US 191 Corridor Study

Four Corners to Beaver Creek

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Prepared for:

MONTANA DEPARTMENT OF TRANSPORTATION

VISION ZERO
zero deaths · zero serious injuries
MONTANA DEPARTMENT OF TRANSPORTATION

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ACKNOWLEDGMENTS

Many individuals cooperated and aided in the successful completion of this study. The following people provided guidance and support throughout the course of this study.

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ABBREVIATIONS/ACRONYMS

BSTD	Big Sky Transportation District
DEQ	Montana Department of Environmental Quality
DNRC	Montana Department of Natural Resources and Conservation
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program
Forest Plan	Custer Gallatin National Forest Plan Revision
FWP	Montana Fish, Wildlife, and Parks
GIS	Geographic Information System
GRTF	Gallatin River Task Force
HSIP	Highway Safety Improvement Program
MCA	Montana Code Annotated
MCS	Motor Carrier Services
MDT	Montana Department of Transportation
mph	Miles per Hour
MWTSC	Montana Wildlife & Transportation Steering Committee
N-50	US Highway 191 (US 191)
NH	National Highway Performance Program
NHS	National Highway System
P-13	US Highway 287 (US 287)
RP	Reference Point
RPA	Robert Peccia and Associates
SIAP	Systems Impact Action Process
Section 4(f)	Section 4(f) of the 1966 Department of Transportation Act
Section 6(f)	Section 6(f) of the 1964 National Land and Water Conservation Fund Act
TA	Transportation Alternatives Program
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
X-81064	Montana Highway 64 (MT 64)

EXECUTIVE SUMMARY

The Montana Department of Transportation (MDT), in partnership with the Federal Highway Administration (FHWA) and Gallatin County, completed the *US 191 Corridor Study* to assess the US Highway 191 (US 191) corridor between Four Corners and Beaver Creek Road south of Montana Highway 64 (MT 64). US 191 connects the Bozeman and Belgrade areas to West Yellowstone and Yellowstone National Park. Within the study area, the highway serves the unincorporated communities of Four Corners, Gallatin Gateway, and Big Sky.

The purpose of the study was to develop a comprehensive long-range plan for managing the corridor and to identify feasible improvement options to address needs identified by the public, study partners, and resource agencies. The study authors examined geometric characteristics, crash history, land uses, physical constraints, environmental resources, and existing and projected operational characteristics of the US 191 corridor.

The study corridor includes US 191 between the intersection with Huffine Lane/Norris Road/Jackrabbit Lane in Four Corners (Reference Post [RP] 81.9) and the intersection with Beaver Creek Road (RP 45.3) near Ophir School south of MT 64.

MDT, Gallatin County, and FHWA used a collaborative process to develop the study, with focused outreach efforts to engage the public, key stakeholders, and resource agencies. Activities completed during the planning process include the following:

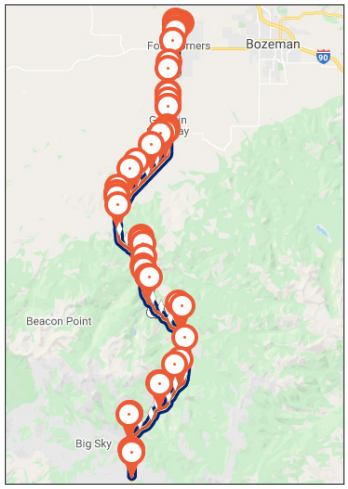
- Investigation and analysis of existing US 191 roadway conditions
- Research of known environmental resources and applicable regulations in the study area
- Identification and documentation of future conditions
- Identification of issues and areas of concern
- Consultation/coordination with local officials, stakeholders, resource agencies, and the public
- Identification of corridor needs and objectives
- Development of corridor improvement options with consideration of costs, available funding, feasibility, public input, and known environmental resource constraints
- Documentation of potential funding sources for improvement options

The *US 191 Corridor Study* followed MDT's guidelines for conducting planning studies in accordance with the National and Montana Environmental Policy Acts. By evaluating existing and projected conditions of the US 191 corridor, this process facilitates a smooth and efficient transition from early transportation planning to project development. MDT uses the planning process to document areas of concern and potential constraints, identify potential mitigation measures, and disclose pertinent information before project decisions are made and carried forward.

Public and Stakeholder Outreach

Active participation and community input were encouraged throughout the planning process. Key audiences included state and local agencies, stakeholder organizations, and the public. Multiple engagement methods were employed during the study.

- Established an Advisory Committee with MDT, FHWA, and Gallatin County representatives
- Developed a project website to provide study interaction
- Hosted an online commenting map to collect feedback from stakeholders and the public
- Created a story board to present study data in a simpler, more graphical manner
- Maintained an email contact list of stakeholders and interested members of the public



The online commenting map collected nearly 600 comments, likes, or dislikes over the study duration.

Targeted outreach was conducted to encourage meaningful input and dialogue with stakeholders and the public. The following activities helped the project team identify areas of concern which assisted in the process of developing recommended improvement options.

- A **Resource Agency Meeting** was held on December 3, 2019, with six representatives from five resource agencies in attendance. The meeting allowed the planning team to confirm the accuracy of study evaluation efforts and engage resource agencies in an open discussion of environmental areas of concern.
- **Informational Meeting #1** was held in Gallatin Gateway on January 28, 2020, with 122 participants and in Big Sky on January, 29, 2020, with 45 people in attendance. The meetings were formatted as open houses which enabled attendees to view exhibits, talk with study representatives, and submit comments by a variety of means.
- **Informational Meeting #2** was held on July 28, 2020 following the release of the public draft report. Due to COVID-19 gathering restrictions, the meeting was held virtually using Zoom. A total of 77 participants attended either the morning or afternoon sessions. The meetings began with a brief presentation, followed by a question and answer period.

Transportation System

The study assessed existing transportation condition using a thorough evaluation of existing plans, on-site field review, and supplemental data collection effort. This assessment resulted in identification of the following areas of concern related to the transportation system.

Physical Features and Characteristics

- Most of the corridor does not meet current width recommendations of 40 feet.
- Pavement is in fair condition for most of the corridor except US 191 between Squaw Creek Bridge and Cascade Creek Road, which is in poor condition.
- Speed limits vary from 45 to 70 miles per hour. The speed varies for cars and trucks and based on daytime and nighttime conditions, which can be confusing to drivers.
- Nearly 400 approaches were identified along the corridor, some of which are unpermitted. Several are designated turnouts and recreational approaches. Parking in undesignated areas and substandard turnouts can cause safety concerns.
- A total of 30 passing zones, 15 northbound and 15 southbound, exist along the corridor. All but two passing zones meet MDT design standards. There is also a passing lane in the northbound direction between RP 70.6 and 71.5.
- Several locations were identified within Gallatin Canyon with poor rock slope conditions. There is potential for rockfall events, possible emergency road closures, and disruption of normal traffic operations at these locations.
- There are nine bridges in the study corridor, all of which meet current design standards to remain in place. Most of the bridges are currently in need of repair and/or maintenance.

