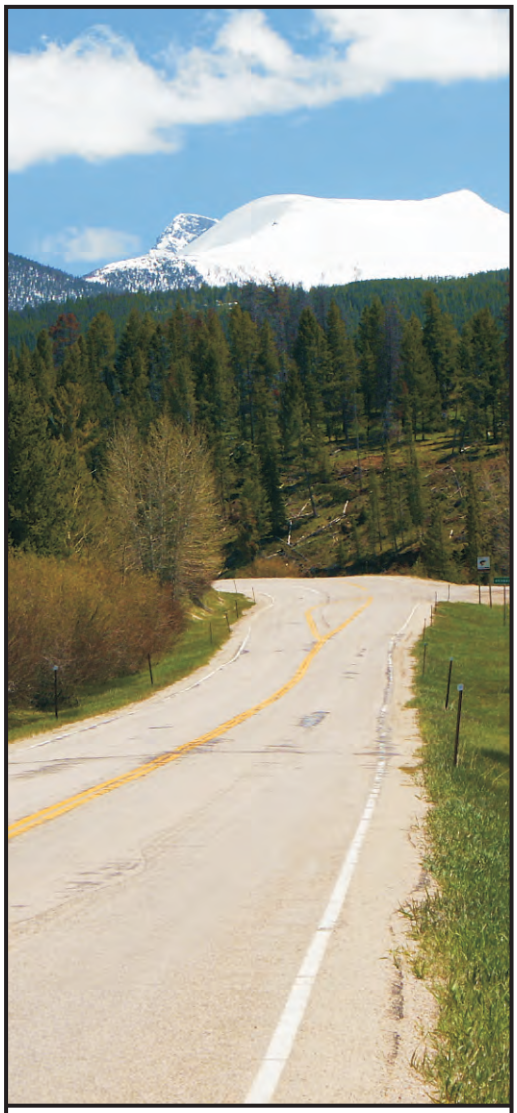
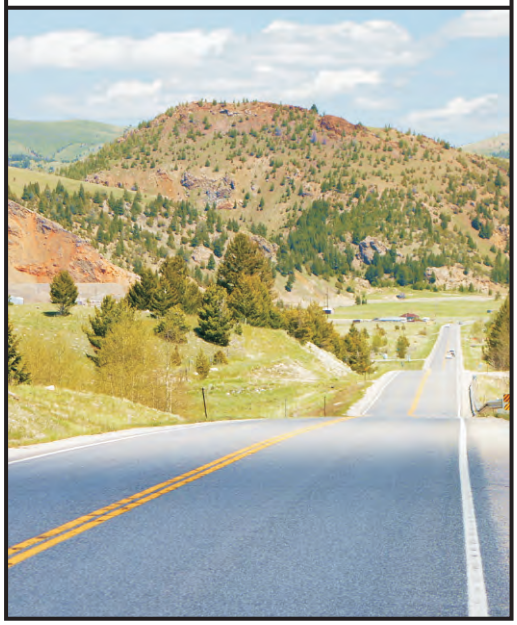


MT-1 WEST OF ANACONDA
TO GEORGETOWN LAKE
CORRIDOR PLANNING STUDY



APPENDIX C

CORRIDOR PLANNING STUDY DOCUMENTATION

COMMUNITY AND STAKEHOLDER INFORMATION PLAN (CSIP)

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Prepared For:

MONTANA DEPARTMENT OF TRANSPORTATION
Helena, Montana

RPA

Prepared By:

ROBERT PECCIA & ASSOCIATES
Helena, Kalispell & Butte, Montana

June 2011

Abbreviations and Acronyms

ADA	Americans with Disabilities Act
ADLC	Anaconda – Deer Lodge County
CSIP	Community and Stakeholder Information Plan
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
NEPA	National Environmental Policy Act
RP	Reference Post
RPA	Robert Peccia and Associates
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

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1.0 Introduction

The Montana Department of Transportation (MDT) and Anaconda – Deer Lodge County (ADLC) have initiated a process to develop the MT-1 West of Anaconda to Georgetown Lake Corridor Planning Study. The study will identify cost-effective ways to address transportation needs within the MT-1 corridor between Anaconda and Georgetown Lake.

The MDT has established the corridor planning process in order to investigate improvement options for the corridor via a Pre-National Environmental Policy Act (NEPA) / Montana Environmental Policy Act (MEPA) study, as provided for in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). If improvement options are forwarded into project development, the corridor planning process will provide information into the NEPA / MEPA process, help advance viable improvement options into NEPA / MEPA, and provide the opportunity for partner involvement at all stages.

An initial step in the corridor planning study process is to develop a Community and Stakeholder Information Plan (CSIP) that provides for and identifies community and stakeholder involvement activities needed to communicate information about existing and future corridor needs. The purpose of the CSIP is to establish a process that provides opportunities for the community to participate in all phases of the corridor study process. This is accomplished by providing complete information, timely notices, opportunities to make comments, and ensuring full access to key decisions.

1.1 Corridor Study Purpose

The purpose for a corridor study is to analyze existing data to determine current and future deficiencies and needs within the corridor, and identify potential environmental issues and mitigation opportunities. The MT-1 Corridor Planning Study is a pre-NEPA / MEPA study that allows flexibility in examining improvement options for the roadway system should any project be advanced forward. Community and stakeholder involvement is an important component in any successful corridor planning study process. For this study, a number of community and stakeholder involvement strategies are proposed with the goal being to reach the most people possible and to elicit meaningful participation. These opportunities will:

- Educate the community on the critical elements included in the Pre-NEPA/MEPA Corridor Study planning process for the MT-1 corridor west of Anaconda;
- Increase the community's ability to provide input and ask questions throughout the corridor planning study; and
- Present findings and recommendations.

1.2 STUDY AREA

The termini of the MT-1 Corridor Planning Study has been established by the Planning Committee and MDT as being along MT-1 from Reference Post (RP) 10.06 on the west end of Anaconda to RP 27.35 (the intersection of MT-1 and Georgetown Lake Road). The study area generally includes a 0.5-mile buffer on each side of MT-1, except the first four miles west of Anaconda include a one-mile buffer each side of the road. The study area location is shown in Figure 1.1.

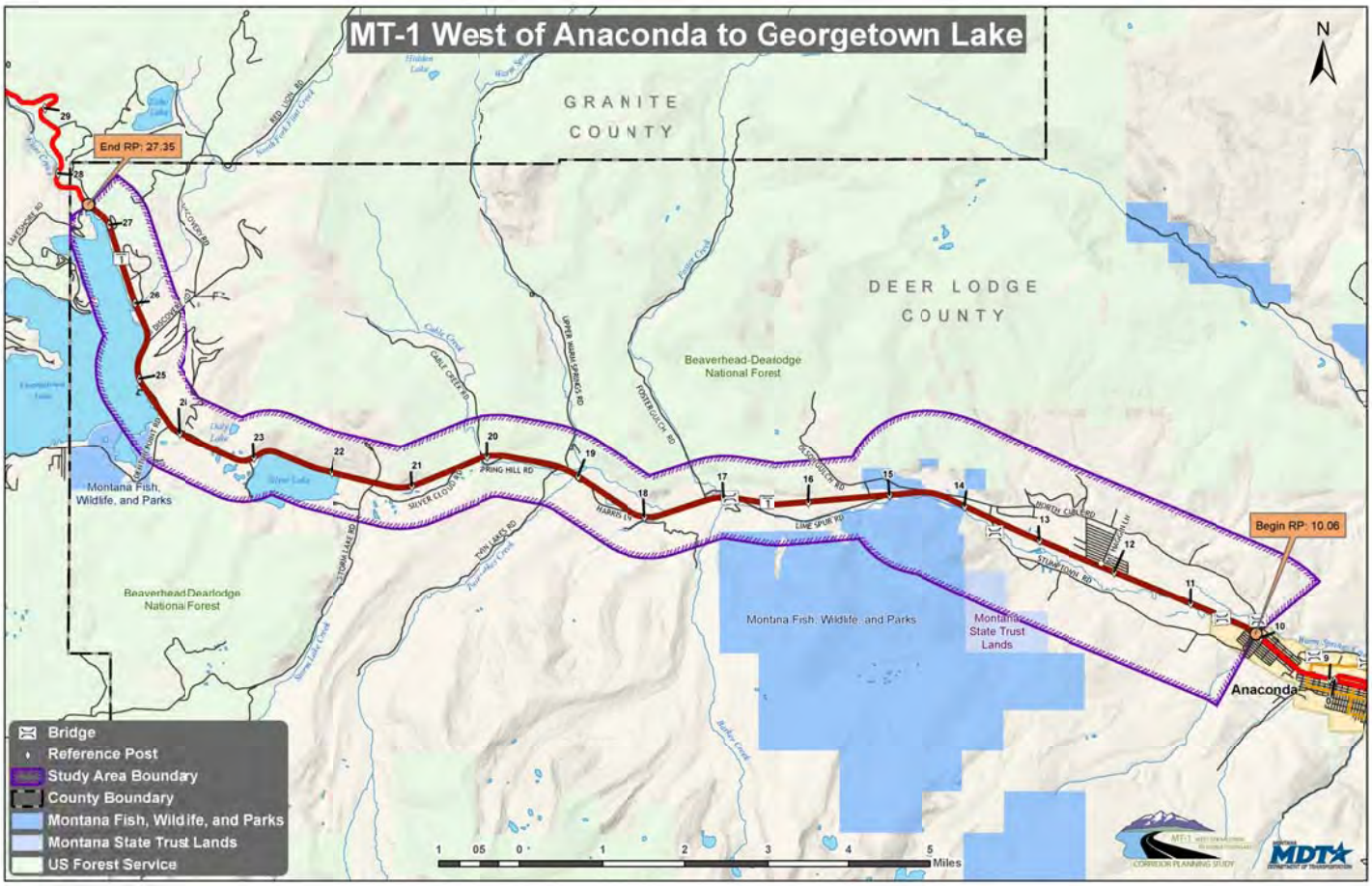


Figure 1.1: Study Area Boundary

1.3 Goals of Community Involvement and Outreach Effort

The goal of the study partners and the Consultant is to have ongoing community and stakeholder involvement throughout the corridor planning study process. Education and community outreach are an essential part of fulfilling the study partners' responsibility to successfully inform the community about the corridor study process. All contracting entities seek to encourage community involvement and meaningful participation.

Education and community outreach are an essential part of fulfilling the study partners' responsibility to successfully inform the community about the corridor study process.

2.0 Community and Stakeholder Participation Procedures

The CSIP describes the community information and input opportunities that will be provided as part of the development of the MT-1 Corridor Planning Study. This plan encourages active participation in identifying and commenting on corridor issues at every stage of the planning process. Participants in this community and stakeholder involvement process include:

- The general community – residents of the City of Anaconda, ADLC, and adjacent unincorporated areas affected by the planning efforts;
- Landowners and business owners affected within the study area boundary;
- Resource agencies; and
- Stakeholders and outreach groups.

Methods of notifying the community of the planning process, upcoming meetings, and other information are detailed in this document. The community will be kept informed of all aspects of the plan and study, and their input will be sought throughout the process. The community and interested parties shall provide input to ADLC, MDT and the Consultant via the methods detailed herein.

2.1 Study Contacts

Contact information for ADLC, MDT and the Consultant will be provided to the community. Telephone numbers and email addresses of study contacts will be published in all information that is released. This information is provided below.

- **Montana Department of Transportation (MDT)** – Butte District Office
  3751 Wynne (PO Box 3068), Butte, MT 59702-3068
  Contact: **Jeff Ebert** – *District Administrator*
  (406) 494-9625
  jebert@mt.gov
- **Montana Department of Transportation (MDT)** – Statewide and Urban Planning
  2960 Prospect Avenue (PO Box 201001), Helena, MT 59620-1001
  Contact: **Carol Strizich** – *MDT Project Manager*
  (406) 444-9240
  cstrizich@mt.gov
- **Anaconda – Deer Lodge County (ADLC)** – Land Use / Planning Department
  800 South Main, Anaconda, MT 59711
  Contact: **Connie Ternes-Daniels** – *ADLC Planning Director*
  (406) 563-4015

ctdaniels@anacondadeerlodge.mt.gov

- **Robert Peccia and Associates (RPA)** – Consultant
  825 Custer Avenue (PO Box 5653), Helena, MT 59604
  Contact: **Jeff Key, P.E.** – *RPA Project Manager*
  (406) 447-5000
  jeff.key@rpa-hln.com

2.2 PUBLICATIONS

Meeting announcements will be developed jointly by RPA and MDT, and advertised by MDT at least three weeks prior to informational meetings. The ads will announce the meeting location, time, and date, the format and purpose of the meeting, and the locations where documents may be reviewed (if applicable). The following print newspapers may carry the display ads:

- Anaconda Leader – print and online (website currently under construction): www.anacondaleader.com;
- Montana Standard – print and online: www.mtstandard.com; and
- Philipsburg Mail – print and online: www.pburgmail.com

In addition, newsletters will be made available one month prior to each formal community meeting. The newsletters will describe work in progress, results achieved, preliminary recommendations, and other related topics. Each newsletter will be saved as a PDF and delivered to ADLC, MDT, and select stakeholders for their use in distribution and posting to their individual internet sites.

2.3 RADIO AND TELEVISION

Meetings may also be announced on local radio and/or television stations. Input from the Planning Team will identify the most popular radio and television stations on which announcements will be made. Tables 2.1 and 2.2 on the following page provide television and radio stations that reach the 59711 ZIP code for the Anaconda area.

Table 2.1: Local Television Stations

Channel	Call Sign	License Type	Network	Home Community	Licensee
4	KXLF-TV	Commercial (VHF)	CBS	Butte, MT	Kxlf Communications, Inc.
6	KTVM	Commercial (VHF)	NBC	Butte, MT	Bluestone License Holdings Inc.
8	KPAX-TV	Commercial (VHF)	CBS	Missoula, MT	Kpax Communications, Inc.
10	KMTF	Commercial (VHF)	The CW	Helena, MT	Rocky Mountain Broadcasting Company
11	KUFM-TV	Educational (VHF)	PBS	Missoula, MT	The University Of Montana
12	KTVH	Commercial (VHF)	NBC	Helena, MT	Beartooth Communications Company
13	KECI-TV	Commercial (VHF)	NBC	Missoula, MT	Bluestone License Holdings Inc.
17	KMMF	Commercial (UHF)	FOX	Missoula, MT	Montana License Sub, Inc.
18	KWYB	Commercial (UHF)	ABC	Butte, MT	Mmm License Llc
23	KTMF	Commercial (UHF)	ABC	Missoula, MT	Mmm License Llc
24	KBTZ	Commercial (UHF)	FOX	Butte, MT	Montana License Sub, Inc.

Source: *The Center for Public Integrity – Television stations that reach ZIP code 59711, Anaconda, MT.* http://projects.publicintegrity.org/telecom/search/default.aspx?zip=59711

Table 2.2: Local Radio Stations

Frequency		Call Sign	Format	Home Community	Licensee
550	AM	KBOW		Butte, MT	Butte Broadcasting Incorporated
580	AM	KANA		Anaconda, MT	Jimmy Ray Carroll
1370	AM	KXTL		Butte, MT	Fisher Radio Regional Group, Inc.
1400	AM	KBCK		Deer Lodge, MT	Jimmy Ray Carroll
88.1	FM	KFRT		Butte, MT	Family Stations, Inc.
91.3	FM	KAPC	National Public Radio	Butte, MT	The University Of Montana
92.5	FM	KAAR		Butte, MT	Fisher Radio Regional Group, Inc.
94.1	FM	KOPR		Butte, MT	Butte Broadcasting Incorporated
95.5	FM	KMBR		Butte, MT	Fisher Radio Regional Group, Inc.
96.9	FM	KQRV		Deer Lodge, MT	Robert Cummings Toole
97.7	FM	KGLM-FM		Anaconda, MT	Jimmy Ray Carroll
101.1	FM	KZMT	Classic Rock	Helena, MT	Ccr-helena Iv, Llc
105.3	FM	KMTX-FM		Helena, MT	Kmtx, Llc

Source: *The Center for Public Integrity – Radio stations that reach ZIP code 59711, Anaconda, MT.* http://projects.publicintegrity.org/telecom/search/default.aspx?zip=59711

2.4 Stakeholder Contact List

A stakeholder contact list will be produced that will include individuals, businesses, or groups identified by ADLC and MDT. The intent of developing the stakeholder list is to identify those individuals and groups to actively seek out and engage in all phases of the study process. Individuals who attend community meetings will also be added to the stakeholder list. The groups or businesses (at a minimum) listed below will be included in the initial list, providing that addresses and/or emails are obtainable from each respective group for these purposes.

- Anaconda – Deer Lodge County

- ADLC Commissioners
- Western Federal Lands Highway Division (WFLHD)
- County Fire Departments and Emergency Medical Personnel
- County Sheriff and Montana State Highway Patrol
- Montana Fish, Wildlife, and Parks
- US Forest Service
- Landowners in the Corridor
- Anaconda Chamber of Commerce
- Anaconda Saddle Club
- Environmental Protection Agency
- Department of Natural Resources and Conservation
- Georgetown Lake Landowners
- West Park Subdivision
- Anaconda Sportsman's Club

2.5 Document Availability

In general, all study deliverables and working draft technical memorandums will be available in hard copy format at the MDT Statewide and Urban Planning Section office (2960 Prospect Avenue). It is also anticipated that hard copy materials may also be made available at the following locations:

- Anaconda – Deer Lodge County Planning Department (800 South Main, Anaconda, MT 59711)
- MDT District #2 Office (3751 Wynne, Butte, MT 59701)
- Hearst Free Library (401 Main Street, Anaconda, MT 59711)

Approved electronic copies of study deliverables will be posted on the study website at the address shown below within 7 days of receiving approval.

www.mdt.mt.gov/pubinvolve/mt1

The following Americans with Disabilities Act (ADA)-required statement will be included on all published materials:

> *ADLC, MDT, and RPA attempt to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity associated with this study. Alternative accessible formats of this information will be provided upon request. For further information, call (406) 447-5000 or TTY (800) 335-7592, or call Montana Relay at 711. Accommodation requests must be made at least 48 hours prior to the scheduled activity and / or meeting.*

2.6 Meetings

2.6.1 Planning Team Meetings

Planning Team meetings will be scheduled every 2 weeks for the duration of the seven-month study period for a total of 16 Planning Team meetings. Individual groups included in the meetings will be ADLC, MDT, the Consultant, and others as needed. The meetings are intended to track progress and address study development issues and questions. The meetings are considered an important aspect for the exchange of information and ideas during the development of the Study. Throughout the meetings, the issues, problems, and possible solutions will be identified and discussed.

2.6.2 Community Meetings

Two formal community meetings will be held throughout the study. The first community meeting will be held early on in the study process and will serve to introduce the study and relevant features and process. This meeting will also serve to receive information from local residents about the study area. The second community meeting will occur after the Draft Corridor Planning Study has been completed. The purpose of this meeting will be to present the types of recommended improvements, and to receive initial feedback from the community. Community comments and concerns will be recorded at all meetings.

2.6.3 Resource Agency Meeting / Involvement

Concurrent to the first formal community meeting, a meeting will be scheduled and held with Resource Agencies. The meeting will be organized by MDT and facilitated by RPA with assistance from the study partners as necessary.

2.7 Consideration for Traditionally Underserved Populations

It is recognized that additional efforts must be made to involve traditionally underserved segments of the population in the community process for the study, including the disabled, minorities, and low-income residents. Including these groups leads to planning that reflects the needs of everyone. The steps listed below will help with these efforts.

- **Plan Meeting Locations Carefully** – Community meetings will be held in locations that are accessible and compliant with the ADA. If a targeted population is located in a certain geographic part of the City or County, then the meeting location should be in that area for convenience.

- **Seek Help from Community Leaders and Organizations** – To facilitate involvement of traditionally underserved populations, community leaders and organizations that represent these groups will be consulted about how to most effectively reach their members.
- **Be Sensitive to Diverse Audiences** – At community meetings, study partner staff and the Consultant will attempt to communicate as effectively as possible. Technical jargon will be avoided and appropriate dress and conduct will be adhered to.

2.8 STUDY SCHEDULE

Adherence to the study schedule is important to stay on track and to keep all participating parties engaged. The study schedule for the MT-1 Corridor Planning Study is shown below in Figure 2.1. It is RPA's intent to adhere to this schedule.

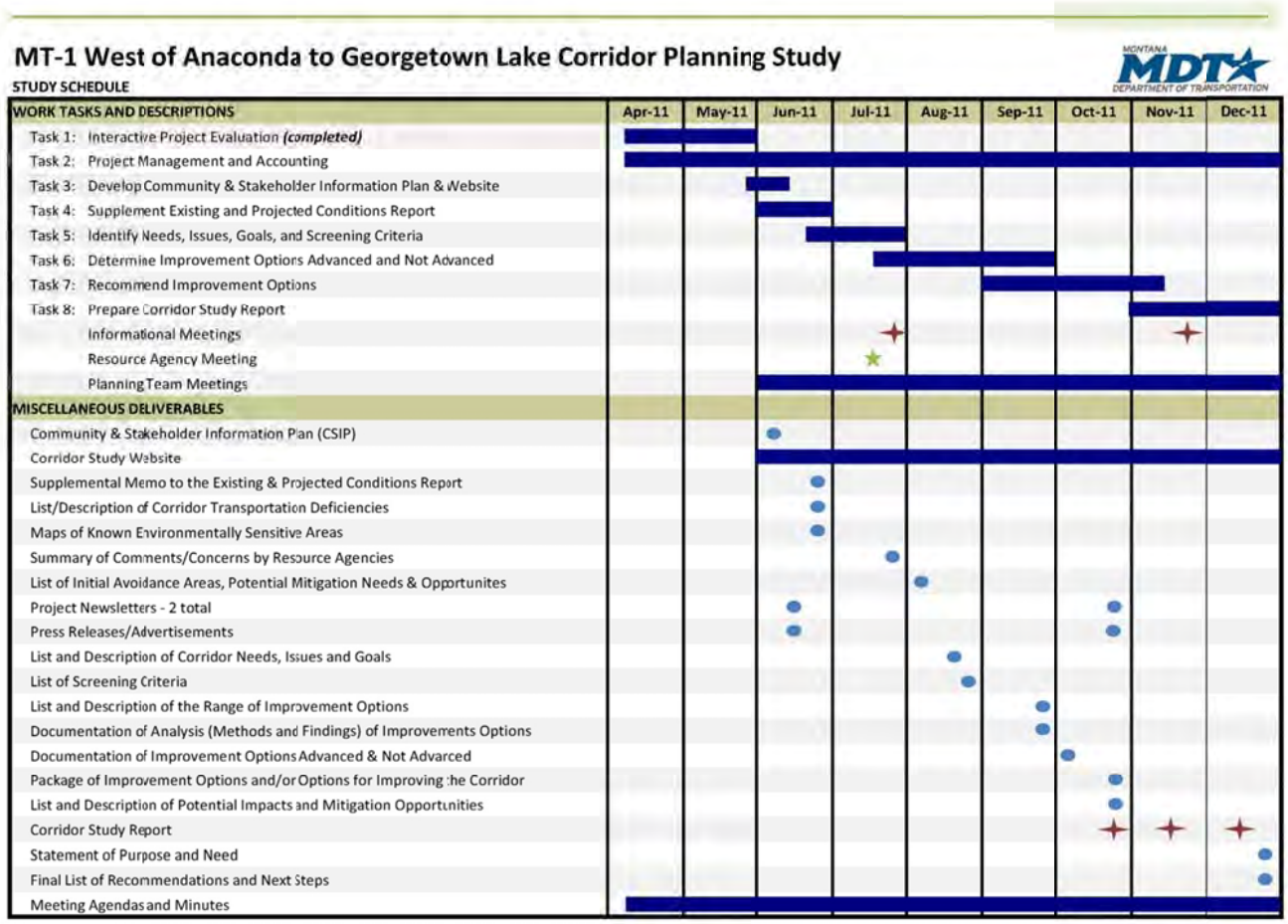


Figure 2.1: MT-1 Corridor Planning Study

3.0 Overall Study Communication

3.1 SUMMARY

The MT-1 Corridor Planning Study CSIP establishes guidelines and procedures for encouraging community participation. The following communication strategies and techniques may be used in their entirety (or partially) to distribute study information to the community at large and seek a higher level of engagement. The Consultant will utilize as many of these techniques as possible that best suit the Corridor Planning Study development.

