held a public information meeting on October 13, 2005 to introduce three conceptual alignment alternatives. One alternative would remain close to the existing alignment, one would replace the existing three curves with a single curve, and the third would bypass the City of Red Lodge and intersect with Highway 212 outside the city limits. A copy of the public meeting transcript is included in Appendix A.

Over the course of the next several months, MDT had numerous conversations with the City of Red Lodge regarding these potential alignments. MCA § 60-2-211 requires MDT to obtain consent of the governing body of an incorporated municipality prior to construction of a highway bypass project, as proposed in one of the alternatives. In response to a notice issued by MDT regarding this provision, the City hosted a public meeting on December 8, 2005 to consider the bypass alternative. The Red Lodge City Council considered a resolution in favor of the bypass alignment at a regularly scheduled meeting on December 13, 2005, which is included in Appendix B. The Council received several written comments regarding the resolution, which are included in Appendix C. The resolution was defeated by a unanimous vote of the City Council. Minutes from the meeting are included in Appendix D. MDT received a letter from the Mayor of Red Lodge relaying the City Council's decision, which is included in Appendix E. Because the Red Lodge City Council voted not to pass the resolution in favor of the bypass alignment, MDT did not explore this option further.

MDT held a second public information meeting on February 9, 2006. MDT relayed the City Council's decision regarding the bypass alternative and requested additional input regarding the remaining two alternatives. A copy of the public meeting transcript is included in Appendix F.

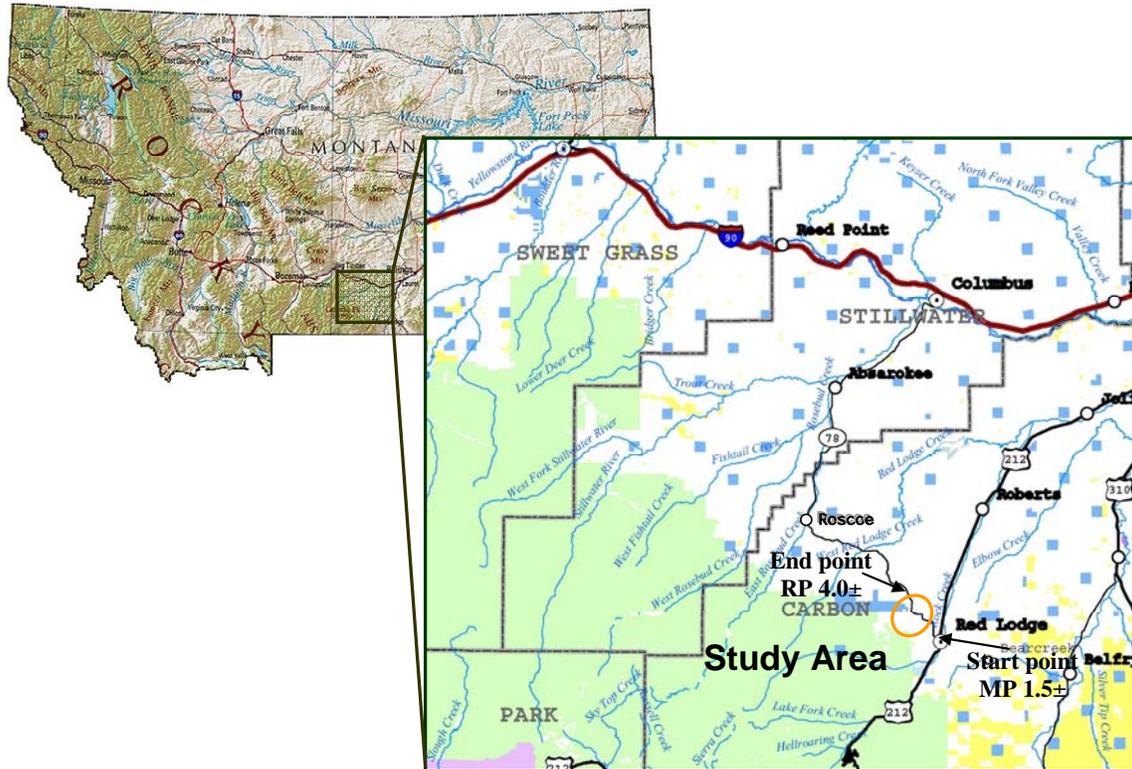
Continued conversations with the public and the City after the second public meeting still did not lead to an agreement on a preferred alignment. Given the lack of consensus, MDT and the Federal Highway Administration (FHWA) elected to conduct an Alternatives Analysis in order to compare the relative benefits and impacts of potential alignment options. For this study, MDT evaluated two alignments along a 2.5-mile portion of MT 78 between RP 1.5± and RP 4.0±. One alignment (Alternative 1) remains close to the existing alignment and the second (Alternative 2) replaces the existing three short, sharp curves with a larger single curve. The purpose of the Alternatives Analysis is to compare these two potential alignments to determine the relative magnitude of environmental, social, and economic impacts in order to determine whether one of the two alternatives should clearly be pursued over the other alternative.

Project Area Description

As shown in Figure 1-1, the proposed project is located entirely within Carbon County and within the following legal description(s):

<u>Township</u>	<u>Range</u>	<u>Section(s)</u>
7 S	20 E	16, 17, 21, 22

Figure 1-1 Study Area



MT 78 is a two-lane highway that begins in Red Lodge and generally runs northwest through the towns of Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. MT 78 is part of the state primary highway system and is functionally classified as a minor arterial route. It is used by rural residents traveling between home and work, as well as regional users traveling between Columbus and Red Lodge. It is also a popular scenic route for tourists, particularly motorcyclists.

The portion of MT 78 between RP 1.5± and RP 4.0± is to the northwest of the town of Red Lodge, as shown above in Figure 1-1.

Purpose of the Alternatives Analysis

For full compliance with the National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA) regulations and permitting requirements, all federally funded actions require some level of analysis to determine whether measures can be undertaken to avoid, minimize, or mitigate anticipated impacts to sensitive resources in a given project area. Oftentimes, this analysis is conducted through the development of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). This Alternatives Analysis is intended to be a pre-NEPA screening of alternatives to compare the relative pros and cons of the two build alternatives under consideration.

Pursuant to guidance on linking transportation planning and project development described in 23 CFR 450.212, this Alternatives Analysis document is intended to provide the following information to be used by MDT and FHWA in future transportation projects:

1. Purpose and need or goals and objectives statement(s);
2. Description of general travel corridor;
3. Preliminary screening of alternatives and elimination of unreasonable alternatives;
4. Basic description of the environmental setting; and
5. Preliminary identification of environmental impacts and environmental mitigation.