Geometric Conditions

- A total of 16 horizontal curves do not meet current standards for this route.
- One vertical curve does not meet current standards for this route.
- The proximity of the Gallatin River and the steep side slopes of the canyon do not allow for standard clear zone widths at many locations. Guardrail has been installed to shield obstacles and prevent run-off-road crashes.

Approximately 18 percent of the horizontal curves within the Gallatin Canyon do not meet current design standards.

Traffic Conditions

- Traffic volumes are projected to grow at a rate of 2.4 percent per year through 2040 based on historic growth trends.
- Commercial truck traffic accounts for 14 percent of the traffic near the Big Sky area and close to 9 percent of the traffic near Four Corners.
- Intersection operations are projected to deteriorate as volumes increase.
  - The Four Corners intersection currently experiences fair to poor traffic operations and is projected to experience failing operations during AM and PM peak hours by 2040.
  - The Mill Street intersection currently experiences poor to failing operations during the AM and PM peak periods, with failing conditions persisting into the future if no changes are made.
  - The MT 64 intersection currently experiences good to fair operations throughout the day except for poor operations during the winter PM peak, and is projected to operate at a poor or failing level during the AM and PM peaks by 2040.
- US 191 is currently operating below target levels for the route type. Under future traffic conditions, the majority of the roadway corridor is projected to operate at poor or failing levels.

Safety

- There were 7 fatal crashes and 27 suspected serious injury crashes resulting in 7 fatalities and 32 suspected serious injuries.
- Wild animal, fixed object, rear-end, and rollover crashes were the most common crash types.
- Adverse road conditions, dark-not lighted conditions, and impaired driving were common crash factors.

Environmental Setting

The study identified the following physical, biological, social, and cultural resources that may be affected by future improvements to US 191. Project-level environmental analysis would be required for any improvements forwarded from this study.

Physical Environment

- Conservation easements exist on a few parcels of land adjacent to US 191.
- The Gallatin Wildlife Management Area is on the east side of US 191 south of MT 64.
- North of the Gallatin Canyon, the study area contains some soils classified as farmland.
- The US 191 study area is in a moderate to high seismic risk zone. Earthquake events near US 191 through Gallatin Canyon appear to be uncommon historically.
- The Gallatin River from Spanish Creek to its mouth is listed as “impaired” due to chronic dewatering for crop irrigation, and sediment loading has been noted as a concern from the Yellowstone National Park boundary to Spanish Creek. Other waters in the study area are also listed as impaired or threatened.
- Hazardous substances in the study area include: five delisted hazardous waste release sites, two delisted remediation response sites, nearly 30 active underground storage tanks, five resolved petroleum tank release sites, four abandoned mine sites, two mining features, and five opencut mines.
- Residences and Section 4(f) properties are sensitive noise receptors which could be affected by future roadway improvements.

Biological Resources

- Invasive and noxious weeds, including spotted knapweed and Canada thistle, are a growing concern in Gallatin County.
- The historic conversion and on-going development of previously native riparian and foothill habitat between Four Corners and the mouth of the Gallatin Canyon has negatively impacted the quantity and quality of wildlife habitat available in this area.
- Wildlife-vehicle conflicts are of concern due to the proximity of general and winter range habitat to US 191 and the observed trend of animal-related crashes.
- Grizzly bear, Canada lynx, wolverine, whitebark pine, and Ute Ladies’ Tresses are federally listed, proposed, or candidate species in Gallatin County. All but the Ute Ladies’ Tresses are known to have the potential to occur in the corridor.

Social and Cultural Resources

- Several designated trails, campgrounds, and day use areas exist along the US 191 corridor, many of which potentially qualify for protection under Section 4(f).
- The Gallatin Gateway Recreation Facilities project qualifies for protection under Section 6(f).
- Nearly 75 historic properties were identified in the vicinity of US 191, two of which are listed on the National Register of Historic Places.

Improvement Options

Corridor needs and objectives were established based on existing and future conditions, local plans, and input from resource agencies, stakeholders, and the public to guide development of improvement options.

Need 1: Improve the Safety of the Corridor

- Reduce fatalities and serious injuries in support of Vision Zero.
- Improve roadway elements to meet current design standards.
- Reduce animal-vehicle conflicts.
- Reduce roadside hazards.
- Reduce vehicle conflicts.

Need 2: Improve the Operations of the Corridor

- Accommodate existing and future travel demands.
- Provide reasonable access to adjacent lands.
- Improve non-motorized mobility and accessibility.
- Improve travel demand management.
- Accommodate wildlife movement.

Other Considerations

- Impacts to environmental resources
- Local and regional planning
- Temporary construction impacts
- Funding availability
- Construction feasibility and physical constraints
- Corridor context, function, and use
- Maintenance cost and responsibility

Recommended improvement options for US 191 were identified to meet the corridor needs and objectives to the extent feasible based on field review, engineering analysis of as-built drawings, traffic and crash data analysis, consultation with resource agencies, and information provided by the public.

Small-scale improvement options may be as simple as installing advisory signs. Larger, more complex improvements include expanding the roadway between Four Corners and the Gallatin Canyon and installing passing lanes at intermittent locations throughout the canyon. Implementation of improvement options ultimately depends on funding availability, right-of-way needs, and other project delivery elements. **Table ES-1** contains a summary of recommended improvements.

The corridor study aimed to identify ways to improve safety and operations of the corridor while aligning with local plans and desires.

