MT 78 Corridor Study

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Montana Department of Transportation

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Background

In the fall of 2005, the Montana Department of Transportation (MDT) initiated a corridor planning process along Montana Primary Highway 78 (MT 78) in order to comprehensively address future transportation needs, prioritize transportation projects, and foster cooperative state and local transportation planning efforts. The *MT 78 Corridor Study* is part of MDT's corridor planning process emphasizing public involvement and early consideration of environmental issues. This planning process is intended to save the state time and money by giving a context to later planning documents and helping to analyze the feasibility of various improvement options.

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs northwest through the towns of Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins at Mile Post (MP) 5± northwest of Red Lodge and extends to the bridge at the south end of Roscoe (MP 20±). MT 78 is part of the state Primary Highway System and is functionally classified as a rural minor arterial route.

Goals and Objectives

The following corridor goals and objectives were developed in cooperation with MDT, FHWA, and the public:

- Improve safety conditions and address crash concentrations within the corridor.
- Improve roadway geometry within the corridor, including horizontal alignment and vertical alignment, meeting current MDT design standards where practicable.
- Minimize social, environmental, and economic impacts in the corridor where possible.
- Maintain the aesthetic character of the corridor.
- Balance the needs of all users, including local residents, tourists, agricultural vehicles, school buses, motorcyclists, and bicyclists.

Public Involvement

The MT 78 Corridor Study utilized a public involvement process to engage area residents in a dialogue about the existing conditions and use of the corridor. The process also sought to inform residents about potential improvement options for the corridor and to seek citizen input on those options. Resource agency coordination was initiated early in the process to identify potential resource constraints and future permitting requirements.

Four public meetings were held to identify issues and concerns, solicit input regarding goals and objectives, discuss preliminary improvement options, and to present the final set of recommended improvement options. Newsletters were prepared in advance of each of the public meetings and a website was developed.

Representatives from the U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife, & Parks (MFWP), Environmental Protection Agency (EPA), the Montana State Historic Preservation Office (SHPO), the Montana Department of Natural Resources and Conservation (DNRC), and the Montana Department of Environmental Quality (DEQ) were invited to attend a resource agency coordination meeting. Additionally, MFWP and the U.S. Army Corps of Engineers (USACE) sent letters in response to a request for information regarding the MT 78 corridor.

Existing Conditions

Based on a planning-level overview of natural resources in the corridor, it was determined that there would be no impacts to the following resources as a result of any future improvement project.

- Land Ownership
- Floodplains
- Hazardous Waste Sites
- Visual Resources
- Public Parks and 6(f) Resources

The following resource areas may potentially be impacted by future projects. Future study requirements are listed with respect to each resource area.

Resource	Future Requirements
Water Bodies	Biological Resource Report (BRR); review stream crossings for specific project
Irrigation Systems	BRR; review irrigation ditch crossings for specific project
Wetlands	BRR; field review for specific project
Air Quality	Cursory review of short-term effects for specific project
Water Quality	BRR; cursory review of short-term effects for specific project
Fish and Wildlife Resources	BRR; review potential impacts resulting from activities within or adjacent to West Red Lodge Creek and East Rosebud Creek for specific project
Wildlife Habitat	BRR; cursory review of short-term effects for specific project
Threatened and Endangered Species and Species of Concern	BRR; coordination with USFWS and MFWP for specific project
Historic, Cultural, and Archaeological Resources	Cultural Resource Inventory (CRI); review for specific project
Prime Farmland	Farmland Conversion Impact Rating Form
Noise	Cursory review of potential noise receptors for specific project

An investigation of existing conditions of the MT 78 transportation system identified a number of geometric and operational issues. These issues are described in the following list.

1. Steep grades exist over a large portion of the corridor. Grades up to and exceeding seven percent, which is the maximum recommended grade for mountainous terrain, are common, especially on the southern portion of the corridor.

2. Sharp horizontal curves exist at the southern and northern ends of the corridor and at a few scattered locations within the middle portion of the corridor.

3. Passing sight distance is limited due to poor horizontal and vertical alignments. The road is used by agricultural vehicles, trucks, recreational vehicles, and other heavy, slow moving vehicles. The lack of ability to pass presents a potential safety hazard.

4. Stopping sight distance is limited, not only due to poor horizontal and vertical alignments, but also due to slope and clear zone issues. In a number of locations short hills connect steep grades, resulting in a "roller-coaster" effect, which leads to inadequate sight distance. Additionally, steep side slopes and short inslopes narrow the line of sight from the roadway. Inadequate sight distance is a safety concern as wildlife, vehicles, and other obstructions can easily be hidden from a driver's view, limiting the ability to stop or take other action to avoid collisions. Narrow clear zones allow wildlife to approach the roadway without being seen by drivers.

5. Crash concentrations are located between MP 5± to 9.5± and from MP 18.5± to 20±, as well as in scattered locations between MP 12± to 14± and MP 17± to 18±.

6. Shoulder widths throughout the corridor are not wide enough to accommodate vehicle stops or exclusive bicycle travel.

7. There are few places to pull off the road due to roadway width and the lack of sight distance. This causes problems for all motorists.

8. There are a number of poorly-aligned access points along the corridor. These access points represent a hazard due to limited sight distance, with vehicles entering the roadway at low speeds undetected by drivers approaching at relatively high speeds.

9. According to the MDT bridge sufficiency ratings database, the two existing bridges within the corridor are not deficient.

Improvement Options

Improvement options were developed to address these deficiencies and to meet the corridor goals and objectives. Fully meeting the corridor goal of improving highway geometry to meet current

MDT design standards will require full reconstruction. MDT programs funding for roadway improvements through a 20-year planning process at the district level. Though individual projects may be reprioritized over the course of the 20-year planning horizon, all available funds are allocated to listed projects over a five-year period. During the last planning process, which occurred in 2006, there were no funds allocated for the portion of MT 78 within the corridor study area. STPP funding for this level of improvement is highly unlikely over the short term but may be available toward the end of the planning horizon depending on other Primary Highway System needs within the Billings District. For this reason, full reconstruction is seen as a long-term corridor recommendation.

Recommendations

Long-Term Recommendations

Two reconstruction projects are recommended within the study area. Project A would involve full reconstruction from MP 5.2± to MP 12.0±. Based on high crash concentrations and the anticipated ability of Project A to improve safety in this portion of the corridor, Project A is recommended as a high priority over the long term at a cost of $17,900,000 in 2006 dollars.

Project B, a full reconstruction from MP 12.0 to the end of the corridor, is recommended as a second priority. Project B includes Roscoe Hill, located at the far northern part of the corridor (MP 18.1± to 21.0±). Options for the Roscoe Hill portion of the corridor include an overlay and widen scenario where minor changes would be made to the vertical curves to improve sight distance (Alignment Option 1), a full reconstruction option that would rework the vertical alignment while utilizing the existing horizontal alignment (Alignment Option 2), and a full reconstruction option where new horizontal and vertical alignments would be developed to provide grades within the recommended standard (Alignment Option 3). Based on relative costs and benefits, the recommended option for Project B is Roscoe Hill Alignment Option 1. Project B / Roscoe Hill Alignment Option 1 is estimated at $16,800,000 in 2006 dollars.

Near-Term Recommendations

In the interim period before funding is allocated to reconstruction, progress towards meeting the goal of improving safety conditions in the corridor may be possible through implementation of spot improvements. These improvements are listed in the table below and are ranked in order of recommendation. Ranking group 1, for example, represents the projects that are recommended for completion first, ranking group 2 represents those projects that should be done second, and so on. There is no ranking of projects within a group. Costs for these improvement options are presented in 2006 dollars and range from $2,800 to $1,108,000.

Recommended Spot Improvements

Ranking Group	Approximate MP	Potential Spot Improvement	Estimated Cost (2006$)
1	6.9, 10.7, 12.1, 13.1, 13.9, 15.1	Update school bus stop signing	$6,700
2	13.0	Trim vegetation for intersection visibility	$2,800
3	8.2	Realign Upper Luther Road and build a school bus pullout / Park and Ride	$151,000
3	13.0	Realign Lower Luther Road and build a school bus pullout	$164,000
4	9.3	Shave side slopes to improve sight distance	$906,000
5	7.4	Shave side slopes to improve sight distance	$107,000
5	8.0 – 8.2	Shave side slopes to improve sight distance	$178,000
6	15.8	Shave side slopes to improve sight distance	$720,000
6	16.8	Shave side slopes to improve sight distance	$1,108,000

Potential Funding Sources

Potential funding sources for these projects include funds from the Billings district maintenance budget; the Stillwater mine; the Highway Safety Improvement Program (HSIP); and the Surface Transportation Program-Primary (STPP).

1.0 INTRODUCTION

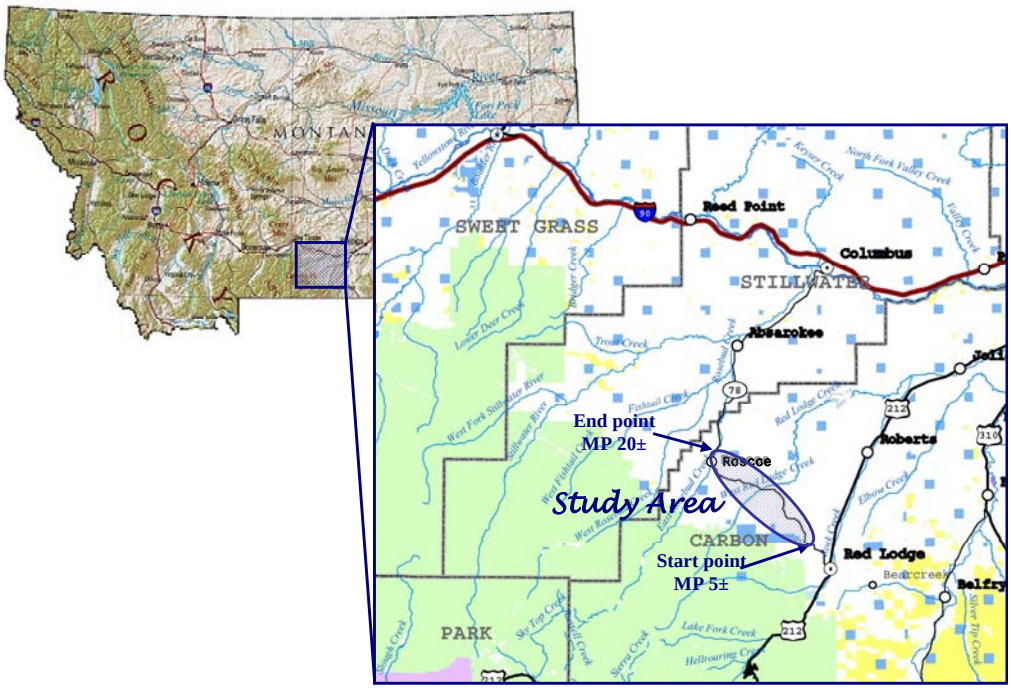
1.1 Background

In the fall of 2005, the Montana Department of Transportation (MDT) initiated a corridor planning process along Montana Primary Highway 78 (MT 78) in order to comprehensively address future transportation needs, prioritize transportation projects, and foster cooperative state and local transportation planning efforts. Corridor planning is a relatively new tool within MDT emphasizing public involvement and consideration of environmental issues at the planning level. The *MT 78 Corridor Study* is part of MDT's corridor planning process emphasizing public involvement and early consideration of environmental issues. This planning process is intended to save the state time and money by giving a context to later planning documents and helping to analyze the feasibility of various improvement options.

1.2 Study Area

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs northwest through the towns of Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins at Mile Post (MP) 5± northwest of Red Lodge and extends to the bridge at the south end of Roscoe (MP 20±), as shown in Figure 1.1. MT 78 is part of the state Primary Highway System and is functionally classified as a rural minor arterial route. Mile post references throughout this document refer to and approximate the location of on-the-ground mile post markers within the corridor, except where otherwise noted.

Figure 1.1 Project Area



1.3 Planning Horizon

This study uses a 20-year planning horizon, with 2006 as the base year. All traffic projects and costs are projected to the year 2026.

1.4 Purpose of the MT 78 Corridor Study

Corridor planning is a process that is collaborative with resource agencies along with local governments and includes public participation opportunities. The process is designed to derive a planning-level analysis of the existing transportation system within the corridor and determine how it could be changed to meet long-term needs. A corridor plan is a document that defines a comprehensive package of recommendations for managing and improving a transportation system. The plan provides an assessment of existing roadway conditions; an overview of the social, economic, and environmental constraints; an analysis of improvement options for the corridor that are intended to make the roadway safer and meet current road design criteria; and an assessment of the financial feasibility of these options. This document provides recommendations regarding how to prioritize these projects and a comparison of the costs of various improvements.

Pursuant to guidance on linking transportation planning and project development described in 23 CFR 450.212, this corridor study document is intended to provide the following information to be used by MDT and the Federal Highway Administration (FHWA) in future transportation projects:

1. Purpose and Need and goals and objectives statements;
2. General travel corridor and general modes definition;
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 National Environmental Policy Act (NEPA) and Montana Environmental Policy Act (MEPA) documents in accordance with 40 CFR 1502.21. This corridor plan thereby links transportation and environmental planning in a way that is intended to improve the efficiency of the project development process.

This plan provides a planning-level consideration of existing conditions from operations, geometric, social, economic, and environmental standpoints. The assessment of these existing conditions is intended to be brief and only detailed enough to guide future studies when specific projects are proposed. It is also intended to determine whether improvement concepts can clearly

be eliminated due to failure to satisfy current safety and design standards and meet cost and constructability targets. The plan is not intended to meet the requirements of NEPA or to provide design-level detail of proposed improvements. The cost estimates contained herein are to be used for comparison purposes only and not as project estimates.

1.5 Goals and Objectives of the Montana 78 Corridor Study

Corridor goals and objectives were developed in cooperation with MDT, FHWA, and the public. This study presents a set of improvement options that are intended to:

- Improve safety conditions and address crash concentrations within the corridor.
- Improve geometric elements within the corridor, including horizontal alignment and vertical alignment, meeting current MDT design standards where practicable.
- Avoid or minimize social, environmental, and economic impacts in the corridor where possible.
- Maintain the aesthetic character of the corridor.
- Balance the needs of all users, including local residents, tourists, agricultural vehicles, school buses, motorcyclists, and bicyclists.

1.6 Organization of the Plan

This document is separated into seven chapters, as described below.

1.0 Introduction
Chapter 1 describes the background for the study, introduces the purpose of the study and corridor goals, and provides an overview of the contents of the study.

2.0 Public Process and Corridor Plan Goals
Chapter 2 reviews the public outreach efforts that were conducted for this study.

3.0 Overview of Existing Community and Environmental Conditions
Chapter 3 presents an inventory of existing social, economic, and environmental constraints along the MT 78 corridor.

4.0 Overview of Existing Transportation Conditions
Chapter 4 discusses present transportation conditions in the corridor. Inventories of roadway geometrics, structural conditions, traffic conditions, crash statistics, and the availability of alternative transportation modes are included in this section.

5.0 Population and Transportation Forecasts
Chapter 5 describes projected population and traffic conditions in the design year (2026).

6.0 Improvement Options Analysis
Chapter 6 presents potential improvement options and provides a description of these proposed improvements, cost estimates, and potential funding sources.

7.0 Discussion and Recommendations

The final chapter of the plan discusses the improvement options presented in Chapter 6, as well as interim spot improvements and additional corridor improvements. Recommendations are made for specific projects as well as comprehensive, corridor-wide improvements.

2.0 PUBLIC PROCESS AND AGENCY COORDINATION

The MT 78 Corridor Study utilized a public involvement process to engage area residents in a dialogue about the existing conditions and use of the corridor. The process also sought to inform residents about potential improvement options for the corridor and to seek citizen input on those options. Agency coordination was initiated early in the process to identify potential resource constraints and further permitting requirements.

2.1 Public Involvement Activities

A public scoping meeting was held on March 28, 2006 at the Roscoe Community Center. A second public scoping meeting was held March 30, 2006 at the Roosevelt Middle School in Red Lodge. Meeting attendees were asked to identify issues and concerns along the MT 78 corridor. Seventeen citizens attended the meeting in Roscoe and two citizens attended the meeting in Red Lodge. Several people came to the meeting in Red Lodge intending to comment on MDT projects within the city limits. Many of these residents left after learning that the corridor study begins five miles outside of Red Lodge and did not include their areas of interest. The main concerns for meeting attendees were the speed of traffic, traffic flow, sight distance, and wildlife hazards. Some residents expressed concerns about the lack of signage relating to traffic speed, while others expressed concern about slow-moving tourists and agricultural vehicles. Turnouts, wider shoulders and passing lanes were suggested as solutions to the perceived high speed of traffic, traffic flow problems, and sight distance issues. Another safety concern of the locals was the abundance of wildlife along MT 78. Deer crossing signs to warn traffic were discussed. Other comments included concerns regarding hazardous bus stops, steep slopes, and culverts. Two written comments were received after the meetings. An article appeared in the *Carbon County News* documenting the meeting in Red Lodge.

A public information meeting was held on September 20, 2006 at the Roscoe Community Center. At this meeting, the project team solicited input regarding goals and objectives for the corridor. The project team also presented a preliminary set of improvement options. Meeting attendees were asked to review and comment on these options. Meeting attendees discussed the need to replace fencing that would be taken down, speed studies, cost, deer crossings, and the condition of old bridges. Ten citizens attended this meeting and no written public comments were submitted.

A final public meeting was held August 22, 2007 to present the final recommendations of the study. The project team briefly reviewed existing geometric and operational deficiencies within the corridor, and presented the recommended set of improvement options, as well as estimated costs and potential funding sources for each option. Meeting attendees commented on or asked questions about funding availability; speed limits; sight distance problems; wider shoulders for bicycle use; installation of deer crossing and hidden driveway signs; and consideration of scenic pullouts, designated livestock crossings, and separated bicycle/pedestrian pathways within the corridor. Ten members of the public attended this meeting and one written public comment was submitted at the meeting.

Additional written public comments were received after these three sets of meetings. All written comments received are included in Appendix A.

Newsletters were prepared in advance of each of the public meetings detailing the study background, corridor planning process, and existing transportation and environmental conditions. Newsletters are included in Appendix B. A website was also developed for this project and included general information about the project, contact information for project team members, and an online comment form.

2.2 Agency Coordination

Resource agencies were invited to attend an agency coordination meeting on July 27, 2006. The meeting was attended by representatives from the U.S. Fish and Wildlife Service (USFWS) and Montana Fish, Wildlife, & Parks (FWP), who noted the relative lack of habitat for threatened and endangered species along the project corridor. Representatives from the Environmental Protection Agency (EPA), the Montana State Historic Preservation Office (SHPO), the Montana Department of Natural Resources and Conservation (DNRC), and the Montana Department of Environmental Quality (DEQ) declined to attend.

In response to a request for information regarding the MT 78 corridor, two agencies, FWP and the U.S. Army Corps of Engineers (USACE), sent letters. These letters are included in Appendix C.

A draft of the study document was mailed to resource agencies in July 2007. Agencies were asked to review and comment on the draft document. In response to this request, FWP and USACE sent letters, which are included in Appendix C. In their letters, FWP and USACE requested continued sensitivity to the natural environment and an opportunity for early coordination on any future projects.

Prior to further project development resulting from this corridor study, coordination will occur with appropriate resource agencies to determine and discuss agency concerns within the specific project limits. Concerns brought forward will be addressed within the project development and design processes.

3.0 EXISTING SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONDITIONS

This chapter presents an inventory of existing social, economic, and environmental constraints along the MT 78 corridor.

3.1 Environmental, Cultural, and Aesthetic Resources

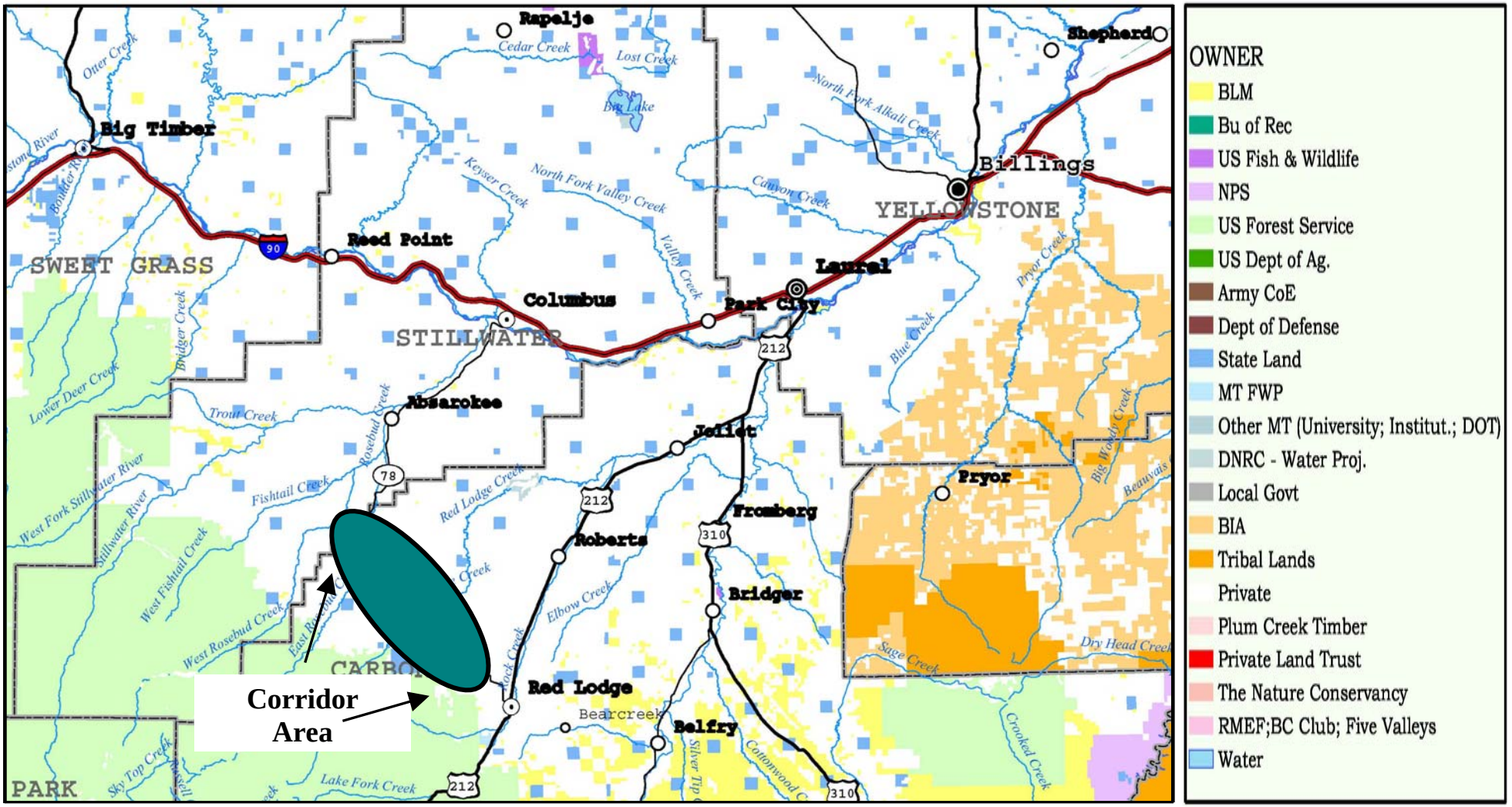
For full compliance with NEPA and MEPA regulations and permitting requirements, all federally and state funded actions require some level of analysis to determine whether measures can be undertaken to avoid, minimize, or mitigate anticipated impacts to sensitive resources in a given project area. The information in this report is intended as a planning-level overview of natural resources in the corridor. Research methods included a review of the Natural Resource Information System (NRIS) database, Natural Resource Conservation Service (NRCS) soil mapping, a Montana Natural Heritage Program (MNHP) database search, coordination with MFWP and USFWS staff, a review of the U.S. Census Bureau database, and windshield surveys of the existing MT 78 corridor.

The analysis contained in this report is not intended to meet NEPA/MEPA requirements or provide a detailed accounting of all resources or potential impacts, but is merely intended to point out those resources or areas of cultural and environmental concern that would likely be a factor in future project decisions and permitting processes.

Land Ownership

Based on information collected for the Montana 78 Access Management Study as well as NRIS mapping for the area, land ownership in the corridor is entirely private. Figure 3.1 shows land ownership in the area. As illustrated, there are state trust and forest service lands in the general study area, but neither would be impacted under any of the improvement options proposed in this plan.

Figure 3.1 Land Ownership in the MT 78 Corridor



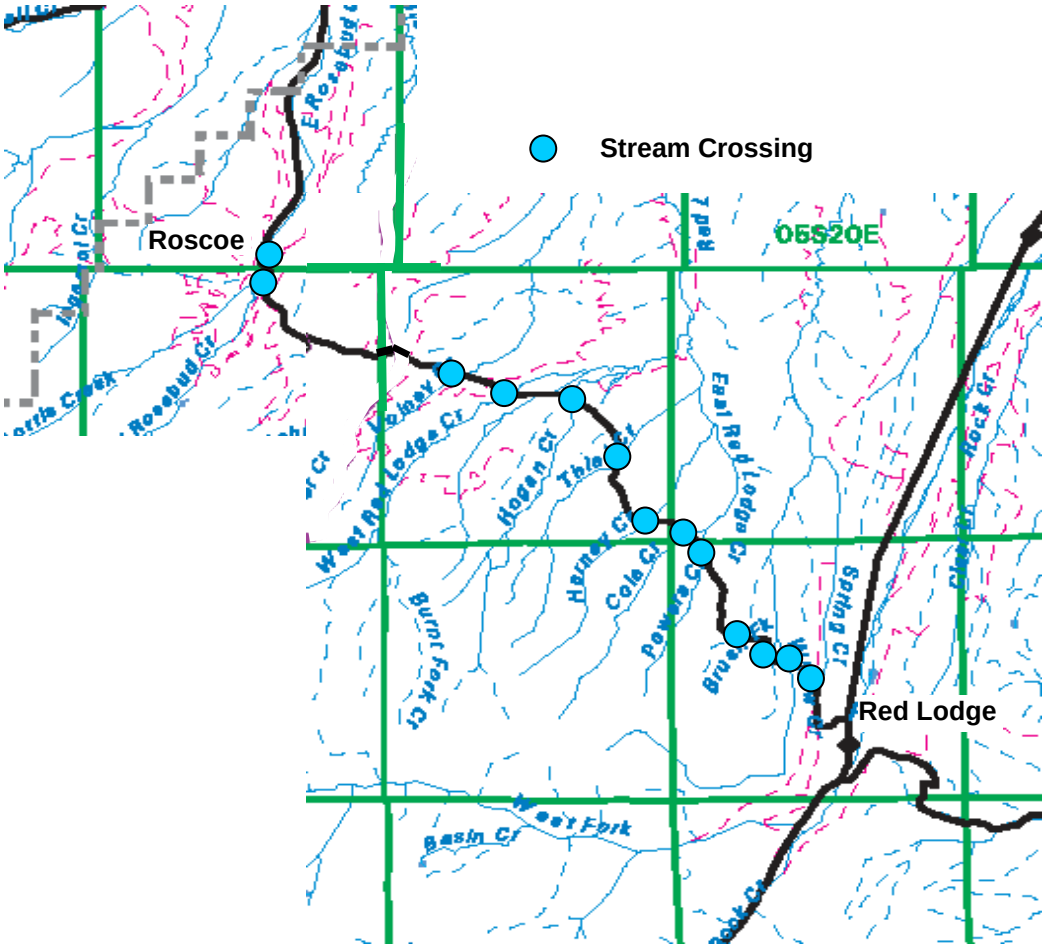
Floodplains

There are no National Flood Insurance Program mapped floodplains within the corridor.

Water Bodies

As shown in Figure 3.2, a number of water resources are located along the MT 78 corridor. West Red Lodge Creek is located at MP 13± and East Rosebud Creek is located at MP 20± near Roscoe. There are also a number of intermittent streams, including Morris Creek, Butcher Creek, Volney Creek, Hogan Creek, Theil Creek, Harney Creek, East Red Lodge Creek, and Cole Creek. Impacts to these water resources would require more detailed hydraulic analysis prior to the initiation of an improvement project in the corridor.

Figure 3.2 Water Body Crossings in the MT 78 Corridor



Irrigation Systems

Based on aerial photographs and a windshield survey, a number of irrigation ditches were identified that run parallel to or cross the MT 78 corridor. The names and specific locations of these ditches have not been determined. Impacts to these ditches would require further study prior to the initiation of an improvement project in the corridor.

Wetlands

According to the National Wetlands Inventory and the Montana Wetlands Survey, there are currently no mapped wetlands within the study area.

A windshield survey was conducted on July 18, 2006. The locations listed in Table 3-1 were identified as potential wetland areas based on visible vegetation and drainage patterns, including several drainage ditches that parallel or cross the roadway.

Table 3-1 Potential Wetland Areas

MP	Comment
19.0	Irrigation ditch on west side of MT 78
18.2	Cattails / wet area on west side of MT 78
17.9	Cattails on west side of MT 78
17.5	Cattails on west side of MT 78
17.2	Small stream
16.5	Potential wetlands – primarily on west side of MT 78
15.5	Irrigation ditch
14-15	Potential wetlands on west and portions of east side of MT 78
14.5	Cattails
14.7	Potential stream
11*	Ditch or creek crossing
9.5	Potential wetlands on east side of MT 78
9	Ditch or creek moves to west side of MT 78
8.3	Ditch / creek crossing
7.0	Ditch / creek crossing
6.5	Ditch / creek crossing

* According to Carbon County soil mapping and the Natural Resource Conservation Service (NRCS) list of hydric soils, this is the only identified area with hydric soils present.

As noted above, only one of the areas displaying wetland vegetation characteristics contains hydric soils according to NRCS soil mapping. The corridor will need to be formally surveyed for wetlands prior to the initiation of any improvement project.

Air Quality

Carbon County's air quality is within attainment levels under National Ambient Air Quality Standards (NAAQS). It is not anticipated that any improvement project would have a long-term negative impact on air quality in the corridor. Construction may cause short-term, temporary impacts to air quality.

Water Quality

DEQ is required by Section 303(d) of the Clean Water Act to identify and prioritize those waters for which total maximum daily loads (TMDLs) are needed. These loads represent the maximum amount of pollutant a water body may receive in order to meet water quality standards. TMDLs have not been developed for any of the water bodies in the corridor.

Fish and Wildlife Resources

The existing road crosses East Rosebud Creek, West Red Lodge Creek, and a number of irrigation ditches and intermittent streams. Impacts to fish species resulting from bridge widening, replacement, or improvement; road widening; culvert replacement; or other activities within or adjacent to these water resources would require further study prior to the initiation of an improvement project in the corridor.

The Montana Fisheries Information System (MFISH) was queried for the two perennial streams in the corridor: East Rosebud and Red Lodge Creeks. The fish species present in the two streams are listed in Table 3-2.

Table 3-2 Fish Species Present in the Corridor

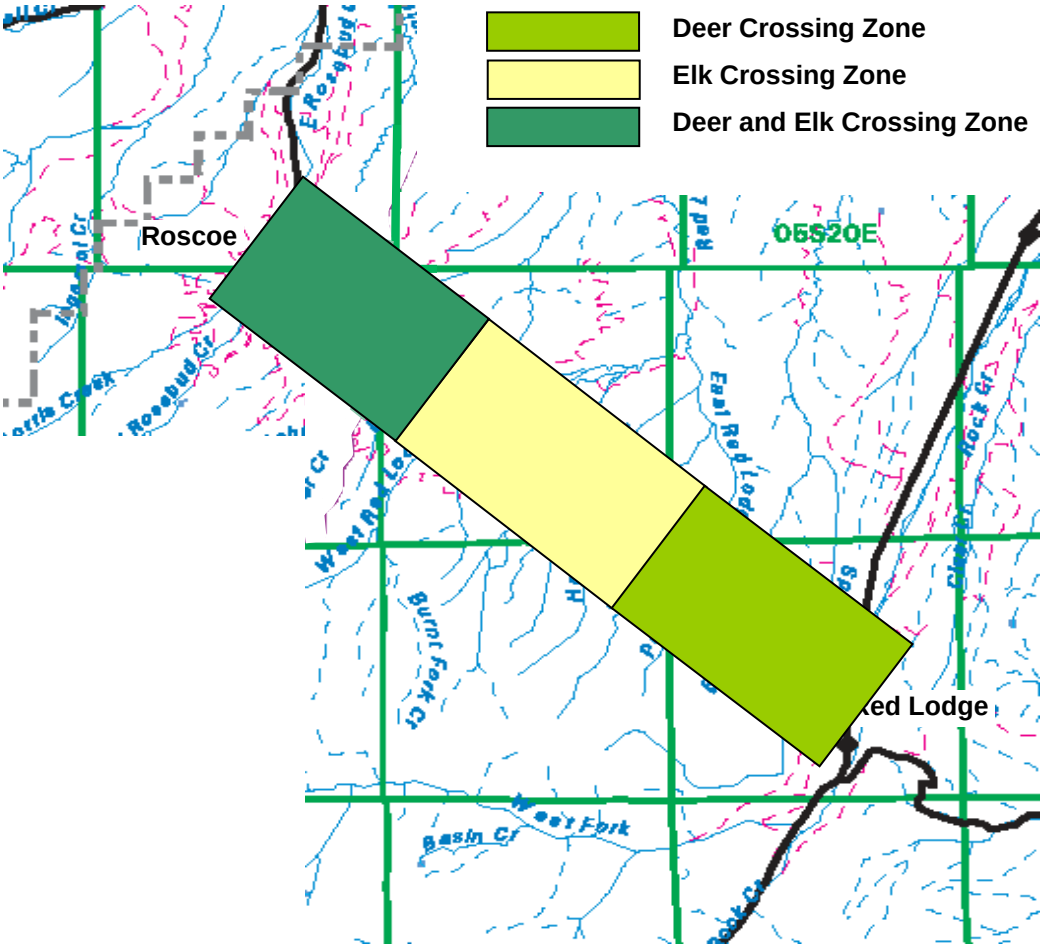
Species	East Rosebud Creek	Red Lodge Creek
Brook Trout	✓	✓
Brown Trout	✓	✓
Lake Chub		✓
Longnose Dace	✓	✓
Longnose Sucker	✓	✓
Mountain Sucker		✓
Mountain Whitefish	✓	✓
Rainbow Trout	✓	✓
White Sucker		✓
Yellowstone Cutthroat Trout	✓	✓

Source: Montana Fisheries Information System (MFISH), 2007.

Wildlife Habitat

According to an MFWP wildlife biologist and local input, the MT 78 corridor is heavily used by wildlife. Specifically, the areas from Roscoe to Volney Creek and from Cole Creek to Red Lodge are used extensively by deer. Elk use the areas between Roscoe and Cole Creek for crossings. Figure 3.3 depicts these crossing zones. There is no sensitive habitat within this corridor.

Figure 3.3 Wildlife Crossings in the MT 78 Corridor



Threatened and Endangered Species and Species of Concern

According to the Montana Natural Heritage Program (MNHP), the following threatened and endangered species *may* exist in the corridor:

Table 3-3 Threatened and Endangered Species

Common Name	Latin Name	Status
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Lynx	*Lynx Canadensis*	Threatened
Grey Wolf	*Canis lupus*	XN*

*Experimental Non-essential Population

Additionally, the following state species of concern *may* exist in the corridor:

Table 3-4 State Species of Concern

Common Name	Latin Name
Beautiful Fleabane	*Erigeron formosissimus*
Bobolink	*Dolichonyx oryzivorusyz*
Brewer's sparrow	*Spizella breweri*
Preble's Shrew	*Sorex preblei*
Yellowstone Cutthroat Trout	*Oncorhynchus clarkia bouvieri*

Potential impacts to these species would require further study and coordination with the USFWS and MFWP prior to the initiation of an improvement project in the corridor.

Hazardous Waste Sites

Based on an NRIS database search, there are no hazardous waste sites in the project corridor.

