

# Improvement Options

## MT-1—ANACONDA TO GEORGETOWN LAKE

### CORRIDOR PLANNING STUDY



*Prepared For:*

**MONTANA DEPARTMENT OF TRANSPORTATION**

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# 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.

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

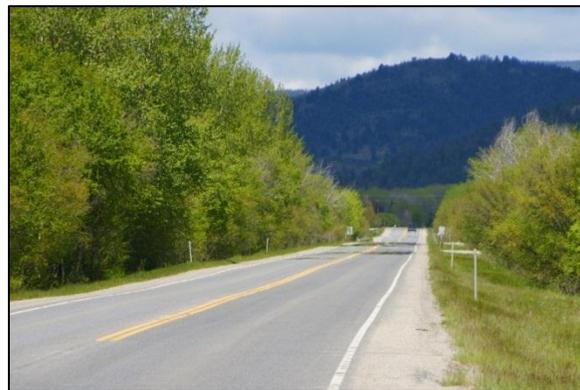


Photo 2.3: Dense roadside vegetation near RP 14.0

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

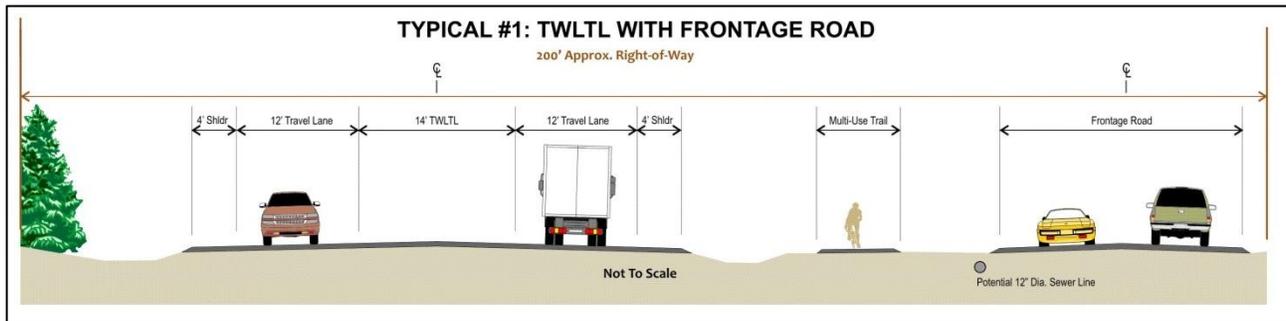
shows that the crash rate and the severity rate along the corridor are both lower than the statewide average for roadways of similar type and function. Data collection shows that the 85<sup>th</sup> percentile speed for this section of road is 42.2 mph, which is 7.2 mph higher than the posted speed.

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

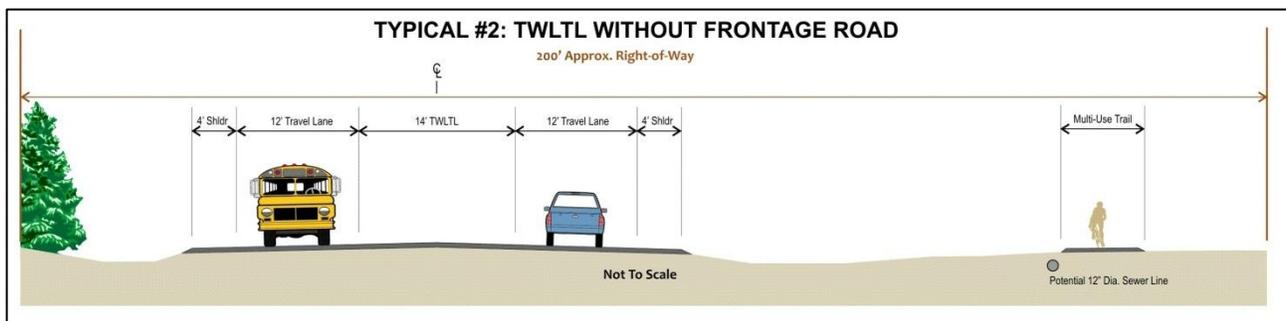
#### **Description:**

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.