ES-1: Recommended Improvement Options Summary

Recommendation		Description	Implementation Agency/ Partners	Timeframe[1]	Cost Estimate[2]	Potential Funding Sources[3]
Spot Improvements						
S1	**Four Corners Intersection (RP 81.9)**	Modify business access; install second westbound left-turn lane; add pedestrian crossing treatments	MDT	Mid-term	$2.5M	NH, HSIP, TA
S2	**3rd Street to 2nd Street (RP 81.4 – 81.3)**	Replace or widen bridge based on future needs of the highway	MDT	Mid-term	$2.2M	NH
S3	**Bozeman Hot Springs/ Cobb Hill/Lower Rainbow Road (RP 81.1 – 81.0)**	Consolidate approaches and realign intersection; improve intersection/ roadway lighting	MDT, Gallatin County, Private	Mid-term	$810,000	NH, HSIP, Local, Private
S4	**Violet Road/Upper Rainbow Road (RP 80.1)**	Install traffic control as warranted	MDT, Gallatin County, Private	Long-term	$2.1M to $4.5M	NH, HSIP, Local, Private
S5	**Zachariah Lane (RP 77.8)**	Consolidate approaches; improve intersection lighting; install turn lane as warranted	MDT, Gallatin County, Private	Mid-term	$480,000	NH, HSIP, Local, Private
S6	**Mill Street/Rabel Lane (RP 76.3)**	Install traffic control as warranted	MDT, Gallatin County	Mid-term	$910,000 to $2.3M	NH, HSIP, Local
S7	**Cottonwood Road (RP 75.7)**	Install additional traffic control and realign intersection as warranted	MDT, Gallatin County, Private	Long-term	$1.5M to $4.7M	NH, HSIP, Local, Private
S8	**Lava Lake (RP 61.4)**	Reconfigure access to Lava Lake trailhead; flatten horizontal curve; reconstruct bridge	MDT, FWP, USFS, GRTF	Mid- to long-term	$560,000 to $10.4M	NH, HSIP, FLAP
S9	**Big Sky Trail Guardrail Improvements**	Install alternative guardrail end treatments	MDT	Short-term	$50,000	HSIP, Maintenance
S10	**Weigh Station**	Relocate weigh station	MDT	Mid- to long-term	$4.9M to $7.8M	NH
S10-a	*South of Williams Road*	*Construct a weigh station on each side of the highway*	*MDT*	*Mid- to long-term*	*$5.6M*	*NH*
S10-b	*Spanish Creek Area*	*Construct a weigh station on one or both sides of US 191*	*MDT*	*Mid- to long-term*	*$7.8M*	*NH*
S10-c	*South of Study Area*	*Construct a second weigh station south of the study area to serve northbound vehicles*	*MDT*	*Mid- to long-term*	*$4.9M*	*NH*
S11	**Turn Lanes at Spot Locations**	Install turn lanes at spot locations as warranted	MDT, Gallatin County, Private	Mid- to long-term	$230,000 to $1.1M	NH, Local, Private
S12	**Turnouts for Slow-moving Vehicles**	Construct/modify turnouts as appropriate to improve function and safety; add signage at each location indicating slow-moving vehicles must use turnouts	MDT	Short- to long-term	$600 to $1.1M	NH, HSIP
S13	**Recreational Access**	Formalize and improve recreational access at existing high-use locations; install additional advance warning signage as appropriate	MDT, USFS, FWP, GRTF	Short- to long-term	$5,000 to $840,000	NH, HSIP, TA, FLAP
S14	**Bridge Replacements**	Replace or widen existing bridges to meet current standards	MDT	Short- to long-term	$1.1M to $8.9M	NH
S15	**Rockfall Hazard Mitigation**	Conduct rockfall hazard mitigation	MDT	Mid- to long-term	$24.5M to $59.8	NH, HSIP

Recommendation		Description	Implementation Agency/ Partners	Timeframe[1]	Cost Estimate[2]	Potential Funding Sources[3]
S16	**Advance Warning Signs**	Install curve warning signs for substandard roadway elements	MDT	Short-term	Varies	HSIP, Maintenance
S17	**Substandard Curve Modifications at Spot Locations**	Reconstruct horizontal and vertical curves at spot locations that do not meet minimum design standards	MDT	Mid- to long-term	$1.7M to $5.5M	NH, HSIP
S17-a	*North of Spanish Creek (RP 69.2 to 68.5)*	*Flatten two substandard horizontal curves*	*MDT*	*Mid- to long-term*	*$5.5M*	*NH, HSIP*
S17-b	*Rockhaven Camp (RP 66.9 to 66.5)*	*Flatten vertical curve; modify passing zones; relocate river access; install warning signage*	*MDT*	*Mid- to long-term*	*$4.4M*	*NH, HSIP*
S17-c	*Greek Creek (RP 57.6)*	*Flatten horizontal curve*	*MDT*	*Mid- to long-term*	*$2.4M*	*NH, HSIP*
S17-d	*North of Goose Creek (RP 52.0)*	*Flatten substandard horizontal curve*	*MDT*	*Mid- to long-term*	*$1.7M*	*NH, HSIP*
S18	**Emergency Call Boxes**	Install signage to notify drivers of upcoming call boxes; install additional call boxes as needed	MDT, Big Sky Rotary Club	Short- to mid-term	$600 to $16,000	HSIP, Private
Corridor-Wide Improvements						
C1	**Highway Maintenance Practices**	Address highway maintenance issues and continue to research and implement best practices	MDT	As needed	Varies Annually	Maintenance
C2	**Passing/No-Passing Zones**	Evaluate and modify existing passing/ no-passing signing and striping for compliance with current standards	MDT	Short-term	$13,000 / mi	NH, HSIP, Maintenance
C3	**Shoulder Widening**	Widen roadway shoulders where feasible	MDT	Mid- to long-term	$1.3M to $1.8M / mi	NH, HSIP
C3-a	*US 191/MT 84/MT 85 to Gateway South Road (RP 81.9 to 75.7)*	*8-foot shoulders*	*MDT*	*Mid- to long-term*	*$1.3M / mi*	*NH, HSIP*
C3-b	*Gateway South Road to MT 64 (RP 75.7 to 48.0)*	*4-foot shoulders*	*MDT*	*Mid- to long-term*	*$1.8M / mi*	*NH, HSIP*
C4	**Guardrail Improvements**	Add, remove, repair, and upgrade guardrail as appropriate through the Gallatin Canyon	MDT	Short- to mid-term	Varies	Maintenance
C5	**Speed Considerations**	Install VSL signage through the Gallatin Canyon; conduct speed studies in response to a local government request	MDT, Gallatin County	Mid-term	$350,000	HSIP, Local
C6	**Mailbox Relocation**	Consolidate individual mailboxes and move clusters to mailbox turnouts or side streets	MDT, Gallatin County, US Postal Service, Private	As needed	Unknown	HSIP, Maintenance, Local, Private
C7	**Access Management**	Manage existing approaches as needed	MDT, Gallatin County, Private	As needed	Unknown	NH, HSIP, Local, Private
C8	**Access Control Plan**	Develop and execute an Access Control Plan between RP 81.9 and 70.5	MDT, Gallatin County, Private	Short-term	$150,000	NH, HSIP, Local, Private
C9	**Vegetation Management Plan**	Develop and implement Vegetation Management Plan	MDT, Gallatin County, USFS	Mid-term	$70,000	Maintenance, Local, Other Agencies