Visual Resources

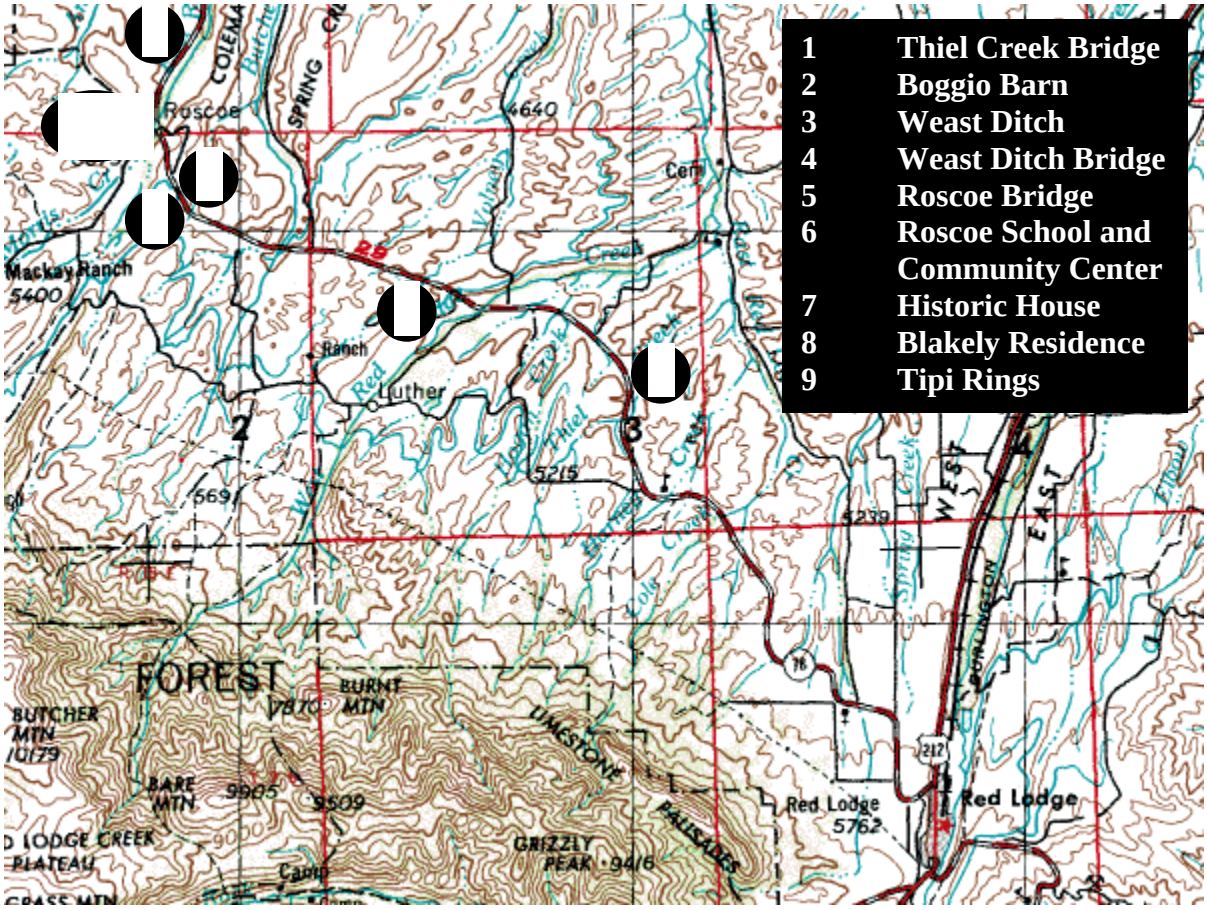
The MT 78 corridor is rural in nature. There are a few scattered rural residences throughout the corridor, but the existing road generally travels through land used for agricultural purposes. Views of the hilly terrain are generally unobstructed, except for a few steep side slopes through the corridor and trees lining brief portions of the roadway. Views of the mountains extend to the south. Public comments received during the planning process included the sentiment that the variation in horizontal and vertical alignments makes the road aesthetically appealing.

Historic, Cultural, and Archaeological Resources

A cultural resource file search was conducted by the Montana Historical Society on June 28, 2006. Jon Axline of MDT's Environmental Services reviewed this list and determined that there are nine known, eligible sites in the general study area.

These sites are shown in Figure 3.4.

Figure 3.4 Historic Sites in the MT 78 Corridor



Of the nine sites shown in Figure 3.4, the four in the town of Roscoe are relatively far removed from the existing alignment. Any future improvement project that either stays near or to the east of the existing alignment will avoid any impacts to these resources. Thiel Creek Bridge is also located off the existing MT 78 alignment on an abandoned portion of MT 78. The Boggio barn is located in the triangle of land formed by the intersection of Lower Luther Road and MT 78 at MP 8.2±. The tipi rings are located on the north end of the corridor. The current alignment crosses the Weast Ditch, though the Weast Ditch Bridge is on an abandoned portion of the MT 78 alignment to the east of the existing alignment at the top of Roscoe Hill. Any roadway project would likely impact Weast Ditch to some degree due to its perpendicular orientation relative to the existing alignment.

The historic and cultural resources listed above should not be considered an exhaustive list because no cultural resource inventory has been completed. Discovery and recording of additional sites is considered likely because the corridor was historically part of the Crow

Reservation. Any improvements to this segment of the MT 78 corridor could impact historic properties. A detailed cultural resource inventory would be required prior to the initiation of an improvement project in the corridor.

Public Parks and 6(f) Resources

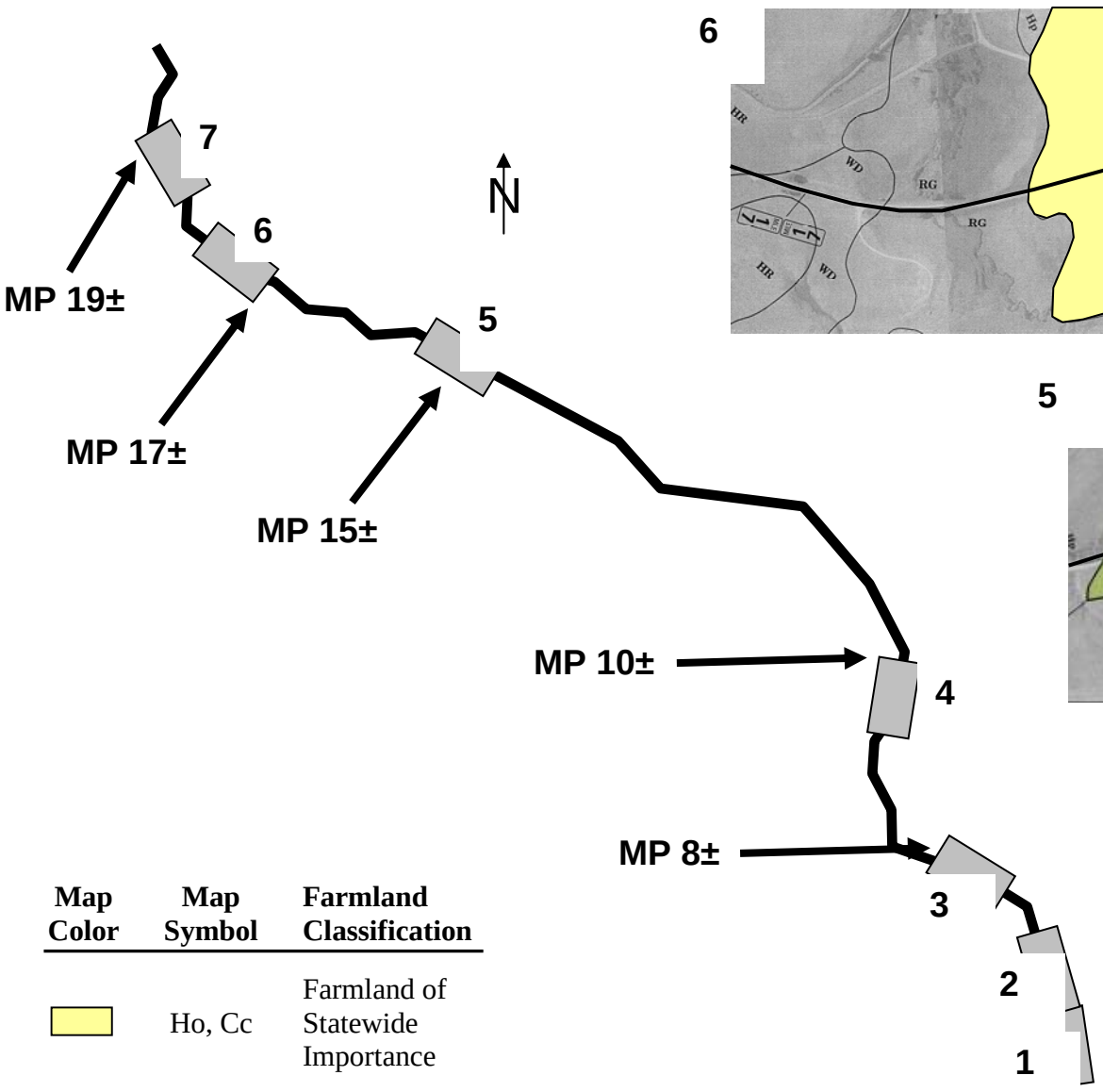
There are no public parks located along the MT 78 corridor between Red Lodge and Roscoe. A search of the MFWP database indicated that there are no N.L.&W.C.F. - 6(f) resources in the project area.[1]

Prime Farmland

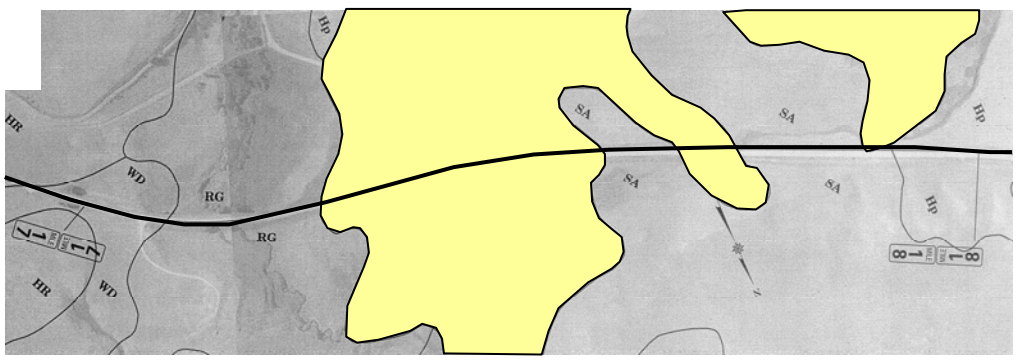
As illustrated on Figure 3.5, there are a number of areas of Prime Farmland and Farmland of Statewide Importance along the existing MT 78 corridor. There are also several areas of Prime Farmland and Farmland of Statewide Importance within one mile of the existing alignment. Due to the perpendicular orientation of some areas in relation to the existing roadway alignment, no avoidance of these areas is feasible. An AD - 1006 Farmland Conversion Impact Rating Form will need to be prepared, but it is unlikely that any detailed analysis would be required.

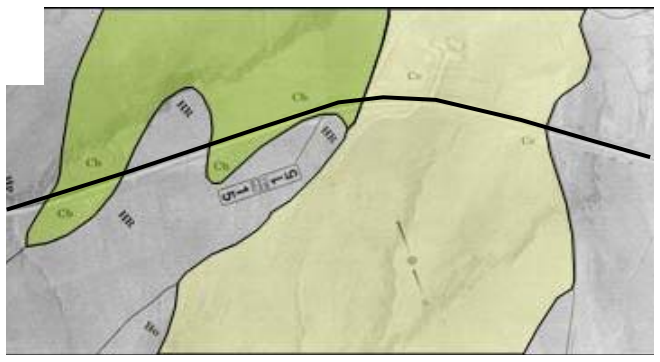
[1] http://fwp.mt.gov/FwpPaperApps/parks/countylist.htm. Accessed February, 2007.

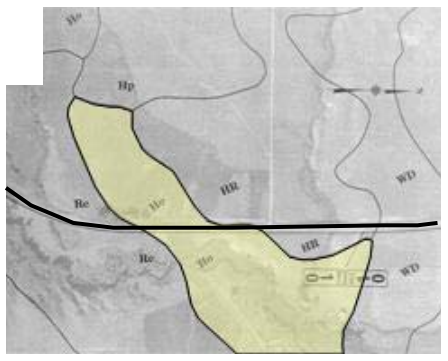
Figure 3.5 Prime Farmland



Map Color	Map Symbol	Farmland Classification
	Ho, Cc	Farmland of Statewide Importance
	Cb	Prime Farmland If Irrigated
	An	Prime Farmland







Noise

A noise analysis was not conducted for this study. Based on data collected during a windshield survey and review of aerial photographs, there are scattered residential receptors along the MT 78 corridor. Noise impacts to these receptors may require further study prior to the initiation of an improvement project in the corridor.

Regulatory and Study Requirements

Due to the number of potential impacts to water bodies, wetlands, wildlife, irrigation resources, and cultural resources, the following studies will likely be necessary before undertaking any project in the corridor:

- A Biological Resource Report (BRR) would be necessary to make recommendations regarding fish and wildlife movement in the corridor; assess potential fish and wildlife impacts from a specific project; determine the potential effect on threatened and endangered species or species of concern from any project; and to delineate wetlands. The likelihood for wetlands in the corridor is low, since only one area has hydric soils, but the number of water bodies and wet areas in the corridor indicates that a study would be necessary.
- A Cultural Resource Inventory (CRI) would be necessary to determine the eligibility and potential impacts to historic and cultural resources from any proposed project.
- An irrigation study may be necessary to gather information and assess potential impacts to numerous irrigation ditches in the corridor.

The following permits and notifications will likely be necessary in this corridor:

- A SPA 124 Notification
- A COE 404 Permit (if wetlands are identified)
- A Section 402/Montana Pollutant Discharge Elimination System (MPDES) authorization from the DEQ's Permitting & Compliance Division.

All work would need to be in accordance with the Water Quality Act of 1987 (P.L. 100-4), as amended.

Summary of Potential Environmental Impacts

Table 3-5 presents a qualitative summary of potential impacts to environmental resources within the MT 78 corridor.

Table 3-5 Summary of Potential Environmental Impacts

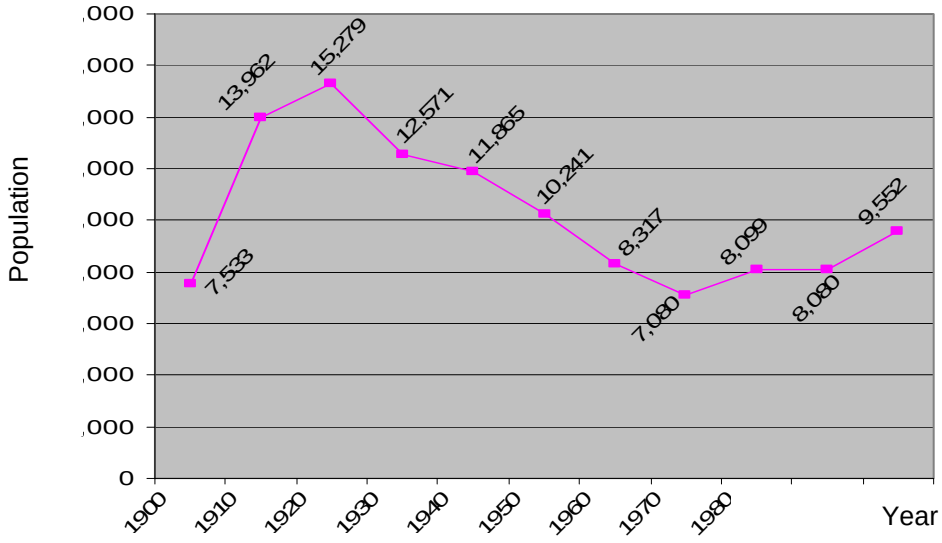
Resource	Potential Impact	Future Requirements
Land Ownership	None	None
Floodplains	None	None
Water Bodies	Potential for impacts	BRR; review stream crossings for specific project
Irrigation Systems	Potential for impacts	BRR; review irrigation ditch crossings for specific project
Wetlands	Some potential for impacts	BRR; field review for specific project
Air Quality	Little likelihood of impact	Cursory review of short-term effects for specific project
Water Quality	Little likelihood of impact	BRR; cursory review of short-term effects for specific project
Fish and Wildlife Resources	Potential for impacts	BRR; review potential impacts resulting from activities within or adjacent to West Red Lodge Creek and East Rosebud Creek for specific project
Wildlife Habitat	Little likelihood of impact	BRR; cursory review of short-term effects for specific project
Threatened and Endangered Species and Species of Concern	Potential for impacts	BRR; coordination with USFWS and MFWP for specific project
Hazardous Waste Sites	None	None
Visual Resources	None	None
Historic, Cultural, and Archaeological Resources	Potential for impacts	CRI; review for specific project
Public Parks and 6(f) Resources	None	None
Prime Farmland	Potential for impacts	Farmland Conversion Impact Rating Form
Noise	Little likelihood of impact	Cursory review of potential noise receptors for specific project

3.2 Community Demographics

Population

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 as shown in Figure 3.6. 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.

Figure 3.6 Carbon County Population, 1900 – 2000



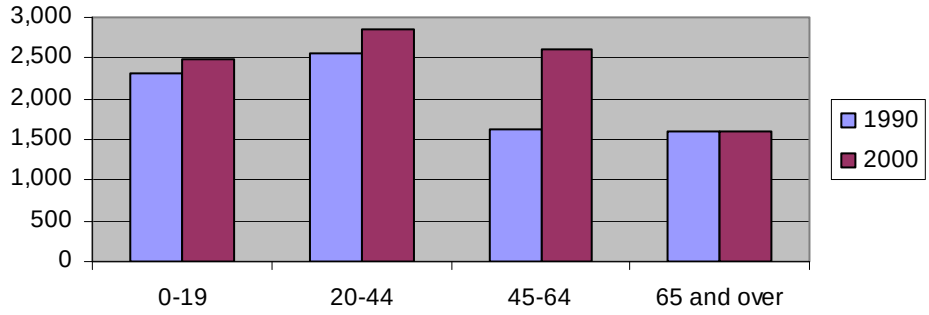
Source: US Census Bureau

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. No Census data are available for Roscoe.

Demographic Composition

As shown in Figure 3.6, the percentage of Carbon County residents in various age groups remained relatively constant between 1990 and 2000, with the exception of the 45 to 64 group.

Figure 3.7 Carbon County Population by Age, 1990 – 2000

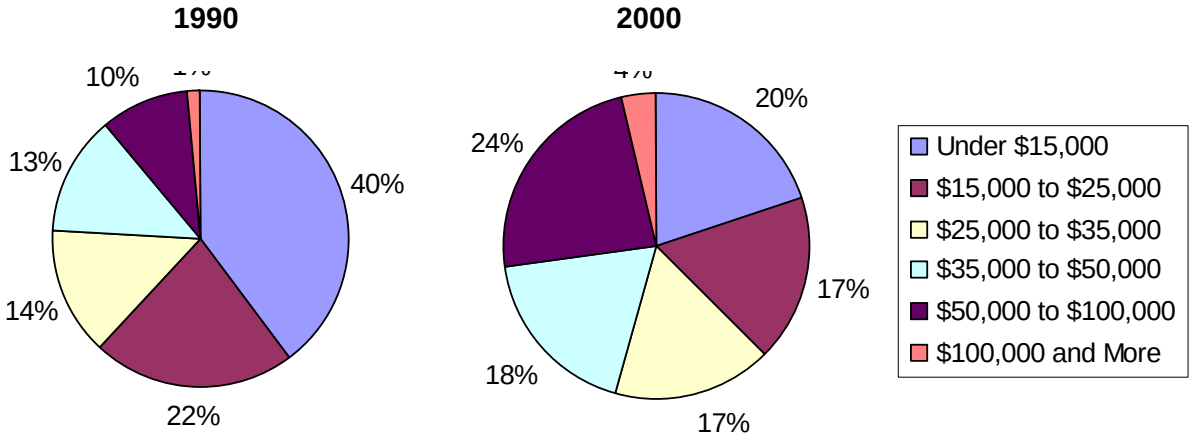


The majority of residents in Carbon County are categorized as "white" by the US Census Bureau. In 1990, over 99 percent of the county was categorized as "white" and the minority population was less than one percent. By 2000, the minority population grew to nearly three percent. Within the study area, Census data are only available at the county level. Therefore it is not possible to identify any existing minority populations located along the corridor.

Household Income

Between 1990 and 2000, Carbon County's median household income increased from $19,042 in 1990 to $32,139 in 2000. As shown in Figure 3.7, 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.

Figure 3.8 Carbon County Household Income, 1990 – 2000

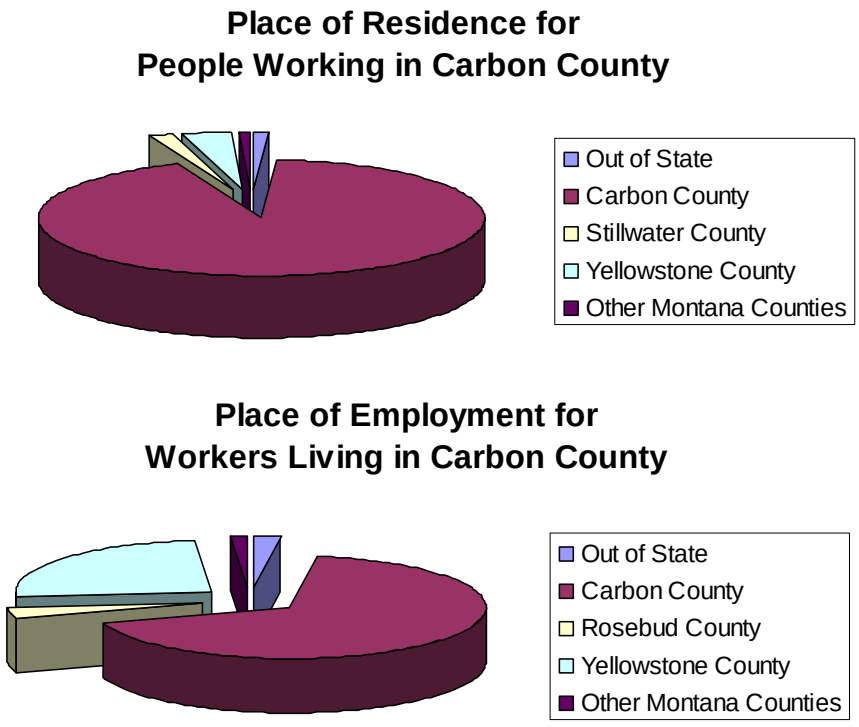


Commute

As shown in Figure 3.8, Carbon County does not experience a large influx of commuting workers. Of all workers in Carbon County in 2000, 93 percent lived in Carbon County, over three percent lived in Yellowstone County, nearly two percent lived in Stillwater County, and one percent lived out of state. The remaining workers lived in other Montana counties.

A substantial number of Carbon County residents work in other counties. Of those workers who live in Carbon County, almost 68 percent work in Carbon County, 25 percent work in Yellowstone County, nearly four percent work in Rosebud County, and just over two percent work out of state. The remaining Carbon County residents work in other Montana counties.

Figure 3.9 Place of Residence and Employment



3.3 Other Studies, Plans, and Regulations

This section summarizes relevant points from a number of local planning and regulatory documents.

Carbon County Growth Policy

The Carbon County Growth Policy sets forth a series of goals, objectives, and implementation measures that were developed by the Carbon County Planning Board in cooperation with the public under the Montana requirements for growth policies as set forth in Montana Code, Section 76-1-601.

The following three goals from the Growth Policy are pertinent to this study.

1. "Encourage land uses that are appropriate on the lands for which they are proposed." The County also seeks to retain lands in agricultural production. The Growth Policy stipulates that the County will request MDT to provide "information on how improvement options under consideration for state highway projects will affect existing residences and agricultural land." Carbon County officials will be kept apprised of plans relating to specific projects. The improvement options presented in Chapter 6 generally follow the existing alignment and thus do not discourage lands to stay in agricultural production.

2. "Ensure that proposed land uses consider and disclose known and/or potential impacts to ground and surface water quality and availability." Any project undertaken by MDT that would require NEPA compliance would also require consideration of water quality. As a pre-NEPA study, this document lists water resources in the corridor.

3. "Work cooperatively for the benefit of County residents with unincorporated communities, local governments in the County, and state and federal government agencies planning activities in the County that would affect Carbon County residents." The Growth Policy further stipulates that the County will "meet annually with MDOT [sic]… to discuss road projects, coordinate schedules, and look for efficiencies through working cooperatively." Any proposed projects will be undertaken in cooperation with County officials.

Carbon County Subdivision Regulations

The Carbon County Development Code provides comprehensive rules for the subdivision of land within Carbon County.

Chapter V, "Design and Improvement Standards," relates to this corridor study. A section on roads and streets provides guidelines for general design, improvements, improvements

completion and certification, and a table of road design standards. The regulations explicitly state that "any vehicular access onto a state highway shall be approved by the MDOT [sic]."

Route Segment Plan

MDT maintains a Route Segment Plan, which aids in determining desired roadway widths. The desired width is based on a number of factors, including traffic projections and functional classification of the route. Based on the Route Segment Plan, MT 78 should be widened to a minimum of 28 feet under any reconstruction scenario. This would provide for two 12-foot travel lane widths and a minimum of two-foot shoulder widths.

Access Management Study

MDT completed an Access Management Study for MT 78 in 2004. This study reviewed all accesses along the highway. It recommended adoption of an access management plan, which would manage and administer accesses along the highway. Access management seeks to:

- Limit the number of conflict points;
- Separate basic conflict areas;
- Reduce interference with through traffic;
- Maintain progressive mainline speeds; and
- Practice controlled land development.

The recommendations in the Access Management Study for MP 5.0± to MP 20.0± are included in Appendix F. The majority of the accesses identified in the study corridor are farm field accesses; i.e., dirt roads used to access lands in agricultural use. The Study generally recommends realigning and combining these accesses. The Study and its recommendations were accepted for use in future planning efforts in Carbon and Stillwater counties.

Absarokee to Columbus Environmental Impact Statement

An Environmental Impact Statement (EIS) was prepared for the portion of MT 78 to the north of the study area between Absarokee and Columbus. The Preferred Alternative, approved in a Record of Decision (ROD) in 2002, included a 32-foot typical section and is currently being constructed. The portion of MT 78 between Absarokee and Columbus has higher traffic volumes than the portion of MT 78 between Roscoe and Red Lodge, necessitating the 32-foot width.

4.0 EXISTING TRANSPORTATION SYSTEM

The majority of location references throughout this document refer to and approximate the location of on-the-ground mile post markers within the corridor. The horizontal and vertical curve data included in Chapters 4 and 6 draw from as-built stationing, which has been converted to English mile post references for ease of comparison.

4.1 Highway Characteristics

The geometric, operational, and crash information contained in Sections 4.1 and 4.2 is presented in graphic form in Figure 4.2, located at the end of Section 4.2.

Terrain

The topography of the land traversed by a roadway influences the horizontal and vertical alignment of the facility. Topography is generally separated into three categories based on terrain: level, rolling, and mountainous. The MT 78 corridor traverses mountainous terrain within the study area, and includes several areas with steep grades, which cause trucks to slow down to speeds below those of passenger cars. Based on public input, the area south of Roscoe is an example of a location where passenger vehicle travel is impeded by large trucks slowly climbing the steep grade.

Vertical Alignment

Vertical alignment is a measure of grade change on a roadway. The length and steepness of grades directly affects the operational characteristics of the roadway. The MDT Road Design Manual lists recommendations for maximum vertical grades on rural arterials according to the type of terrain in the area. The maximum grade recommended for mountainous terrain is seven percent. There are currently several segments within the study area where the vertical grade exceeds the recommended grade for the local terrain, as shown in Table 4-1.

Table 4-1 Vertical Curves Exceeding Maximum Vertical Grade of Seven Percent

Mile Post	Existing Vertical Northbound
5.0	-
5.6	-10.81
5.7	-8.38
5.8	-10.62
5.9	-
6.3	-9.92
6.4	-
6.8	-8.55
7.0	-
8.0	7.27
8.2	-
8.4	-8.19
8.5	-10.71
8.6	-
9.1	-8.55
9.2	-
9.5	-8.33
9.6	-
10.7	-9.51
10.8	-
11.1	8.44
11.2	-
15.7	-8.5
16.0	-
18.2	7.83
18.6	-
19.0	-9.00
19.7	-

Figure 4.2 illustrates the northbound vertical curves within the corridor. A Good rating was provided for each segment of the corridor where vertical grades were less than four percent (the MDT standard for rolling terrain). Segments with grades ranging from four percent to seven

percent were considered Fair, and segments with grades above seven percent were classified as Poor. The analysis segment length was determined by the length of the curve and is centered on the point of intersection. Vertical curves with grades above seven percent make up approximately 13 percent of the length of the corridor. Vertical curves with grades between four and seven percent make up approximately 14 percent of the corridor length.

Horizontal Alignment

Horizontal alignment is a measure of the degree of turns and bends in the road. The primary element of horizontal alignment is horizontal curvature. The degree of curvature, or curve radius, is the main physical control on a vehicle rounding a horizontal curve. The curve radius describes how "sharp" the curve is. The maximum recommended degree of curvature on a highway is directly related to design speed. For a design speed of 60 miles per hour (mph), the MDT Road Design Manual recommends a minimum curve radius of 1,200 feet (ft). Nine horizontal curves do not meet the recommended minimum curve radius, as shown in Table 4-2. Horizontal curves that do not meet the recommended minimum curve radius make up approximately ten percent of the length of the corridor.

Table 4-2 Horizontal Curves Sharper Than Minimum Radius of 1,200 Feet

Mile Post	Existing Curve Radius (ft)
5.0	1,146
5.6	573
7.6	1,146
9.4	819
11.8	955
16.5	716
16.8	716
19.7	955
19.9	955

Figure 4.2 illustrates the horizontal curves within the corridor. A Good rating was provided for each segment of the corridor where the curve radius exceeded 1,200 ft. Segments with a radius less than 1,200 ft are considered Poor. The analysis segment length was determined by the length of the curve and is centered on the point of intersection.

Stopping Sight Distance (SSD)

Stopping Sight Distance is the distance required for a driver to perceive an obstacle in the roadway and brake to a stop. It is affected by the horizontal and vertical alignment, as well as visual obstructions such as berms, headwalls, and embankments. Other factors affecting SSD include the driver's perception-reaction time, the driver's eye height, the height of the object, pavement surface conditions, condition of the vehicle, and the vehicle operating speed. SSD in

Figure 4.2 is measured in terms of a variable, K. K is a measure of the rate of grade change on a hill or in a gully; i.e., a measure of curve length over grade. According to MDT standards for a 60 mph facility, the minimum K value for the crest of a hill is 151 and 136 for a gully between hills, also known as a sag curve. The K value for the crest of a hill is higher because visibility is more limited at the top of a hill than it is at a dip between hills.

Of the 81 vertical curves within the project limits, 59 fail to meet the respective minimum K values for crest hills and sag curves, as shown in Tables 4-3 and 4-4.

Table 4-3 Crest Hills Failing to Meet Minimum K Value of 151

Beginning Mile Post	K Value
5.0	54.6
5.2	54.4
5.4	133.3
5.6	86.3
6.3	70.6
6.8	47.4
7.3	63.9
7.6	81.7
7.8	69.9
7.9	66.7
8.2	134.5
8.4	68.2
9.1	56.9
9.3	103.8
9.5	129.9
9.9	87.5
10.2	110.9
10.4	96.4
10.7	52.6
10.9	56.3
11.2	81.8
13.6	88.9
13.9	125.2
15.7	120.5
16.1	140.4
16.9	114.6
18.1	120.5
18.6	106.4
19.0	116.4

Table 4-4 Sag Curves Failing to Meet Minimum K Value of 136

Beginning Mile Post	K Value
5.1	32.3
5.7	82.3
5.9	44.1
6.2	99.6
6.4	57.8
6.5	113.6
7.0	51.8
7.4	80.2
7.7	39.9
8.0	40.7
8.6	56.0
9.0	69.9
9.2	37.7
9.6	42.4
9.8	89.6
10.0	77.3
10.3	102.8
10.6	38.2
10.8	32.9
11.1	49.6
11.8	65.5
13.4	113.6
14.1	97.8
16.0	82.2
16.5	74.1
17.2	111.3
17.5	115.2
17.8	106.4
18.2	106.2
19.7	128.3

Figure 4.2 illustrates stopping sight distance within the corridor. SSD was calculated using a model and correlates to the stationing and profile provided on the as-built plans. A Good rating was provided for each segment of the corridor where K values for crest and sag curves were greater than 151 and 136, respectively. A Poor rating was assigned to segments having K values less than the respective minimum values for crests and sags. Analysis segments begin at the point identified for the hill or sag and extend until the point identified for the following hill or sag.

Passing Opportunities

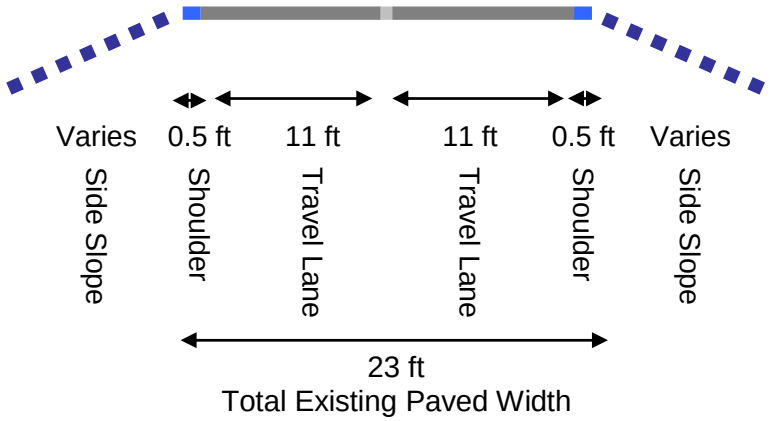
Passing Sight Distance (PSD) is a measure of motorists' ability to see oncoming vehicles and safely complete the passing maneuver of slower vehicles. According to the MDT Road Design Manual, a minimum PSD for a 60 mile-per-hour facility is 2,135 feet, or a little more than one-third of a mile. Passing zones are normally established based on field measurements of available sight distance, thus marked passing zones are a good indication of the adequacy of 60 mile-per-hour passing zones. A windshield survey of marked passing and no-passing zones was conducted to collect both northbound and southbound PSD data. PSD data correlate to the Mile Posts located along the existing roadway. These data are presented in Figure 4.2 and provide only an illustration of the northbound PSD due to the very similar nature in both directions.

A Good rating was provided for each segment of the corridor with a broken center line, and a Poor rating was assigned to segments marked with a solid center line. Approximately 27 percent of the corridor includes passing zones, thus 73 percent of the corridor is rated as Poor for passing opportunities.

Roadway Width and Widening Feasibility

Lane widths throughout the corridor are relatively narrow, averaging 11 feet wide. Shoulders throughout the entire corridor range from zero to one foot in width, averaging approximately six inches in width. A cross section of the existing roadway conditions, also known as a typical section, is shown in Figure 4.1. The existing side slopes vary in width and degree and are therefore depicted as discontinuous lines in Figure 4.1.

Figure 4.1 Existing Roadway Width



Widening through the southern half of the corridor would require a substantial amount of cut and fill due to steep side slopes, which would increase the cost of widening in this portion. In the northern half of the corridor, the side slopes are not as steep. This portion would require less earthwork, and would therefore be less expensive for a comparable length of roadway. New right-of-way would be required at several locations throughout the corridor.

Bridges

There are two bridges in the corridor: one at MP 12.9± over Red Lodge Creek and one at MP 19.8± over East Rosebud Creek. MDT evaluates the current sufficiency of bridges in terms of structural adequacy and safety, serviceability and functional obsolescence, essentiality for public use, and special reductions. According to the MDT bridge sufficiency ratings database, neither of these bridges is deficient. The sufficiency of these bridges over time will be assessed by MDT.

4.2 Traffic Conditions

Average Daily Traffic Volumes

The weighted annual average daily traffic (AADT) is a total of all motorized vehicles traveling both directions on a highway on an average day. AADT for the MT 78 segment from MP 5.0 to MP 19.0 during the period January 1, 1995 to December 31, 2005 was 742 vehicles per day. AADT for the MT 78 segment from MP 4.0 to MP 20.0 during the period January 1, 2005 to December 31, 2005 was 994 vehicles per day.

Crashes

Crash rates in the corridor were compared to the average crash rate for similar facilities throughout the state of Montana. The data were collected by MDT for the period of January 1, 1995 through December 31, 2004. The average crash rate for all state primary roads for the period 1995 through 2004 is 1.502 crashes per million vehicle miles. Based on AADT for this portion of MT 78, the average statewide crash rate would be expected to equal 2.72 crashes per half-mile segment for the period 1995 to 2004. Appendix D provides a more detailed analysis of crash rates.

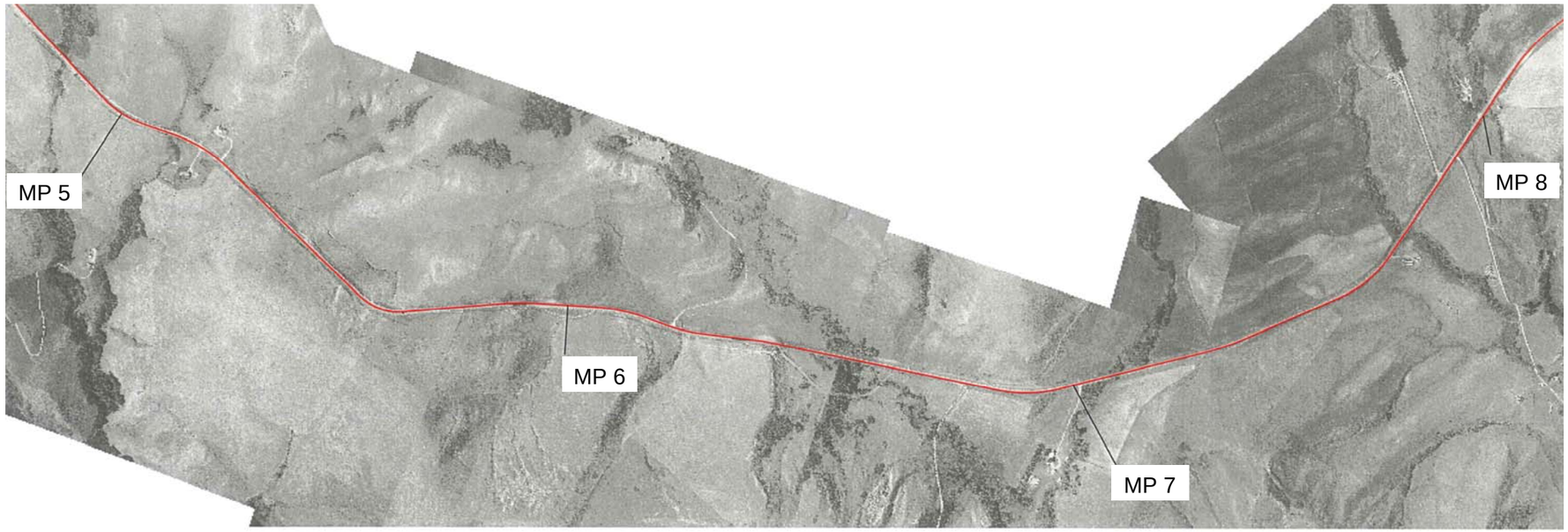
Segments of the roadway with a higher number of crashes than the expected statewide average are identified as crash concentrations in Table 4-5 and Figure 4.2. As depicted in the figure, crash concentrations generally coincide with areas exhibiting poor roadway geometry. Within these segments, there are three or more crashes per half-mile.