The information described above and as outlined throughout this document may be incorporated directly into future NEPA/MEPA documents in accordance with 40 CFR 1502.21. This Alternatives Analysis thereby links transportation and environmental planning in a way that is intended to improve the efficiency of the project development process.

The screening of environmental, social, and economic impacts in this Alternatives Analysis is intended to be brief and only detailed enough to determine whether additional analyses are warranted, or if an alternative can clearly be eliminated due to a magnitude of projected difference in impacts or construction costs. The cost estimates contained herein are to be used for comparison purposes only and not as project estimates.

This Alternatives Analysis documents the history of the project; the rationale for the development of alternatives; physical opportunities and constraints in the corridor; screening criteria; qualitative, planning-level analysis of impacts; planning-level cost estimates; and public and agency concerns expressed to date.

2.0 DEVELOPMENT OF ALTERNATIVES

Physical Characteristics

The existing MT 78 facility in this corridor is a narrow, two-lane highway with limited shoulders and steep side slopes. The existing roadway was constructed in 1952 under Federal Aid Secondary Project S-289(2). Table 2.1 lists improvement and preservation projects that have been completed since that time within the project limits.

Table 2.1
Improvement and Preservation Projects

Project	Date	Beginning MP	Ending MP
STPHS 78-1(2)2 Slope flattening and chevron installation	1994	1.5	2.5
Machine Patching	1996	1.5	3.5
Seal and Cover	1997	1.5	4.0
Machine Patching	1998	2.4	2.4
Crack Filling and Joint Sealing	2000	1.5	4.0
Machine Patching	2002	2.4	2.4

The roadway generally has very poor geometrics. Between RP 1.5± and RP 4.0±, there are three horizontal curves that do not meet the minimum radius of 305 meters (1001 feet) stipulated in MDT’s Geometric Design Criteria for Minor Arterials in rolling terrain, as detailed in Table 2.2.

Table 2.2
Horizontal Curves Failing to Meet Minimum Radius of 305 Meters

Curve Location	Curve Radius (m/ft)
RP 2.00	184 / 604
RP 3.00	175 / 574
RP 3.45	175 / 574

None of these curves have spiral transitions, though they are warranted for all. The existing vertical alignment is equally poor.

A representative portion of the road is shown in Photo 2-1.

Photo 2-1 MT 78 at MP 3.1± (Southbound)



Crash Data

In a ten-year period from July 1, 1992 to June 30, 2002, there were 58 crashes reported between RP 0.0 and RP 5.1±, including three truck crashes. Of the 58 total accidents, there were five incapacitating injury crashes that resulted in 11 incapacitating injuries, and three fatal injury crashes. The all-vehicle crash rate was 2.35 and the severity rate was 6.16 for the study area, compared to statewide rural primary averages of 1.53 and 3.75, respectively. The truck crash and severity rates were both 4.03, compared to statewide rural primary averages of 1.36 for crash rate and 3.11 for severity rate for trucks.

Intent of Future Improvements

Based on the physical characteristics of the roadway, MDT's Environmental Services Bureau developed the following need statement for the proposed Red Lodge – Northwest project, including the area between RP 1.5± and RP 4.0±:

The accident severity rate for this portion of the route is high, and the trend is single vehicle, off road crashes at the sharp curves. The combination of substandard features of the highway, traffic counts, and the growth of this area is causing the high crash and severity rates. The substandard features need to be fixed.

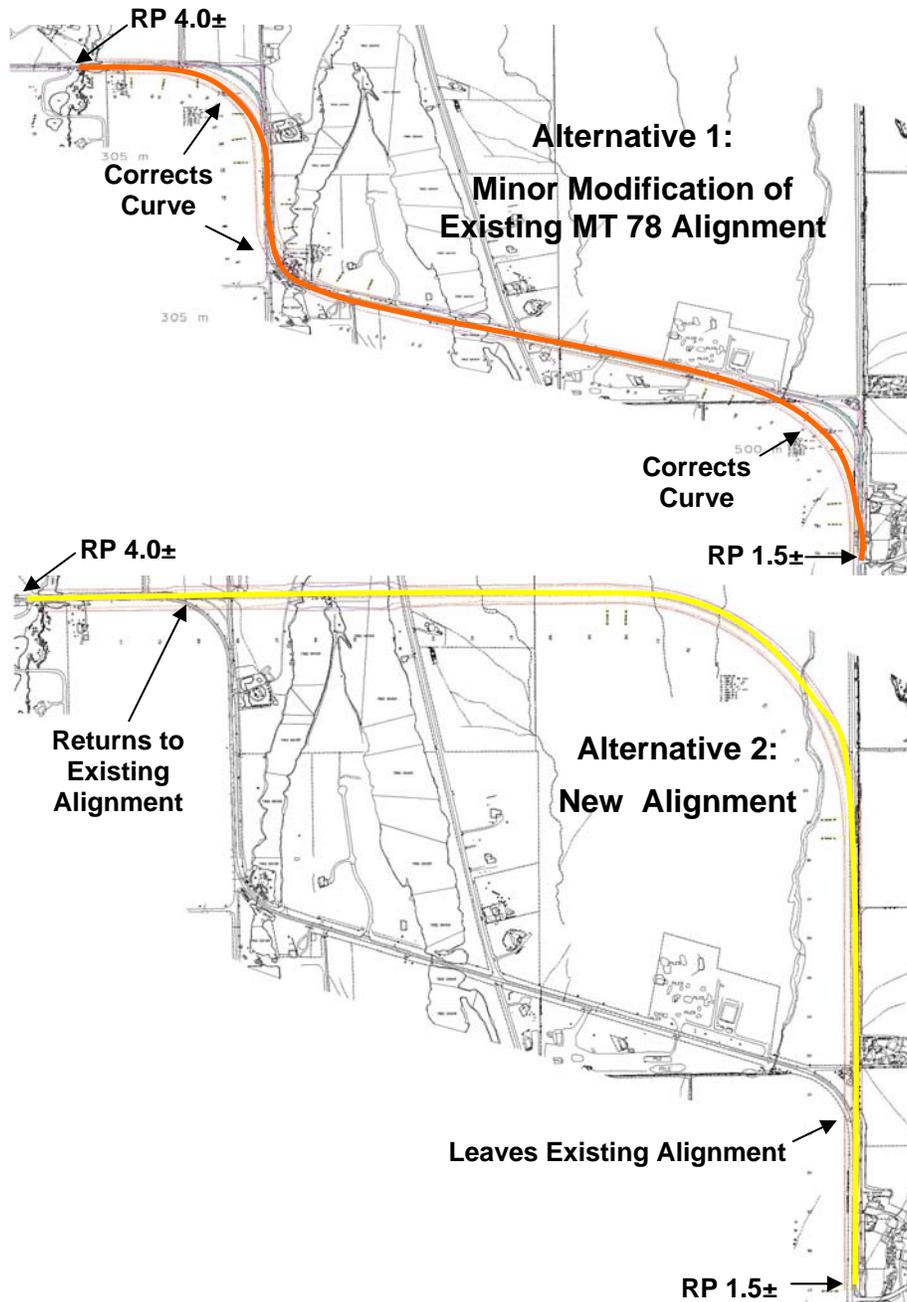
In order to increase the safety of the route, and to reduce the accident rate, the project was nominated for reconstruction. The roadway needs to be brought up to current design standards as follows:

- Adjustment of the horizontal alignment, including realignment of the curves to a larger radius and incorporating spiral transitions and proper superelevation.
- Adjustment of the vertical alignment to meet current design standards for stopping sight distance. Grades also need to be adjusted.
- Slopes need to be flattened to meet current design standards.
- Widening of the roadway to include shoulders with rumble strips.
- Realignment of intersecting county roads for improved safety.

Proposed Alternatives

MDT developed two alternatives that would correct the geometric deficiencies of the roadway between RP 1.5± and RP 4.0± in order to improve safety. Alternative 1 corrects the curves at RP 2.00, RP 3.00, and RP 3.45 while generally staying on the existing alignment. Alternative 2 leaves the existing roadway between RP 1.5± and RP 2.0± and returns to the existing alignment between RP 3.5± and RP 4.0±. The alternatives are shown in Figure 2-1.

Figure 2-1
Alignment Alternatives



3.0 OPPORTUNITIES AND CONSTRAINTS

The analysis contained in this report is intended to provide a pre-NEPA/MEPA assessment to point out those resources or areas of social, economic, and environmental concern that would likely be a factor in future project decisions and permitting processes.

To conduct a broad-brush analysis in the most efficient manner, the analysis in this report is based on available database searches. These searches included a review of the Natural Resource Information System (NRIS) database, Natural Resource Conservation Service (NRCS) soil mapping, the Montana Natural Heritage Program (MNHP) database search and communication with MNHP biologists, U.S. Census Bureau database, and windshield surveys of the existing MT 78 roadway.

FHWA has provided guidance that outlines several areas of concern under NEPA. Each of the areas of concern is briefly discussed below relative to its pertinence in this corridor.

Land Use

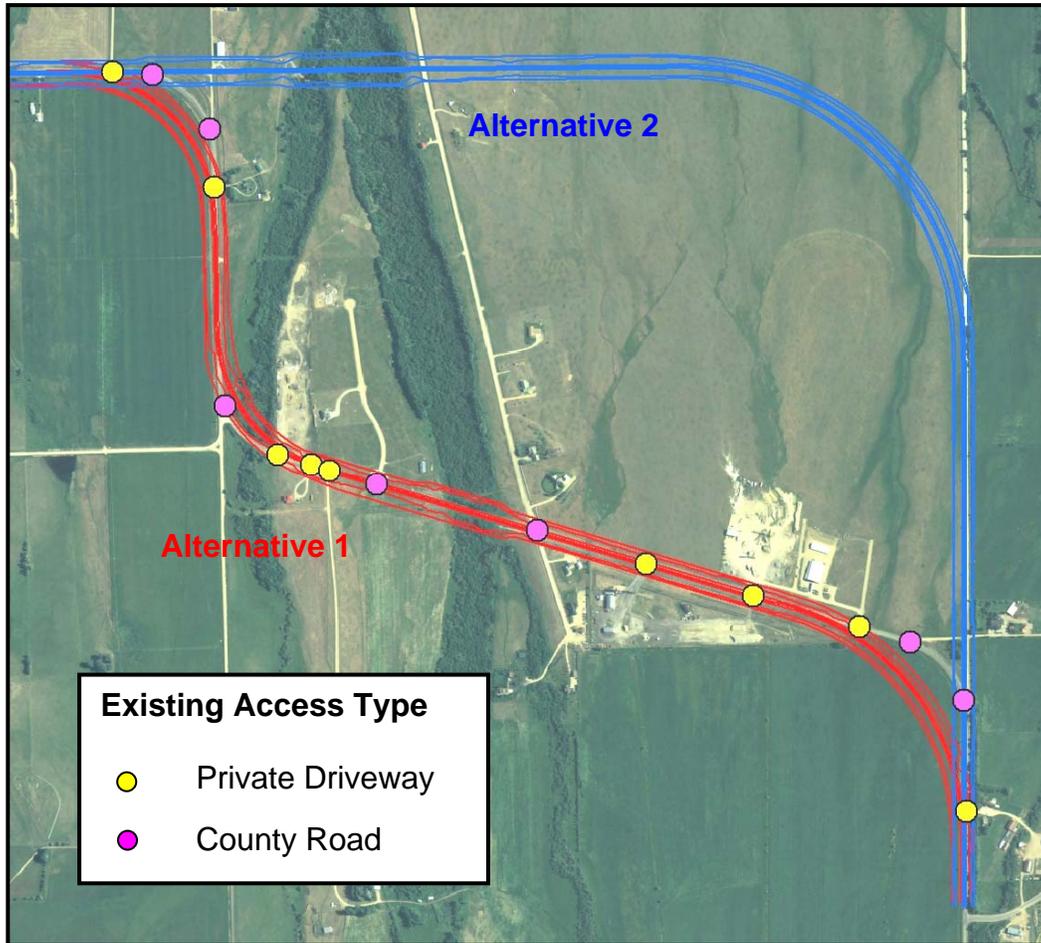
Adjacent land use in this rural area includes scattered residential and commercial properties. Adjacent properties are typically irrigated and dry land farming and grazing. Land ownership is private with the exception of MDT facilities to the south of the road at RP 2.3±.

While Alternative 1 would remain consistent with current land uses within the area, Alternative 2 would bisect private property currently in agricultural use, potentially disrupting farming operations.

Access

As shown in Figure 3-1, there are a number of intersecting access roadways along MT 78 within the study area.

Figure 3-1
Existing Access in the Corridor



Existing access points along MT 78 would be maintained under the Alternative 1.

Access to MT 78 may be impacted under Alternative 2. If the existing alignment were maintained under this alternative, traffic from private driveways and public roadways could utilize the existing alignment in order to access the new MT 78 alignment. If the existing alignment were abandoned, existing access points would need to be lengthened to intersect with the new alignment.

