# 6.0 IMPROVEMENT OPTIONS ANALYSIS

In the early stages of this Corridor Study, a preliminary set of improvement options was proposed based on input received during initial public involvement activities. Over the course of the Study, the list of improvement options was refined as a result of additional input from the public, the Advisory Committee, and MDT.

Proposed improvement options have been grouped into six categories, as described below.

- **Options Adding Vehicular Capacity**
  Options adding lanes on the existing US 93 facility or generally within the US 93 corridor.
- **Transit Options**
  Options expanding or enhancing transit services and programs.
- **Other Options Enhancing Mode Choice**
  Options expanding or enhancing other alternative modes of transportation.
- **Travel Demand Management (TDM) / Transportation System Management (TSM)**
  Strategies intended to reduce travel demand or improve the efficiency of the transportation system.
- **Spot Improvements**
  Options improving corridor operation and design in discrete locations.
- **Policy Tools**
  Planning strategies intended to aid the implementation or operation of other proposed improvement options.

Section 6.1 provides a description of each option under consideration and Section 6.2 describes the improvement option screening process and results.

## 6.1 Improvement Options

### Options Adding Vehicular Capacity

During the early phase of the Corridor Study, it was assumed that over the planning horizon, the existing US 93 lane structure might not be able to accommodate future demand and that congestion would exceed acceptable levels by 2030. Accordingly, a number of options were proposed that would add capacity within the US 93 corridor in the form of either new lanes on US 93 or the construction of a new facility to the east of the existing roadway. Originally, these options were proposed over the entire length of the corridor. Based on the transportation analysis conducted for this study as presented in Chapters 4 and 5, additional capacity will not be needed

in the southern portion of the corridor (Florence to Lolo) over the planning horizon. Options adding capacity have accordingly been amended to reflect the long-term needs of the corridor.

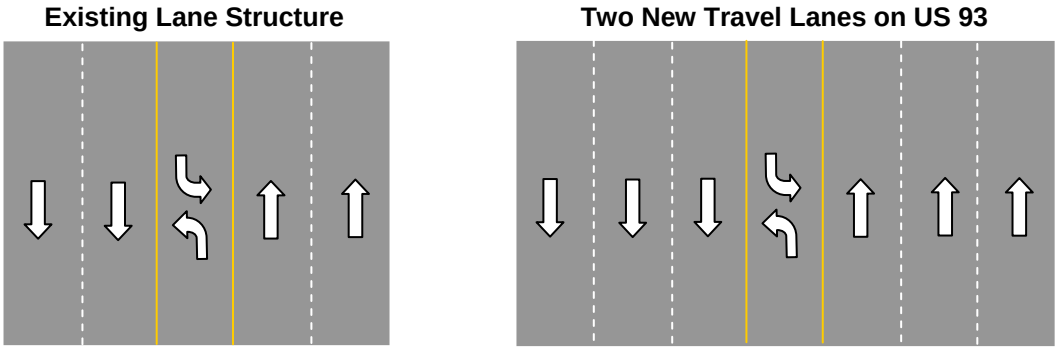
The portion of the corridor between Lolo and Missoula includes approximately one mile where the roadway currently narrows to a four lane section. In order to add lanes to the existing US 93 facility in this narrow area, a retaining wall or a bridge structure would be required. It should also be noted that in addition to adding capacity, reconstruction and widening of US 93 would address any nonstandard geometric features within the roadway segment, unless design exceptions were warranted.

Options proposing additional vehicular capacity within the corridor are described below.

***Two New Travel Lanes on US 93 from Lolo to Missoula***

This option would add a single travel lane in each direction in the northern portion of the corridor, as depicted in Figure 6-1 below.

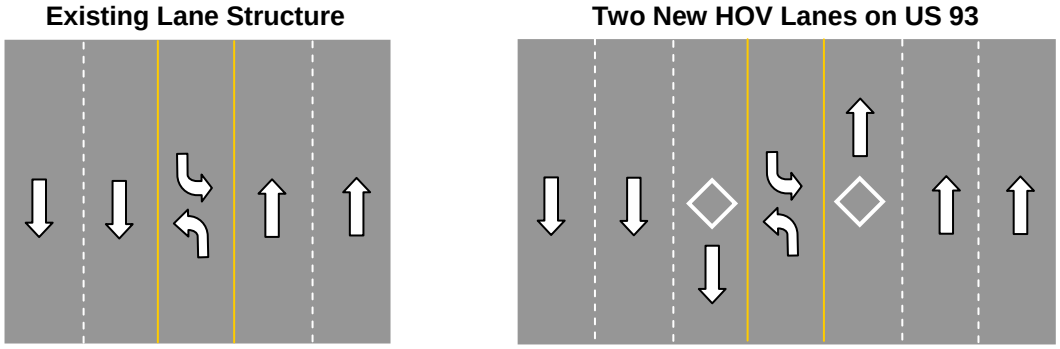
**Figure 6-1 Option Adding Two New Travel Lanes**




***Two New HOV Lanes on US 93 from Lolo to Missoula***

This option would add a single lane in each direction in the northern portion of the corridor. The new High Occupancy Vehicle (HOV) lanes would be designated for exclusive use by multiple occupant vehicles, as depicted by the diamond symbol in Figure 6-2.

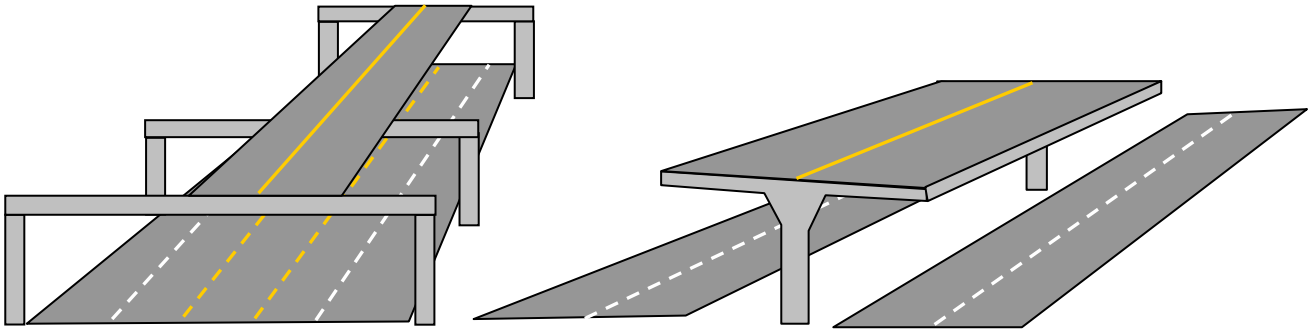
**Figure 6-2 Option Adding Two New HOV Lanes**



***Elevated Expressway with Two New Lanes from Lolo to Missoula***

This option would include a two-lane elevated expressway, with access points at either end of the facility in Lolo and Missoula. Design details for this option have not been developed for this study. Two different elevated expressway configurations are presented in Figure 6-3. The configuration presented at the right would require removal of the existing center turn lane to allow construction of the support structures.

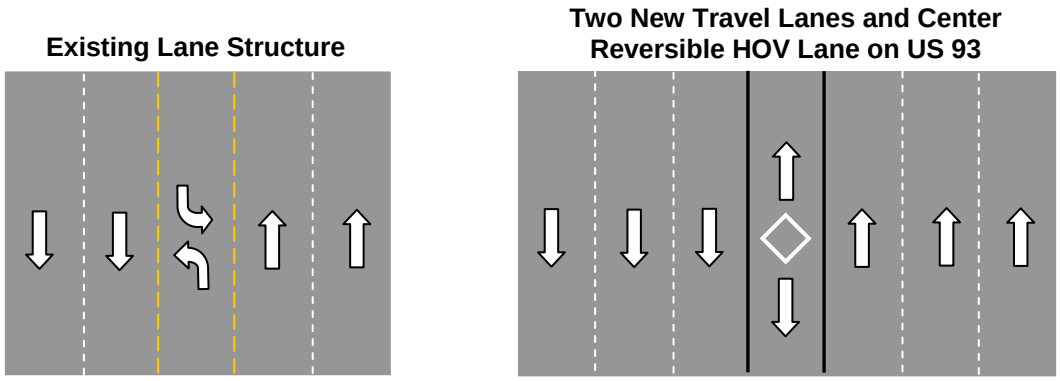
**Figure 6-3 Elevated Expressway Configurations**



***Two New Lanes and Center Reversible HOV Lane from Lolo to Missoula***

This option would add a single travel lane in each direction and convert the center turn lane into a reversible HOV lane, as depicted in Figure 6-4.

**Figure 6-4 Option Adding Two New Travel Lanes with Center Reversible HOV Lane**

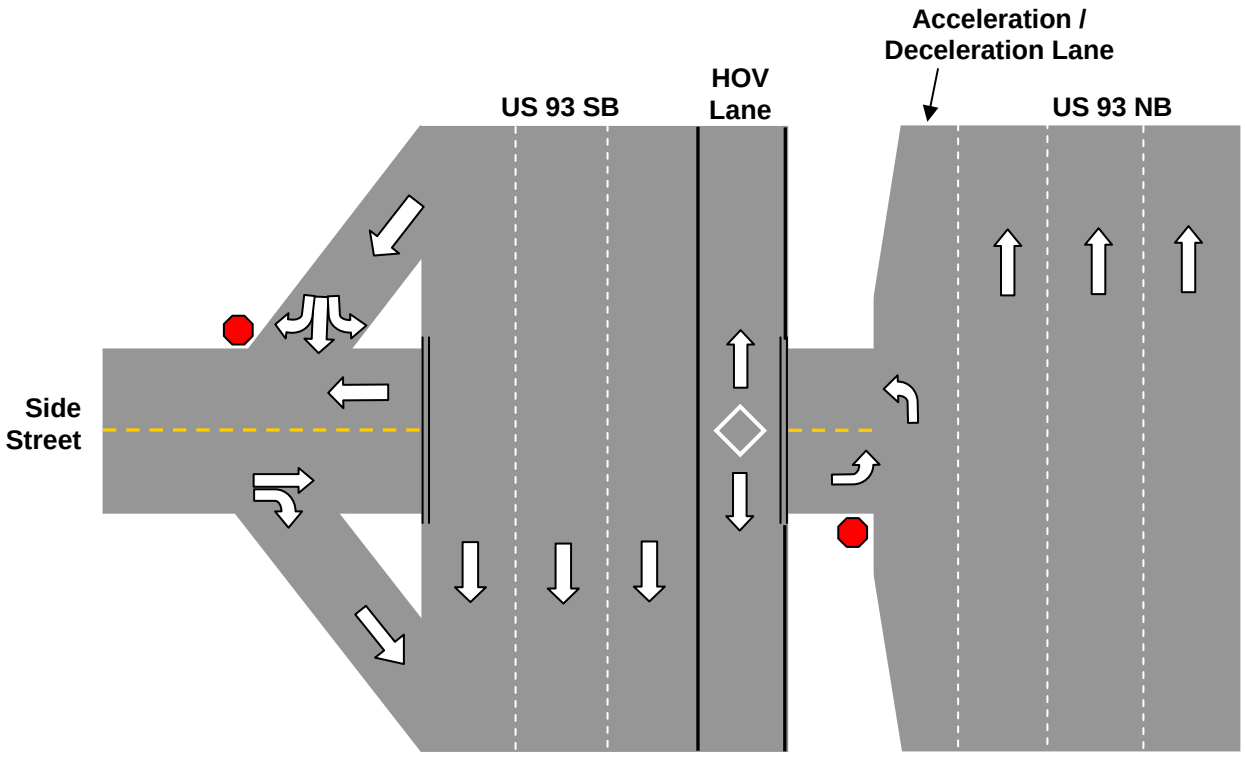



Under this option, the center lane would be designated for exclusive use by multiple occupant vehicles traveling in the peak direction of travel. In order to eliminate the risk of collision with opposing traffic, jersey barriers, which are indicated as solid black lines in Figure 6-4, would separate the center reversible lane from adjacent lanes. Jersey barriers would thereby restrict access to the HOV lane throughout the majority of the corridor, with access limited to a number of key intersection points.

A form of grade separation at key intersections would safely allow vehicles to enter and exit US 93 without delaying mainline through volumes. Access to the center HOV lane would be provided upstream and downstream of the intersection and would involve merge lengths and movable barriers. The barriers would be lifted or lowered based on the direction of travel allowed during a particular period. Variable message signs would be required to inform motorists of the direction of travel in the center reversible lane.

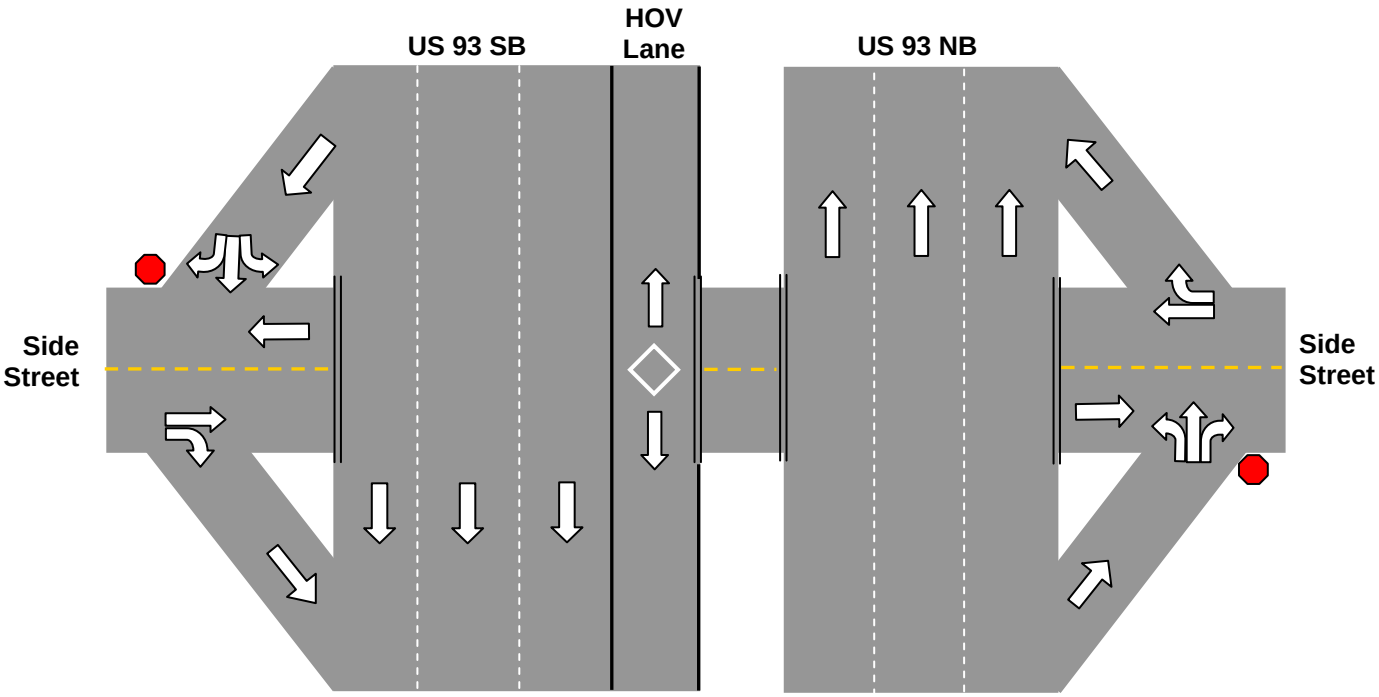
Grade separated intersections could take the form of a junior interchange as depicted in Figure 6-5 or a full interchange as depicted in Figure 6-6. Given an intersecting side street to the west of US 93 and a junior intersection configuration as depicted in Figure 6-5, US 93 southbound lanes would be elevated over the side street. Traffic movements between southbound US 93 and the side street would be accommodated by slip ramps on the west side of US 93. Eastbound to northbound movements entering US 93 from the approach would pass under the southbound US 93 traffic stream and merge from the left into the northbound US 93 traffic stream at the end of a long acceleration lane. This configuration would be flipped in the case of an intersecting side street to the east of US 93.

**Figure 6-5 Two New Lanes, Center Reversible HOV Lane, and Junior Interchange**



In the case of a full interchange as depicted in Figure 6-6, US 93 northbound and southbound lanes would be elevated over the side street, and slip ramps to the east and west of US 93 would accommodate entering and exiting vehicles. As noted above, access to the center HOV lane would be provided at points upstream and downstream of the interchange.

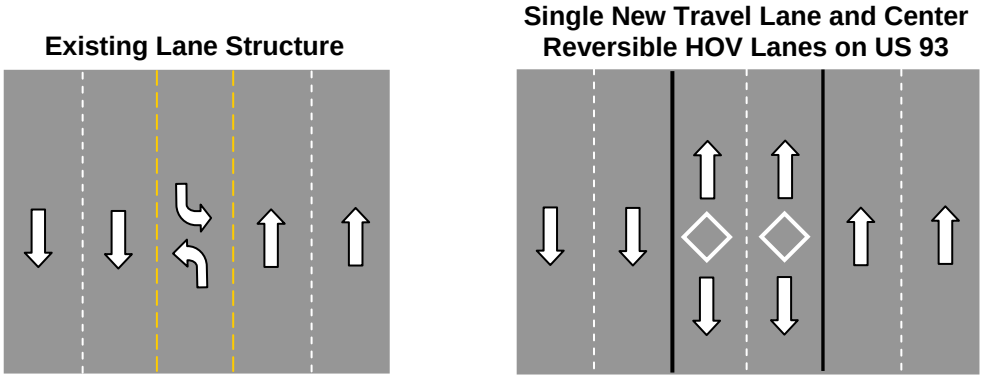
**Figure 6-6 Two New Lanes, Center Reversible HOV Lane, and Full Interchange**




***Center Reversible HOV Lanes with New Lane from Lolo to Missoula***

This option would add a single travel lane on US 93 and convert the center turn lane into a reversible High Occupancy Vehicle (HOV) lane, as depicted in Figure 6-7.