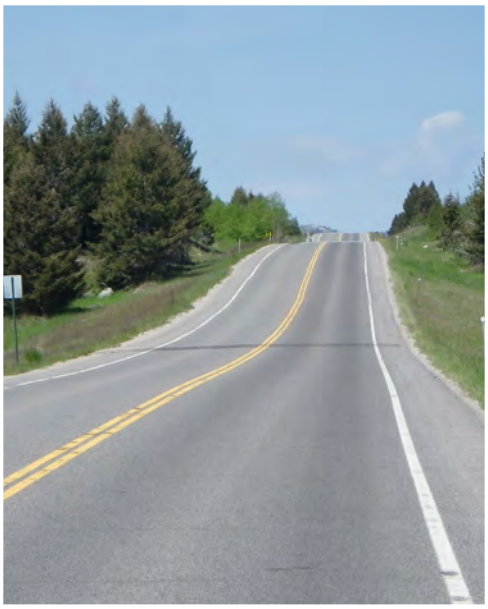
- All relevant deliverables and associated materials will be posted on the study website at the following address:
  - www.mdt.mt.gov/pubinvolve/mt1
- Public service announcements and interviews on radio and television may be conducted to explain the subject matter and promote participation.
- Articles and press releases for the newspaper or other widely circulated publications will be developed.
- Informal presentations will be made at regional sites, open houses, round tables, or other community forums to receive input from the affected community.
- Select mailings, as requested by interested parties, will be provided to individuals or groups that have expressed interest or made comments at meetings.
- Technical memorandums (working drafts) will be provided to the MDT for posting to the study's internet site, and will also be distributed to the Project Team, to provide a better understanding of proposed corridor issues and recommendations and, in return, to provide the study entities with feedback and an opportunity for continual comment. Hard copies of all materials will be made available at the MDT Statewide and Urban Planning Section (2960 Prospect Avenue).
- Special presentations may be made, upon request, to community groups and organizations.
- Fact sheets may be used to explain corridor related issues.
- Special issues documents may be announced or reported at meetings and/or via email on relevant corridor issues.

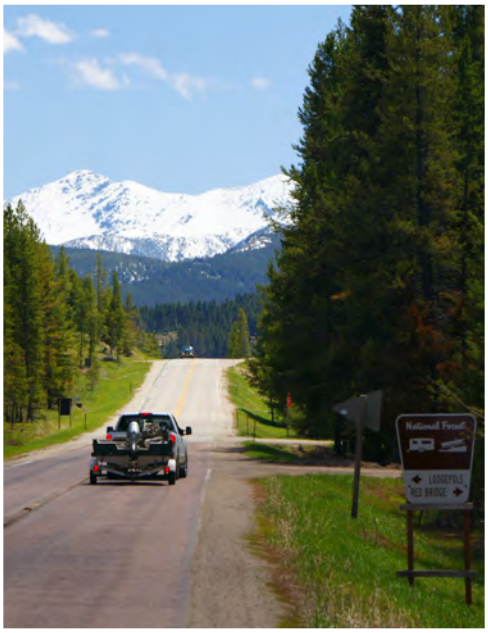
Responses to questions and comments from the community concerning the community participation process, working draft technical memorandums, the draft Corridor Planning Study documents, and other work products will be made via written response in an Appendix to the actual documents. In some circumstances, the Consultant may respond directly to an individual or group by letter, email, telephone call, or periodic newsletter.

Existing and Projected Conditions

MT 1—ANACONDA TO GEORGETOWN LAKE

Corridor Planning Study





MT-1 WEST OF ANACONDA TO GEORGETOWN LAKE

CORRIDOR PLANNING STUDY

August 2011

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Abbreviations and Acronyms

AADT	Average Annual Daily Traffic
ADLC	Anaconda – Deer Lodge County
ARCO	Atlantic Richfield Company
BA&P	Butte Anaconda & Pacific Railway
DEQ	Department of Environmental Quality
ENN	Exotic Species not Native to Montana
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GIS	Geographic Information Systems
LOS	Level of Service
LWQD	Local Water Quality District
mph	Miles per Hour
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MFISH	Montana Fisheries Information System
MNHP	Montana Natural Heritage Program
MFWP	Montana Fish Wildlife and Parks
NAAQS	National Ambient Air Quality Standards
NAIP	National Agricultural Imagery Program
NEPA	National Environmental Policy Act
NHS	National Highway System
NRCS	Natural Resource Conservation Service
NRIS	Natural Resource Information System
NWI	National Wetland Inventory
RP	Reference Post
SOC	Species of Concern
TMDL	Total Maximum Daily Loads
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
vpd	Vehicles per Day
WMA	Wildlife Management Area

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1.0 Existing and Projected Conditions

1.1 Introduction

This report documents the existing and projected roadway conditions and environmental factors for Montana Highway 1 (MT-1) between Anaconda and Georgetown Lake in Deer Lodge County. The purpose of this report is to portray the existing and projected conditions throughout the corridor utilizing technical and environmental factors such that known issues and/or areas of concern may be identified via a high-level of planning analysis.

MT-1 is functionally classified as a Rural Minor Arterial on the Primary Highway System and is designated as Primary Route 19 (P-19). MT-1 serves as an east-west corridor between Anaconda and the eastern shore of Georgetown Lake.

The study area consists of 17.29 miles along MT-1 beginning at the Linden Street / North Cable Road intersection (Reference Post (RP) 10.06) and ending at the intersection with Georgetown Lake Road (RP 27.35). The study area boundary includes a one mile buffer on each side of MT-1 from RP 10.06 to RP 14.50 and a 0.5 mile buffer on each side from RP 14.50 to RP 27.35. The study area boundary is shown in **Figure 1**.

The information provided herein is the product of a high-level baseline scan. This general information may be used to guide future "project level" analysis if projects are forwarded from this study.

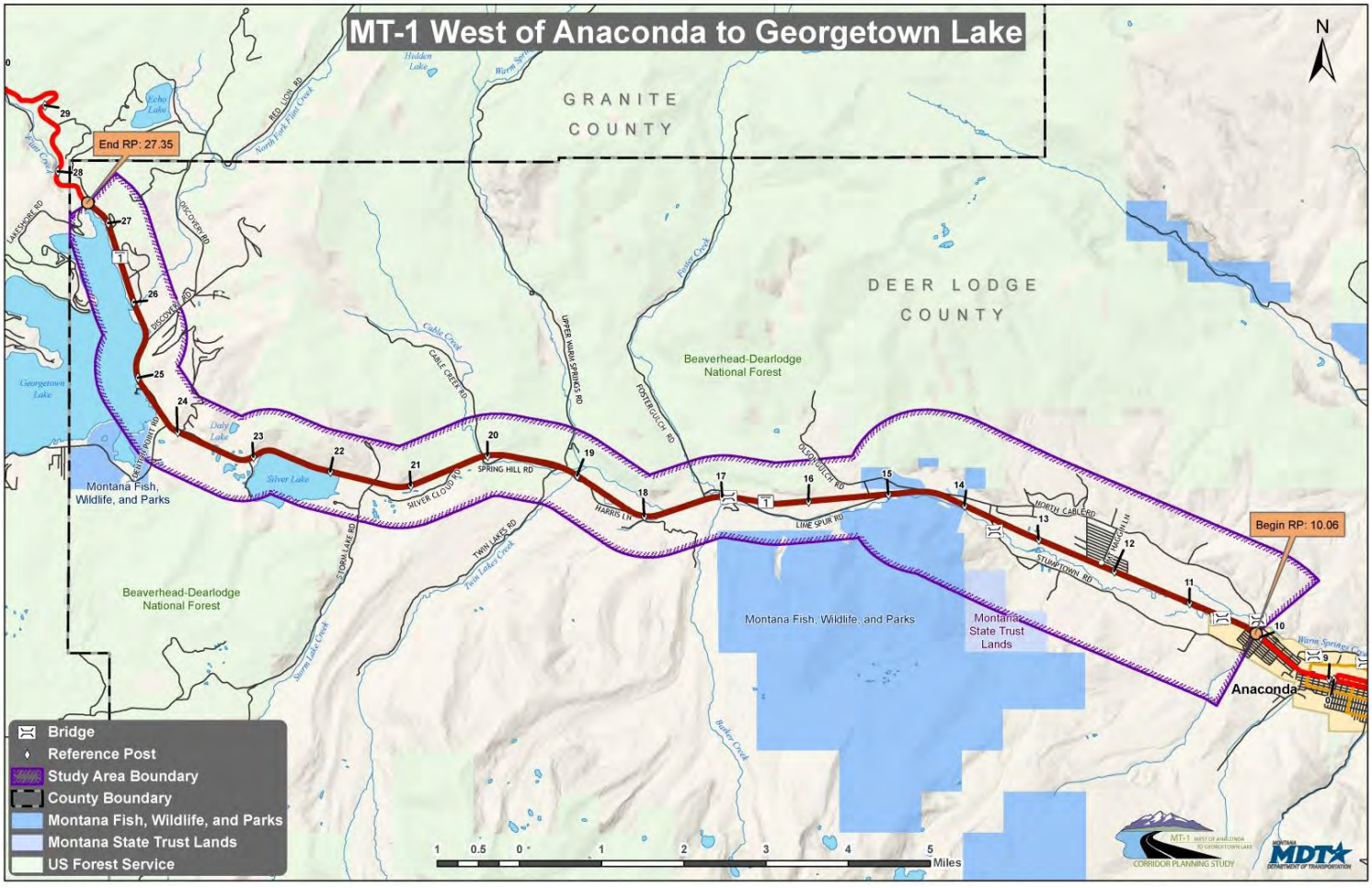


Figure 1.1: Study Area Boundary

1.2 Area Description and Demographics

Anaconda – Deer Lodge County (ADLC) is one of two consolidated City-County local governments in Montana. The core of Deer Lodge County's population is located in the original town site of Anaconda, established in 1883 by one of the famous Montana copper barons, Marcus Daly.[1] Deer Lodge County is located in the southwest part of the state and shares borders with Powell, Jefferson, Butte-Silver Bow, Beaverhead, Granite and Ravalli Counties. Deer Lodge County encompasses 741 square miles. At 5,280 feet, Anaconda, the county seat, is one of the nations "Mile-High" cities. The Beaverhead – Deer Lodge National Forest and the Anaconda – Pintler Wilderness Area encompass a large portion of the county area. Georgetown Lake, Silver Lake, the Big Hole River and Warm Springs Creek are major water features in the County. The city of Butte is the nearest urban center and is located about 27 miles south-east of Anaconda.

[1] Anaconda Deer Lodge County Growth Policy – Public Hearing Draft – 2010, Local Services Section

The major transportation route in the county is Interstate 90 (I-90), which runs along the county's eastern boundary. I-90 is a major east-west travel corridor through the state, but in Deer Lodge County, it is aligned in a north-south direction. MT-1, which runs east-west through Anaconda, is another major travel corridor in the area. MT-1 was designated as the Pintler Veterans' Memorial Scenic Highway by the 2011 Montana Legislature.

Deer Lodge County is the smallest county in land area and ranks 22nd in population out of the 56 counties in Montana. The total population of the county was estimated in 2010 at 9,298[2], which is a 1.3% drop in population from the 2000 Census total population of 9,415 people. The county has an average of 12.6 persons per square mile compared to the State average of 6.8 persons per square mile. Most of the population is concentrated in the Anaconda urban area. Population in the county has historically been linked to the level of operation of the copper smelter run by the Anaconda Mining Company. The county population peak occurred in 1960 at 18,640 people and since the smelter closed in 1980, the county has seen a steady decline in population. From 1970 to 2010 the county population has declined over 40%. According to the 2010 census, population in the county is concentrated around Anaconda and smaller pockets of population occur at Galen, Warm Springs, Georgetown Lake and the West Valley area.[3]

The County population is projected to continue to decline through the year 2025. Population projections estimate approximately 7,860 people for the year 2030[4]. Future population projections are generally based on existing and historic trends. Changes in trends due to economic development, changes in the economy, or other factors can result in a change in population trends.

The median household income in 2009 for the county was $32,173 compared to the state median household income of $42,222 and the nation's median household income of $50,221.

1.3 PHYSICAL CHARACTERISTICS

MT-1 runs east/west between I-90 and Philipsburg. MT-1 then runs north/south to connect back with I-90 at Drummond. I-15 runs north/south and connects to I-90 approximately 10 miles east of the MT-1 / I-90 junction. MT-1 provides users of these interstates access to Anaconda and the surrounding area. At the east end of the corridor (RP 10.06), MT-1 transitions from the four-lane roadway that traverses through Anaconda, to a two-lane roadway section that travels the length of the study area. The roadway expands to three lanes between RP 19 and RP 20.2 to provide a passing lane for westbound traffic. The corridor passes through the West Valley area, through areas of Beaverhead-Deer Lodge National Forest and past Silver Lake where the corridor curves slightly north and travels along Georgetown Lake. The study area ends at the intersection with Georgetown Lake Road (RP 27.35).

[2] US Census Bureau http://quickfacts.census.gov/qfd/states/30/30023.html
[3] Anaconda Deer Lodge County Growth Policy – Public Hearing Draft – 2010, Population Economy Section
[4] Montana Census and Economic Information Center, Dept. of Commerce & NPA Data Services

Sections of the roadway were constructed or improved at various times, as early as 1934 and as recently as 1995. Pavement preservation projects have been completed as recently as 2008.

The posted speed limit along the MT-1 corridor varies from 25 mph to 70 mph. At the beginning of the study area (RP 10.06) the posted speed limit is 25 mph. The posted speed limit changes to 35 mph at approximately RP 10.15. The 35 mph speed limit continues to just before RP 12, where 45 mph is posted. The rural highway day/night speed limit of 70/65 mph for cars and light trucks and 65/55 for commercial trucks begins at approximately RP 14.3. During the winter and spring of 2011 a seasonal 45 mph speed zone was implemented between RP 14.3 and 15.3 as an effort to address animal / vehicle crashes at this location. The next change in speed is posted for 60 mph at RP 24 (Georgetown Lake Road turn off) and continues to approximately RP 27.15, where the speed is decreased to 50 mph as the road travels away from the lake and continues into mountainous terrain, with curves in the roadway, towards Philipsburg. The end of the corridor study (RP 27.35) is within this 50 mph section. **Figure 1.2** shows the existing posted speed limits for the study area.

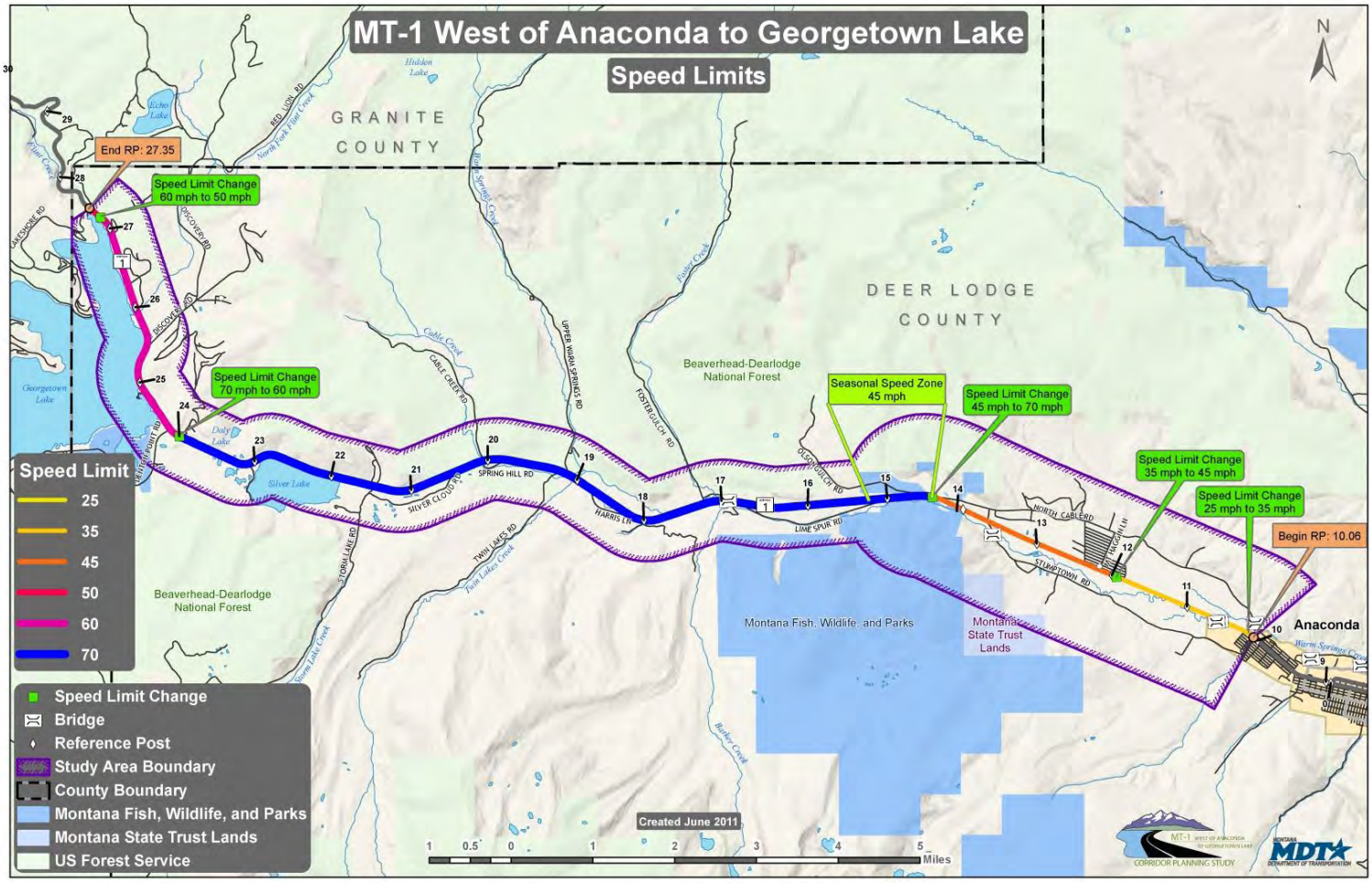


Figure 1.2: Posted Speed Limits

1.4 Roadway Users and Traffic Volumes

Primary users of the roadway consist of local residents from the community of Anaconda at the eastern end of the corridor and commercial users. The road is used by local land owners for access to their property throughout the corridor and for recreational users accessing United States Forest Service (USFS) lands, other recreational opportunities along the corridor, and Georgetown Lake.

1.4.1 Traffic Data

The Average Annual Daily Traffic (AADT) for the study area ranges from approximately 3800 vehicles per day (vpd) on the eastern end near Anaconda to 1300 vpd on the western end near Georgetown Lake. **Table 1.1** below shows the most recent 20 years of AADT data for the corridor. A review of this traffic data shows that the corridor has experienced a decline in traffic volumes over the last 20 years.

Table 1.1: Average Annual Daily Traffic Data[5]

Site	Location	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
12-1C-43	E of Haufbrau Tavern Turnoff	4220	4030	4300	4280	3970	-	4230	-	3920	5140
12-1C-54	0.6 mi W of Bridge Ln - RP 11	3880	3650	3810	-	3160	-	3860	-	3490	4560
12-1C-44	W of Jones Ln - RP 13	2620	2450	2550	-	2860	-	2470	-	2580	2890
12-1C-45	W of MDT Gravel Stockpile - RP 15	1780	1640	2020	2220	1680	-	1720	-	1790	2120
12-1-4	W of Anaconda - RP 17	1740	1770	1850	1770	1980	-	1830	1820	-	2330
12-1-5	N of Silver Lake - RP 23	1120	1210	1490	-	1200	1370	1410	1470	1810	1690
Site	**Location**	**2001**	**2002**	**2003 (1)**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
12-1C-43	E of Haufbrau Tavern Turnoff	3150	3360	4110	3640	4130	4130	4140	3660	3730	3790
12-1C-54	0.6 mi W of Bridge Ln - RP 11	2700	3040	3690	3230	3820	3820	3830	3340	3400	3480
12-1C-44	W of Jones Ln - RP 13	2260	2460	2830	3080	2390	2470	2540	2490	2580	1960
12-1C-45	W of MDT Gravel Stockpile - RP 15	1380	1600	2100	1970	2140	2210	2270	1360	1410	1720
12-1-4	W of Anaconda - RP 17	1790	1970	-	1970	2140	2210	1310	1230	1270	1600
12-1-5	N of Silver Lake - RP 23	1630	1060	2080	1450	1620	1670	1090	1030	1070	1330

(1) Short-term factoring process was changed in 2003 resulting in higher than usual traffic volume increases.[6]

The volumes shown in **Table 1.1** are representative of yearly average traffic volumes. It is likely that peaks in traffic volumes occur due to recreational use in the area. Vehicles traveling along the corridor currently do not encounter delay or congestion during peak travel periods, however. Trucks and recreational vehicles are common modes of transportation through the corridor, which may slow the flow of traffic in areas with steep grades.

[5] MDT Data and Statistics Bureau, Traffic Data Collection Section, 2011
[6] MDT VMT Increase Documentation, 2003

1.4.2 Future Traffic Projections

It is difficult to estimate future growth based on historical traffic counts due to recent economic conditions and other influences in Deer Lodge County. Historic traffic data shows a general increase in volumes between 1991 and 2000; however, a sharp decline occurred between 2000 and 2005. Based on the historical traffic data, and on expected conditions in the county, an assumed traffic growth rate of 1.0% for the corridor was utilized for planning purposes. **Table 1.2** shows future projected traffic values based on the assumed growth rate.

Table 1.2: Future Projected Traffic Data

Site	Location	2010	2030 (1)
12-1C-43	E of Haufbrau Tavern Turnoff	3790	4625
12-1C-54	0.6 mi W of Bridge Ln - RP 11	3480	4246
12-1C-44	W of Jones Ln - RP 13	1960	2392
12-1C-45	W of MDT Gravel Stockpile - RP 15	1720	2099
12-1-4	W of Anaconda - RP 17	1600	1952
12-1-5	N of Silver Lake - RP 23	1330	1623

(1) *Projection was based on an annual growth rate of 1.0%.*

1.4.3 Speed Data Collection

Speed data was collected at four locations along MT-1 in June 2011. The speed data was collected to help determine the effectiveness of existing posted speed limits. Posted speed limits are based on a number of factors including speed data, Montana Code, roadside development, functional classification, crash experience, road surfacing, and context. The effort completed as part of this *Corridor Planning Study* only addresses the speed data factor.

Table 1.3 shows the results from the speed data collection. The primary speed data factor for determining the validity of the posted speed limit is the 85th percentile speed. The 85th percentile speed is the speed at which 85 percent of vehicles travel at or below. For example, if the 85th percentile speed is 45 mph, it means 85 percent of vehicles are traveling at or below 45 mph. It is generally recommended that the posted speed limit be within 5 mph of the 85th percentile speed.