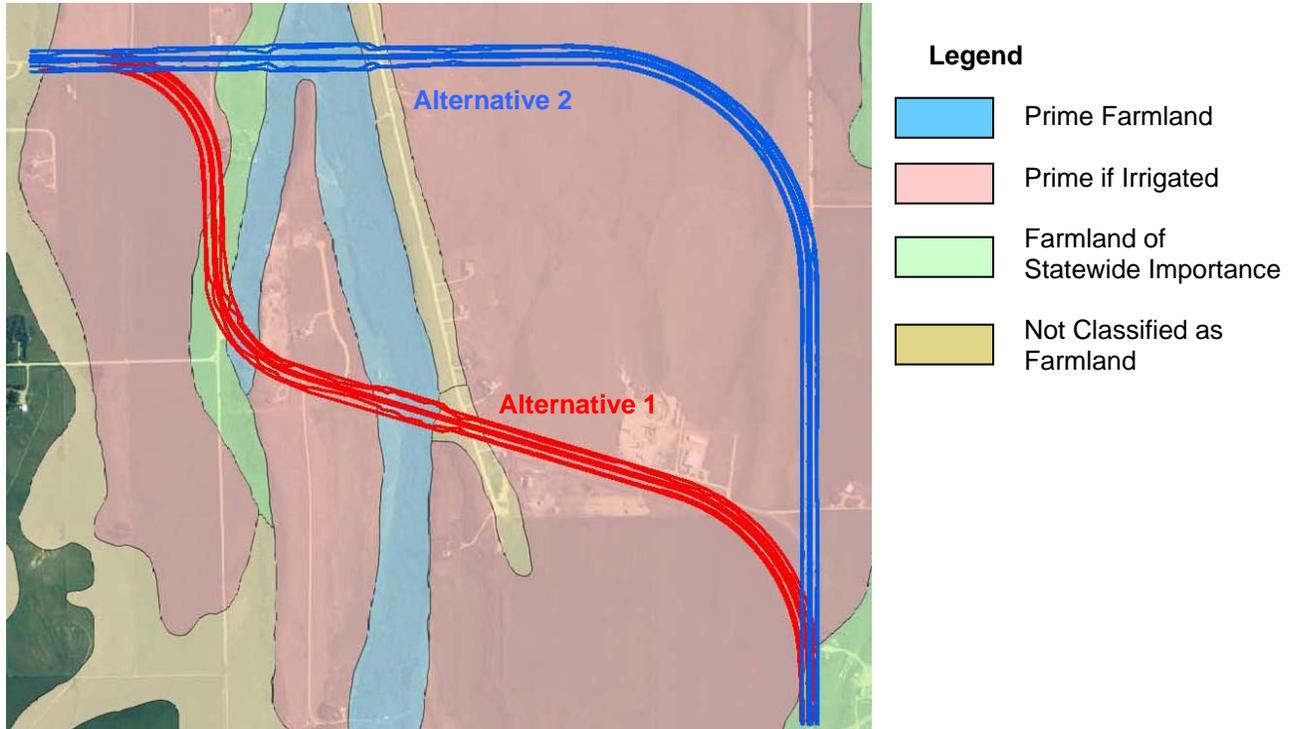
Public Parks and 6(f) Resources

There are no public parks or 6(f) resources in the corridor.

Farmlands

Nearly the entire corridor consists of soils that are classified as Prime Farmland and Farmland of Statewide Importance. Both alternatives would impact Farmlands, as Figure 3-2 shows. Impacts resulting from Alternative 1 would be minor since this alternative largely follows the existing alignment. Alternative 2 would bisect private property currently in agricultural use, potentially disrupting farming operations.

**Figure 3-2
Farmlands in the Corridor**



Social Conditions

According to the U.S. Census Bureau, the population of Carbon County has fluctuated over the past hundred years from a high of over 15,000 in 1920 to a low of 7,080 in 1970. The county began growing again after 1970 to reach 8,080 residents in 1990. Between 1990 and 2000, the county gained nearly 1,500 residents to reach a population of 9,552, an increase of over 18 percent over the previous decade. The City of Red Lodge grew more slowly during this decade, from a population of 1,958 in 1990 to 2,177 in 2000, an increase of just over 11 percent.

More recent population estimates suggest that Carbon County had grown to 9,721 residents in 2002 and 9,770 in 2003, a yearly increase of 0.5 percent. Over the same period, Red Lodge grew from 2,252 residents in 2002 to 2,273 in 2003, a yearly gain of nearly one percent.

The growth in population has led to an increased demand for housing in and around the town of Red Lodge. If MDT were to build Alternative 2, there could be two parallel roadways, which

might change the manner by which residents choose to access private property on both routes. Construction of an alternate alignment may indirectly affect the pattern of housing development.

Economic Conditions

Between 1990 and 2000, Carbon County's median household income increased from \$19,042 in 1990 to \$32,139 in 2000. Nearly 40 percent of the households in Carbon County had incomes less than \$15,000 in 1990, and by 2000 this group had shrunk to just under 20 percent of the households. Within the study area, Census data are only available at the county level. Therefore it is not possible to identify any existing low-income populations located along the corridor. Construction of either alternative is not anticipated to impact economic conditions in the corridor.

Pedestrian and Bicycle Facilities

Pedestrian/bicycle traffic in the vicinity of the proposed project is currently limited, and the narrow paved width and lack of shoulders through much of the corridor does not encourage pedestrian/bicycle use on the existing MT 78 alignment. Both of the proposed alternatives would provide improved facilities for bicyclists and pedestrians in the form of wider shoulders.