**Figure 6-7 Option Adding Single New Travel Lane with Center Reversible HOV Lanes**

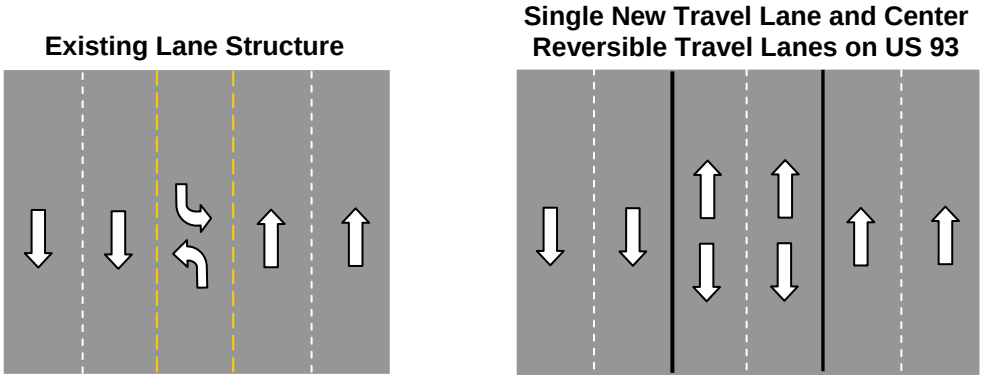


As under the option proposing two new travel lanes with a center reversible HOV lane, jersey barriers would separate the center reversible lanes from adjacent lanes and grade separated intersections would be recommended to allow safe and efficient entrance and exit. Grade separated intersections would be configured in the same manner as depicted in Figures 6-5 or 6-6.

***Center Reversible Lanes with New Lane from Lolo to Missoula***

This option would add a single travel lane on US 93 and convert the center turn lane and an adjacent lane to reversible lanes designated for peak direction travel, as depicted in Figure 6-8.

**Figure 6-8 Option Adding Single New Travel Lane with Center Reversible Travel Lanes**



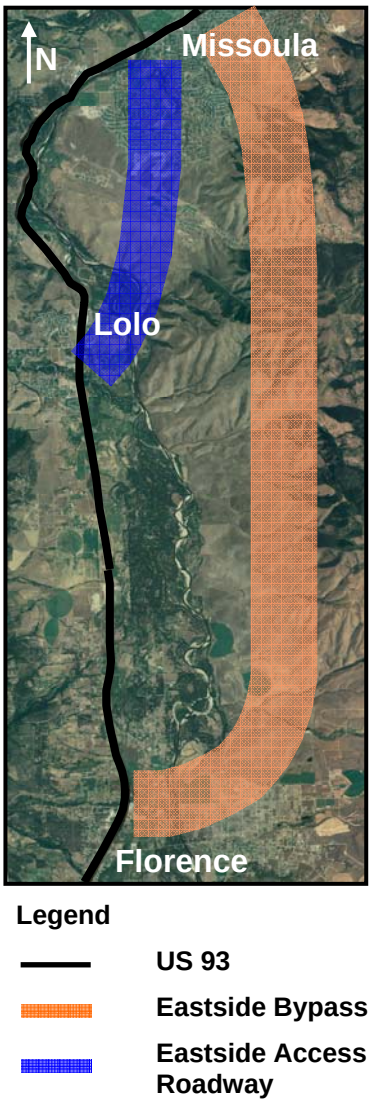

As under the option proposing a two new travel lanes with a center reversible HOV lane, jersey barriers would separate the center reversible lanes from adjacent lanes and grade separated intersections would be recommended to allow safe and efficient entrance and exit. Grade separated intersections would be configured in the same manner as depicted in Figures 6-5 or 6-6.

***Eastside Bypass and Eastside Access Roadway***

A bypass option was proposed not only to add capacity in the US 93 corridor, but also to provide an alternate route between Missoula and the Bitterroot Valley. Under current conditions, a major incident on US 93 would create substantial delays and could potentially prevent entrance to or exit from the Missoula area until the incident was addressed.

Two bypass options were originally proposed. The Eastside Access Roadway would originate just to the south of Lolo and enter the Missoula area at the north end of the corridor. The Eastside Bypass option would originate near Florence and bypass the entire stretch of US 93 under consideration in this study. Figure 6-9 depicts the general location of these options; specific alignments have not been developed and would be dictated by terrain and availability of right-of-way.

**Figure 6-9 General Location of Bypass Options**



***Lolo Options***

This set of options is intended to relieve some of the congestion in Lolo projected by 2030. As discussed in greater detail later in this section, proposed intersection spot improvements in Lolo will not reduce 2030 mainline delay to acceptable levels (LOS C or better).

This set of three options includes (1) a flyover ramp, (2) a tunnel, and (3) the construction of two additional travel lanes in Lolo. These options would generally extend over the portion of the corridor from the US 93 intersection with US 12 to the intersection with Ridgeway Drive. A Westside Arterial linking US 12 and US 93 was also briefly considered for this study, but was not advanced due to the rough terrain west of Lolo and the extremely high costs associated with constructing such a route.

**Figure 6-10 General Location of Lolo Options**

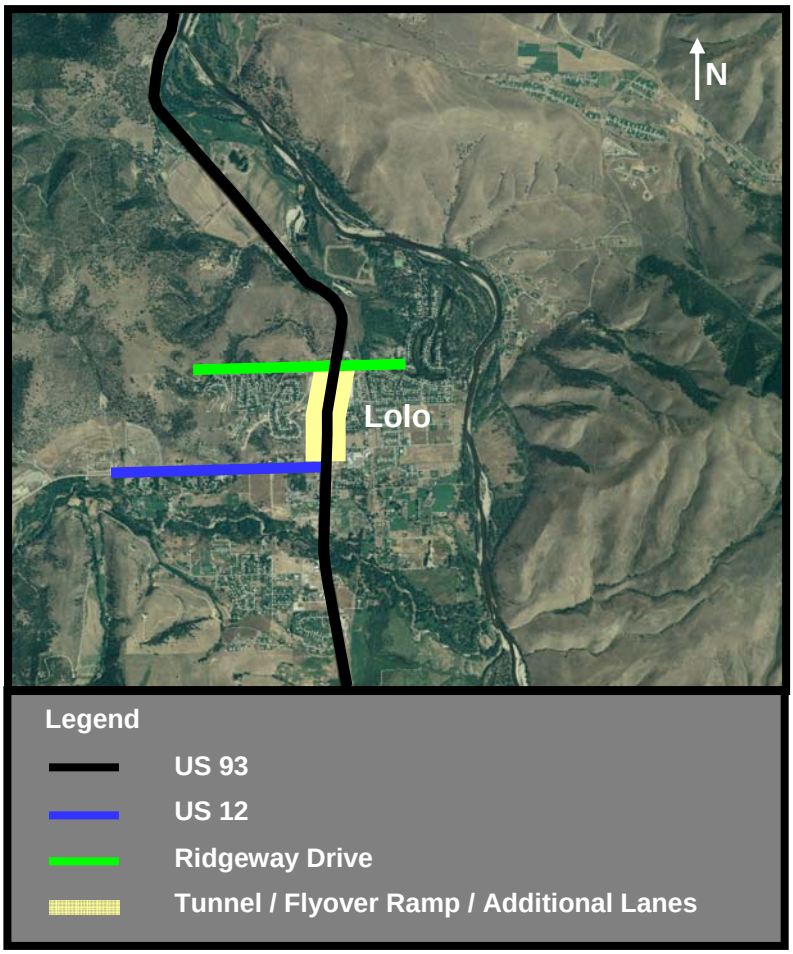



Figure 6-10 depicts the general location of this set of options. These options have only been developed at a conceptual level.

This set of options was developed following the intersection spot improvement analysis, and was not presented during early public involvement activities.

## Transit Options

Early in the Corridor Study process, transit groups and members of the public voiced a strong desire for options providing mode choice within the US 93 corridor. Accordingly, a number of transit options were proposed for consideration and a Transit Analysis was conducted for this study (Appendix H). For the purpose of the Transit Analysis, the study area was extended south to Stevensville to account for potential transit riders commuting between this population center and Missoula, as noted in Section 1.2.

***Enhanced Vanpool / Carpool Programs***

Under this option, the current vanpool service operated by MR TMA would be expanded by increasing the number of vans in circulation to accommodate increased passenger service. Additionally, education programs could be expanded to encourage ridesharing and to promote greater use of MR TMA's carpool matching program and existing park and ride facilities.

***Improved Park & Ride Facilities***

This option would include construction and installation of covered waiting shelters, bicycle racks, lighting and signing, connecting pathways, and bike lockers. It would also include landscaping and installation of an irrigation system. This option is intended to enhance the function and aesthetic quality of existing park and ride facilities, and thereby encourage use of existing carpool and vanpool programs.

***Fixed Route Bus Service***


Under this option, bus service would be offered on a fixed route from Stevensville to Missoula. Peak hour bus service would include service at regularly scheduled intervals, at fixed stops, during peak commute hours, which are defined as the hours from 6:00 a.m. to 9:00 a.m. in the morning and from 4:00 p.m. to 7:00 p.m. in the evening. This fixed route peak hour bus service option assumes 30-minute intervals, which equates to two buses every hour. If ridership and financial goals were met, the number of buses operating during peak hours could be increased and bus service could eventually be offered during off-peak hours, which would include the hours from 9:00 a.m. to 4:00 p.m., and from 7:00p.m. to 9:00 p.m.

***Passenger Rail***

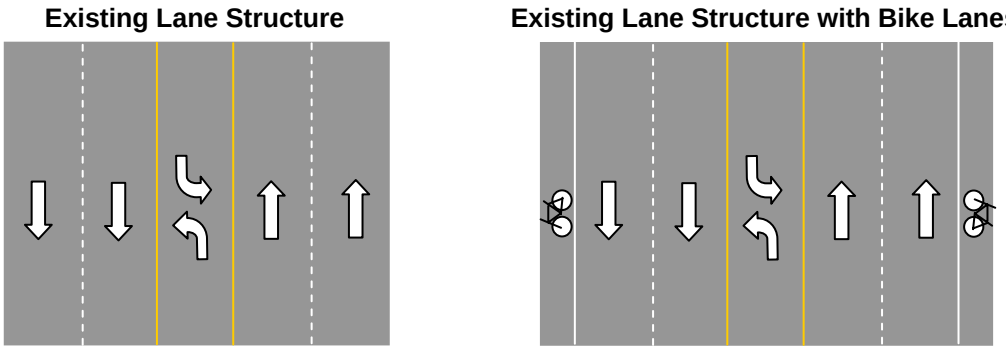
This option would provide a form of passenger rail service using the existing Montana Rail Link (MRL) infrastructure. Implementation of this option would require upgrades to the MRL track, including the installation of a signal system, as well as passenger stations.

## Other Options Enhancing Mode Choice

***Bike Lanes on US 93 from Florence to Missoula***

This option would add bike lanes on either side of US 93 from Florence to Missoula, as depicted in Figure 6-11.

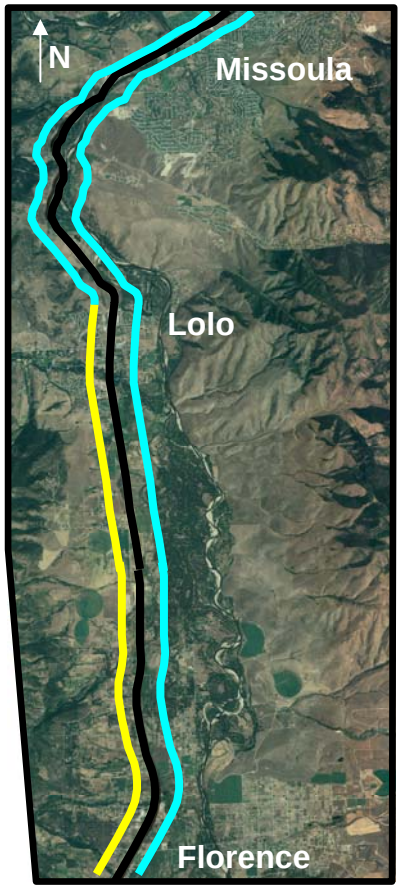
**Figure 6-11 Bike Lanes on US 93**




***Separated Bicycle / Pedestrian Path***

This option was initially proposed as an extension of the existing pathway located on the west side of US 93 between Florence and Lolo and was intended to provide a continuous facility over the entire corridor on both sides of US 93 from Florence to Missoula, as depicted in Figure 6-12. The Bitterroot Trail Committee, a citizen advocacy group, has considered a number of additional trail alignments concurrent with this Corridor Study. The Committee intends to conduct a feasibility study at some point in the future to identify a preferred alignment.

**Figure 6-12 Existing and Proposed Pathways Adjacent to US 93**




**Legend**

- US 93
- Existing Pathway
- Proposed Pathway

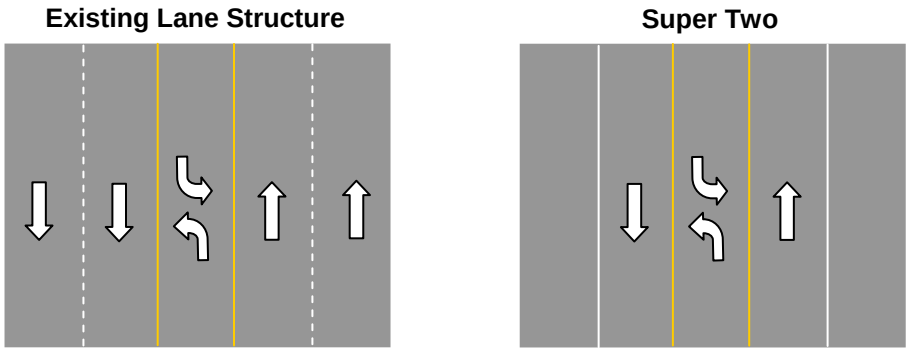
Note: Figure not to scale. Existing and proposed pathway locations are approximated for illustrative purposes.

## Transportation System Management (TSM) / Transportation Demand Management (TDM)

***Super Two from Florence to Missoula***

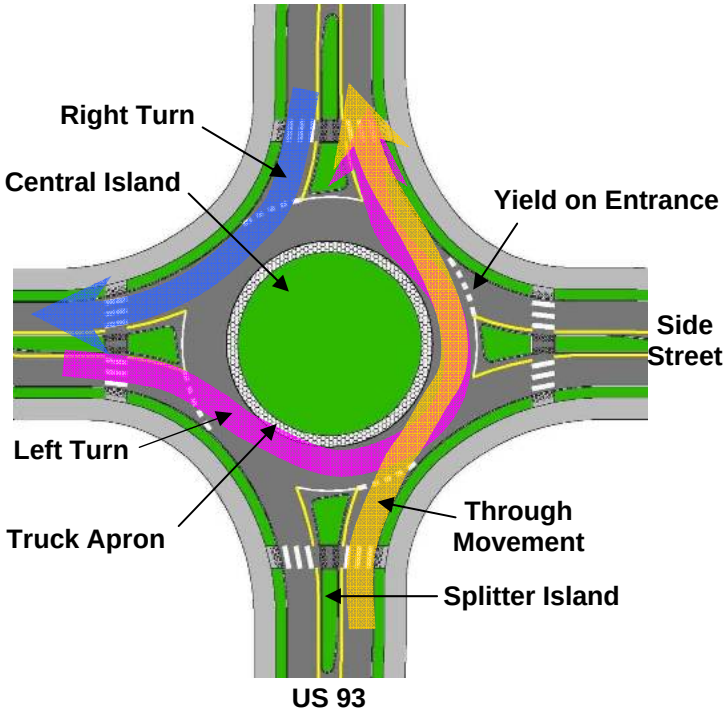
This option would convert the existing five-lane US 93 facility to a two-lane facility, as depicted in Figure 6-13. The wide shoulders would be converted to passing lanes in the portion of the corridor with rolling terrain.

**Figure 6-13 Super Two Option**



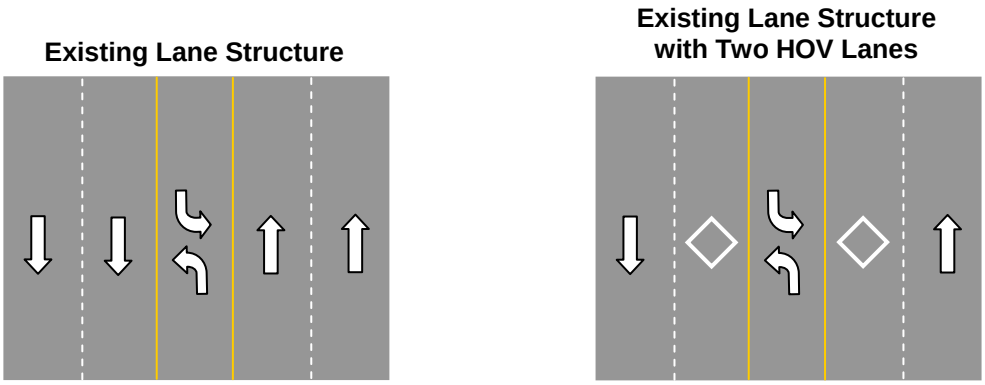

This option would also convert major stop-controlled and signalized intersections to single-lane roundabouts, as shown in Figure 6-14.

**Figure 6-14 Single-Lane Roundabout**



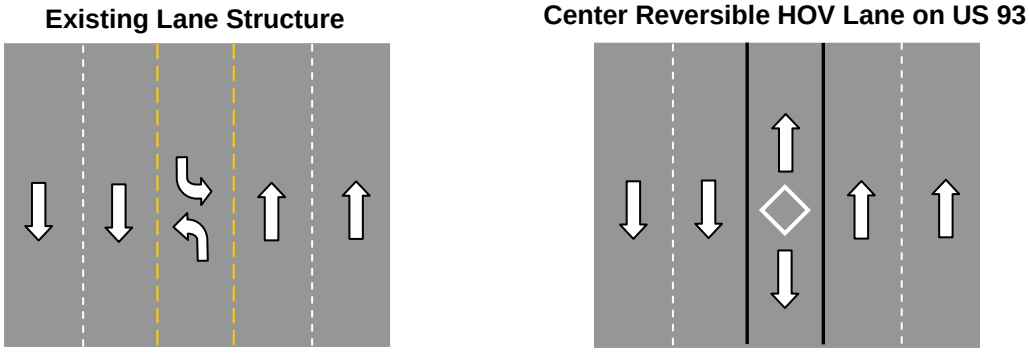
***Two HOV Lanes within Existing Lane Structure from Lolo to Missoula***
This option would convert two existing through lanes to designated HOV lanes, as depicted in Figure 6-15.