Table 1.3: Speed Data Collection

Location	Posted Speed Limit (mph)	ADT (vpd)	Average Speed (mph)	85th Percentile Speed (mph)
RP 11.2	**35**	**3902**	**37.8**	**42.2**
EB	*35*	*1937*	*37.8*	*42.3*
WB	*35*	*1964*	*37.7*	*42.1*
RP 14.0	**45**	**2333**	**46.7**	**51.9**
EB	*45*	*1165*	*45.6*	*49.8*
WB	*45*	*1168*	*47.8*	*53.3*
RP 15.3	**70**	**2145**	**59.9**	**68.5**
EB	*70*	*1079*	*56.3*	*64.2*
WB	*70*	*1065*	*63.5*	*71.0*
RP 24.4	**60**	**1539**	**57.0**	**65.4**
EB	*60*	*757*	*57.2*	*66.2*
WB	*60*	*781*	*56.9*	*64.9*

The results of the speed data collection indicate that the posted speed limits at RP 11.2 (35 mph), RP 14.0 (45 mph), and RP 24.4 (60 mph) may be low compared to the 85th percentile speeds. At RP 11.2, 85th percentile speeds are more than 7 mph higher than the 35 mph posted speed limit. Additionally at RP 14.0, 85th percentile speeds are almost 7 mph higher than the posted speed limit of 45 mph.

No discernible difference was found between weekend and weekday traffic relating to vehicle speeds. This indicates that speeding found along the corridor is occurring by both local and recreational traffic. During several field reviews, heavy speed enforcement was witnessed; particularly throughout the 35 mph and 45 mph speed zones.

In addition to the speed data collection conducted for this study, MDT completed a *Speed Limit Investigation* in early June, 2011. During the MDT investigation, the seasonal 45 mph speed zone between RP 14.3 and RP 15.3 was in place. MDT recommended from the report that the 45 mph speed zone be implemented "on a need only basis to assist in mitigating conflicts with Big Horn Sheep." It was also recommended that the duration of the 45 mph speed zone be set "annually based on observation and/or receiving reports from local governing or state wildlife officials."

1.4.4 Level of Service

The current Level of Service (LOS) for the corridor on MT-1 was obtained from the MDT *Congestion Management System*. This section of MT-1 is currently operating at congestion indices of 71 out of 100, which is a LOS of B. A LOS of B indicates the ability of vehicles to maneuver within the traffic stream is slightly restricted and the general level of physical and psychological comfort provided to drivers is still high. Minor disruptions are still easily absorbed at this level.

A LOS of B indicates that the corridor does not currently experience delays or congestion during peak travel periods. However, the LOS is forecasted to degrade to a C in five years and remain there for the projected 20 years if improvements are not implemented in the corridor. **Table 1.4** shows the various congestion indices and their corresponding LOS.

Table 1.4: Congestion Index / LOS Scale

Congestion Index Range	LOS
85 - 100	A
70 - 84	B
55 - 69	C
40 - 54	D
25 - 39	E
0 - 24	F

1.5 Right-of-Way

The existing road is located adjacent to a mixture of private and public lands, including land belonging to the USFS and also to Montana Fish Wildlife and Parks (MFWP). Right-of-way widths vary along the corridor from 275 feet to as little as 80 feet. **Table 1.5** gives the right-of-way widths for the study area along with the adjacent land ownership information.

Table 1.5: Right-of-Way Widths

Begin RP	End RP	R/W Width (approx.)	Adjacent Ownership
10.06	14.51	200'	Private
14.51	16.42	160'	Private and Public
16.42	17.06	180'	Private
17.06	19.23	160'	Private
19.23	21.16	180'	Public
21.16	24.94	160' TO 275'	Private and Public
24.94	27.35	80' TO 240'	Public

MDT has recently acquired approximately four miles of railroad right-of-way property, which runs parallel to MT-1 from just west of North Cable Road (RP 10.06) to the Quarry (approximately RP 14.0). The acquisition of this additional right-of-way increases the potential improvement options, and may increase opportunities to improve safety through access control. The values shown in **Table 1.5** include the recently acquired right-of-way.

1.6 DESIGN STANDARDS

The MDT *Road Design Manual* specifies general design principles and controls which determine the overall operational characteristics of the roadway and enhance the aesthetic appearance of the roadway. The geometric design criteria for the MT-1 *Corridor Planning Study* are based on the current MDT design criteria for a Non-National Highway System (NHS) Rural Minor Arterial. A Rural Minor Arterial road system links communities and provides service to corridors with trip lengths and travel density greater than those predominantly served by rural collector or local systems. **Table 1.6** lists the current design standards for Rural Minor Arterials according to MDT design criteria.

The design speed for a Rural Minor Arterial roadway ranges between 45 mph and 60 mph depending on terrain. MDT's *Road Design Manual* contains the following definitions for each terrain type:

- Level Terrain – The available stopping sight distances are generally long or can be made to be so without construction difficulty or major expense.
- Rolling Terrain – The natural slopes consistently fall below and rise above the roadway and occasional steep slopes offer some restriction to horizontal and vertical alignment.
- Mountainous Terrain – Longitudinal and traverse changes in elevation are abrupt and extensive grading is frequently needed to obtain acceptable alignments.

Based on these definitions, the majority of the study area appears to be level terrain (60 mph design speed) with some areas of rolling terrain (55 mph design speed).

Table 1.6: Geometric Design Criteria[7]

Design Element			Design Criteria		
Design Controls	Design Forecast Year (Geometrics)		20 Years		
	Design Speed [(1)]	Level	60 mph		
		Rolling	55 mph		
		Mountainous	45 mph		
	Level of Service [(1)]		Level/Rolling: B Mountainous: C		
Roadway Elements	Travel Lane Width [(1)]		12'		
	Shoulder Width [(1)]		Varies		
	Cross Slope	Travel Lane [(1)]	2%		
		Shoulder	2%		
	Median Width		Varies		
Earth Cut Sections	Ditch	Inslope	6:1 (width: 10')		
		Width	10' Min.		
		Slope	20:1 towards back slope		
	Back Slope; Cut Depth at Slope Stake	0' - 5'	5:1		
		5' - 10'	Level/Rolling: 4:1; Mountainous: 3:1		
		10' - 15'	Level/Rolling: 3:1; Mountainous: 2:1		
		15' - 20'	Level/Rolling: 2:1; Mountainous: 1.5:1		
		> 20'	1.5:1		
Earth Fill Slopes	Fill Height at Slope Stake	0' - 10'	6:1		
		10' - 20'	4:1		
		20' - 30'	3:1		
		> 30'	2:1		
Alignment Elements	DESIGN SPEED		45 mph	55 mph	60 mph
	Stopping Sight Distance [(1)]		360'	495'	570'
	Passing Sight Distance		1625'	1885'	2135'
	Minimum Radius (e=8.0%) [(1)]		590'	960'	1200'
	Superelevation Rate [(1)]		e_{max} = 8.0%		
	Vertical Curvature (K-value) [(1)]	Crest	61	114	151
		Sag	79	115	136
	Maximum Grade [(1)]	Level	3%		
		Rolling	4%		
		Mountainous	7%		
	Minimum Vertical Clearance [(1)]		17.0'		

[(1)] Controlling design criteria (see Section 8.8 of the MDT Road Design Manual).

[7] MDT Road Design Manual – Chapter 12, Figure 12-4 "Geometric Design Criteria for Rural Minor Arterials (Non-NHS – Primary)", 2008

1.7 Roadway Geometrics

Existing roadway geometrics were evaluated for MT-1 within the study area to identify areas of concern that do not meet current MDT standards. This analysis was conducted based on information from as-built construction drawings and confirmed through field review. The findings of this analysis are discussed in the following sections.

1.7.1 Horizontal Alignment

Elements comprising horizontal alignment include curvature, superelevation, and sight distance which have an influence on traffic operation and safety. These parameters define horizontal alignment and are directly related to the design speed of the corridor.

Table 1.7 provides a summary of the horizontal curves present along the study area. Included in the table is the approximate center RP for the curve, length of curve, radius, and highest standard met based on the MDT *Road Design Manual*. For example, if a curve is listed as meeting "Rolling" standards, the controlling design elements (in this case curve radius) meet standards at or below rolling terrain levels, but do not meet level terrain standards. Four horizontal curves do not meet MDT's level terrain standards based on radius values. All four curves do, however, meet rolling terrain standards.

Table 1.7: Horizontal Curves

Center RP	Length (ft)	Radius (ft)	Standard Met
10.193	893.3	2865.0	Level
13.193	236.6	5730.0	Level
14.408	2007.8	3820.0	Level
16.331	940.0	3820.0	Level
17.024	1796.8	3737.0	Level
17.933	2098.0	2292.0	Level
19.087	2356.7	5730.0	Level
19.984	2205.0	3820.0	Level
21.129	1813.8	2865.0	Level
22.259	890.8	5730.0	Level
22.860	1050.3	1146.0 [(1)]	Rolling
23.185	1093.5	1146.0 [(1)]	Rolling
24.019	630.2	1146.0 [(1)]	Rolling
25.095	1988.9	1909.9	Level
25.528	1243.2	1432.4	Level
25.953	580.0	5729.6	Level
27.055	821.7	1432.4	Level
27.077	718.7	1145.9 [(1)]	Rolling

[(1)] *Values in red do not meet current MDT design standards for level terrain (see Table 1.6 for standards).*

1.7.2 Vertical Alignment

Vertical alignment is a measure of elevation change of 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 grades along with minimum values for vertical curvature (K-value) for Rural Minor Arterials according to the type of terrain in the area. According to the *Road Design Manual*, the maximum allowable grade for level terrain is 3%, for rolling terrain is 4%, and for mountainous terrain is 7%.

The grades throughout the corridor are generally less than 3% and therefore meet level terrain standards. There are, however, twelve vertical curves that have grades greater than 3%, ten of which have grades exceeding rolling terrain standards (4%). This information is shown in **Table 1.8**.

In addition to roadway grades, **Table 1.8** shows curve information for all the vertical curves along the study area. The controlling design factors for vertical curves are the rate of vertical curvature, or K-value, and stopping sight distance. K-values are a function of the length of the curve compared to the algebraic change in grade which comprises either a sag or a crest vertical curve. This controlling design criterion is directly dependent on the design speed of the study area. Within the study area, there are five vertical curves that do not meet K-value standards for level terrain, three of which do not meet current standards for rolling terrain. In addition, two vertical curves do not meet standards for rolling terrain based on stopping sight distance, but do meet mountainous terrain standards.

Table 1.8: Vertical Curves

Center RP	Length (ft)	G1	G2	Type	K-Value	SSD	Standard Met
10.762	200.0	1.01%	1.57%	Sag	355.2	-	Level
10.929	100.0	1.57%	0.83%	Crest	134.6 [(1)]	1502.2	Rolling
11.024	200.0	0.83%	1.02%	Sag	1041.7	-	Level
11.104	100.0	1.02%	1.73%	Sag	140.6	-	Level
11.254	200.0	1.73%	1.36%	Crest	536.2	2992.8	Level
11.369	200.0	1.36%	1.22%	Crest	1428.6	7807.1	Level
11.484	400.0	1.22%	1.60%	Sag	1052.6	-	Level
11.677	200.0	1.60%	1.10%	Crest	400.0	2258.0	Level
11.964	200.0	1.10%	1.44%	Sag	588.2	-	Level
12.070	300.0	1.44%	0.75%	Crest	434.8	1713.8	Level
12.251	800.0	0.75%	1.35%	Sag	1333.3	-	Level
12.808	200.0	1.45%	0.51%	Crest	212.8	1247.9	Level
12.884	300.0	0.51%	2.12%	Sag	186.3	-	Level
13.000	200.0	2.12%	1.38%	Crest	270.3	1558.1	Level
13.077	200.0	1.38%	2.70%	Sag	151.5	-	Level
13.174	400.0	2.70%	1.05%	Crest	242.4	853.9	Level
13.519	100.0	1.25%	1.71%	Sag	217.4	-	Level
13.596	200.0	1.71%	1.34%	Crest	540.5	3016.2	Level
13.884	300.0	1.34%	0.15%	Crest	252.1	1056.7	Level

[(1)] Values in red do not meet current MDT design standards for level terrain (see Table 1.6 for standards).
[(2)] Values in blue do not meet current MDT design standards for rolling terrain standards (see Table 1.6 for standards).

Center RP	Length (ft)	G1	G2	Type	K-Value	SSD	Standard Met
13.998	500.0	0.15%	3.16% [1]	Sag	166.1	-	Rolling
14.115	550.0	3.16% [1]	1.48%	Crest	327.4	917.3	Rolling
14.884	1000.0	1.48%	2.23%	Sag	1333.3	-	Level
15.349	400.0	2.23%	5.52% [2]	Sag	121.6 [1]	-	Mountainous
15.490	900.0	5.52% [2]	1.52%	Crest	225.0	696.8	Mountainous
15.624	400.0	1.52%	6.00% [2]	Sag	89.3 [2]	-	Mountainous
15.825	1600.0	6.00% [2]	-1.21%	Crest	221.8	691.9	Mountainous
16.256	500.0	-1.21%	0.57%	Sag	280.4	-	Level
16.867	300.0	0.06%	1.47%	Sag	213.1	-	Level
16.961	300.0	1.47%	1.80%	Sag	895.5	-	Level
17.147	400.0	1.80%	1.44%	Crest	1095.9	3156.2	Level
17.502	400.0	1.44%	1.75%	Sag	1290.3	-	Level
17.892	600.0	1.44%	0.82%	Crest	975.6	2054.5	Level
18.493	600.0	0.82%	2.19%	Sag	439.2	-	Level
18.919	600.0	2.19%	4.16% [2]	Sag	304.0	-	Mountainous
19.501	400.0	4.16% [2]	5.50% [2]	Sag	298.5	-	Mountainous
20.076	1400.0	5.50% [2]	0.96%	Crest	308.4	815.8	Mountainous
20.451	400.0	0.96%	1.50%	Sag	740.7	-	Level
20.693	400.0	1.50%	1.98%	Sag	840.3	-	Level
20.898	600.0	1.98%	1.03%	Crest	630.9	1434.6	Level
21.123	400.0	1.03%	1.50%	Sag	842.1	-	Level
21.626	800.0	1.50%	0.19%	Crest	612.6	1226.2	Level
22.101	400.0	0.19%	1.04%	Sag	472.8	-	Level
22.476	800.0	1.04%	-0.24%	Crest	625.0	1243.0	Level
22.931	800.0	-0.24%	-1.44%	Crest	666.7	1299.2	Level
23.393	400.0	-1.44%	-0.70%	Sag	543.5	-	Level
23.774	600.0	-0.70%	1.36%	Sag	290.7	-	Level
23.922	400.0	1.36%	-2.86%	Crest	94.8 [2]	455.7 [2]	Mountainous
24.455	400.0	-2.86%	-0.38%	Sag	161.3	-	Level
24.749	1200.0	-0.38%	1.54%	Sag	625.0	-	Level
24.995	800.0	1.54%	-2.00%	Crest	226.0	698.3	Level
25.128	600.0	-2.00%	0.30%	Sag	260.9	-	Level
25.308	700.0	0.30%	-1.06%	Crest	514.7	1143.4	Level
25.431	600.0	-1.06%	0.00%	Sag	566.0	-	Level
25.885	400.0	0.00%	2.00%	Sag	200.0	-	Level
26.132	1400.0	2.00%	-1.00%	Crest	466.7	1003.5	Level
26.302	400.0	-1.00%	3.00%	Sag	100.0	-	Level
26.586	1400.0	3.00%	-4.54% [2]	Crest	185.7	633.0	Mountainous
26.794	800.0	-4.54% [2]	-0.50%	Sag	198.0	-	Mountainous
26.984	400.0	-0.50%	1.20%	Sag	235.3	-	Level
27.268	600.0	1.20%	-5.83% [2]	Crest	85.3 [2]	429.1 [2]	Mountainous

[1] Values in red do not meet current MDT design standards for level terrain (see Table 1.6 for standards).
[2] Values in blue do not meet current MDT design standards for rolling terrain standards (see Table 1.6 for standards).

1.7.3 Roadside Clear Zones

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or recovery area. The desired clear zone width varies depending on traffic volumes, speeds, and roadside geometry. Clear zones are evaluated individually based on the roadside cross section. According to MDT, clear zone should be attained by removing or shielding obstacles if costs are reasonable.

In certain instances along the study area it may be impractical to protect or remove certain obstacles within the clear zone. As improvement options develop, roadside clear zones should be designated, to a practical extent, to meet current MDT design standards.

A list of roadside clear zone areas of concern was developed based on information obtained during field reviews. Features looked at during the field reviews were sight distances, side slopes, and roadside hazards. A table of roadside clear zone observations is presented in **Table 1.9**.

Table 1.9: Roadside Clear Zones

Approximate Location (RP)	Feature	Description	Comments
12.4 - 13.4	Clear Zone	Cut slope with fallen rock	South side
13.9 - 14.2	Clear Zone	Heavy vegetation	Area with high rate of animal crashes
16.4	Slope	Steep fill slope	Noted fatality at this location
16.5 - 16.8	Slope	Steep fill slope	
21.1 - 21.4	Slope	Cut slope with fallen rock	North Side
21.7 - 21.8	Slope	Cut slope with fallen rock	North Side
22.1 - 22.6	Slope	Cut slope with fallen rock	North Side
22.9 - 23.1	Slope	Cut slope with fallen rock	North Side
24.2	Horizontal Curve	Poor sight distance	Steep cut slope at Georgetown Lake Rd intersection
24.8	Slope	Steep fill slope	Culvert location
25.0	Slope	Sharp drop-off into water	Signed "no parking" area by lake
25.0 - 25.3	Horizontal Curve	Poor sight distance	Due to cut slope on north side
25.4 - 25.6	Slope	Shoulder and side slope to water	
25.5	Slope / Intersection	Steep slope into water at intersection	Noted fatality at this location
25.9	Bridge ends	Blunt concrete bridge ends	
26.1	Slope	Steep fill slope	Culvert location
26.2 - 26.8	Slope	Steep fill slope	South side

1.8 SURFACING

Existing roadway surfacing characteristics were determined from MDT's 2011 *Montana Road Log*. The *Road Log* contains information for surface width, lane width, shoulder width, surfacing thickness, and base thickness. This information was supplemented through field data collection efforts. **Table 1.10** shows the existing roadway width and surface thickness.

Table 1.10: Existing Roadway Surfacing[8]

			Width (ft)			Thickness (inches)	
Begin (RP)	End (RP)	Lanes	Surface	Lane	Shoulder	Surfacing	Base
10.060	10.076	2	28	12	2	5	12
10.076	10.202	2	32	12	4	5	12
10.202	10.496	2	32	12	4	6	12
10.496	10.565	2	36	12	6	6	12
10.565	19.066	2	32	12	4	6	12
19.066	20.246	3	44	12	4	6	12
20.246	24.148	2	32	13	3	6	12
24.148	26.851	2	24	12	0	4	4
26.851	27.350	2	24	12	0	6	4

The MDT *Road Design Manual* requires a minimum travel lane width of 12 feet. A surface width of 28 feet is recommended for a Rural Minor Arterial. However, the MDT Road Width Committee would ultimately determine the appropriate width during future project development.

1.9 ACCESS POINTS

Access points were identified through a review of available Geographic Information Systems (GIS) data and aerial photography. Based on this review, there are approximately 156 access points along the study area. **Table 1.11** provides a summary of access points grouped in incremental segments along the study area.

[8] Values from MDT *Road Log* and field data collection.

Table 1.11: Access Points

Begin RP	End RP	Length (mi)	Access Points	Density (Access / mi)
10.06	15.00	4.94	80	16.19
15.00	20.00	5.00	33	6.60
20.00	24.00	4.00	22	5.50
24.00	27.35	3.35	21	6.27
Total		**17.29**	**156**	**9.02**

A high concentration of approaches exists in the first five miles west of Anaconda, with over 16 approaches per mile. Access density decreases west of West Valley (RP 15.00) towards Georgetown Lake. Between West Valley and Georgetown Lake, access density ranges between approximately 5.5 and 6.6 access points per mile.

1.10 Turn Lanes

There is currently a dedicated westbound left-turn lane located at the intersection with Georgetown Lake Road (RP 24.2) on the southeast side of Georgetown Lake. This is the only dedicated turn-lane within the study area.

1.11 Hydraulics

1.11.1 Drainages

The study area is located within the Upper Clark Fork watershed, within the Columbia River basin. Warm Springs Creek parallels MT-1 throughout the study area. Numerous intermittent and ephemeral tributaries, including Cable Creek, Twin Lakes Creek, Storm Creek, Big Gulch, Olson Gulch, and Grays Gulch flow out of the mountains on either side of the highway. Silver Lake is south of the corridor between RP 22.0 and 23.0 while Georgetown Lake is west of the corridor between RP 24.5 and 27.0. Several irrigation ditches and canals exist within the corridor and consideration will be given to drainages during the project development process if an improvement option is deemed feasible.

1.11.2 Structures

Table 1.12 lists the hydraulic structures located on the roadway throughout the study area. There was heightened flooding throughout Montana in 2011 and no evidence of drainage issues was observed during the field review along the corridor. It is presumed, therefore, that for the purposes of this report, irrigation ditches, culverts and bridges are hydraulically adequately sized.

Table 1.12: Existing Hydraulic Structures

RP	Diameter	Comments
10.189	24"	
10.278	48"	
10.520	24"	
11.037	24"	
12.364	24"	
12.990	30"	Irrigation
13.017	24"	Irrigation
13.672	24"	Irrigation
14.530	24"	
14.749	24"	
14.849	24"	
15.155	24"	
15.617	24"	
15.786	24"	
16.269	24"	
16.526	24"	
17.240	30"	
17.678	60"	
18.225	60"	Beaver Pond
18.455	24"	
18.537	24"	
18.581	36"	
18.775	24"	
18.903	11'5"x7'3"x80'	Pipe Arch - Twin Lakes Creek
18.996	108"x112'	Cable Creek
19.100	24"	
19.409	36"	
19.497	24"	
19.797	24"	
20.095	108"x152'	Cable Creek
20.536	36"	
20.770	72"	Storm Lake Creek
21.019	24"	
21.342	36"	
21.405	36"	
21.767	24"	
22.204	24"	
22.252	8"x50' & 12"x50'	"T" Shaped Perforated Pipe Drain
22.498	24"	
22.725	48"	
22.895	24"	
23.143		Concrete Box Culvert
23.170	36"	
23.350	24"	
23.653	24"	
23.738	24"	
23.909	48"	
24.503	18"	
24.635	18"	
24.804	24"	
25.014	18"	
25.213	18"	
25.516	18"	
25.582	36"	
25.909		Concrete Box Culvert
26.084	18"	
26.283	24"	
26.539	18"	
27.077	24"	

1.11.3 Bridge Crossings

Two bridge crossings are located within the study area boundary, one located at approximately RP 10.57 (P00019010+03321) and the other located approximately 7 miles west of Anaconda at RP 16.91 (P00019016+09111), each spanning Warm Springs Creek. The bridge located at RP 10.57 is a two lane, three-span concrete structure that was constructed in 1990. This bridge is 68.01 feet long and 39.4 feet wide. The bridge located at RP 16.92 is also a two lane structure spanning 42 feet, 36.4 feet in width and is a single span concrete design constructed in 1930.

The bridge located at RP 10.57 was assessed by MDT in 2010 to determine the sufficiency rating while the bridge located at RP 16.92 was assessed in 2009. The sufficiency rating formula is a method of evaluating highway bridge data to obtain a numeric value indicating the sufficiency of the bridge to remain in service. The result of this method is the percentage in which 100 is an entirely sufficient bridge and 0 is an entirely deficient bridge. In order to receive funding through the *Highway Bridge*

Replacement and Rehabilitation Program, structures must be "Structurally Deficient" or "Functionally Obsolete" and have a sufficiency rating of 80 or below. Structures with a sufficiency rating of 0 to 49.9 are eligible for replacement, and structures at 50 to 80 are eligible for rehabilitation unless otherwise approved by the Federal Highway Administration (FHWA).

The following criteria determine whether or not a structure is structurally deficient or functionally obsolete:

Structurally Deficient

A condition of 4 or less for any of the following:

- Deck Rating
- Superstructure Rating
- Substructure Rating

Or, an appraisal of 2 or less for the following:

- Structure Rating
- Waterway Adequacy

Functionally Obsolete

An appraisal of 3 or less for the following:

- Deck Geometry
- Under Clearance
- Approach Roadway Alignment

Or, an appraisal of 3 for the following:

- Structure Rating
- Waterway Adequacy

Both bridge structures are determined to be not structurally deficient and not functionally obsolete at the present time. The design loadings meet current MDT standards which require a minimum design loading of MS 13.5 (metric) / HS 15 (English) for bridges to remain in place.[9] **Table 1.13** shows the sufficiency ratings of the two bridge crossings.