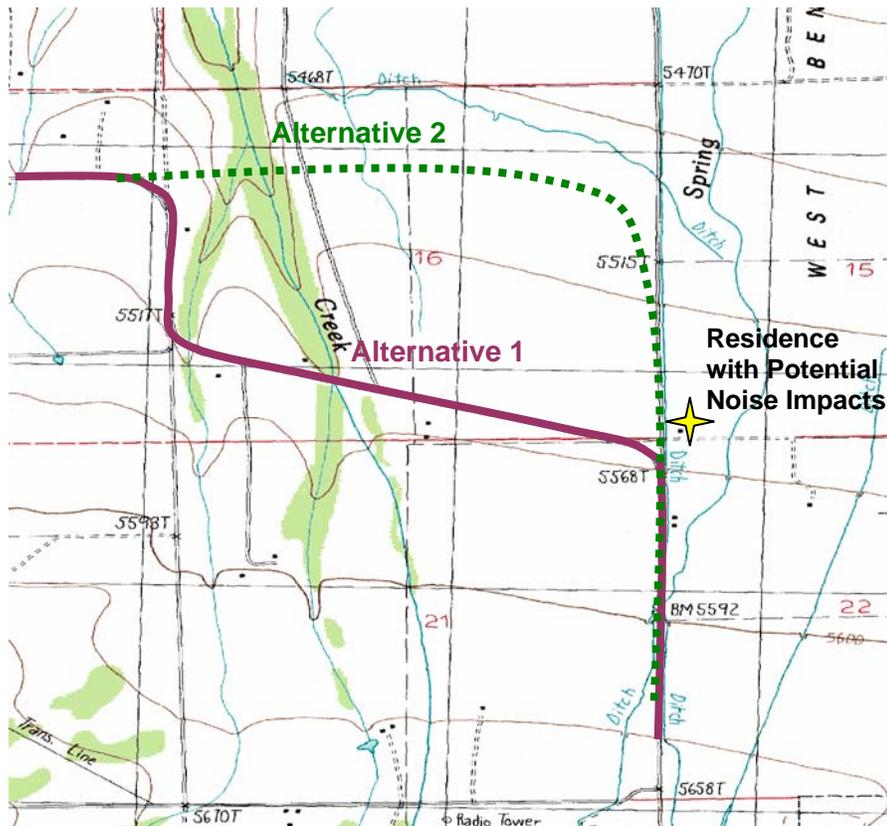
Air Quality

Carbon County's air quality is acceptable under federal guidelines. It is anticipated that neither alternative would have a negative impact on air quality in the corridor.

Noise

A noise-sensitive receptor (private residence) is located near the intersection of Alternative 2 with the existing alignment (see Figure 3-3). A noise impact to this residence is considered likely to occur with construction of Alternative 2, though it could be avoided by shifting the alignment 20 feet away from the residence.

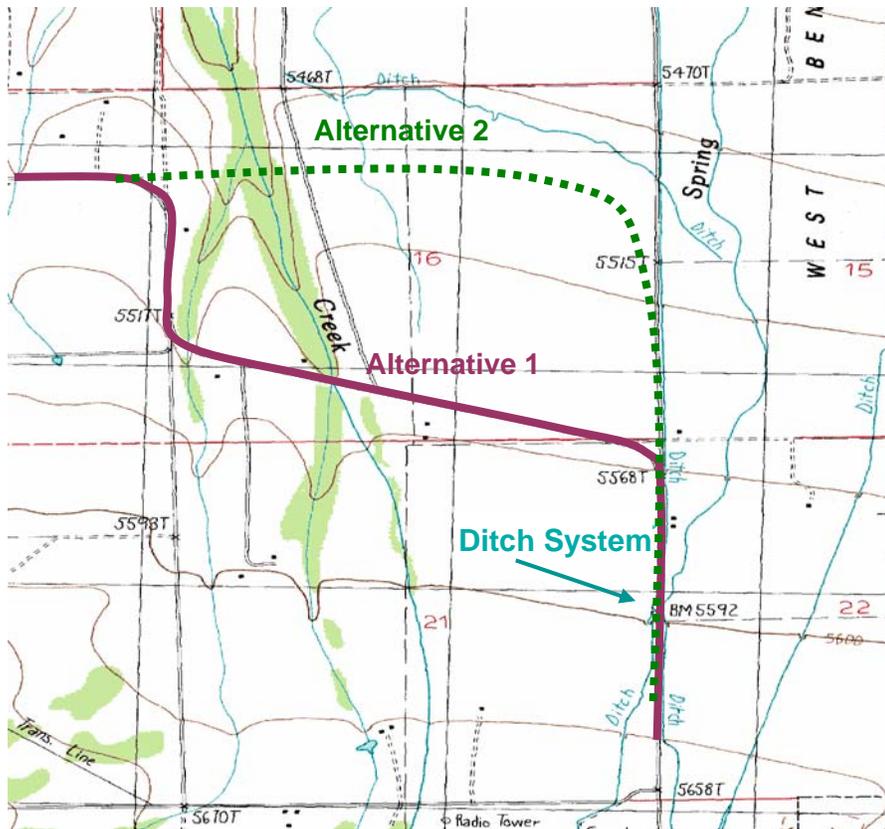
Figure 3-3
Potential Noise Impacts



Historic/Cultural Resources

According to a June 2006 search of historic resources in the MT 78 corridor, a single historic site is located in the study area. The site is an irrigation system located in T 7S, R 20E, sections 16 and 21. Its status is currently undetermined. Both alternatives have the potential to impact the irrigation ditch system; it runs north to south, and crosses the existing roadway south of where Alternative 2 would tie in with the existing alignment, as shown in Figure 3-4. It should be noted, however, that the status of the irrigation system is undetermined; it may or may not be historic.

Figure 3-4
Potentially Historic Irrigation System



A cultural resource inventory was not conducted under this Alternatives Analysis. There may be additional cultural or historic resources in the study area that have not been catalogued. For this reason, historic and cultural resources within the project corridor would require future study under any NEPA/MEPA analysis.

Water Quality

Both the Alternative 1 and the Alternative 2 cross Willow Creek. Therefore, construction activities in and around flowing water are anticipated. MDT current design and construction specifications require temporary water pollution control measures to minimize the effects of construction activities. Mitigation of water quality impacts caused by stormwater runoff and erosion would be achieved through engineering controls such as grading, revegetation, design of culverts/ditches, and the use of Best Management Practices. Construction of the new roadway would require a Montana Pollution Discharge Elimination System (MPDES) and a National Pollution Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan and field monitoring/oversight to ensure the impacts to water quality due to construction and demolition associated with this project are minimal.