	Recommendation	Description	Implementation Agency/ Partners	Timeframe[1]	Cost Estimate[2]	Potential Funding Sources[3]
C10	**Wildlife-Vehicle Conflict Management**	Install appropriate wildlife accommodations resulting from MDT project development process; coordinate with MWTSC and other organizations to identify partnership opportunities that will advance wildlife accommodation priorities	MDT, USFS, FWP, Gallatin County, Montana Water Trust, Various Wildlife Organizations	Short- to long-term	$80,000 to $4.2M	Other Programmed Projects (NH, HSIP), Other Agencies, Private
	Alternate Transportation Modes					
A1	**Four Corners to Gallatin Gateway Shared Use Path**	Extend the existing shared use path from its terminus at Zachariah Lane to the Four Corners intersection	MDT, Gallatin County, Private	Mid-term	$3.5M	TA, Local, Private
A2	**Four Corners Intersection Pedestrian Improvements (RP 81.9)**	Install pedestrian accommodations at the intersection	MDT	Mid-term	$230,000	TA
A3	**Beaver Creek Road Pedestrian Crossing (RP 45.3)**	Install enhanced pedestrian crossing if warranted	MDT, FWP, GRTF	Short-term	$9,000 to $65,000	TA
A4	**Skyline Bus**	Add additional Skyline bus trips between Bozeman and Big Sky; purchase additional motorcoaches	BTSD, Private	Short- to mid-term	$1.8M (capital) & $350,000/yr	Transit Programs, Local, Private
A5	**Bus Stop Turnouts**	Install bus stop turnouts	MDT, Transit Operators, School Districts	Mid-term	$140,000	NH, Transit Programs, Local
A6	**Airport – Big Sky Shuttles**	Expand bus service to Airport	Transit Operators, Bozeman Yellowstone International Airport	Short- to mid-term	Unknown	Transit Programs, Local
A7	**Park-and-Ride/Carpool Lots**	Construct a park-and-ride/carpool lot in the Four Corners area and as warranted with future large developments along corridor	MDT, Transit Operators, Gallatin County, Private	Mid-term	$390,000	Transit Programs, Local, Private
	Roadway Reconstruction					
R1	**US 191/MT 84/MT 85 to Blackwood Road (RP 81.9 to 79.5)**	Construct additional lane in each direction with center two-way left-turn lane	MDT	Long-term	$21.1M	NH
R2	**Blackwood Road to Cottonwood Road (RP 79.5 to 75.7)**	Construct additional lane in each direction with center two-way left-turn lane between Zachariah Lane and Cottonwood Road	MDT	Long-term	$31.6M	NH
R3	**Cottonwood Road to Wilson Creek Road (RP 75.7 to 73.5)**	Construct a consistent three-lane configuration with center two-way left-turn lane or dedicated left-turn bays	MDT	Long-term	$13.5M	NH

Recommendation		Description	Implementation Agency/ Partners	Timeframe[1]	Cost Estimate[2]	Potential Funding Sources[3]
R4	**Wilson Creek Road to Gateway South Road (RP 73.5 to 70.5)**	Construct a passing lane in each direction with left-turn bays at major intersections	MDT	Long-term	$30.2M	NH
R5	**Gallatin Canyon (RP 70.5 to 48.0)**	Reconstruct the corridor at incremental locations within the canyon	MDT	Long-term	$11.5M to $20.5M	NH
R5-a	*Spanish Creek Road to Sheep Rock (RP 68.7 to 67.0)*	*Construct a passing lane in each direction*	*MDT*	*Long-term*	*$20.5M*	*NH*
R5-b	*Shenango Creek to Storm Castle (RP 64.8 to 63.5)*	*Construct center two-way left-turn lane*	*MDT*	*Long-term*	*$11.5M*	*NH*
R5-c	*Karst Camp to Portal Creek (RP 55.4 to 53.1)*	*Construct center two-way left-turn lane or left-turn bays*	*MDT*	*Long-term*	*$19.2M*	*NH*
R5-d	*Jack Smith Bridge to Dudley Creek (RP 49.8 to 48.3)*	*Construct a passing lane in the northbound direction*	*MDT*	*Long-term*	*$11.9M*	*NH*

[1] ***Timeframes:*** *The timing and ability to implement improvement options depends on factors including the availability of funding, right-of-way needs, and other project delivery elements. Implementation timeframes are not a commitment to developing recommendations.*

- ***Short-term:*** *Implementation is feasible within a 0- to 5-year period.*
- ***Mid-term:*** *Implementation is feasible within a 5- to 10-year period.*
- ***Long-term:*** *Implementation is feasible within a 10- to 20-year period.*
- ***As needed:*** *Implementation could occur based on observed need at any time as needed.*

[2] ***Cost Estimates*** *include construction, engineering, right-of-way, utilities, drainage, and indirect costs. In addition, an inflationary factor of three percent per year was applied to the planning-level costs to account for an estimated year of expenditure. Contingencies were added to account for unknown factors at the planning-level stage, however actual costs may vary due to changed conditions at the time of construction.*

[3] ***Potential Funding*** *for recommended options identified in this study include federal, state, local, and private sources. Additional detail on funding sources is provided in* ***Section 6.1*** *and in* ***Appendix 5****.*

Project Implementation

Successful implementation of improvements may require cooperation and effort from multiple entities with the resources, funds, jurisdiction, or special expertise necessary to accomplish the improvement options. As listed in **Table ES-1**, implementation agencies and partners playing a role in recommended improvement options include MDT, federal and state agencies, transit operators, school districts, local task forces and community groups, private landowners and developers, wildlife organizations, and other parties with interest or authority. In addition to the specific options recommended in this study, MDT will pursue opportunities with the neighboring states of Wyoming and Idaho to develop, communicate, and implement compatible maintenance and construction strategies for routes connecting to the US 191 corridor to facilitate consistency in snow removal, traffic control during construction, and other activities that cross state lines. MDT will continue to look for partnering opportunities in funding, communications, maintenance, strategy identification, and infrastructure improvements to meet the needs and objectives of the corridor.

Additionally, resource agencies, local governments, enforcement agencies, non-profit organizations, and private landowners have an opportunity to pursue actions within and outside of the highway corridor, independent of MDT efforts. These efforts could include public outreach and educational campaigns; comment and input on land use changes such as zoning ordinances and private development proposals; enforcement activities; and projects to protect habitat and facilitate wildlife movement on adjoining lands. MDT supports actions that have the potential to minimize conflicts and positively influence safety and operations for all users of the US 191 corridor.

Conclusions and Next Steps

This study provides a diverse list of improvement options and strategies that may be considered as funding becomes available. The identified recommendations will assist implementing partners in targeting the most critical needs and allocation of resources. At the current time, no funding has been identified to complete any of the recommended improvement options. To continue with the development of a project, the following steps are needed.