[9] MDT Bridge Design Standards

Table 1.13: Bridge Sufficiency Rating (SR)[10]

Structurally Deficiency SR Criteria		Bridge at RP 10.57	Bridge at RP 16.92
Deck Rating	≤ 4	6	7
Superstructure Rating	≤ 4	7	6
Substructure Rating	≤ 4	7	6
Structure Rating	≤ 2	7	6
Waterway Adequacy	≤ 2	8	8
Functionally Obsolete SR Criteria			
Structure Rating	= 3	7	6
Deck Geometry	≤ 3	5	6
Under Clearance	≤ 3	-	-
Waterway Adequacy	= 3	8	8
Approach Roadway Alignment	≤ 3	7	8
Design Loading		5 MS 18 (HS 20)	3 MS 13.5 (HS 15)
Sufficiency Rating		97.2	88.1
Structure Status		Not Deficient	Not Deficient

1.12 Crash Analysis

The MDT Traffic and Safety Bureau conducted a crash analysis along MT-1 throughout the study area. The crash analysis included five years of crash data from January 1, 2005 and December 31, 2009. The analysis compared the study area with the average crash rates on statewide rural minor arterials.

Crash rates are defined as the number of crashes per million vehicle miles. Severity index is defined as the ratio of the sum of the level of crash degree to the total number of crashes. Severity rate is defined as the crash rate multiplied by the severity index.

The crash rate for the corridor study segment is 1.16 crashes per million vehicle miles travelled for this time period. By comparison, crash data indicates that the statewide rural minor arterial average crash rate is 1.22 for 2005-2009, which is higher than the corridor crash rate. The severity rate for this corridor segment is 2.44 weighed by severity crashes per million vehicle miles traveled, which is also below the statewide rural minor arterial average crash severity rate of 2.83.

For this period (2005-2009), the Montana Highway Patrol records shows 67 crashes, consisting of two fatal crashes (with two fatalities), 20 injury crashes and 45 property damage only crashes. The dominant crash type for the corridor is single vehicle crashes (49 out of 67), of which 28 crashes involved a single vehicle that ran off of the road and 20 crashes were a wild animal-vehicle collision. 18 crashes involved two or more vehicles. Just to the west of Anaconda, in a segment with numerous approaches, there

[10] MDT Bridge Management System, Initial Assessment Form, 2011

were seven multi-vehicle collisions; however, these crashes were not concentrated in one location. Lane departure crashes were spread over the entire length of the corridor. There is a concentration of wild animal-vehicle collisions, 9 reported, between RP 14.7 and 15.7. The run-off-the-road crashes were spread over the corridor. Based on the crash data reviewed for the study area, crash clusters were identified at the following locations:

- RP 13.2-13.6
- RP 16.8-17.1
- RP 21.4-21.8
- RP 22.8-23.3

The 20 reported incidences that included collisions with wild animals mostly included single animal collisions; however, one crash involved eight bighorn sheep that were killed at RP 14.4. Carcass data for the corridor indicates 87 total carcasses recovered along the corridor in the time period from 2006-2010. The 87 carcasses does not indicate 87 crashes, as four crashes killed two animals each, and one crash included the eight bighorn sheep as discussed previously. According to the carcass data, 71 wild animal-vehicle collisions occurred along the corridor.

A cluster of wild animal-vehicle collisions has been identified between reference points 11.2 and 17, as almost 50% of the wild animal-vehicle collisions occurring in this corridor have occurred through this 5.8 mile stretch, according to the carcass data. In the fall of 2010, eight bighorn sheep, including two trophy rams, were killed in a single incident on MT-1, approximately a half-mile after westbound travelers leave the 45 mph zone and enter the 70 mph zone (approximately RP 14.5). Other clusters have been identified between reference points 17.8 and 19.8, with 12 collisions (17%), and also reference points 21 to 22.1, with 9 crashes (13%).

1.13 TRANSPORTATION SERVICES

Railroad – Butte, Anaconda & Pacific Railway (BA&P), formerly referred to as the Rarus Railway, connects Butte and Anaconda, intersecting the Union Pacific line at Silver Bow. The short-line railroad currently is owned by Patriot Rail Corp. While an excursion train also operates on the line between June and September, the principal commodities hauled on the line include copper concentrate and mine tailings.[11] Between Butte and Garrison, BNSF operates 51.1 miles of track with stations in Silver Bow, Warm Springs, and Deer Lodge. The Port of Montana, a 55-acre facility located in Silver Bow, provides a strategic gateway to rail and highway connections.

Bus – Commercial interstate bus service is available in Butte, located 27 miles east of Anaconda. This service is provided by Rimrock Stages, the bus service provider that picked up former Greyhound routes

[11] MDT Montana State Rail Plan, 2010

between Billings and Missoula on June 21, 2011. Local bus carriers are Karst Stage and Tucker Transportation.

Motor Freight – Numerous trucking firms serve Anaconda and Deer Lodge County, including, but not limited to, Andy's Motor Freight, Yellow Freight System Inc., Ravalli Motor Freight, Montana Express Inc., Molerway Freight Lines, Boka Freight Line, Watkins Shepard and Ambrose Distributing Company. These firms may change over time, however statewide it is estimated that over 1,000 motor freight carriers serve Montana and have access to the Anaconda area.

Air Service – A non-commercial airport is located three miles northeast of Anaconda. This is a basic utility airport, able to accommodate 95% of all general aviation equipment (larger twin engine and small corporate jets).

Commercial Airport – Bert Mooney Airport is a public airport located in Butte (27 miles). SkyWest Airlines, a subsidiary of Delta, is the only air carrier serving the Bert Mooney Airport.

1.14 UTILITIES

Public utilities available in Deer Lodge County[12] and particularly the Anaconda area include electrical service from Northwestern Energy and Vigilante Electric Co-op (serving some rural areas). Northwestern Energy supplies natural gas to the county through 12 inch supply lines.

Garbage removal services are through the Anaconda-Deer Lodge Solid Waste District contracts with Butte-Silver Bow for Class II solid waste disposal at a landfill located in Butte-Silver Bow (Rocker). Anaconda Disposal provides garbage collection service for Anaconda-Deer Lodge County. A Class III landfill is located in Deer Lodge County (east of Anaconda).

The primary water source for drinking water for the city of Anaconda is operated by the local government. Six, twelve-inch wells with a four million gallon storage tank serve approximately 6,224 users. Average consumption is 3.7 million gallons per day. Maximum capacity is 4 million gallons per day. Water temperature ranges from 49 - 54 degrees with moderate hardness. Hearst Lake and Fifer Creek Reservoir are secondary, developable sources with a combined storage capacity of 315 million gallons. Areas outside of the city limits are served by individual wells, with the exception of Warm Springs and Galen which are managed by the State of Montana.

Industrial Water – Silver Lake has the capacity of more than 2 million gallons per day.

Waste Water – The City of Anaconda is served by a tertiary treatment, public wastewater system operated by the City and County governments. Outside the city limits, domestic and commercial wastewater is treated by onsite disposal (septic tank/drain field system).

[12] http://www. anacondamt.org/utilities.htm

2.0 Local Planning

2.1 Growth Policy

The *Anaconda – Deer Lodge County Growth Policy, 2010* was developed as a guiding document for growth and development within ADLC. The *Growth Policy* is a decision making tool to help achieve the vision of ADLC citizens and to provide guidance to developers and investors in ADLC. The vision of the *Growth Policy* is as follows:

> *"Anaconda – Deer Lodge County will, as a community, preserve our rich heritage and common values while retaining and enhancing our turn-of-the century image. With long-range planning to direct growth and development, our community will continue to be a safe place where individuals and families can work, play, and learn based on a strong education, and mutual respect. The preservation and development of our resources will be for the betterment of all citizens, now and in the future."*[13]

There are three goals related to transportation identified in the *Growth Policy:*

1. Provide a modern, efficient transportation system to support the County's economic development efforts and to meet the needs of present and future residents.
2. Integrate transportation considerations into the various land use and economic development planning processes.
3. Through integrated community planning, non-motorized system planning and transportation system enhancements provide the widest possible range of transportation choices for ADLC residents.

2.2 Trails Master Plan

Trails are an integral part of the transportation system in Anaconda and Deer Lodge County. A *Trails Master Plan* was recently developed for ADLC to provide safe alternative mode of travel opportunities and connectivity between communities. There is a desire to extend trail facilities west of Anaconda to the West Valley area and beyond. The primary goals of the *Trails Master Plan* are:

1. Design and construction of a new trailhead park at the existing Beaver Dam School site in Opportunity.

[13] Anaconda – Deer Lodge County Growth Policy, 2010, http://www.anacondadeerlodge.mt.gov/departments/planning.aspx#growth_policy

2. Design and construction of a multi-use trail system that will connect the communities of Anaconda, Opportunity, and Fairmont.
3. Provide a connection for the new trailhead park and interconnecting multi-use trail system to the proposed Greenway Trail System.
4. Provide for maintenance of the existing and proposed park and trail system components.

2.3 WATER/WASTEWATER SYSTEM

A wastewater system *Preliminary Engineering Report* was developed to address the needs of the wastewater system in Anaconda and the surrounding areas. Residents in the West Valley area have private water wells, but there is concern about potential contamination from area septic systems. The *West Valley Water and Sewer Feasibility Study, 2000* suggests that Anaconda's water and wastewater facilities could be expanded to serve the West Valley Area. Other potential additions, relative to the water system on the west end of the city, include the Sunnyside Road area, the North Cable Road properties, and the Stump Town Road area.

The *Growth Policy* recommends that a central wastewater system for West Valley be constructed to provide long-term protection of the Anaconda Municipal well field. According to the *Growth Policy*, the system could connect to the existing Anaconda treatment facility.

3.0 Environmental Scan

3.1 Geographic Setting

The general topography of Deer Lodge County is mountainous in the extreme, the valleys being little more than depressions between mountain ranges. The average elevation is 6,000 feet, rising to over 10,500 feet on the mountain peaks. The land use within the corridor is predominantly for recreational and residential purposes. The majority of the land within the identified corridor is uninhabited. A high-level Environmental Scan was completed in January 2011 and covers the study area from west of Anaconda – RP 10.06 to Georgetown Lake RP 27.35. This section provides a summary of the scan.

3.2 Land Ownership

Land ownership within the study area was determined by reviewing GIS based information to assess the amount of area that is public versus privately owned. The land within the study area is predominately privately owned land (approximately 64%). There are no 6(f) resources in the study area. There are 4(f) resources present, however, and are noted below:

- Pumping Station (historic site)
- BA&P Spur (railroad)
- Malvey Cabin (historic site)
- Anaconda-Philipsburg Power Line (historic site)
- Silver Lake Water System (historic site)
- Garrity Mountain WMA (wildlife management area)
- Blue Eyed Nellie WMA (wildlife management area)
- Stuart Mill Bay FAS (fishing access site)

3.2.1 Montana Fish, Wildlife & Parks Wildlife Management Areas

The Garrity Mountain Wildlife Management Area (WMA) covers 9,475 acres and is located near the mid-point and south of the study area. This public land is managed by MFWP. Just south of the highway, Garrity Mountain rises over 8,000 feet in elevation. The mountain's, open grassy area provide critical winter foraging for elk, deer, and bighorn sheep, while pockets of timber offer shelter and thermal cover. North of the highway in the same vicinity is the Blue Eyed Nellie WMA. The management goal of this 164 acre area is to provide winter range for Bighorn Sheep and opportunities for wildlife observation.

3.2.2 Montana Fish, Wildlife & Parks Fishing Access Sites (FASs)

MFWP owns the Stuart Mill Bay Fishing Access Site (FAS). This FAS has a portion of its land within the corridor study area (roughly 20 percent of its total area). The FAS is not accessed directly from MT-1, rather is accessed off Georgetown Lake Road just north of RP 24.0.

3.3 Cultural and Archaeological Resources

The corridor contains many cultural resources, including the Anaconda to Phillipsburg Power Line (24DL0496), a pumping station (24DL0425), the Silver Lake Water System (24DL0691), the National Register of Historic Places – listed Butte, Anaconda and Pacific Railroad Historic District (24DL0211), a railroad spur line (24DL0425), and the Malvey Cabin (24DL0427). Cultural resources may be a significant issue and is an important consideration as planning progresses on this study. Any further reconstruction of the highway infrastructure in this corridor would require a cultural resource survey of the "Area of Potential Effect" for this project as specified in Section 106 of the National Historic Preservation Act (36 CFR 800).

3.4 Soil Resources and Prime Farmland

Soil resource information was gathered through available soil surveys, while information regarding areas of prime farmland in the corridor area was compiled from the US Department of Agriculture, Natural Resource Conservation Service (NRCS). The agricultural soils of Deer Lodge County are confined chiefly to the terraces in the vicinity of Galen in the northern part of the county and to the benches north of the Big Hole River in the southwest part of the county.

The Farmland Protection Policy Act of 1981, which has as its purpose "to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland". Farmland is defined by the act in Section 420 as including prime farmland, unique farmland, and farmland, other than prime or unique, this is of statewide or local importance.

Soil map units found within the study area have been classified as prime and important farmland. Project activities associated with any proposed construction of the MT-1 Anaconda to Georgetown Lake corridor will likely create impacts to the soil map units with prime and important farmland status, thus it is likely required that a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects would be completed.

3.5 VEGETATION

According to the Montana Natural Heritage Program (MNHP) report, seventy-five percent of the vegetative land cover in Deer Lodge County is comprised of a combination of Rocky Mountain Lodgepole Pine Forest (23%), Rocky Mountain Lower Montane, Foothill, and Valley Grassland (14%), Montane Sagebrush Steppe (12%), Rocky Mountain Montane Douglas-fir Forest and Woodland (9%), Rocky Mountain Subalpine-Upper Montane Grassland (7%), Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland (6%), and Northern Rock Mountain Lower Montane Riparian Woodland and Shrubland (4%). In the vicinity of the study area, a combination of lodge pole pine forest and grasslands dominate the hillsides and foothills. Riparian woodland and shrub land line the major drainage corridors, especially Warm Springs Creek. There are patches of previously harvested forest-tree, forest-shrub, and forest-grassland regeneration along the slopes within the higher mountain elevations. Adjacent to the highway, low intensity development has occurred.

Noxious weeds are present within Deer Lodge County. The Invaders Database System lists 60 exotic plant species and 18 noxious weed species documented in the County. ADLC has additional species that they consider to be noxious. The additional species considered noxious by ADLC were defined by ADLC Council Resolution 10-24, and include the following: Babysbreath, Common Mullein, Curley Dock, Kochia, Musk Thistle, and Sowthistle.

3.6 WILDLIFE

Wildlife species inhabiting or traversing the study area are typical of those in mixed forests and intermountain valley grasslands of south central Montana. Of the 108 mammal species known to occur in the state, 65 are known or suspected to occur in Deer Lodge County. Common mammals occupying habitats in, traversing, or having a distribution range that overlaps the study area are white-tail deer, mule deer, moose, red fox, black bear, elk, mountain lion, and coyote.

There is a large herd of bighorn sheep occupying habitat in the Flint, Anaconda, and Pintler mountains which are frequently observed on or adjacent to MT-1 in the study area, especially in the winter season. Bighorn sheep inhabit both sides of MT-1 throughout the corridor study area, but especially near the Wildlife Management Area at Garrity Mountain. The bighorn sheep are attracted to the salt in de-icing material used on the highway in the winter season. The use of de-icing material may cause bighorn sheep to concentrate on and adjacent to the roadway, increasing the incidents of vehicle collisions with bighorn sheep. Bighorn frequently graze alongside the roadway in this area and lick the salt from the roadway during the winter months. The herd has also experienced fatal pneumonia outbreaks, which MFWP has managed with some culling of the herd to prevent spread of the disease. It is estimated by MFWP that of the 300 animals currently inhabiting the area, only about 1/3 of the herd may survive the winter.

Other species present in the study area are noted in the Environmental Scan.

3.7 Amphibians and Reptiles

The species expected to occur in the corridor study area were extrapolated from "known" areas studied in the MNHP – *Natural Heritage Tracker* (2010) database. The species potentially occurring in the study area may include but are not limited to the Columbia spotted frog, Rocky Mountain tailed Frog, the long-toed salamander, and the Boreal (Western) Toad. Over a dozen invertebrate species, some listed as State Species of Concern (SOC) also have been observed in the project study area.

3.8 Birds

According to the MNHP – *Natural Heritage Tracker* (2009) database of documented observations of species, there are a few hundred different species of birds documented in Deer Lodge County, with the potential to occur and nest in the project area. These species include representative songbirds, birds of prey, waterfowl, owls, and shorebirds, including several State SOC. Most avian observations occur in the riparian draws and hillsides associated with the numerous drainages along the study area and surrounding lakes. Migratory birds and Golden and Bald Eagles are protected under the *Migratory Bird Treaty Act* and the protection of these species and compliance with the *Act* would need to be carefully considered with any planned project resulting from this study.

MFWP manage a wildlife area adjacent to both sides of the highway in the vicinity of Garrity Mountain.

3.9 Aquatic Resources

3.9.1 Fisheries

Warm Springs Creek parallels and is crossed by the highway in the study area. Multiple tributaries to Warm Springs Creek converge in the proximity of the study area, including Cable Creek, Twin Lakes Creek, and Storm Creek. The Stumptown Pond and the AMC Pond are near the highway just west of Anaconda in the study area while Silver Lake and Georgetown Lake are adjacent to the highway near the northern terminus in the study area. According to the MFWP *Montana Fisheries Information System* (MFISH) database (2010), fish species occurring in Warm Springs Creek within the study area are brown trout (ENN -Exotic Species – not native to Montana), longnose sucker, mottled sculpin, rainbow trout slimy sculpin, brook trout (ENN), bull trout (SOC), mountain whitefish, and westslope cutthroat (SOC). The stream stretch between river miles 2.6 and 32.6 is considered bull trout core area, but not node area. River miles from 24.2 to 32.6 are considered MFWP protected areas for big wintering/spring usage.

The tributaries and other drainages within the study area have the potential to support all or some of the fish species listed above. Fish passage and/or barrier opportunities must be considered at all affected drainages if a project is forwarded from this corridor study.

Warm Springs Creek is rated as an outstanding fisheries resource value by MFWP and receives recreational angler use year round. Ponds and lakes within the study area are also recreation destinations. Silver Lake and Georgetown Lake are managed as a recreational fisher resource by MFWP. There are several access roads from the highway into adjacent public lands as well.

3.10 Threatened and Endangered Species

The federal list of endangered and threatened species is maintained by the United States Federal Wildlife Service (USFWS). Species on the list receive protection under the Endangered Species Act (ESA). An 'endangered' species is one that is in danger of extinction throughout all or a significant portion of its range. A 'threatened' species is one that is likely to become endangered in the foreseeable future. The USFWS also keeps a list of species that are candidates or proposed for possible addition to the federal list. **Table 3.1** lists the threatened, endangered or candidate species occurring in the study area according to the USFWA.

Table 3.1: Threatened and Endangered Species[14]

Common Name	Scientific Name	ESA Status
Bull Trout	Salvelinus confluentus	LT/CH/PCH
Wolverine	Gulo gulo	C

LT – Listed Threatened
CH – Critical Habitat
PCH – Potential Critical Habitat
C – Candidate

Warm Springs Creek is designated Bull Trout critical habitat. If a project is developed from the corridor study, an evaluation of potential effects to bull trout and wolverine will need to be completed during the project development process.

3.11 Species of Concern

Montana SOC are native animals breeding in the state that are considered be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana SOC is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively.

[14] US Fish and Wildlife Service

The MNHP maintains a *Sensitive Species Heritage Program Ranking* database. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). Other state ranks include SU (un-rankable due to insufficient information), SH (historically occurred), and SX (believed to be extinct). State ranks may be followed by modifiers, such as B (breeding) or N (non-breeding).

A search of the MNHP species of special concern database revealed five mammal species and one bird species within the first four miles of the study area. Four mammal species have been documented in the remainder of the study area. Five bird species have documented breeding within the study area. Two fish species of concern occur within the study area drainages. One invertebrate species and three vascular plant species of concern have also been documented within the study area.

Table 3.2: Species of Special Concern[15]

Common Name	Scientific Name
Dwarf shrew	Sorex nanus
Canada Lynx	Lynx Canadensis
Wolverine	Gulo gulo
Fisher	Martes pennant
Gray wolf	Canis Lupis
Species Observed Breeding in Study Area	
Bald Eagle	Haliaeetus leucocephalus
Great Blue Heron	Ardea Herodias
Great Grey Owl	Strix nebulosa
Lewis's Woodpecker	Melanepes lewis
Northern Goshawk	Accipiter gentilis
Bull Trout	Saleevelinus confluentus
Westslope Cutthroat Trout	Onchorynchus clarkia lewisi

There are other sensitive species not listed that have the potential to be within the study area. A thorough field investigation for the presence and extent of these species should be conducted during the project design phase. If present, special conditions to the project design or construction should be considered to avoid or minimize impact to these species.

There are no endangered, threatened, proposed, or candidate plant species listed for Deer Lodge County in the USFWS database, and none are currently expected to occur in the study area.

[15] Montana Natural Heritage Program

3.12 Wildlife and Traffic Conflicts

A high number of animal / vehicle conflicts exist in the study area. As noted in section 1.12, there is a concentration of wild animal-vehicle collisions between RP 14.7 and 15.7. Reported incidences that included collisions with wild animals mostly included single animal collisions; however, one crash involved eight bighorn sheep that were killed at RP 14.4. Carcass data for the corridor indicates 87 total carcasses recovered along the corridor in the time period from 2006-2010. The 87 carcasses does not indicate 87 crashes, as four crashes killed two animals each, and one crash included the eight bighorn sheep as discussed previously. According to the carcass data, 71 wild animal-vehicle collisions occurred along the corridor.

A cluster of wild animal-vehicle collisions has been identified between reference points 11.2 and 17, as almost 50% of the wild animal-vehicle collisions occurring in this corridor have occurred through this 5.8 mile stretch, according to the carcass data. In the fall of 2010, eight bighorn sheep, including two trophy rams, were killed in a single incident on MT-1, approximately a half-mile after westbound travelers leave the 45 mph zone and enter the 70 mph zone (approximately RP 14.5). Other clusters have been identified between reference points 17.8 and 19.8, with 12 collisions (17%), and also reference points 21 to 22.1, with 9 crashes (13%).

3.13 Water Resources and Fisheries

The Montana Department of Environmental Quality (DEQ), Clean Water Act Information Center website provides information for the study area. The study area is within the Upper Clark Fork watershed, in the Columbia basin. Warm Springs Creek parallels MT-1 throughout the study area. Numerous intermittent and ephemeral tributaries, including Cable Creek, Twin Lakes Creek, Storm Creek, Big Gulch, Olson Gulch, and Grays Gulch flow out of the mountains on either side of the highway. Warm Springs Creek is considered to be in water quality category 4C. Total Maximum Daily Loads (TMDL) are not required as no pollutant-related impairment is identified. Warm Spring Creek fully supports beneficial uses including agriculture, industrial and primary contact recreation. The creek partially supports aquatic life and cold water fishery. Twin Lakes Creek also supports aquatic life and is an important cold water fishery.

Warm Springs Creek crosses the highway at approximately RP 10.5, near the beginning of the study area, and again at RP 17.0. The North Fork of Flint Creek crosses the highway at RP 25.9, joining Flint Creek in the vicinity of Georgetown Lake. Storm Lake Creek crosses the highway near RP 20.8 and joins Cable Creek just above its highway crossing at RP 20.1. Storm Lake Creek parallels the highway and joins Warm Springs Creek near RP 19.0. Foster Creek and Barker Creek join Warm Springs Creek near RP 17.0. Numerous intermittent and ephemeral drainages as well as irrigation ditches flow out of the mountains on either side of the highway within the study area. Georgetown Lake is immediately west of the highway between RP 22.0 and 23.0.