Wetlands and Water Bodies

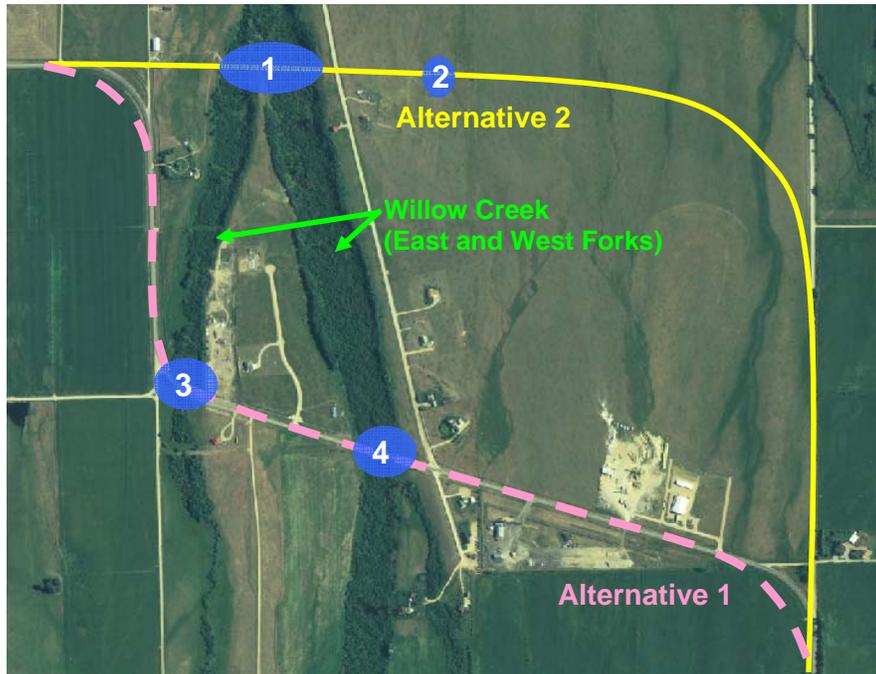
According to the National Wetlands Inventory and the Montana Wetland Survey, there are no mapped wetlands within the project area. However, the presence of Willow Creek and several culverts on the existing alignment suggest that wetlands are present.

Wetlands have not been delineated for either alternative under this study. Using aerial photography and ArcGIS, polygons were drawn in areas that are likely to be classified as wetlands, in whole or in part. This method is likely to yield a higher estimate of wetland acreage than is actually present. In the area of Alternative 1, the impact acreage was based on the area within the potential construction limits, with the existing roadway area removed. In the area of Alternative 2, wetland impact acreage was based on the total area within the potential construction limits. Potential wetlands were visually examined on the ground to confirm the presence of wetland vegetation in each of the areas, though a biologist would need to confirm the presence of such vegetation at the time of delineation. Potential wetland areas are shown in Figure 3-5 and the estimated impact acreages are shown in Table 3.1.

Table 3.1
Potential Wetland Impacts in the Study Area

Wetland	Estimated Acreage Alternative 1	Estimated Acreage Alternative 2
1		4.4
2		0.6
3	1.8	
4	1.9	
Total	3.7 acres	5.0 acres

Figure 3-5
Areas of Potential Wetland Impact
(Potential impact areas shown in blue)



There may be additional wetland acreage not accounted for in the figure above. There are five primary drainages within the project corridor along the existing alignment, including the West and East forks of Willow Creek. Full wetland delineation would be required to determine if they are jurisdictional wetlands. A location hydraulics report states that there are unnamed culverts at RP 3.8±, RP 4.2±, and RP.4.4±. The report recommends the replacement of all drainage and irrigation culverts/structures. There would likely be drainage issues under Alternative 2 as well; a full comparison is not possible because the drainage needs for Alternative 2 have not been determined.

Under Alternative 2, it may be possible to sever a portion of the existing alignment in order to reclaim wetland areas, thus mitigating the impact to wetlands under this alternative.

Wildlife Resources and Habitat

The following animal species of concern may be located within the project area:

Table 3.2
Potential Species of Concern in the Study Area

Common Name	Scientific Name	Status
Brewer's Sparrow	<i>Spizella breweri</i>	Sensitive
Preble's Shrew	<i>Sorex preblei</i>	Species of Concern
White-tailed Prairie Dog	<i>Cynomys leucurus</i>	Sensitive
Yellowstone Cutthroat Trout	<i>Oncorhynchus clarkia bouvieri</i>	Sensitive

A biological resources study would be required to determine the potential impact of either alternative on wildlife resources and habitat. It is anticipated that construction of either alternative would result in similar impacts given the close proximity of the two proposed alignments.

Threatened and Endangered Species

The Canada lynx (*Lynx Canadensis*), which is listed as Threatened, may be located within the project area.

A biological resources study would be required to determine the potential impact of either alternative on threatened and endangered species. It is anticipated that construction of either alternative would result in similar impacts given the close proximity of the two proposed alignments.

Floodplains

There are no delineated floodplains within the project limits. A location hydraulic study would need to be prepared during later phases of project development.

Irrigation

There are multiple irrigation crossings and longitudinal irrigation operations within the project limits. The primary irrigation crossings are owned by private irrigation companies. There are also many small, lateral irrigation ditches paralleling or crossing the project area. It is anticipated that construction of either alternative would result in similar impacts given the close proximity of the two proposed alignments.

Hazardous Wastes

An initial site assessment (ISA) was completed for this study. There are no hazardous waste sites between RP 1.5± and RP 4.0±.

Visual Resources

The MT 78 corridor is rural in nature. There are a few scattered rural residences throughout the corridor, but the existing road generally travels through land used for agricultural purposes. Views of the hilly terrain are generally unobstructed. Views of the mountains extend to the south.

Construction of either alternative would cause temporary visual disturbances. Alternative 2 would result in permanent changes to area views due to the construction of a new roadway bisecting lands currently in agricultural use.

Table 3.3 Summary of Potential Environmental Impacts

Resource	Potential Impacts From Alternative 1	Potential Impacts From Alternative 2
Land Use/Land Ownership	Right-of-way acquisition (see Chapter 5)	Right-of-way acquisition (see Chapter 5) and potential disruption of farming operations and
Access	None	Existing access points would be either re-routed or extended to access new alignment
Public Parks and 6(f) Resources	None	None
Farmlands	Minor impacts would occur	Potential disruption of farming operations
Social Conditions	Impacts unlikely	Impacts possible, though a negative impact is unlikely
Economic Conditions*	Impacts unlikely	Impacts unlikely
Pedestrians/Bicycles*	Net benefit from wider shoulders	Net benefit from wider shoulders
Air Quality*	Impacts unlikely	Impacts unlikely
Noise	Impacts unlikely	Potential impact to noise receptor (residence)
Historic, Cultural, and Archaeological Resources*	Potential impacts	Potential impacts
Water Quality*	Minor impacts would occur	Minor impacts would occur
Wetlands and Water Bodies	3.7 acres estimated impact	5.0 acres estimated impact
Wildlife Resources and Habitat*	Unknown	Unknown
Threatened and Endangered Species*	Unknown	Unknown
Floodplains	None	None
Irrigation*	Potential impacts	Potential impacts
Hazardous Waste Sites	None	None
Visual Resources	Temporary impacts limited to construction	Temporary impacts limited to construction and permanent impacts related to new alignment

*There would be no substantive difference between impacts to these resources resulting from construction of either alternative given the close proximity of the two proposed alignments.