- Identify and secure a funding source(s).
- For MDT-led projects, follow MDT guidelines for project nomination and development, including a public involvement process and environmental documentation.
- For projects that are developed by others and may impact MDT routes, coordinate with MDT via the System Impact Action Process or other appropriate collaborative processes.

The corridor study identified 18 spot improvements, 10 corridor-wide improvements, 7 alternate transportation mode improvements, and 5 roadway reconstruction improvement options.

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1.0. INTRODUCTION

The Montana Department of Transportation (MDT), in partnership with the Federal Highway Administration (FHWA) and Gallatin County, completed the *US 191 Corridor Study* to assess the US Highway 191 (US 191) corridor between Four Corners and Beaver Creek Road south of Montana Highway 64 (MT 64). The purpose of the study was to develop a comprehensive long-range plan for managing the corridor and to identify feasible improvement options to address needs identified by the public, study partners, and resource agencies.

The corridor study investigated traffic, safety, and environmental conditions and needs on of the US 191 highway between Four Corners and south of MT 64.

1.1. Study Process

The *US 191 Corridor Study* followed the 2009 *Montana Business Process to Link Planning and National and Montana Environmental Policy Act Reviews,*[1] MDT's guideline for conducting planning studies. This process is intended to facilitate a smooth and efficient transition from early transportation planning to project development and may be used to help determine the level and scope of required environmental review should a project advance.

The planning process evaluated existing and projected conditions, including demographic characteristics, physical roadway features, geometric and traffic conditions, crash history and safety performance, and environmental conditions of the US 191 corridor. The study also identified needs and objectives; provided opportunities for engagement with the public, stakeholders, and resource agencies; and identified a package of feasible short- and long-term recommendations to address the needs of the highway over the 2040 planning horizon. Additionally, the planning process documented potential environmental impacts and constraints and discloses information to the public, stakeholders, resource agencies, and transportation officials before decisions are made. The corridor planning process does not replace the need for environmental documentation, and it is not a design or construction project.

1.2. Study Area

The study corridor includes US 191 between the intersection with Huffine Lane/Norris Road/ Jackrabbit Lane in Four Corners (Reference Post [RP] 81.9) and the intersection with Beaver Creek Road (RP 45.3) near Ophir School south of MT 64. The study area is shown in **Figure 1**.

US 191 connects the greater Bozeman and Belgrade areas to West Yellowstone and Yellowstone National Park. Within the study area, the highway serves the unincorporated communities of Four Corners, Gallatin Gateway, and Big Sky. The corridor is highly used by recreationists for hiking, backpacking, camping, rock climbing, rafting, fishing, hunting, skiing, and more.

The corridor generally parallels the Gallatin River and provides direct access to the Custer Gallatin National Forest and indirect access to the Beaverhead-Deerlodge National Forest. In addition to providing access to public lands for recreational visitors and commercial operations, the corridor serves individual residences, rural subdivisions, and commercial enterprises.

The use of lands accessed by US 191 has historically provided tourism traffic and economic subsistence for the rural communities along the corridor. In recent years, the study area has experienced growth which has put strain on existing infrastructure resulting in increased traffic, reduced travel times, and safety concerns. Planning efforts and construction projects along US 191 and associated roads have occurred in recent years to help address these concerns. Making improvements to the corridor can be complicated due to physical, financial, and environmental constraints, however.

In addition to serving commuters and area residents, the study corridor provides access to National Forest lands and several recreational sites.