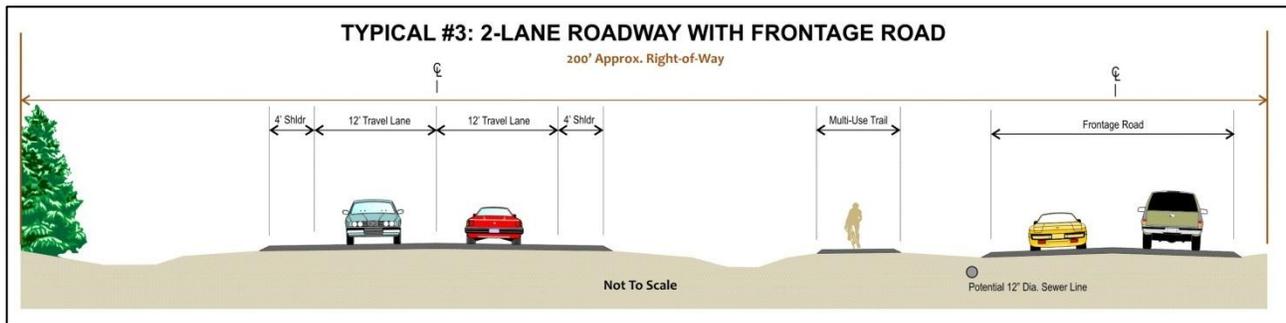


Figure 2.3: Typical Section #3 – 2-Lane Roadway with Frontage Road

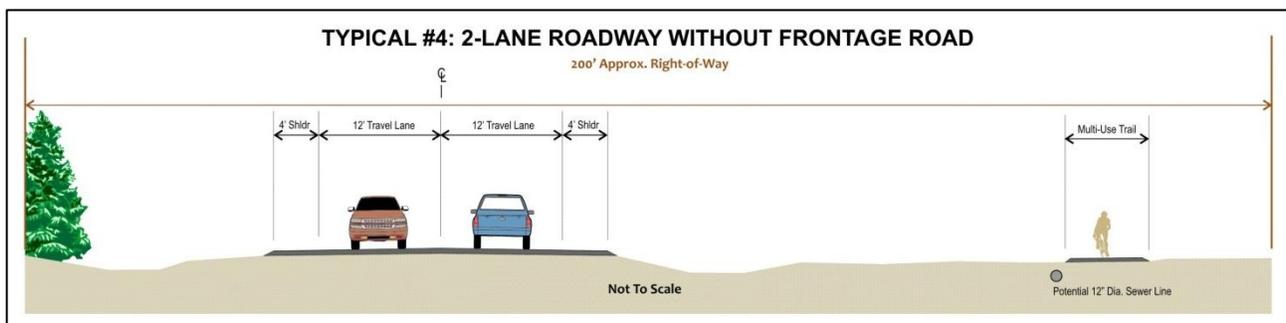


Figure 2.4: Typical Section #4 – 2-Lane Roadway without Frontage Road

### **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.

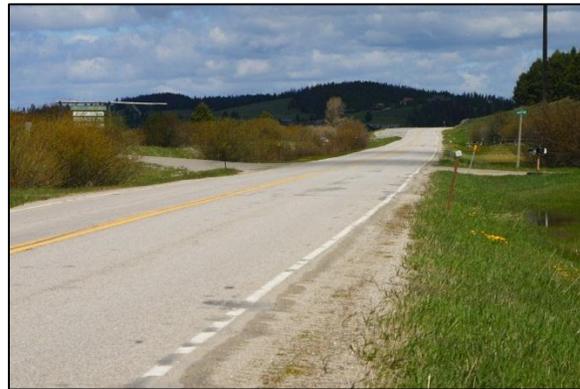


Photo 2.12: Narrow roadway with deteriorating surfacing near RP 24.5.