4.0 SCREENING CRITERIA

The purpose of this Alternatives Analysis was to compare the relative pros and cons of the Alternatives 1 and 2 and to determine if one or the other alternative could clearly be eliminated due to a magnitude of projected difference in impacts, costs, or constructability. The following screening criteria were developed for this proposed project with this purpose in mind:

- **Social values** – What are the lifestyle impacts to the surrounding community and the traveling public from the two alternatives?
- **Economic values** – What is the functional value of the roadway facility to the users, and who bears the cost of the proposed improvements?
- **Environmental values** – What resources are most likely to be impacted, how severely, and how can they be mitigated?

5.0 ANALYSIS OF IMPACTS

This section of the feasibility study projects anticipated impacts from right-of-way acquisition. Cost criteria are discussed in Section 6.0.

Social Impacts

Right-of-Way

New right-of-way would be required for this project. Under Alternative 1, the total amount of right-of-way required would be 39.16 acres, 20.71 acres of which falls in existing right-of-way. Therefore the net right-of-way acquisition would be 18.45 acres. Under Alternative 2, 43.38 acres of right-of-way would be required, and only 3.43 acres are in existing right-of-way. Therefore, 39.95 acres of new right-of-way would be required under Alternative 2.

Safety and Crashes

Crash forecasting was done for the two alternatives to determine the potential benefits of replacing the three substandard curves with one large curve. Crash forecasting was based on a model accepted by FHWA and the National Highway Institute called the “Substantive Safety Approach.” This approach allows departments of transportation to evaluate design alternatives quantitatively while in the design phase. The “Substantive Safety Approach” applies safety research results to design decisions. The model takes curvature, lane width, shoulder width, grade, and intersections into account while applying accepted American Association of State and Highway Transportation Officials (AASHTO) standards. Several states use the “Substantive Safety Approach,” including Iowa, New York, Minnesota, and Illinois. As shown in Table 5.1, the model determined that 23.2 crashes would occur over a five-year period under existing conditions, while 15.4 crashes would occur under Alternative 1 and 14.8 crashes would occur under Alternative 2 during the same time period. Accordingly, Alternative 1 would result in a 34 percent reduction in crashes while Alternative 2 would result in a 36 percent reduction in crashes over the five-year period as compared to existing conditions. Using MDT Safety Management Section criteria, it was determined that Alternative 1 would have a benefit / cost ratio of 1.14, while Alternative 2 would have a benefit / cost ratio of 0.94.

Table 5.1
Safety Benefit of Each Alternative Relative to Existing Conditions

Alternative	Number of Crashes Over Five Years	Percent Reduction From Existing Conditions	Benefit / Cost*
Existing Conditions	23.2	---	---
Alternative 1	15.4	34%	1.14
Alternative 2	14.8	36%	0.94

*Benefit / Cost ratio calculated using MDT Safety Management Section.

Based on a review of the crash history over this portion of the corridor, crashes occurring at the intersecting roadways on the three curves have historically involved single vehicles as opposed to multiple vehicles. Accordingly, neither alternative would provide any crash reduction benefit with regard to these specific locations.

Economic Impacts

When considering the economic effects of roadway improvements, it is important to consider not only the financial cost in terms of taxpayer dollars, but also the cost of delaying improvements, or providing no improvements to the transportation facilities. Unimproved and failing infrastructure imposes a direct cost on those goods and service providers who use the highway system to access Montana communities. These perspectives are discussed briefly below.

Cost of construction

Detailed cost estimates for the two alternatives are provided in the next chapter. For brief comparison, Alternative 1 is projected to cost approximately \$1.9 million, while Alternative 2 would cost nearly \$2.3 million – approximately a 20 percent difference in projected cost.

Opportunity costs

When considering the impacts of infrastructure spending, it is important to recognize the real costs to the providers of goods and services if the most efficient transportation routes are congested, in disrepair, or are unsafe. They must choose either longer routes or accept the liability of traveling on these undesirable routes and pass on the costs to the consumer. Providing no improvements in this corridor would be inconsistent with the mission of the MDT and FHWA to provide safe and efficient roadways for people and commerce.

Environmental Impacts

As discussed in the Opportunities and Constraints chapter above, wetlands are the primary potential environmental impact from either alternative. This Alternatives Analysis provides a planning-level comparison of wetlands impacts from the two alternatives. Alternative 1 is estimated to have 3.7 acres of impacts and Alternative 2 is estimated to have 5.0 acres of impacts. The methodology used to arrive at these numbers is likely to overestimate the wetland acreage, but there also may be additional wetland areas in the study area that could not be identified from aerial photographs. Wetland delineation is recommended during later phases of

project development to ascertain the exact size of existing wetlands in the study area as well as to determine the quality of each of the wetland areas.

6.0 COST ESTIMATES

Table 6.1 provides a summary of planning-level costs associated with each of the alternatives. The cost estimates are useful for the purpose of comparing the order of magnitude differences in price relative to each alternative. Tables 6.2 and 6.3 provide detailed cost calculations. All costs were calculated by MDT using the 2006 Weighted Average Unit Bid Price Sheet, with adjustments made by MDT for quantity, location, and other factors that have affected recent bid prices.

Table 6.1 Planning-Level Cost Comparison

Item Description	Alternatives	
	Alternative 1	Alternative 2
Plant Mix	\$149,500	\$173,628
Asphalt Cement	\$132,175	\$153,000
Crushed Aggregate Course	\$296,856	\$344,736
Seal	\$18,000	\$20,625
Cover	\$14,322	\$16,632
SURFACING SUBTOTAL	\$610,853	\$708,621
Unclassified Excavation	\$318,464	\$501,975
Unclassified Borrow	\$65,410	\$58,730
GRADING SUBTOTAL	\$383,874	\$560,705
Wetland Mitigation	\$74,000	\$100,000
SUBTOTAL	\$1,068,727	\$1,369,326
Contingency (20%)*	\$213,745	\$273,865
Traffic Control	\$200,000	\$50,000
SUBTOTAL	\$1,482,472	\$1,693,191
Mobilization	\$148,247	\$169,319
CN SUBTOTAL	\$1,630,719	\$1,862,510
CE SUBTOTAL	\$163,072	\$186,251
CN & CE SUBTOTAL	\$1,793,791	\$2,048,761
Right-of-Way	\$92,250	\$199,750
Total Cost**	\$1,886,041	\$2,248,511

*Contingency category includes costs associated with clearing, grubbing, removing existing pavement, drainage, painting/stripping, signing, seeding, fencing, planning/survey/design, construction contingencies, and construction management, and all other miscellaneous costs. Quantities for these specific cost categories are not available at this level of analysis.