Table 4-5 Roadway Segments with Three or More Crashes per Half Mile

Segment (from MP to MP)	Total Crashes in Study Period
4.9-5.1	4
5.1-5.6	16
5.6-6.1	10
6.1-6.6	8
6.6-7.0	10
7.0-7.5	4
7.4-7.8	5
7.6-8.1	3
7.8-8.3	4
8.3-8.7	3
8.7-9.2	4
9.2-9.5	3
12.1-12.4	3
12.4-12.9	5
13.4-13.9	4
16.3-16.6	5
17.5-17.8	3
18.6-18.9	3
18.9-19.1	3
19.1-19.5	3
19.5-19.9	4
19.9-20.0	4

Figure 4.2 Geometric and Operational Characteristics of the MT 78 Corridor

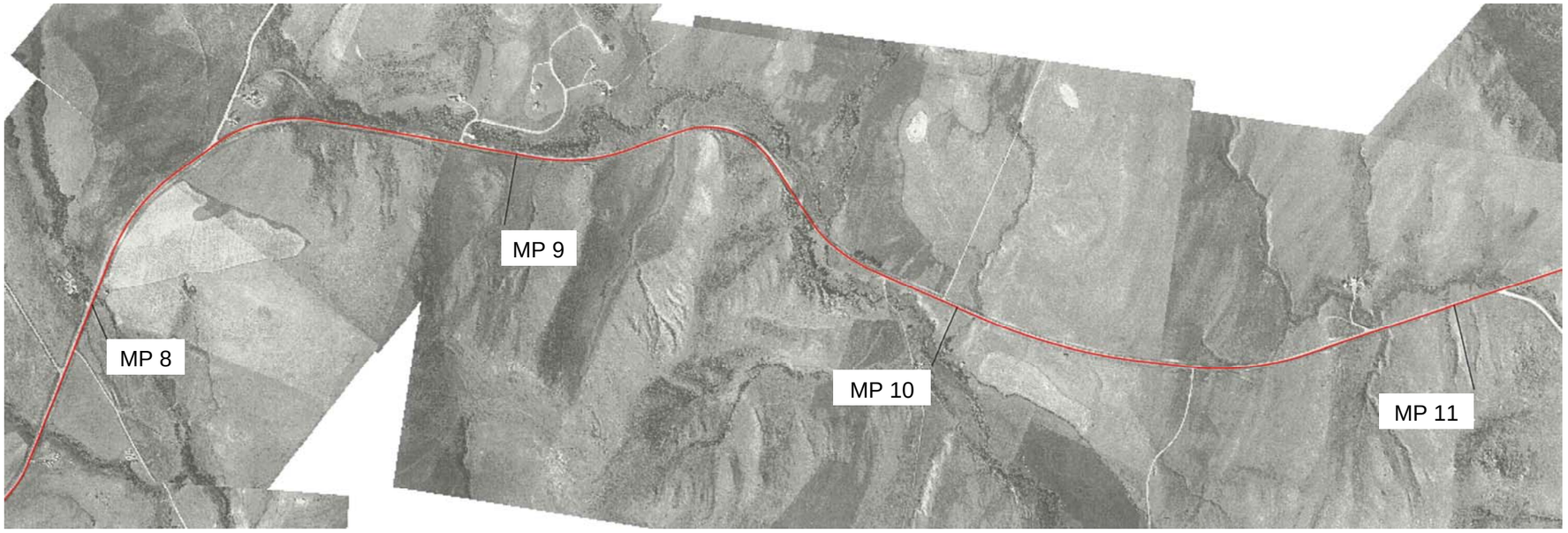
LEGEND	
	MT 78
G	Geometric Criteria
O	Operational Criteria
NB	Northbound (Southbound is similar)
	Good
	Fair
	Poor
	Not Measured
	Crash Concentration

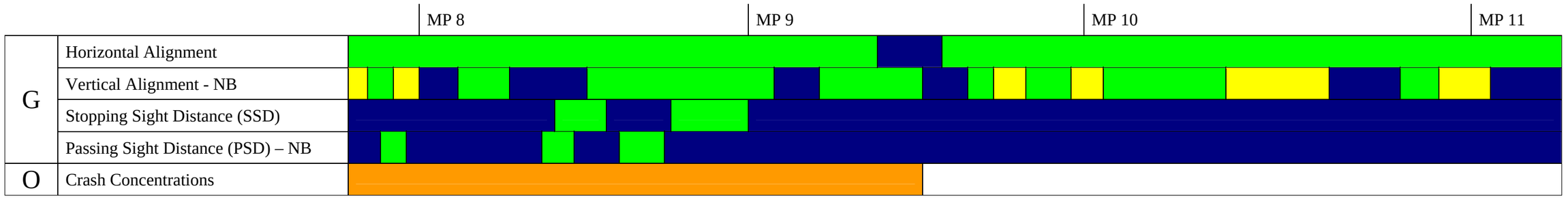


			MP 5	MP 6	MP 7	MP 8
G	Horizontal Alignment					
	Vertical Alignment -NB					
	Stopping Sight Distance (SSD)					
	Passing Sight Distance (PSD) - NB					
O	Crash Concentrations					

LEGEND

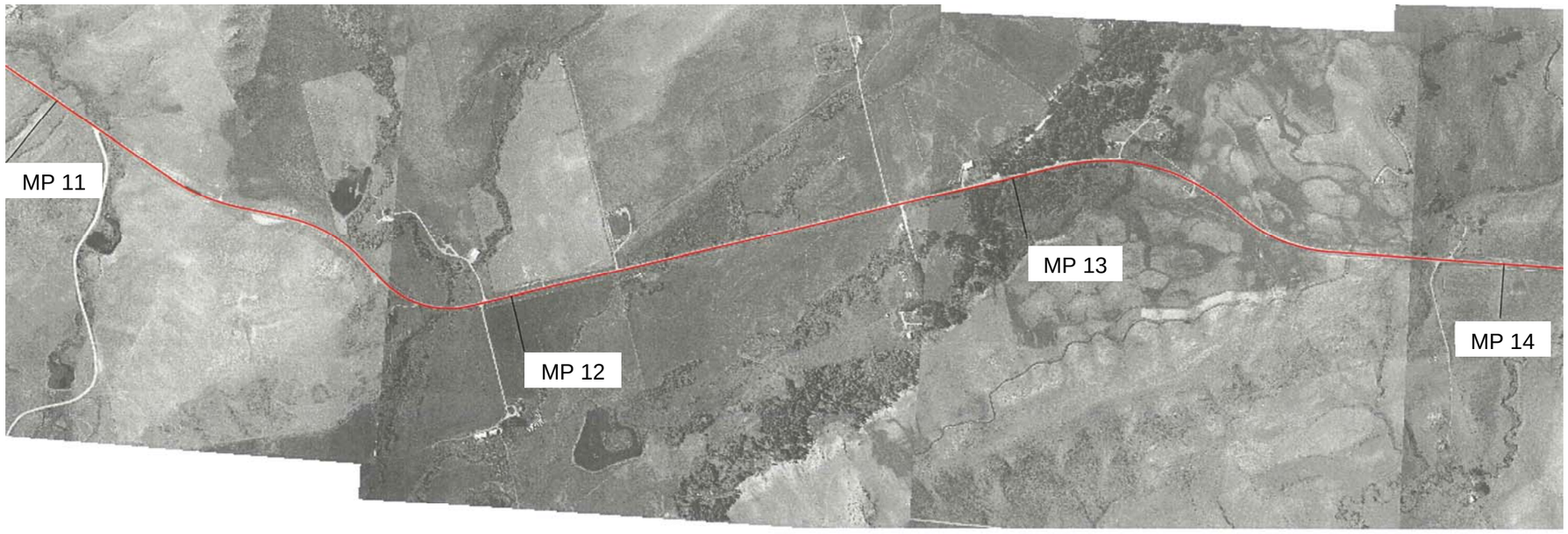
- MT 78
- G — Geometric Criteria
- O — Operational Criteria
- NB — Northbound (Southbound is similar)
- Good
- Fair
- Poor
- Not Measured
- Crash Concentration





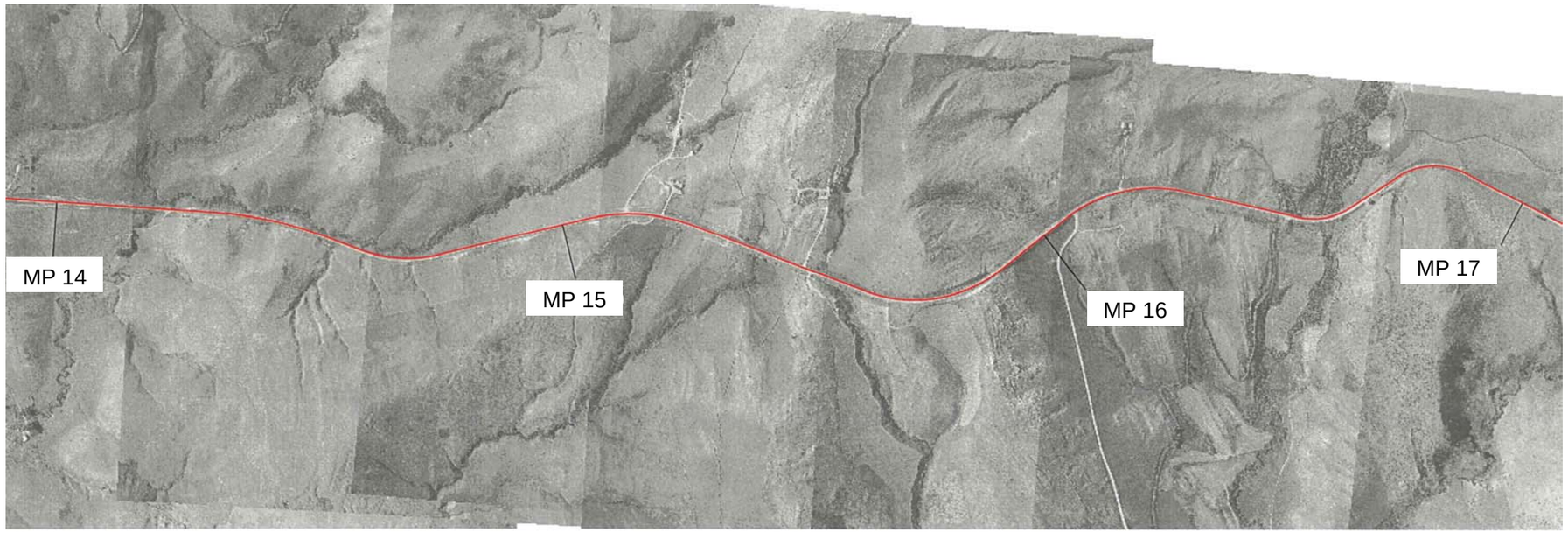
LEGEND

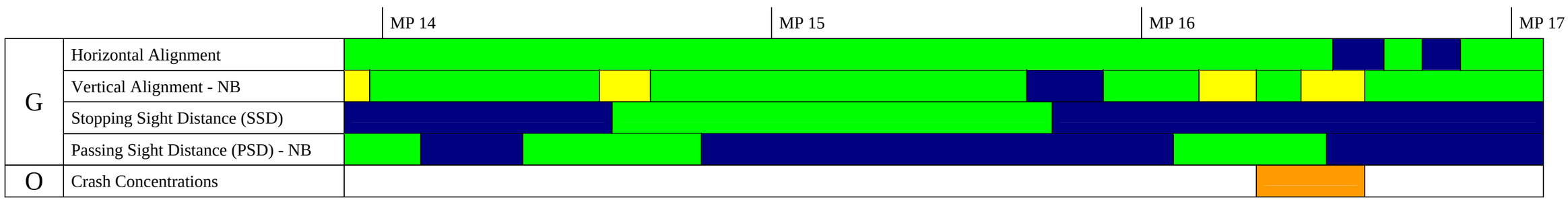
- MT 78
- G — Geometric Criteria
- O — Operational Criteria
- NB — Northbound (Southbound is similar)
- Good
- Fair
- Poor
- Not Measured
- Crash Concentration



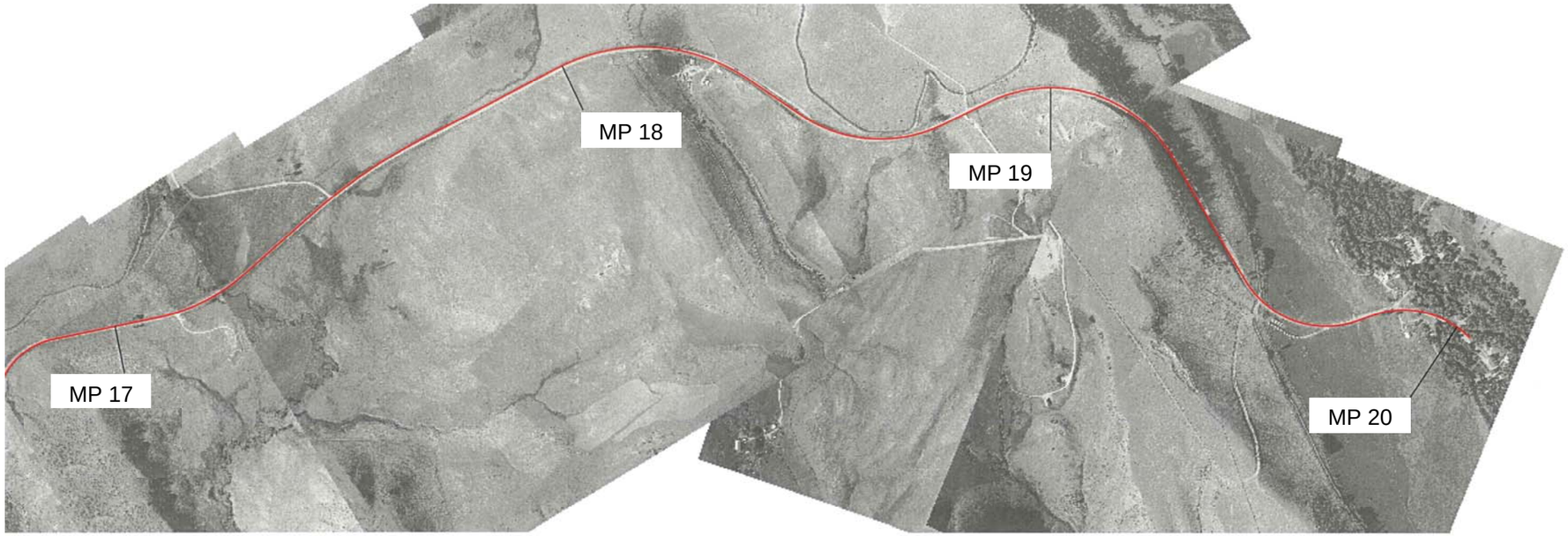
		MP 11	MP 12	MP 13	MP 14
G	Horizontal Alignment				
	Vertical Alignment - NB				
	Stopping Sight Distance (SSD)				
	Passing Sight Distance (PSD) - NB				
O	Crash Concentrations				

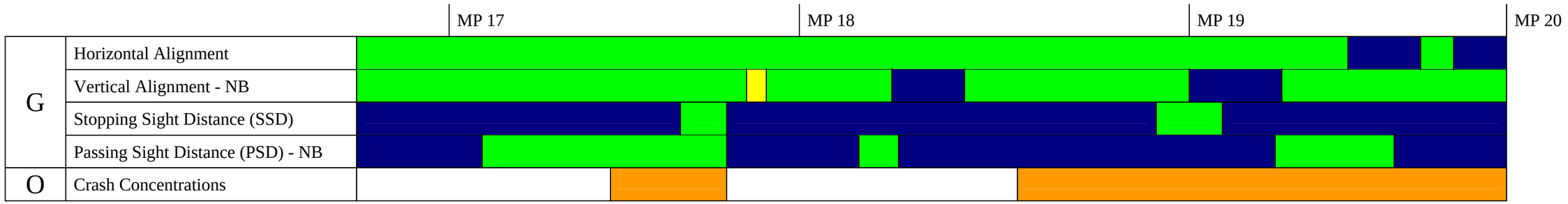
LEGEND	
	MT 78
G	Geometric Criteria
O	Operational Criteria
NB	Northbound (Southbound is similar)
	Good
	Fair
	Poor
	Not Measured
	Crash Concentration





LEGEND	
	MT 78
G	Geometric Criteria
O	Operational Criteria
NB	Northbound (Southbound is similar)
	Good
	Fair
	Poor
	Not Measured
	Crash Concentration





4.3 Multi-Modal Transportation

Railroad Facilities

There is no rail service along the entire MT 78 corridor. Montana Rail Link operates a main line to the north of MT 78 that runs through Columbus.

Air Facilities

The Red Lodge Airport is located approximately one mile northwest of Red Lodge. Commercial airlines do not currently service the Airport. The Airport averages 22 operations daily, 46 percent of which is local general aviation.

The Laurel Municipal Airport is located approximately 45 miles northeast of Red Lodge. Commercial airlines do not currently service the Airport. The Airport averages 36 operations daily, nearly 60 percent of which is local general aviation.

Located approximately 60 miles northeast of Red Lodge, the Billings Logan International Airport offers 35 commercial scheduled air flights daily. In 2003, there were over 370,000 passenger boardings and nearly 375,000 passenger deplanements, making the Airport one of the largest and busiest facilities in the region. The Airport offers services from eight national carriers.

Yellowstone Regional Airport is located in Cody, Wyoming, approximately 60 miles south of Red Lodge. The Airport is served by three national carriers. The Airport averages over 100 operations per day, the majority of which are local general aviation (42 percent).

Bicycle and Pedestrian Facilities

There are no existing facilities within the corridor reserved solely for bicycle or pedestrian use. The MDT bicycle map notes that shoulders throughout this portion of the corridor are less than four feet in width and grades are greater than seven percent. Based on a field review, shoulders generally appear to be less than one foot in width or nonexistent. Anecdotal data from a local bicycle shop in Red Lodge suggests that there is low bicycle usage of the corridor, mainly due to sight distance limitations, high vehicle speeds, and the limited shoulder along the corridor. The bicycle shop does not recommend the route to its customers.

The Yellowstone Valley Cycling Club of Billings conducts a club bicycle ride from Roscoe to Red Lodge once a year. According to the club, the route is physically challenging due to the steep grades, and is therefore not popular among its members. Based on anecdotal information, Highway 212 is used more often by bicyclists because it provides a more direct link to Billings. Adventure Cycling, a national bicycling organization, was contacted regarding their use of the corridor. They do not use the route and therefore have no data regarding ridership.

Few pedestrians use the corridor as a walking facility, although users include school-aged children who may walk short distances to bus stops along the corridor and residents who live in the area. There are no planned or proposed trails or routes for bicycle or pedestrian use within the corridor at this time.

Transit Services

There are no public transit service providers within the corridor. The Red Lodge Senior Citizens Center provides transportation services for senior citizens traveling between Red Lodge and Billings. There are no known service providers that travel the MT 78 corridor between Red Lodge and Roscoe.

Utilities

Utilities within the corridor include telephone and electric service. Telephone service is provided by Qwest Communications. Electric service is provided by NorthWestern Energy. Each of these utility companies were contacted, but could not provide a map of transmission lines in the area. A private utility mapping contractor was also contacted, but did not have any data within the corridor. Because no utility mapping exists for the area, a survey of utilities would be necessary prior to the completion of any project.

4.4 Area Projects

There are a number of recent, planned, and ongoing projects along MT 78 between Red Lodge and Columbus. They are as follows:

- The study corridor was resurfaced in 2006 to address pavement preservation needs.
- *Red Lodge – NW* is a reconstruction project of MT 78 from the beginning of the route at the intersection with P-28 in Red Lodge (MP 0.0) extending north and west to MP 5.1±. This project is proposed to bring the roadway up to current design standards.
- *8km NW Red Lodge* is a safety improvement project to address a crash cluster location. The project is located on MT 78 between MP 5.2 and MP 5.6. This project is proposed to reconstruct a sharp horizontal curve to a larger radius with flatter slopes.
- *Columbus-South* is a reconstruction project to improve safety and efficiency and to accommodate increasing travel demands. The project extends from the bridge over the Yellowstone River just south of Columbus at RP 45.9 south to RP 37.1. This project is currently under construction.

- *Absarokee-North & South* is a full reconstruction project to improve safety and efficiency and to accommodate increasing travel demands. It ties to the Columbus - South project at RP 37.1 and continues south to RP 29.8. This project is scheduled for construction in 2010.

- *Roscoe-Jct 419* is a combination widen/overlay and reconstruction project to improve safety and efficiency and to accommodate increasing travel demands. The project begins north of Roscoe at MP 20.15 and ends just south of Junction 419 at MP 29.8. This project is scheduled to be let to contract in early 2010.

4.5 Summary of Existing Geometric Issues and Identified Improvement Needs

The investigation of existing conditions of the MT 78 transportation system identified a number of issues to be considered in development of the corridor plan. These issues are described in the following list.

1. Steep grades exist over a large portion of the corridor. Grades up to and exceeding seven percent, which is the maximum recommended grade for mountainous terrain, are common, especially on the southern portion of the corridor.

2. Sharp horizontal curves exist at the southern and northern ends of the corridor and at a few scattered locations within the middle portion of the corridor.

3. Passing sight distance is limited due to poor horizontal and vertical alignments. The road is used by agricultural vehicles, trucks, recreational vehicles, and other heavy, slow moving vehicles. The lack of ability to pass presents a potential safety hazard.

4. Stopping sight distance is limited, not only due to poor horizontal and vertical alignments, but also due to slope and clear zone issues. In a number of locations short hills connect steep grades, resulting in a "roller-coaster" effect, which leads to inadequate sight distance. Additionally, steep side slopes and short inslopes narrow the line of sight from the roadway. Inadequate sight distance is a safety concern as wildlife, vehicles, and other obstructions can easily be hidden from a driver's view, limiting the ability to stop or take other action to avoid collisions. Narrow clear zones allow wildlife to approach the roadway without being seen by drivers.

5. Crash concentrations are located between MP 5± to 9.5± and from MP 18.5± to 20±, as well as in scattered locations between MP 12± to 14± and MP 17± to 18±.

6. Shoulder widths throughout the corridor are not wide enough to accommodate vehicle stops or exclusive bicycle travel.

7. There are few places to pull off the road due to roadway width and the lack of sight distance. This causes problems for all motorists.

8. There are a number of poorly-aligned access points along the corridor. These access points represent a hazard due to limited sight distance, with vehicles entering the roadway at low speeds undetected by drivers approaching at relatively high speeds.

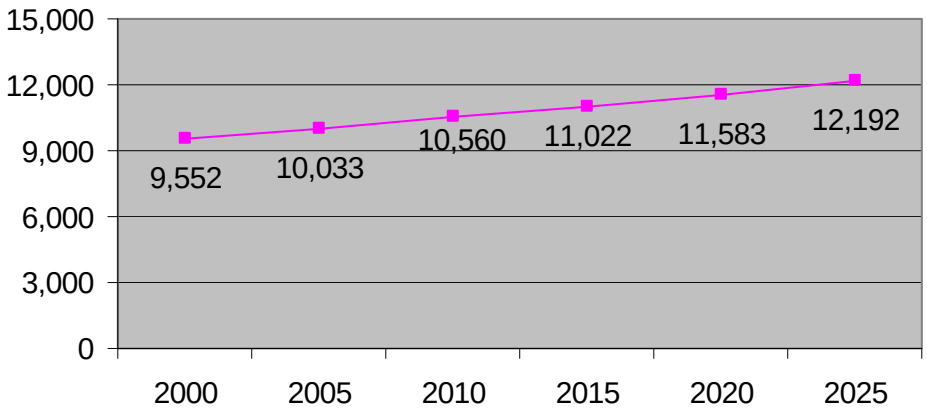
9. According to the MDT bridge sufficiency ratings database, the two existing bridges within the corridor are not deficient.

5.0 TRANSPORTATION FORECASTS

5.1 Population Projections

NPA Data Services Inc., a Washington, D.C.-based economic research, forecasting, and data development firm, has projected county populations into the year 2025. As shown in Figure 5.1, Carbon County is projected to gain 2,159 residents between 2005 and 2025 for a total population of 12,192 in 2025.

Figure 5.1 Carbon County Population Projections, 2000 – 2025



This represents nearly a 22 percent increase in population for the period 2005-2025. The annual average growth rate for the 20-year period from 2005 to 2025 is projected to be approximately one percent per year. In comparison, the city of Red Lodge is projected to grow at an annual rate of 2.2 percent.

5.2 Traffic Projections

The forecasts for the Carbon County population and Red Lodge population show slow to moderate growth. Population growth rates alone, however, cannot provide an accurate measure of traffic growth for the MT 78 corridor because they do not account for tourist, commerce, and commuter traffic. Traffic count data collected on MT 78 over the period 1970 to 2004 may provide a more accurate estimate of traffic growth. There is a large difference between traffic volumes throughout the entire MT 78 corridor between Red Lodge and Columbus. Although the growth rates associated with traffic count locations at MP 6± and MP 13± are fairly high, the traffic volumes themselves are fairly low. In comparison, there are higher traffic volumes north of the MT 78 junction with Highway 419, but growth rates for this portion of MT 78 are generally lower. Table 5-1 lists several growth rates and the corresponding estimated traffic volumes for the corridor.

Table 5-1 Growth Rates and Projected AADT for the MT 78 Corridor, 1970 – 2004

Annual Growth Rate	Method of Calculation of Growth Rate	Estimated AADT in 2006	Projected AADT in 2026
5.13	Calculated from traffic count data at MP 6±	1,139	3,098
5.69	Calculated from traffic count data at MP 13±	927	2,804
4.14	Average for corridor from MP 0± to MP 47.5± weighted by segment length	1,665	3,747
3.95	Average for corridor from MP 6± to MP 44.5±	1,606	3,485

As noted in Table 5-1, the various growth rates produce projections within a range of approximately 2,800 to 3,800 AADT in 2026. Even the greatest projected increase in AADT does not affect capacity recommendations, but may result in a need for passing and/or climbing lanes in some locations (see Chapter 7).

On the portion of MT 78 north of the study area, traffic volumes tend to be higher. This is primarily due to traffic related to the Stillwater Mine, which splits off at the junction with MT Secondary Highway 419 (S-419) (MP 29.8±). MDT's March 2002 *Final Environmental Impact Statement, Absarokee to Columbus* reported that AADT on MT 78 north of S-419 junction was 1,710. South of the junction, it dropped to 590 AADT. AADT (estimated and projected) in Table 5-1 for MP 0± to MP 47.5± and MP 6± and MP 44.5± include higher traffic volumes north of S-419. This explains in part the discrepancy between the lower traffic volumes in the first two rows of the table above and the higher traffic volumes in the bottom two rows.

6.0 IMPROVEMENT OPTIONS ANALYSIS

Based on existing roadway conditions, it was determined that in certain areas along MT 78, spot improvements could be made to the roadway in order to improve sight distance and, therefore, safety. However, because the roadway failed to meet both vertical and horizontal requirements in numerous locations, a full reconstruction should be considered in the long range plan.

The roadway can be brought up to current design standards in the most cost-effective manner by improving the roadway on the current alignment throughout the majority of the corridor. This strategy is cost-effective because it requires less new right-of-way and minimizes adverse impacts to the surrounding built and natural environment. An exception is at the northern end of the corridor, where two steep hills leading into Roscoe limit the ability to improve roadway geometry. In this particular area, improvement options include building the road on a new alignment in order to meet current standards.

There were some early discussions within the Department regarding reconstruction on an entirely new alignment or on an historic alignment over the entire corridor. An off-alignment option over the full corridor did not generate any interest or comment at the public meetings. Once it was determined through the study analysis that improved safety and geometric design could largely be achieved while remaining on the existing alignment, an off-alignment option over the entire corridor was not explored further.

In this chapter, the corridor is discussed mile-by-mile. Suggested improvements, including both spot improvements and full reconstruction options, are presented. At the end of the chapter, three alignment options are shown for Roscoe Hill. Specific recommendations and a more detailed discussion of improvement options are provided in Chapter 7. Improvement options between MP 5± and MP 18± are discussed in Section 6.1. Alignment options for Roscoe Hill (MP 18± to MP 20±) are discussed in Section 6.2. One of the improvement options, Improvement Option 3, extends beyond the defined corridor study limits, to MP 21.5±, in order to tie the new alignment in with the existing alignment.

6.1 Improvement Options

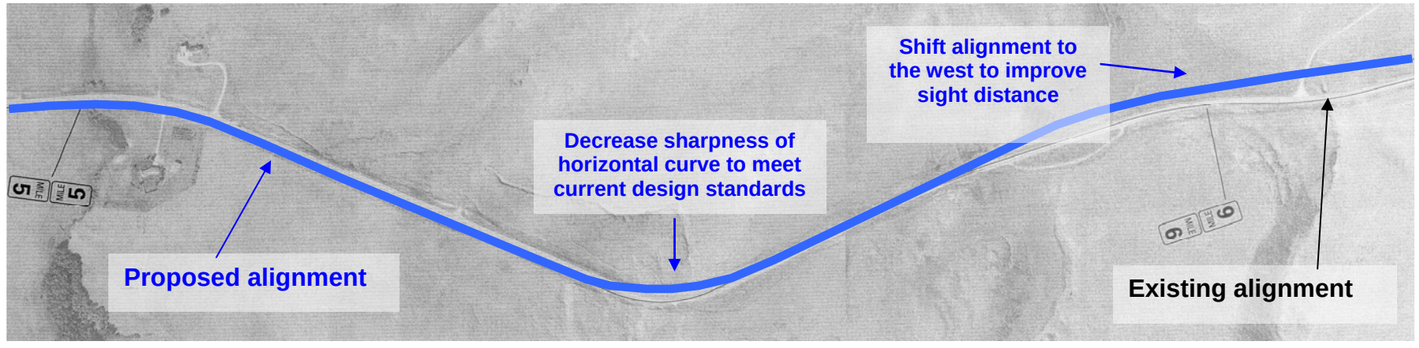
MP 5± to MP 6±

Horizontal

At MP 5.5±, there is a sharp horizontal curve. As noted in Figure 4.2, this curve is rated “poor” due to its inadequate curve radius.

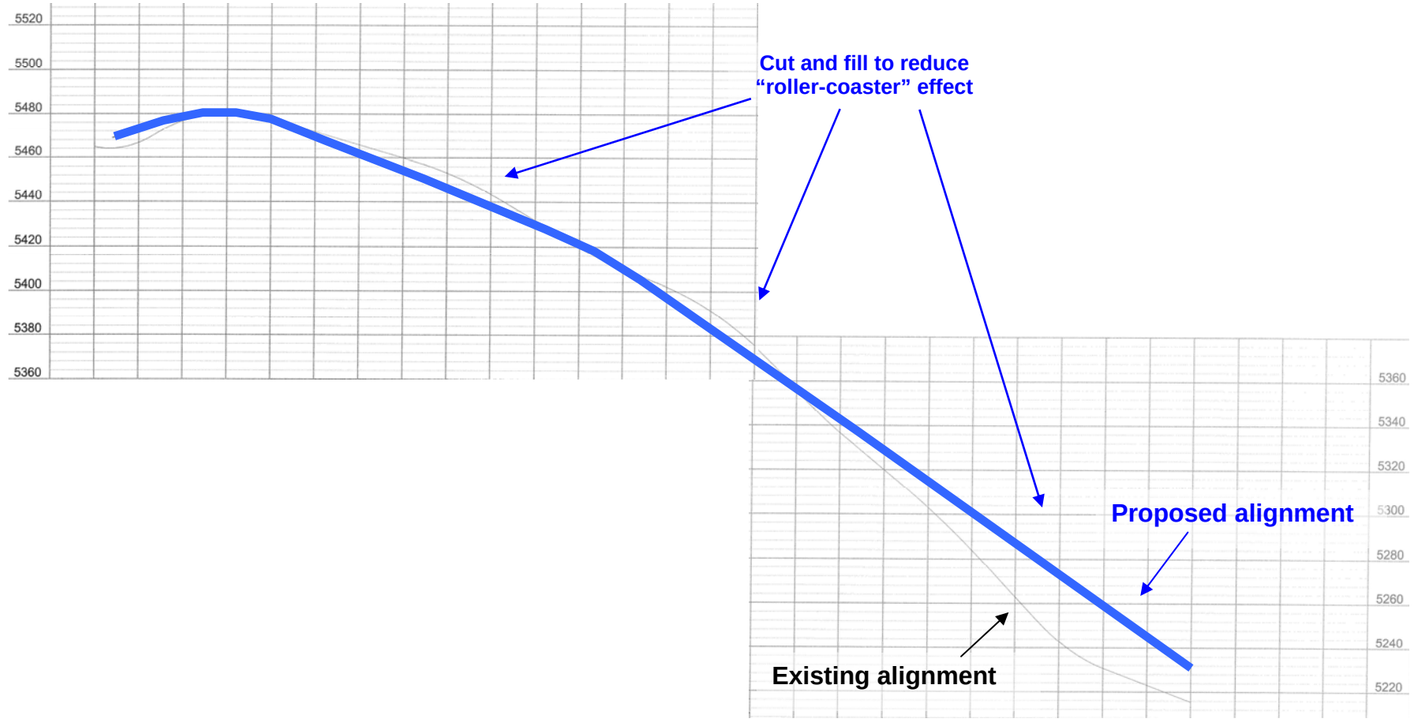
As shown in Figure 6.1, it is proposed that the roadway be shifted to the west in this location to decrease the sharpness of this curve. The alignment was shifted only far enough to ensure that the curve meets current design standards.

Beginning at MP 5.8±, it is proposed that the roadway be shifted to the west again in order to improve sight distance.



Vertical

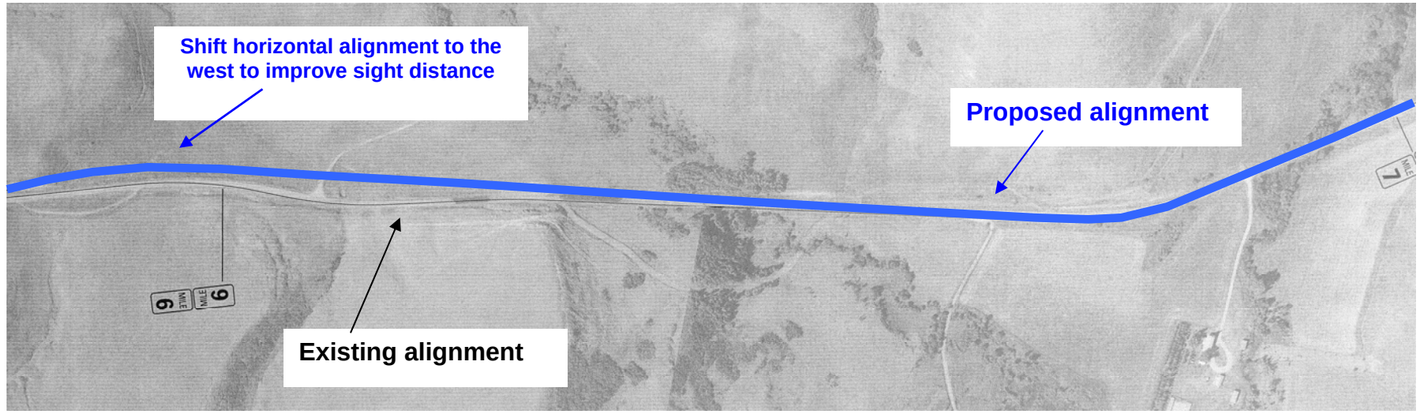
Between MP 5± and 6±, there are several sag and crest curves in the vertical alignment, creating a “roller-coaster” effect. Grades exceeding the maximum recommended grade within this portion of MT 78 range from approximately eight to 11 percent. As noted in Figure 4.2, these curves are rated “fair” and “poor,” due to their steep grades. It is proposed that cut and fill be used to reduce this effect and create a more uniform grade. This action would bring the curve up to current design standards.