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

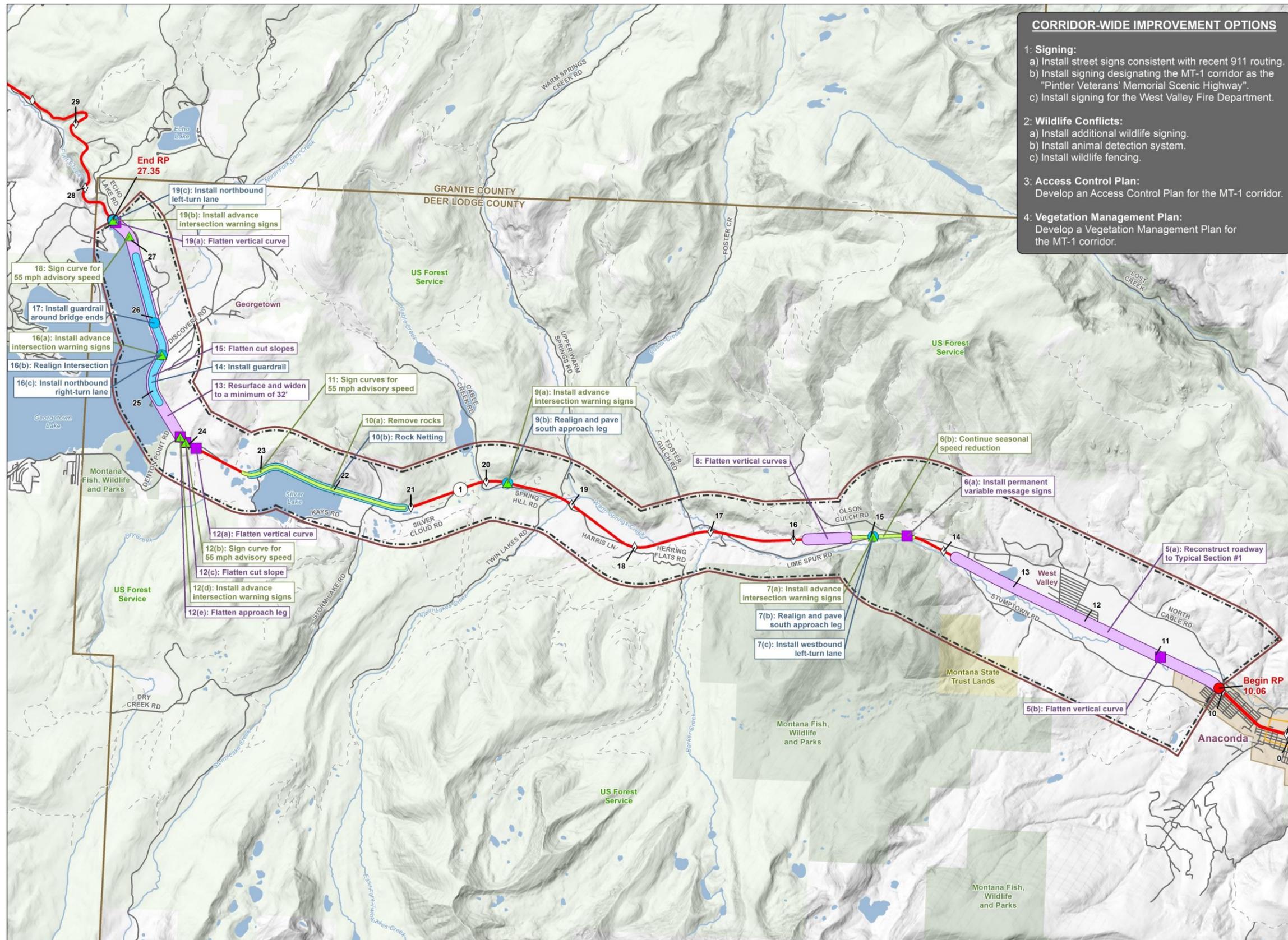
| ID    | Name                       | Location      | Feature            | Issue/Concern   | Improvement Options   | Concerns Addressed             | Action  | Cost     |
|-------|----------------------------|---------------|--------------------|---|---|--------------------------------|---------|----------|
| 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 Veterans' 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 <i>Vegetative Management Plan</i>   | 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<br>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<br>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<br>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       |