**Total Cost does not include indirect costs

Table 6.2 Calculation of Costs for Alternative 1

		Red Lodge Northwest Alternatives Analysis Planning Level Estimate of Costs		
Alternative 1				
Item Description	Approximate Quantity	Unit Measurement	Estimated Unit Price	Amount
Plant mix	5,750	Ton	\$26.00	\$149,500
Asphalt cement	311	Ton	\$425.00	\$132,175
Crushed aggregate course	12,369	m ³	\$24.00	\$296,856
Seal	48	Ton	\$375.00	\$18,000
Cover	26,040	m ²	\$0.55	\$14,322
SURFACING SUBTOTAL				\$610,853
Excavation	55,385	m ³	\$5.75	\$318,464
Borrow	6,541	m ³	\$10.00	\$65,410
GRADING SUBTOTAL				\$383,874
Wetland Mitigation	4	Acre	\$20,000.00	\$74,000
SUBTOTAL				\$1,068,727
Contingency*	1	Lump sum	\$213,745.40	\$213,745
Traffic Control	1	Lump sum	\$200,000.00	\$200,000
SUBTOTAL				\$1,482,472
Mobilization	1	Lump sum	\$148,247.20	\$148,247
CN SUBTOTAL				\$1,630,719
CE SUBTOTAL				\$163,072
CN & CE TOTAL				\$1,793,791
R/W	18	Acre	\$5,000.00	\$92,250
TOTAL**				\$1,886,041

*Contingency category includes costs associated with clearing, grubbing, removing existing pavement, drainage, painting/stripping, signing, seeding, fencing, planning/survey/design, construction contingencies, and construction management, and all other miscellaneous costs. Quantities for these specific cost categories are not available at this level of analysis.

**Total Cost does not include indirect costs

Table 6.3 Calculation of Costs for Alternative 2

		Red Lodge Northwest Alternatives Analysis Planning Level Estimate of Costs		
Alternative 2				
Item Description	Approximate Quantity	Unit Measurement	Estimated Unit Price	Amount
Plant mix	6,678	Ton	\$26.00	\$173,628
Asphalt cement	360	Ton	\$425.00	\$153,000
Crushed aggregate course	14,364	m ³	\$24.00	\$344,736
Seal	55	Ton	\$375.00	\$20,625
Cover	30,240	m ²	\$0.55	\$16,632
SURFACING SUBTOTAL				\$708,621
Excavation	87,300	m ³	\$5.75	\$501,975
Borrow	5,873	m ³	\$10.00	\$58,730
GRADING SUBTOTAL				\$560,705
Wetland Mitigation	5	Acre	\$20,000.00	\$100,000
SUBTOTAL				\$1,369,326
Contingency*	1	Lump sum	\$273,865.00	\$273,865
Traffic Control	1	Lump sum	\$50,000.00	\$50,000
SUBTOTAL				\$1,693,191
Mobilization	1	Lump sum	\$169,319.00	\$169,319
CN SUBTOTAL				\$1,862,510
CE SUBTOTAL				\$186,251
CN & CE TOTAL				\$2,048,761
R/W	40	Acre	\$5,000.00	\$199,750
TOTAL **				\$2,248,511

*Contingency category includes costs associated with clearing, grubbing, removing existing pavement, drainage, painting/stripping, signing, seeding, fencing, planning/survey/design, construction contingencies, and construction management, and all other miscellaneous costs. Quantities for these specific cost categories are not available at this level of analysis.

**Total Cost does not include indirect costs

7.0 PUBLIC INVOLVEMENT

As noted in Chapter 1, MDT hosted a public information meeting on October 13, 2005 to introduce three conceptual alignment alternatives. Attendees expressed concerns regarding pedestrian and bicycles facilities; safety issues, including snow and ice on the roadway, crash concentrations at the curves, and wildlife conflicts; perceived high speeds; perpetuation of irrigation facilities; maintenance of the abandoned roadway; turn lanes; right-of-way acquisition; funding and timeframe; and the steep grade on Brewery Hill leading into Red Lodge. A copy of the public meeting transcript is included in Appendix A.

MDT held a second public information meeting on February 9, 2006. At this meeting, MDT relayed the City Council’s decision not to pass the resolution in favor of the bypass alignment and requested additional input regarding the remaining two alternatives. Attendees expressed concerns regarding wildlife crossings, speed issues, irrigation facilities, property impacts and right-of-way acquisition, bicycle facilities, and funding. A copy of the public meeting transcript is included in Appendix F.

8.0 CONCLUSION

Based on this preliminary evaluation of the two conceptual alternatives, Alternative 1 is the Preferred Alternative. Alternative 1 has fewer impacts, is less costly, and has a higher benefit / cost ratio as compared to Alternative 2. Alternative 1 is projected to be approximately \$360,000 less expensive to construct than Alternative 2. This cost savings is provided through less impacted wetland acreage, shorter length, and less right-of-way. Additionally, Alternative 2 would have nearly double the maintenance cost on an annual basis because if it was built, MDT would bear the responsibility of maintaining both the existing and alternate alignments. Although construction of Alternative 2 would result in a slightly higher percent crash reduction as compared to Alternative 1, this benefit is offset by the higher cost of Alternative 2. Table 8.1 provides a summary of costs, benefits, and wetland impacts related to the two alternatives.

Table 8.1 Summary Comparison Matrix

Criteria	Alternatives	
	Alternative 1	Alternative 2
Construction Cost*	\$1,886,041	\$2,248,511
Yearly Road Maintenance Costs	\$22,200	\$43,100**
Percent Crash Reduction from Existing Conditions	34%	36%
Benefit / Cost***	1.14	0.94
Route Mileage	1.94 mi	2.24 mi
New Right-of-Way	18.45 acres	39.95 acres
Impacted Wetland Acreage	3.7 acres	5.0 acres

* Includes costs for right-of-way.

**Includes cost for maintaining existing alignment and Alternative 2 alignment.

***Benefit / Cost ratio calculated using MDT Safety Management Section.

Appendix A

Public Meeting Transcript
October 13, 2005

Appendix B

City Council Resolution # 3204

Appendix C

Public Comments

Appendix D

Minutes from the
December 13, 2005 City Council Meeting

Appendix E

Letter from the Mayor of Red Lodge

Appendix F

Public Meeting Transcript
February 9, 2006