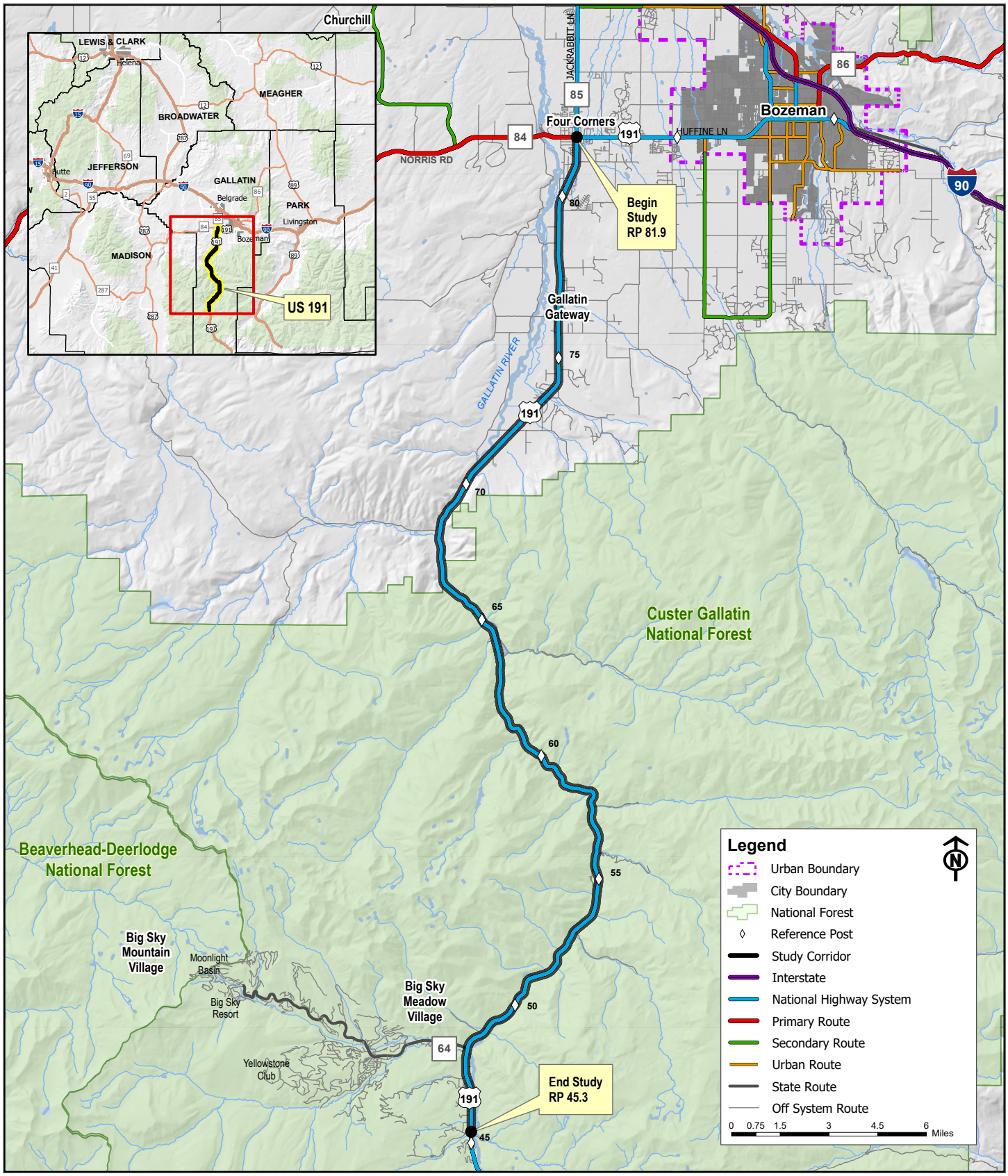


Figure 1: Study Area

02

2.0. PUBLIC AND STAKEHOLDER OUTREACH

An important aspect of the planning study process is to provide opportunities for ongoing and meaningful public involvement. Education and public outreach are essential parts of achieving this goal. A *Public and Agency Involvement Plan* was developed to identify public involvement activities needed to gain insights and seek input about existing and future transportation needs. The purpose of the plan was to ensure a proactive public involvement process that provided opportunities for the public to be involved in all phases of the corridor study planning process. Specific public outreach activities are noted in this chapter. Meeting materials, such as press releases, advertisements, agendas, presentations, and meeting summaries are provided in **Appendix 1**.

Public and stakeholder outreach was critical to understand local concerns and ideas for improvements to the corridor.

2.1. On-Demand Involvement Opportunities

Multiple on-demand involvement opportunities enabled participants to engage in the study process at their convenience. Key audiences included state and local agencies, stakeholder organizations, and the public.

Email Contact List

The study email contact list included individuals, businesses, or groups with knowledge of the study area and individuals who attended public meetings. Emails sent prior to informational meetings and to notify study contacts of key milestones in study development.

Project Website

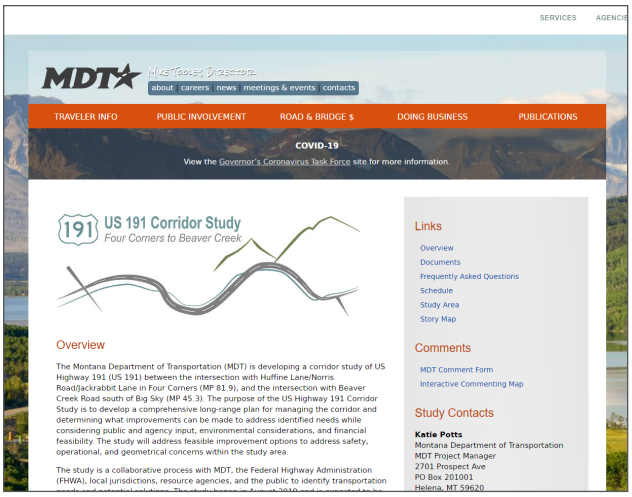
MDT hosted a study website (http://mdt.mt.gov/pubinvolve/us191) to encourage public interaction and provide study information. The website contained contact information, meeting announcements, newsletter/flyers, frequently asked questions about the corridor study process, a description of the study, and study reports. The website included links to MDT's commenting platform and other engagement/commenting opportunities including the online map and story board discussed below.

Online Commenting Map

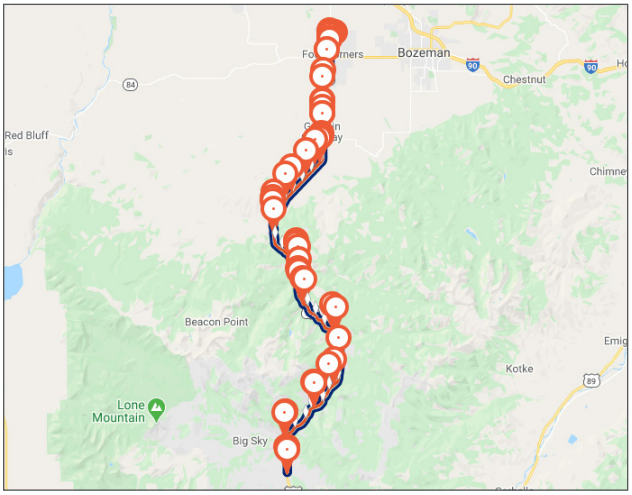
An interactive commenting platform allowed the public to provide feedback throughout the duration of the study. Users could leave notes and identify areas of concern. Over the course of the study 55 unique comments and 92 replies were posted, with an additional 441 likes and dislikes related to those comments.

ArcGIS Online Story Board

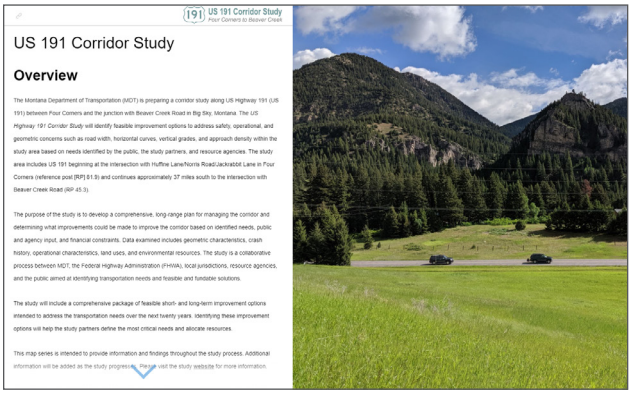
A story board supplemented the project website by presenting study data in a sequence of steps to demonstrate how the project team arrived at key decisions for the corridor study.



The study website (http://mdt.mt.gov/pubinvolve/us191) contained pertinent study information and encouraged interaction from the public and stakeholders.



An online commenting map was used to gather feedback from the public throughout the study. Nearly 150 comments and replies were made using the commenting platform.



The story board detailed the steps of the study process and presented important study data.

2.2. Targeted Outreach Events

Targeted outreach events were scheduled to share important study information and enable interactive input and dialogue. The following outreach events were conducted to interact with the study advisory committee, resource agencies, stakeholders, and the public.

2.2.1. Advisory Committee

A study advisory committee was established with representatives from MDT, FHWA, and Gallatin County. The committee met approximately every four to six weeks to discuss study progress, analysis methodologies and results, draft technical memorandums and reports, and other issues and concerns. The committee advised the consulting team and reviewed study documentation before publication.

2.2.2. Resource Agency Meeting

A resource agency workshop was held on December 3, 2019, at MDT Headquarters in Helena with accommodations for remote participation. The purpose of the workshop was to provide an overview of the study process and confirm the accuracy of study evaluation efforts. The following agencies were invited to participate, with those noted in bold in attendance.