3.14 Water Quality

The Environmental Scan contains details regarding the water quality report available through the Montana DEQ on the Upper Clark Fork River tributaries. The Upper Clark Fork watershed is listed in the *2010 Integrated 303(d)/305(b) Water Quality Report for Montana* by the MDEQ. The water bodies within this watershed that are located in the study area are designated as Category 5 and Category 4C.

Category 5 water bodies are waters where one or more applicable beneficial use has been assessed as being impaired or threatened, and a TMDL of the pollutant is required to address the factors causing the impairment or threat. Warm Springs Creek (MT76G002_012) has probable cause of impairment from arsenic to aquatic life, cold water fishery, and drinking water and probable cause of impairment from cadmium, copper, lead zinc, and iron to aquatic life and cold water fishery.

Category 4C water bodies are waters where TDMLs are not required as no pollutant-related use impairment is identified. TMDLs have not yet been written for water bodies in this watershed.

3.15 Groundwater and Irrigation

Deer Lodge County does not currently have a Local Water Quality District (LWQD) which is a tool local governments can use to protect, preserve and improve the quality of surface water and groundwater within the district. If a LWQD is developed for the county, water quality protection measures may have to be addressed with any project that may develop from the corridor study.

Very little irrigated farm land exists in Deer Lodge County adjacent to the study area. Any impact to lateral and longitudinal irrigation facilities that may exist in the study area would need to be studied and mitigated for by MDT during project development; this could include such measures as relocation of canals and ditches in consultation with land owners and consideration of the impact to farming operations.

3.16 Wetlands

The majority of the wetlands are within the riparian bottom lands associated with the major drainages in the study area, especially Warm Springs Creek, its tributaries, and the major draws coming out of the mountains. A notable amount of potential wetland area occurs in the valley adjacent to the current highway alignment. Any project forwarded from this corridor study has the potential to impact wetland areas, riparian areas, and streams. Formal wetland delineations would be necessary for any proposed highway-related actions in the corridor, as required by Section 404 of the Clean Water Act and Executive Order 11990, Protection of wetlands. Evaluation of stream impacts would need to be completed according to USACOE May, 2010 Stream Mitigation Procedure.

Mapping data for the study area was provided by the National Wetland Inventory (NWI). West Valley, Silver Lake, and Georgetown Lake area identified areas within the confines of the study. West Valley and Silver Lake mapping was completed from 2006 National Agricultural Imagery Program (NAIP) imagery and available from NWI or from the Montana Wetlands Map. The NWI maps are typically generated based on aerial and satellite imagery, and are not accurate or detailed enough for MDT project wetland determination and/or delineation.

3.17 Flood Plains and Floodways

Executive Order (EO) 11988, Floodplain Management, required federal agencies to avoid direct or indirect support of floodplain development whenever a practicable alternative exists. EO 11988 and 23 CFT 650 Part A requires an evaluation of project alternatives to determine the extent of any encroachment into the base floodplain. The base flood (100-year flood) is the regulatory standard used by federal agencies and most states to administer floodplain management programs. A "floodplain" is defined as lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, with a one percent or greater chance of flooding in a given year. As described in FHWA's floodplain regulation (23 CFR 650 Part A), floodplains provide natural beneficial values serving as areas for fish, wildlife, plants, open space, natural flood moderation, water quality maintenance, and groundwater recharge.

Within most of the study area, there are 100-year floodplains delineated by the Federal Emergency Management Agency (FEMA). There are FEMA issued flood maps for the east end of the study area within Deer Lodge County, however no maps are available for the west end in the Georgetown Lake vicinity where the map index notes that it is in a Zone D – undetermined flood hazard. If a project is forwarded from the corridor study, coordination with Deer Lodge County should be conducted during the project development process to obtain necessary floodplain permits.

3.18 Air Quality

The MT-1 Anaconda to Georgetown Lake study area is not a designated "non-attainment" area which is defined as an area that does not meet the National Ambient Air Quality Standards (NAAQS) for PM 2.5, PM 10, or carbon monoxide (CO), nor is it near any area so designated as non-attainment.

3.19 Traffic Noise

Traffic noise may need to be evaluated for any planned improvements to the MT-1 Anaconda to Georgetown Lake corridor if a project is developed that involves a substantial shift in the horizontal or vertical alignments of the roadway, increasing the number of thru-lanes, or increasing the traffic speed and volume. If such improvements are planned then the project would be considered a Type I project. Type I projects require a detailed noise analysis, including measuring ambient noise levels at selected

receivers and modeling design year noise levels using projected traffic volumes. Noise abatement measures would be considered for any project if noise levels *approach* or *substantially exceed* the noise abatement criteria. If traffic noise impacts are shown to exist on a project, possible abatement measures may be considered, but are not limited to:

- Altering the horizontal or vertical alignment;
- Constructing noise barriers such as sound walls or earthen berms; and/or
- Decreasing traffic speed limits.

3.20 HAZARDOUS SUBSTANCES

The Montana Natural Resource Information System (NRIS) database was searched for underground storage tank sites, leaking underground storage tank sites, abandoned mine sites, remediation response sites, landfills, National Priority sites, hazardous waste, crude oil pipelines, and toxic release inventory sites in the vicinity of the study area. The following sites within the corridor study area boundary were initially identified with potential contamination impacts:

- Several underground storage tank locations
- Four leaking underground storage tank locations
- Several abandoned and inactive mines sites and;
- One Federal Superfund program site (Georgetown Railroad)

Given the lack of location precision in the NRIS database, ground review along the corridor would be necessary to determine if any of these sites are in close proximity to the road and/or any proposed alignments. Further evaluation may be needed at specific sites to determine if contamination will be encountered during construction.

4.0 Areas of Concern Summary

This section provides a summary of the areas of concern within the study area. These areas were identified through as-built drawings, field review, and other available data. A summary of the identified areas of concern are shown in **Table 4.1**. More discussion has been provided in the previous sections, and is reiterated here as appropriate. The order the areas of concern are listed do not imply importance or priority of one over the other.

4.1 Geometrics

Geometric areas of concern include roadside safety (including cut and fill slopes), sub-standard horizontal and vertical curvature (including k-values and grades), and sight distance. The geometric areas of concern have been previously described and are summarized in tabular format in **Table 4.1** by reference post. They are also shown graphically in **Figure 4.1**.

Table 4.1: Areas of Concern

Location (RP)	Feature	Cause		Description
10.9	Vertical Curve	K-Value	134.6	K-value is below standards for level terrain
12.4 - 13.4	Roadside Safety	Clear Zone		Cut slope with fallen rock
13.9 - 14.2	Roadside Safety	Clear Zone		Heavy vegetation
14.0 - 14.1	Grade	Grade	3.16%	Grade is greater than standards for level terrain
15.3 - 15.5	Grade	Grade	5.52%	Grade is greater than standards for rolling terrain
15.3	Vertical Curve	K-Value	121.6	K-value is below standards for level terrain
15.6 - 15.8	Grade	Grade	6.00%	Grade is greater than standards for rolling terrain
15.6	Vertical Curve	K-Value	89.3	K-value is below standards for rolling terrain
16.4	Roadside Safety	Slope		Steep fill slope
16.5 - 16.8	Roadside Safety	Slope		Steep fill slope
18.9 - 19.5	Grade	Grade	4.16%	Grade is greater than standards for rolling terrain
19.5 - 20.1	Grade	Grade	5.50%	Grade is greater than standards for rolling terrain
21.1 - 21.4	Roadside Safety	Slope		Cut slope with fallen rock
21.7 - 21.8	Roadside Safety	Slope		Cut slope with fallen rock
22.1 - 22.6	Roadside Safety	Slope		Cut slope with fallen rock
22.9 - 23.1	Roadside Safety	Slope		Cut slope with fallen rock
22.9	Horizontal Curve	Radius	1146'	Curve radius is below standards for level terrain
23.2	Horizontal Curve	Radius	1146'	Curve radius is below standards for level terrain
23.9	Vertical Curve	K-Value	94.8	K-value is below standards for rolling terrain
23.9	Vertical Curve	SSD	455.7'	Stopping sight distance is below standards for rolling terrain
24.0	Horizontal Curve	Radius	1146'	Curve radius is below standards for level terrain
24.2	Roadside Safety	Horizontal Curve		Poor sight distance
24.8	Roadside Safety	Slope		Steep fill slope
25.0 - 25.3	Roadside Safety	Horizontal Curve		Poor sight distance

25.0	Roadside Safety	Slope		Sharp drop-off into water
25.4 - 25.6	Roadside Safety	Slope		Shoulder and side slope to water
25.5	Roadside Safety	Slope / Intersection		Steep slope into water at intersection
25.9	Roadside Safety	Bridge ends		Concrete bridge ends
26.1	Roadside Safety	Slope		Steep fill slope
26.2 - 26.8	Roadside Safety	Slope		Steep fill slope
26.6 - 26.8	Grade	Grade	4.54%	Grade is greater than standards for rolling terrain
27.1	Horizontal Curve	Radius	1146'	Curve radius is below standards for level terrain
27.3 - 27.4	Grade	Grade	5.83%	Grade is greater than standards for rolling terrain
27.3	Vertical Curve	K-Value	85.3	K-value is below standards for rolling terrain
27.3	Vertical Curve	SSD	429.1'	Stopping sight distance is below standards for rolling terrain

4.2 SPEEDS

Vehicle speed data was collected at 4 locations along the corridor. As shown in **Table 4.2**, the results of the speed data collection indicate that the posted speed limits at RP 11.2 (35 mph), RP 14.0 (45 mph), and RP 24.4 (60 mph) may be low compared to the 85th percentile speeds. At RP 11.2, 85th percentile speeds are more than 7 mph higher than the 35 mph posted speed limit. Additionally at RP 14.0, 85th percentile speeds are almost 7 mph higher than the posted speed limit of 45 mph. The 85th percentile is an engineering parameter used by traffic engineers in determining roadway speeds. It is the speed at which 85 percent of vehicles travel at or below. For example, if the 85th percentile speed is 45 mph, it means 85 percent of vehicles are traveling at or below 45 mph. It is generally recommended that the posted speed limit be within 5 mph of the 85th percentile speed.

Table 4.2: Speed Data

Location (RP)	Posted Speed Limit (mph)	ADT (vpd)	85th Percentile Speed (mph)
11.2	35	3902	42.2
14.0	45	2333	51.9
15.3	70	2145	68.5
24.4	60	1539	65.4

4.3 Access Density

A high concentration of approaches exists in the first five miles west of Anaconda, with over 16 approaches per mile. The most dense concentration of approaches exists along the one segment between RP 10.8 and 11.8 with 34 approaches. Access density decreases west of West Valley towards Georgetown Lake. Between West Valley and Georgetown Lake, access density ranges between approximately 5.5 and 6.6 access points per mile. The high density of accesses within the first five miles is a concern due to a variety of factors. The area is in a speed transition area from 25 mph to 45 mph. The acceleration and deceleration of vehicles turning into and out of the accesses cause operational concerns on the mainline of MT-1. As roadway width is limited in this area, there is no "widened" shoulder available to exit the traffic stream.

4.4 Wildlife Connectivity and Wildlife-Vehicle Collisions

A large bighorn sheep herd exists in this corridor study area. Bighorn sheep inhabit both sides of MT-1 throughout the corridor study area, but especially near the Wildlife Management Area at Garrity Mountain. Wildlife connectivity is a concern along the corridor as the bighorn sheep herd has been characterized as vulnerable by MFWP staff due to pneumonia outbreaks, vehicle collisions, subdivision encroachment, and natural attrition. The bighorn sheep are attracted to the salt in de-icing material used on the highway in the winter season. The use of de-icing material may cause bighorn sheep to concentrate on and adjacent to the roadway, increasing the incidents of vehicle collisions with bighorn sheep.

The entire corridor experiences animal-vehicle collisions as evidenced by crash reports and carcass removal data. Of particular concern is the occurrence of moose fatalities occurring in the last third of the corridor near Georgetown Lake. There is also the prevalence of deer collisions throughout the entire corridor.

Fish passage through culverts and bridges, and entrainment in irrigation canals, is also of concern throughout the corridor.

4.5 Alternative Use Facilities

Local planning objectives include the future extension of trails infrastructure west of Anaconda to the West Valley area in the near future. Long term objectives include the provision of trails the entire length of the corridor to Georgetown Lake to complement the scenic highway.

4.6 Local Infrastructure Expansion

Local planning efforts have included the future extension of wastewater system infrastructure west of Anaconda to the West Valley area in the near future. The locating of this future infrastructure in the corridor is important to optimize service to areas residents and ensure that maintenance and access to the infrastructure is allowed.

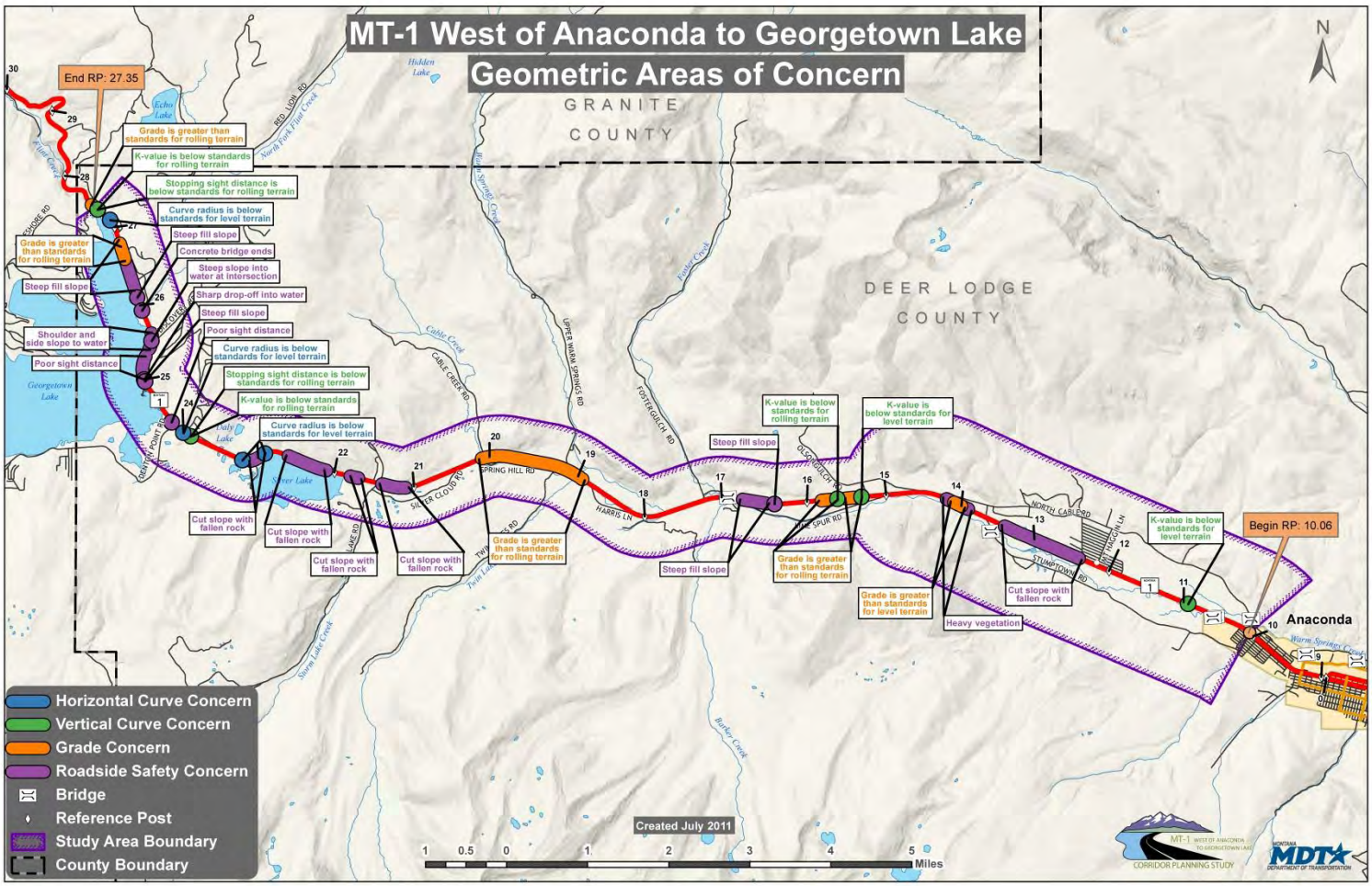


Figure 4.1: Geometric Areas of Concern

NEEDS AND OBJECTIVES

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Prepared For:

MONTANA DEPARTMENT OF TRANSPORTATION
Helena, Montana

RPA

Prepared By:

ROBERT PECCIA & ASSOCIATES
Helena, Kalispell & Butte, Montana

August 2011

1.0 Corridor Needs and Objectives

Needs and Objectives for the MT-1 corridor within the study area were identified based on a comprehensive review of existing data, local plans, and resource agency, stakeholder and community input and coordination. The discussion and analysis leading to the development of these needs and objectives recognizes the diverse nature of the corridor and takes into account social and economic conditions.

The following needs and objectives will be used in the development of improvement options. Note that needs and objectives will be met to the extent practicable given financial, community preference and environmental constraints within the corridor.

Need Number 1: Improve safety and operation of MT-1 through the Corridor Study area

Objectives

- Improve geometric elements to meet current MDT design criteria.
- Accommodate existing and future capacity demands within the corridor.
- Minimize access density impacts.
- Identify appropriate speeds within the study area.
- Provide adequate clear zones to meet current MDT design criteria.
- Review and implement innovative maintenance practices.

Need Number 2: Preserve the environmental, scenic and recreational nature of the corridor and promote wildlife and aquatic connectivity

Objectives

- Preserve the scenic nature of the corridor with respect to view sheds and landscape features.
- Minimize the environmental resource impacts of improvement options.
- Evaluate and incorporate “best practice” mitigation strategies to promote wildlife connectivity across MT-1.
- Evaluate and incorporate “best practice” mitigation strategies to reduce animal-vehicle conflicts.
- Evaluate fish (aquatic organism) passage issues and incorporate appropriate solutions to improve aquatic connectivity and stream function through structures and culverts.

Need Number 3: Coordinate with local planning efforts and minimize conflicts along the corridor

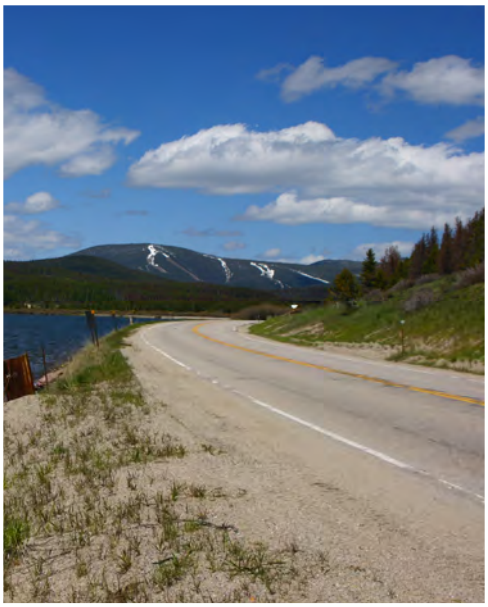
Objectives

- Coordinate future infrastructure needs with ADLC.
- Support local planning efforts.
- Minimize impacts to existing residences and businesses along the corridor.
- Consider all modes of transportation.

Improvement Options

MT-1—ANACONDA TO GEORGETOWN LAKE

Corridor Planning Study



MT-1 WEST OF ANACONDA TO GEORGETOWN LAKE
CORRIDOR PLANNING STUDY

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Prepared For:

Montana Department of Transportation
Helena, Montana

RPA

Prepared By:

Robert Peccia & Associates
Helena, Kalispell & Butte, Montana

September 2011

Abbreviations and Acronyms

ADLC	Anaconda – Deer Lodge County
mph	Miles per Hour
MDT	Montana Department of Transportation
MFWP	Montana Fish Wildlife and Parks
RP	Reference Post
TWLTL	Two-Way Left-Turn Lane
WMA	Wildlife Management Area

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1.0 Introduction

This memorandum identifies recommended improvement options for the MT-1 corridor from Reference Post (RP) 10.06 (Linden Street/North Cable Road intersection) to RP 27.35 (Georgetown Lake Road). The recommended improvement options have been based on the evaluation of the existing conditions of MT-1 within the study area. Roadway issues and areas of concern were identified based on field review, engineering analysis of as-built drawings, crash data analysis, consultation with various resource agencies, and information provided by the general public. Overall corridor needs and objectives were subsequently identified. This analysis developed a range of improvement options that address the roadway issues and areas of concern, and satisfy the corridor needs and objectives.

The purpose of this memorandum is to provide a description and evaluation of each of the improvement options being considered, and to identify potential benefits and impacts to determine whether an improvement option should be carried forward.

1.1 Strategies Explored

General improvement option "types" were considered and recommended to address previously defined areas of concern. The various improvement option types are discussed in the following sections.

1.1.1 Geometrics

Roadway geometrics were compared to current Montana Department of Transportation (MDT) standards. A list of areas that do not meet current MDT standards was developed previously in the *Existing and Projected Conditions* memorandum. The analysis identified potential strategies that may help correct some of the identified issues, and/or minimize potential effects. Some of the strategies examined are:

- Expand roadway widths via shoulder widening and/or frontage roads.
- Modify sub-standard vertical curves with future improvements to bring vertical curves up to current MDT standards.
- Improve deficient vertical grades entering or leaving sub-standard vertical curves to comply with current MDT standards.
- Install advisory signs at sub-standard horizontal curves.
- Improve clear zones by flattening slopes or installing guardrail.
- Improve intersections by realigning minor approach legs, adding turn bays, improving signage or reducing vegetation to benefit sight distance.

1.1.2 Speeds

Speed issues have been identified by the community as one of the most important concerns. These concerns were documented in previous memorandums. The issue of speeds and whether speed limits can be raised (or lowered) ultimately depend on the local governing body, in this case the Anaconda – Deer Lodge County (ADLC) Board of County Commissioners. In examining speed issues, the following strategies were reviewed:

- Modify the posted speed limit in conjunction with road improvements in the 35 mph zone (RP 10.1 – RP 12.0).
- Continue seasonal speed limit reduction as a strategy to mitigate bighorn sheep collisions near RP 14.4.

1.1.3 Wildlife / Aquatics

Mitigation strategies to reduce wildlife-vehicle collisions were assessed through a variety of measures. Corridor carcass data for the time period 1999-2010 was obtained and reviewed to identify areas that may indicate geographical clusters of animal deaths or collisions. This information was measured against formal crash report data provided by law enforcement agencies, via MDT. Comments received from the various resource agencies, along with targeted outreach to the Montana Fish Wildlife and Parks (MFWP) wildlife biologist, were used to develop potential strategies to benefit wildlife and reduce collision potential for the travelling public. The publication titled *Wildlife-Vehicle Collision Reduction Study: Report to Congress (FHWA-HRT-08-034)*, dated August 2008, was reviewed for potential broad range mitigation strategies. Wildlife connectivity was also reviewed, on a high level, by examining carcass locations and comparing them to available mapping of individual species ranges. Any improvement option, if implemented, should include a review of wildlife connectivity issues with project level design.

Mitigation strategies attempting to reduce wildlife-vehicle collisions can be grouped into four distinct categories, as follows:

- Influence driver behavior
- Influence animal behavior
- Reduce wildlife population size
- Physically separate animals from the roadway

After a review of potential strategies, the following were identified as being most appropriate given the concerns regarding wildlife within the corridor:

- Consider a wildlife overpass with appropriate fencing near RP 14.5 for bighorn sheep and other wildlife.
- Monitor other wildlife crossing areas and implement mitigation strategies to minimize animal-vehicle conflicts.