**Figure 6-15 Two HOV Lanes within Existing Lane Structure**




***Center Reversible HOV Lane within Existing Lane Structure from Lolo to Missoula***
This option would convert the center turn lane into a travel lane designated for exclusive use by multiple occupant vehicles traveling in the peak direction, as shown in Figure 6-16.

**Figure 6-16 Center Reversible HOV Lane**




As under the option proposing two new lanes and a center reversible HOV lane, jersey barriers would separate the center reversible lane from adjacent lanes and grade separated intersections would be recommended to allow safe and efficient entrance and exit from side streets. Access to the center HOV lane would be provided upstream and downstream of the intersection via movable barriers. Grade separated intersections could take the form of a junior interchange as depicted in Figure 6-17 or a full interchange as depicted in Figure 6-18.

Figure 6-17 Center Reversible HOV Lane and Junior Interchange

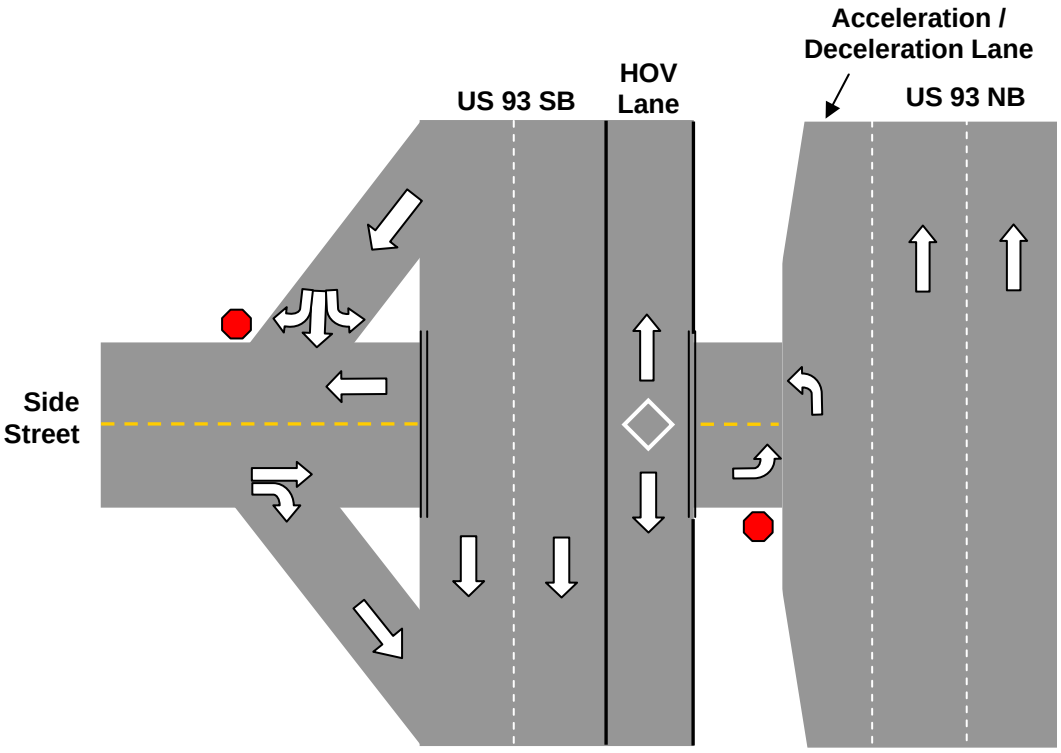
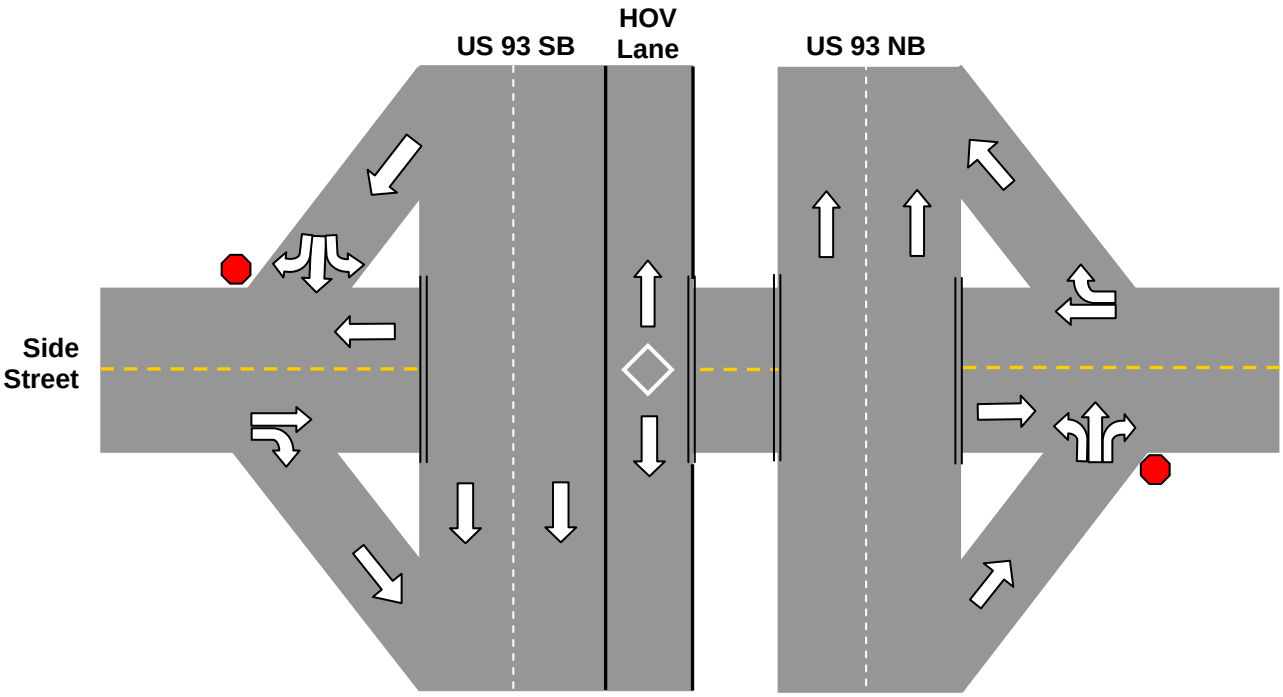


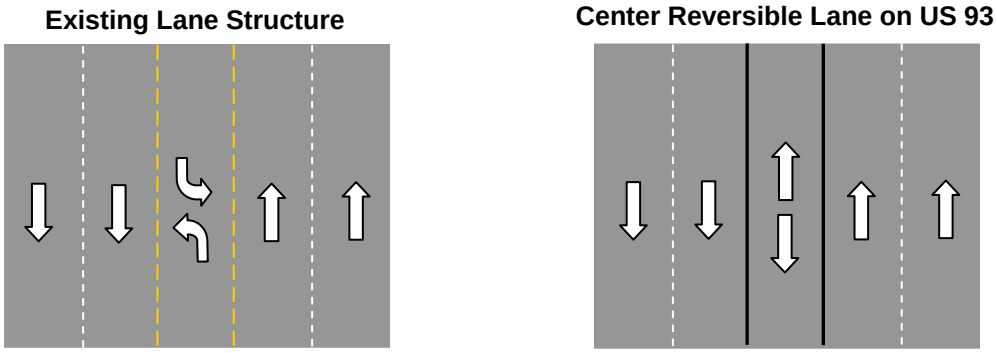

Figure 6-18 Center Reversible HOV Lane and Full Interchange



***Center Reversible Lane within Existing Lane Structure from Lolo to Missoula***

This option would convert the center turn lane into a travel lane for vehicles traveling in the peak direction, as shown in Figure 6-19.

**Figure 6-19 Center Reversible Lane**




As under the option proposing a center reversible HOV lane within the existing lane structure, jersey barriers would separate the center reversible lane from adjacent lanes and grade separated intersections would be recommended to allow safe and efficient entrance and exit. Grade separated intersections would be configured in the same manner as depicted in Figures 6-17 or 6-18.

***Interchanges / Grade Separated Intersections***

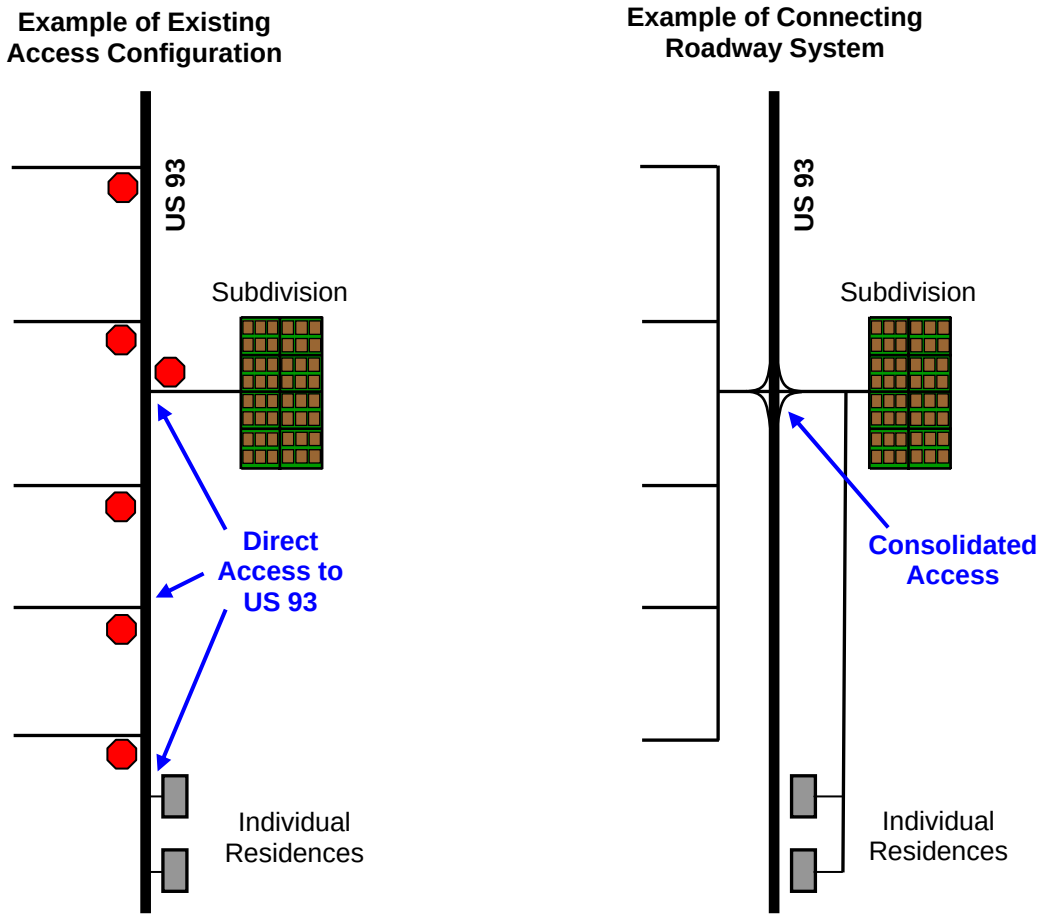
This option proposes a form of grade separation at key intersections throughout the corridor. The configuration of these intersections could take the form described in Figures 6-5, 6-6, 6-17, and 6-18. Under this option, signalized intersections in Florence, Lolo, and Missoula would remain signalized and side streets would be able to access US 93 at these points. Additional points of access to US 93 could be provided at evenly-spaced grade-separated intersections near Bird Lane (MP 85.5±), at Old US 93 S (MP 75±), and in the vicinity of MP 78± – MP 79±. A connecting roadway network as described below would be required for proper function of grade separation facilities.

***Frontage Roads / Connecting Local Roadway Networks***

Currently, there are a number of stop-controlled access points on either side of US 93 between Florence and Missoula, as shown in Figure 6-20. Given high mainline volumes, it is often difficult to access US 93 during peak hour travel, especially when attempting to make left-hand turns onto the roadway.

This option proposes a connecting roadway system that would consolidate these access points and allow access onto US 93 at a set of designated locations. Ideally, these designated access points would either be in-town signalized intersections or grade separated intersections as described previously.

**Figure 6-20 Depiction of Existing Access Configuration and Proposed Connecting Roadway System**




## Spot Improvements

***Intersection Improvements***

This option was originally intended to provide design improvements at seven intersections within the corridor in order to improve traffic flow and potentially improve safety performance in and near these intersections. The seven intersections discussed in this section were chosen based on each overall intersection's projected failure to operate at LOS C or better by 2030 during both AM and PM peak hour periods.

An alternatives analysis has been conducted to determine the quantitative effect of these proposed improvements on projected intersection LOS over the planning horizon. As with the operational analyses presented in Chapters 4 and 5 of this document, this analysis used stochastic simulation software (i.e., involving a randomly determined sequence of observations) to model the street network and estimate vehicle delay at each study intersection, which accounts for

different mixes of driver behavior that might occur over a range of peak hours sampled in one location. Multiple runs were performed for each scenario to provide statistically sound results. The random nature of simulation, however, creates variation even when using identical input values for each simulation run. Further, it should be noted that in some cases, slight improvements in overall intersection delay are due to variations in simulation runs, including differences in the percent of vehicles served by the Build scenario (with improvement options in place) as compared to the No-Build scenario (under existing intersection configurations). Accordingly, the results of this analysis should be viewed as approximate and slight differences (i.e., 10 seconds or less) between the Build and No-Build scenarios should be discounted.

Proposed intersection improvements were analyzed simultaneously, rather than individually. Changes in delay times and LOS values presented in this section for a particular intersection are due not only to the proposed improvement at that intersection, but also due to the proposed improvements at other intersections throughout the corridor, as these have a cumulative effect on corridor operations. This is especially true in Lolo, where signalized intersections are spaced in relatively close proximity. Where there is a slight increase in delay at the Lolo intersections, this is due to increased signal cycle lengths, as explained in greater detail in Section 6.2 of this document.

Specific intersection improvements and the resulting LOS effects are discussed below. As noted in the following sections, some options considered for this analysis improve LOS and delay times, while others have little effect or actually worsen mainline operations. All options are presented in this section, some of which are currently not advanced as detailed in Section 6.2 for their failure to improve overall intersection operations. It should be noted that proposed intersection spot improvements are described in general terms; the specific dimensions and geometric configurations of these options would be determined during the final design process.

Blue Mountain Road / US 93

The intersection of US 93 and Blue Mountain Road Drive currently operates at LOS A during the AM peak hour and LOS B during the PM peak hour of travel. By 2030, this intersection is projected to operate at LOS B during the AM peak hour and LOS F during the PM peak hour. 2030 mainline volumes will be delayed substantially during the PM peak while the relatively large Blue Mountain volumes execute left and right turn movements.

The spot improvement proposed for this intersection would include constructing an additional southbound through lane on US 93 to allow more mainline vehicles through the intersection during the signal's green cycle. These three southbound through lanes would taper back to two through lanes near the Wornath Road intersection with US 93.

As presented in Table 6.1, delay times on US 93 could be substantially reduced during the PM peak if this spot improvement were implemented. This intersection would remain at LOS B

during the AM peak hour, but would improve from LOS F to LOS C during the PM peak hour of travel.

**Table 6.1 Intersection of Blue Mountain Road / US 93 (2030)**

| AM Peak Hour Overall Intersection | | | | PM Peak Hour Overall Intersection | | | |
|---|---|---|---|---|---|---|---|
| No-Build Conditions | | Build Conditions | | No-Build Conditions | | Build Conditions | |
| Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS |
| 19.4 | B | 14.3 | B | 99.9 | F | 23.7 | C |

Ridgeway Drive / US 93

The intersection of US 93 and Ridgeway Drive currently operates at LOS B during both the AM and PM peak hours of travel. By 2030, this intersection is projected to operate at LOS D during peak hours.

The spot improvement proposed for this intersection would include converting the existing southbound shared through / right-turn lane to an exclusive through lane and adding an exclusive right turn lane. This would allow through volumes to proceed without having to wait for right-turning vehicles. There may be sufficient existing pavement to accommodate an exclusive right turn lane at this intersection. Additionally, the southbound left-turn phase could be converted from a permitted-only phase to a permitted-plus-protected phase.

As presented in Table 6.2, delay times on US 93 would worsen slightly during the AM peak hour, but would be reduced during the PM peak hour as a result of this proposed spot improvement.

**Table 6.2 Intersection of Ridgeway Drive / US 93 (2030)**

| AM Peak Hour Overall Intersection | | | | PM Peak Hour Overall Intersection | | | |
|---|---|---|---|---|---|---|---|
| No-Build Conditions | | Build Conditions | | No-Build Conditions | | Build Conditions | |
| Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS |
| 46.5 | D | 51.4 | D | 36.1 | D | 34.7 | C |

Tyler Way / US 93

The intersection of US 93 and Tyler Way currently operates at LOS B during both the AM and PM peak hours of travel. By 2030, this intersection is projected to continue to operate at LOS B during the PM peak hour, but will degrade to LOS E during the AM peak hour.

The spot improvement proposed for this intersection would include converting the existing northbound shared through / right-turn lane to an exclusive through lane and adding an exclusive

right turn lane. There may be sufficient existing pavement to accommodate an exclusive right turn lane at this intersection.

Additionally, the proposed spot improvement would include an exclusive westbound left turn lane at this intersection. Through, left, and right movements are currently accommodated by a single westbound lane at this intersection. By 2030, it is projected that over 100 vehicles will be attempting the westbound to southbound left turn movement in the AM peak hour. Delay could be reduced by providing an exclusive westbound left turn lane at this intersection so that the heaviest movement does not obstruct through and right-turning vehicles. There may be sufficient existing pavement to accommodate an exclusive westbound left turn lane at this intersection.

Lastly, this option would include extending the northbound left-turn lane storage length from the current 110 feet to 175 feet.

As presented in Table 6.3, delay times on US 93 would improve during the AM peak hour, but would worsen during the PM peak hour as a result of this proposed spot improvement.