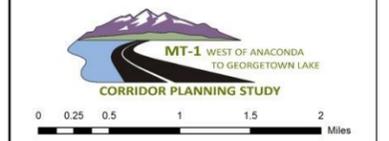


- CORRIDOR-WIDE IMPROVEMENT OPTIONS**
- 1: Signing:**
    - a) Install street signs consistent with recent 911 routing.
    - b) Install signing designating the MT-1 corridor as the "Pintler Veterans' Memorial Scenic Highway".
    - c) Install signing for the West Valley Fire Department.
  - 2: Wildlife Conflicts:**
    - a) Install additional wildlife signing.
    - b) Install animal detection system.
    - c) Install wildlife fencing.
  - 3: Access Control Plan:**

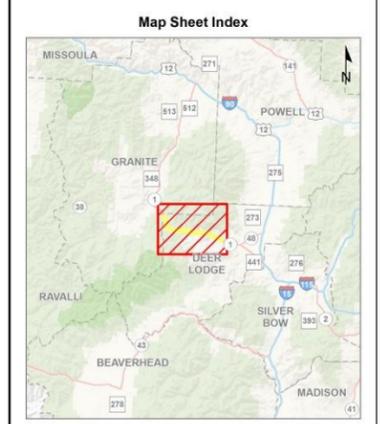
Develop an Access Control Plan for the MT-1 corridor.
  - 4: Vegetation Management Plan:**

Develop a Vegetation Management Plan for the MT-1 corridor.

# RECOMMENDED IMPROVEMENT OPTIONS



- Map Legend**
- |                              |                                  |
|------------------------------|----------------------------------|
| <b>CORRIDOR IMPROVEMENTS</b> | <b>BOUNDARIES</b>                |
| Long Term                    | Study Area Boundary              |
| Mid Term                     | County Boundary                  |
| Short Term                   | Urban Boundary                   |
| <b>SPOT IMPROVEMENTS</b>     | Montana Fish, Wildlife and Parks |
| Long Term                    | Montana State Trust Lands        |
| Mid Term                     | US Forest Service                |
| Short Term                   | <b>ROUTES</b>                    |
| <b>OTHER</b>                 | Primary                          |
| Reference Post               | Urban                            |
| River / Stream               | Local Route                      |
| Waterbody                    | USFS Route                       |