- Develop a Vegetation Management Plan – Site-specific implementation of vegetation management in combination with fencing, at-grade crossings and signage during project level design may be the most feasible and effective wildlife-vehicle collision mitigation strategies for the corridor. The possible incorporation of animal-detection system technologies should also be considered among the wildlife mitigation strategies.

1.1.4 Alternative Travel Modes

Strategies examined within the corridor to accommodate potential alternative travel modes included signage, widened shoulders and separated paths. The ADLC Trails Master Plan provides a long term vision for trails in Anaconda and Deer Lodge County including a separated path between the west limit of Anaconda to the West Valley (approximately 4.2 miles). Strategies applicable to alternative travel modes included:

- Separated path for the first four miles of the corridor.
- Minimum shoulder widths along the roadway to Georgetown Lake of at least 4 feet (each side).
- Appropriate signage.

1.1.5 Approaches

The first four miles of the corridor has a much higher access density; almost twice the density as the remainder of the corridor. The potential to consolidate or eliminate approaches was reviewed through roadway typical section changes (i.e. two-way left-turn lane (TWLTL) or frontage roads).

2.0 Description and Evaluation

This section describes the improvement options developed for the MT-1 corridor, their potential benefits and impacts, and recommendations on whether the improvement options should be carried forward. These improvement options address previously defined issues or areas of concern, and are intended to satisfy the corridor needs and objectives. For ease of identification, the improvement options have been given unique identifiers via a numbering scheme.

Planning level cost estimates for the improvement options have been developed. These costs are for construction costs only in year 2011 dollars. The planning level costs do not include right-of-way acquisition, utility relocation, preliminary engineering (PE) or construction engineering (CE).

2.1 Corridor-Wide Improvements

A number of improvement options have been identified for the entire MT-1 study corridor. These improvement options address common issues and areas of concern occurring throughout the corridor. Some of the options, however, are more relevant to specific areas of the corridor rather than the entire study area. In these cases, anticipated implementation locations were identified.

1. Signing

Additional signing is needed for various areas identified in the study area. Deficient signing can increase the chance of driver error and potential for crashes. Proper roadway signing provides guidance, navigation, and increases driver performance.

1(a). Street Signing

Description:

Existing street signing is inconsistent with recent 911 routing completed in the study area. Areas exist without street signing, making it difficult for emergency vehicles and daily drivers to find their destinations.

Recommendation:

It is recommended that new street signs be installed as needed throughout the study area for consistency with 911 routing.

Benefits:

- Improved 911 response times.
- Improved safety.

Impacts:

- None identified.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

1(b). Scenic Highway Designation

Description:

MT-1 is designated as the "Pintler Veterans' Memorial Scenic Highway". Signing designating the route as the "Pintler Scenic Route" presently exists along the corridor. New signing is needed to match the current corridor designation.

Recommendation:

It is recommended that new signing designating MT-1 as the "Pintler Veterans' Memorial Scenic Highway" be installed.

Benefits:

- Improved corridor awareness.

Impacts:

- None identified.

Estimated Cost: **$750 EA**

Recommended Action: **ADVANCE**

1(c). Fire Department Signing

Description:

The West Valley Fire Department is accessed via MT-1 near West Valley. There presently is no signing indicating the Fire Department. Signing is needed to caution drivers about the possibility of fire trucks entering or exiting the study area.

Recommendation:

It is recommended that new signing be installed indicating the West Valley Fire Department.

Benefits:

- Increased safety due to driver awareness.
- Increased ability to locate the Fire Department

Impacts:

- None identified.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

2. Wildlife Conflicts

Animal-vehicle conflicts commonly occur throughout the study area and present a danger to human safety as well as wildlife survival. A number of improvement options are recommended to help reduce the number of these types of collisions. In addition, Improvement Option 6 has specific recommendations relating to bighorn sheep conflicts. The strategies identified under Improvement Option 6 may also be appropriate in other areas of the corridor. Some of these are identified below. Concepts such as wildlife overpasses or underpasses are not only relevant to the bighorn sheep crossing near RP 14.5. As data is collected and issues are defined, mitigation strategies for other wildlife, such as moose or deer, may include identifying ways to physically separate vehicles from wildlife. The area between Silver Lake and Georgetown Lake realizes a high occurrence of moose/vehicle collisions. Fencing, advance animal detection, signing, or speed reduction strategies may have merit in this area, as well as other areas of the corridor. These should be explored further as project development activities commence.

2(a). Wildlife Signing

Description:

Signing indicating the regular presence of wildlife in the area is intended to alert drivers of potential animal conflicts. Deer frequently occur throughout the corridor while moose are commonly found near the Anaconda Saddle Club (RP 13), near RP 21.0, and along Georgetown Lake.

Recommendation:

It is recommended that additional wildlife signing be installed as needed.

Benefits:

- Increased driver awareness.

Impacts:

- Limited effectiveness on driver behavior.
- Doesn't change animal behavior.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

2(b). Animal Detection System

Description:

Animal detection systems use sensors to detect animals near roadways. When an animal is detected, warning signals and/or signs are activated to alert drivers that an animal may be on or near the roadway.

Recommendation:

It is recommended that animal detection systems be installed as needed.

Benefits:

- Increased driver awareness.
- Reduced animal-vehicle collisions.

Impacts:

- Doesn't change animal behavior.

Estimated Cost: $400,000

For cost estimating purposes it was assumed that approximately four miles of the study area would receive animal detection systems. An estimated cost of $100,000 per mile for an animal detection system was used.

Recommended Action: ADVANCE

2(c). Wildlife Fencing

Description:

Wildlife fencing is intended to separate animals from the roadway. Wildlife fencing is commonly used with wildlife underpasses and overpasses to allow for safe animal crossings by channelizing wildlife to desired crossing areas.

Recommendation:

It is recommended that wildlife fencing be installed as needed.

Benefits:

- Reduced animal-vehicle collisions.

Impacts:

- Fencing should be combined with safe crossing areas.
- Natural animal movements are blocked.
- Animals can get tangled up in the fencing.
- May alter pedestrian travel movements.

Estimated Cost: **$600,000**

For cost estimating purposes it was assumed that approximately four miles of the study area would receive wildlife fencing. An estimated cost of $75,000 per mile per side of roadway was used.

Recommended Action: **ADVANCE**

3. Access Control Plan

Description:

In advance of long term improvement options identified later in this report, an *Access Control Plan* should be developed to address the high density of accesses within the corridor, especially in the first four miles. The plan should explore ways to eliminate, reduce, or combine accesses to individual properties.

Recommendation:

It is recommended that an *Access Control Plan* be developed for MT-1.

Benefits:

- Improved safety.
- Improved traffic characteristics.

Impacts:

- Reduction in access points.

Estimated Cost: **$75,000**

Recommended Action: **ADVANCE**

4. Vegetation Management Plan

Description:

Areas with dense vegetation were identified as areas of concern due to decreased sight distances and clear zones. The area of the corridor between RP 12.4 and RP 14.2, for example, includes willow stands and high grass clusters in the roadside ditches, which presents driver sight distance concerns. Additionally, whitetail deer and moose movements are frequently observed along the road within these heavy vegetative areas.

Photo 2.3: Dense roadside vegetation near RP 14.0

Before any vegetation removal activities are initiated, a *Vegetation Management Plan* should be developed for the entire corridor. The goals of the *Vegetation Management Plan* include

maintenance of quality wildlife habitat along the corridor, providing cover for animal movements across the highway in appropriate locations, improved sight distance for driver detection of animals in the clear zone, maintenance of riparian zone integrity and wetland function, and sediment/runoff control along Warm Springs Creek adjacent to the highway.

Recommendation:
It is recommended that a *Vegetation Management Plan* be developed for the corridor.

Benefits:

- Increased roadside clear zones.
- Improved sight distances.

Impacts

- Potential wildlife habitat and connectivity effects.

Estimated Cost: $40,000

Recommended Action: ADVANCE

2.2 Spot Improvement Options

In addition to the corridor-wide improvement options, spot improvements were identified to address specific areas of concern. The location and description of each spot improvement option is included. In some locations, multiple spot improvements were identified for the same area of concern. In these instances short, mid, and/or long term options were developed with the assumption being that less costly and/or easy to implement projects could be developed quickly to help address the area of concern.

5. Urban Interface (RP 10.06 to RP 13.8)

This option is envisioned as a long-term improvement that will modify approximately the first four miles of the corridor (RP 10.06 to RP 13.8). The intent of long-term changes in this section of the corridor is to improve roadway geometrics, better manage access and to establish a speed limit that matches the roadside environment and driver expectations.

The 35 mph posted speed limit between RP 10.1 and RP 12.0 results in driver frustration. Safety data shows that the crash rate and the severity rate along the corridor are both lower than the statewide average for roadways of similar type and function. Data collection shows that the 85th percentile speed for this section of road is 42.2 mph, which is 7.2 mph higher than the posted speed.

5(a). Typical Sections (RP 10.06 – RP 13.8)

Description:

Two typical sections have been developed for this section of the corridor. Typical Section #1 utilizes a two-way left-turn lane (TWLTL) with a frontage road on the north side of MT-1 (see **Figure 2.1**). Typical Section #2 utilizes a TWLTL without a frontage road on the north side of the roadway (see **Figure 2.2**). **Appendix A and B** of this memorandum contain conceptual plans for Typical Sections #1 and #2, respectively, for the first 2,500 feet of the corridor.

These typical sections will accommodate local planning efforts by providing alternative travel mode opportunities and by providing room for future wastewater infrastructure. Both typical sections allow for a parallel, multi-use trail on the north side of the roadway for alternative travel modes. In addition, the presence of the TWLTL may provide a refuge area for pedestrians crossing MT-1. If areas are identified in the future where specific pedestrian crossing movements occur across the highway, then raised medians may also be considered in the TWLTL during project development activities.

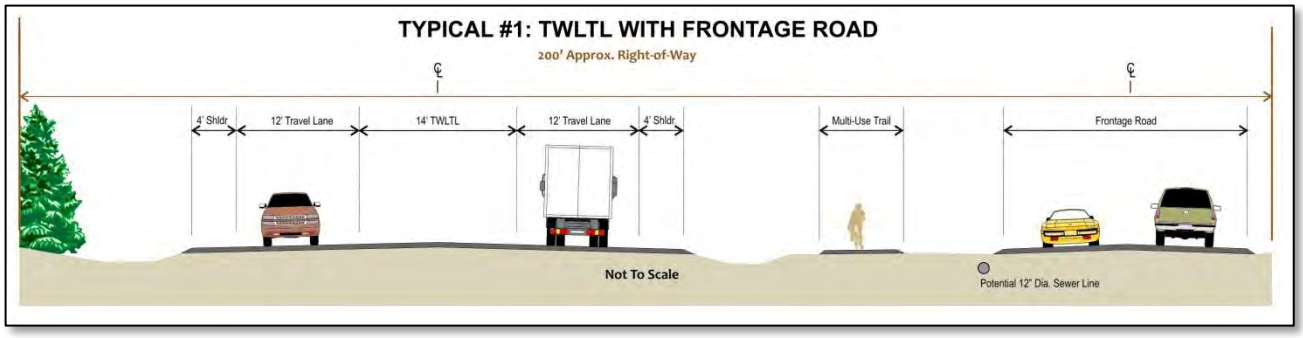


Figure 2.1: Typical Section #1 – TWLTL with Frontage Road

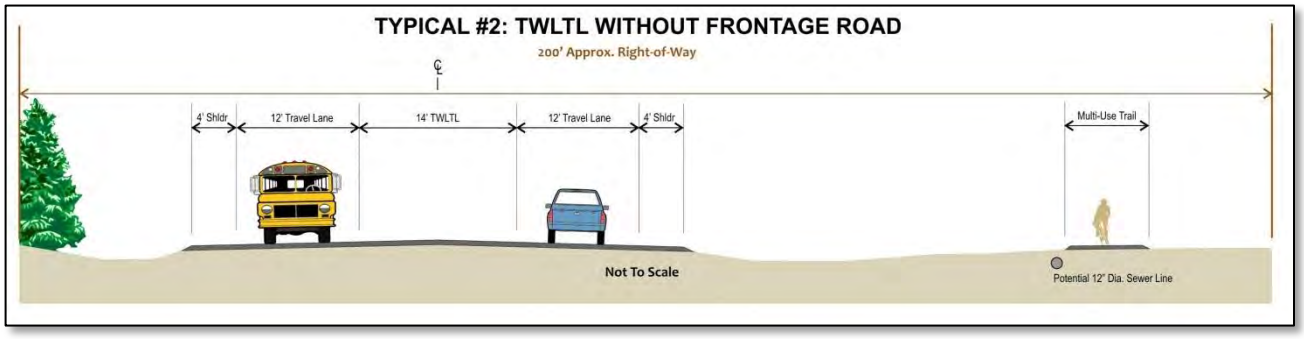


Figure 2.2: Typical Section #2 – TWLTL without Frontage Road

Additional typical sections were considered for the first four miles and are shown as **Figure 2.3** and **Figure 2.4**. These typical sections do not utilize a TWLTL. The Planning Team removed these typical sections from further consideration, as they do not improve turning movement operations on the south side of the roadway. The Planning Team determined that any long-term reconfiguration of the roadway

in the first four miles must include a TWLTL to satisfy the corridor needs relative to geometrics, access and safety.

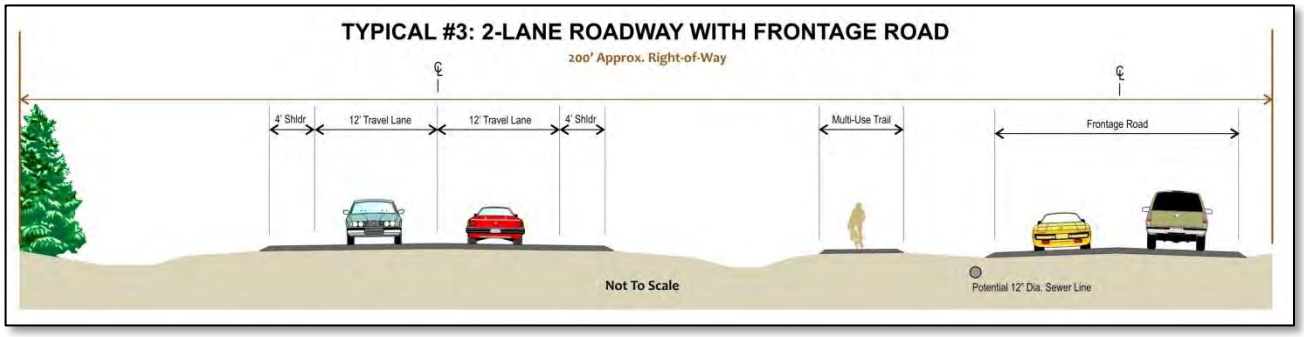


Figure 2.3: Typical Section #3 – 2-Lane Roadway with Frontage Road

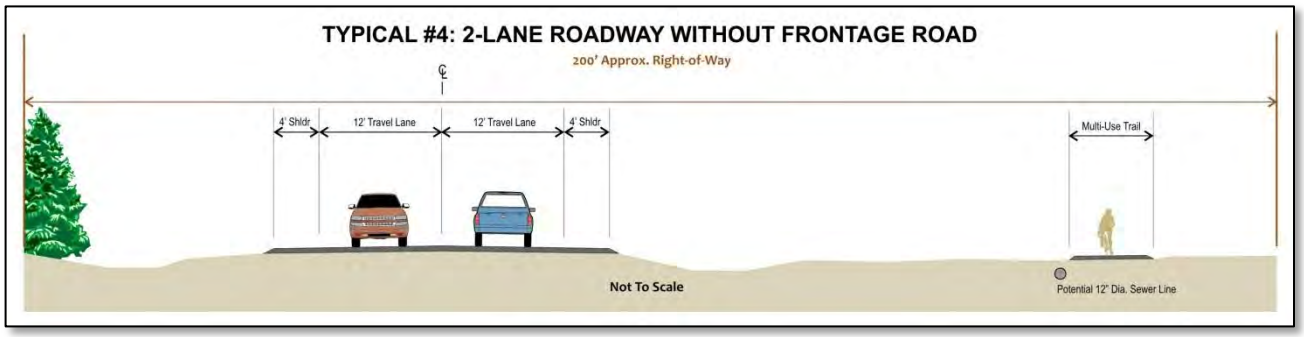


Figure 2.4: Typical Section #4 – 2-Lane Roadway without Frontage Road

Recommendation:

It is recommended that the roadway between RP 10.06 and RP 13.8 be modified to incorporate Typical Section #1 – TWLTL with Frontage Road. This typical section will provide a center TWLTL to accommodate westbound and eastbound left turning traffic from MT-1. The development of a frontage road on the north side of MT-1 will allow the consolidation and/or closure of numerous private approaches. The typical section can accommodate local infrastructure plans for wastewater facility extension and a multi-use trail. Although the exact location of the multi-use trail cannot be identified, it is recommended that it be placed between the edge of MT-1 and the proposed frontage road. The potential also exists for adding right-turn lanes at appropriate major access points on the north side of MT-1. The need and location of right-turn lanes would be explored during project development activities. Pedestrian signage should be incorporated into future project implementation as appropriate.

After the development of the TWLTL, it is recommended that the speed limit in the 35 mph posted speed limit area be increased to 45 mph with appropriate transitions. The speed limit can only be raised to 45 mph by petition of the ADLC Commissioners to the Montana Transportation Commission. Representatives of ADLC state that raising the speed limit in this segment will be supported if future improvements are implemented along the roadway as described under this improvement option.

The frontage road on the north side of MT-1, within the first 0.5 miles of the corridor (i.e. RP 10.06 to approximately RP 10.56), may not be necessary unless development occurs on currently vacant property to the north. The West Valley area is a designated growth area that likely will realize future development. If the undeveloped land in this area does develop, ADLC and MDT should review potential traffic impacts of the development(s) to identify the necessity and timing of frontage road implementation.

Benefits:

- Increased safety due to left-turning traffic being removed from the traffic stream.
- Enhanced multi-modal accommodations.
- Potential for reduction of approaches to reduce conflict points.
- Increased speed limit correlates closer to driver expectation.
- Reduction in speed variability between vehicles.

Impacts:

- Increased speed limit may increase number of crashes and/or crash severity.
- Elimination or consolidation of approaches (potentially can close up to 18 approaches).
- Construction activities may result in the removal of vegetation used by wildlife.
- Potential wetland mitigation required.
- 4(f) property present on north side (BA&P Spur).

Estimated Cost: **$9,500,000**

Recommended Action: **ADVANCE**

5(b). Vertical Curve Flattening (RP 10.9)

Description:

This area currently has a vertical curve that does not meet current MDT design standards. Substandard vertical curves can cause sight distance issues and decrease driver comfort levels.

Recommendation:

It is recommended that the vertical curve be modified to meet current MDT standards. This improvement option should be combined with Improvement Option 5(a).

Benefits:

- Improves safety by addressing roadway geometrics.

Impacts

- Would require limited roadway reconstruction along MT-1.

Estimated Cost: **$25,000**

Recommended Action: **ADVANCE**

6. Bighorn Sheep Wildlife Conflicts (RP 14.5)

A large bighorn sheep herd, known as the Lost Creek Herd, exists in this corridor study area. Bighorn sheep inhabit both sides of MT-1 throughout the corridor study area, but especially near the Wildlife Management Area at Garrity Mountain (approximately RP 14.5). Wildlife connectivity is a concern along the corridor as the bighorn sheep herd has been characterized as vulnerable by Montana Fish, Wildlife and Parks (MFWP) staff due to pneumonia outbreaks, vehicle collisions, subdivision encroachment, and natural attrition.

6(a). At-Grade Wildlife Crossing and Signage (RP 14.5)

Description:

A high concentration of bighorn sheep collisions have occurred near RP 14.5. Temporary variable message signs have been used in the past to help warn drivers of potential bighorn sheep near the roadway. The temporary signs were used in conjunction with decreased speed limits and the removal of salt from roadway deicing in the area in response to the concentration of bighorn sheep collisions. Crash data analysis resulted in an identifiable trend with animal/vehicle collisions in this area.

Recommendation:

It is recommended that permanent variable message signs be installed near RP 14.5.

Benefits:

- Increased driver awareness of potential wildlife.

Impacts:

- Effectiveness of signs may decrease over time due to driver familiarity.

Estimated Cost: **$100,000 EA**

Recommended Action: **ADVANCE**

6(b). Seasonal Speed Reduction (RP 14.3 – RP 15.3)

Description:

During the winter and spring of 2010 / 2011 a temporary speed zone of 45 mph was established between RP 14.3 and RP 15.3, in the 70 mph speed zone, to help address bighorn sheep conflicts in the area. The temporary speed zone was part of multiple measures aimed to decrease animal vehicle collisions. Crash data analysis resulted in an

identifiable trend with animal vehicle collisions in this area.

Recommendation:
It is recommended that the 45 mph seasonal speed zone be continued between RP 14.3 and RP 15.3 during winter and spring time periods when bighorn sheep are in the area. MFWP biologists have expressed that this mitigation measure has had positive results. Long term monitoring should be performed to evaluate this strategies continued effectiveness. This strategy can be enhanced by using the permanent variable message signs described in Improvement Option 6(a).

Benefits:
- Increased safety and driver awareness.
- Reduction of wildlife collisions.

Impacts:
- Reduction in vehicle speeds.
- Requires increased law enforcement presence to ensure adherence to speed by drivers.

Estimated Cost: **LABOR**
Little financial cost is anticipated; however, some labor costs would be associated with this recommendation.

Recommended Action: **ADVANCE**

6(c). Wildlife Overpass (RP 14.5)

Description:
This improvement option pertains to a grade separated wildlife crossing near RP 14.5 for the benefit of bighorn sheep and mule deer. This area of MT-1 is the predominant area of concern for the Lost Creek bighorn sheep herd. Wildlife overpasses are increasingly being explored as a feasible strategy to physically separate animals from the road environment. Crash data analysis resulted in an identifiable trend with animal/vehicle collisions in this area.

Recommendation:
It is not recommended that a wildlife overpass be constructed at this location as a long term improvement option.

Benefits:
- Provides grade separation for bighorn sheep and other wildlife at a critical location with a history of conflicts with vehicles.
- Decrease in animal / vehicle collisions.

Impacts:
- Unknown how effective overpasses are for bighorn sheep.
- High cost.
- Would require wildlife fencing that may impede pedestrian crossings of the road.

- Valley terrain and development along roadway may present difficulties with access.
- Could adversely impact historical bighorn sheep migration if not readily used.

Estimated Cost: **$1,250,000**

Recommended Action: **NOT ADVANCE**

It is recommended to not advance development of a wildlife overpass at this location as a long term improvement. There is not enough supporting data available on the effectiveness of a wildlife overpass for bighorn sheep. In addition, there are concerns with wildlife fencing restricting connectivity in this area. Although wildlife fencing has proven to be successful mitigation strategy for other types of wildlife, fencing in this area may impede local resident's movement across the highway via motorized and non-motorized modes. MFWP biologists have expressed that the measures implemented over the last two years have had positive results. These measures have included the removal of salt in winter sand mixtures, and the use of a lower variable speed limit in winter. While these measures have been viewed as positive, long term monitoring is needed to evaluate their effectiveness over time.

The future feasibility of a wildlife overpass may be revisited over time as more data becomes available on their effectiveness for bighorn sheep. The success of developing this type of high cost strategy depends on the forming of partnerships between affected agencies, interest groups and the local community. As the management of the adjacent lands intensifies to protect this valuable resource, and more data becomes available on short term mitigation strategies, the issue of a wildlife overpass in this area should be reevaluated.

7. Lime Spur Road Intersection (RP 15.0)

The intersection of Lime Spur Road with MT-1, located at RP 15.0, causes operational concerns due to its heavy skew angle to the highway. Lime Spur Road is the primary access to several residences, and is in an area where the posted speed is 70 mph, except during the seasonal speed reduction for bighorn sheep, when it becomes 45 mph. There are three recommended improvement options at this intersection which represent a range of improvement types. During project development activities, the opportunity may exist to combine one or more of these recommended improvements.