- **Montana Department of Environmental Quality (DEQ)**
- **Montana Fish, Wildlife and Parks (FWP)**
- Montana Department of Natural Resources and Conservation (DNRC)
- **Montana Department of Transportation**
- Gallatin County
- U.S. Environmental Protection Agency (USEPA)
- U.S. Army Corps of Engineers (USACE)
- Federal Highway Administration
- **U.S. Forest Service (USFS)**
- **U.S. Fish and Wildlife Service (USFWS)**

Following a presentation of key findings from draft reports, meeting attendees engaged in open discussion of environmental resource concerns and other study considerations. Comments offered by agency representatives were incorporated into final study documents.

2.2.3. Informational Meetings

Public informational meetings were held at two key points during the planning study. The first informational meeting occurred after evaluation of existing and projected conditions. The second meeting will coincide with the release of preliminary recommendations and the draft *Corridor Study Report*.

Informational Meeting 1

MDT hosted a set of informational meetings in January 2020. To better serve the public, the meetings were held at two locations on consecutive dates. Advertisements were placed in the Lone Peak Lookout, and the Bozeman Daily Chronicle published an article announcing the meetings. Direct invitations were mailed to 358 adjacent landowners. Electronic invitations were sent to over 125 identified stakeholders and study contacts. Electronic notice was posted to the study website and Gallatin County's website.

Approximately 122 members of the public attended the meeting held on January 28, 2020, at the Gallatin Gateway Community Center, and approximately 45 members of the public attended the meeting held on January 29, 2020, at the Warren Miller Performing Arts Center in Big Sky.

Over 160 people attended the first informational meetings in January 2020. The meetings were formatted as open houses to encourage feedback from the public.

The purpose of the meetings was to provide information about the scope of the study, share existing conditions data, collect feedback, and answer questions. The meetings followed an open house format which enabled attendees to view project information, talk with study representatives, and submit comments.

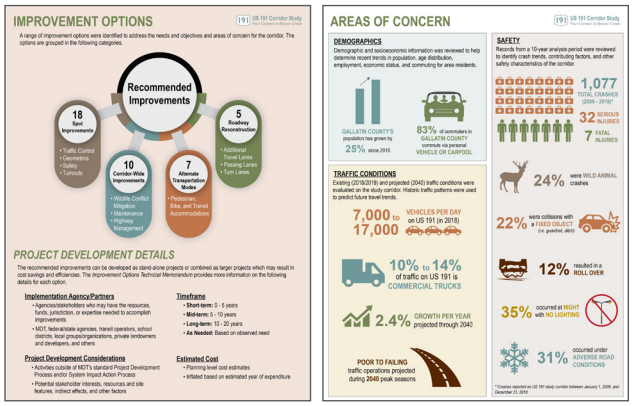
At each meeting, a series of stations displayed charts, maps, and facts about the study. Attendees received a copy of the study newsletter with additional study information and a link to the study website. Several comments were collected through conversations with individuals, notes attached to an aerial image of the corridor, and written comments submitted on comment forms, by email, and through MDT's web comment form. Refer to **Appendix 1** for a summary of comments received.

Informational Meeting #1 participants attached notes to an aerial image of the study corridor to point out areas of concern and other feedback for consideration by the project team.

Informational Meeting 2

MDT hosted a set of virtual informational meetings on July 28, 2020. Due to COVID-19 gathering restrictions, the meeting was held remotely using Zoom. To better serve the public, the meetings were held at two times, 11:30 AM and 5:30 PM, on the same date. Public notice was given in multiple formats, similarly to Informational Meeting #1. Advertisements were placed in the Lone Peak Lookout, and the Bozeman Daily Chronicle published an article announcing the meetings. Direct invitations were mailed to 352 adjacent landowners. Electronic invitations were sent to over 125 identified stakeholders and study contacts. Electronic notice was also posted to the study website and Gallatin County's website.

Informational Meeting #2 was held following the release of the draft *Corridor Study Report.* The purpose of the meetings was to share the draft report, provide study updates, discuss recommended improvements, and answer questions. The meeting began with a short presentation, followed by a question and answer period. Approximately 48 people attended the morning meeting, and approximately 29 people attended the afternoon meeting. Refer to **Appendix 1** for a summary of comments received.



Informational sheets were posted on the project website in coordination with Informational Meeting #2. The informational sheets provided a concise overview of the study's key findings and recommendations.

2.3. Public and Agency Comment Period

The public and agency comment period coincided with the release of the draft *Corridor Study Report*. The commenting period started July 22, 2020, and ended August 28, 2020. A summary of comments received is provided below.

- **Community Character:** When developing improvements within the corridor, the existing community character should be considered. Continued development, land use changes, and increases in traffic are changing the community.
- **Enforcement:** Increased enforcement is desired to address speeds, passing maneuvers, slow-moving vehicles that fail to use turnouts, use of truck compression brakes, roadside parking, and impaired drivers.
- **New Alignments and Alternate Routes:** A bypass route was suggested to provide additional capacity and serve local users. Some individuals also requested that trucks be encouraged to use alternate routes.
- **Natural Resources:** Attendees expressed a desire to protect the Gallatin River and Gallatin Canyon's water quality, habitat, and the scenic value. Wild and Scenic River and Scenic Byway designations were noted as being desired.
- **Pedestrians and Bicyclists:** A continuous pedestrian and bicycle path is desired. Improved accommodations in the canyon and better connectivity to high use destinations and existing facilities are also desired.
- **Speeds:** There is desire for lower speed limits for a variety of reasons including, increased vehicle safety, wildlife protection, and reduced traffic noise. The use of speed cameras or automated enforcement was suggested.
- **Transit:** Additional transit options are desired to reduce single-occupancy vehicles. A direct route from Bozeman to Big Sky is desired to serve Big Sky workers. Large employers in Big Sky should offer carpooling or transit options.
- **Trucks:** Noise from trucks is excessive due to truck compression brakes and increasing truck volumes. The potential for spills into the Gallatin River is also a concern. Some individuals suggested encouraging trucks to use other routes. Some members of the public also expressed a desire to ban trucks from using the corridor.
- **Turning Movements and Access:** Turning movements to and from intersecting roadways and driveways on US 191 are difficult due to high traffic volumes. During peak hours, residents experience delays waiting for a break in traffic to turn onto the highway. Turns from US 191 to adjacent properties are also difficult due to heavy oncoming traffic and passing vehicles. Some individuals requested consideration of traffic signals, dedicated right turn lanes, and center turn lanes.
- **Turnouts:** Some turnouts are too short to safety enable stopping and should be lengthened to accommodate trucks. Formalized turnouts to serve recreational access points are also desired. Additional signage through the canyon is needed to remind slow vehicles to use turnouts in accordance with state law.
- **Weigh Station:** The existing weigh station should be relocated to improve truck access and staffed full-time to ensure appropriate loads are transported through the canyon. Further consideration is needed for optimal placement of a new weigh station.
- **Wildlife Conflicts:** Animal crossings are a concern in terms of human safety, property damage, and wildlife population impacts. Wildlife mitigation strategies are desired, including consideration of grade-separated crossings and detection systems. A formal wildlife crossing/movement study is desired by some wildlife organizations.