**Table 6.3 Intersection of Tyler Way / US 93 (2030)**

| AM Peak Hour Overall Intersection | | | | PM Peak Hour Overall Intersection | | | |
|---|---|---|---|---|---|---|---|
| No-Build Conditions | | Build Conditions | | No-Build Conditions | | Build Conditions | |
| Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS |
| 70.1 | E | 61.4 | D | 19.6 | B | 25.0 | C |

Lewis & Clark Drive / US 93

The intersection of US 93 and Lewis & Clark Drive currently operates at LOS A during both the AM and PM peak hours of travel. By 2030, this intersection is projected to operate at LOS D during the PM peak hour, and LOS E during the AM peak hour.

The spot improvement proposed for this intersection would include converting the existing northbound shared through / right-turn lane to an exclusive through lane and adding an exclusive right turn lane. There may be sufficient existing pavement to accommodate an exclusive northbound right turn lane. An exclusive southbound right turn lane would not improve operations at this intersection because very few vehicles are projected to make the southbound to westbound turn movement during peak hours.

Additionally, the proposed spot improvement would include an exclusive westbound right turn lane at this intersection. Through, left, and right movements are currently accommodated by a single westbound lane at this intersection. By 2030, it is projected that over 100 vehicles will be attempting the westbound to northbound right turn movement in the AM peak hour. Delay could be reduced by providing an exclusive westbound right turn lane at this intersection so that the

heaviest movement does not obstruct through and left-turning vehicles. This improvement would require new roadway width.

Finally, this improvement would include extending the southbound left-turn lane storage length from the current 55 feet to 200 feet.

As presented in Table 6.4, delay times on US 93 would improve during both the AM and PM peak hours of travel as a result of this proposed spot improvement.

**Table 6.4 Intersection of Lewis & Clark Drive / US 93 (2030)**

| AM Peak Hour Overall Intersection | | | | PM Peak Hour Overall Intersection | | | |
|---|---|---|---|---|---|---|---|
| No-Build Conditions | | Build Conditions | | No-Build Conditions | | Build Conditions | |
| Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS |
| 45.8 | E | 45.1 | E | 27.9 | D | 20.5 | C |

US 12 / US 93

The intersection of US 93 and US 12 currently operates at LOS A during the PM peak and LOS B during the AM hour of travel. By 2030, this intersection is projected to operate at LOS B during the PM peak hour, and LOS F during the AM peak hour.

The spot improvement proposed for this intersection would include converting the existing southbound and northbound shared through / right-turn lanes to exclusive through lanes and adding exclusive right turn lanes. There may be sufficient existing pavement to accommodate an exclusive right turn lane in the northbound direction; an exclusive right turn lane in the southbound direction would likely require new roadway width.

Additionally, the proposed spot improvement would include an exclusive eastbound left turn lane at this intersection. The eastbound approach is currently configured as an exclusive right turn lane and a shared through / left-turn lane. The eastbound to northbound left turn movement is the heaviest movement at this approach. By 2030, it is projected that over 300 vehicles will be making this movement during the AM peak hour. Delay could be reduced by converting the lane configuration to an exclusive left turn lane and a shared through / right-turn lane so that the heaviest movement does not obstruct through and right-turning vehicles. Additional roadway width would probably be required for this improvement.

As presented in Table 6.5, delay times on US 93 would worsen during both the AM and PM peak hours of travel as a result of this proposed spot improvement.

**Table 6.5 Intersection of US 12 / US 93 (2030)**

| AM Peak Hour Overall Intersection | | | | PM Peak Hour Overall Intersection | | | |
|---|---|---|---|---|---|---|---|
| No-Build Conditions | | Build Conditions | | No-Build Conditions | | Build Conditions | |
| Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS |
| >120.0 | F | 128.2 | F | 18.5 | B | 25.9 | C |

An additional eastbound left turn lane was also considered at this intersection. This option did not improve delay at this intersection due to the northbound queue spilling back from intersections to the north. This queue does not allow the eastbound left-turning vehicles to make their movement during their respective green time. Therefore, an additional eastbound left turn lane is not proposed for this intersection.

Mormon Creek Road / US 93

Mainline volumes at the intersection of US 93 and Mormon Creek are projected to experience LOS F during the 2030 AM peak due to long vehicle queues extending from poorly-operating intersections to the north. Originally, it was hoped that mainline delay at this intersection would be reduced as a result of proposed improvements at signalized intersections in Lolo as described above. The analysis shows, however, that there would be a slight increase in mainline delay at the Mormon Creek intersection during both the AM and PM peak hours of travel, as presented in Table 6.6.

**Table 6.6 Intersection of Mormon Creek / US 93 (2030)**

| AM Peak Hour Overall Intersection | | | | PM Peak Hour Overall Intersection | | | |
|---|---|---|---|---|---|---|---|
| No-Build Conditions | | Build Conditions | | No-Build Conditions | | Build Conditions | |
| Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS | Avg. Delay (Sec/Veh) | LOS |
| 53.7 | F | 63.5 | F | 5.7 | A | 6.0 | A |

Highway 203/US 93

The intersection of US 93 and Highway 203 currently operates at LOS B during the AM and PM peak hours. By 2030, this intersection is projected to operate at LOS D during the PM peak hour and LOS F during the AM peak hour. By 2030, over 900 vehicles are projected to make the westbound to northbound right turn movement, which currently is accommodated by an exclusive right turn lane.

The spot improvement proposed for this intersection would include a westbound channelized free right turn lane with an acceleration lane extending onto US 93. The acceleration lane would then merge with the existing northbound through lanes to the north of the Highway 203 intersection. A channelized right turn lane would allow vehicles to complete their westbound to

northbound right-turn movement without delaying the through and left-turning movements at the westbound approach. Because traffic volumes are lower and there are greater gaps between vehicles at the southern end of the corridor as compared to the northern end of the corridor, vehicles making this turn-movement would be able to successfully merge into the northbound lanes without substantially delaying mainline traffic.

As presented in Table 6.7, delay times on US 93 could be substantially reduced during the AM peak if this spot improvement were implemented. Delay would increase slightly in the PM peak hour, but would the intersection would improve from LOS F to LOS B during the AM peak hour of travel.

**Table 6.7 Intersection of Highway 203 / US 93 (2030)**

| AM Peak Hour Overall Intersection | | | | PM Peak Hour Overall Intersection | | | |
|---|---|---|---|---|---|---|---|
| **No-Build Conditions** | | **Build Conditions** | | **No-Build Conditions** | | **Build Conditions** | |
| **Avg. Delay** (Sec/Veh) | **LOS** | **Avg. Delay** (Sec/Veh) | **LOS** | **Avg. Delay** (Sec/Veh) | **LOS** | **Avg. Delay** (Sec/Veh) | **LOS** |
| >120.0 | F | 15.6 | B | 23.2 | C | 19.4 | B |

Figures 6-21 and 6-22 present the AM and PM results of the intersection spot improvement analysis. Proposed intersection improvements are noted by blue arrows in the inset intersection diagrams.

**Figure 6-21 Overall Intersection LOS - 2030 AM Peak Hour (with Intersection Improvements)**

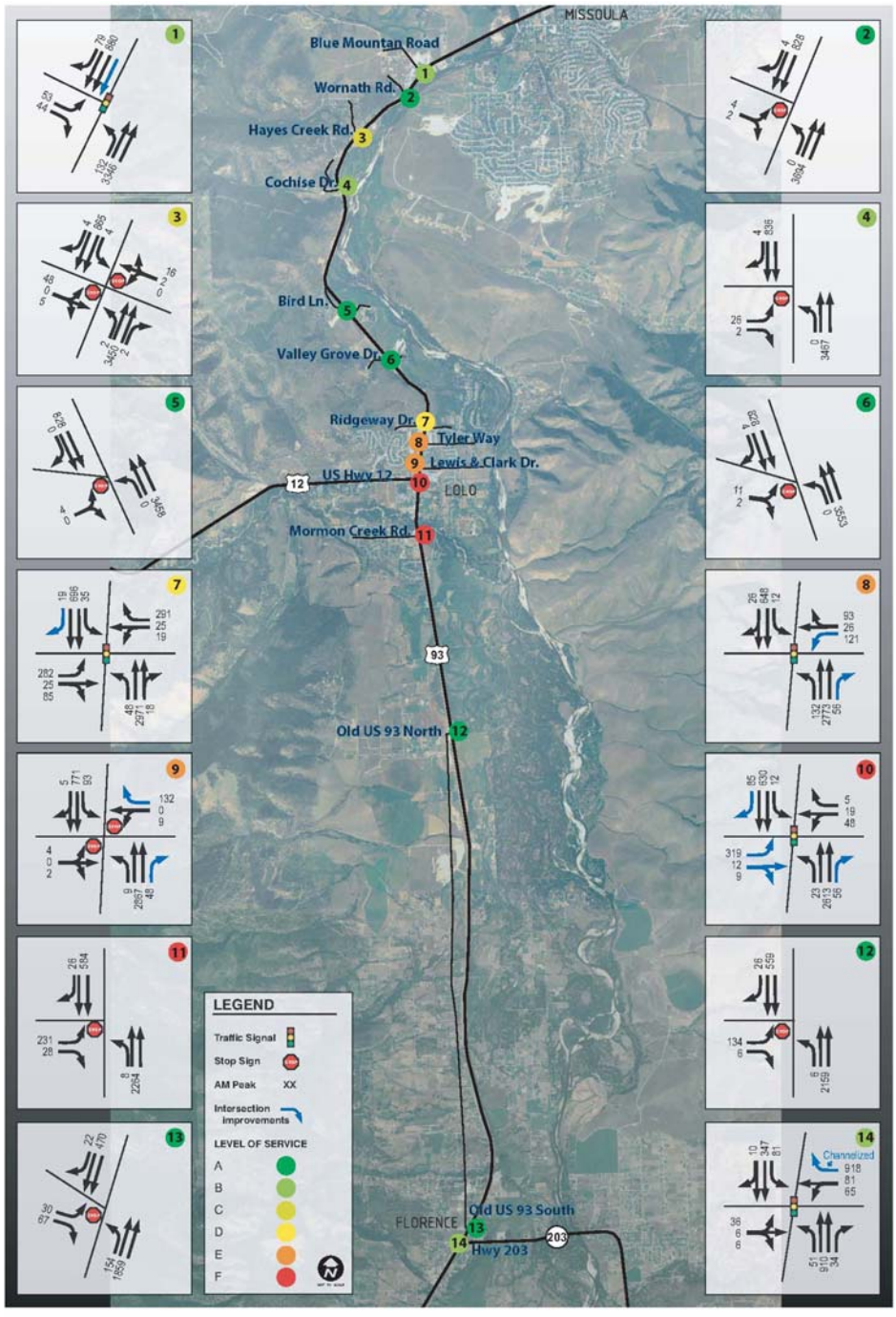
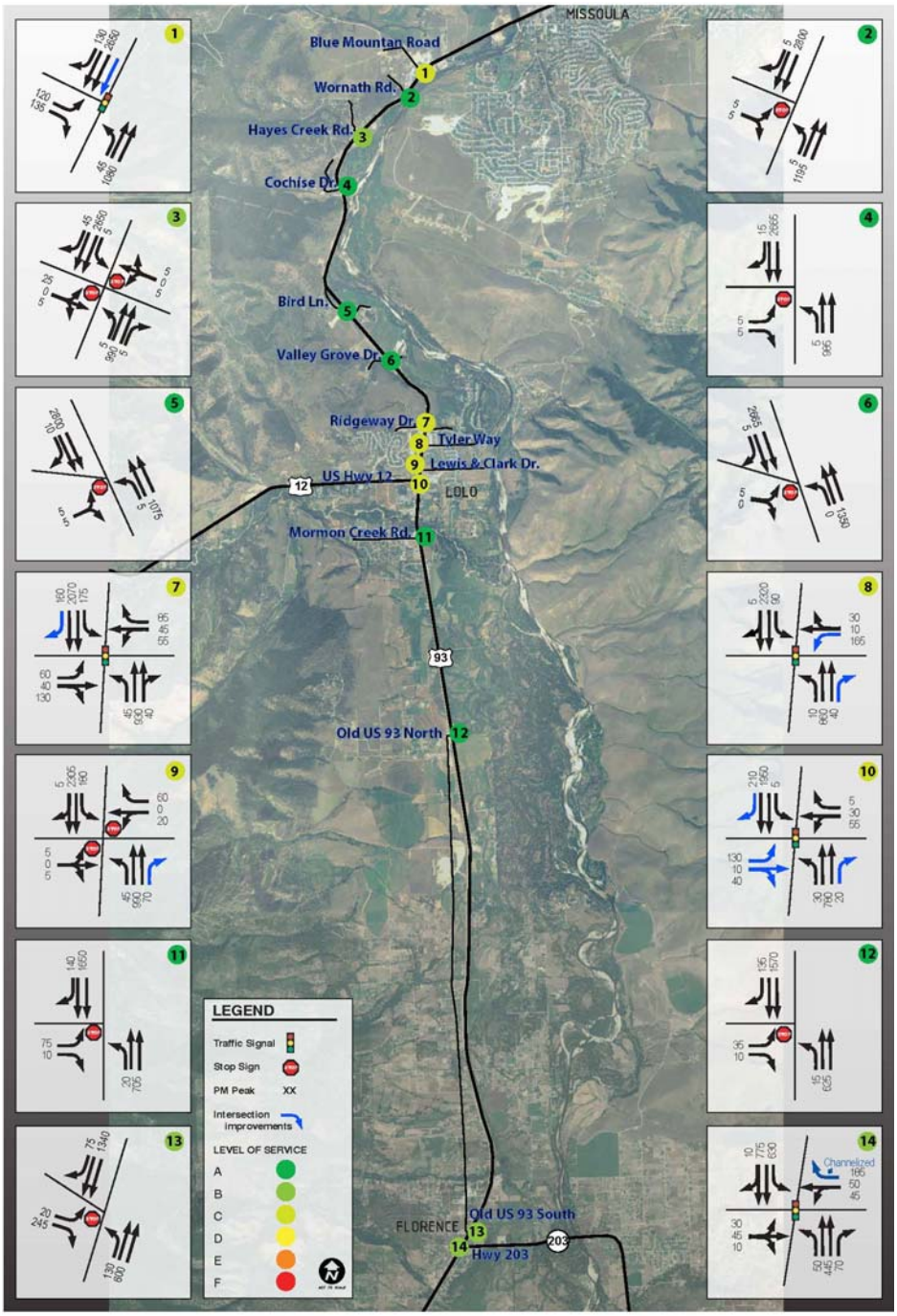


**Figure 6-22 Overall Intersection LOS - 2030 PM Peak Hour (with Intersection Improvements)**

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US 93 TRAFFIC STUDY
Future (2030) Build PM Peak Hour Level of Service - Overall Intersection LOS

***Improved Pedestrian Crossings***

This option was originally proposed in order to improve pedestrian access across US 93. The option would include pedestrian actuation at existing traffic signals and grade-separated walkways providing pedestrian access to park and ride facilities throughout the corridor. The grade-separated crossings could consist of either a bridge extending over the US 93 facility or a tunnel beneath US 93, allowing pedestrian access on either side of the roadway. School crossings are also a perceived safety concern in the corridor. A grade-separated crossing would be beneficial near the Florence and Lolo schools. This option is not intended to address an existing crash concentration relating to pedestrians, but rather to improve pedestrian comfort within the corridor and encourage greater use of recreational and community facilities on both sides of US 93.

***Animal Crossings***

The 2004 report An Assessment of Wildlife and Fish Habitat Linkages on Highway 93 – Western Montana identifies three fish and wildlife linkage areas within the study area, including the areas near Lolo Creek (MP 82±), Miller Creek (MP 85±), and the Bitterroot River (MP 89±). With regard to Lolo Creek and the Bitterroot River, the report recommends modifications to the existing bridges in order to allow wildlife to cross beneath US 93. The 2004 report also recommends construction of a wildlife crossing in the Miller Creek area.

The wildlife crossing locations identified in the 2004 report generally correlate with crash data and roadkill data obtained from MDT covering the period 2002 to 2006. The one-mile stretch between MP 82± and MP 83± contained the highest number of recovered animals, while the roadway segment from MP 88± to MP 89± included the highest number of collisions with wild animals. Additionally, the wildlife crossing locations identified in the 2004 report generally correlate with some segments of US 93 having more crashes than the projected number of crashes expected to occur based on the statewide average crash rate, including the segments from 82.5± to MP 84.4±, and MP 85.6± to MP 89.3±. Wildlife crossings may improve safety performance in these locations.

Wildlife crossings can range from a simple open culvert design to more elaborate bridges and overpasses as used along US 93 from Evaro to Polson. Additional study of wildlife migration patterns may be warranted to determine the wildlife crossing structure most appropriate for use in the study area.

Wildlife habitat and linkage areas have been identified in this document based on existing wildlife travel patterns and land uses within the US 93 corridor. As development continues, the location of these wildlife habitat and linkage areas may change. For example, the construction of major residential subdivision developments within the corridor could impact the habitat and migratory routes of wildlife along US 93. Development trends and wildlife travel patterns would need to be reviewed over the planning horizon to determine if any substantive changes have occurred prior to any major construction project in this corridor.

***Transportation Communication System with Variable Message Board***

In the event of a major incident on US 93 during peak hour travel, vehicles may become stuck in traffic and experience substantial delays. A transportation communication system including variable message boards through the corridor could warn of an incident several miles ahead, allowing drivers to pull off the road prior to reaching queued traffic. Additionally, variable message boards would be required in connection with options proposing reversible lanes. In this application, variable message boards would alert drivers regarding the direction of traffic flow.

***Improved Pullouts***

This option would include the construction of additional pullout locations throughout the corridor, which could be used to stage emergency vehicles, or to provide temporary storage for other emergency vehicles stops, thereby minimizing disruption of mainline traffic flow in the event that a vehicle stalls or becomes incapacitated. Construction of pullout locations would be especially useful in the portion of the corridor between MP 86± and MP 88±, where the roadway width is constrained by a ridge on the west side of US 93 and a drop-off to the east. This area has been identified as a wildlife crossing area. Therefore, any reconstruction or new construction for a pullout must also consider wildlife underpasses.