7(a). Advance Warning Signs (RP 15.0)

Description:

This improvement is recommended as a short-term improvement for installing advance intersection warning signs in both directions along MT-1.

Recommendation:

It is recommended that advance intersection warning signs be installed at the intersection of Lime Spur Road and MT-1.

Benefits:

- Increased driver awareness of the intersection.

- Improved safety.

Impacts:

- Doesn't address the intersection geometric issues.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

7(b). Intersection Realignment (RP 15.0)

Description:

The south leg of the intersection (i.e. Lime Spur Road) is heavily skewed to MT-1. The intersection should be aligned perpendicular with MT-1 to create a conventional "tee" intersection.

Recommendation:

It is recommended that Lime Spur Road be realigned and paved at the intersection with MT-1.

Benefits:

- Improved geometrics and safety.

Impacts:

- Additional right-of-way may be needed.
- Leaking underground storage tank located in the area of potential realignment.

Estimated Cost: **$50,000**

Recommended Action: **ADVANCE**

7(c). Left-Turn Lane (RP 15.0)

Description:

A westbound left-turn lane is recommended at the intersection of MT-1 and Lime Spur Road. This option would provide an opportunity for left-turning traffic to exit the mainline traffic stream.

Recommendation:

It is recommended that a westbound left-turn lane be constructed along MT-1 at the intersection with Lime Spur Road.

Benefits:

- Improved safety.

Impacts:

- Would require minimal roadway reconstruction along MT-1.
- Additional right-of-way may be needed.

Estimated Cost: $100,000

Recommended Action: ADVANCE

8. Vertical Curve Flattening (RP 15.3 – 15.8)

Description:

This improvement option has been identified between RP 15.3 and RP 15.8. This area, commonly referred to as the "camel humps", has two vertical curves that do not meet current MDT design standards. A long-term improvement option is to flatten and/or lengthen the vertical curves to bring the geometrics up to current standards.

Recommendation:

It is recommended that the vertical curves be modified to meet current MDT standards. According to carcass reports for the time period 1999 to 2010, this area exhibits a high occurrence of mule deer collisions. During project development activities, specific mitigation measures to reduce mule deer collision occurrence should be examined.

Benefits:

- Improves safety by addressing roadway geometrics.
- May reduce mule deer and other wildlife collision trends.

Impacts

- Would require roadway reconstruction along MT-1.

Estimated Cost: $375,000

Recommended Action: ADVANCE

9. Spring Hill Road Intersection (RP 19.9)

The intersection of Spring Hill Road with MT-1, located at RP 19.9, causes operational concerns due to its heavy skew angle to the highway. The Spring Hill Road intersection provides access to recreational areas and to a local water spring. The intersection is in an area where the posted speed is 70 mph and there are two eastbound travel lanes.

9(a). Advance Warning Signs (RP 19.9)

Description:
This improvement is recommended as a short-term improvement for installing advance intersection warning signs in both directions along MT-1.

Recommendation:
It is recommended that advance intersection warning signs be installed at the intersection of Spring Hill Road and MT-1.

Benefits:

- Increased driver awareness of the intersection.
- Improved safety.

Impacts:

- Doesn't address the intersection geometric issues.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

9(b). Intersection Realignment (RP 19.9)

Description:
The south leg of the intersection (i.e. Spring Hill Road) is heavily skewed to MT-1. The intersection should be aligned perpendicular with MT-1 to create a conventional "tee" intersection.

Recommendation:
It is recommended that Spring Hill Road be realigned and paved at the intersection with MT-1.

Benefits:

- Improved geometrics and safety.

Impacts:

- Additional right-of-way may be needed.
- Potential wetland impacts, especially where Cable Creek interfaces with MT-1.

Estimated Cost: **$100,000**

Recommended Action: **ADVANCE**

10. Rock Cut Slopes (RP 21.1 – RP 23.1)

Multiple steep rock cut slopes exist within the MT-1 clear zone between RP 21.1 and RP 23.1. Multiple improvement options are identified to help mitigate fallen rocks and steep cut slopes in this area. During project development activities, the opportunity may exist to combine one or more of these recommended improvements.

10(a). Maintenance (RP 21.1 – RP 23.1)

Description:

Rocks commonly fall into ditches and along the edge of roadway creating safety hazards. Rocks along the roadway within the clear zone should be removed.

Recommendation:

It is recommended that maintenance measures be taken to remove rock debris between RP 21.1 and RP 23.1.

Benefits:

- Improved clear zones and safety.

Impacts:

- None identified.

Estimated Cost: **LABOR**

Little financial cost is anticipated; however, maintenance labor costs would be associated with this recommendation.

Recommended Action: **ADVANCE**

10(b). Rockfall Protection Netting (RP 21.1 – RP 23.1)

Description:

Rock fall protection netting provides a boundary between rock debris and the roadway to prevent rocks from falling onto the roadway and roadside ditches.

Recommendation:

It is recommended that rock fall protection netting be installed along rock cut slopes between RP 21.1 and RP 23.1.

Benefits:

- Reduction in fallen rocks along the roadway and roadside ditches.
- Improved clear zones and safety.

Impacts:

- May not be aesthetically pleasing.

Estimated Cost: $400,000

Cost estimate was based on a unit price of $240 per square-yard of netting. An assumed height of 15 feet over 10% of the two-mile segment of roadway was used to estimate the required area of netting.

Recommended Action: ADVANCE

10(c). Flatten Cut Slopes (RP 21.1 – RP 23.1)

Description:

Steep cut slopes exist between RP 21.1 and RP 23.1 resulting in fallen rocks, decreased clear zones, and potential safety hazards.

Recommendation:

It is not recommended that steep cut slopes be flattened between RP 21.1 and RP 23.1.

Benefits:

- Reduction in fallen rocks.
- Improved clear zones and safety.
- May reduce snow drifting concerns.

Impacts:

- Large amounts of earthwork.
- May require additional right-of-way.
- Gillette's Checkerspot (plant species of concern) may exist in this part of the corridor.
- Potential wetlands impact on south side of the road in this area.

Estimated Cost: $1,250,000

Estimated cost was based on an assumed area of 140,000 cubic yards of material being blasted and excavated.

Recommended Action: NOT ADVANCE

The MDT Road Design Manual suggests that in areas of steep rock slopes maintenance activities (i.e. rock removal) and/or barriers be pursued as mitigation unless a potential hazard exists. In this area, sight distance is adequate and mitigation such as rock netting will prohibit rocks from falling on the roadway.

11. Horizontal Curve Signing (RP 22.9 – RP 23.2)

Description:

Two horizontal curves between RP 22.9 and RP 23.2 have been identified as having a radius that does not meet current MDT design standards. Curves that do not meet current standards can cause potential safety hazards unless properly mitigated. Currently, advance signing warning of the curves is not present.

Recommendation:

It is recommended 55 mph curve advisory speed signs be installed for the horizontal curves between RP 22.9 and RP 23.2.

Benefits:

- Reduced driver speed along the curve.
- Increased driver awareness.
- Increased safety.

Impacts:

- Does not address the geometric issues.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

12. Denton Point Road Intersection (RP 24.2)

The intersection of Denton Point Road with MT-1, located at RP 24.2, has poor sight distances and substandard geometrics. An existing westbound left-turn lane presently exists at the intersection along MT-1. Improvements for this intersection are recommended and consist of five separate recommendations. During project development activities, the opportunity may exist to combine one or more of these recommended improvements.

12(a). Vertical Curve Flattening (RP 23.9)

Description:

This improvement option has been identified at RP 23.9. A vertical curve that does not meet current MDT design standards exists before the intersection with Denton Point Road. A long-term improvement option is to flatten or lengthen the vertical curve to bring the geometrics up to current standards.

Recommendation:

It is recommended that the vertical curve be modified to meet current MDT standards.

Benefits:

- Improves safety by addressing roadway geometrics.

Impacts

- Would require roadway reconstruction along MT-1.
- 4(f) property present in the area (Silver Lake irrigation system).

Estimated Cost: $125,000

Recommended Action: ADVANCE

12(b). Horizontal Curve Signing (RP 24.0)

Description:

The horizontal curve located at RP 24.0 just before the intersection with Denton Point Road has a radius that does not meet current MDT design standards. Curves that do not meet current standards can cause potential safety hazards unless properly mitigated. Currently, advance signing warning of the curves is not present. Although the reconstruction of this curve as a stand-alone improvement was explored, the existing curve is very close to meeting the required standard and it was determined to install advance warning signs with an advisory speed.

Recommendation:

It is recommended 55 mph curve advisory speed signs be installed for the horizontal curve at RP 24.0.

Benefits:

- Reduced driver speed along the curve.
- Increased driver awareness.
- Increased safety.

Impacts:

- Potential for accidents remains without full reconstruction.

Estimated Cost: $500 EA

Recommended Action: ADVANCE

12(c). Flatten Cut Slopes (RP 24.0)

Description:

Existing cut slopes along the inside of the horizontal curve located near the Denton Point Road intersection are steep. The existing cut slopes, combined with the substandard horizontal curve, limit sight distances and create potential safety hazards.

Recommendation:

It is recommended that cut slopes along the inside of the horizontal curve at RP 24.0 be flattened.

Benefits:

- Increased sight distances.
- Improved safety.

- May reduce snow drifting concerns.

Impacts:

- Would require roadway construction along MT-1.
- 4(f) property present in the area (Silver Lake irrigation system).

Estimated Cost: **$50,000**

Recommended Action: **ADVANCE**

12(d). Advance Warning Signs (RP 24.2)

Description:

This improvement is recommended as a short-term improvement for installing advance intersection warning signs in both directions along MT-1.

Recommendation:

It is recommended that advance intersection warning signs be installed at the intersection of Denton Point Road and MT-1.

Benefits:

- Increased driver awareness of the intersection.
- Improved safety.

Impacts:

- Doesn't address the intersection geometric issues.

Estimated Cost: **$500 EACH**

Recommended Action: **ADVANCE**

12(e). Flatten Approach (RP 24.2)

Description:

The west leg of the intersection (i.e. Denton Point Road) has a steep approach grade which creates a potential safety hazard. The geometrics at this location should be improved to reduce grades and increase safety.

Recommendation:

It is recommended that Denton Point Road be flattened at the intersection with MT-1.

Benefits:

- Improved geometrics and safety.

- Possible reduction in moose collision trends in the area.

Impacts:

- Earthwork and limited reconstruction would be required.
- 4(f) property present in the area (Silver Lake irrigation system).

Estimated Cost: $50,000

Recommended Action: ADVANCE

13. Roadway Widening (RP 24.2 – RP 27.35)

Description:

MT-1 between RP 24.2 and RP 27.35 is only 24 feet wide between edges of pavement and has deteriorating surfacing. Current MDT standards call for a minimum roadway width of 28 feet for a rural Minor Arterial roadway.

An improvement option was looked at to simply construct 4-foot shoulders along the existing edge of roadway. However, due to the poor existing surfacing condition, as well as the potential impacts to the adjacent area, it was assumed that the entire roadway section would be reconstructed.

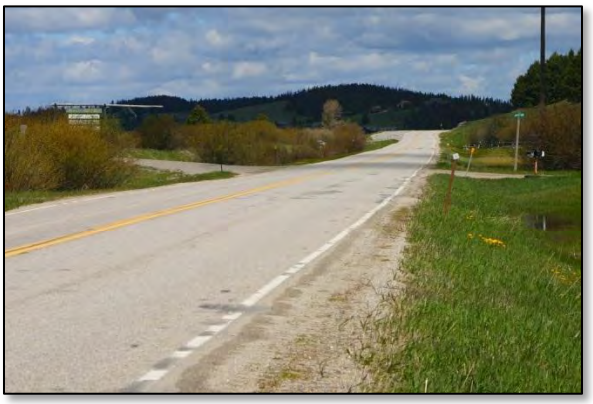


Photo 2.12: Narrow roadway with deteriorating surfacing near RP 24.5.

Opportunities should be explored to perpetuate animal and aquatic connectivity during reconstruction efforts. The area between RP 24 and RP 26 realizes a high occurrence of moose collisions based on a review of carcass reports for the time period 1999 thru 2010. Regarding fisheries, there is a pond located east of the roadway near RP 26.5 that serves as a rearing pond for fish. The potential exists to improve aquatic connectivity to this pond with this improvement option.

Recommendation:

It is recommended that MT-1 be reconstructed to a minimum width of 32 feet between RP 24.2 and RP 27.35.

Benefits:

- Improved geometrics and safety.
- Improved accommodations for bicyclists.
- Potential reduction in moose mortality.
- Betterment of fish passage between Georgetown Lake and fish rearing pond east of RP 25.5.

Impacts:

- Roadway reconstruction required.

- Potential encroachment on adjacent wetland areas.
- Potential closure or modifications to informal parking areas.
- Two 4(f) properties are present in the area (Silver Lake irrigation system and Malvey Cabin).

Estimated Cost: **$3,750,000**

Recommended Action: **ADVANCE**

14. Guardrail (RP 24.8 – RP 26.8)

Description:

Multiple areas with steep fill slopes within the roadway clear zones exist between RP 24.8 and RP 26.8. These areas are potential safety hazards due to the steep slopes. Across from Georgetown Lake is an existing water feature (pond) which may also be a candidate for protection with guardrail. The pond is important for fish rearing and presents a clear zone concern. Total reconstruction of the roadway in these areas is included under Improvement Option 13, however until which time this occurs a stand-alone option is to incorporate guardrail in this area.

Photo 2.13: Steep fill slopes exist along Georgetown Lake.

Recommendation:

It is recommended the guardrail be installed along areas with steep fill slopes between RP 24.8 and RP 26.8.

Benefits:

- Improved roadside safety.

Impacts:

- May cause difficulties with maintenance due to snow removal.

Estimated Cost: **$200,000**

Estimated cost was based on a unit price for box guardrail of $35 per linear foot. It was estimated that guardrail would be needed for approximately 50% of this two mile segment of roadway.

Recommended Action: **ADVANCE**

15. Flatten Cut Slopes (RP 25.0 – RP 25.3)

Description:

Steep cut slopes along the horizontal curve between RP 25.0 and RP 25.3 limit sight distance and create potential safety hazards. This improvement option recommends that the cut slopes be flattened to increase sight distances and increase safety.

Recommendation:

It is recommended the cut slopes between RP 25.0 and 25.3 be flattened.

Benefits:

- Improved sight distances and safety.
- May reduce snow drifting concerns.

Impacts:

- Requires roadside construction.
- Additional right-of-way may be required.

Estimated Cost: **$50,000**

Recommended Action: **ADVANCE**

16. Discovery Road Intersection (RP 25.5)

The intersection of Discovery Road with MT-1, located at RP 25.5, causes operational concerns due to poor intersection definition. Discovery Road provides access to multiple recreation areas, including Discovery Ski Area, as well as the Georgetown residential area. The speed limit at this location is 60 mph. There are three recommended improvement options at this intersection which represent a range of improvement types. During project development activities, the opportunity may exist to combine one or more of these recommended improvements.

16(a). Advance Warning Signs (RP 25.5)

Description:

This improvement is recommended as a short-term improvement for installing advance intersection warning signs in both directions along MT-1.

Recommendation:

It is recommended that advance intersection warning signs be installed at the intersection of Discovery Road and MT-1.

Benefits:

- Increased driver awareness of the intersection.
- Improved safety.

Impacts:

- Potential for accidents remains without full reconstruction.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

16(b). Intersection Realignment (RP 25.5)

Description:

The northeast leg of the intersection (i.e. Discovery Road) has poor geometric definition and is skewed to MT-1. The intersection should be aligned perpendicular with MT-1 to create a conventional "tee" intersection.

Recommendation:

It is recommended that Discovery Road be realigned at the intersection with MT-1.

Benefits:

- Improved geometrics and safety.

Impacts:

- Additional right-of-way may be needed.

Estimated Cost: **$50,000**

Recommended Action: **ADVANCE**

16(c). Right-Turn Lane (RP 25.5)

Description:

A northbound right-turn lane is recommended at the intersection of MT-1 and Discovery Road. This option would provide opportunity for right-turning traffic to exit the mainline traffic stream.

Recommendation:

It is recommended that a northbound right-turn lane be constructed along MT-1 at the intersection with Discovery Road.

Benefits:

- Improved safety.

Impacts:

- Would require minimal roadway reconstruction along MT-1.

- Potential slope issues along the edge of roadway.

Estimated Cost: **$100,000**

Recommended Action: **ADVANCE**

17. Bridge Ends (RP 25.9)

Description:

An existing box culvert located at RP 25.9 has concrete bridge ends which are located close to the edge of roadway. No protection currently exists around the concrete ends which are within the roadway clear zone and are potential safety hazards. Total reconstruction of the roadway in this area is included under Improvement Option 13, however until which time this occurs a stand-alone option is to incorporate guardrail around the concrete bridge ends.

Photo 2.15: Concrete bridge ends near the edge of roadway present safety hazards.

Recommendation:

It is recommended that guardrail be installed around the concrete bridge ends at RP 25.9. Long term, improvements to the box culvert may be warranted in conjunction with Improvement Option 13.

Benefits:

- Improved safety.

Impacts:

- Does not remove hazard from clear zone.
- Potential for accidents remains without full reconstruction.

Estimated Cost: **$25,000**

Recommended Action: **ADVANCE**

18. Horizontal Curve Signing (RP 27.1)

Description:

The horizontal curve located at RP 27.1 has a radius that does not meet current MDT design standards. Curves that do not meet current standards can cause potential safety hazards unless properly mitigated. Currently, advance signing warning of the curves is not present. Although the reconstruction of this curve as a stand-alone improvement was explored, the existing curve is very close to meeting the required standard and it was determined to install advance warning signs with an advisory speed.

Recommendation:
It is recommended 55 mph curve advisory speed signs be installed for the horizontal curve at RP 27.1.

Benefits:
- Reduced driver speed along the curve.
- Increased driver awareness.
- Increased safety.

Impacts:
- Potential for accidents remains without full reconstruction.

Estimated Cost: $500 EA

Recommended Action: ADVANCE

19. Georgetown Lake Road Intersection (RP 27.35)

The intersection of Georgetown Lake Road with MT-1, located at RP 27.35, causes operational concerns due to roadway geometrics and limited sight distances. Georgetown Lake Road provides access to the west side of Georgetown Lake. Multiple recreation and residential areas are accessed from Georgetown Lake Road. There are three recommended improvement options at this intersection which represent a range of improvement types. During project development activities, the opportunity may exist to combine one or more of these recommended improvements. These improvement options could be combined with Improvement Option 13 which recommends full reconstruction between RP 24.2 and RP 27.35.

Photo 2.16: Georgetown Lake Road intersection has limited sight distances and geometric concerns south of the intersection.

19(a). Vertical Curve Flattening (RP 27.3)

Description:
A vertical curve exists at RP 27.3 just before the intersection with Georgetown Lake Road and does not meet current MDT design standards. The location of the vertical curve in relation to the intersection reduces sight distances and creates potential safety hazards. This long-term improvement option is to flatten or lengthen the vertical curve to bring the geometrics up to current standards.

Recommendation:
It is recommended that the vertical curve be modified to meet current MDT standards.

Benefits:
- Improves safety by addressing roadway geometrics and increases sight distances.

Impacts:

- Would require roadway reconstruction along MT-1.
- Unknown how construction would impact the Georgetown Lake Dam.

Estimated Cost: **$125,000**

Recommended Action: **ADVANCE**

19(b). Advance Warning Signs (RP 27.35)

Description:

This improvement is recommended as a short-term improvement for installing advance intersection warning signs in both directions along MT-1.

Recommendation:

It is recommended that advance intersection warning signs be installed at the intersection of Georgetown Lake Road and MT-1.

Benefits:

- Increased driver awareness of the intersection.
- Improved safety.

Impacts:

- Potential for accidents remains without full reconstruction.

Estimated Cost: **$500 EA**

Recommended Action: **ADVANCE**

19(c). Left-Turn Lane (RP 27.35)

Description:

A northbound left-turn lane is recommended at the intersection of MT-1 and Georgetown Lake Road. This option would provide opportunity for left-turning traffic to exit the mainline traffic stream.

Recommendation:

It is recommended that a westbound left-turn lane be constructed along MT-1 at the intersection with Georgetown Lake Road.

Benefits:

- Improved safety.

Impacts:

- Would require roadway reconstruction along MT-1.
- Unknown how construction would impact the Georgetown Lake Dam.
- Could be constructed in conjunction with Improvement Option 19(a)

Estimated Cost: **$100,000**

Recommended Action: **ADVANCE**

3.0 Summary

This memorandum identifies recommended improvement options for the MT-1 corridor from RP 10.06 (Linden Street/North Cable Road intersection) to RP 27.35 (Georgetown Lake Road). The recommended improvement options have been based on the evaluation of several factors, including but not limited to field review, engineering analysis of as-built drawings, crash data analysis, consultation with various resource agencies, and information provided by the general public.

The improvement options identified for advancement are intended to offer a range of potential mitigation strategies for corridor issues and areas of concern. Small scale improvement options have been identified and may be as simple as adding advance warning signs at intersections or installing advisory speed limit signs. Larger, more complex improvements are also envisioned. These include complete roadway reconstruction between RP 10.06 and RP 13.8 (i.e. West Valley), and reconstruction of MT-1 near Georgetown Lake between RP 24.20 and RP 27.35. Intersection improvements have also been identified, and during project development activities the potential may exist to combine improvement options for ease of implementation and other efficiencies.

Wildlife and aquatic concerns are found throughout the entire corridor. Certain areas of the corridor realize unique issues between wildlife and drivers. The area near RP 14.5 is a known bighorn sheep area of concern, and the perpetuation of strategies currently ongoing may allow for the continued reduction in animal/vehicle collisions at this location. Collision occurrences with moose have been frequently documented near Georgetown Lake. The recommended improvement options recognize the impact of the roadway on wildlife resources, and offers potential mitigation strategies that may be candidates for further exploration during project development activities. These include wildlife signing, wildlife fencing, animal detection systems, and the potential for wildlife underpasses/overpasses.

The improvement options have been categorized into implementation timeframes:

- **Short Term** – Designated to occur within a 0 to 2 year period.
- **Mid Term** – Improvements would occur in a 2 to 5 year period.
- **Long Term** – Improvements would occur during a time period of 5 years or more.

Tabular summaries of the recommended improvement options, broken out by implementation timeframe, are contained in **Tables 3.1** – **3.3** and shown graphically in **Figure 3.1**.