MP 6± to MP 7±

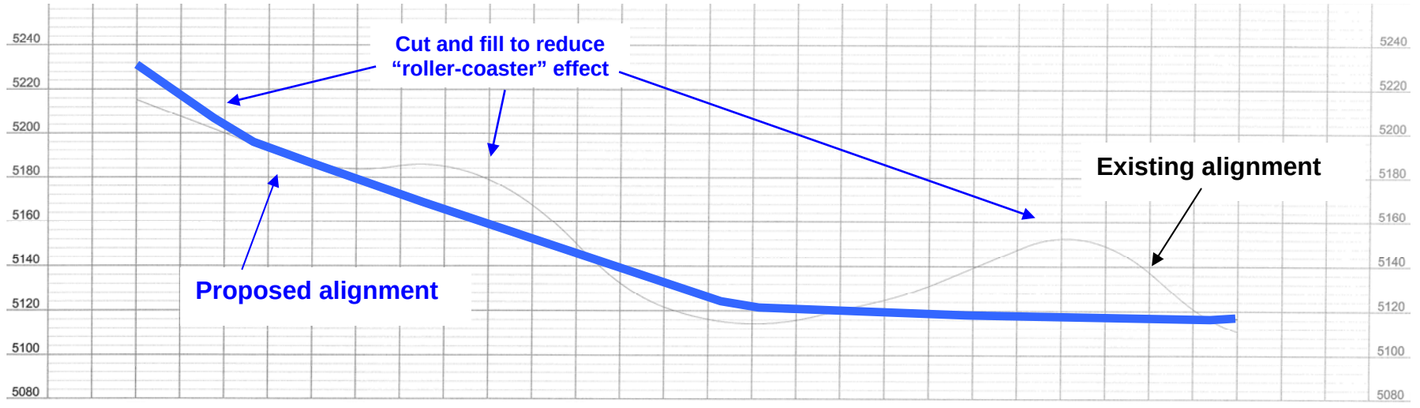
Horizontal

Near MP 6±, it is proposed that the roadway be shifted to the west in order to improve sight distance.



Vertical

Between MP 6± and 7±, there are several sag and crest curves in the vertical alignment, creating a “roller-coaster” effect. Grades exceeding the maximum recommended grade within this portion of MT 78 range from approximately nine to ten percent. It is proposed that cut and fill be used to reduce this effect and create a more uniform grade.



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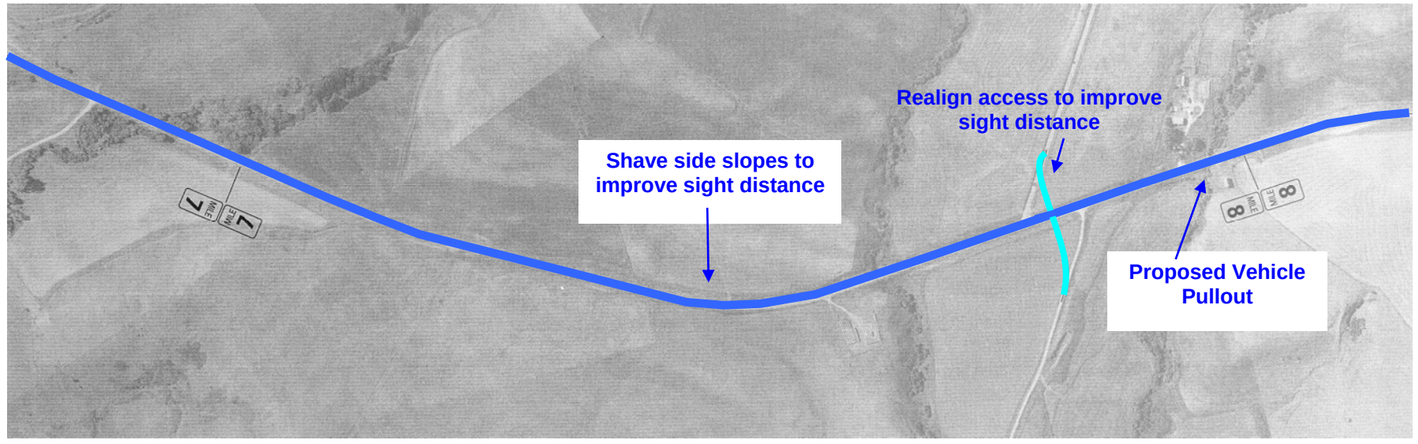
MP 7± to MP 8±

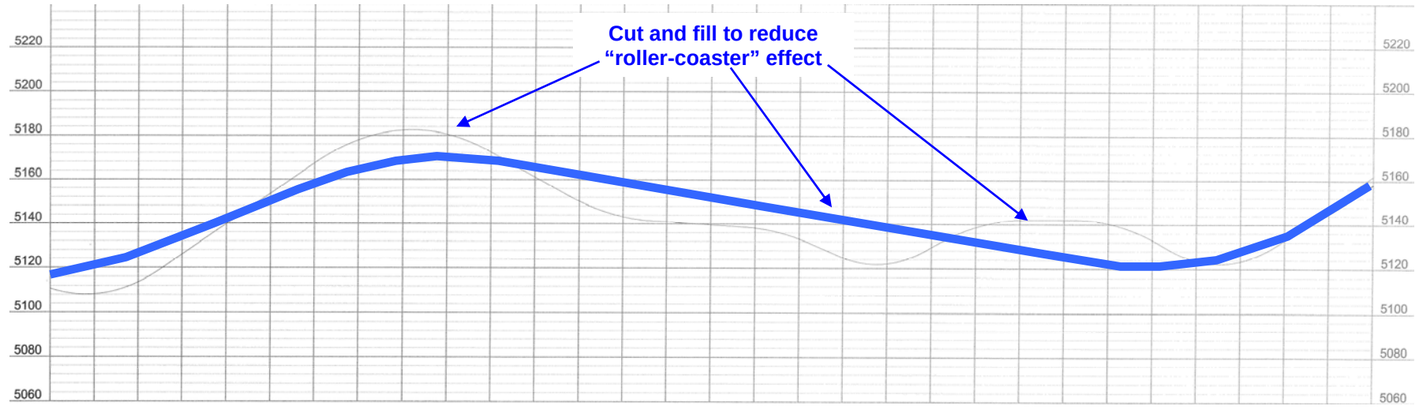
Horizontal

Between MP 7± and MP 8±, it is proposed that the side slopes be shaved to improve sight distance. At MP 7.8±, it is proposed that the access points be realigned to improve sight distance. At MP 7.9±, a vehicle pullout is proposed.



Vertical

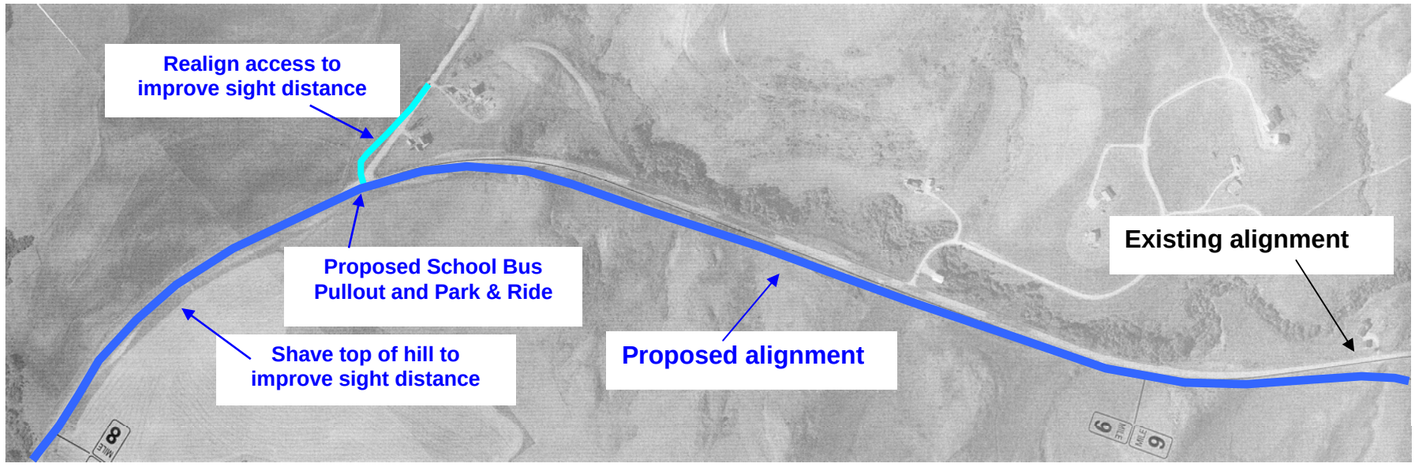
Between MP 7± and MP 8±, there are several sag and crest curves in the vertical alignment, creating a “roller-coaster” effect. Grades exceeding the maximum recommended grade within this portion of MT 78 range from approximately seven to nine percent. It is proposed that cut and fill be used to reduce this effect and create a more uniform grade.



MP 8± to MP 9±

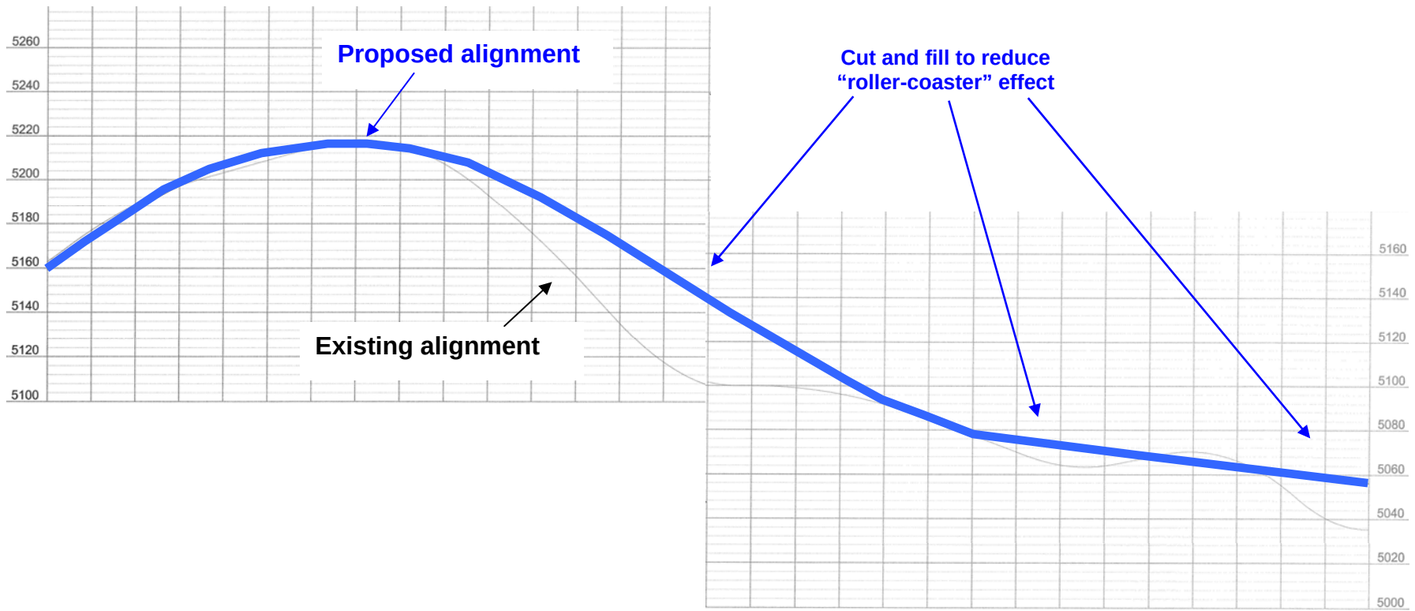
Horizontal

Between MP 8± and MP 9±, it is proposed that the top of the hill be shaved to improve sight distance. At MP 8.2±, it is proposed that Uppoer Luther Road be realigned to improve sight distance. Additionally, a school bus pullout and park & ride facilities are proposed at this location.



Vertical

Between MP 8± and MP 9±, there are several sag and crest curves in the vertical alignment, creating a “roller-coaster” effect. Grades exceeding the maximum recommended grade within this portion of MT 78 range from approximately seven to 11 percent. It is proposed that cut and fill be used to reduce this effect and create a more uniform grade.



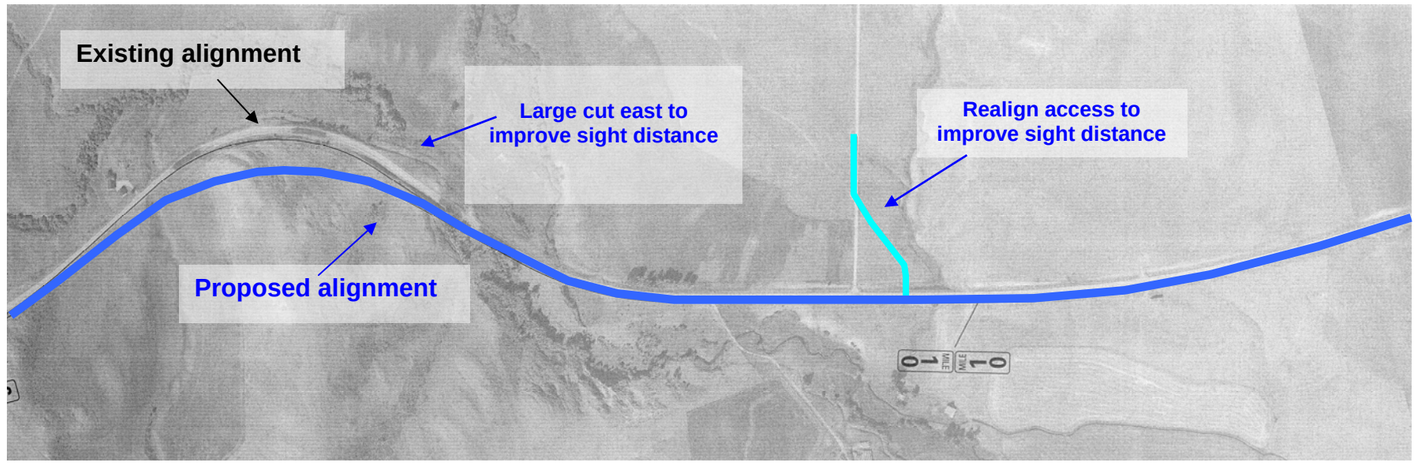
MP 9± to MP 10.5±

Horizontal

At MP 9.4±, there is a sharp horizontal curve. As noted in Figure 4.2, this curve is rated “poor” due to its inadequate curve radius.

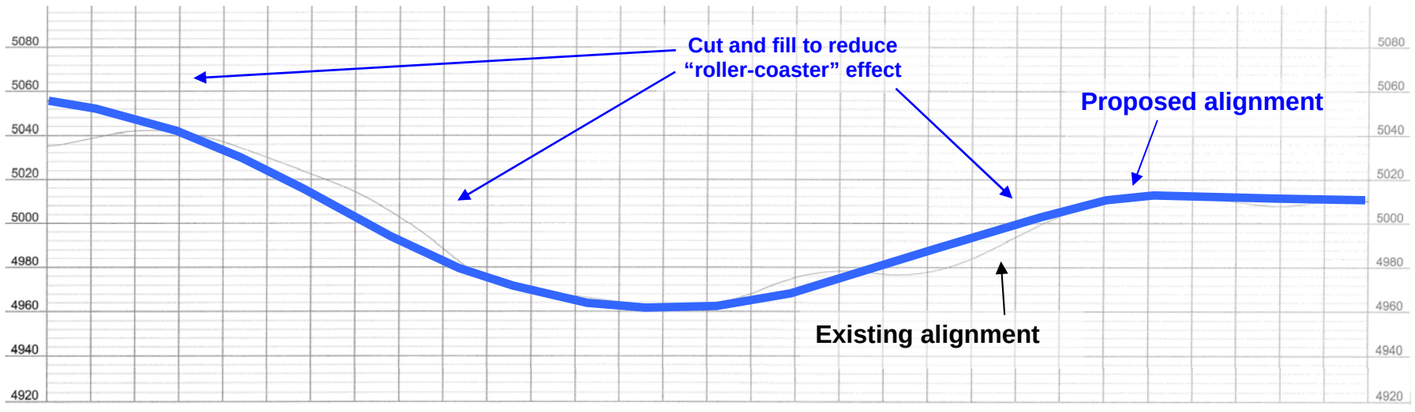
As shown in the aerial to the right, it is proposed that the roadway be shifted to the east in this location to decrease the sharpness of this curve.

It is also proposed that the access point be realigned to improve sight distance.



Vertical

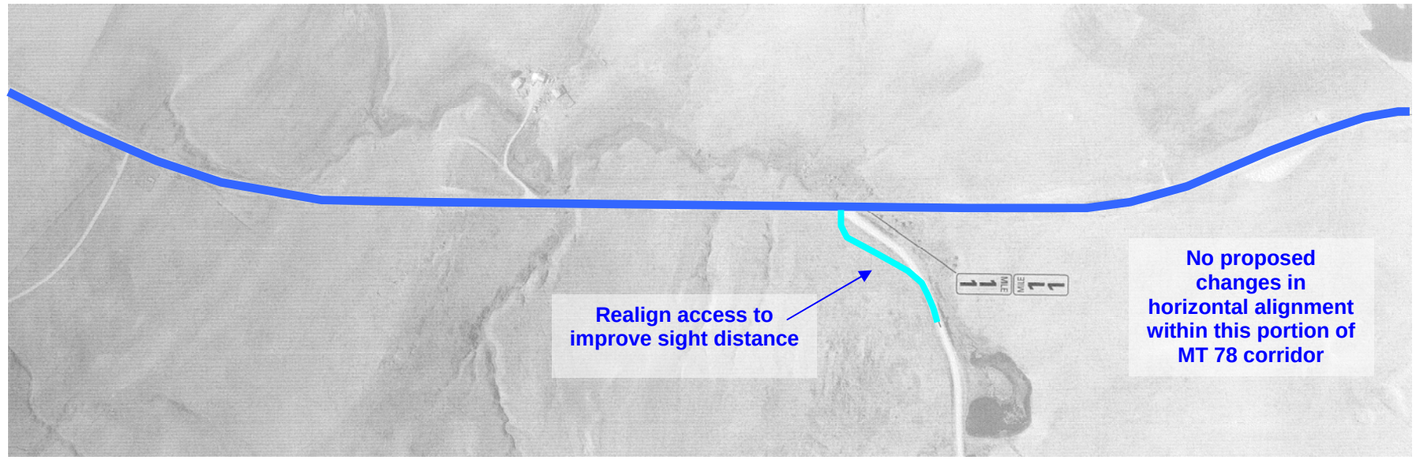
Between MP 9± and MP 10.5±, there are several sag and crest curves in the vertical alignment, creating a “roller-coaster” effect. Grades exceeding the maximum recommended grade within this portion of MT 78 range from approximately eight to nine percent. It is proposed that cut and fill be used to reduce this effect and create a more uniform grade.



MP 10± to MP 11.5±

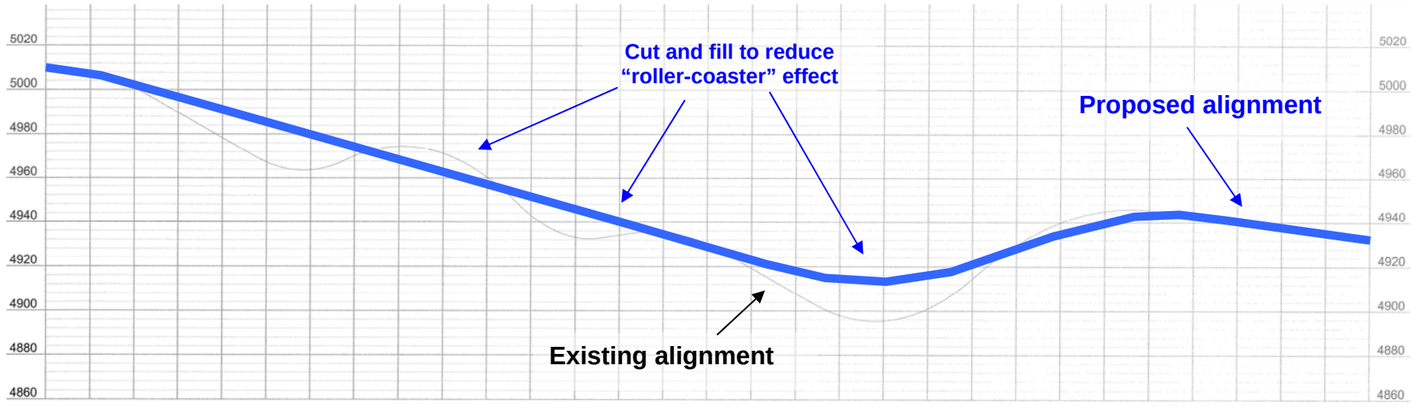
Horizontal

At MP 11±, it is proposed that the access road be realigned to improve sight distance. There are no proposed changes in the horizontal alignment within this portion.



Vertical

Between MP 10± and MP 11.5±, there are several sag and crest curves in the vertical alignment, creating a "roller-coaster" effect. Grades exceeding the maximum recommended grade within this portion of MT 78 range from approximately eight to ten percent. It is proposed that cut and fill be used to reduce this effect and create a more uniform grade.

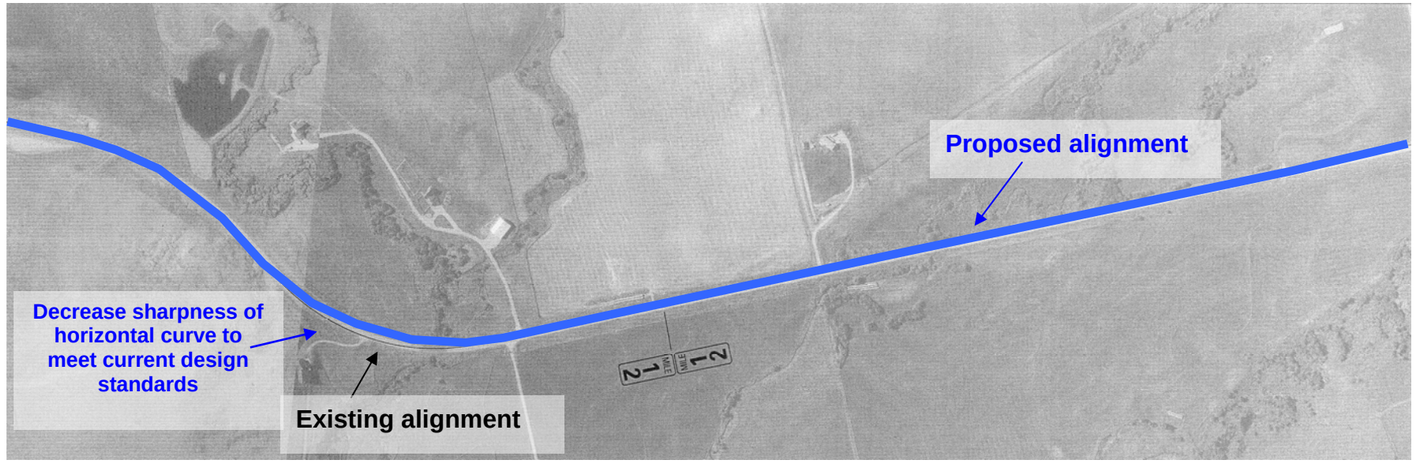


MP 11.5± to MP 12.5±

Horizontal

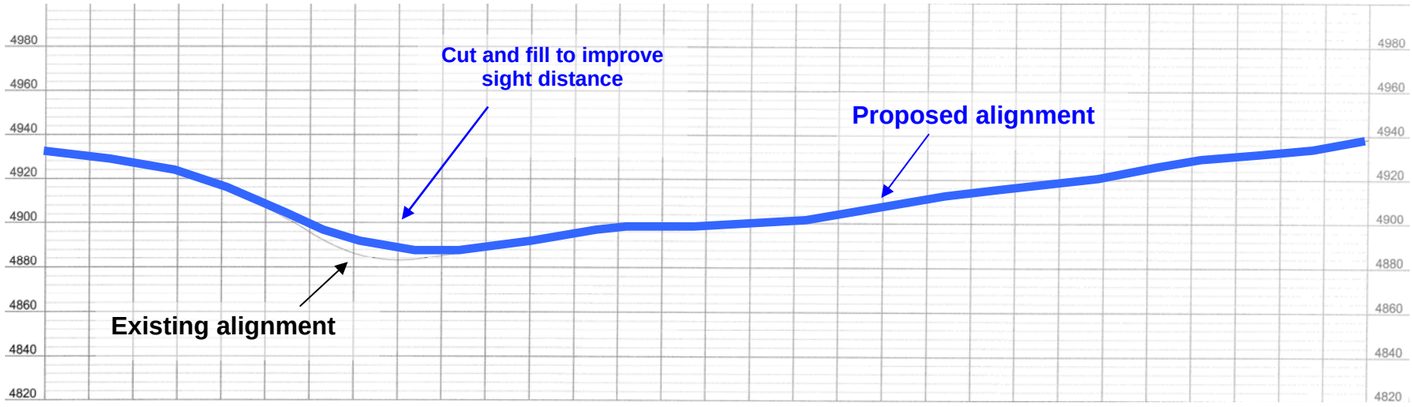
Between MP 11.5± and 12.0±, there is a sharp horizontal curve. As noted in Figure 4.2, this curve is rated “poor” due to its inadequate curve radius.

As shown in Figure 6.1, it is proposed that the roadway be shifted to slightly in this location to decrease the sharpness of this curve. The alignment was shifted only far enough to ensure that the curve meets current design standards.



Vertical

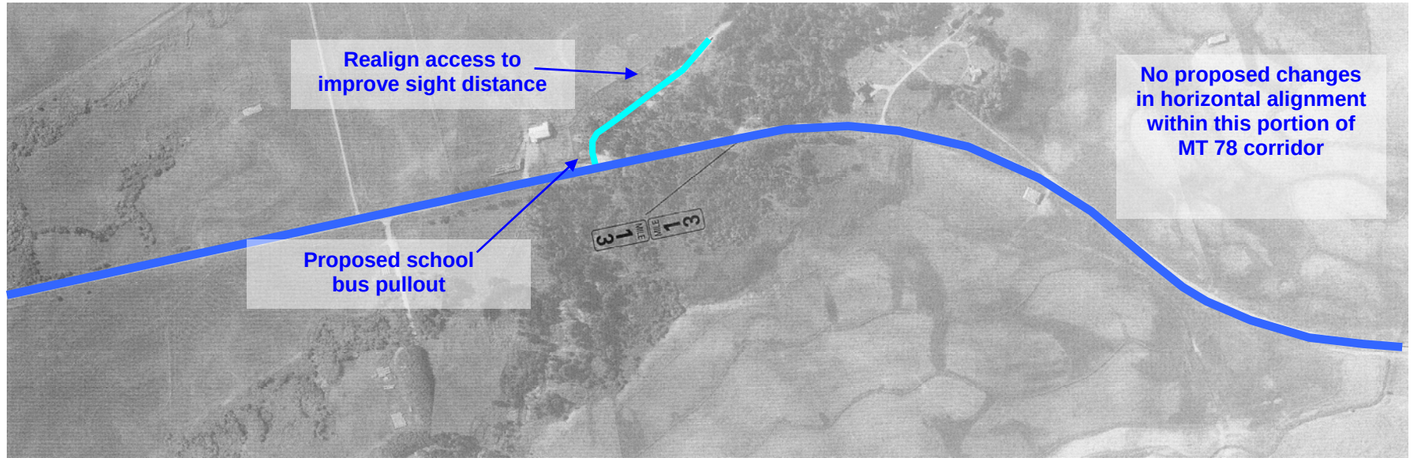
Between MP 11.5± and MP 12.0±, there is a sag curve in the vertical alignment which does not meet current design standards for sight distance. It is proposed that fill be used to improve the sight distance of this curve.



MP 12.5± to MP 13.5±

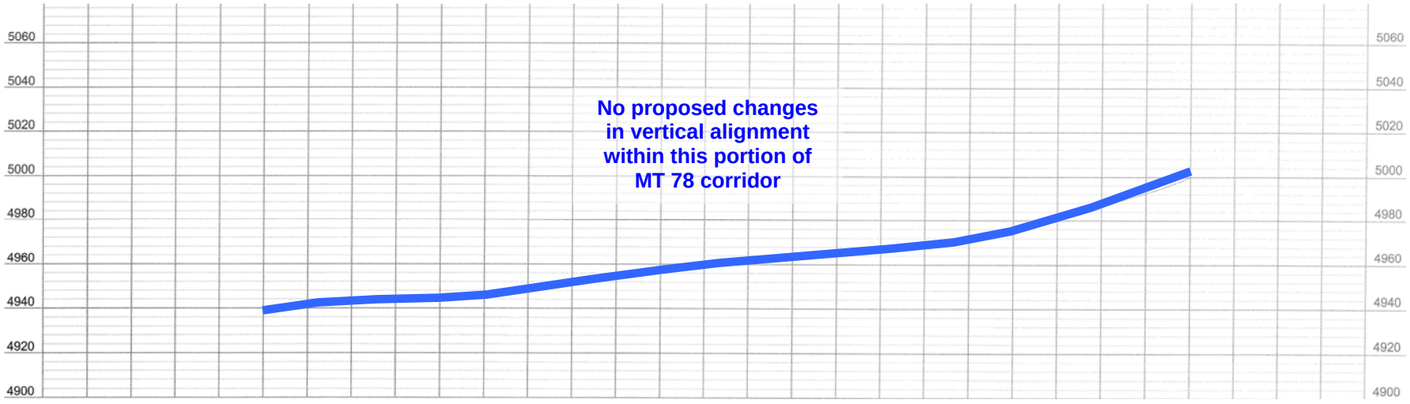
Horizontal

Between MP 12.5± and MP 13.5±, it is proposed that the access point be realigned to improve sight distance. At MP 13.0, a school bus pullout is proposed. There are no proposed changes in the horizontal alignment within this portion.



Vertical

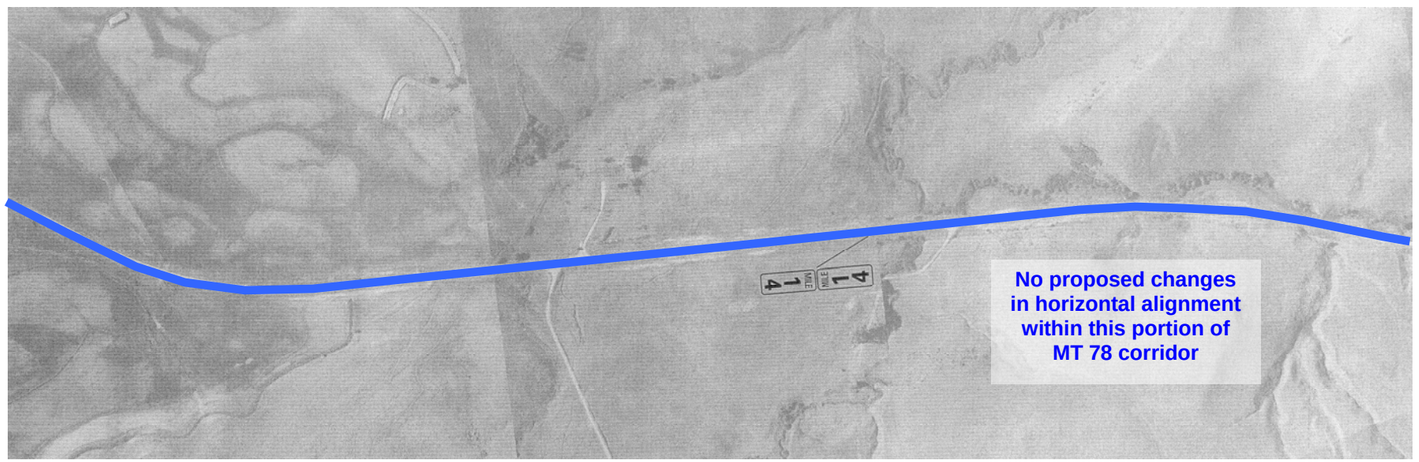
There are no proposed changes in the vertical alignment between MP 12.5± and MP 13.5±.



MP 13.5± to MP 14.5±

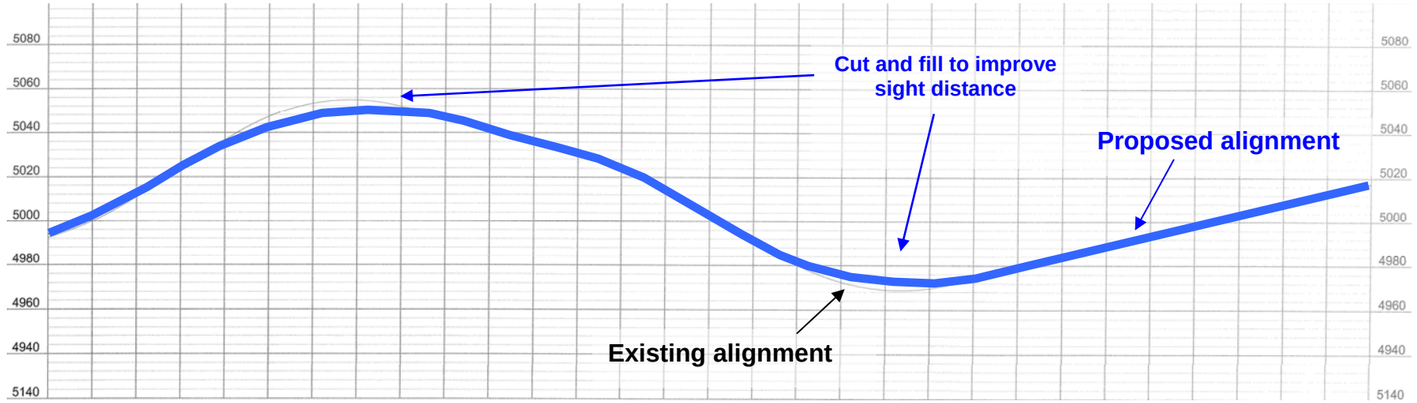
Horizontal

There are no proposed changes in the horizontal alignment between MP 13.5± and MP 14.5±.



Vertical

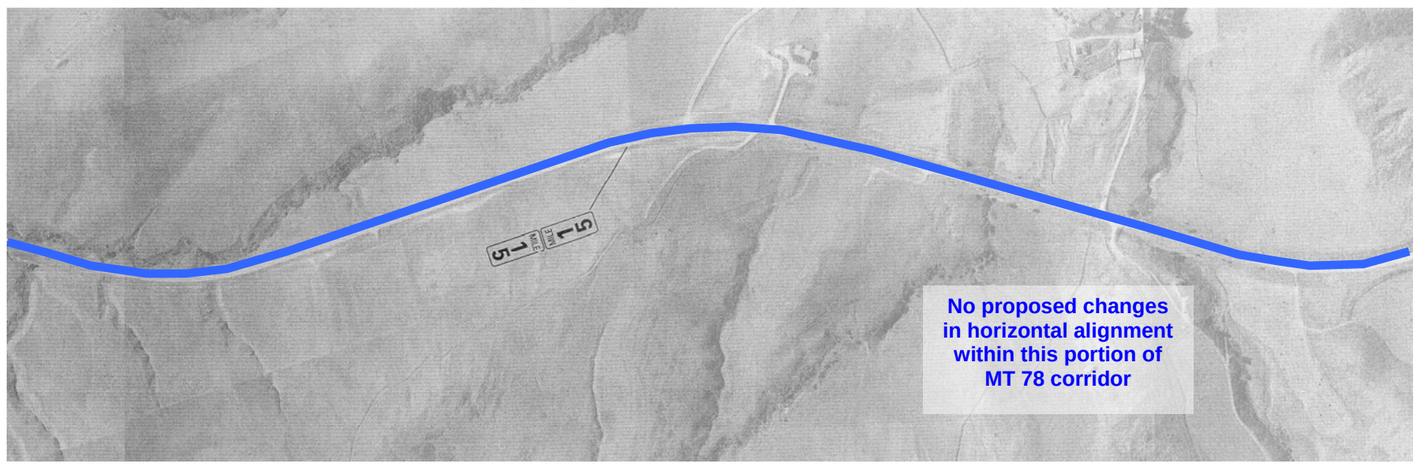
Between MP 13.5± and MP 14.5±, there is a sag and a crest curve in the vertical alignment, which do not meet current design standards for sight distance. It is proposed that fill be used to improve the sight distance of these curves.



MP 14.5± to MP 15.5±

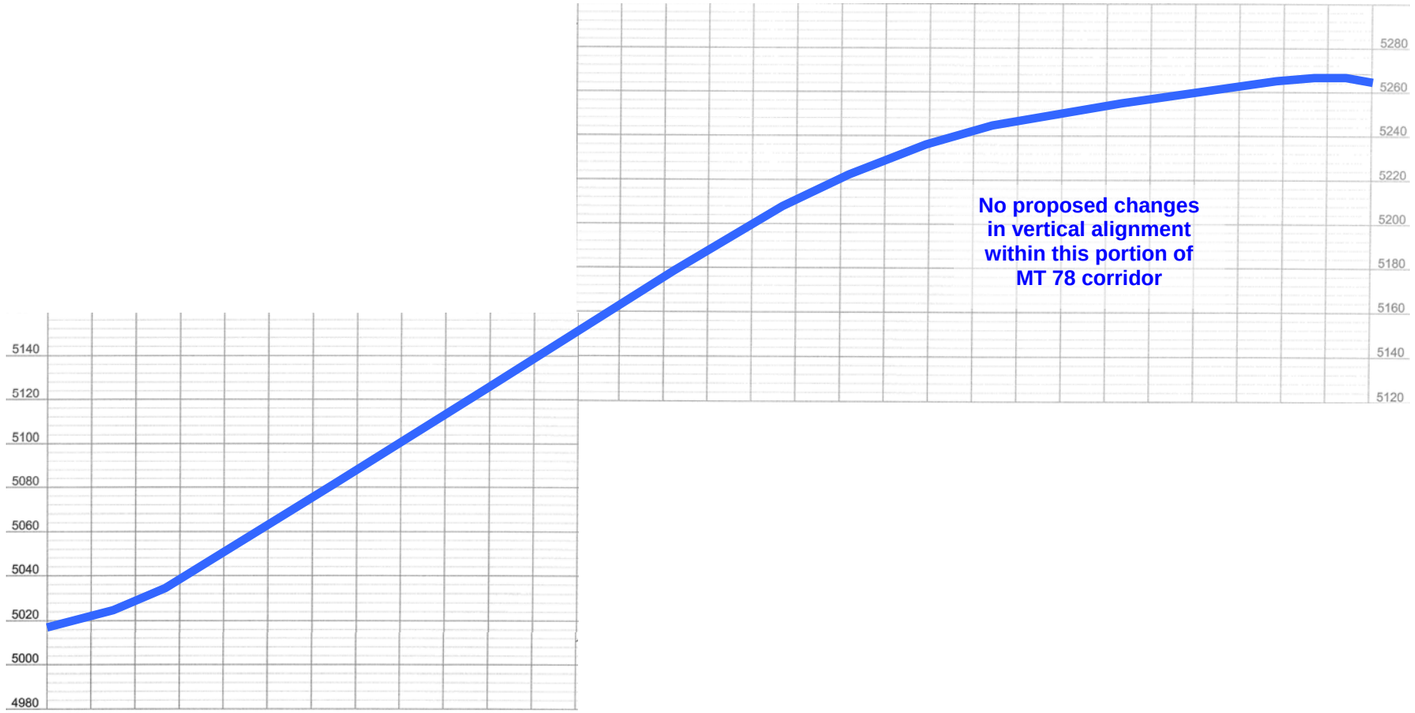
Horizontal

There are no proposed changes in the horizontal alignment between MP 14.5± and MP 15.5±.