## Policy Tools

This category of improvement options involves implementation of policies and programs that are designed to influence the ways in which the US 93 travel corridor is utilized and the kinds of uses permitted within the corridor. Because policies are generally implemented through governing bodies, it will be critical to develop education programs for both representatives and constituents regarding the benefits of these policies. In some cases, long-term transportation solutions for the US 93 corridor are only possible with coordinated implementation of the policies presented in this section. Policy categories are described in more detail below and include Incentive/Disincentive Programs, Zoning, Corridor Preservation, Incident Management, and Access Management. Following the description of each of these categories, Table 6.8 provides a summary of proposed policy tools and notes the parties that would be involved in their implementation.

***Incentive / Disincentive Programs***

This category of policy tools is intended to reduce the number of single occupant vehicles on US 93 by either discouraging single-occupancy or by encouraging alternative modes of transportation, including carpool, vanpool, and bus service programs.

Implementation of some of the incentive programs would likely fall under the jurisdiction of existing transit authorities. These programs would encourage commuter use of existing transit services and are described in more detail below.

The existing **Guaranteed Ride Home** program, currently administered by MR TMA and MIM, provides a free taxi ride home from the office for employees who have an emergency arise on a day they used alternative transportation. Additional advertising and education programs regarding this benefit could help increase the number of commuters using alternative modes of transportation.

Existing **telework training programs** currently administered by MR TMA and MIM could be expanded to educate more employers regarding the benefits of teleworking. Teleworking, also known as telecommuting, allows employees to perform work duties in a location other than their company's office location. By encouraging flexible employee schedules, employers have the opportunity to reduce the number of vehicles traveling during peak hours. As a result of allowing or encouraging teleworking and flexible employee schedules, employers would benefit from reduced parking needs and costs, reduced absenteeism, maximized work space, and public recognition.

A **Multi-Modal Access Guide** could be developed to provide comprehensive information about alternative transportation options available within the US 93 corridor. This guide could include a map of the area showing destinations, major roads, nearby landmarks, the closest bus stops and park and ride locations, and recommended cycling and walking routes. The guide should also include information about transit service frequency, fares, first and last runs, public transportation schedules, phone numbers and web addresses for transit service providers and taxi companies, as well as information regarding access arrangements for people with disabilities.

In coordination with the Missoula Parking Commission, the University of Montana, and various employers, MR TMA is working to provide **preferential parking areas** for carpoolers and vanpoolers. Additional advertising and education programs could help increase the number of carpooler and vanpoolers interested in this benefit.

Another set of incentive programs could be coordinated or sponsored by employers, who have an opportunity to influence the commuting behavior of their employees. These programs are described in more detail below.

**Education Programs** could be developed by employers to provide employees with information regarding the benefits of alternative modes of transportation, including cost savings for parking spaces, and flexibility in work schedules.

**Parking Cash Out** or **Travel Allowance** programs could be developed by employers whereby employees who are currently offered subsidized parking would also be offered the cash equivalent if they use alternative travel modes. Commuters would then have the options of using this money to pay for parking or for another travel mode.

Employers could provide a **Cafeteria Plan**, or an employee benefits plan with tax benefits for employers who provide transit options to employees.

Company **travel reimbursement policies** could be revised to include reimbursement of bicycle or transit mileage for business trips when these modes are comparable in speed to driving, rather than only reimbursing automobile mileage.

Employers can offer **flexible work schedules**, including compressed work weeks and staggered shifts, to encourage non-peak travel.

There are also a number of disincentive programs that could be implemented to discourage single-occupant vehicle usage. These programs are described in more detail below.

**Parking Demand Management Strategies** could be implemented within the Missoula city limits to discourage commuters from driving to work. Employers could reduce employee parking subsidies and require commuters who drive to work to pay for some or all of their parking costs. Parking costs for Missoula public parking lots could be increased. The City of Missoula could consider revising the Missoula City Zoning Ordinance to include ceilings for private parking lot sizes and a cost structure for private parking lots could be explored. Revenue used from parking fees could be used to pay for bike racks and covered bus stop shelters. In implementing parking demand strategies, it would be important to balance the desire to reduce single-occupant vehicles with retailers' desire to encourage tourism and shopping.

**Road Pricing** could be explored for the US 93 corridor. This strategy could include the development of a high-occupant-toll (HOT) lane, whereby multiple-occupant vehicles can utilize the designated lane free of charge, but single-occupant vehicles can only utilize the lane by paying a toll. A toll structure could also be implemented for all through travel lanes on US 93. Toll roads are currently not permitted in Montana. Legislative authority would first need to be granted in order to move forward with any kind of toll structure on US 93.

***Zoning and Land Use Planning***

The Transit Analysis conducted for this Corridor Study found that transit ridership is heavily influenced by the density of dwelling units and land use patterns within a catchment area, or the geographic distance from a transit station that passengers are willing to travel to access transit. These factors generally also dictate whether transit programs can be economically sustainable. Accordingly, land use and zoning policies considered in this Study include the encouragement of residential development within previously-developed areas, preservation of open space, and the restriction of certain types of land use directly adjacent to the US 93 facility.

The City of Missoula and Missoula County currently have zoning regulations in place. In this case, additional measures could be undertaken by these entities to **enforce existing regulations**. There currently are no zoning regulations in place in Ravalli County, with the exception of an Interim Zoning Regulation limiting subdivisions to a density of one residence per two acres. Further work could be done to encourage **enactment of formal zoning policies**. In both cases, a **zoning education program** would be beneficial in raising public awareness of the benefits of zoning, including preservation of open space and improving viability of transit programs.

Local governments could consider enacting zoning and/or subdivision regulations with **special provisions** intended to preserve mobility within the US 93 corridor. Examples of these provisions include:

- Requiring internal connections between adjacent developments
- Requiring driveways to be located away from intersections and a minimum "throat" distance of 100 feet
- Requiring consolidation of multiple driveways/shared use access
- Requiring larger setbacks for lots along state highways
- Requiring traffic impact studies for developments
- Requiring coordination with MDT for developments that may impact but do not directly access state highways
- Requiring developments to conform with the Manual on Uniform Traffic Control Devices (MUTCD) for signing and pavement markings for roadways and parking lots
- Requiring development of school bus pick-up/turn around areas
- Requiring development of frontage roads

***Corridor Preservation***

Corridor preservation policies are intended to preserve land areas that could be used in the future for a specific transportation improvement option. While funding is not currently available for some improvement options, these options may become viable at some point in the future if appropriate corridors are preserved in the near-term.

As a first step, **future transportation corridors should be identified**. These could include an east-side bypass corridor from either Lolo to Missoula or from Florence to Missoula and frontage road or connecting roadway corridors. Corridors that have already been identified by local transportation advocacy groups include the existing MRL rail corridor and a corridor for a separated bicycle / pedestrian pathway.

There are a number of means that can be used by local governments to preserve future transportation corridors. First, government entities can **purchase lands** that are intended for future transportation development, although this is a costly method.

Government entities can also exercise their **planning and zoning powers**. Transportation corridor zones can be designated which restrict the type and density of development allowed within these areas. Setback requirements from transportation corridors can also be designated, thereby preserving the potential for future expansion of existing facilities.

A third method includes **voluntary agreements and governmental inducements**. Private landowners can voluntarily agree to help preserve transportation corridors by placing private lands in easements or reserving lands for future transportation development. Density transfer arrangements can be negotiated with private landowners whereby a landowner agrees to leave some land vacant to be used for future transportation purposes and is then allowed to cluster development in excess of governing density requirements on the remaining portion of land. Resulting development on this remaining portion thereby yields an equivalent number of housing units as would have been allowed on the full parcel.

In terms of corridor preservation for a future passenger rail option, MRL would have to abandon their existing rail corridor. Land relinquished through a railroad abandonment is generally first offered to another rail service provider, next offered to another public use such as a Rails-to-Trails program or a highway department, and finally it may revert to the adjacent landowner, depending on the means of original acquisition. For example, if the land was originally granted, it will usually revert to a public entity, whereas if the land was purchased, it could revert to the adjacent landowner. Land for MRL's Bitterroot spur was acquired through a variety of methods, including warrantee deed, purchase from property owners, and through the 1875 land grants. Under an abandonment, reversion would therefore be dictated by individual land parcel records.

As with all other policies, education programs are critical in raising public awareness regarding the long-term benefits of corridor preservation.

***Incident Management***

Many improvement options proposed in this document are intended to improve operation and design of the US 93 corridor, and thereby reduce future incidents. Some incidents cannot be prevented through design strategies, however. Accordingly, it is important to consider incident management policies, which have the potential to improve response times to incidents within the US 93 corridor.

An **Incident Management Plan** is a key first step in improving response to incidents and should include the five components described below.

> The Plan should outline methods for **detection of the incident**. This may include a driver education program and signs posted throughout the corridor to encourage incident reporting through 911.

**Incident response** protocols should be outlined in the Plan. The Plan may encourage or require the development of a coordinated incident response team, including state, county, city, and other officials. The Plan should describe the process for immediately alerting responding agencies.

The Plan should describe methods for **motorist information dissemination**. This may include activation of permanent variable message signs within the corridor to alert drivers to the incident and inform them of an alternate route, including Old US 93. The Plan may also encourage the creation of an emergency radio station and hotline.

**Site management** procedures should be outlined. This could include a motorist education program and variable message signs encouraging those involved in minor crashes to pull onto the shoulder to avoid creating a hazard for other motorists.

The Plan should also outline **incident clearance procedures**, and may identify appropriate pullouts and parallel roadways that can be used to move impacted vehicles following an incident.

***Access Management***

Access management is critical in ensuring proper function of the US 93 facility and will become even more important as volumes on US 93 continue to grow over the 2030 planning horizon. Access management policies considered in this study are intended to reduce the number of direct access points on US 93 by consolidating or closing existing access points and limiting the number of new access points.

An Access Control Report was developed for the portion of the US 93 corridor between Missoula and Lolo and has been posted to the US 93 Corridor web site at http://www.mdt.mt.gov/pubinvolve/us93corridor/docs/access_report.pdf Access management recommendations for the remainder of the corridor are included in the Hamilton to Lolo EIS located online at http://www.mdt.mt.gov/pubinvolve/docs/eis_ea/eis_us93hamilton.pdf (86MB). As a first step, the recommendations from these two documents could be implemented and enforced. In addition to these recommendations, this study encourages consideration of frontage roads or connecting local roadway networks that could be used to consolidate existing access points and direct traffic to designated access points on US 93.

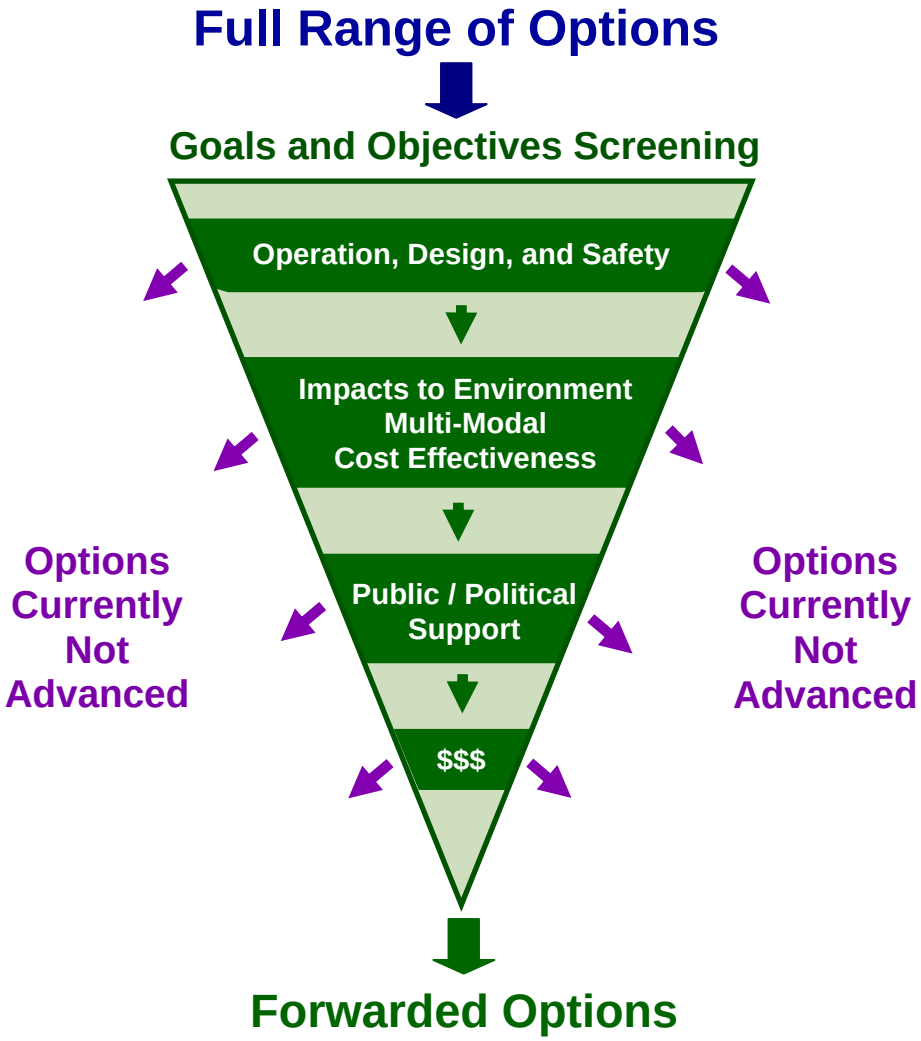
**Table 6.8 Summary of Policy Tools and Parties Responsible for Implementation**

| Category | Policy / Strategy | Lead Entity | Other Key Players |
|---|---|---|---|
| Incentives | Carpool program | Missoula Ravalli Transportation Management Association (MR TMA) | Missoula in Motion (MIM)<br><br>School Districts |
| | Guaranteed ride home | | |
| | Telework training program | | |
| | Van pool program | | |
| | Multi-Modal Access Guide | | |
| | Preferential Parking Areas | Employers | MIM<br>MR TMA<br>Missoula Parking Commission |
| | Employee Education Program | | |
| | Parking Cash Out / Travel Allowances | | |
| | Cafeteria Plan | | |
| | Travel reimbursement policies | | |
| | Flexible work schedules | | |
| Disincentives | Reduced employee parking subsidies | Employers | None Identified |
| | Parking Demand Management | City of Missoula | Missoula Parking Commission |
| | Road Pricing | MDT; City of Missoula; Counties | None Identified |
| Zoning and Land Use Planning | Encourage enactment of additional zoning regulations | Ravalli and Missoula Counties | None Identified |
| | Enforce existing zoning regulations | City of Missoula; Counties | |
| | Zoning Education Program | | |
| Corridor Preservation | Identify future transportation corridors | MDT; Missoula and Ravalli Counties | |
| | Utilize various corridor preservation planning tools, including land acquisition; exercise of planning and zoning powers; and voluntary agreements and government inducements | | |
| Incident Management | Develop Incident Management Plan | MDT; City of Missoula; Counties; First Responders | |
| Access Management | Implement recommendations from Access Control Report (Lolo to Missoula) and Hamilton to Lolo EIS | MDT; Missoula and Ravalli Counties | |
| | Consider use of Old US 93, residential corridors, and forest service roads as frontage routes in order to consolidate access points | | |

## 6.2 Evaluation of Improvement Options

Improvement options were evaluated in the context of the stated goals for the Corridor Study to improve safety and operation within the US 93 corridor. Options were further reviewed in the context of a set of Corridor Study objectives, which encourage the minimization of impacts to environmental resources, enhancement of multi-modal travel, provision of cost-effective solutions, public and political support, and consideration of funding sources. Figure 6-23 illustrates this screening process.

**Figure 6-23 Improvement Option Screening Process**




The following section provides an explanation of how each option meets or fails to meet the stated goals and objectives for corridor improvements. The Operation, Design, and Safety screen

was used to determine whether options address the operational issues identified within the US 93 corridor, as described in Chapters 4 and 5. Following the first screen, the remaining options were evaluated in the context of the improvement objectives. No single objective was weighted more heavily than any other in this evaluation process. In some cases, forwarded options were not able to individually meet all of the improvement objectives. When viewed collectively with other forwarded options, however, each option plays a role in providing a safe and efficient transportation system offering a number of travel mode options. Overall, the forwarded package of options attempts to provide low-impact, cost-effective, publicly-supported transportation solutions over the course of the 20-year planning horizon.

This Corridor Study evaluates a number of improvement options falling under the jurisdiction of Missoula and Ravalli counties, the City of Missoula, Mountain Line, Missoula Ravalli Transit Authority (MR TMA), private advocacy groups, and other parties. Some of the improvement options are currently not advanced for their failure to meet the stated goals and objectives of the Study. Parties that would be responsible for coordinating implementation efforts are encouraged to further consider the merits of these options. If in the future there is sufficient local support and funding, these options could move forward in an independent process.

## Options Adding Vehicular Capacity

Based on the traffic analysis conducted for this study, by 2030 the US 93 facility is projected to approach maximum capacity in the northern portion of the corridor during peak hours of travel. As noted in Section 5.2, US 93 may operate at LOS C, D or worse, depending on the terrain and free flow speed of the corridor segment in question. The southern portion of the corridor is projected to continue to operate at LOS A or B, and therefore would not require additional vehicular capacity.

Adding travel lanes in the northern portion of US 93 would increase the capacity of the roadway, thereby alleviating projected congestion. While an option adding vehicular capacity has clear operational benefits, implementation would be difficult. Through Lolo, travelers are delayed at signalized intersections; this delay would not be improved with the addition of new lanes through Lolo. Additionally, constructing new lanes over this portion of the corridor would have substantial impacts on adjacent development.

To the north of Lolo, from approximately MP 86.5 to MP 88.5, the roadway narrows from a five lane section to a four lane section as the terrain shifts from level to rolling, and a sharp drop-off on the east side of US 93 constrains roadway width. In order to construct additional lanes over this portion of the corridor, a large retaining wall or bridge structure would be required, which would substantially increase the cost of construction.

Construction of new lanes on US 93 would require the purchase of additional right-of-way and could have substantial environmental impacts. Furthermore, there currently is no funding available for such an option over the planning horizon. For these reasons, **options proposing additional travel lanes on US 93** are currently not advanced in this Corridor Study. These options may become viable at some point in the future if funding sources are identified.