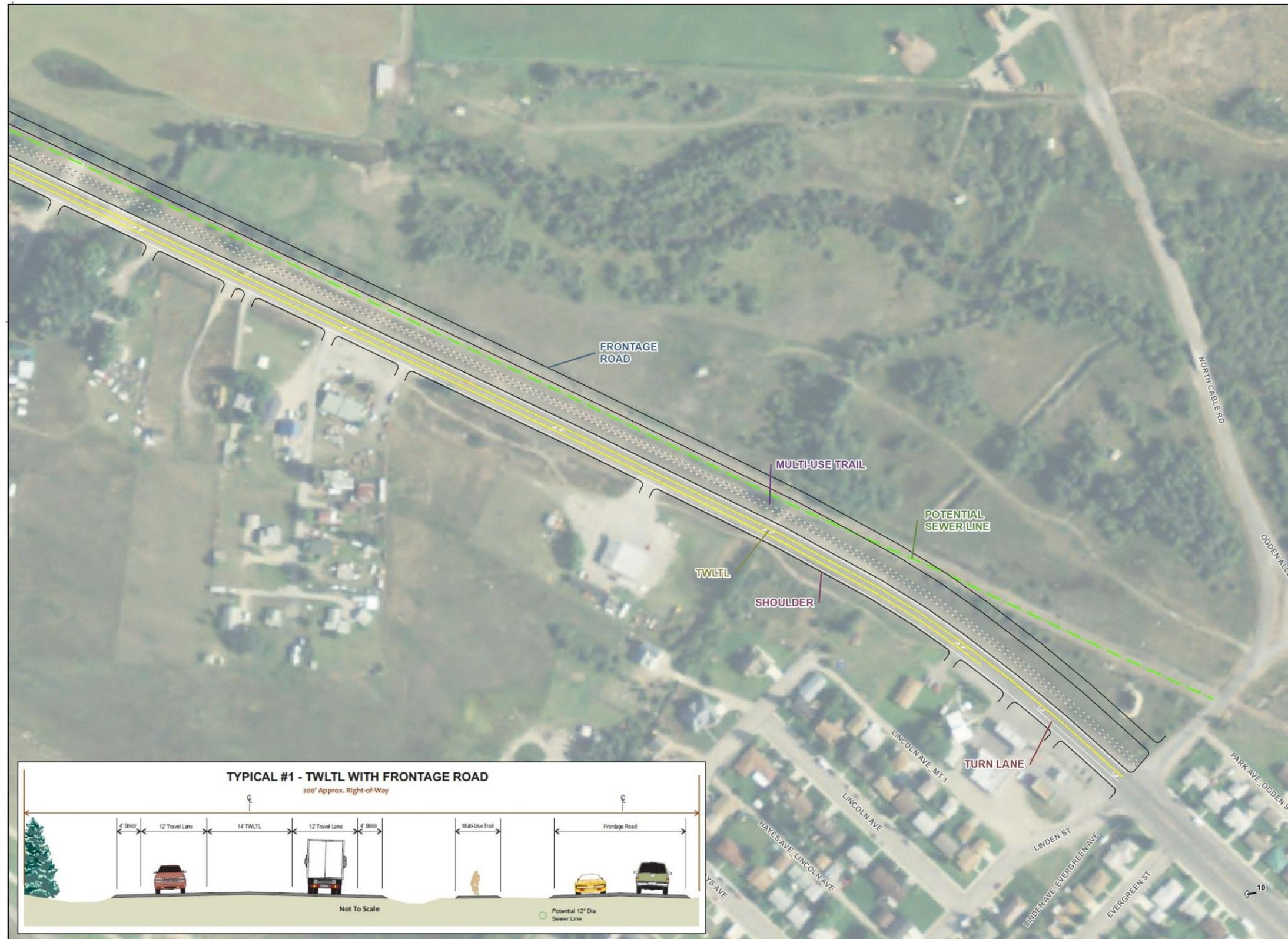


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Figure 3.1

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



### TYPICAL #1 TWLTL WITH FRONTAGE

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

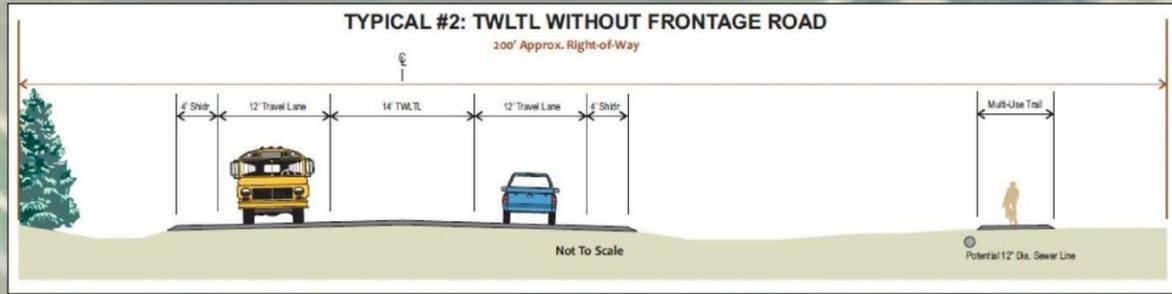
**Map Sheet Index**

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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**