Vertical

There are no proposed changes in the vertical alignment between MP 14.5± and MP 15.5±.

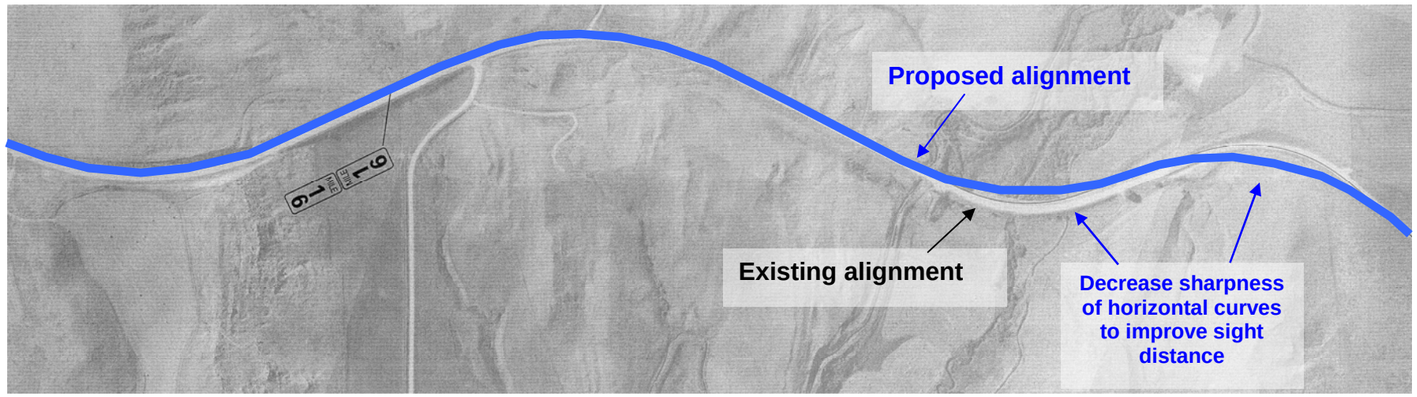


MP 15.5± to MP 16.5±

Horizontal

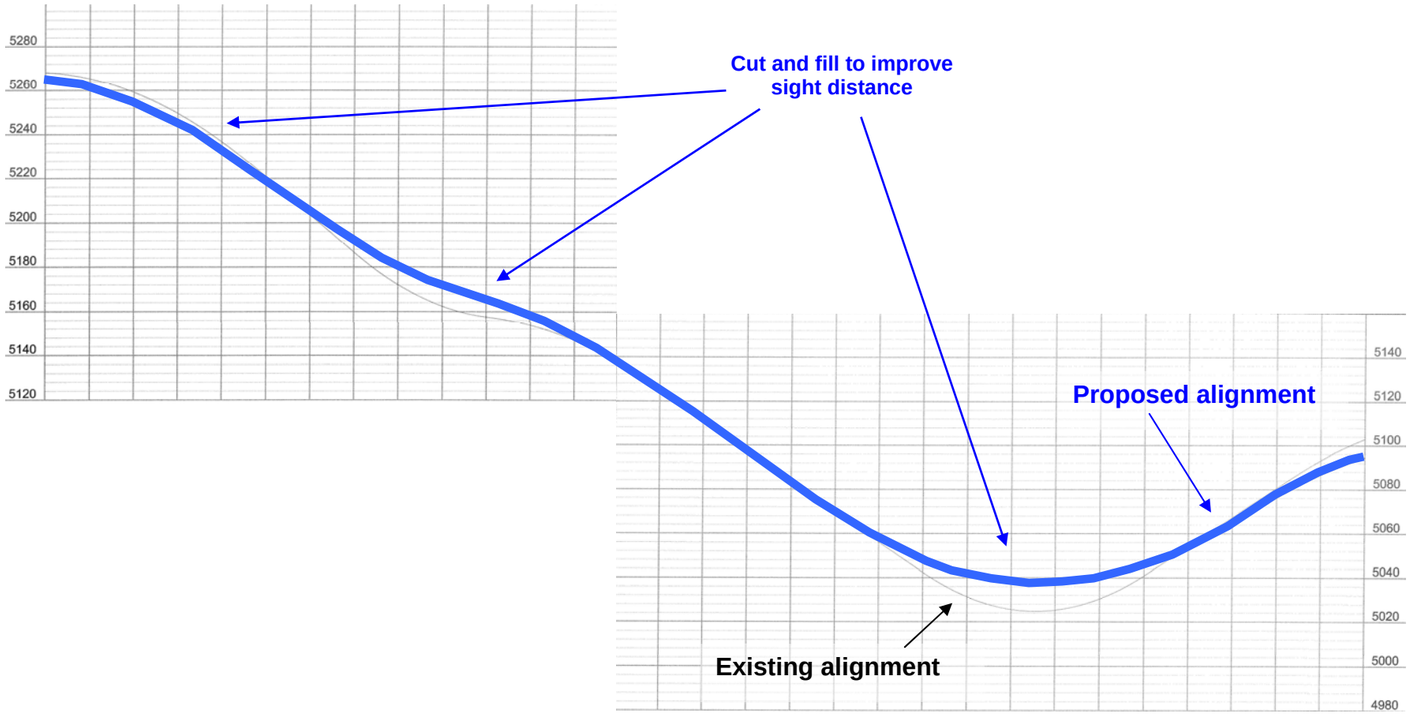
At MP 16.5± and 16.8±, there are two sharp horizontal curves. As noted in Figure 4.2, these curves are rated “poor” due to their inadequate curve radius.

As shown in Figure 6.1, it is proposed that the roadway be shifted to the north and south, respectively, to decrease the sharpness of this curve.



Vertical

Between MP 15.5± and MP 16.5±, there are several sag and crest curves in the vertical alignment, which do not meet current design standards for sight distance. It is proposed that fill be used to improve the sight distance of these curves.

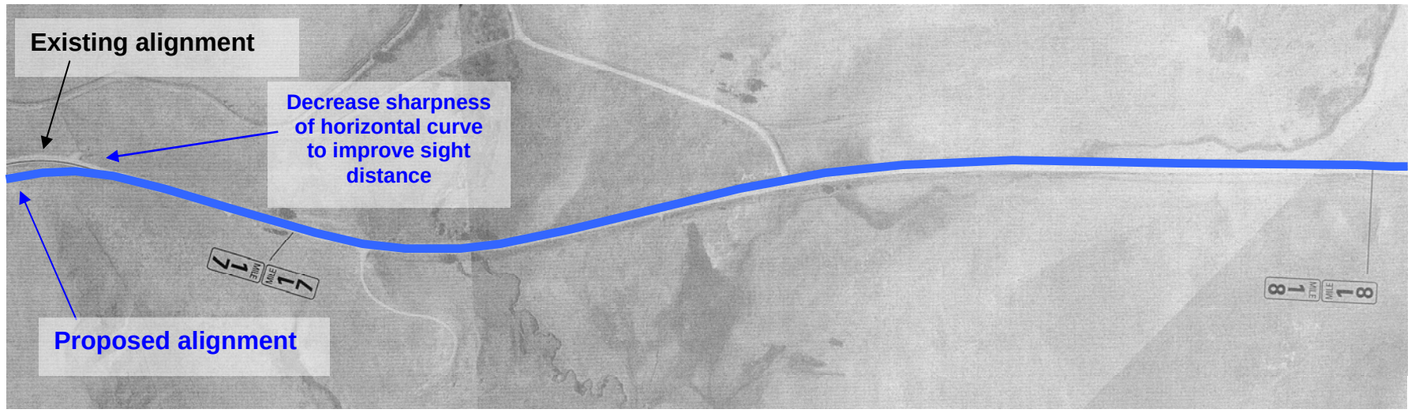


MP 16.5± to MP 18±

Horizontal

Between MP 16.5± and 17.0±, there is a sharp horizontal curve. As noted in Figure 4.2, this curve is rated “poor” due to its inadequate curve radius.

As shown in Figure 6.1, it is recommended that the roadway be shifted to the south to decrease the sharpness of this curve.



Vertical

Between MP 16.5± and MP 18±, there is a crest curve in the vertical alignment, which does not meet current design standards for sight distance. It is proposed that fill be used to improve the sight distance of this curve.

6.2 Roscoe Hill Alignment Options

The Roscoe Hill is the portion of the project between MP 18.0± and the town of Roscoe. The hill's two faces have grades of 7.8 percent and 9.0 percent, respectively. There is poor sight distance at the top of the hill due to the rounded hilltop. There are three options for this portion of the project:

Option 1: Stay on existing alignment. Shave off hill faces in order to improve sight distance. No alteration of sub-standard grades.

Option 2: Stay on existing alignment. Bring grades up to standard.

Option 3: Reconstruct a new alignment at current standards. This alignment would bypass the town of Roscoe and rejoin the existing alignment just past MP 21.

The Roscoe Hill options are discussed below. The options are compared and a recommendation is made in Chapter 7.

Roscoe Hill Alignment Options 1 and 2

MP 18± to MP 19±

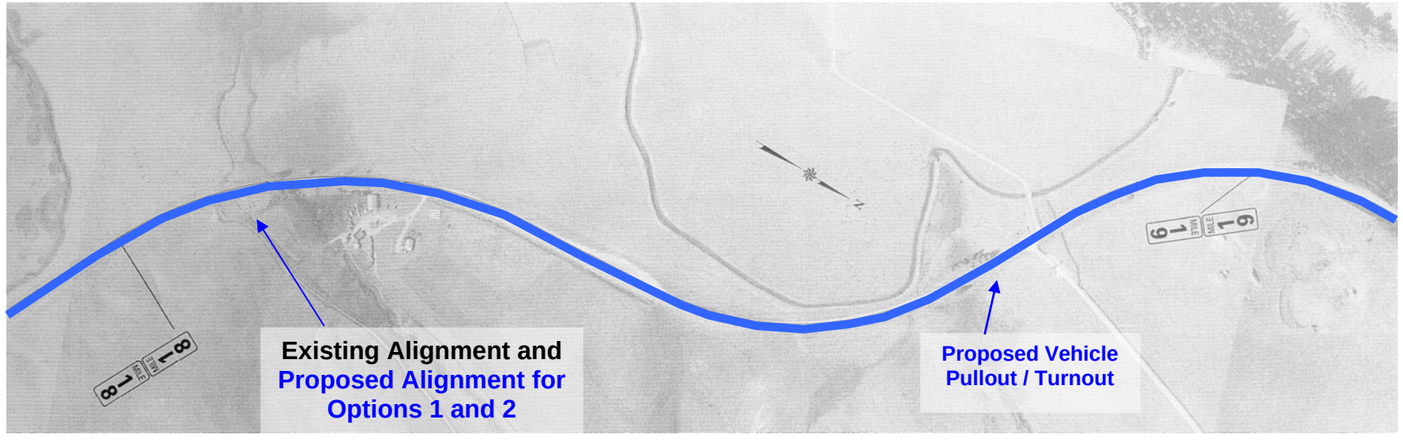
Horizontal

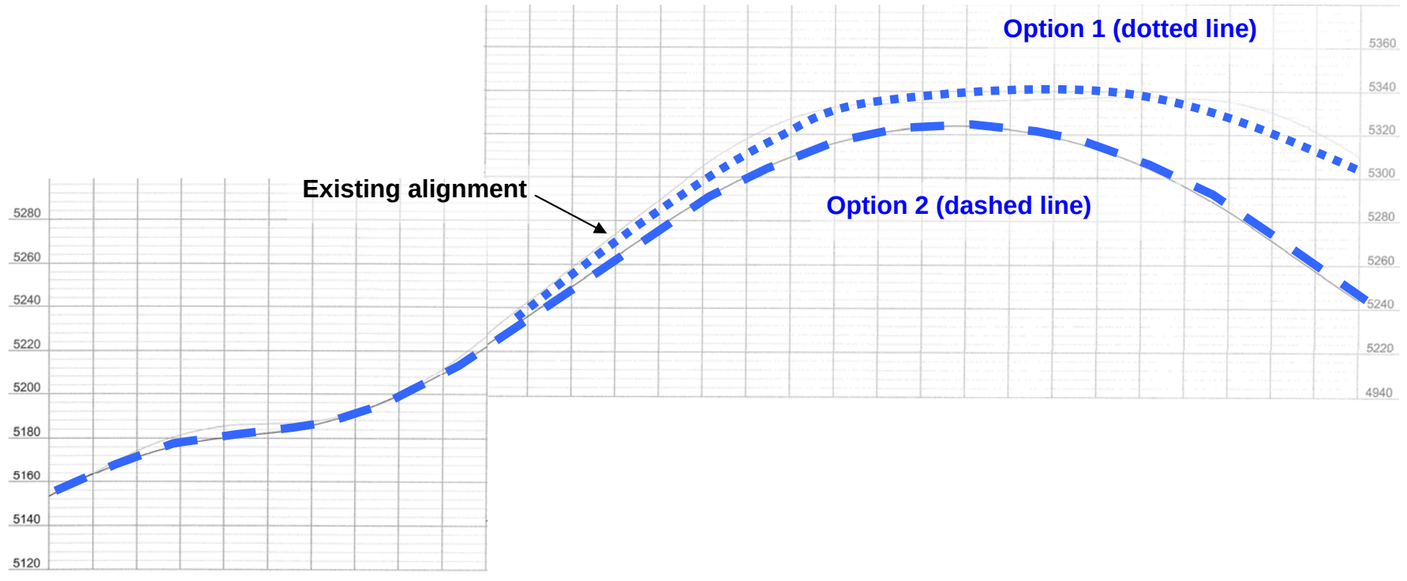
There are no proposed changes in the horizontal alignment between MP 18± and MP 19±.

Vertical

Option 1: It is proposed that the hill faces at the top of Roscoe Hill be shaved off in order to improve sight distance.

Option 2: The grade between MP 18± and MP 19± would be substantially reduced from nearly eight percent to just under seven percent to bring the roadway to current MDT design standards. This would require a large amount of earthwork.



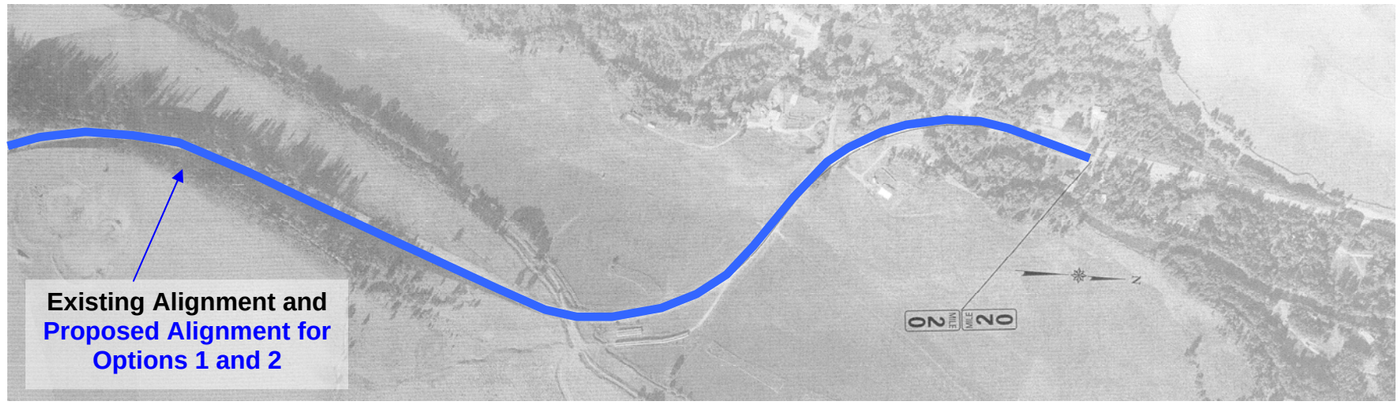


Roscoe Hill Alignment Options 1 and 2

MP 19± to MP 20±

Horizontal

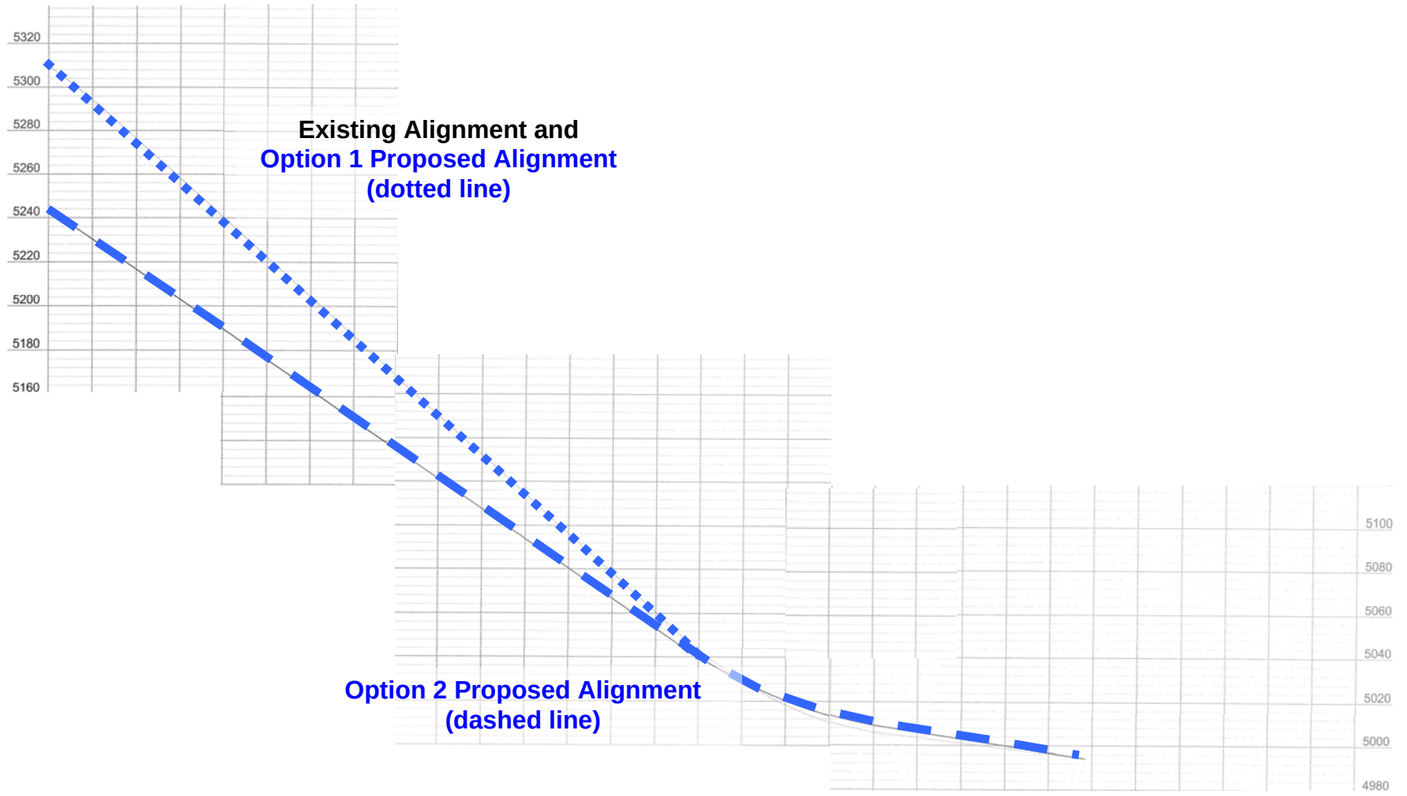
There are no proposed changes in the horizontal alignment between MP 19± and MP 20±.



Vertical

Option 1: There are no proposed changes to the grade.

Option 2: The grade between MP 19± and MP 20± would be substantially reduced from approximately nine percent to just under seven percent to bring the roadway to MDT design standards. This would require a large amount of earthwork.



Roscoe Hill Alignment Option 3

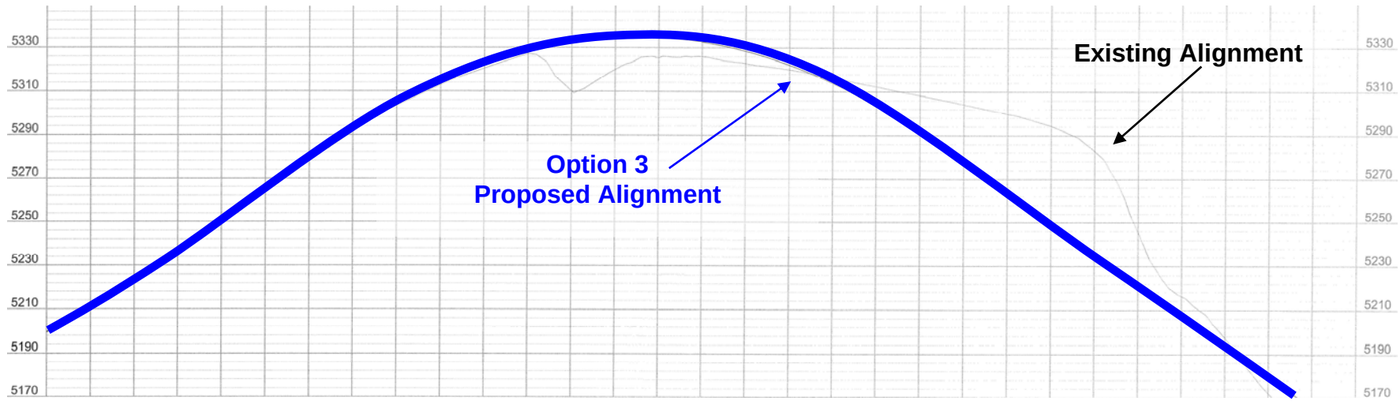
MP 18.5± to MP 19.5±

Horizontal

Alignment Option 3 would shift east from the existing alignment starting south of MP 19±. The new alignment would follow the natural curve of the hill to the east of Roscoe and the existing alignment.

Vertical

Alignment Option 3 would result in the construction of a new alignment between MP 18.5± and 19.5± which would meet MDT design standards for vertical grades.

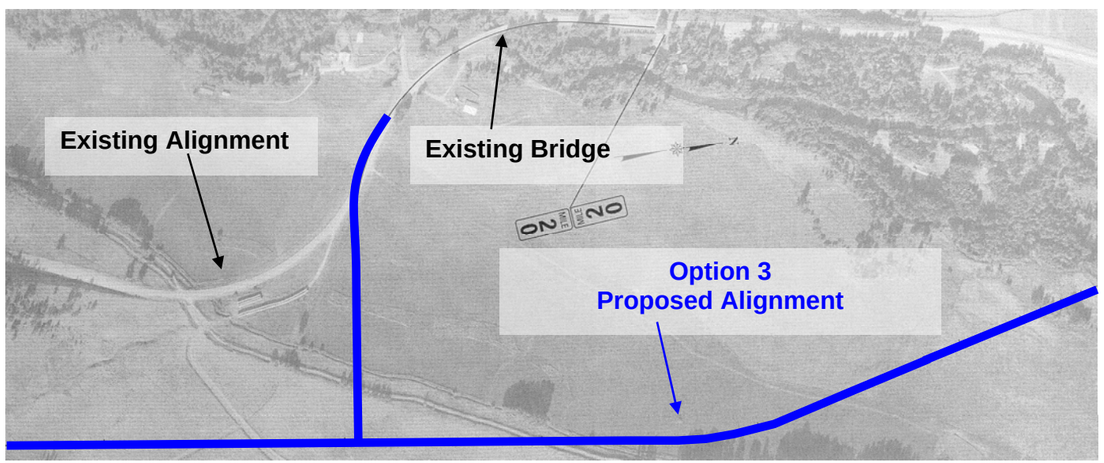


Roscoe Hill Alignment Option 3

MP 19.5± to MP 20.5±

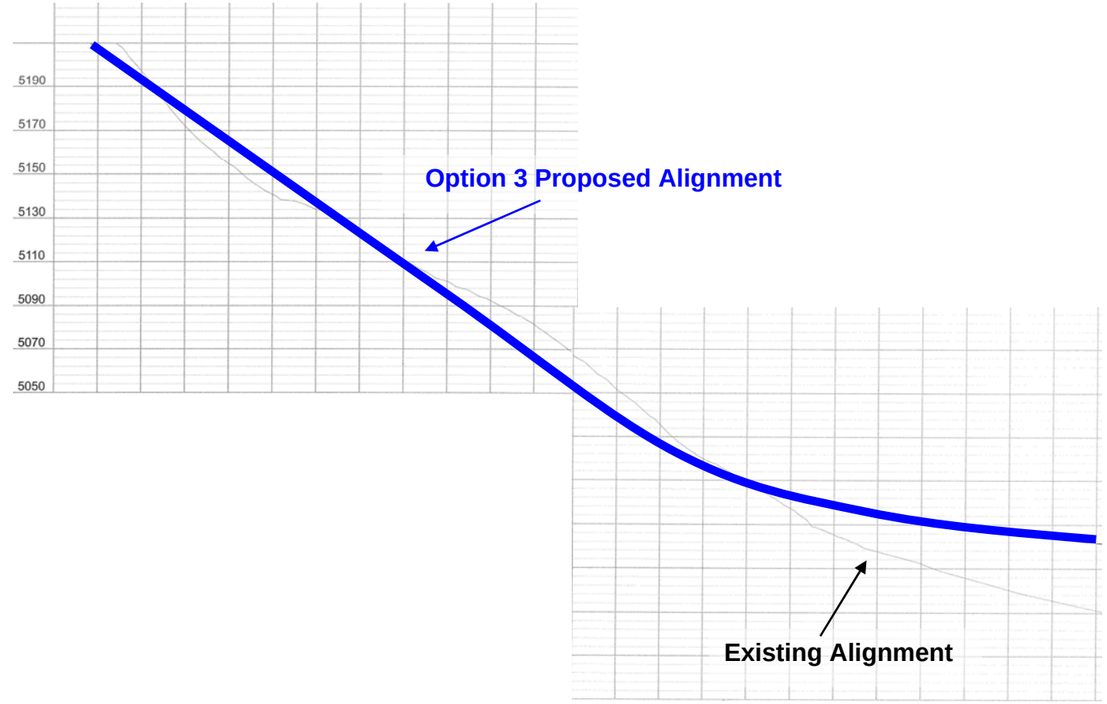
Horizontal

Between MP 19.5± and 20.5±, the new horizontal alignment would continue east of the current alignment and the town of Roscoe. An access to Roscoe would be built at the bottom of Roscoe Hill (MP 20±). The existing bridge on MT 78 would be used for this access road.



Vertical

Alignment Option 3 would result in the construction of a new alignment between MP 19.5± and 20.5± which would meet MDT design standards for vertical grades.

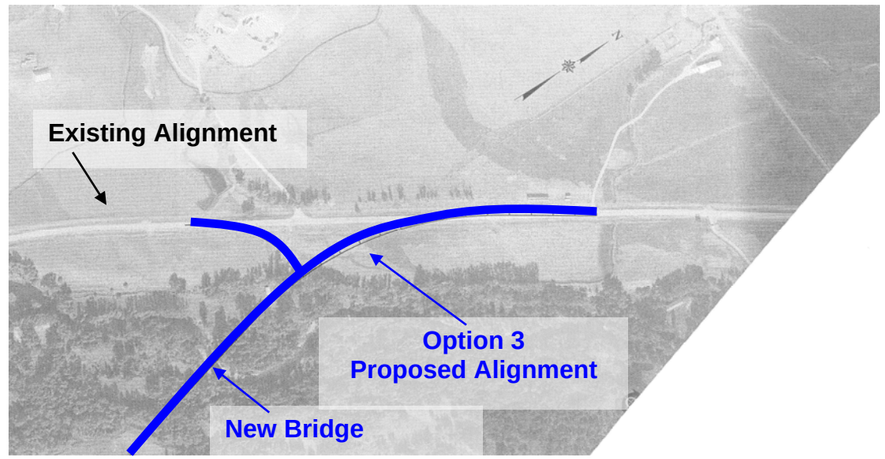


Roscoe Hill Alignment Option 3

MP 20.5± to MP 21.5±

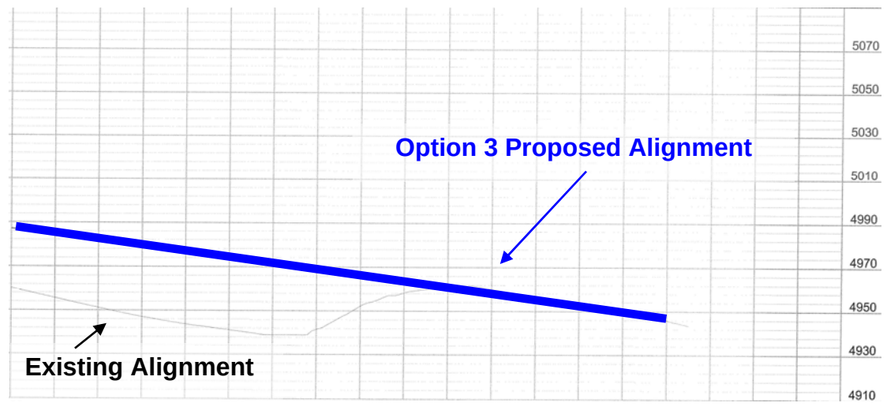
Horizontal

The new alignment for Option 3 would rejoin the existing alignment north of Roscoe. An access to Roscoe would be built north of Roscoe (MP 20.5±). A new bridge would be built over East Rosebud Creek.



Vertical

Alignment Option 3 would result in the construction of a new alignment which would meet MDT design standards for vertical grades.



7.0 DISCUSSION AND RECOMMENDATIONS

This chapter provides an implementation strategy for the improvement options introduced in Chapter 6. As this chapter will explain, to fully meet the corridor goals of improving safety conditions and geometric elements within the corridor, full reconstruction of the corridor will ultimately be necessary, but because of factors such as resource allocation and prioritization of projects around the state, reconstruction should be viewed as a long-term target. In the near-term, some of the spot improvements shown in Chapter 6 should be implemented to forward the goal of improving safety. Projected costs for improvements are given and funding sources are discussed.

7.1 Corridor Goals and Objectives

In Chapter 1, a set of corridor goals and objectives was presented that were developed by MDT and FHWA in cooperation with the public. Through the study process the intent was to design improvement options that would:

- Improve safety conditions and address crash concentrations within the corridor.
- Improve roadway geometry within the corridor, including horizontal alignment and vertical alignment, meeting current MDT design standards where practicable.
- Avoid or minimize social, environmental, and economic impacts in the corridor where possible.
- Maintain the aesthetic character of the corridor.
- Balance the needs of all users, including local residents, tourists, agricultural vehicles, school buses, motorcyclists, and bicyclists.

At the end of Chapter 4, a list of existing corridor conditions was presented. Many of the items on the list highlight safety issues and a need for improved highway geometry. Some of the conditions, such as narrow shoulders and a lack of places to pull off the roadway, in addition to being safety concerns, also inhibit the ability of the roadway to balance the needs of all users.

Improvement options presented in Chapter 6 attempt to improve both safety conditions and highway geometry. The improvements in Chapter 6 are also designed to meet the objective of minimizing social, environmental, and economic impacts to the corridor area. For example, areas with potential wetlands were avoided or the area of impact was minimized. The improvement options generally follow the existing alignment where possible in an attempt to minimize impacts, including aesthetic impacts.

7.2 Project Programming

MDT assesses funding needs for roadway improvements through a 20-year planning process at the district level. Though individual projects may be reprioritized over the course of the 20-year planning horizon, all available funds are allocated to listed projects over a five-year period.

During the last planning process, which occurred in 2006, there were no funds allocated for the portion of MT 78 within the corridor study area. STPP funding for this level of improvement is highly unlikely over the short term but may be available toward the end of the planning horizon depending on other Primary Highway System needs within the Billings District.

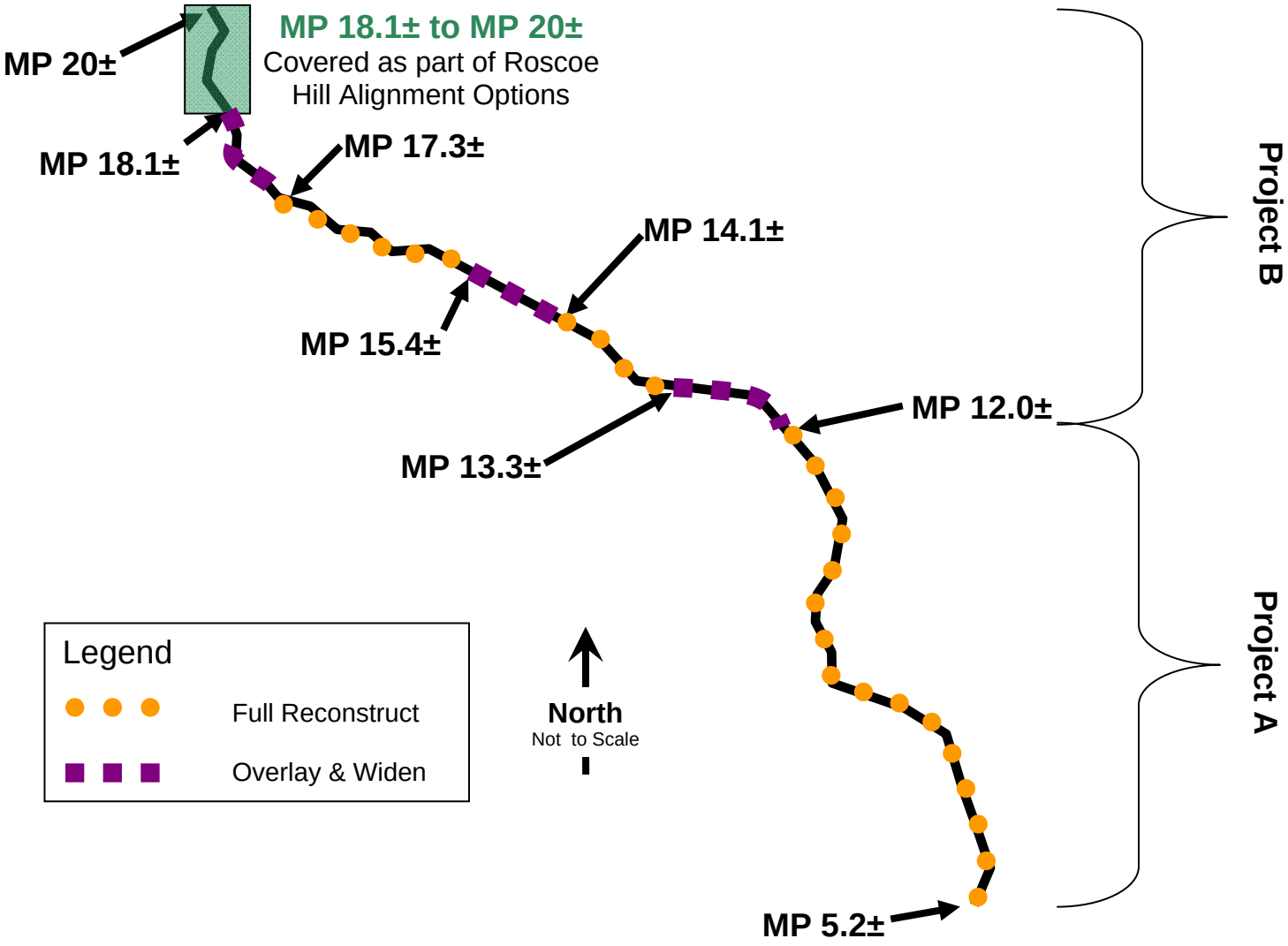
Fully meeting the corridor goal of improving highway geometry to meet current MDT design standards where practicable will require full reconstruction. Reconstruction is seen as a long-term corridor recommendation and would likely be programmed as at least two separate projects; however, progress towards meeting the goal of improving safety conditions in the corridor may be possible through implementation of the spot improvements presented in Chapter 6. Because no funding has been allocated to date for spot improvements, potential sources of funding are identified in this chapter.

7.3 Reconstruction

The existing horizontal alignment, vertical alignment, and roadway widths and slopes were evaluated to determine the minimum level of improvement necessary to bring the roadway up to current MDT standards. Over much of the corridor, full reconstruction of the roadway is necessary to satisfy current design standards. Full reconstruction would rebuild the entire roadway to make curves less sharp and hills less steep, in addition to widening the roadway to current standards for this type of facility.