**Table 6.9 Screening of Options Adding Travel Lanes on US 93**

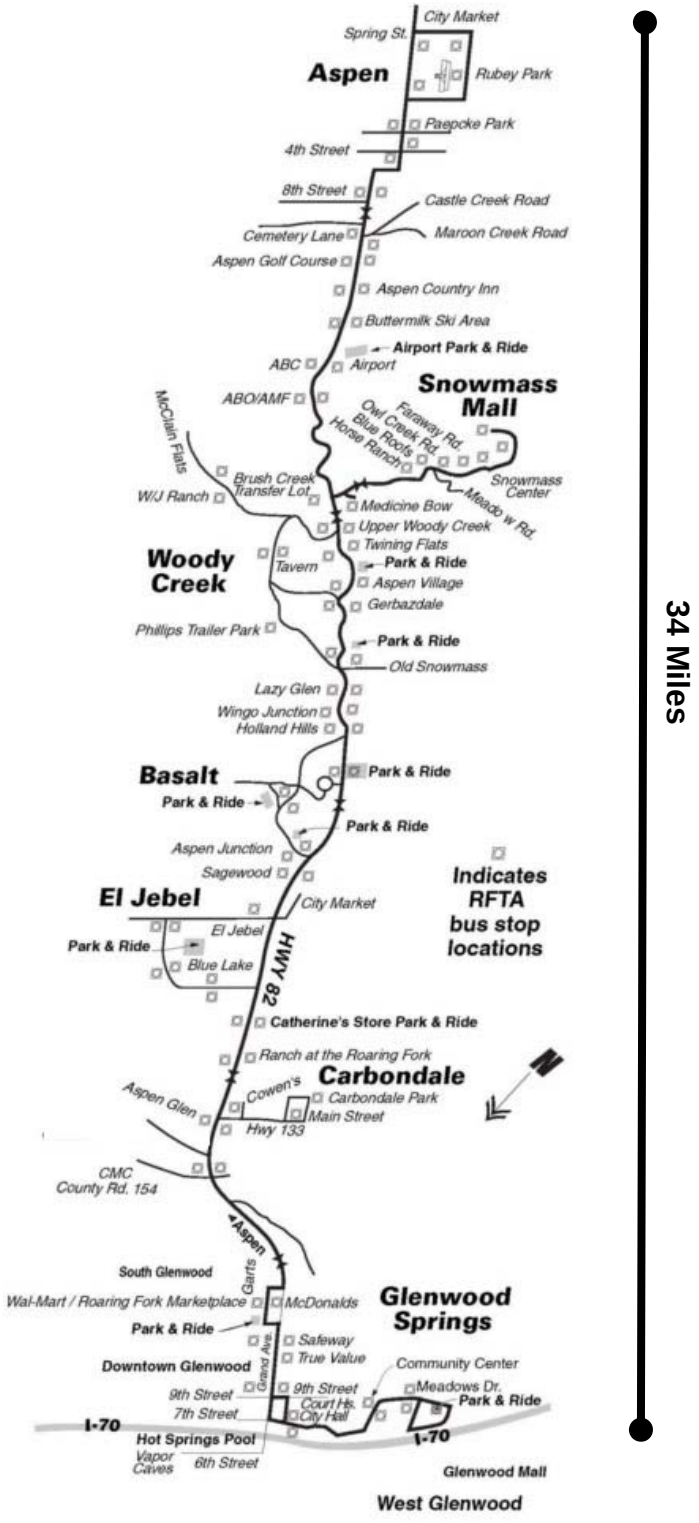
| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Additional travel lanes on US 93 would increase the capacity of the roadway, thereby alleviating projected congestion. Existing geometric issues within the corridor would be addressed as part of any reconstruction project. | **Currently Not Advanced** in this Study |
| Impacts to Environment | Options proposing additional travel lanes would have more substantial impacts to the surrounding built and natural environment when compared to other options that do not add roadway capacity. | |
| Multi-Modal | Options adding lanes would improve overall functionality of the corridor, but would not specifically enhance mode choice. | |
| Cost Effectiveness | Construction of additional lanes on US 93 from Lolo to Missoula would range in cost from $100,000,000 for two new lanes to $350,000,000 for an elevated expressway with two new lanes. These estimates include the cost of reconstruction of the existing US 93 lanes in the northern portion of the corridor. Estimates for additional lanes on US 93 also include the cost of a retaining wall over a one-mile portion of the corridor between Lolo and Missoula. | |
| Public/Political Support | There is mixed public support for construction of additional lanes on US 93. | |
| Fundability | Currently, there is no state or federal funding available for additional lanes on US 93. Detailed information about funding sources is provided in Section 7.2. | |

As with options adding travel lanes, **options proposing additional HOV lanes on US 93** would increase capacity of the roadway while facing similar implementation challenges, including potential impacts to adjacent development, difficult terrain, and right-of-way costs. Options proposing HOV lanes would also involve a unique set of operational challenges.

HOV lanes are most effective when implemented in corridors with land use and development patterns that support high transit usage. The Transit Analysis conducted for this study included a comparative assessment of peer communities, including the Roaring Fork region of Colorado. The Roaring Fork Valley is located in western Colorado on State Highway 82 just south of Interstate 70. This corridor has experienced substantial growth in the last 40 years due to the popularity of Aspen, Colorado as a place to recreate and live. The impact of this popularity has increased housing values in Aspen and traffic on State Highway 82, and has transitioned work-force housing to outlying communities. A bus system was implemented to alleviate congestion problems in the corridor. The Roaring Fork Transportation Authority (RFTA) operates the

transit system in the valley. The spine of the system is a coach bus route between Glenwood Springs and Aspen for a total of 34 miles, as shown in Figure 6-24. The service averages approximately 8,500 daily passengers, with a one-way peak hour directional capacity of 200 passengers.

**Figure 6-24 RFTA Highway 82 System Map**



The success of the Roaring Fork bus system has been due to the large commuting population of workers that live a distance away from Aspen in dense residential areas; high housing and parking costs in Aspen; and high congestion levels on Highway 82, which encourage transit use. For many workers, transit services provide the most economical and efficient means to reach Aspen from their homes in other communities. HOV lanes are currently planned to be constructed in the Highway 82 corridor.

As discussed in greater detail in the transit options section, the US 93 corridor does not currently exhibit the type of land use development patterns associated with high transit usage. Based on existing development patterns, projected transit mode share in the US 93 corridor as it is currently configured is optimistically estimated at between two and five percent of all work trips.

Adding designated HOV lanes may result in a higher transit mode share, although this would be most likely if HOV lanes could provide a time-travel advantage over single-occupant lanes, thereby encouraging commuters to utilize transit services. In the US 93 corridor, multiple-occupant vehicles would likely experience only a minimal time travel advantage due to delays for all lanes at signalized intersections throughout the corridor. A substantial time travel advantage would be provided if US 93 were a fully access controlled facility. Under full access control conditions, multiple-occupant vehicles would experience uninterrupted travel at higher speeds as compared to single occupant vehicles traveling in congested lanes during peak direction peak hour travel.

While options adding HOV lanes would provide some additional capacity, additional HOV lanes would only minimally reduce congestion on US 93. Without dense residential development patterns and clear time-travel advantages, transit mode share is not likely to exceed percentages projected in the Transit Analysis.

As with options proposing additional travel lanes, there currently is no funding available over the planning horizon for options adding HOV lanes. For this reason, **options proposing additional HOV lanes on US 93** are currently not advanced in this Corridor Study. These options may become viable at some point in the future if funding sources are identified.

**Table 6.10 Screening of Options Adding HOV Lanes on US 93**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Constructing new HOV lanes on US 93 would provide some additional roadway capacity, although this may not appreciably reduce congestion levels. Only a small percentage of commuters are projected to utilize transit services due to development patterns in the corridor and the lack of time travel advantage provided by HOV lanes. Existing geometric issues within the corridor would be addressed as part of any reconstruction project. | **Currently Not Advanced** in this Study |
| Impacts to Environment | Options proposing additional HOV lanes would have more substantial impacts to the surrounding built and natural environment when compared to other options that do not add roadway capacity. | |
| Multi-Modal | These options would provide dedicated lanes for multiple-occupant vehicles. Without a substantial time travel advantage, however, HOV lanes would provide a minimal incentive to utilize transit services. | |
| Cost Effectiveness | Construction of additional HOV lanes on US 93 from Lolo to Missoula would range in cost from $100,000,000 to $125,000,000. These estimates include the cost of reconstruction of the existing US 93 lanes in the northern portion of the corridor and the cost of a retaining wall over a one-mile portion of the corridor between Lolo and Missoula. | |
| Public/Political Support | There is mixed public support for construction of additional lanes on US 93. | |
| Fundability | Currently, there is no state or federal funding available for additional HOV lanes on US 93. Detailed information about funding sources is provided in Section 7.2. | |

A **bypass route** would not only provide additional capacity within the US 93 corridor, it would also provide secondary access to and from Missoula that could be used in the event of an incident on US 93. Currently, there is no alternate route linking Missoula and the Bitterroot Valley. A bypass route would, however, have impacts to the surrounding built and natural environment and the cost of this project is beyond current and projected funding availability at the state and local level. Depending on the specific location of the route, a bypass to the east of US 93 could encounter rough terrain and a number of river crossings, thereby increasing the cost of construction. There is minimal public support for such an option at this time. The majority of public meeting attendees opposed a bypass option out of concern that a new roadway may promote development in previously undisturbed areas. Additionally, there currently is no state or federal funding available for a bypass route. For these reasons, this option is currently not advanced in this Corridor Study.

If in the future there is sufficient local support and local / private funding, a bypass option could move forward in an independent process. In order to be reconsidered in the future, however, corridor preservation planning mechanisms must be implemented in the near term. These planning mechanisms are included in the set of policy tools which are recommended by this Study.

**Table 6.11 Screening of Bypass Options**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | A bypass route would provide additional capacity in the US 93 corridor and secondary access to and from Missoula that could be used in the event of an incident on US 93, providing safety and operational benefits. | **Currently Not Advanced** in this Study |
| Impacts to Environment | A bypass would have more substantial impacts to the surrounding built and natural environment when compared to other options that do not add roadway capacity. | |
| Multi-Modal | A bypass option would improve overall functionality of the corridor in the event of an incident but would not specifically enhance mode choice. | |
| Cost Effectiveness | Construction of a bypass option could range from $11,000,000 to $30,000,000, depending on whether the bypass extended from Lolo or from Florence. These cost estimates do not include consideration of rough terrain or river crossings, which would increase the cost substantially. | |
| Public/Political Support | There is minimal public support for a bypass option at this time due to concern that a new roadway may promote development in previously undisturbed areas. | |
| Fundability | Currently, there is no state or federal funding available for a bypass route. Private / local funding sources would be needed in order for this option to move forward. Detailed information about funding sources is provided in Section 7.2. | |

The set of three **Lolo Options** would provide additional capacity either on or adjacent to US 93. Although overall intersection LOS for Lolo study intersections currently ranges from LOS A to B during peak hours, these intersections are projected to operate at LOS D, E, and F during the 2030 AM peak hour.

Peak hour, peak direction mainline through volumes are projected to range from approximately 2,000 to 2,600 vehicles at the intersection of US 93 and US 12 by 2030. These high mainline volumes coupled with relatively high volumes turning onto US 93 from side streets create a bottle-neck effect in Lolo given the slower in-town speeds and the closely-spaced signalized intersections.

By 2030, 319 vehicles are projected to make an eastbound to northbound left turn from US 12 onto US 93 during the AM peak hour, while 210 vehicles are projected to make a southbound to westbound right turn movement from US 93 onto US 12 during the PM peak hour. With the flyover ramp and tunnel options, these traffic volumes traveling between areas to the north and west of Lolo would be able to bypass heavy in-town mainline volumes during peak hours. By redirecting volumes traveling to and from westside developments, mainline volumes between US 12 and Ridgeway Drive would be reduced, thereby reducing mainline delay over this portion of US 93. The option adding lanes in Lolo would add capacity directly on US 93, thereby reducing in-town delay.

There would be substantial impacts resulting from all of these options, including right-of-way acquisitions and potential relocations of businesses and residences.

There currently is no state or federal funding available for this set of options. For this reason, these options are currently not advanced in this Corridor Study.

This set of options was developed following the intersection spot improvement analysis, and was presented at the set of final public meetings in August 2008. Meeting attendees expressed opposition to all three Lolo options. If in the future there is sufficient local support and local / private funding, one of these options could move forward in an independent process. Additional analysis would need to be conducted to determine which option would provide the most benefit in terms of mainline operations while minimizing cost and impacts to built and natural resources.

**Table 6.12 Screening of Lolo Options**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | These options would increase capacity in the Lolo vicinity, thereby reducing in-town mainline delay. | **Currently Not Advanced** in this Study |
| Impacts to Environment | This set of options would have more substantial impacts to the surrounding built and natural environment when compared to other options that do not add roadway capacity. | |
| Multi-Modal | These options would improve overall functionality of the corridor in the Lolo vicinity but would not specifically enhance mode choice. | |
| Cost Effectiveness | Costs for Lolo Options are being developed. | |
| Public/Political Support | This set of options was developed following the intersection spot improvement analysis, and was presented at the final set of public meetings in August 2008. Meeting attendees expressed opposition to the Lolo options. | |
| Fundability | Currently, there is no state or federal funding available for any of these options. Private / local funding sources would be needed in order for this option to move forward. Detailed information about funding sources is provided in Section 7.2. | |

## Transit Options

A number of factors influence transit ridership. Primary among these are the density of dwelling units and land use patterns within a catchment area, or the geographic distance from a transit station that passengers are willing to travel to access transit. Congestion levels, accessibility, and the type and frequency of service offered are also important factors affecting whether travelers choose to use transit services. Transit services can be offered in the absence of density and land use thresholds, but may be less economically sustainable.

Transit mode share is the percentage of transit work trips, compared to work trips by all modes of transportation, which occur during the peak travel period. The mode share concept was utilized in the Transit Analysis to determine the potential transit ridership market in the absence of a regional travel model, travel survey information, or other means. Based on 2000 Census data, the Mountain Line service offered in the city of Missoula had a two percent transit mode share for work trips.

It should be noted that the 2008 Missoula Long-Range Transportation Plan Survey Draft Final Report was prepared concurrent with this Corridor Study and was completed in April 2008. The telephone survey, conducted by the University of Montana Bureau of Business and Economic Research (BBER), found that 6.5 percent of Missoula-area workers age 18 or older use public transportation when commuting to work, representing over four percent greater transit mode share than reported by the US Census Bureau. The BBER survey disclosed a 95 percent confidence interval. When accounting for error, public transportation mode share reported by the BBER survey appears to be generally consistent with Census data. The US Census Bureau is cited for the purposes of this Study because it is widely accepted as a reputable and objective source of data.

The transit mode share measurement provides a basis for the demand for transit service in the US 93 corridor. Table 6.13 presents potential ridership numbers within the study area under three mode share scenarios.

**Table 6.13 Potential Ridership within US 93 Study Area**

| | Potential Ridership within US 93 Study Area | | | | | |
|---|---|---|---|---|---|---|
| **Mode Share Scenarios** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** |
| **2% Mode Share** | 130 | 140 | 160 | 170 | 190 | 210 |
| **5% Mode Share** | 330 | 360 | 390 | 430 | 470 | 510 |
| **10% Mode Share** | 660 | 720 | 780 | 860 | 940 | 1030 |

Achieving a two percent transit commute mode share within the US 93 corridor assumes that peak hour travelers will follow trends similar to those using Mountain Line in Missoula, as reported by the US Census Bureau. A five percent transit commute mode share assumes that

transit ridership in the study area would double the ridership of Mountain Line, while a ten percent transit commute mode share would be approximately five times that of Mountain Line, using US Census Bureau data. Based on the Transit Analysis, transit mode share is optimistically estimated at between two and five percent over the 2030 planning horizon.

Under dense residential development and other favorable conditions, transit services generally have the potential to reduce the number of single occupant vehicles on the roadway. Given the projected transit mode share in the US 93 corridor over the 2030 planning horizon, however, it is unlikely that transit will appreciably reduce congestion levels on the roadway unless there are substantial changes in density characteristics or land use patterns during that period. Despite the relatively minimal impact that transit options are predicted to have on US 93 congestion levels, the public's strong desire for mode choice was given considerable weight in the screening process where practicable.

**Enhanced vanpool / carpool programs, improved park and ride facilities,** and a **fixed route bus service** are options that would provide additional mode choice. Near-term implementation could involve improving park and ride facilities, expanding the existing carpool program, and increasing the number of vanpools in operation. A peak hour fixed route bus service could be developed over the mid-term and bus service could be expanded to non-peak periods over the long term. These phased options are recommended in this Corridor Study.

**Table 6.14 Screening of Enhanced Vanpool / Carpool Programs, Improved Park & Ride Facilities, and Fixed Route Bus Service**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | These options would encourage ridesharing and would provide mode choice, thereby potentially reducing the number of single-occupant vehicles on US 93 and improving operation within the corridor, although this reduction is anticipated to be minimal given projected rideshare estimates. | **Recommend** |
| Impacts to Environment | This option would not impact the environment because no new construction would be required. | |
| Multi-Modal | This option would enhance mode choice. | |
| Cost Effectiveness | **Improving park and ride facilities** would cost approximately $150,000 per location. According to the Five Valleys Regional Transit Study, strengthening the **carpool program** through enhanced outreach efforts would cost approximately $5,000, while expanding the **vanpool program** would cost approximately $40,000 for the purchase of each additional vehicle. Developing a fixed route **bus service** could range from $400,000 up to $8,000,000. The lower end of this range is drawn from the Five Valleys Regional Transit Study and includes the capital cost of three small buses. The upper end of this range was developed under this Corridor Study and includes the purchase of seven hybrid buses, land acquisition, station construction, and a service facility. | |
| Public/Political Support | There is strong public support for options enhancing mode choice in the corridor. | |
| Fundability | There are a number of potential funding sources for transit options. Funding for these options would need to be arranged through Missoula and Ravalli Counties, the City of Missoula, and local transit organizations. Detailed information about funding sources is provided in Section 7.2. | |

There is strong support for **passenger rail** service within the US 93 corridor. In order to be cost effective, however, this option would require a combination of densification of population and employment throughout the US 93 corridor, and a higher mode share than is projected over the 2030 planning horizon. Even assuming these requirements could be met, there currently is no state or federal funding for this option. For this reason, this option is currently not advanced in this Study. If in the future there is sufficient local support and local / private funding, passenger rail could be reconsidered by these entities in an independent process.