Table 3.1: Short Term Improvement Options Summary

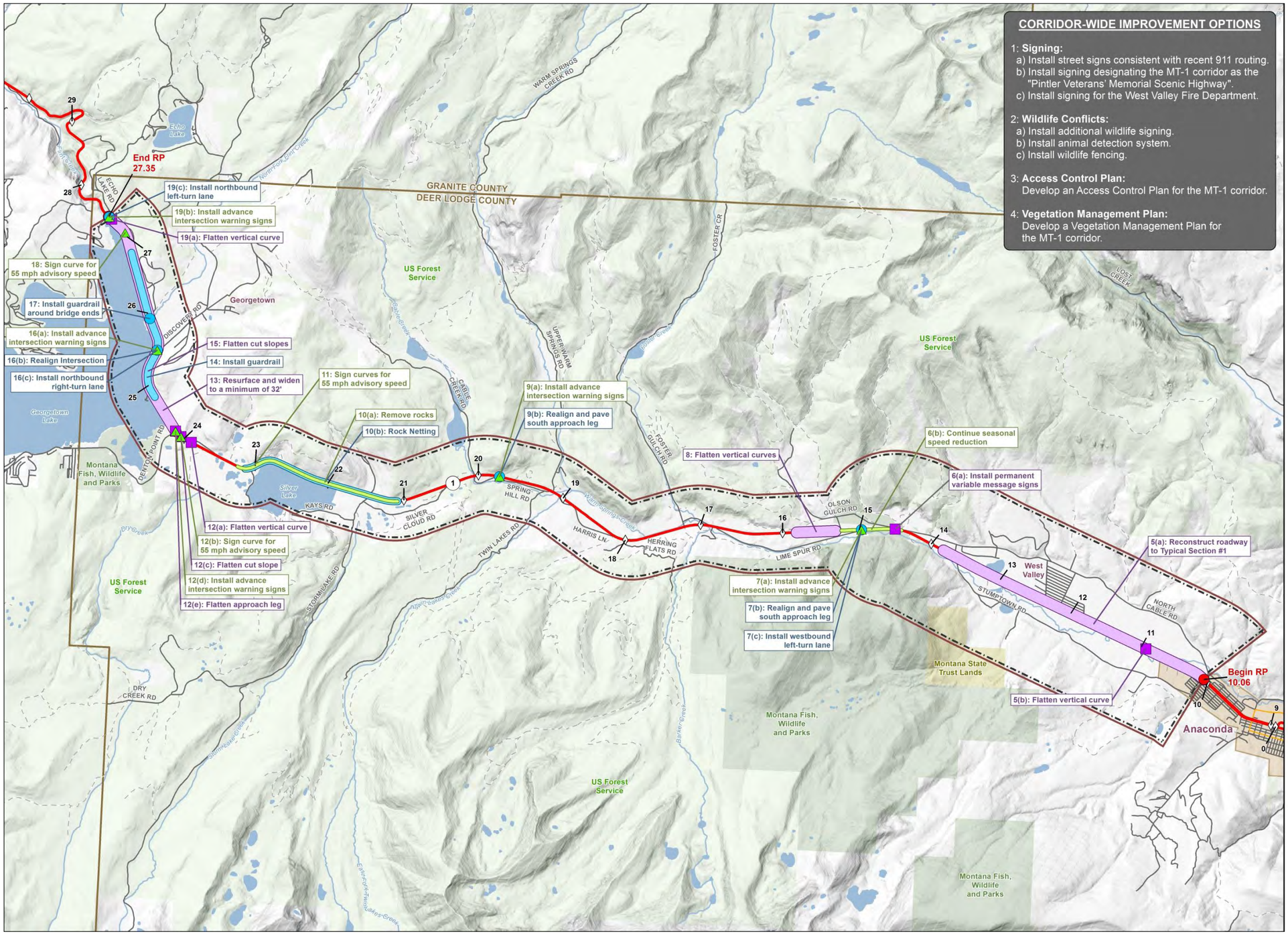
ID	Name	Location	Feature	Issue/Concern	Improvement Options	Concerns Addressed	Action	Cost
1(a)	Street Signing	Corridor-Wide	Signing	Inconsistent and missing signing	Install street signs consistent with recent 911 routing.	Approach	ADVANCE	$500 EA
1(b)	Scenic Highway Designation	Corridor-Wide	Signing	Additional signing	Install signing designating the MT-1 corridor as the "Pintler Verterans' Memorial Scenic Highway".	Approach	ADVANCE	$750 EA
1(c)	Fire Department Signing	Corridor-Wide	Signing	Additional signing	Install signing for the West Valley Fire Department	Approach	ADVANCE	$500 EA
2(a)	Wildlife Signing	Corridor-Wide	Signing	Additional signing	Install signing warning of potential wildlife conflicts.	Wildlife, safety	ADVANCE	$500 EA
4	Vegetation Management Plan	Corridor-Wide	Clear Zone	Heavy roadside vegetation	Prepare *Vegetative Management Plan*	Geometrics, wildlife	ADVANCE	$40,000
6(b)	Seasonal Speed Reduction	14.3 - 15.3	Wildlife Conflicts	High number of conflicts with wildlife - particularly Bighorn Sheep	Continue seasonal speed reduction	Safety, speeds, wildlife	ADVANCE	LABOR
7(a)	Advance Warning Signs	15.0	Intersection	Intersection alignment	Install advance intersection warning signs	Geometrics, safety, approaches	ADVANCE	$500 EA
9(a)	Advance Warning Signs	19.9	Intersection	Intersection alignment	Install advance intersection warning signs	Geometrics, safety, approaches	ADVANCE	$500 EA
10(a)	Maintenance	21.1 - 23.1	Clear Zone	Steep cut slopes with fallen rocks	Remove rocks	Safety	ADVANCE	LABOR
11	Horizontal Curves	22.9 - 23.2	Horizontal Curve	Curve radius is below existing standards	Sign curve for 55 mph advisory speed	Geometrics, safety	ADVANCE	$500 EA
12(b)	Horizontal Curve	24.0	Horizontal Curve	Curve radius is below existing standards	Sign curve for 55 mph advisory speed	Geometrics, safety	ADVANCE	$500 EA
12(d)	Advance Warning Signs	24.2	Intersection	Poor sight distances	Install advance intersection warning signs	Geometrics, safety, approaches	ADVANCE	$500 EA
16(a)	Advance Warning Signs	25.5	Intersection	Poor intersection definition	Install advance intersection warning signs	Geometrics, safety, approaches	ADVANCE	$500 EA
18	Horizontal Curve	27.1	Horizontal Curve	Curve radius is below existing standards	Sign curve for 55 mph advisory speed	Geometrics, safety	ADVANCE	$500 EA
19(b)	Advance Warning Signs	27.35	Intersection	Poor sight distance	Install advance intersection warning signs	Geometrics, safety	ADVANCE	$500 EA

Table 3.2: Mid Term Improvement Options Summary

ID	Name	Location	Feature	Issue/Concern	Improvement Options	Concerns Addressed	Action	Cost
2(b)	Animal Detection System	Corridor-Wide	Signing	Additional signing	Install animal detection system	Wildlife, safety	ADVANCE	$400,000
2(c)	Wildlife Fencing	Corridor-Wide	Fencing	High number of conflicts with wildlife	Install wildlife fencing	Wildlife, safety	ADVANCE	$600,000
3	Access Control Plan	Corridor-Wide	Access Control	Access control plan	Develop an Access Control Plan for the MT-1 corridor.	Geometrics, safety, approaches	ADVANCE	$75,000
7(b)	Intersection Realignment	15.0	Intersection	Intersection alignment	Realign and pave south approach leg	Geometrics, safety, approaches	ADVANCE	$50,000
7(c)	Left-Turn Lane	15.0	Intersection	Traffic at intersection	Install westbound left-turn lane	Geometrics, safety, approaches	ADVANCE	$100,000
9(b)	Intersection Realignment	19.9	Intersection	Intersection alignment	Realign and pave south approach leg	Geometrics, safety, approaches	ADVANCE	$100,000
10(b)	Rock Fall Protection Netting	21.1 - 23.1	Clear Zone	Steep cut slopes with fallen rocks	Rock Netting	Safety	ADVANCE	$400,000
14	Guardrail	24.8 - 26.8	Clear Zone	Intermittent steep fill slopes	Install guardrail	Safety	ADVANCE	$200,000
16(b)	Intersection Realignment	25.5	Intersection	Poor intersection definition	Realign Intersection	Geometrics, safety, approaches	ADVANCE	$50,000
16(c)	Right-Turn Lane	25.5	Intersection	Poor intersection definition	Install northbound right-turn lane	Geometrics, safety, approaches	ADVANCE	$100,000
17	Bridge Ends	25.9	Clear Zone	Concrete bridge ends	Install guardrail around bridge ends	Geometrics, safety	ADVANCE	$25,000
19(c)	Left-Turn Lane	27.35	Intersection	Traffic at intersection	Install northbound left-turn lane	Geometrics	ADVANCE	$100,000

Table 3.3: Long Term Improvement Options Summary

ID	Name	Location	Feature	Issue/Concern	Improvement Options	Concerns Addressed	Action	Cost
5(a)	Typical Sections	10.06 - 13.8	Roadway Section	High number of approaches, need for multi-modal accommodations	Reconstruct roadway to Typical Section #1	Access, speeds, geometrics	ADVANCE	$9,500,000
5(b)	Vertical Curve Flattening	10.9	Vertical Curve	Vertical curve does not meet existing standards	Flatten vertical curve	Geometrics	ADVANCE	$25,000
6(a)	At-Grade Wildlife Crossing and Signage	14.5	Wildlife Conflicts	High number of conflicts with wildlife - particularly Bighorn Sheep	Install permanent variable message signs	Safety, speeds, wildlife	ADVANCE	$100,000 EA
6(c)	Wildlife Overpass	14.5	Wildlife Conflicts	High number of conflicts with wildlife - particularly Bighorn Sheep	Wildlife overpass / underpass with wildlife fencing	Safety, wildlife	NOT ADVANCE	$1,250,000
8	Vertical Curve Flattening	15.3 - 15.8	Vertical Curve	Vertical curve and grade do not meet existing standards	Flatten vertical curves	Geometrics	ADVANCE	$375,000
10(c)	Flatten Cut Slopes	21.1 - 23.1	Clear Zone	Steep cut slopes with fallen rocks	Flatten Cut Slopes	Safety	NOT ADVANCE	$1,250,000
12(a)	Vertical Curve Flattening	23.9	Vertical Curve	Vertical curve does not meet existing standards	Flatten vertical curve	Geometrics, safety	ADVANCE	$125,000
12(c)	Flatten Cut Slopes	24.0	Horizontal Curve	Cut slope along inside of curve reduces sight distances	Flatten cut slope	Geometrics, safety	ADVANCE	$50,000
12(e)	Flatten Approach	24.2	Intersection	Poor sight distances	Flatten approach leg	Geometrics, safety, approaches	ADVANCE	$50,000
13	Roadway Widening	24.2 - 27.35	Roadway Width and Surfacing	Existing roadway surfacing is 24 feet wide. Existing roadway surfacing is in poor condition and is deteriorating.	Resurface and widen to a minimum of 32'	Geometrics, safety	ADVANCE	$3,750,000
15	Flatten Cut Slopes	25.0 - 25.3	Sight Distance	Poor sight distance due to cut slopes on north side	Flatten cut slopes	Safety	ADVANCE	$50,000
19(a)	Vertical Curve Flattening	27.3	Vertical Curve	Vertical curve, stopping sight distance, and grade do not meet existing standards	Flatten vertical curve	Geometrics	ADVANCE	$125,000



RECOMMENDED IMPROVEMENT OPTIONS

MT-1 WEST OF ANACONDA TO GEORGETOWN LAKE
CORRIDOR PLANNING STUDY

0 0.25 0.5 1 1.5 2 Miles

Map Legend

CORRIDOR IMPROVEMENTS
- Long Term
- Mid Term
- Short Term

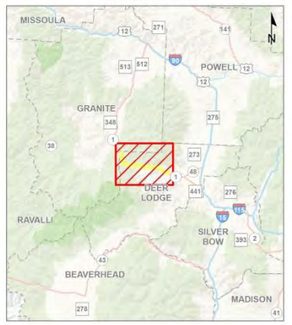
SPOT IMPROVEMENTS
- Long Term
- Mid Term
- Short Term

OTHER
- Reference Post
- River / Stream
- Waterbody

BOUNDARIES
- Study Area Boundary
- County Boundary
- Urban Boundary
- Montana Fish, Wildlife and Parks
- Montana State Trust Lands
- US Forest Service

ROUTES
- Primary
- Urban
- Local Route
- USFS Route

Map Sheet Index



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Project: 11601.000 MT-1 Corridor Planning Study
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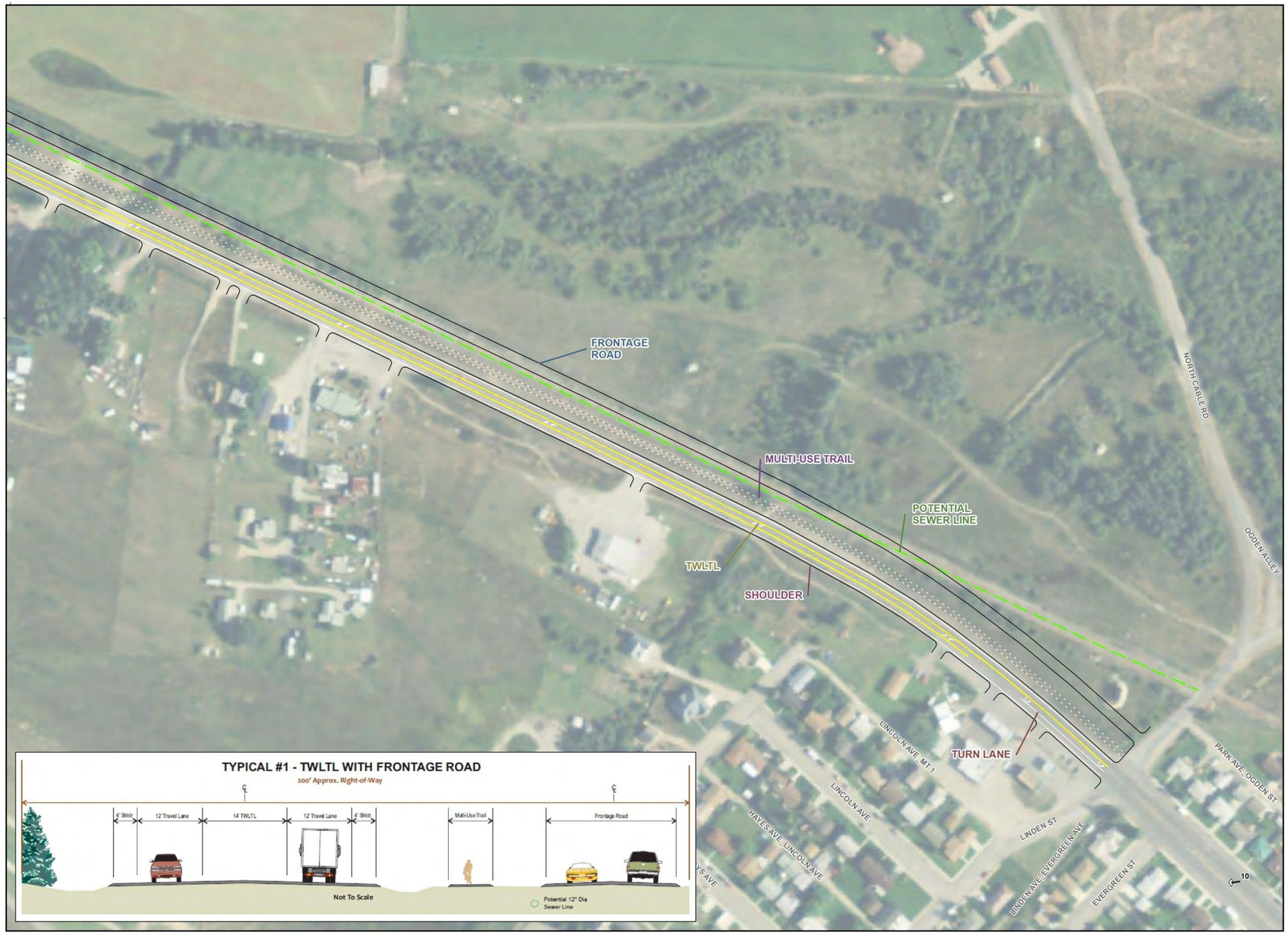
Figure 3.1

Appendix A: Concept Plan (Typical Section 1 – With Frontage Road)



TYPICAL #1 TWLTL WITH FRONTAGE

MT-1 WEST OF ANACONDA TO GEORGETOWN LAKE
CORRIDOR PLANNING STUDY

0 50 100 200 300 Feet
1 inch = 200 feet

Map Legend

- Edge of Roadway
- Shoulder
- Multi-Use Trail
- TWLTL
- Left-Turn Lane
- Potential Sewer Line
- Reference Marker

Map Sheet Index

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Figure A.1

Appendix B: Concept Plan (Typical Section 2 – Without Frontage Road)

TYPICAL #2 TWLTL WITHOUT FRONTAGE

MT-1 WEST OF ANACONDA TO GEORGETOWN LAKE
CORRIDOR PLANNING STUDY

0 50 100 200 300 Feet
1 inch = 200 feet

Map Legend

- Edge of Roadway
- Shoulder
- Multi-Use Trail
- TWLTL
- Left-Turn Lane
- Potential Sewer Line
- Reference Marker

Map Sheet Index

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Figure B.1

MT-1 IMPROVEMENT OPTIONS - PLANNING LEVEL COST ESTIMATES

1(a)	**STREET SIGNING**		**$500**	**EA**
1(b)	**SCENIC HIGHWAY DESIGNATION**		**$750**	**EA**
1(c)	**FIRE DEPARTMENT SIGNING**		**$500**	**EA**
2(a)	**WILDLIFE SIGNING**		**$500**	**EA**
2(b)	**ANIMAL DETECTION SYSTEM**	L= 4	**$400,000**	**TOT**
			$100,000	MI
			$35,000	SPOT LOCATION
2(c)	**WILDLIFE FENCING**	L= 4	**$600,000**	**TOT**
			$75,000	MI
3	**ACCESS CONTROL PLAN**		**$75,000**	**EA**
4	**VEGETATION MANAGEMENT PLAN**		**$40,000**	**EA**
5(a)	**URBAN INTERFACE**	L= 3.75	**$9,500,000**	**TOT**
			$9,375,000	TOT
			$2,500,000	MI

Mainline

Type	Units	Quantity / Sta.	Unit Price	Cost per Mile
Crushed Aggregate Couse	CUYD	219.6	$17.30	$200,591
Cover - Type 1	SQYD	511	$0.43	$11,602
Plant Mix Bit Surf GR S - 3/4"	TON	176	$23.45	$217,916
Asphalt Cement PG 70-28	TON	10.56	$656.17	$365,859
Emulsified Asphalt CRS-2P	TON	0.87	$519.30	$23,855
Excavation - Unclassified Borrow	CUYD	711.11	$4.06	$152,439
Special Borrow	CUYD	355.56	$14.70	$275,971
Sub Total				$1,248,234
Contingency			15%	$1,435,469

Frontage Road

Type	Units	Quantity / Sta.	Unit Price	Cost per Mile
Crushed Aggregate Couse	CUYD	138.1	$17.30	$126,146
Cover - Type 1	SQYD	267	$0.43	$6,062
Plant Mix Bit Surf GR S - 3/4"	TON	97.5	$23.45	$120,721
Asphalt Cement PG 70-28	TON	5.85	$656.17	$202,678
Emulsified Asphalt CRS-2P	TON	0.45	$519.30	$12,339
Excavation - Unclassified Borrow	CUYD	466.67	$4.06	$100,039
Special Borrow	CUYD	233.33	$14.70	$181,101
Sub Total				$749,086
Contingency			15%	$861,448

Path

Type	Units	Quantity / Sta.	Unit Price	Cost per Mile
Crushed Aggregate Couse	CUYD	30.9	$17.30	$28,225
Cover - Type 1	SQYD	111	$0.43	$2,520
Plant Mix Bit Surf GR S - 3/4"	TON	20.8	$23.45	$25,754
Asphalt Cement PG 70-28	TON	1.25	$656.17	$43,307
Emulsified Asphalt CRS-2P	TON	0.19	$519.30	$5,210
Excavation - Unclassified Borrow	CUYD	81.02	$4.06	$17,368

Special Borrow	CUYD	32.41	$14.70	$25,155	
Sub Total				$147,539	
Contingency			15%	$169,670	

5(b)	**VERTICAL CURVE FLATTENING**	L= 0.02	**$25,000**	**TOT**
			$20,000	TOT

Type	Units	Quantity / Sta.	Unit Price	Cost per Mile
Crushed Aggregate Couse	CUYD	167.8	$17.30	$153,275
Cover - Type 1	SQYD	356	$0.43	$8,083
Plant Mix Bit Surf GR S - 3/4"	TON	126.1	$23.45	$156,132
Asphalt Cement PG 70-28	TON	7.57	$656.17	$262,269
Emulsified Asphalt CRS-2P	TON	0.61	$519.30	$16,726
Excavation - Unclassified Borrow	CUYD	555.56	$4.06	$119,094
Special Borrow	CUYD	277.78	$14.70	$215,602
Sub Total				$931,180
Contingency			15%	$1,070,857

6(a)	**AT-GRADE WILDLIFE CROSSING AND SIGNAGE**	**$100,000**	**EA**
6(b)	**SEASONAL SPEED REDUCTION**	**LABOR**	
6(c)	**WILDLIFE UNDERPASS**	**$810,000**	**TOT**
6(d)	**WILDLIFE OVERPASS**	**$1,250,000**	**TOT**
7(a)	**ADVANCE WARNING SIGNS**	**$500**	**EA**
7(b)	**INTERSECTION REALIGNMENT**	**$50,000**	**TOT**
7(c)	**LEFT TURN LANE**	**$100,000**	**TOT**

8	**VERTICAL CURVE FLATTENING**	L= 0.35	**$375,000**	**TOT**
			$370,000	**TOT**
9(a)	**ADVANCE WARNING SIGNS**		**$500**	**EA**
9(b)	**INTERSECTION REALIGNMENT**		**$100,000**	**EA**
10(a)	**MAINTENANCE**		**LABOR**	

10(b)	**ROCKFALL PROTECTION NETTING**	L= 2		**$400,000**	**TOT**
		H= 15		$420,000	TOT
		Ratio 10%		$240	SQYD
10(c)	**FLATTEN CUT SLOPES**	A= 139333	YD^3	**$1,250,000**	**TOT**
		Ratio = 50%		$1,230,000	TOT
		L= 2	MI		
		SURFACE AREA = 712.5	FT^2		

Fattig Creek

Blasting	$100000	22,600	yd^3	$4.42	yd^3

Excavation $4.43 yd^3

11 HORIZONTAL CURVE SIGNING **$500 EA**

12(a) VERTICAL CURVE FLATTENING L= 0.10 **$125,000 TOT**
$110,000 TOT

12(b) HORIZONTAL CURVE SIGNING **$500 EA**

12(c) FLATTEN CUT SLOPES 24.0 **$50,000 LS**

12(d) ADVANCE WARNING SIGNS **$500 EA**

12(e) FLATTEN APPROACH **$50,000 TOT**

13 ROADWAY WIDENING L= 3.15 **$3,750,000 TOT**
$3,700,000 TOT
$1,200,000 MI

Type	Units	Quantity / Sta.	Unit Price	Cost per Mile
Crushed Aggregate Couse	CUYD	167.8	$17.30	$153,275
Cover - Type 1	SQYD	356	$0.43	$8,083
Plant Mix Bit Surf GR S - 3/4"	TON	126.1	$23.45	$156,132
Asphalt Cement PG 70-28	TON	7.57	$656.17	$262,269
Emulsified Asphalt CRS-2P	TON	0.61	$519.30	$16,726
Excavation - Unclassified Borrow	CUYD	555.56	$4.06	$119,094
Special Borrow	CUYD	277.78	$14.70	$215,602
Sub Total				$931,180
Contingency			25%	$1,163,975

14 GUARDRAIL L= 2 **$200,000 TOT**
Ratio 50% $180,000 TOT
$33.59 LNFT

15 FLATTEN CUT SLOPES 25.0 - 25.3 **$50,000 LS**

16(a) ADVANCE WARNING SIGNS **$500 EA**

16(b) INTERSECTION REALIGNMENT **$50,000 TOT**

16(c) RIGHT-TURN LANE **$100,000 TOT**

16(d) LEFT-TURN LANE **$100,000 TOT**

17 BRIDGE ENDS L= 0 **$25,000 TOT**
$19,000 TOT

Guard Rail - Steel	LNFT	0	17.22	$0
Guard Rail - Stl/br Appr-Ty 3	EA	4	2233.85	$8,935
Guard Rail - Optional Term Sect	EA	4	2554.01	$10,216
Sub Total				$19,151

18	**HORIZONTAL CURVE SIGNING**		**$500 EA**
19(a)	**VERTICAL CURVE FLATTENING**	L= 0.1	**$125,000 TOT**
			$110,000 TOT
19(b)	**ADVANCE WARNING SIGNS**		**$500 EA**
19(c)	**LEFT-TURN LANE**		**$100,000 TOT**