Some parts of the existing alignment in the north end of the corridor have a satisfactory alignment, but have narrow travel lane and shoulder widths. An overlay and widen concept could be employed in these areas. An overlay and widen option would use the existing roadway base as the "core" for new construction, with widening occurring at the sides of the roadway. This method of improving the roadway does not necessarily require less right-of-way than a full reconstruction, but under most circumstances it is less costly because it does not require reconstruction of the road base. Figure 7.1 shows the areas in the corridor requiring overlay and widen and the areas requiring full reconstruction.

Figure 7.1 Needed Corridor Improvements



The differences between the southern and northern portions of the corridor lead to a natural split of the corridor into two projects. Project A would involve full reconstruction from MP 5.2± to MP 12.0±. A project length of 6.8± miles is a practical size to develop, finance, and manage through construction. Although the same can be said for the length of the northern portion of the corridor (Project B), the figure demonstrates that within this segment there are areas requiring full reconstruction and other areas that can be improved using an overlay and widen scenario. MDT has determined that it is not cost effective to utilize an overlay and widen concept when more than 25 percent of the proposed project requires full reconstruction. As illustrated in Figure 7.1, nearly half of Project B requires full reconstruction, therefore the overlay and widen

concept is not recommended in this instance. The ultimate improvement strategy for the entire corridor is full reconstruction.

Project B includes Roscoe Hill, located at the far northern part of the corridor (MP 18.1± to 21.0±). As discussed in Chapter 6, options for this portion of the corridor include an overlay and widen scenario where minor changes would be made to the vertical curves to improve sight distance (Alignment Option 1), a full reconstruction option that would rework the vertical alignment while utilizing the existing horizontal alignment (Alignment Option 2), and a full reconstruction option where new horizontal and vertical alignments would be developed to provide grades within the recommended standard (Alignment Option 3). The project terminus for Project B depends on which Roscoe Hill Alignment Option is chosen. If Alignment Option 1 or 2 is chosen, the project would terminate at MP 20.0±. If Alignment Option 3 is chosen, the project would terminate at MP 20.71±.

Table 7-1 provides a summary of planning-level costs associated with reconstruction in the base year (2006). These cost estimates are useful for the purpose of comparing the order of magnitude differences in price relative to each improvement option. More detailed estimates are included in Appendix E.

Table 7-1 2006 Planning-Level Cost Estimates for Reconstruction

Project	Improvement Option	Total Estimated Cost (2006 dollars)
Project A		$17,900,000
Project B	Roscoe Hill Alignment Option 1	$16,800,000
	Roscoe Hill Alignment Option 2	$48,800,000
	Roscoe Hill Alignment Option 3	$26,000,000

Table 7-2 provides a summary of these costs over the 20-year planning horizon and includes inflation costs of three percent. Detailed calculations are included in Appendix E.

Table 7-2 Planning-Level Cost Estimates for Reconstruction over 20-Year Planning Horizon

		Total Estimated Cost			
Project	**Improvement Option**	**2011**	**2016**	**2021**	**2026**
Project A		$20,700,000	$24,000,000	$27,800,000	$32,300,000
Project B	Roscoe Hill Alignment Option 1	$19,500,000	$22,600,000	$26,200,000	$30,400,000
	Roscoe Hill Alignment Option 2	$56,500,000	$65,500,000	$76,000,000	$88,100,000
	Roscoe Hill Alignment Option 3	$30,200,000	$35,000,000	$40,600,000	$47,000,000

Under Roscoe Hill Alignment Option 1, substandard grades would not be addressed and a design exception would be required. In comparison, remaining on the existing alignment and lowering the grades (as proposed under Roscoe Hill Alignment Option 2) would cost almost three times more in the base year. The additional earthwork and associated cost would only improve the grade by two percent. Only Project B Option 3 incorporates the cost of a new bridge because the alignment shift necessitates a new stream crossing. The existing bridges at East Rosebud and Red Lodge Creeks would be perpetuated under all options. Building the road on a new alignment and bypassing the town of Roscoe is not justified in light of the additional cost and impacts associated with a new bridge.

Though a culvert inventory was not completed for this project, cost calculations for each of the improvement and alignment options include an allowance for the cost of drainage structures on a per mile basis. Fencing and signing were also estimated on a per mile basis (see Appendix E).

Other Potential Corridor Improvements to be Considered as Part of Reconstruction

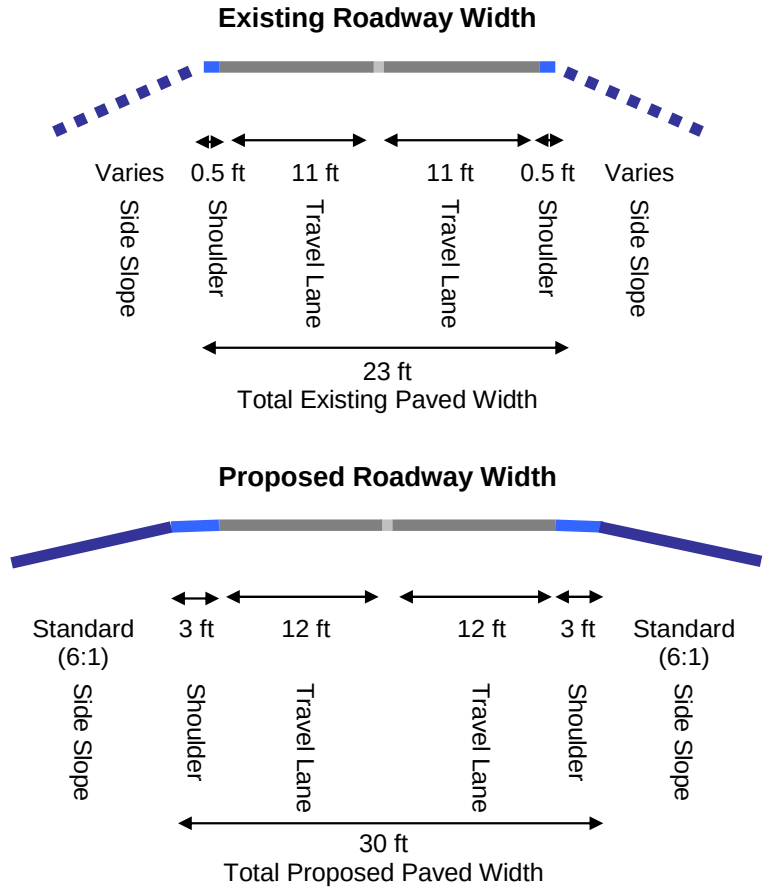
Roadway Widening

According to the current MDT Route Segment Plan, MT 78 should be widened to 28 feet with any reconstruction effort. This would ultimately provide for 12-foot travel lane widths and two-foot shoulders. Consistent with the Route Segment Plan and MDT policy, the roadway will be initially constructed with three-foot shoulders, which will allow for placement of an overlay in the future. This provides for a longer roadway lifespan.

The current MT 78 roadway has approximately 11-foot lanes and approximately 0.5-foot shoulders. Widening would increase each lane by approximately one foot and each shoulder by approximately 2.5 feet. The total paved width would increase by approximately seven feet. The roadway footprint would be considerably wider, however, because implementation of current design standards would result in flatter side slopes for maintenance and safety reasons.

As shown in Figure 7.2, the reconstructed roadway would feature a wider typical section with wider travel lanes (12 feet) and wider paved shoulders (three feet). The existing roadway section shown below is a general representation of field conditions; there is some variation in the existing typical section throughout the corridor.

Figure 7.2 Existing and Proposed Roadway Width



Climbing Lanes

Truck climbing lanes are intended to be constructed on upward gradients to remove heavy vehicles (trucks, buses, RV's) from the through-traffic stream. Heavy vehicles slow on long upward gradients and impede vehicles behind them. This has an adverse effect on safety, increases delay, and can reduce the overall capacity of the roadway. The need for a climbing lane is based on a combination of grade (length and rate), traffic volume, and heavy vehicle volume. *AASHTO Geometric Design of Streets and Highways* states:

> On highways with low volumes, only an occasional car is delayed, and climbing lanes, although desirable, may not be justified economically even where the critical length of grade is exceeded. For such cases, slow moving vehicle turnouts should be considered to

reduce delay to occasional passenger cars from slow moving vehicles (2004 edition, pg. 244).

AASHTO lists the following criteria for evaluation of climbing lanes to reflect economic considerations:

1. Upgrade traffic flow in excess of 200 vehicles per hour (vph)
2. Upgrade truck flow in excess of 20 vph. One of the following exists:
   - A 10 mph or greater speed reduction is expected for the typical heavy truck
   - Level of service E or F exists on the grade
   - A reduction of two or more levels of service is experienced when moving from the approach to the segment grade

In some instances, safety considerations can override all of these warrant guidelines if there is a specific crash trend involving slow moving vehicles. This safety criterion is not currently met within the MT 78 corridor.

In the design year 2026, the roadway and traffic conditions in the corridor are predicted to be near the threshold for justification of climbing lanes. Further analysis, including a detailed traffic analysis and an economic analysis for each specific location, should be conducted prior to the design of any project. These analyses should compare the total vehicle delay with the construction cost of a climbing lane, including the cost of right-of-way. Based on such analyses, a decision could be made concerning whether a climbing lane is justified and the appropriate location(s) for the lane(s).

Passing Lanes

Passing lanes can be used to improve capacity and reduce delay regardless of the need for climbing lanes. These are typically provided if there is a roadway capacity / vehicle delay problem or a specific crash trend that would be remedied by construction of a passing lane. It may be possible to achieve acceptable passing site distance under the full reconstruction improvement option, at least in some segments of the northern portion of the corridor. It may not be possible to improve passing sight distance in this manner over the southern portion of the corridor where there are limited passing opportunities due to terrain.

Vehicle Turnouts

Turnouts for slow-moving vehicles can be provided as an alternative to climbing lanes. These turnouts are widened areas of the shoulder where slow-moving vehicles can pull out of the traffic stream and allow any following vehicles to pass. These should be considered as part of the more detailed analysis of climbing lanes. They would be much shorter (approximately 500 feet) than climbing or passing lanes.

The Roscoe Hill is the only location where a vehicle turnout might be considered because the hill's substandard grade would not be addressed under the recommended improvement option.

Members of the public did not provide input regarding vehicle turnouts. Because of its longer length, a climbing lane would be preferable to a turnout in this location.

Vehicle Pullouts

At public meetings, members of the public were supportive of vehicle pullouts at various places in the corridor. Pullouts are locations where drivers can completely pull off the road and into a designated parking area in order to pause to view scenery, use a cell phone safely, or stop for other reasons. Roscoe Hill (MP 18.8±) was mentioned frequently as a possible vehicle pullout location. Another possible location would be near the Hogan School (MP 7.9±), which was mentioned during meetings as an important historic point of interest for the community.

Bicycle and Pedestrian Facilities

As noted in Section 4.3 of the document, anecdotal data suggests that there is currently low bicycle usage of the corridor, mainly due to sight distance limitations, high vehicle speeds, steep grades, and the limited shoulder along the corridor. A number of public meeting attendees and written public comments expressed interest in a dedicated pedestrian / bicycle facility within the corridor and suggested that usage may increase if a safe facility were provided. Given the strong public interest in this element, more detailed investigation of a dedicated bicycle / pedestrian facility, either in the form of a bicycle lane along the roadway or a separated path, should be considered under any future reconstruction project.

Access Management

The improvement options shown in Chapter 6 include new horizontal and vertical alignments. Changing the profile of the road as proposed would necessitate new access recommendations not included in the Access Management Study. These are shown in the graphics in Chapter 6 and discussed below.

- Combine two access roads just before the Hogan School south of MP 7.9±. This change would be recommended with the new vertical alignment in order to improve sight distance.
- Move Scilley Mountain Vista Drive access, located south of MP 10.0±. This access has a steep vertical grade; recommended changes to the vertical profile would cause it to be even steeper. The access point should be moved to improve sight distance.
- Realign May Grade Road south of MP 11.0±. This would improve sight distance upon construction of the recommended alignment.

The improvement options in Chapter 6 also highlight the need to realign Upper Luther Road just south of MP 8.2± to improve sight distance. This was also recommended in the Access Management Study.

Recommendations

Based on high crash concentration in the corridor and the anticipated ability of Project A to improve safety in the corridor, Project A, a full reconstruction of MP 5.2± through MP 12.0±, is recommended as a high priority over the long term based on crash concentrations in the area.

Project B, a full reconstruction from MP 12.0 to the end of the corridor, is recommended as a second priority. Based on the costs shown in Table 7-2, the recommended option for Project B is Roscoe Hill Alignment Option 1. Substandard grades would not be addressed under this option and a design exception would be required. Climbing lanes should be considered on Roscoe Hill if Alignment Option 1 is forwarded as part of a project.

In addition to the access realignment recommendations included in this Study and discussed in Section 7.4, the Access Management Recommendations in Appendix E should be included in any future comprehensive roadway project on MT 78.

Purpose and Need

The purpose of both Projects A and B is to improve safety conditions and address crash concentrations within the corridor as well as to improve geometric elements within the corridor to meet current MDT design standards where practicable, including horizontal alignment, vertical alignment, and sight distance.

Projects A and B are needed in the long-term to address safety and operational concerns in the corridor, which can only be partially addressed with near-term improvements.

Potential Funding Sources

As part of the state-designated Primary Highway System, the most prevalent source of funding for improvements along the MT 78 corridor is Surface Transportation Program-Primary (STPP) funds. STPP funds are distributed statewide (MCA § 60-3-205) to each of five financial districts, including the Billings District. The Commission distributes STPP funding based on system performance and projects are let through a competitive bidding process. The federal and state funds available under this program are used to finance transportation projects on the state-designated Primary Highway System. Of the total received, approximately 87 percent are federal and 13 percent are state funds from the state special revenue account. Eligible activities include construction, reconstruction, rehabilitation, resurfacing, restoration, and operational improvements.

The Billings District, which this corridor is a part of, is anticipated to receive an average of about $15,000,000 to $20,000,000 annually of STPP funds over the course of the study planning horizon. Current Billings District priorities already under development total an estimated construction cost of $100,000,000 to $150,000,000 of which approximately $33,000,000 is for improvements along segments of the MT 78 corridor outside of this study area. Given the estimated planning level cost of $40,000,000 to $70,000,000 to reconstruct the

study segment in 2011, STPP funding for this level of improvement is highly unlikely over the short term, but may be available toward the end of the planning horizon depending on other Primary Highway System Needs within the Billings District.

It is recommended that the Billings District plan Long Term Projects A and B into its next 20-year plan, with Project A being the first priority, and Project B being the second.

7.4 Spot Improvements

A number of small spot improvements could be completed at discrete locations independent of full reconstruction of the MT 78 roadway. Each of these improvements was shown in Chapter 6. Table 7-3 (below) lists each of the improvements, notes whether the improvement is located near or at a crash concentration location, describes the long-term geometric improvement that would result as a consequence of the improvement, and states the estimated cost of the improvement in 2006 dollars.

The spot improvements that correspond to a previously identified crash concentration location (see Appendix C) are identified in Table 7-3. It is important to recognize, however, that a "yes" designation does not indicate that the potential interim spot improvement fully addresses the factors that may be contributing to the crash concentration. For example, shaving the side slopes near MP 9.3 would substantially improve horizontal sight distance which is currently restricted by the hillside; however, there are other factors in this vicinity, including vertical sight distance and horizontal curvature, that contribute to crashes but that are beyond the scope of a spot improvement.

The column labeled "Long-Term Geometric Improvements" describes the result of a comparison of spot improvement options to the proposed reconstruction. Some of the spot improvements contribute to the reconstruction improvement options and some of them provide only an interim benefit because additional or new construction work would have to be ultimately conducted in this same area under a full reconstruction. For example, the spot improvement near MP 7.4 would shave the hillside to improve sight distance. The ultimate improvement would include reconstructing the roadway approximately ten feet higher than it presently exists to improve the vertical sight distance. Because the area would ultimately be reconstructed, a spot improvement would only be beneficial in the near term. Cases like this are identified as "Near-term benefits" in the matrix. On the other hand there are situations like the potential improvements near MP 15.8± where shaving the hillside to improve sight distance could be considered as initial work towards the ultimate improvement that would include lowering the roadway grade by approximately four feet to improve vertical sight distance. Cases like these are labeled as "Near- and Long-term benefits" in the matrix. Even improvement options that would have only near-term benefits are recommended for completion due to the safety benefits over the 20-year planning horizon.

Recommendations

The improvements are ranked in Table 7-3 in order of recommendation. Ranking group 1, for example, represents the projects that are recommended for completion first, ranking group 2 represents those projects that should be done second, and so on. There is no ranking of projects within a group. Costs listed in Table 7-3 are in 2006 dollars. The Purpose and Need for each ranking group is discussed separately following the table. Possible sources of funding are then discussed for the entire group of spot improvements.

The factors used to rank improvements are:

- Cost
- Ability to improve safety in a crash concentration location
- Near- and Long-Term Benefits

More detailed estimates are included in Appendix E.

Table 7-3 Recommended Spot Improvements

Ranking Group	Approximate MP	Potential Spot Improvement	Crash Concentration Location*	Near- and Long-Term Geometric Improvements	Estimated Cost (2006$)
1	6.9, 10.7, 12.1, 13.1, 13.9, 15.1	Update school bus stop signing	Yes; at 6.9, 12.1, and 13.9	None	$6,700
2	13.0	Trim vegetation for intersection visibility	No	None	$2,800
3	8.2	Realign Upper Luther Road and build a school bus pullout / Park and Ride	Yes	Access management improvement **Near- and Long-term benefits**	$151,000
3	13.0	Realign Lower Luther Road and build a school bus pullout	No	Access management improvement **Near- and Long-term benefits**	$164,000
4	9.3	Shave side slopes to improve sight distance	Yes	Major Horizontal Shift 0-10 ft. Vertical Cut **Near- and Long-term benefits**	$906,000
5	7.4	Shave side slopes to improve sight distance	Yes	± 10 ft. Grade Raise Minor Horizontal Shift **Near-term benefits**	$107,000
5	8.0 – 8.2	Shave side slopes to improve sight distance	Yes	± 5 ft. Grade Raise Minor Horizontal Shift **Near-term benefits**	$178,000
6	15.8	Shave side slopes to improve sight distance	No	± 4 ft. Vertical Cut **Near- and Long-term benefits**	$720,000
6	16.8	Shave side slopes to improve sight distance	No	Major Horizontal Shift 0-8 ft. Vertical Cut **Near- and Long-term benefits**	$1,108,000

* The proposed improvement does not fully address a specific crash trend.

Table 7-4 provides a summary of spot improvement costs over the 20-year planning horizon and includes inflation costs of three percent. Detailed calculations are included in Appendix E.

Table 7-4 Planning-Level Cost Estimates for Spot Improvements over 20-Year Planning Horizon

Ranking Group	Approximate MP	Potential Spot Improvement	Total Estimated Cost			
			2011	2016	2021	2026
1	6.9, 10.7, 12.1, 13.1, 13.9, 15.1	Update school bus stop signing	$7,800	$9,000	$10,500	$12,100
2	13.0	Trim vegetation for intersection visibility	$3,200	$3,800	$4,400	$5,100
3	8.2	Realign Upper Luther Road and build a school bus pullout / Park and Ride	$175,000	$203,000	$235,000	$273,000
3	13.0	Realign Lower Luther Road and build a school bus pullout	$190,000	$220,000	$255,000	$295,000
4	9.3	Shave side slopes to improve sight distance	$1,051,000	$1,218,000	$1,412,000	$1,637,000
5	7.4	Shave side slopes to improve sight distance	$125,000	$144,000	$167,000	$194,000
5	8.0 – 8.2	Shave side slopes to improve sight distance	$206,000	$239,000	$277,000	$321,000
6	15.8	Shave side slopes to improve sight distance	$835,000	$968,000	$1,122,000	$1,301,000
6	16.8	Shave side slopes to improve sight distance	$1,284,000	$1,489,000	$1,726,000	$2,000,000

Ranking Group One: Update School Bus Signage

Purpose and Need

School children are arguably the most at-risk group of highway users because they are on foot when entering or exiting school buses, they may or may not use good judgment, and their size makes them hard to see. The Purpose of updating school bus signage is to help drivers know that children could be in the area, or may be waiting for, entering, or leaving a bus.

There is a need to improve school bus signage in the corridor. There has been an accident involving a school bus at one of the designated school bus stops (MP 6.9±). Three of the six school bus stops are in areas identified as crash concentrations.

Although the location of school bus stops will likely change over time, the relatively small cost of updating signage is justified in light of the risk to school children in the absence of well-marked bus-stops.

Ranking Group Two: Trim Vegetation

Purpose and Need

The Purpose of trimming intersection vegetation is to improve sight distance.

There is a need to improve sight distance at MP 13.0 (Lower Luther Road). At this location, an intersection and a riparian area formed by West Red Lodge Creek are major features along the roadway. The riparian area is a migration corridor for wildlife, which presents a traffic hazard and the intersection is difficult to see because of overgrown vegetation.

Although this area is not a crash concentration location, improved sight distance is considered to be important considering the relatively small cost of the improvement, approximately $2,500.

Ranking Group Three: Build School Bus Pullouts

Purpose and Need

The Purpose of building school bus pullouts is to give the Red Lodge School safe school bus stops that are located fully out of the travel lane. School children are arguably the most at-risk group of highway users because they are on foot when entering or exiting school buses, they may or may not use good judgment, and their size makes them hard to see. The School District could use the parking areas at Upper and Lower Luther roads as areas to meet parents to drop off or pick up children traveling to school and as a place of refuge in case of inclement weather or mechanical problems.

There is a need to improve school bus stop conditions in the corridor. The Superintendent of Red Lodge schools reports that the Upper Luther Road (MP 8.2±) is seen as a very dangerous intersection by bus drivers because of sight distance issues. Lower Luther Road (MP 13.0±) is in a crash concentration area.

There is an added benefit of building a pullout at Upper Luther Road. That intersection is currently used as an informal park-and-ride by Stillwater mine employees. The pullout could be built large enough to be formally used as a park-and-ride for little additional cost.

Upper and Lower Luther Roads are ideal locations for pullouts because they are spaced along the corridor such that, including the possibility to pull out at Roscoe, there would be a pullout location every five miles of the corridor (MP 5 to MP 10, MP 10 to MP 15, and MP 15 to MP 20).

Ranking Group Four: Shave Side Slopes at MP 9.3±

Purpose and Need

The Purpose of shaving side slopes at MP 9.3± is to improve sight distance.

There is a need to improve sight distance at MP 9.3. This area has been identified as a crash concentration location. Safety would likely be improved to some degree by improving sight

distance at the location. Improving sight distance at this location would have both near- and long-term benefits, as shaving side slopes fits into the proposed eventual reconstruction recommended in this portion of the corridor.

Ranking Group Five: Shave Side Slopes at Two Crash Concentration Locations

Purpose and Need

The Purpose of shaving side slopes at MP 7.4 and MP 8.0 to MP 8.2 is to improve sight distance.

There is a need to improve sight distance at both locations. The areas have been identified as crash concentration locations. Safety would likely be improved to some degree by improving sight distance at these locations.

Improving sight distance at these locations would have only near-term benefits as they do not dovetail into the proposed eventual reconstruction necessary in this portion of the corridor. However, the cost of these improvements is relatively low – about $250,000 overall.

Ranking Group Six: Shave Side Slopes to Improve Sight Distance

Purpose and Need

The purpose of shaving side slopes at MP 15.8± and MP 16.8± is to improve sight distance.

These improvements are needed because sight distance in this portion of the corridor is very poor. Based on a visual inspection and plan review, these improvements were considered to be beneficial.

Ranking Groups One – Six: Spot Improvements

Potential Funding Sources

Some sources of funding exist for spot improvement options. One potential source of funding is the Highway Safety Improvement Program (HSIP). HSIP funds are federally apportioned to Montana and allocated to safety improvement projects identified in the strategic highway safety improvement plan by the Commission. Projects described in the State strategic highway safety plan must correct or improve a hazardous road location or feature, or address a highway safety problem.

Another potential source of funding is maintenance money. There may be enough money in the Billings District maintenance budget over the next several years to fund relatively inexpensive projects, such as improving school bus signage or trimming vegetation.

For the Upper Luther Road spot improvement location, the Stillwater mine might be willing to allocate some funds toward the creation of a park-and-ride for their employees.

Surface Transportation Program-Primary (STPP) funds may be another potential funding source for spot improvement options. These funds are currently fully allocated. However, should funds

become available due to budget changes or shifts in project priorities, these spot improvement projects would be a good use of STPP funds.

7.5 Summary of Recommendations

Decisions about future highway improvements within the study corridor are the responsibility of MDT with approvals necessary from the Montana Transportation Commission, FHWA, and federal and state resource agencies. Based on the results of this corridor study, the following could provide the basis for establishing the Purpose and Need for future improvements to the corridor:

Purpose

- In the near- and long-term, improve safety conditions within the MT 78 corridor.
- In the near- and long-term, improve geometric elements within the corridor to meet current MDT design standards where practicable, including horizontal and vertical alignment.

Need

- There are crash concentrations throughout the corridor.
- There are substandard geometric elements throughout the corridor.

The following improvement options are recommended by this corridor study:

Near Term:

- Update school bus signage
- Trim intersection vegetation
- Build two school bus pullouts, at MP 8.2± and MP 13.0±
- Shave side slopes to improve sight distance at MP 7.4±, MP 8.0 to MP 8.2±, MP 9.3±, MP 15.8±, MP 16.8±

Long Term:

- Reconstruct the highway from MP 5.2± to MP 12.0±
- Reconstruct the highway from MP 12.0± to MP 20.0±

Appendix A

Public Comments Received

MT 78 Corridor Study

Public Scoping Meeting March 2006

We Invite Your Comments:

I live on Brewery Hill. I have water rights to the ditch running in front of my house. In the event highway improvements include a culvert in lieu of ditch, I want to be sure there is at least a T joint from the main culvert to the ditch that runs on my property, thereon it and north to the neighbors, who also claim water rights.

I am still concerned with high speeds on Brewery Hill and fear that improving the highway will only increase it. Also, I hope a roundabout is being considered at the junction of 78 and 212.

To receive further project information, please provide your name and address:

Name: RUTH H. SHELLER

Address: HC 50, BOX 4010
RED LODGE MT
59068

Please leave your comments with Project Team staff at the meeting, or mail to :

Darryl L. James
HKM Engineering Inc.
PO Box 1009
Helena, MT 59624-1009

HKM

MT 78 Corridor Study

Public Scoping Meeting March 2006

We Invite Your Comments:

Montana Highway alignment through agriculture land use areas, from travel observation, would be assisted in maintaing highway vehicle capacity with the establishment of well designed and placed turnouts. turn outs are used by most slow moving trucking carrying live stock feed, corn, Sugar beets, livestock to feed lots etc. also visitors tend to use turn outs to enjoy views, brief rests and to seperate traffic. turn outs are less costly than rest areas, may be highly effective especially in areas of high Scenic Value. turn outs may assist in lowering accidents. Montana State enjoys visitors traveling interstate and Intrastate. Visitors contribute a significant economics benefit to the State economy.

To receive further project information, please provide your name and address:

Name: George Chopper

Address: PO Box 1621
Red Lodge, Mt 59068
446 2436

Please leave your comments with Project Team staff at the meeting, or mail to :

Darryl L. James
HKM Engineering Inc.
PO Box 1009
Helena, MT 59624-1009

HKM

Miller, Zoe

From: Don Kinney [rlprojectmanager@vcn.com]

Sent: Thursday, March 30, 2006 3:51 PM

To: Zoe Miller; Jennifer Peterson

Cc: Barry Usher; David Beach; Don Kinney; Estelle Tafoya; Jody Ronning; John Prinkki; judytoler@montana.net; Kathy Teter; Larry Yung; Laura Getz; Rich Bruner; Tom Kohley; Bob Carr; Donna Bastain; George Cartwright; John Gilligan; John Toler; Marcella Manuel; Red Lodge Area Chamber of Commerce; Terri Holt

Subject: HWY 78 scoping comments

Zoe & Jennifer,
First, it was great to meet both of you in Red Lodge and I am sure we will run into each other again in the near future.

My comments for the Highway 78 scoping follows:

The road is used by many tourists to travel between Red Lodge and Columbus to view the Beartooth Mountains. The road's allure in many respects is the "curving" nature of the road which gives it a county / rural feeling vs. a major road feel. During the warm months many thousand motorcycle enthusiasts ride the road to experience the views and the curves of the road following the contours of the land. Highway 78, along with the Beartooth All American Road, is a major tourist attraction for the Red Lodge area. The new design of the road must make the road safe by modifying the vertical and horizontal curves; however, it must not be made so "straight" as to take away from the ambiance of road travel for these visitors to our area. As one who travels the first fourteen miles of this section daily I too like the "feel" of the road and I want the majority of the contour hugging attributes to remain, but I want is safer.

My second request is regarding providing a "dual use" for the road. Many road bikers (peddle bikers) would love to ride the route along with the auto traveler to experience the same views and "feel" of the road that motor bikers enjoy, but cannot due to the narrowness of the present route. Any redesign must be done in a manor to provide safe and sufficient biking lanes in both directions. This would be a major attraction for road biker of all strips to come to our region to enjoy the views along the route and feel safe in doing so.

Thanks for taking my comments.

Don L. Kinney, AICP, CED
dkinney@direcway.com or rlprojectmanager@vcn.com

traffic on Mt Hy Route 78 is increasing slowly and steady ~~for~~ ~~As a result of Reasons~~. Increasing visitor use, Subdivision Development etc. Land use along this Corridor is essentially Devoted to Raising Livestock, Cow Calf operations, Wool Growing (Sheep operation.) and horses For general use, trail riding and horses trained For Sale etc the Capacity of Hy 78 to Carry Vehicle traffic may be somewhat. ~~is~~ impaired by the Severe undulation of the Alignment ~~in Segments~~ across the beartooth Front. However the Alignment presents delight Ful Vieos For visitors— Increasing Numbers, Road Approaches to this high way may tend to reduce the Smooth Flow of traffic — on the highway. Slow moving Vehicles, Farm type trucks and trucks carrying Supplies to the communities along this Corridor ~~may~~ tend to Slow the Smooth Flow of General traffic. Pepsi Bear hotdogs, garbage turn outs, well Placed and designed along Hy 78 Corridor may Serve to seperate slow moving Vehicles From general traffic

And aid orderly Flow of traffic.
Also turn outs enhance visitor travel.
with opportunity For delight Ful views,
brief stops For a stretch From driving
And other etc. use.
turn outs may be helpful to Assure Hy
Capacity For traffic AND For reducing
Accident danger.
Hy 89 Livingston - Gardiner has well
desicned turnouts with good sight
distance For entering or leaving the
turn outs these turnouts are Essentially
situated in the vicinity of Yankee Jim
Canyon And Gardiner
Hy 212 Lawrel to Rockvale Needs a
turnout as traffic being backed up For
A considerable distance as a result of Slow
moving trucks + Farm Equipment and
traffic Congestion.
i think two turn outs on the Route Roscoe -
Red Lodge would benefit traffic -
One on Hill As Hy leaves Roscoe +
One About halfway to Red Lodge.

Turnouts may be established at
Nominal Cost for maximum benefit.

Appendix B

Project Newsletters

MT 78 Corridor Study

June 2006 **Project Newsletter No. 1**

What is the MT 78 Corridor Study?

The Montana Department of Transportation (MDT) has initiated a corridor planning process along the MT 78 corridor in order to comprehensively assess future transportation needs, prioritize future transportation projects, provide opportunities for early public input and resource agency coordination, and foster cooperative state and local transportation planning efforts. Corridor planning is a relatively new tool within the Montana Department of Transportation (MDT) emphasizing public involvement and consideration of environmental issues at the planning level. Early corridor planning may save the state time and money by giving a context to later planning and environmental compliance documents.

Corridor planning is a process that is collaborative with local governments as well as regulating and resource agencies and includes extensive public participation opportunities. The process is designed to derive a planning-level analysis of the existing transportation system within the corridor and determine how it could be changed or managed to meet long-term needs.

What is a corridor?

A corridor is a broad geographic area defined by existing travel patterns that provides important connections for the movement of people, goods, and services within and between regions of the state.

What is the project's primary purpose?

This planning process will examine the existing transportation facility and travel characteristics, as well as existing social, economic and environmental issues within the corridor. The end result of the study will be a comprehensive package of recommendations intended to satisfy current design standards, meet mobility and level of service targets, improve safety, and fit within cost and constructability constraints.

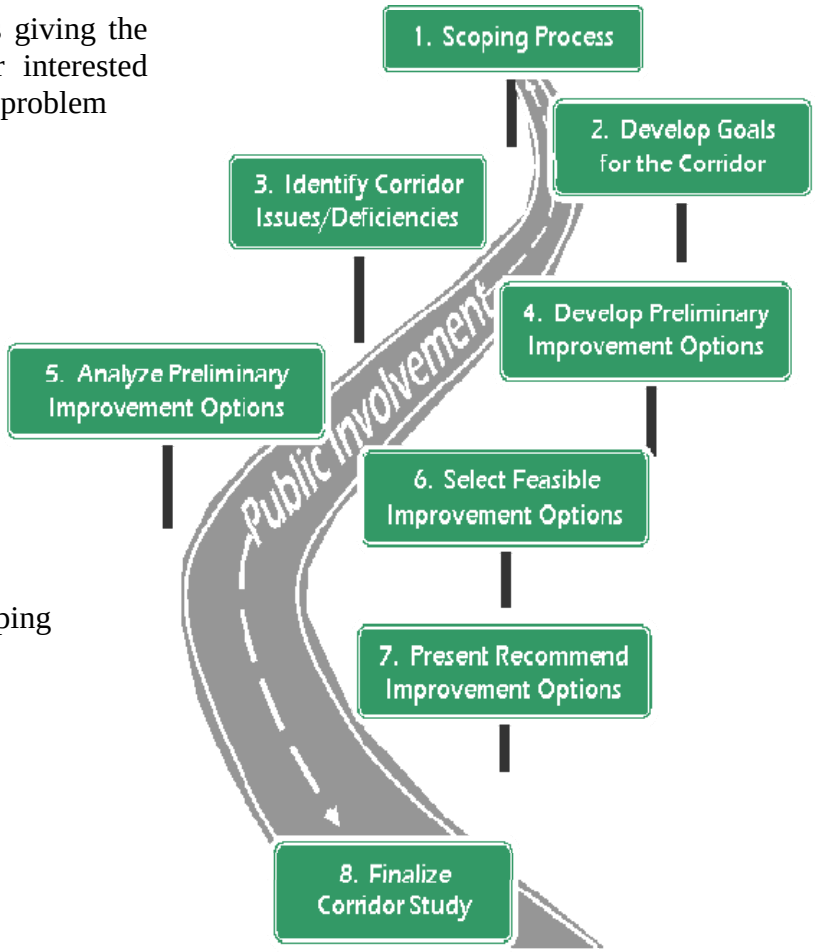
MDT attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity of the Department. Alternative accessible formats of this information will be provided upon request. For further information, please call (406)**442-0370** or TTY (800)335-7592, or by calling Montana Relay at 711. Accommodation requests must be made within 48 hours of a public meeting.

What is involved in the Corridor Planning Process?

The Corridor Planning Process has several distinct phases that are illustrated as mileposts in the graphic below. There are two key aspects to this study: a proactive public participation program to ensure that we understand your concerns, and a rigorous exploration of improvement options to ensure that we are being responsive to the needs of area residents and users of the area's transportation facilities. We are now nearing the end of the scoping phase of the study and are developing and analyzing a variety of improvement options.

Scoping

Scoping is an active consultation process giving the public, resource agencies, and all other interested parties an opportunity to help identify any problem areas or individual concerns relevant to the project, and to suggest opportunities for improvement.



Public scoping meetings were held for this project on Tuesday, March 28 at the Roscoe Community Center and Thursday, March 30 at the Roosevelt Middle School in Red Lodge. We listened to your comments and had a productive discussion about the proposed project.

Some of the issues raised at the public scoping meeting (in no order of priority) were:

- Safety concerns
- Project cost
- Design considerations
- Aesthetic impacts
- Impacts to agriculture and tourism
- Pedestrian and bicycle facilities
- Traffic control and traffic volume

Next Step: Develop Improvement Options

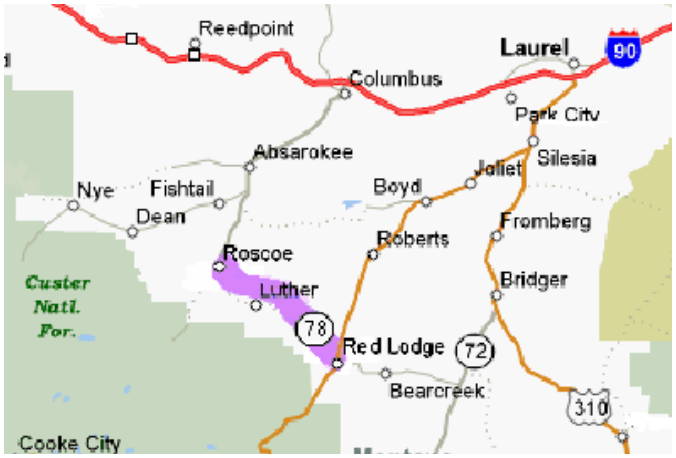
In response to geometric and operational analyses and public input, improvement options will be developed to determine how well each meets the overall goals and objectives for this corridor. Once we have developed an initial range of options, we will schedule another public meeting to gather your input.