**Table 6.15 Screening of Passenger Rail Option**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Passenger rail could potentially reduce the number of single-occupant vehicles on US 93, although this reduction is anticipated to be minimal given projected rideshare estimates.<br><br>Implementing passenger rail service would likely increase delay at existing at-grade crossings. Additionally, this option could increase the number of at-grade crossings throughout the corridor with the addition of new stations, thereby creating additional conflict points with vehicles, pedestrians, and bicyclists. | **Currently Not Advanced** in this Study |
| Impacts to Environment | This option could result in impacts to the environment associated with construction of rail stations. | |
| Multi-Modal | This option would enhance mode choice. | |
| Cost Effectiveness | Passenger rail would cost approximately $123,700,000 in capital construction and rolling stock. Annual operating and maintenance costs for peak hour rail service would be approximately $6,200,000, while all day rail service would cost approximately $6,700,000 to operate and maintain. These costs are very high when viewed on a per-rider basis. | |
| Public/Political Support | There is strong public support for options enhancing mode choice in the corridor. | |
| Fundability | There is no state or federal funding available for passenger rail service. Private / local funding sources would need to be arranged in order for this option to move forward. Detailed information about funding sources is provided in Section 7.2. | |

## Other Options Enhancing Mode Choice

The Bitterroot Trail Committee and public meeting attendees did not express strong support for **bike lanes** on US 93 when compared to a separated bicycle / pedestrian path due to perceived safety and comfort concerns associated with bicycle travel directly adjacent to high speed vehicles. For this reason, this option is currently not advanced in this Corridor Study. It should be noted that bicyclists may still legally use the shoulder of the existing US 93 facility.

**Table 6.16 Screening of Bike Lanes**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Construction of bike lanes on US 93 would provide a continuous facility for bicyclists and improve current conditions. | **Currently Not Advanced** in this Study |
| Impacts to Environment | Construction of bike lanes on US 93 would result in some impacts to the environment due to the increased roadway width. | |
| Multi-Modal | Bike lanes on US 93 would provide a continuous facility for bicyclists, thereby enhancing mode choice. | |
| Cost Effectiveness | Bike lanes would total approximately $4,000,000 for continuous facilities on both sides of US 93. | |
| Public/Political Support | There is little public support for this option. The Bitterroot Trail Committee and public meeting attendees preferred separated pathways as opposed to bike lanes on US 93. | |
| Fundability | MDT generally funds and constructs bike lanes in connection with roadway reconstruction projects. Detailed information about funding sources is provided in Section 7.2. | |

The Bitterroot Trail Committee and public meeting attendees have stated a preference for a **separated bicycle / pedestrian path** when compared to bike lanes. Increased distance from high speed vehicles on US 93 was perceived to provide greater safety and comfort for bicycle users. Furthermore, pedestrians would be more likely to use separated pathways, whereas on-street bike lanes would likely only be used by bicyclists. For this reason, this option is recommended in this Corridor Study. For the purpose of this screening, this option is defined as a continuous pathway adjacent to US 93. This option could be modified in the future if the Bitterroot Trail Committee identifies a different preferred alignment through their anticipated feasibility study.

**Table 6.17 Screening of Separated Bicycle / Pedestrian Path**

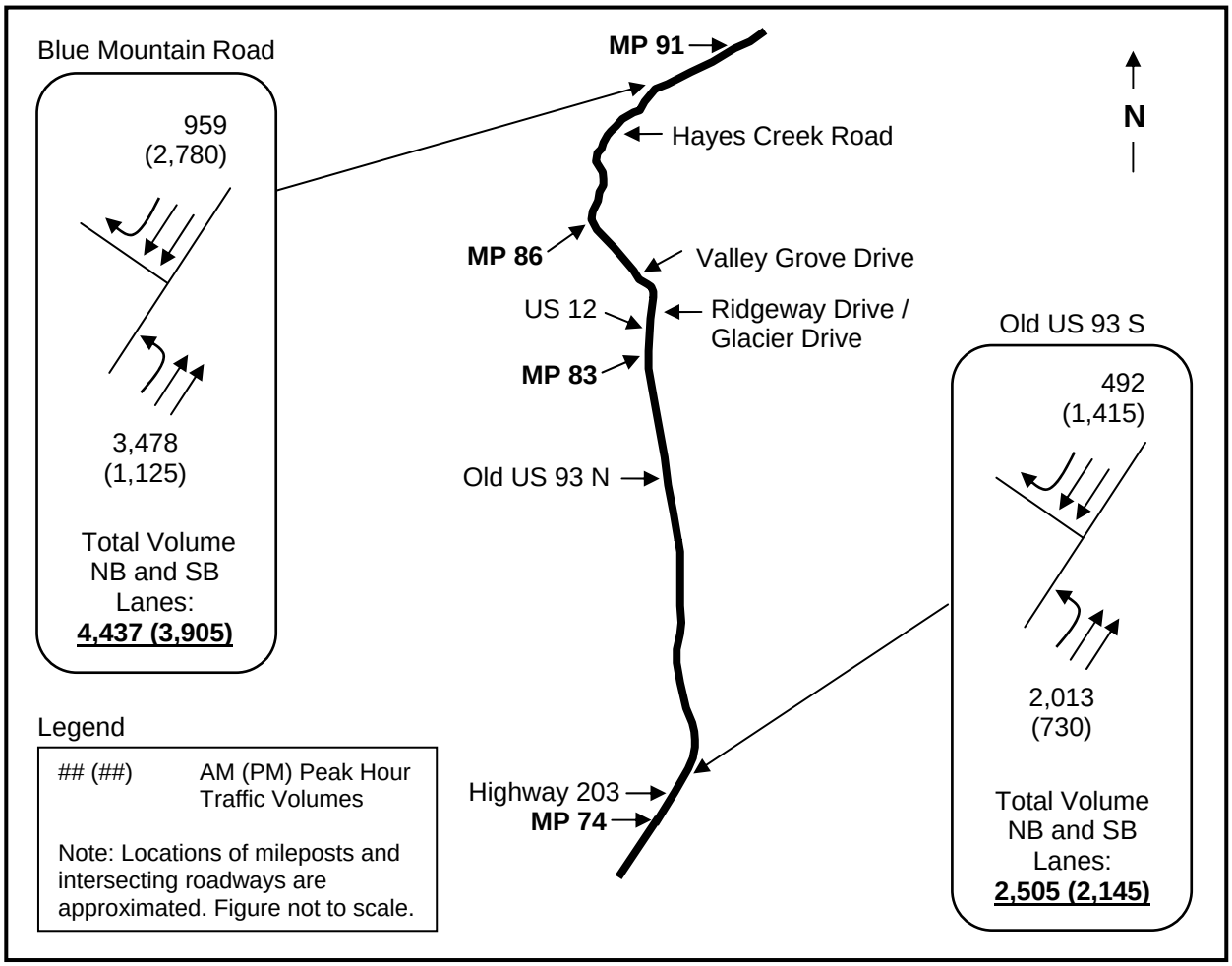
| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | This option would provide a safe, continuous facility for pedestrians and bicyclists. Separation of the pathway from the roadway would improve safety, comfort and operation for all modes. | **Recommend** |
| Impacts to Environment | This option would impact the environment due to the footprint of the pathway. | |
| Multi-Modal | This option would enhance mode choice. | |
| Cost Effectiveness | Using a construction cost estimate of $100,000 per mile, a continuous pathway adjacent to US 93 could cost approximately $2,200,000. This estimate does not include consideration of rough terrain or river crossings, which would increase the cost substantially. Estimates for additional alignments under consideration by the Bitterroot Trail Committee were not developed for this Corridor Study. | |
| Public/Political Support | There is strong public support for this option; Bitterroot Trail Committee members and public meeting attendees preferred separated pathways as opposed to bike lanes on US 93. | |
| Fundability | CTEP funds could potentially be used for this project. Funding for this option would need to be arranged and coordinated through Missoula and Ravalli Counties, the City of Missoula, and local transit organizations. Detailed information about funding sources is provided in Section 7.2. | |

## TSM / TDM

Two options in this category are currently not advanced due to functionality concerns. The **Super Two with Roundabouts** option would eliminate one through lane in each direction on US 93, thereby constraining travel to the remaining single through lane in each direction. As traffic volumes continue to grow over the planning horizon, a two lane roadway would not be able to accommodate safe, efficient travel over this corridor.

By 2030, the four existing US 93 northbound and southbound lanes are projected to carry a total of approximately 4,400 vehicles in the northern portion of the corridor and 2,500 vehicles in the southern portion of the corridor during the AM peak hour, as shown in Figure 6-25. US 93 is projected to carry approximately 3,900 vehicles in the northern portion of the corridor and 2,100 vehicles in the southern portion of the corridor during the PM peak hour.

**Figure 6-25 Projected 2030 Volumes on US 93**



As presented in Table 6.18, the Highway Capacity Manual (2000) estimates that approximately 870 vehicles per hour can be accommodated by a Class I two-lane rural highway operating at LOS C, 1,460 vehicles per hour at LOS D, and 2,770 vehicles per hour at LOS E, assuming level terrain and a free flow speed of 60 miles per hour. Under the best terrain and vehicle speed conditions, the US 93 corridor could operate at LOS E in the southern portion of the corridor and LOS F in the northern portion of the corridor given a single through lane in each direction, as proposed under this option. By eliminating a single through lane in each direction, the Super Two option would sacrifice capacity and force vehicles into the remaining single through lane in each direction. This reconfigured lane structure would result in higher congestion levels and longer delays at intersections resulting from the loss of capacity.

**Table 6.18 Example Service Volumes for a Class I Two-Lane Rural Highway**

| Free Flow Speed (mi/h) | Terrain | Level of Service (LOS) Categories | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | E |
| | | Service Volumes (veh/h) | | | | |
| 65 | Level | 260 | 480 | 870 | 1,460 | 2,770 |
| | Rolling | 130 | 290 | 710 | 1,390 | 2,590 |
| | Mountainous | N/A | 160 | 340 | 610 | 1,300 |
| 60 | Level | 260 | 480 | 870 | 1,460 | 2,770 |
| | Rolling | 130 | 290 | 710 | 1,390 | 2,590 |
| | Mountainous | N/A | 160 | 340 | 610 | 1,300 |
| 55 | Level | N/A | 330 | 870 | 1,460 | 2,770 |
| | Rolling | N/A | 170 | 710 | 1,390 | 2,590 |
| | Mountainous | N/A | 110 | 340 | 610 | 1,300 |
| 50 | Level | N/A | N/A | 330 | 1,000 | 2,770 |
| | Rolling | N/A | N/A | 170 | 790 | 2,590 |
| | Mountainous | N/A | N/A | 110 | 420 | 1,300 |
| 45 | Level | N/A | N/A | N/A | 330 | 2,770 |
| | Rolling | N/A | N/A | N/A | 170 | 2,590 |
| | Mountainous | N/A | N/A | N/A | 110 | 1,300 |

Source: HCM 2000, Exhibit 12-15 Example Service Volumes for a Class I Two0Lane Rural Highway
Assumptions: 60/40 directional split; 20-, 40-, and 60- percent no passing zones for level, rolling, and mountainous terrain, respectively; 14 percent trucks; and 4 percent RVs.
N/A = not achievable for the given condition

Replacing stop-controlled and signalized intersections with roundabouts would also cause operational difficulties. Because volumes on US 93 are comparatively large and would be forced from two through lanes in each direction into a single through lane in each direction, there would be fewer gaps on the mainline. Accordingly, smaller volumes on side streets would have greater difficulty accessing US 93 during peak hours as compared to current conditions. For these reasons, this option is currently not advanced in this Corridor Study.

**Table 6.19 Screening of Super Two with Roundabouts**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | This option would reduce the functionality of the corridor by removing one through lane in each direction. Further, it is likely that roundabouts would make it more difficult for side-street traffic to access US 93 during peak hours due to the imbalanced flow of traffic. | **Currently Not Advanced** in this Study |
| Impacts to Environment | This option is not expected to impact the environment, but could result in higher vehicle emissions due to increased congestion levels. | |
| Multi-Modal | This option would reduce the overall functionality of the corridor, thereby hindering all modes of travel. | |
| Cost Effectiveness | This option would cost approximately $3,000,000 to construct. This cost is not justified given that a Super Two with Roundabouts would degrade the functionality of US 93. | |
| Public/Political Support | There is some public support for this option. | |
| Fundability | State and federal funding would not be available for this option given its expected performance. Detailed information about funding sources is provided in Section 7.2. | |

Similarly, the option proposing two dedicated **HOV lanes within the existing lane structure** would convert two through lanes on US 93 to exclusive HOV use. Based on the Transit Analysis, transit mode share is optimistically estimated at between two and five percent of all work trips during the peak period in 2030. While multiple-occupant vehicles could utilize HOV lanes, the larger percentage of vehicles would be forced into a single through lane in each direction, generally causing increased congestion and delay through the corridor. On one hand, this increased congestion may provide greater incentive for commuters to participate in carpool or vanpool programs. Given the configuration of the corridor, however, the HOV-lane time travel advantage would probably not be substantial, as noted under the discussion of options adding HOV lanes. All travel lanes, including HOV lanes, would be delayed at signalized intersections throughout the corridor. North of Lolo, HOV lanes would provide time travel savings for a stretch of approximately four to five miles before US 93 enters the outer Missoula urban area, where congestion and delay increase with proximity to more dense development. For these reasons, this option is currently not advanced in this Study.

**Table 6.20 Screening of Two HOV Lanes within Existing Lane Structure**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | This option would reduce the overall functionality of the corridor by removing two through lanes, and thereby increasing congestion levels. | **Currently Not Advanced** in this Study |
| Impacts to Environment | This option is not anticipated to impact the environment, but could result in higher vehicles emissions due to increased congestion levels. | |
| Multi-Modal | This option would reduce the functionality of the single-occupant vehicle lanes within the corridor, and could thereby encourage ridesharing and vanpool programs. Use of HOV lanes would likely not provide substantial time travel savings, however, due to mainline delays at signalized intersections. Ridership estimates were not prepared for alternate configurations of US 93. | |
| Cost Effectiveness | This option would cost approximately $60,000 to construct. This cost is not justified given that this option would degrade the functionality of US 93. | |
| Public/Political Support | There is some public support for this option. | |
| Fundability | State and federal funding would not be available for this option given its expected performance. Detailed information about funding sources is provided in Section 7.2. | |

The option proposing a **center reversible HOV lane within the existing lane structure** would retain two through lanes in each direction for single-occupant vehicles. The existing center turn lane would be converted into an exclusive HOV lane for peak hour peak direction travel. In order to function efficiently and safely, this option would require a barrier system between the center reversible HOV lane and adjacent lanes. Vehicles would no longer have the opportunity to make left turn movements to enter or exit US 93 from minor side streets. Therefore, a frontage road system / connected local roadway network and grade-separated intersections would be required to allow access to side streets, as depicted in Section 6.1.

While this option would provide a third lane for peak direction travel, the majority of vehicles would still likely travel in the two through travel lanes in each direction, as noted under the discussion of options adding HOV lanes. A center reversible HOV lane would not likely give bus and vanpool service a substantial time travel advantage over single-occupant vehicles. Multiple occupant vehicles would still be delayed at signalized intersections in Florence, Lolo, and Missoula along with single occupant vehicles. The only means of ensuring uninterrupted travel at high speeds throughout the corridor would be to require grade separation at every access point on US 93, thereby converting US 93 to a fully access-controlled facility.

A center reversible HOV lane within the existing lane structure in combination with grade-separated intersections would cost approximately $17,000,000, which does not include the cost of variable message boards to inform motorists of the direction of travel. In combination with a frontage road / connected local roadway network, which would be required for side street access, the cost would likely exceed $65,000,000. There currently is no state or federal funding available for this combined option. For this reason, it is currently not advanced in this Study. This option may become viable at some point in the future if funding becomes available.

**Table 6.21 Screening of Center Reversible HOV Lane within Existing Lane Structure**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | This option may improve peak hour operations by providing a third lane for peak direction travel. Converting the current center turn lane into a reversible HOV lane would require limited access control, a frontage road system or a connecting local roadway network, and grade-separated intersections throughout the corridor in order to provide access to adjacent development. | **Currently Not Advanced** in this Study |
| Impacts to Environment | A center reversible HOV lane would not require additional roadway width on US 93 and therefore would result in minimal direct impacts. In order to function properly, however, a center HOV lane would require a frontage road system or a connecting roadway network and grade separated intersections throughout the corridor, which would result in impacts to previously undisturbed areas. | |
| Multi-Modal | While this option would provide a dedicated lane for multiple-occupant vehicles, it would not likely give bus and vanpool service a time travel advantage over single-occupant vehicles. Accordingly, this option would not necessarily encourage mode shift. | |
| Cost Effectiveness | The cost to construct this option would be approximately $17,000,000, which includes the cost of grade separated intersections. In combination with a frontage road / connected local roadway network, which would be required for proper function, the cost would likely exceed $65,000,000. | |
| Public/Political Support | Public meeting attendees have expressed support for an HOV lane. | |
| Fundability | No state or federal funding is currently available for this combined option. Funding partnerships would need to be arranged with the counties and local developers in order for this option to move forward. Detailed information about funding sources is provided in Section 7.2. | |

The option proposing a **center reversible travel lane within the existing lane structure** would retain two through lanes in each direction for single-occupant vehicles. The existing center turn lane would be converted into an additional travel lane for peak hour peak direction travel. As under the option proposing a center reversible HOV lane, this option would require a barrier system between the center reversible travel lane and adjacent lanes in order to function efficiently and safely. Vehicles would no longer have the opportunity to make left turn movements to enter or exit US 93 from minor side streets. Therefore, a frontage road system / connected local roadway network and grade-separated intersections would be required to allow access to side streets, as depicted in Section 6.1.

This option would provide a third lane for peak direction travel, thereby increasing capacity and decreasing congestion in the peak direction. Because access to the center travel lane would be restricted to certain key locations, it would likely be used by commuters traveling the full length of the corridor as opposed to local traffic. This lane would likely be fully utilized during peak hours, thereby decreasing congestion levels in the two other peak direction travel lanes.