Is there a Need for this Project?

The MT 78 alignment between Red Lodge and Roscoe does not meet current design and safety standards. Ninety-seven of the 117 vertical curves within the project limits fail to meet the minimum stopping sight distance (SSD) requirement. Thirty-six of these curves fail to meet the maximum gradient. Fifty-one of the 55 passing opportunities within the project limits fail to meet the minimum passing sight distance (PSD) requirement. Fifteen of the 43 horizontal curves are too tight. As a result of these conditions, the accident rate for the segment is 65 percent higher and the accident severity rate is 62 percent higher than the statewide average for all primary roads. Consequently, there is a need to plan for improvements to this corridor.

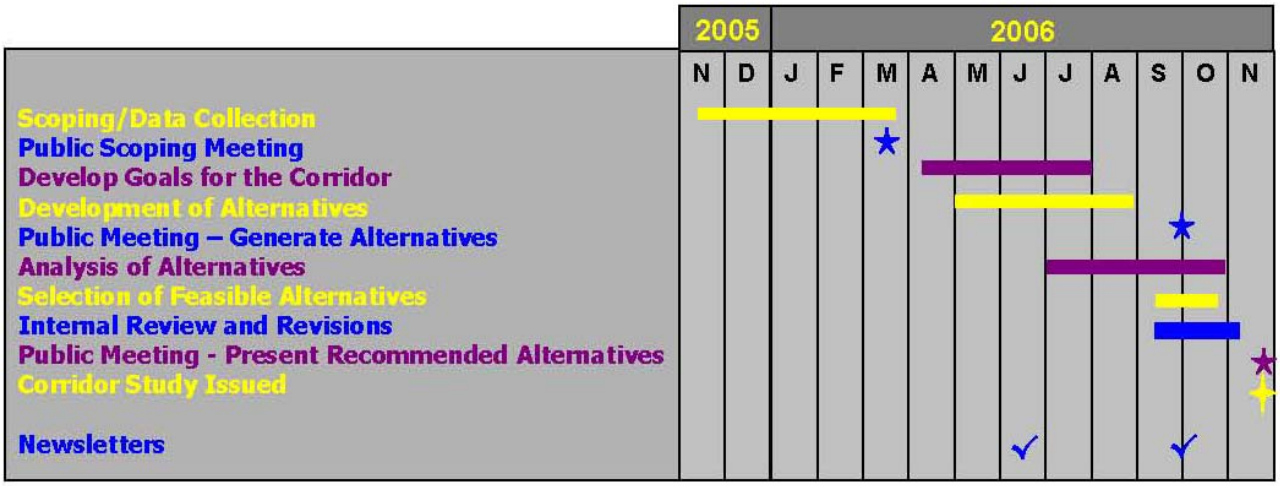
Where will the project be located?

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs through Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins five miles north of Red Lodge and extends to the north end of Roscoe.



Schedule

This Corridor Study is scheduled to be completed within a twelve (12) month timeframe. Project activities are detailed in the schedule below.



How Can I Stay Involved?

Please mail or email your name and address to HKM Engineering to receive further newsletters. We encourage you to continue to participate in further public involvement activities, and hope you will make sure your friends and neighbors are also aware of the project. You can also contact the Project Team at the phone numbers and addresses listed to the right.

Next Public Meeting . . .

We are currently developing a range of options. We will be coming back out to the community to discuss the most promising options and request further input to select a set of feasible options that meet the needs of the corridor, are environmentally sound, and physically and financially feasible. We anticipate this meeting to occur sometime in July, so watch the newspaper for an announcement.

For more information, please contact:

Bruce Barrett
Billings District Administrator
MDT
424 Morey St.
PO Box 20437
Billings, MT 59104-0437
(406) 657-0210
bbarrett@mt.gov

Carol Strizich
Project Manager
MDT Planning
2701 Prospect Drive
PO Box 201001
Helena, MT 59620-1001
(406) 444-9240
cstrizich@mt.gov

Darryl L. James
Project Manager
HKM Engineering
7 West 6th Avenue, Suite 3W
P.O. Box 1009
Helena, MT 59624
(406) 442-0370

HKM ENGINEERING

The Power Block West
7 West 6th Avenue, 3W
P.O. Box 1009
Helena, MT 59624-1009

MT 78 Corridor Study

September 2006 **Project Newsletter No. 2**

What is the MT 78 Corridor Study?

The Montana Department of Transportation (MDT) has initiated a corridor planning process along the MT 78 corridor in order to comprehensively assess future transportation needs, prioritize future transportation projects, provide opportunities for early public input and resource agency coordination, and foster cooperative state and local transportation planning efforts. Corridor planning is a relatively new tool within the Montana Department of Transportation (MDT) emphasizing public involvement and consideration of environmental issues at the planning level. The study will focus on assessment of the existing transportation system within the corridor and determine how it could be changed or managed to meet long-term needs.

Where is the study located?

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs through Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins at milepost 5.0 northwest of Red Lodge and extends milepost 20.15 southeast of Roscoe.

Purpose of the Study

The primary intent of this study is to present a set of alternatives that:

- Improve safety conditions and address accident concentrations within the corridor
- Improve geometric elements within the corridor to meet current MDT design standards, including horizontal alignment, vertical alignment, and sight distance

MDT attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity of the Department. Alternative accessible formats of this information will be provided upon request. For further information, please call (406)**442-0370** or TTY (800)335-7592, or by calling Montana Relay at 711. Accommodation requests must be made within 48 hours of a public meeting.

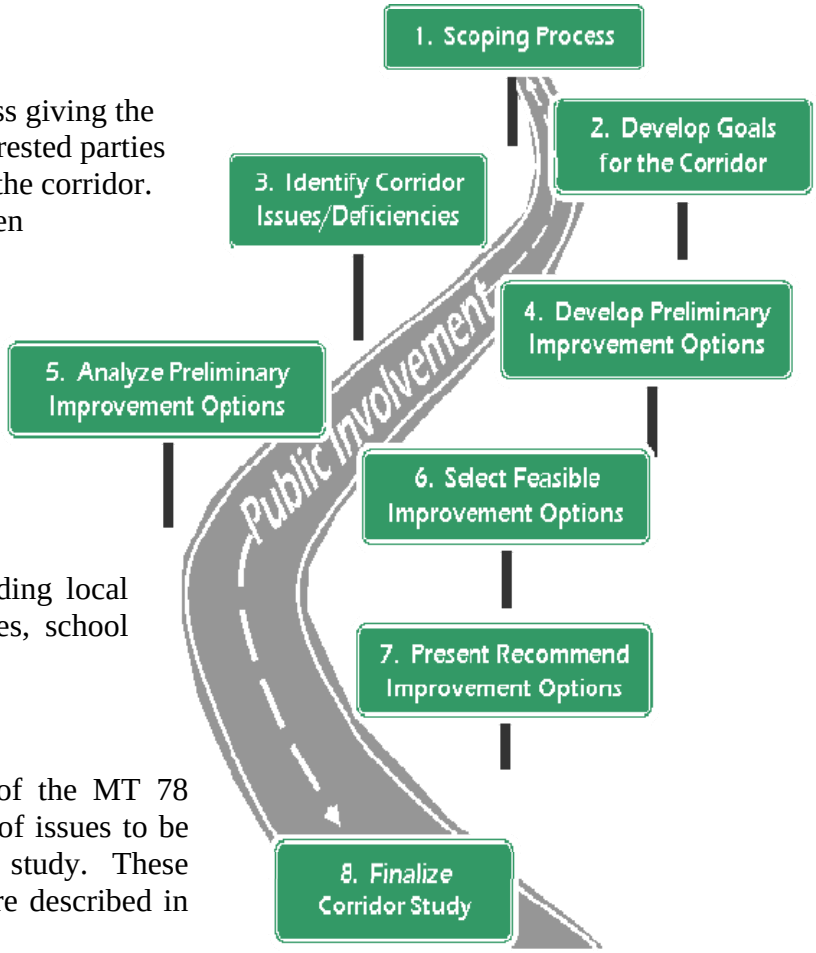
What is involved in the Corridor Planning Process?

The Corridor Planning Process has several phases that are illustrated as mileposts in the graphic below. There are two key aspects to this study: a proactive public participation program to ensure that we understand your concerns, and a rigorous exploration of improvement options to ensure that we are being responsive to the needs of area residents and users of the area's transportation facilities. We have begun developing goals for the corridor, identifying corridor deficiencies, and developing preliminary improvement options.

Corridor Goals

Goal setting is an active consultation process giving the public, resource agencies, and all other interested parties an opportunity to help identify a vision for the corridor. A set of preliminary corridor goals have been developed in cooperation with MDT and with input from the public involvement process. These goals, together with baseline data, will be used to evaluate alternatives and identify the most desirable alternatives to be included in this Plan's recommendations. Preliminary corridor goals include:

- Preserve the character of the corridor
- Balance the needs of all users, including local residents, tourists, agricultural vehicles, school buses, motorcyclists, and bicyclists



Corridor Deficiencies

The investigation of existing conditions of the MT 78 transportation system identified a number of issues to be considered in development of the corridor study. These existing corridor deficiencies and issues are described in the following list.

1. Steep grades exist over a large portion of the corridor.
2. Sharp curves exist at the southern and northern ends of the corridor and at a few scattered locations within the middle portion of the corridor.
3. Passing and stopping sight distances are limited not only due to poor horizontal and vertical alignment, but also due to steep side slopes in several locations.
4. Shoulder widths throughout the corridor are not wide enough to safely accommodate vehicle stops or bicycle travel.
5. There are a number of poorly-aligned access points along the corridor.
6. Accident concentrations are located between MP 5 to 9.5 and from MP 18.5 to 20, as well as in scattered locations between MP 12 to 14 and MP 17 to 18.

Preliminary Improvement Options

In response to geometric and operational analyses and public input, we have developed a set of preliminary improvement options for the corridor. The figures shown below are included as representative examples of these improvement options. Figure 1 is an aerial photograph of the MT 78 highway between MP 9.3 and MP 9.8. The existing roadway is visible as a gray line on the aerial. The blue line shows the proposed new horizontal alignment, which would decrease the sharpness of the horizontal curve to improve sight distance. Figure 2 is a profile view of the same portion of the roadway. The gray line represents the existing roadway, and the blue line represents the proposed new grade, which would also improve sight distance. The numbers on the right and left side of Figure 2 are elevations.

Figure 1
Aerial View

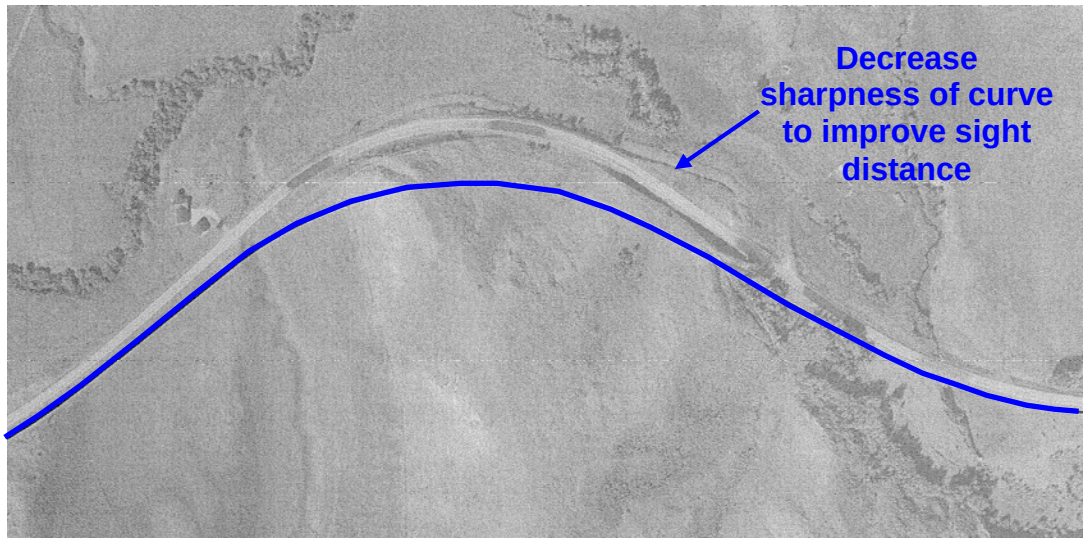


Figure 2
Profile View

How Can I Stay Involved?

We encourage you to continue to participate in further public involvement activities, and hope you will make sure your friends and neighbors are also aware of the project. You can contact the Project Team at the phone numbers and addresses listed to the right.

Next Public Meeting . . .

We have developed a set of preliminary goals for the corridor, identified corridor deficiencies, and developed preliminary improvement options. We will be coming back out to the community to discuss the preliminary goals and the most promising improvement options. At that time, we will request further input to select a set of options that meet the needs of the corridor, are environmentally sound, and physically and financially feasible. The next public meeting will be held on **September 20, 2006** from **7:00 pm to 9:00 pm** at the **Roscoe Community Center** north of Roscoe. We invite you to join us!

HKM ENGINEERING

The Power Block West
7 West 6th Avenue, 3W
P.O. Box 1009
Helena, MT 59624-1009

For more information, please contact:

Bruce Barrett
Billings District Administrator
MDT
424 Morey St.
PO Box 20437
Billings, MT 59104-0437
(406) 657-0210
bbarrett@mt.gov

Carol Strizich
Project Manager
MDT Planning
2701 Prospect Drive
PO Box 201001
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(406) 444-9240
cstrizich@mt.gov

Darryl L. James
Project Consultant
HKM Engineering
7 West 6th Avenue, Suite 3W
P.O. Box 1009
Helena, MT 59624
(406) 442-0370

MT 78 Corridor Study

August 2007 **Project Newsletter No. 3**

What is the MT 78 Corridor Study?

The Montana Department of Transportation (MDT) has completed a corridor planning process along the MT 78 corridor in order to comprehensively assess future transportation needs, prioritize future transportation projects, provide opportunities for early public input and resource agency coordination, and foster cooperative state and local transportation planning efforts.

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs through Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins at milepost 5.0± northwest of Red Lodge and extends to milepost (MP) 20.0± southeast of Roscoe.

The study presents a set of improvement options that:

- Improve safety conditions and address accident concentrations within the corridor.
- Improve geometric elements within the corridor, including horizontal alignment, vertical alignment, and sight distance.

What issues were identified?

The investigation of the existing MT 78 transportation system identified a number of issues. These existing corridor deficiencies and issues are described in the following list.

7. Steep grades exist over a large portion of the corridor.
8. Sharp curves exist at the southern and northern ends of the corridor and at a few scattered locations within the middle portion of the corridor.
9. Passing and stopping sight distances are limited not only due to poor horizontal and vertical alignment, but also due to steep side slopes in several locations.
4. Shoulder widths throughout the corridor are not wide enough to safely accommodate vehicle stops or bicycle travel.
5. There are a number of poorly-aligned access points along the corridor.
6. Accident concentrations are located between MP 5 to 9.5 and from MP 18.5 to 20, as well as in scattered locations between MP 12 to 14 and MP 17 to 18.

An inventory of existing social, economic, and environmental conditions was conducted for the study. Because the proposed improvements are either on or close to the existing alignment and are limited to minor widening and alignment shifts, impacts to resources are not anticipated to be significant for the purpose of future environmental compliance.

Summary of Improvement Options

In response to geometric and operational analyses and public input, a set of short-term and long-term improvement options was developed for the corridor. Efforts were made to avoid or minimize impacts to known constraints, such as wetlands and historic resources, within the corridor. The following provides a summary of these options.

Short Term Improvement Options

Short-term improvement options were ranked based on the following criteria: cost, ability to improve safety in a crash concentration location, and near- and long-term benefits. Based on their respective rankings under these criteria, each of the spot improvements were then assigned a priority ranking as follows.

High Priority Improvement Options

- Update school bus stop signing at MP 6.9, 10.7, 12.1, 13.1, 13.9, and 15.1.
- Trim vegetation for intersection visibility at MP 13.0.

Moderate Priority Improvement Options

- Realign Upper Luther Road and build a school bus pullout / Park and Ride at MP 8.2.
- Realign Lower Luther Road and build a school bus pullout at MP 13.0.
- Shave side slopes to improve sight distance at MP 9.3 and MP 7.4, and from MP 8.0 through 8.2.

Low Priority Improvement Options

- Shave side slopes to improve sight distance at MP 15.8 and MP 16.8.

Short Term Improvement Option Costs

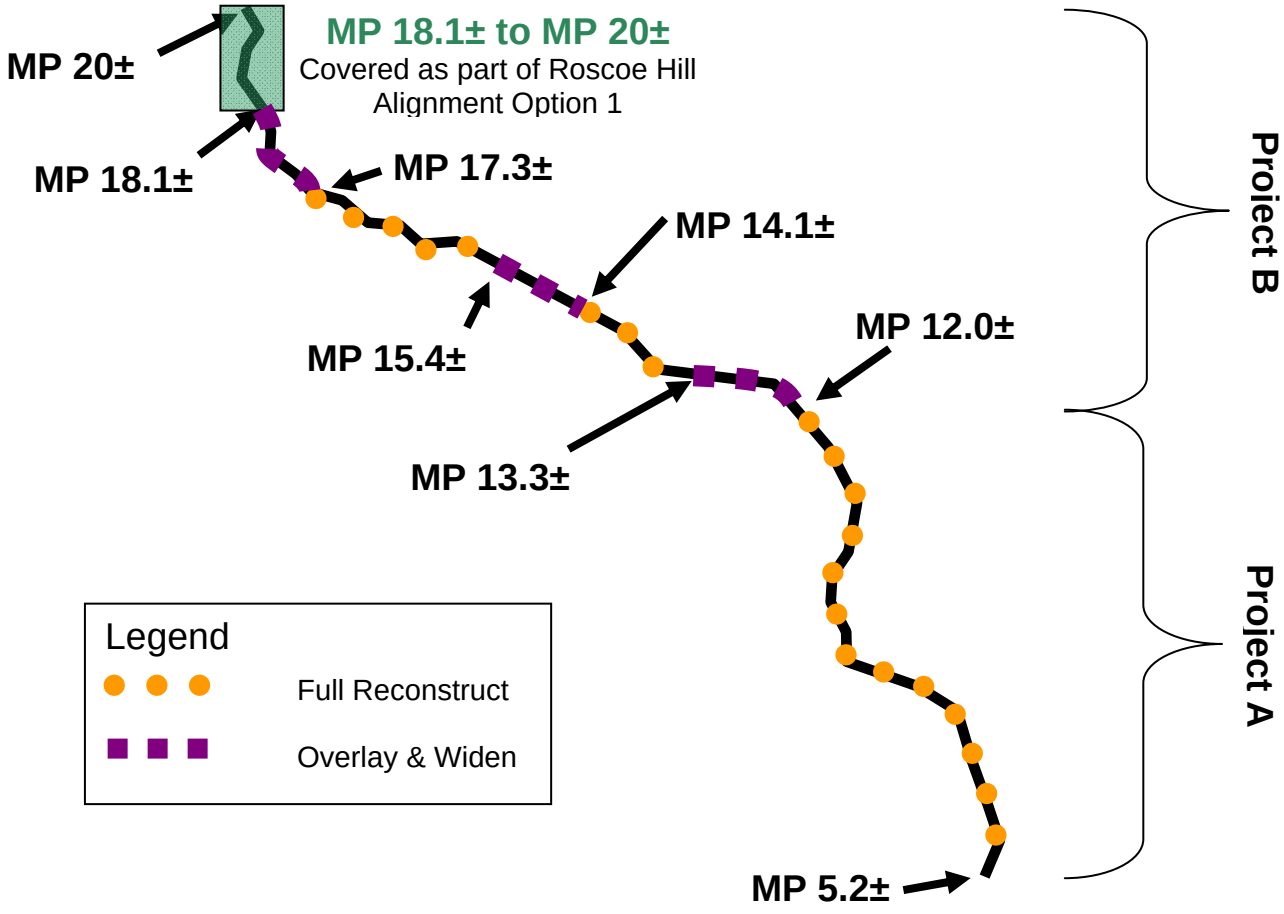
Ranking Group	Approximate MP	Potential Spot Improvement	Estimated Cost (2006 dollars)
1	6.9, 10.7, 12.1, 13.1, 13.9, 15.1	Update school bus stop signing	$6,700
2	13.0	Trim vegetation for intersection visibility	$2,800
3	8.2	Realign Upper Luther Road and build a school bus pullout / Park and Ride	$151,000
3	13.0	Realign Lower Luther Road and build a school bus pullout	$164,000
4	9.3	Shave side slopes to improve sight distance	$906,000
5	7.4	Shave side slopes to improve sight distance	$107,000
5	8.0 – 8.2	Shave side slopes to improve sight distance	$178,000
6	15.8	Shave side slopes to improve sight distance	$720,000
6	16.8	Shave side slopes to improve sight distance	$1,108,000

Long Term Improvement Options

Existing roadway conditions were evaluated to determine the minimum level of improvement necessary to upgrade the roadway to improve safety. Over much of the corridor, full reconstruction is necessary to satisfy this goal. Two long-term improvement options were identified.

Project A involves full reconstruction from MP 5.2± to MP 12.0±.

Project B involves full reconstruction from MP12.0± through the end of the corridor. Additionally, Project B includes Roscoe Hill, located at the far northern part of the corridor (MP 18.1± to 20.0±), where three possible alignments were investigated. Based on cost estimates, the recommended option is Alignment Option 1, an overlay and widen scenario where minor changes would be made to the vertical curves to provide minimum sight distance. Substandard grades would not be addressed under this option and a design exception would be required.



As shown in the figure above, within the Project B segment there are areas requiring full reconstruction and other areas that can be improved using an overlay and widen scenario. MDT has determined that it is not cost effective to utilize an overlay and widen concept when more than 25 percent of the proposed project requires full reconstruction. Because nearly half of Project B requires full reconstruction, the overlay and widen concept is not recommended. The ultimate improvement strategy for the entire corridor is full reconstruction in the long-term.

Long Term Improvement Option Costs

Project	Improvement Option	Total Estimated Cost (2006 dollars)
Project A		$17,900,000
Project B	Roscoe Hill Alignment Option 1	$16,800,000

How Can I Review the Report?

The Draft Plan is available for public review and comment. You may either review the report online at the MT 78 project web site at www.mdt.mt.gov/pubinvolve/mt78corridor/ or request a copy of the report by contacting Darryl James at the phone number and address provided to the right.

How Can I Submit My Comments?

Comments may be submitted in writing at the final public meeting on **Wednesday, August 22, 2007** from **7 p.m. to 9 p.m.** at the **Roscoe Community Center** located on MT 78.

Comments may also be submitted by mail to project consultant Darryl James of HKM Engineering Inc. at P.O. Box 1009, Helena, MT 59624; or they may be submitted online at the MT 78 project web site at www.mdt.mt.gov/pubinvolve/mt78corridor/

Please indicate comments are for the MT 78 Corridor Study and submit comments by **September 24, 2007**.

For more information, please contact:

Montana Department of Transportation
serving you with pride

Bruce Barrett
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MDT
424 Morey St.
PO Box 20437
Billings, MT 59104-0437
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HKM ENGINEERING

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Project Consultant
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djames@hkminc.com

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Appendix C

Letters Received from State and Federal Agencies

Montana Fish, Wildlife & Parks

1420 E. Sixth Avenue
P.O. Box 200701
Helena, Montana 59620-0701

RECEIVED
OCT 24 2006
ENVIRONMENTAL

October 23, 2006

Jean Riley
Montana Department of Transportation
2701 Prospect Avenue
P.O. Box 201001
Helena, Montana 59620-1001

MT 78 Corridor Study
Red Lodge to Roscoe

Dear Jean:

The following are comments from Montana Fish, Wildlife & Parks regarding the MT 78 Corridor Study. Additional, more specific comments may be forthcoming as we gather data for each of the drainages that could be affected by a road improvement project.

a. Development plans should first incorporate a design that avoids direct adverse impacts to these fish and wildlife resources. If conditions are such that direct adverse impacts cannot be avoided, project features should be designed to minimize impacts. Unavoidable adverse impacts may need to be mitigated.
b. Several ephemeral, intermittent and perennial stream systems cross the study corridor. In general, efforts should be taken during pre-design through construction phases to assure uninterrupted passage of a stream's discharges to maintain the natural channel pattern, dimension and profile and temporal characteristics. There may be instances, however, where it is desirable to create a fish barrier and we will coordinate further with MDT if this is desirable.
c. Riparian areas, including wildlife/wetland habitat adjacent to these drainages should also be protected to the maximum extent possible. If such areas cannot be avoided or will be notably degraded in scope or quality, they should be mitigated on site and in kind, if possible. This may require MDT to develop procedures that allow the re-establishment of stream systems and riparian areas outside of existing rights-of-way.
d. Where crossings are necessary, bridges are preferred over culverts as bridges usually result in less adverse impact to a stream's features, functions, dynamic processes and adjacent riparian habitat compared to a culvert. Installation of culverts may or may not require site-specific mitigation. In general, culverts should be embedded and lengths minimized where feasible.
e. Long culverts, whether the drainage supports a fishery or not, are not preferred because of the potential loss of "open", vegetated, productive segments of a drainage can be lost and undesirable bed degradation or aggradation can be induced. It would be appreciated if road design would consider minimizing overall culvert length through reduction of road prism fill.

Thank you for the opportunity to provide comments at this time. If they are unclear, please contact me at (406) 444-3175. We will provide more specific comments as field data becomes available.

Sincerely,

dougmcdonald

Doug McDonald
Stream Protection Coordinator
Habitat Protection Bureau/Fisheries

Copy: FWP Region 5 – Jim Darling/Jim Olsen
DEQ – Jeff Ryan
COE – Allan Steinle

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
BILLINGS REGULATORY OFFICE
2602 FIRST AVENUE NORTH, ROOM 309
BILLINGS MT 59101

Please reply to attention of:

August 15, 2006

Billings Regulatory Office
Phone (406) 657-5910
Fax (406) 657-5911

RE: MT 78 Corridor Study
Corps File No. 200690568

Montana Department of Transportation
Attention: Ms. Jean Riley
Post Office Box 201001
Helena, Montana 59620-1001

Dear Ms. Riley:

Reference is made to your letter regarding the MT 78 Corridor Study from Red Lodge to Roscoe, Montana.

Under the authority of Section 404 of the Clean Water Act, Department of the Army permits are required for the discharge of fill material into waters of the United States. Waters of the United States include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters.

Based on the information provided, the project area may contain jurisdictional waters of the U.S., which may trigger permitting requirements. It is impossible to advise you on likely permitting scenarios without detailed information pertaining to the project corridor and the scope of project impacts.

When final design has been completed, please submit plans and a joint application to this office, along with project drawings and photographs of the proposed sites. Please also include an inventory of aquatic resources, including wetlands that may be affected by this project. The application can be downloaded from http://www.nwo.usace.army.mil/html/od-rmt/applications.html, or one can be mailed to you upon request. When the application is complete, a determination will be made as to whether or not authorization will be granted.

If you have any questions, please call me at the Billings office at (406) 657-5910, and reference File No. 200690568.

Sincerely,

Shannon Johnson
Project Manager

Montana Fish, Wildlife & Parks

August 14, 2007

1420 East Sixth Avenue
P.O. Box 200701
Helena, Montana 59620-0701

Lynn Zanto, Supervisor
Statewide & Urban Planning
Montana Department of Transportation
2701 Prospect Avenue
P.O. Box 201001
Helena, Montana 59620-1001

Dear Lynn:

We have reviewed the July 2007 version of the MT 78 Corridor Study Report (Report) – Red Lodge top Roscoe and have the following comments.

a. Please refer to our letter of October 23, 2006, which was enclosed in the Report Appendix C, and incorporate those comments into the purpose, need and goal statements.
b. In addition, it should be an objective to maintain or create continuous and connected aquatic and terrestrial habitat corridors along this reach of highway and re-establish or re-connect floodplains and abandoned channels where appropriate.

Thank you again for the opportunity to review this report. If you have any questions on these comments please feel free to contact me at 444-3175.

Sincerely,

doug mcdonald

Doug McDonald
Stream Protection Coordinator
Habitat Protection Bureau

Cc: Glenn Phillips
Region V - Jim Olsen/Jim Darling

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
BILLINGS REGULATORY OFFICE
2602 FIRST AVENUE NORTH, ROOM 309
BILLINGS MT 59101

Please reply to attention of:

October 24, 2007

Billings Regulatory Office
Phone (406) 657-5910
Fax (406) 657-5911

RE: MT 78 Corridor Study – Red Lodge to Roscoe
Corps File No. NWO-2007-2657-MTB

Montana Department of Transportation
Attention: Ms. Lynn Zanto
Post Office Box 201001
Helena, Montana 59620-1001

Dear Ms. Zanto:

Reference is made to your request for comments on the draft of the MT 78 Corridor Study report. The study refers to the portion of the project extending from Red Lodge to Roscoe, Montana.

Under the authority of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, Department of the Army permits are required for the discharge of fill material into waters of the United States. Waters of the United States include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters.

Based on the information provided, the project area contains jurisdictional waters of the U.S., including wetlands. Wetlands along the project corridor will have to be delineated prior to any permitting or construction. However, we cannot determine at this time if an IP would be required. A condition that might require project review under IP procedures would be exceeding ½ acre of fill at any one crossing and/or filling of a jurisdictional water. If the project will be reviewed as an IP, it would be subject to 404(b)(1) guidelines review, which requires the least damaging practicable alternative in light of the overall project purpose as determined by the Corps.

When final design has been completed, please submit plans and a joint application to this office, along with project drawings and photographs of the proposed sites. Please also include an inventory of aquatic resources, including wetlands that may be affected by this project. The application can be downloaded from http://www.nwo.usace.army.mil/html/od-rmt/applications.html, or one can be mailed to you upon request. When the application is complete, a determination will be made as to whether or not authorization will be granted. The permit decision will be based on compliance with the guidelines and the Corps analysis may give different weight to some of the information that MDT used in deciding upon their preferred alternative.

If you have any questions, please call me at the Billings office at (406) 657-5910, and reference File No. NWO-2007-2657-MTB.

Sincerely,

Shannon Johnson

Shannon Johnson
Project Manager

Appendix D

Crash Analysis

MT 78 Crash Analysis

Crash rates are a measure of the relative safety of a section of roadway. These rates are most often measured and expressed as the number of reported crashes per million vehicle miles (MVM) traveled over a given section / length of roadway. Crash rates experienced at a particular location can be compared to statewide averages for similar types of roadways and a determination then made regarding the relative safety of that section of roadway. In this report, the crash rate experienced over the MT 78 corridor, considering half mile segments at one-tenth mile increments of roadway, is compared to the statewide average for Primary Highways.

Statewide Crash Rates for State Primary Highways

	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	Average 1995-2004
State Primary Crash Rate	1.33	1.44	1.46	1.48	1.54	1.54	1.56	1.55	1.74	1.38	1.502

The statewide average crash rate for state primaries over the period 1995 to 2004 is 1.502 crashes per MVM. The annual average daily traffic (AADT) for the MT 78 segment from MP 5.0 to MP 19.0 during the period January 1, 1995 to December 31, 2005 was 742 vehicles per day. The annual average daily traffic (AADT) for the MT 78 segment from MP 4.0 to MP 20.0 during the period January 1, 2005 to December 31, 2005 was 994 vehicles per day. In calculating the average number of crashes per half mile below, the highest (and therefore most conservative) measure of AADT was used.

994 vehicles per day	×	365 days per year	×	10 years	×	0.5 miles	=	1,814,050 vehicle miles		
1,814,050 vehicle miles	=	1.814050 million vehicle miles for 10 year period								
x crashes	/	1.814050 million vehicle miles					=	1.502 crashes per MVM		
x	=	2.7247 crashes								

In order to illustrate crash concentrations, the statewide average number of crashes per half mile was rounded up to the next whole number. Accordingly, the term “crash concentration” is defined in this context as three or more crashes per half-mile segment for the period 1995 to 2004. Crash data for the entire corridor was reviewed by half-mile segments every tenth of a mile. The following table lists half-mile segments with three or more crashes recorded between January 1, 1995 and December 31, 2004.

MP	# Crashes	Total Crashes in ½ mile segment
4.9	1	4
5.1	3	
5.1	3	16
5.4	1	
5.5	6	
5.6	6	
5.6	6	10
5.7	2	
5.8	1	
6.1	1	
6.1	1	8
6.2	2	
6.3	1	
6.4	1	
6.5	2	
6.6	1	
6.6	1	10
6.8	2	
6.9	6	
7.0	1	
7.0	1	4
7.4	2	
7.5	1	
7.4	2	5
7.5	1	
7.6	1	
7.8	1	
7.6	1	3
7.8	1	
8.1	1	
7.8	1	4
8.1	1	
8.2	1	
8.3	1	

MP	# Crashes	Total Crashes in ½ mile segment
8.3	1	3
8.7	2	
8.7	2	4
8.9	1	
9.2	1	
9.2	1	3
9.4	1	
9.5	1	
12.1	1	3
12.3	1	
12.4	1	
12.4	1	5
12.6	1	
12.9	3	
13.4	1	4
13.7	2	
13.9	1	
16.3	2	5
16.4	1	
16.5	1	
16.6	1	
17.5	1	3
17.6	1	
17.8	1	
18.6	1	3
18.7	1	
18.9	1	
18.9	1	3
19.1	2	
19.1	2	3
19.5	1	

MP	# Crashes	Total Crashes in ½ mile segment
19.5	1	4
19.9	3	
19.9	2	4
20.0	2	

Appendix E

Detailed Costs and Cost Derivations

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project A Reconstruct MP 5.2 to MP 12.0
(6.8 miles; 359.04 Sta.)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$1,087,801.00	$ 1,087,801.00
2	Excavation - Unclassified	880,500	CY	$ 4.07	$ 3,583,635.00
3	Crushed Aggregate Course	359.04	Sta.	$ 3,435.00	$ 1,233,302.00
4	Plant Mix Bituminous Surfacing	359.04	Sta.	$ 5,300.00	$ 1,902,912.00
5	Seal & Cover	359.04	Sta.	$ 392.00	$ 140,744.00
6	Drainage	359.04	Sta.	$ 1,650.00	$ 592,416.00
7	Signing / Markings	359.04	Sta.	$ 450.00	$ 161,568.00
8	Fencing	359.04	Sta.	$ 1,010.00	$ 362,630.00
	Subtotal				$ 9,065,008.00
	Miscellaneous Items (20%) *				$ 1,813,002.00
	Structures (Bridges over 20 ft.)				
		0	SF	$ 130.00	$ -
	Subtotal				$10,878,010.00
	Contingency (25%)				$ 2,719,503.00
	Subtotal Construction Costs				**$13,597,513.00**
	Preliminary Engineering (8%)				$ 1,087,801.00
	Construction Engineering (8%)				$ 1,087,801.00
	Subtotal Engineering				$ 2,175,602.00
	Right of Way **				
	Rural Residential	6.9	Acre	$ 10,000.00	$ 69,000.00
	Rural Agriculture (dry land)	27.8	Acre	$ 1,000.00	$ 27,800.00
	Rural Agriculture (Irrigated)	11.4	Acre	$ 7,000.00	$ 79,800.00
	Subtotal R/W				$ 176,600.00
	Total Estimated Cost				**$15,949,715.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project B Reconstruct MP 12.0 to MP 20.0; Existing Horiz. Align.
Option 1 (8.0 miles; 422.4 Sta.)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$1,014,264.00	$ 1,014,264.00
2	Excavation - Unclassified	557,500	CY	$ 4.07	$ 2,269,025.00
3	Crushed Aggregate Course	422.40	Sta.	$ 3,435.00	$ 1,450,944.00
4	Plant Mix Bituminous Surfacing	422.40	Sta.	$ 5,300.00	$ 2,238,720.00
5	Seal & Cover	422.40	Sta.	$ 392.00	$ 165,581.00
6	Drainage	422.40	Sta.	$ 1,650.00	$ 696,960.00
7	Signing / Markings	422.40	Sta.	$ 450.00	$ 190,080.00
8	Fencing	422.40	Sta.	$ 1,010.00	$ 426,624.00
	Subtotal				$ 8,452,198.00
	Miscellaneous Items (20%) *				$ 1,690,440.00
	Structures (Bridges over 20 ft.)				
		0	SF	$ 130.00	$ -
	Subtotal				$10,142,638.00
	Contingency (25%)				$ 2,535,660.00
	Subtotal Construction Costs				**$12,678,298.00**
	Preliminary Engineering (8%)				$ 1,014,264.00
	Construction Engineering (8%)				$ 1,014,264.00
	Subtotal Engineering				$ 2,028,528.00
	Right of Way **				
	Rural Residential	6.8	Acre	$ 10,000.00	$ 68,000.00
	Rural Agriculture (dry land)	5.8	Acre	$ 1,000.00	$ 5,800.00
	Rural Agriculture (Irrigated)	35.4	Acre	$ 7,000.00	$ 247,800.00
	Subtotal R/W				$ 321,600.00
	Total Estimated Cost				**$15,028,426.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project B Reconstruct MP 12.0 to MP 20.0; Revised Vert. Align.@ Roscoe Hill
Option 2 (8.0 miles; 422.4 Sta.)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$2,977,576.00	$ 2,977,576.00
2	Excavation - Unclassified	4,095,000	CY	$ 4.07	$16,666,650.00
3	Crushed Aggregate Course	422.40	Sta.	$ 3,435.00	$ 1,450,944.00
4	Plant Mix Bituminous Surfacing	422.40	Sta.	$ 5,300.00	$ 2,238,720.00
5	Seal & Cover	422.40	Sta.	$ 392.00	$ 165,581.00
6	Drainage	422.40	Sta.	$ 1,650.00	$ 696,960.00
7	Signing / Markings	422.40	Sta.	$ 450.00	$ 190,080.00
8	Fencing	422.40	Sta.	$ 1,010.00	$ 426,624.00
	Subtotal				$24,813,135.00
	Miscellaneous Items (20%) *				$ 4,962,627.00
	Structures (Bridges over 20 ft.)				
			SF	$ 130.00	$ -
	Subtotal				$29,775,762.00
	Contingency (25%)				$ 7,443,941.00
	Subtotal Construction Costs				**$37,219,703.00**
	Preliminary Engineering (8%)				$ 2,977,576.00
	Construction Engineering (8%)				$ 2,977,576.00
	Subtotal Engineering				$ 5,955,152.00
	Right of Way **				
	Rural Residential	7.2	Acre	$ 10,000.00	$ 72,000.00
	Rural Agriculture (dry land)	16.4	Acre	$ 1,000.00	$ 16,400.00
	Rural Agriculture (Irrigated)	39.2	Acre	$ 7,000.00	$ 274,400.00
	Subtotal R/W				$ 362,800.00
	Total Estimated Cost				**$43,537,655.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project B Reconstruct MP 12.0 to MP 20.71; Revised Horiz. Align. MP 18.25 - 20.71
Option 3 Including 1,850 ft. of connecting roadway (8.71 miles; Sta.459.9)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$1,573,544.00	$ 1,573,544.00
2	Excavation - Unclassified	1,288,500	CY	$ 4.07	$ 5,244,195.00
3	Crushed Aggregate Course	459.90	Sta.	$ 3,435.00	$ 1,579,757.00
4	Plant Mix Bituminous Surfacing	459.90	Sta.	$ 5,300.00	$ 2,437,470.00
5	Seal & Cover	459.90	Sta.	$ 392.00	$ 180,281.00
6	Drainage	459.90	Sta.	$ 1,650.00	$ 758,835.00
7	Signing / Markings	459.90	Sta.	$ 450.00	$ 206,955.00
8	Fencing	459.90	Sta.	$ 1,010.00	$ 464,499.00
	Subtotal				$12,445,536.00
	Miscellaneous Items (20%) *				$ 2,489,107.00
	Structures (Bridges over 20 ft.)				
	East Rosebud Creek	6,160	SF	$ 130.00	$ 800,800.00
	Subtotal				$15,735,443.00
	Contingency (25%)				$ 3,933,861.00
	Subtotal Construction Costs				**$19,669,304.00**
	Preliminary Engineering (8%)				$ 1,573,544.00
	Construction Engineering (8%)				$ 1,573,544.00
	Subtotal Engineering				$ 3,147,088.00
	Right of Way **				
	Rural Residential	5.6	Acre	$ 10,000.00	$ 56,000.00
	Rural Agriculture (dry land)	35.3	Acre	$ 1,000.00	$ 35,300.00
	Rural Agriculture (Irrigated)	48.2	Acre	$ 7,000.00	$ 337,400.00
	Subtotal R/W				$ 428,700.00
	Total Estimated Cost				**$23,245,092.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement RP 7.4 Shave Side Slope for SD

	Item	Quantity	Units		Price #		Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$	6,588.00	$	6,588.00
2	Excavation - Unclassified	9,000	CY	$	4.07	$	36,630.00
3	Crushed Aggregate Course	0.00	Sta.	$	3,435.00	$	-
4	Plant Mix Bituminous Surfacing	0.00	Sta.	$	5,300.00	$	-
5	Seal & Cover	0.00	Sta.	$	392.00	$	-
6	Drainage	0.00	Sta.	$	1,650.00	$	-
7	Signing / Markings	8.00	Sta.	$	450.00	$	3,600.00
8	Fencing	8.00	Sta.	$	1,010.00	$	8,080.00
	Subtotal					$	54,898.00
	Miscellaneous Items (20%) *					$	10,980.00
	Structures (Bridges over 20 ft.)						
		0	SF	$	130.00	$	-
	Subtotal					$	65,878.00
	Contingency (25%)					$	16,470.00
	Subtotal Construction Costs					**$**	**82,348.00**
	Preliminary Engineering (8%)					$	6,588.00
	Construction Engineering (8%)					$	6,588.00
	Subtotal Engineering					$	13,176.00
	Right of Way **						
	Rural Residential	0	Acre	$	10,000.00	$	-
	Rural Agriculture (dry land)	0.4	Acre	$	1,000.00	$	400.00
	Rural Agriculture (Irrigated)	0	Acre	$	7,000.00	$	-
	Subtotal R/W					$	400.00
	Total Estimated Cost					**$**	**95,924.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement RP 8.0 Shave Side Slope for SD

	Item	Quantity	Units		Price #		Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$	10,913.00	$	10,913.00
2	Excavation - Unclassified	15,000	CY	$	4.07	$	61,050.00
3	Crushed Aggregate Course	0.00	Sta.	$	3,435.00	$	-
4	Plant Mix Bituminous Surfacing	0.00	Sta.	$	5,300.00	$	-
5	Seal & Cover	0.00	Sta.	$	392.00	$	-
6	Drainage	0.00	Sta.	$	1,650.00	$	-
7	Signing / Markings	13.00	Sta.	$	450.00	$	5,850.00
8	Fencing	13.00	Sta.	$	1,010.00	$	13,130.00
	Subtotal					$	90,943.00
	Miscellaneous Items (20%) *					$	18,189.00
	Structures (Bridges over 20 ft.)						
		0	SF	$	130.00	$	-
	Subtotal					$	109,132.00
	Contingency (25%)					$	27,283.00
	Subtotal Construction Costs					**$**	**136,415.00**
	Preliminary Engineering (8%)					$	10,913.00
	Construction Engineering (8%)					$	10,913.00
	Subtotal Engineering					$	21,826.00
	Right of Way **						
	Rural Residential	0	Acre	$	10,000.00	$	-
	Rural Agriculture (dry land)	0.6	Acre	$	1,000.00	$	600.00
	Rural Agriculture (Irrigated)	0	Acre	$	7,000.00	$	-
	Subtotal R/W					$	600.00
	Total Estimated Cost					**$**	**158,841.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement MP 8.2 Upper Luther Road Bus Pullout / County Road Realignment

	Item	Quantity	Units		Price #		Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$	8,906.00	$	8,906.00
2	Excavation - Unclassified	3,240	CY	$	4.07	$	13,187.00
3	Crushed Aggregate Course	1,575.00	CY	$	16.41	$	25,846.00
4	Plant Mix Bituminous Surfacing	124.00	Ton	$	19.27	$	2,389.00
5	Asphalt Cement	7.60	Ton	$	430.01	$	3,268.00
6	Drainage	200.00	FT	$	41.20	$	8,240.00
7	Signing / Markings	1.00	LS	$	2,000.00	$	2,000.00
8	Fencing	1.00	LS	$	4,880.00	$	4,880.00
	Subtotal					$	68,716.00
	Miscellaneous Items (20%) *					$	13,743.00
	Structures (Bridges over 20 ft.)						
		0	SF	$	130.00	$	-
	Subtotal					$	82,459.00
	Contingency (35%)					$	28,861.00
	Subtotal Construction Costs					**$**	**111,320.00**
	Preliminary Engineering (8%)					$	8,906.00
	Construction Engineering (8%)					$	8,906.00
	Subtotal Engineering					$	17,812.00
	Right of Way **						
	Rural Residential	0	Acre	$	10,000.00	$	-
	Rural Agriculture (dry land)	0	Acre	$	1,000.00	$	-
	Rural Agriculture (Irrigated)	0.82	Acre	$	7,000.00	$	5,740.00
	Subtotal R/W					$	5,740.00
	Total Estimated Cost					**$**	**134,872.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement RP 9.3 Shave Side Slope for SD

	Item	Quantity	Units		Price #		Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$	55,711.00	$	55,711.00
2	Excavation - Unclassified	95,000	CY	$	4.07	$	386,650.00
3	Crushed Aggregate Course	0.00	Sta.	$	3,435.00	$	-
4	Plant Mix Bituminous Surfacing	0.00	Sta.	$	5,300.00	$	-
5	Seal & Cover	0.00	Sta.	$	392.00	$	-
6	Drainage	0.00	Sta.	$	1,650.00	$	-
7	Signing / Markings	15.00	Sta.	$	450.00	$	6,750.00
8	Fencing	15.00	Sta.	$	1,010.00	$	15,150.00
	Subtotal					$	464,261.00
	Miscellaneous Items (20%) *					$	92,852.00
	Structures (Bridges over 20 ft.)						
		0	SF	$	130.00	$	-
	Subtotal					$	557,113.00
	Contingency (25%)					$	139,278.00
	Subtotal Construction Costs					**$**	**696,391.00**
	Preliminary Engineering (8%)					$	55,711.00
	Construction Engineering (8%)					$	55,711.00
	Subtotal Engineering					$	111,422.00
	Right of Way **						
	Rural Residential	0	Acre	$	10,000.00	$	-
	Rural Agriculture (dry land)	1.3	Acre	$	1,000.00	$	1,300.00
	Rural Agriculture (Irrigated)	0	Acre	$	7,000.00	$	-
	Subtotal R/W					$	1,300.00
	Total Estimated Cost					**$**	**809,113.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement MP 13.0 Lower Luther Road Bus Pullout / County Road Realignment

	Item	Quantity	Units		Price #		Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$	9,675.00	$	9,675.00
2	Excavation - Unclassified	3,630	CY	$	4.07	$	14,774.00
3	Crushed Aggregate Course	1,740.00	CY	$	16.41	$	28,553.00
4	Plant Mix Bituminous Surfacing	124.00	Ton	$	19.27	$	2,389.00
5	Asphalt Cement	7.60	Ton	$	430.01	$	3,268.00
6	Drainage	200.00	FT	$	41.20	$	8,240.00
7	Signing / Markings	1.00	LS	$	2,000.00	$	2,000.00
8	Fencing	1.00	LS	$	5,755.00	$	5,755.00
	Subtotal					$	74,654.00
	Miscellaneous Items (20%) *					$	14,931.00
	Structures (Bridges over 20 ft.)						
		0	SF	$	130.00	$	-
	Subtotal					$	89,585.00
	Contingency (35%)					$	31,355.00
	Subtotal Construction Costs					**$**	**120,940.00**
	Preliminary Engineering (8%)					$	9,675.00
	Construction Engineering (8%)					$	9,675.00
	Subtotal Engineering					$	19,350.00
	Right of Way **						
	Rural Residential	0.4	Acre	$	10,000.00	$	4,000.00
	Rural Agriculture (dry land)	0	Acre	$	1,000.00	$	-
	Rural Agriculture (Irrigated)	0.25	Acre	$	7,000.00	$	1,750.00
	Subtotal R/W					$	5,750.00
	Total Estimated Cost					**$**	**146,040.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement RP 15.8 Shave Side Slope for SD

	Item	Quantity	Units		Price #		Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$	44,255.00	$	44,255.00
2	Excavation - Unclassified	74,000	CY	$	4.07	$	301,180.00
3	Crushed Aggregate Course	0.00	Sta.	$	3,435.00	$	-
4	Plant Mix Bituminous Surfacing	0.00	Sta.	$	5,300.00	$	-
5	Seal & Cover	0.00	Sta.	$	392.00	$	-
6	Drainage	0.00	Sta.	$	1,650.00	$	-
7	Signing / Markings	16.00	Sta.	$	450.00	$	7,200.00
8	Fencing	16.00	Sta.	$	1,010.00	$	16,160.00
	Subtotal					$	368,795.00
	Miscellaneous Items (20%) *					$	73,759.00
	Structures (Bridges over 20 ft.)						
		0	SF	$	130.00	$	-
	Subtotal					$	442,554.00
	Contingency (25%)					$	110,639.00
	Subtotal Construction Costs					**$**	**553,193.00**
	Preliminary Engineering (8%)					$	44,255.00
	Construction Engineering (8%)					$	44,255.00
	Subtotal Engineering					$	88,510.00
	Right of Way **						
	Rural Residential	0	Acre	$	10,000.00	$	-
	Rural Agriculture (dry land)	1.5	Acre	$	1,000.00	$	1,500.00
	Rural Agriculture (Irrigated)	0	Acre	$	7,000.00	$	-
	Subtotal R/W					$	1,500.00
	Total Estimated Cost					**$**	**643,203.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement RP 16.8 Shave Side Slope for SD

	Item	Quantity	Units		Price #		Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	$	68,078.00	$	68,078.00
2	Excavation - Unclassified	118,000	CY	$	4.07	$	480,260.00
3	Crushed Aggregate Course	0.00	Sta.	$	3,435.00	$	-
4	Plant Mix Bituminous Surfacing	0.00	Sta.	$	5,300.00	$	-
5	Seal & Cover	0.00	Sta.	$	392.00	$	-
6	Drainage	0.00	Sta.	$	1,650.00	$	-
7	Signing / Markings	13.00	Sta.	$	450.00	$	5,850.00
8	Fencing	13.00	Sta.	$	1,010.00	$	13,130.00
	Subtotal					$	567,318.00
	Miscellaneous Items (20%) *					$	113,464.00
	Structures (Bridges over 20 ft.)						
		0	SF	$	130.00	$	-
	Subtotal					$	680,782.00
	Contingency (25%)					$	170,196.00
	Subtotal Construction Costs					**$**	**850,978.00**
	Preliminary Engineering (8%)					$	68,078.00
	Construction Engineering (8%)					$	68,078.00
	Subtotal Engineering					$	136,156.00
	Right of Way **						
	Rural Residential	0	Acre	$	10,000.00	$	-
	Rural Agriculture (dry land)	1.8	Acre	$	1,000.00	$	1,800.00
	Rural Agriculture (Irrigated)	0	Acre	$	7,000.00	$	-
	Subtotal R/W					$	1,800.00
	Total Estimated Cost					**$**	**988,934.00**

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

\# Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

Cost Derivations

Drainage Cost Derivation

(Based on Columbus - South Reconstruction 9-22-05)

Item	Units (m)	Units (Ft.)	Unit Price	Item Cost
18" Drain	668.5	2193.24	$ 37.21	$ 81,610.52
24" Drain	534.0	1751.97	$ 61.01	$ 106,887.60
30" Drain	250.5	821.85	$ 70.33	$ 57,800.74
36" Drain	94.5	310.04	$ 97.11	$ 30,107.92
42" Drain	23.5	77.10	$ 105.00	$ 8,095.47
48" Drain	42.5	139.44	$ 125.00	$ 17,429.46
8 ft. CSP	31.5	103.35	$ 250.00	$ 25,836.61
10 ft. CSP Irr.	51.0	167.32	$ 450.00	$ 75,295.28
18" RCP Irr.	773.5	2537.73	$ 47.00	$ 119,273.29
24" RCP Irr.	288.0	944.88	$ 50.00	$ 47,244.09
30" RCP Irr.	52.0	170.60	$ 122.00	$ 20,813.65
6' x 3' RCB	100.0	328.08	$ 450.00	$ 147,637.80

Drainage Cost (14.2 km; 8.8 miles)		$ 738,032.43	
Drainage Cost / Mile		$ 83,867.32	
			Infl. @ 3%
Drainage Cost / Station		$ 1,588.40	$1,636.05
	Use $1,650 / Sta.		

Signing / Marking Cost Derivation

(Based on Columbus - South Reconstruction 9-22-05)

Item	Units (m)	Units (E)	Unit Price	Item Cost
Temp Markings	29.5	18.33	$ 151.36	$ 2,774.43
Signs -Al. Sht. Inc. - I	7.4	80.00	$ 24.52	$ 1,961.60
Signs - Sht. Al. - I	185.0	1991.00	$ 25.48	$ 50,730.68
Signs - Sht. Al. - III	195.0	2099.00	$ 23.00	$ 48,277.00
Posts - Stl. U	89.1	196.00	$ 5.50	$ 1,078.00
Posts - Structural Stl.	257.8	568.00	$ 4.75	$ 2,698.00
Posts - Trtd Timber 4"	162.4	532.81	$ 12.11	$ 6,452.31
Posts - Trtd Timber 5"	14.1	46.26	$ 12.26	$ 567.15
Frang Brkwy	2.0	2.00	$ 850.00	$ 1,700.00
Delineators	421.0	421.00	$ 26.00	$ 10,946.00
Remove Signs	108.0	108.00	$ 165.00	$ 17,820.00
Striping - White Pnt.	1145.0	303.00	$ 26.00	$ 7,878.00
Striping - Yellow Pnt.	609.0	161.00	$ 26.00	$ 4,186.00
Striping - White Epoxy	892.0	236.00	$ 59.00	$ 13,924.00
Striping - Yellow Epoxy	1940.0	513.00	$ 59.00	$ 30,267.00
	Signing / Marking Cost (14.2 km; 8.8 miles)			$ 201,260.16
	Signing / Marking Cost / Mile			$ 22,870.47
				Infl. @ 3%
	Signing / Marking Cost / Station			$ 433.15 $ 446.15
			Use $450 / Sta.	

Fencing Cost Derivation

(Based on Columbus - South Reconstruction 9-22-05)

Item	Units (m)	Units (E)	Unit Price	Item Cost	
Farm Fence - F4W	3671.0	12043.96	$ 2.30	$ 27,701.12	
Farm Fence - F4M	190.8	625.98	$ 2.30	$ 1,439.76	
Farm Fence - F5W	1543.0	5062.34	$ 2.30	$ 11,643.37	
Farm Fence - F5M	11768.1	38609.25	$ 2.30	$ 88,801.28	
Farm Fence - F6W	527.2	1729.66	$ 2.30	$ 3,978.22	
Fence - Special Design	65.2	213.91	$ 14.00	$ 2,994.75	
Single Panel	466.0	466.00	$ 150.00	$ 69,900.00	
Double Panel	336.0	336.00	$ 200.00	$ 67,200.00	
Farm Gate G2	212.2	696.19	$ 8.58	$ 5,973.35	
Farm Gate G3	162.3	532.48	$ 20.00	$ 10,649.61	
Temporary Fence	14200.0	46587.93	$ 1.25	$ 58,234.91	
Farm Fence WW	10462.0	34324.15	$ 3.00	$ 102,972.44	
Deadman	85.0	85.00	$ 35.00	$ 2,975.00	
				$ -	
				$ -	
	Fencing Cost (14.2 km; 8.8 miles)			$ 454,463.80	
	Fencing Cost / Mile			$ 51,643.61	
					Infl. @ 3%
	Fencing Cost / Station			$ 978.10	$1,007.44
			Use $1,010 / Sta.		

Surfacing Cost Derivation

(based on 0.45 PMBS and 1.25 CAC [both assumed] and Billings District Standard Units)

Assumes 12 ft. lanes and 3 ft. shoulder to accommodate a future overlay

Costs based on Jan. thru Dec. MDT English Bid Tabs)

			Unit Cost	Cost / Sta.	Estimated Cost	Use
PMBS	115.3	Tons / Sta.	$ 19.27	$2,221.83	$ 5,298.19	$5,300.00
AC	6.92	Tons / Sta.	$ 430.01	$2,975.67	#	
Tack	20.3	Gal / Sta.	$ 2.48	$ 50.34	#	
AggregateTack	20.3	Gal / Sta.	$ 2.48	$ 50.34	#	
CAC	209.3	CY / Sta.	$ 16.41	$3,434.61	$ 3,434.61	$3,435.00
Cover	334	SY / Sta.	$ 0.44	$ 146.96	$ 392.08	$ 392.00
Seal Oil	0.57	Tons / Sta.	$ 430.04	$ 245.12	#	

Combined with previous item

Appendix F

Access Management Study Recommendations

(Between MP 5.0± and MP 20.0±)

Mile Post (+/-)	Side	Approach Reference	Access Type	Access Recommendation
5.1	LT	MP05A-LT	Farm Field	RELOCATE TO ALIGN WITH MP05B-RT
5.1	RT	MP05B-RT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP05A-LT
5.1	LT	MP05C-LT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP05D-RT
5.2	RT	MP05D-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP05C-LT
5.3	LT	MP05E-LT	FARM FIELD	NO RECOMMENDATION
5.6	RT	MP05F-RT	FARM FIELD	NO RECOMMENDATION
5.6	RT	MP05G-RT	FARM FIELD	RECOMMEND CLOSING
5.8	RT	MP05H-RT	FARM FIELD	NO RECOMMENDATION
5.9	RT	MP05I-RT	FARM FIELD	NO RECOMMENDATION
6.1	LT	MP06A-LT	FARM FIELD	NO RECOMMENDATION
6.3	RT	MP06B-RT	FARM FIELD	NO RECOMMENDATION
6.4	RT	MP06C-RT	FARM FIELD	NO RECOMMENDATION
6.5	LT	MP06E-LT	FARM FIELD	NO RECOMMENDATION
6.7	RT	MP06D-RT	RESIDENTIAL	NO RECOMMENDATION
6.7	LT	MP06F-LT	FARM FIELD	NO RECOMMENDATION
6.8	LT	MP06G-LT	FARM FIELD	NO RECOMMENDATION
6.9	RT	MP06H-RT	RESIDENTIAL	NO RECOMMENDATION
6.9	LT	MP06I-LT	FARM FIELD	NO RECOMMENDATION
7.0	RT	MP07A-RT	FARM FIELD	RELOCATE TO ALIGN WITH MPO7B-LT AT STA 114+90
7.0	LT	MP07B-LT	FARM FIELD	NO RECOMMENDATION
7.1	LT	MP07C-LT	FARM FIELD	COMBINE WITH MP07D-LT
7.1	LT	MP07D-LT	FARM FIELD	COMBINE WITH MP07C-LT
7.1	RT	MP07E-RT	FARM FIELD	COMBINE WITH MP07F-RT
7.2	RT	MP07F-RT	FARM FIELD	COMBINE WITH MP07E-RT
7.4	RT	MP07G-RT	FARM FIELD	NO RECOMMENDATION
7.5	LT	MP07H-LT	FARM FIELD	NO RECOMMENDATION
7.5	RT	MP07I-RT	FARM FIELD	NO RECOMMENDATION
7.7	RT	MP07J-RT	FARM FIELD	NO RECOMMENDATION
7.7	LT	MP07K-LT	PUBLIC	NO RECOMMENDATION
7.8	RT	MP07L-RT	RESIDENTIAL	NO RECOMMENDATION
7.9	LT	MP07M-LT	RESIDENTIAL	NO RECOMMENDATION
7.9	RT	MP07N-RT	OTHER	NO RECOMMENDATION
7.9	LT	MP07O-LT	FARM FIELD	NO RECOMMENDATION
8.0	RT	MP08A-RT	FARM FIELD	NO RECOMMENDATION
8.1	RT	MP08B-RT	FARM FIELD	NO RECOMMENDATION
8.1	LT	MP08C-LT	FARM FIELD	NO RECOMMENDATION
8.2	LT	MP08D-LT	PUBLIC	REALIGN APPROACH PERPENDICULAR TO P-78
8.8	RT	MP08E-RT	FARM FIELD	NO RECOMMENDATION
8.8	LT	MP08F-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
8.9	RT	MP08G-RT	FARM FIELD	NO RECOMMENDATION
8.9	LT	MP08H-LT	FARM FIELD	RECOMMEND CLOSING
9.2	LT	MP09A-LT	RESIDENTIAL	NO RECOMMENDATION
9.2	RT	MP09B-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP09A-LT AT STA 150+00
9.5	LT	MP09C-LT	FARM FIELD	NO RECOMMENDATION
9.7	LT	MP09D-LT	FARM FIELD	NO RECOMMENDATION
9.8	RT	MP09E-RT	FARM FIELD	NO RECOMMENDATION
9.9	LT	MP09F-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
9.9	RT	MP09G-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP09F-LT AT STA 160+40
10.0	RT	MP10A-RT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP10B-LT AT STA 162+10
10.0	LT	MP10B-LT	FARM FIELD	NO RECOMMENDATION
10.1	RT	MP10C-RT	FARM FIELD	NO RECOMMENDATION
10.1	LT	MP10D-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP10C-RT AT STA 164+20
10.3	RT	MP10E1-RT	FARM FIELD	COMBINE WITH MP10C-RT OR MP10E2-RT
10.4	RT	MP10E2-RT	RESIDENTIAL	NO RECOMMENDATION
10.4	LT	MP10F-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP10E-RT

Mile Post (+/-)	Side	Approach Reference	Access Type	Access Recommendation
10.5	LT	MP10H-LT	FARM FIELD	NO RECOMMENDATION
10.7	LT	MP10G-LT	RESIDENTIAL	NO RECOMMENDATION
11.0	RT	MP11A-RT	PUBLIC	NO RECOMMENDATION
11.2	RT	MP11C-RT	FARM FIELD	NO RECOMMENDATION
11.3	LT	MP11B-LT	FARM FIELD	NO RECOMMENDATION
11.5	RT	MP11D-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP11E-LT
11.5	LT	MP11E-LT	FARM FIELD/SHARED	RELOCATE TO ALIGN WITH MP11D-RT
11.6	LT	MP11F-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP11G-RT AT STA 190+10
11.7	RT	MP11G-RT	RESIDENTIAL	NO RECOMMENDATION
11.8	RT	MP11H-RT	RESIDENTIAL	NO RECOMMENDATION
11.8	LT	MP11I -LT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP11H-RT AT STA 192+20
12.0	LT	MP12A-LT	FARM FIELD	NO RECOMMENDATION
12.1	LT	MP12C-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
12.1	RT	MP12B-RT	FARM FIELD	NO RECOMMENDATION
12.2	RT	MP12D-RT	FARM FIELD	NO RECOMMENDATION
12.5	LT	MP12E-LT	FARM FIELD	NO RECOMMENDATION
12.5	RT	MP12F-RT	FARM FIELD	NO RECOMMENDATION
12.7	LT	MP12G-LT	RESIDENTIAL/SHARED	RELOCATE TO ALIGN WITH MP12H-RT
12.7	RT	MP12H-RT	PUBLIC	RELOCATE TO ALIGN WITH MP12G-LT
12.9	LT	MP12I-LT	COMMERCIAL	NO RECOMMENDATION
12.9	LT	MP12J-LT	PUBLIC	NO RECOMMENDATION
13.0	LT	MP13A-LT	RESIDENTIAL	NO RECOMMENDATION
13.1	RT	MP13B-RT	FARM FIELD	NO RECOMMENDATION
13.1	LT	MP13C-LT	RESIDENTIAL	NO RECOMMENDATION
13.2	RT	MP13D-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP13E-LT
13.2	LT	MP13E-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP13D-RT
13.4	RT	MP13F-RT	FARM FIELD	NO RECOMMENDATION
13.4	LT	MP13G-LT	FARM FIELD	NO RECOMMENDATION
13.7	LT	MP13H-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP13I-RT
13.7	RT	MP13I-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP13H-LT
13.8	RT	MP13J-RT	RESIDENTIAL	NO RECOMMENDATION
13.8	LT	MP13K-LT	RESIDENTIAL	NO RECOMMENDATION
14.0	LT	MP14A-LT	FARM FIELD	NO RECOMMENDATION
14.1	RT	MP14B-RT	RESIDENTIAL	NO RECOMMENDATION
14.1	LT	MP14C-LT	FARM FIELD	NO RECOMMENDATION
14.5	LT	MP14D-LT	FARM FIELD	NO RECOMMENDATION
14.8	RT	MP14E-RT	FARM FIELD	NO RECOMMENDATION
14.8	LT	MP14F-LT	FARM FIELD	NO RECOMMENDATION
15.0	LT	MP15A-LT	RESIDENTIAL	NO RECOMMENDATION
15.1	LT	MP15B-LT	RESIDENTIAL	NO RECOMMENDATION
15.2	RT	MP15C-RT	FARM FIELD	NO RECOMMENDATION
15.3	LT	MP15D-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
15.3	RT	MP15E-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP15D-LT AT STA 249+35
15.5	LT	MP15F-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP15G-RT AT STA 252+55
15.5	RT	MP15G-RT	FARM FIELD	NO RECOMMENDATION
15.8	RT	MP15H-RT	FARM FIELD	NO RECOMMENDATION
15.8	LT	MP15I-LT	FARM FIELD	NO RECOMMENDATION
16.0	RT	MP16A-RT	PUBLIC	NO RECOMMENDATION
16.0	LT	MP16B-LT	FARM FIELD	NO RECOMMENDATION
16.1	LT	MP16C-LT	RESIDENTIAL	NO RECOMMENDATION
16.2	RT	MP16D-RT	COMMERCIAL	REMOVE DUE TO CHANGE IN USE WITH NEW OWNERS; ALTERNATIVE ACCESS AVAILABLE FROM BUTCHER CREEK ROAD
16.3	LT	MP16E-LT	FARM FIELD	NO RECOMMENDATION
16.3	RT	MP16F-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP16G-LT AT STA 264+80

Mile Post (+/-)	Side	Approach Reference	Access Type	Access Recommendation
16.3	LT	MP16G-LT	FARM FIELD	NO RECOMMENDATION
16.4	RT	MP16H-RT	FARM FIELD	COMBINE WITH APPROACH MP16I-RT AND CENTER ON FENCELINE
16.4	RT	MP16I-RT	FARM FIELD	COMBINE WITH APPROACH MPH-RT AND CENTER ON FENCELINE
16.6	RT	MP16J-RT	FARM FIELD	NO RECOMMENDATION
16.6	LT	MP16K-LT	FARM FIELD	NO RECOMMENDATION
16.6	LT	MP16L-LT	FARM FIELD	COMBINE APPROACH WITH MP16K-LT AT STA 268+80
16.8	LT	MP16M-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP16N-RT
16.9	RT	MP16N-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP16M-LT
17.0	RT	MP17A-RT	RESIDENTIAL	NO RECOMMENDATION
17.4	RT	MP17B-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP17C-LT
17.4	LT	MP17C-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP17B-RT
17.5	RT	MP17D-RT	FARM FIELD	NO RECOMMENDATION
17.5	LT	MP17E-LT	PUBLIC	NO RECOMMENDATION
17.7	RT	MP17F-RT	FARM FIELD	NO RECOMMENDATION
17.9	RT	MP17G-RT	FARM FIELD	NO RECOMMENDATION
18.0	LT	MP18A-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP18B-RT AT STA 291+90
18.0	RT	MP18B-RT	FARM FIELD	NO RECOMMENDATION
18.2	LT	MP18C-LT	FARM FIELD	NO RECOMMENDATION
18.2	RT	MP18D-RT	RESIDENTIAL	NO RECOMMENDATION
18.6	LT	MP18E-LT	FARM FIELD	NO RECOMMENDATION
18.8	RT	MP18F-RT	RESIDENTIAL/SHARED	RELOCATE AND ALIGN WITH MP18G-LT AT STA 303+65
18.8	LT	MP18G-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
19.0	RT	MP18H-RT	FARM FIELD	NO RECOMMENDATION
19.0	LT	MP18I-LT	FARM FIELD	NO RECOMMENDATION
19.4	LT	MP19C-LT	FARM FIELD	NO RECOMMENDATION
19.5	RT	MP19D-RT	FARM FIELD	NO RECOMMENDATION
19.5	LT	MP19E-LT	FARM FIELD	NO RECOMMENDATION
19.6	RT	MP19F-RT	FARM FIELD	REALIGN PERPENDICULAR TO HIGHWAY
19.6	LT	MP19H-LT	FARM FIELD	NO RECOMMENDATION
19.7	RT	MP19G-RT	FARM FIELD	NO RECOMMENDATION
19.7	RT	MP19I-RT	FARM FIELD	RECOMMEND CLOSING FARM FIELD APPROACH
19.7	RT	MP19J-RT	FARM FIELD	NO RECOMMENDATION
19.7	LT	MP19K-LT	PUBLIC	NO RECOMMENDATION
19.9	LT	MP19L-LT	PUBLIC	NO RECOMMENDATION
19.9	RT	MP19N-RT	FARM FIELD	NO RECOMMENDATION
19.9	LT	MP19O-LT	COMMERCIAL	NO RECOMMENDATION
19.9	LT	MP19P-LT	COMMERCIAL	NO RECOMMENDATION
20.0	LT	MP19Q-LT	RESIDENTIAL	NO RECOMMENDATION
20.0	RT	MP20A-RT	RESIDENTIAL	NO RECOMMENDATION
20.0	RT	MP20B-RT	RESIDENTIAL	NO RECOMMENDATION
20.0	RT	MP20BB-RT	FARM FIELD	NO RECOMMENDATION

	MP 5.2 -12.0 Project A	MP 12.0 -20.0 Project B Option 1	MP 12.0 -20.0 Project B Option 2	MP 12.0 -20.7 Project B Option 3	Spot Improvement MP 7.4 Slope	Spot Improvement MP 8.0 Slope	Upper Luther MP 8.2 Bus Pull Out	Spot Improvement MP 9.3 Slope	Lower Luther MP 13.0 Bus Pull Out	Spot Improvement MP 13.0 Vegetation	Spot Improvement MP 15.8 Slope	Spot Improvement MP 16.8 Slope	School Bus Stop Signing/Location
2006 Estimated Const. Cost	**$15,949,715**	**$ 15,028,426**	**$ 43,537,655**	**$ 23,245,092**	**$ 95,924**	**$ 158,841**	**$ 134,872**	**$ 809,113**	**$ 146,040**	**$ 2,500**	**$ 643,203**	**$ 988,934**	**$ 1,000**
Indirect Costs (@12%)	$ 1,913,966	$ 1,803,411	$ 5,224,519	$ 2,789,411	$ 11,511	$ 19,061	$ 16,185	$ 97,094	$ 17,525	$ 300	$ 77,184	$ 118,672	$ 120
Year 2006 Estimate	**$17,863,681**	**$ 16,831,837**	**$ 48,762,174**	**$ 26,034,503**	**$ 107,435**	**$ 177,902**	**$ 151,057**	**$ 906,207**	**$ 163,565**	**$ 2,800**	**$ 720,387**	**$ 1,107,606**	**$ 1,120**
Inflation at 3% Annually to Year 2011	$18,490,091	$ 17,422,065	$ 50,472,075	$ 26,947,433	$ 111,202	$ 184,140	$ 156,354	$ 937,984	$ 169,300	$ 2,898	$ 745,649	$ 1,146,446	$ 1,159
Indirect Costs (@12%)	$ 2,218,811	$ 2,090,648	$ 6,056,649	$ 3,233,692	$ 13,344	$ 22,097	$ 18,762	$ 112,558	$ 20,316	$ 348	$ 89,478	$ 137,573	$ 139
Year 2011 Estimate	**$20,708,902**	**$ 19,512,713**	**$ 56,528,724**	**$ 30,181,125**	**$ 124,546**	**$ 206,237**	**$ 175,116**	**$ 1,050,542**	**$ 189,616**	**$ 3,246**	**$ 835,127**	**$ 1,284,019**	**$ 1,298**
Inflation at 3% Annually to Year 2016	$21,435,083	$ 20,196,948	$ 58,510,968	$ 31,239,460	$ 128,914	$ 213,469	$ 181,257	$ 1,087,380	$ 196,266	$ 3,360	$ 864,411	$ 1,329,045	$ 1,344
Indirect Costs (@12%)	$ 2,572,210	$ 2,423,634	$ 7,021,316	$ 3,748,735	$ 15,470	$ 25,616	$ 21,751	$ 130,486	$ 23,552	$ 403	$ 103,729	$ 159,485	$ 161
Year 2016 Estimate	**$24,007,293**	**$ 22,620,582**	**$ 65,532,284**	**$ 34,988,195**	**$ 144,384**	**$ 239,085**	**$ 203,008**	**$ 1,217,866**	**$ 219,818**	**$ 3,763**	**$ 968,140**	**$ 1,488,530**	**$ 1,505**
Inflation at 3% Annually to Year 2021	$24,849,136	$ 23,413,798	$ 67,830,248	$ 36,215,096	$ 149,446	$ 247,469	$ 210,126	$ 1,260,572	$ 227,526	$ 3,895	$ 1,002,089	$ 1,540,727	$ 1,558
Indirect Costs (@12%)	$ 2,981,896	$ 2,809,656	$ 8,139,630	$ 4,345,812	$ 17,934	$ 29,696	$ 25,215	$ 151,269	$ 27,303	$ 467	$ 120,251	$ 184,887	$ 187
Year 2021 Estimate	**$27,831,032**	**$ 26,223,454**	**$ 75,969,878**	**$ 40,560,908**	**$ 167,380**	**$ 277,165**	**$ 235,341**	**$ 1,411,841**	**$ 254,829**	**$ 4,362**	**$ 1,122,340**	**$ 1,725,614**	**$ 1,745**
Inflation at 3% Annually to Year 2026	$28,806,959	$ 27,143,009	$ 78,633,848	$ 41,983,222	$ 173,249	$ 286,885	$ 243,594	$ 1,461,348	$ 263,764	$ 4,515	$ 1,161,696	$ 1,786,125	$ 1,806
Indirect Costs (@12%)	$ 3,456,835	$ 3,257,161	$ 9,436,062	$ 5,037,987	$ 20,790	$ 34,426	$ 29,231	$ 175,362	$ 31,652	$ 542	$ 139,404	$ 214,335	$ 217
Year 2026 Estimate	**$32,263,794**	**$ 30,400,170**	**$ 88,069,910**	**$ 47,021,209**	**$ 194,039**	**$ 321,311**	**$ 272,825**	**$ 1,636,710**	**$ 295,416**	**$ 5,057**	**$ 1,301,100**	**$ 2,000,460**	**$ 2,023**