The cost for this option would be equal to the cost for center reversible HOV lane, and would also cost upwards of $65,000,000 in combination with a frontage road / connected local roadway network and grade-separated intersections. There currently is no state or federal funding available for this combined option. For this reason, it is currently not advanced in this Study. This option may become viable at some point in the future if funding becomes available.

**Table 6.22 Screening of Center Reversible Travel Lane within Existing Lane Structure**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | This option would improve peak hour operations by providing a third lane for peak direction travel. Converting the current center turn lane into a reversible travel lane would require limited access control, a frontage road system or a connecting local roadway network, and grade-separated intersections throughout the corridor in order to provide access to adjacent development. | **Currently Not Advanced** in this Study |
| Impacts to Environment | A center reversible travel lane would not require additional roadway width on US 93 and therefore would result in minimal direct impacts. In order to function properly, however, a center reversible travel lane would require a frontage road system or a connecting roadway network and grade separated intersections throughout the corridor, which would result in impacts to previously undisturbed areas. | |
| Multi-Modal | This option would improve overall functionality of the corridor, but would not specifically enhance mode choice. | |
| Cost Effectiveness | The cost to construct this option would be approximately $17,000,000, which includes the cost of grade separated intersections. In combination with a frontage road / connected local roadway network, which would be required for proper function, the cost would likely exceed $65,000,000. | |
| Public/Political Support | Public meeting attendees have expressed support for a center travel lane. | |
| Fundability | No state or federal funding is currently available for this combined option. Funding partnerships would need to be arranged with the counties and local developers in order for this option to move forward. Detailed information about funding sources is provided in Section 7.2. | |

**Grade separation** at various locations within the corridor may become necessary in order to provide safe, efficient access from adjacent side streets without degrading mainline level of service on US 93, especially if a center HOV lane or center reversible travel lane option is reconsidered at some point in the future. Major intersections in Florence, Lolo, and Missoula would still remain signalized and mainline traffic would be required to slow through these portions of the US 93 corridor. Throughout the remainder of the corridor, however, grade-separated access points would provide side street access while maintaining relatively uninterrupted through travel at commuter speeds on US 93. A form of grade separation would be beneficial near Bird Lane (MP 85.5±), at Old US 93 S (MP 75±), and in the vicinity of MP 78± – MP 79±. These three locations, in addition to access points within the towns of Florence, Lolo and Missoula, would provide evenly-spaced access throughout the corridor. A connecting roadway network would be required for proper function of grade separation facilities.

There currently is no state or federal funding available for this option. For this reason, it is currently not advanced in this Study. This option may become viable at some point in the future if funding becomes available. Local governments could consider requiring an impact fee as a condition of subdivision approval where substantial traffic delay at an intersection is projected as a result of new development.

**Table 6.23 Screening of Grade Separation Option**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Grade separation at several points along the corridor would improve the overall functionality of the corridor by providing safe, efficient access from adjacent side streets without degrading mainline level of service. | **Currently Not Advanced** in this Study |
| Impacts to Environment | There would be environmental impacts associated with this option due to the footprint of the grade separation structure, as well as the associated frontage roads / connecting local roadway networks, which would be required for proper function. | |
| Multi-Modal | Grade separation would improve overall functionality of the corridor but would not specifically enhance mode choice. | |
| Cost Effectiveness | Three grade separated intersections within the corridor would cost approximately $15,000,000. | |
| Public/Political Support | Public meeting attendees have expressed support for grade separation within the corridor. | |
| Fundability | No state or federal funding is currently available. Funding partnerships would need to be arranged with the counties and local developers in order for this option to move forward. Local governments could consider impact fees to help fund this option. Detailed information about funding sources is provided in Section 7.2. | |

**Frontage Roads / Connecting Local Roadway Networks** are options that could alleviate delays associated with current access configurations within the corridor. Based on projected future development and traffic volumes, side street traffic movements are expected to experience substantial delays, with the worst approach at the majority of stop-controlled intersections operating at LOS F during AM and PM peak hour travel in 2030. As new development occurs, connecting local roadway networks could serve to channel traffic from subdivisions to a limited number of key access points on US 93, as illustrated in Section 6.1. Frontage roads may be necessary in some locations where development has already occurred in order to consolidate existing access points and direct traffic to major intersections in order to enter or exit US 93.

This option would not be eligible for state or federal funds. Additionally, no local / private funds have been reserved or identified for such a project. For this reason, this option is currently not advanced in this Study. This option may become viable at some point in the future if funding becomes available. Local governments could consider requiring an impact fee or concurrent construction of frontage roads with any new development as a condition of subdivision approval where substantial traffic delays at an intersection or on a local roadway are projected as a result of new development.

**Table 6.24 Screening of Frontage Roads / Connecting Local Roadway Networks**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Connecting local roadway networks and frontage roads would improve the overall functionality of the corridor by directing traffic to a limited number of key entry and exit points on US 93. This option would be necessary in order for a center reversible HOV lane to function within the existing lane structure. | **Currently Not Advanced** in this Study |
| Impacts to Environment | Frontage roads and connecting local roadway networks would impact previously undisturbed areas due to their footprint over a large portion of the corridor. | |
| Multi-Modal | This option would improve overall functionality of the corridor, but would not specifically enhance mode choice. | |
| Cost Effectiveness | Continuous frontage roads on both sides of US 93 would cost approximately $50,000,000 to construct, assuming that the Old US 93 route could serve as a connecting roadway over that portion of the corridor. | |
| Public/Political Support | Public meeting attendees have expressed support for access consolidation and some form of connecting roadway network. | |
| Fundability | This option would not be eligible for state or federal funds. Additionally, no local / private funds have been reserved or identified for such a project. Funding partnerships would need to be arranged with the counties and local developers in order for this option to move forward. Local governments could consider impact fees to help fund this option. Detailed information about funding sources is provided in Section 7.2. | |

## Spot Improvements

**Intersection spot improvements** were proposed to address operations at seven intersections within the corridor that are projected to experience LOS D or worse during at least one peak hour period of the day by 2030. Table 6.25 presents a summary comparison between operations in 2030 without any intersection improvements (No Build) and operations in 2030 with the intersection improvements discussed in Section 6.1 (Build). Delay time and LOS information is presented for the full set of corridor study intersections; highlighted rows indicate those intersections targeted for improvement.

**Table 6.25 Summary of Changes Resulting from Intersection Spot Improvements**

| Intersection | | Future (2030) No Build | Future (2030) Build |
|---|---|---|---|
| ID | Name | LOS & Sec / Veh[1] AM / PM[2] | LOS & Sec / Veh[1] AM / PM[2] |
| 1 | **Blue Mountain Rd. / US 93** | **B/F** 19.4/99.9 | **B/C** 14.3/23.7 |
| 2 | Wornath Rd. / US 93 | **A/A** 6.3/<5.0 | **A/B** 6.5/8.5 |
| 3 | Hayes Creek Rd. / US 93 | **C/B** 16.5/10.0 | **C/A** 16.0/10.1 |
| 4 | Cochise Dr. / US 93 | **B/A** 10.6/<5.0 | **B/A** 10.6/<5.0 |
| 5 | Bird Lane / US 93 | **A/A** <5.0/7.5 | **A/A** <5.0/<5.0 |
| 6 | Valley Grove Dr. / US 93 | **A/A** 7.5/7.5 | **A/A** 7.4/8.0 |
| 7 | **Ridgeway Dr. / US 93** | **D/D** 46.5/36.1 | **D/C** 51.4/34.7 |
| 8 | **Tyler Way / US 93** | **E/B** 70.1/19.6 | **D/C** 61.4/25.0 |
| 9 | **Lewis & Clark Dr. / US 93** | **E/D** 45.8/27.9 | **E/C** 45.1/20.5 |
| 10 | **US 12 / US 93** | **F/B** >120/18.5 | **F/C** 128.2/25.9 |
| 11 | **Mormon Creek Rd. / US 93** | **F/A** 53.7/5.7 | **F/A** 63.5/6.0 |
| 12 | Old US 93 N. / US 93 | **A/A** 7.5/7.9 | **A/A** 7.6/7.8 |
| 13 | Old US 93 S. / US 93 | **A/C** <5.0/18.8 | **A/B** <5.0/13.0 |
| 14 | **Highway 203 / US 93** | **F/C** >120/23.2 | **B/B** 15.6/19.4 |

[1]Intersection LOS and delay (seconds/vehicle[sec/veh]) values represent the overall intersection average.
[2]This represents the intersection LOS and delay for AM and PM peak hours.
Source: Fehr & Peers, June 2008.

As noted in Table 6.25, the proposed intersection improvements have a positive effect at the northern and southern ends of the corridor. The intersection of Blue Mountain Road and US 93 improves from LOS F to LOS C in the PM peak hour, while the intersection of Highway 203 and US 93 improves from LOS F to LOS B in the AM peak hour.

The proposed option at the intersection of Blue Mountain Road and US 93 would reduce delay during the PM peak hour by over 75 seconds per vehicle. This reduction in delay is achieved by constructing an additional southbound lane, which would allow more southbound vehicles (the heaviest movement) through the intersection in less time, thereby reducing mainline delay. Since mainline green time would be shorter under this option, side street volumes would not have to wait as long for a green signal, thus reducing side street delay as well. This option would therefore reduce overall intersection delay substantially. Improvements in AM peak delay would be negligible under this option.

The proposed option at the intersection of Highway 203 and US 93 would reduce delay during the AM peak hour by over 200 seconds per vehicle. Adding a westbound channelized right-turn lane would allow westbound-to-northbound-turning vehicles to freely make their movement without any form of intersection control. Accordingly, this would allow the westbound to northbound queue to move through the intersection more quickly than under the existing intersection configuration. By clearing this movement more quickly, all westbound movements would be able to move through the intersection with less delay. Improvements in PM peak delay would be negligible under this option.

Proposed improvements do not have a beneficial impact at intersections in Lolo. The delay times experienced at the intersections of US 93 and Ridgeway Drive, Tyler Way, Lewis & Clark Drive, US 12, and Mormon Creek Road improve slightly in some cases, and worsen slightly in others. Where there is a slight increase in delay at these intersections, this is due to increased signal cycle lengths. The cycle length at the US 93 / Ridgeway Drive intersection was increased to accommodate a protected left-turn phase. The cycle lengths at the other intersections in Lolo were also increased in order to maintain coordination with the Ridgeway intersection. Typically, increasing the cycle length beyond an optimal length may cause inefficiency in the way the signal operates, thereby creating additional delay. On the other hand, where there is a slight decrease in delay, this may be due to variations in simulation runs, including differences in the percent of vehicles served by the Build scenario as compared to the No-Build scenario. The differences in delay between the Build and No-Build scenarios are less than 10 seconds for Lolo study intersections and therefore these differences should be discounted.

All of the intersections in Lolo experience LOS D or worse during the AM peak hour with or without the intersection improvements proposed in this portion of the corridor. The long mainline delays at the signalized intersections in Lolo are due to high traffic volumes traveling in the north and south directions during peak hours. Insufficient capacity in Lolo creates long queues, which extend back through adjacent intersections. Localized intersection improvements

are inadequate to address the projected delay and congestion problems at these intersections in 2030. Large-scale capacity improvements, including a flyover ramp, tunnel, or construction of additional lanes in Lolo, would be needed to improve operations over this stretch of the corridor.

Accordingly, intersection spot improvements are recommended at the intersections of US 93 with Blue Mountain Road and Highway 203. Improvements at the intersections of US 93 and Ridgeway Drive, Tyler Way, Lewis & Clark Drive, US 12, and Mormon Creek Road are currently not advanced in this study due to their inability to improve traffic operations in Lolo.

**Table 6.26 Screening of Intersection Spot Improvements**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Implementation of improvements at the northern and southern ends of the corridor (intersections of US 93 with Blue Mountain Road and Highway 203) would improve operations in these locations, and thereby enhance safety and functionality of the corridor.<br><br>Improvements at intersections in Lolo would generally not improve operations; these intersections would still operate below LOS C in the AM peak hour. | **Recommend** intersection spot improvements at Blue Mountain Road and Highway 203 |
| Impacts to Environment | Intersections spot improvements would be localized in discrete areas and would have minimal impacts to the environment. | |
| Multi-Modal | This option would improve overall functionality of the corridor, but would not specifically enhance mode choice. | |
| Cost Effectiveness | Constructing a new turn lane would cost approximately $500,000 if no new right-of-way were required. The cost of striping a new lane would be relatively minimal if there were already sufficient pavement width existing at an intersection. | Intersection spot improvements in Lolo are **Currently Not Advanced** in this Study |
| Public/Political Support | There is strong public support for intersection spot improvements. | |
| Fundability | There are a number of potential funding sources for spot improvements. Detailed information about funding sources is provided in Section 7.2. | |

**All other spot improvements** would address a number of localized issues within the corridor. Improved pedestrian crossings would enhance access and comfort for pedestrians in discrete locations throughout the corridor. Improved animal crossings would reduce the opportunity for animal-vehicle conflicts, thereby improving safety for drivers. A transportation communication system would improve operation within the corridor in the event of an incident. Improved pullout locations would allow for emergency vehicle staging, as well as other vehicle stops. Intersection improvements would address capacity and delay issues at existing intersections. For the purpose of this screening, the option proposing improved pedestrian crossings is defined as a bridge extending over the US 93 facility.

Implementation of spot improvements in a number of discrete locations would enhance the overall safety and functionality of the US 93 corridor. These options could be individually implemented over the next five to ten years at relatively low costs. Accordingly, these options are recommended under this Corridor Study.

**Table 6.27 Screening of Other Spot Improvements**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Implementation of improvements in a number of discrete locations would enhance the overall safety and functionality of the US 93 corridor. | **Recommend** |
| Impacts to Environment | Spot improvements as a group are localized in discrete areas and would have minimal impacts to the environment. | |
| Multi-Modal | Improved pedestrian crossings could encourage pedestrian use of the corridor, if constructed in connection with pedestrian pathways and park and ride facilities. Other spot improvements would improve overall functionality of the corridor but would not specifically enhance mode choice. | |
| Cost Effectiveness | Spot improvements are relatively low in cost and generally range from $2,500 to $2,000,000 per improvement location. | |
| Public/Political Support | There is strong public support for spot improvements. | |
| Fundability | There are a number of potential funding sources for spot improvements. Detailed information about funding sources is provided in Section 7.2. | |

## Policy Tools

A number of options proposed in this Study, including frontage road / connecting local roadway networks and a center reversible HOV lane, are dependent upon prior implementation of restrictive land use and access **policies**. Corridor preservation is critically important when considering bypass and frontage road options. Although bypass, frontage road, and center HOV lane options are not recommended in this Study primarily due to lack of funding, these options will not be viable options in the future unless continued planning occurs in the near-term.

Incentive and disincentive programs have the potential to affect the success of mode shift options, including vanpool and bus services. Access management policies have the potential to affect the relative safety of access to US 93. Incident management policies play an important role in ensuring safe travel throughout the corridor and expedient clearing of crash sites to reduce crash-related delay times. Accordingly, all policy tools are recommended in this Study.

**Table 6.28 Screening of Policy Tools**

| Screen | Assessment | Status |
|---|---|---|
| Operation, Design, and Safety | Incentive and disincentive programs could reduce the number of single occupant vehicles, thereby improving corridor operation. Zoning, corridor preservation, and access management would help ensure the continued safe and efficient operation of US 93. Incident management policies would improve corridor operation in the event of an incident on US 93. | **Recommend** |
| Impacts to Environment | As a group, policies would have a minimal impact on the environment. | |
| Multi-Modal | Incentive and disincentive programs could encourage use of ridesharing, vanpool programs, and bus service programs. Other policies would improve the overall functionality of the corridor but would not specifically enhance mode choice. | |
| Cost Effectiveness | There would be minimal costs associated with implementing policies in the corridor. These have not been calculated for purposes of this study. | |
| Public/Political Support | There is strong public and governmental support for the enactment of access management policies and incentive/disincentive programs within the corridor. There is mixed support for zoning policies. | |
| Fundability | The minimal costs associated with policy implementation would be assumed jointly by participating entities. | |

Table 6.29 presents the results of the screening process.

**Table 6.29 Results of Improvement Option Screening**

| Option | | Screening Result |
|---|---|---|
| **Options Adding Vehicular Capacity** | Two new travel lanes on US 93 from Lolo to Missoula | **Currently Not Advanced** due to lack of funding |
| | Two new HOV lanes from Lolo to Missoula | |
| | Elevated Expressway with two new lanes from Lolo to Missoula | |
| | Two new lanes & center reversible HOV lane from Lolo to Missoula | |
| | Center reversible HOV lanes with new lane from Lolo to Missoula | |
| | Center reversible lanes with new lane from Lolo to Missoula | |
| | East Side Bypass between Florence and Missoula | |
| | East Side Access Roadway between Lolo and Missoula | |
| | Lolo Options | |
| **Transit / Multi-Modal Options** | Enhanced Vanpool / Carpool Programs | **Recommend** |
| | Improved Park and Ride Facilities | |
| | Fixed Route Bus Service | |
| | Passenger Rail | **Currently Not Advanced** due to lack of funding and low ridership projections |
| | Bike Lanes on US 93 | **Currently Not Advanced** due to public preference for separated pathway |
| | Separated Bicycle / Pedestrian Path | **Recommend** |
| **TSM / TDM** | Super Two with Roundabouts | **Currently Not Advanced** due to operation and functionality concerns |
| | Two dedicated HOV lanes within existing lane structure | |
| | Center reversible HOV lane within existing lane structure | **Currently Not Advanced** due to lack of funding |
| | Center reversible lane within existing lane structure | |
| | Junior Interchanges / Grade-separated Intersections | |
| | Frontage Roads / Connecting Local Roadway Networks | |
| **Spot Improvements** | Improvements to Intersections in Lolo | **Currently Not Advanced** due to failure to improve operations |
| | Improvements to US 93 Intersections with Blue Mountain Road and Highway 203 | **Recommend** |
| | Improved Pedestrian Crossings | |
| | Improved Animal Crossings | |
| | Transportation Communication System | |
| | Improved Pullout Locations | |
| **Policy Tools** | Incentive / Disincentive Programs | **Recommend** |
| | Zoning and Land Use Planning | |
| | Corridor Preservation | |
| | Incident Management | |
| | Access Management | |