03

3.0. TRANSPORTATION SYSTEM

The study evaluated the existing transportation system and anticipated future conditions in the corridor. This information may be used to support future, detailed, project-level analyses if an improvement option is advanced from this study. Additional information on these topics is provided in the *Existing and Projected Conditions Report* (**Appendix 2**).

Evaluating physical characteristics, design features, traffic volumes, and safety conditions provided a baseline for understanding corridor needs.

3.1. Background

The corridor dates to the late 1800s/early 1900s when the Chicago, Milwaukee & St. Paul Railway (Milwaukee Road) reengineered the road from Gallatin Gateway (formerly named Salesville) to Yellowstone National Park in order to promote tourism in the park. Starting in 1954, the US Department of Commerce Bureau of Public Roads constructed the West Gallatin Highway as part of the Montana Forest Highway System. The highway was later designated as part of US 191 sometime in the 1970s. Since then, the communities along the corridor have developed, and the highway has become more heavily used by local residents, commuters between the Bozeman/Belgrade area and Big Sky, Gallatin National Forest recreationists, tourists visiting Yellowstone National Park and other attractions in the region, and commercial users. To accommodate growing demand on the corridor, MDT and local agencies have completed the following plans and projects.

The Milwaukee Road historically operated a transit service within the US 191 study corridor to transport tourists to Yellowstone National Park.

3.1.1. Local and Regional Planning

Many local plans and studies provide relevant information on transportation and land use within the study area. Land use policy and development regulation on private lands are governed by Gallatin County. Within the National Forest boundary, land use policy and regulations are dictated by the *Forest Plan.* Other planning documents relate to transportation for specific areas or spot locations. The planning documents listed below were reviewed to provide context for the study and identify considerations that may be relevant to improvement options on US 191.

- *Gallatin County Growth Policy*[2] (2015)
- *Gallatin Triangle Planning Study*[3] (2014)
- *Gallatin Gateway Community Plan*[4] (2011)
- *Gallatin County Park and Trails Comprehensive Plan*[5] (2010)
- *Four Corners Community Plan*[6] (2006)
- *Gallatin Canyon/Big Sky Plan*[7] (1996)
- *Custer Gallatin National Forest Plan Revision (Forest Plan)*[8] (2019)
- *Gallatin National Forest Travel Management Plan*[9] (2006)
- *Big Sky Trails Master Plan*[10] (2018)
- *Big Sky Spur Left-turn Signal Review*[11] (2017)
- *Big Sky Transportation Study*[12] (2017)
- *Four Corners Motor Carrier Services Scale Site Traffic Study*[13] (2015)
- *Gallatin Canyon River Access Site Assessment*[14] (2015)
- *Bighorn Center Left-Turn Lane Study*[15] (2014)
- *Gallatin Canyon Safety Improvements*[16,17] (1996 – 2014)

3.1.2. Past Projects Completed on US 191

Multiple projects have been constructed within the study corridor over the past 60 years involving resurfacing or reconstruction with slope flattening, widening, the addition of turn lanes, guardrail, striping, signing, and other safety improvements.

The MDT online summary of road and bridge construction projects awarded since July 23, 1987, was reviewed to identify projects previously implemented on US 191 within the study area. Since 1987, MDT has completed 17 projects along the corridor as listed in **Table 1**.

Table 1: MDT Projects on US 191 Since 1987

Name	Letting Year	Description
Guardrail 3 Locations District 2	1988	Guardrail installation
Gallatin Canyon—Gallatin County	1991	Guardrail installation
Gallatin Gateway—North & South	1992	Widening and resurfacing
S. Of Spanish Creek—Gallatin County	1994	Slope flattening
Bozeman-Four Corners	1994	Resurfacing
Safety Improvements—Gallatin Canyon	1998	Safety improvements
Gallatin Gateway N&S	2002	Seal and cover (RP 70.2-73.3 and RP 74.4-81.9)
Turnbays—S of Gallatin Gateway	2004	Left turn lanes at Little Bear Creek Rd and Wilson Creek Rd
US 191/MT 64 Int Imp—E Big Sky	2006	Intersection improvements
Slope Flattening – Widening – Gallatin Canyon	2008	Slope flattening, turn lanes, guardrail
Erosion Prot—Gallatin Canyon	2008	Erosion control (retaining walls and structures)
North Gallatin Canyon	2009	Resurfacing
N Gallatin Canyon—Four Corners	2011	Resurfacing
Gallatin Canyon/Big Sky	2011	Aesthetic Timber Facing
Turn Lanes – Gallatin Canyon	2012	Grade, widening, added turn lanes
Four Corners—North	2012	Reconstruction with added capacity
Guardrail Upgrade—Gallatin	2019	Guardrail replacement and erosion treatment along river

Source: MDT Awarded Projects Search: https://app.mdt.mt.gov/project-search/project/search

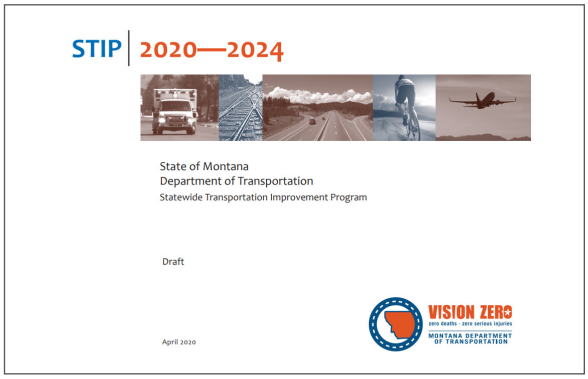
3.2. Projects Under Development

Multiple MDT, Gallatin County, and private developer projects are expected to be completed in the coming years. These projects will primarily address roadway maintenance needs as well as needs associated with current and planned future developments.

MDT Planned Projects

The *Montana 2020-2024 Statewide Transportation Improvement Program*[18] identifies the following projects on US 191 anticipated to be funded over the next five years:

- **Turnbay – North of Gallatin Gateway (RP 76.8):** Northbound right-turn lane at the intersection of US 191 and Gooch Hill Road.
- **SF 179 Gallatin Canyon Variable Message Signs:** Installation of permanent variable message signs to notify drivers of real-time roadway conditions and emergency situations.
- **S of Spanish Creek – S (RP 61.4 to 65.2):** Pavement rehabilitation on US 191 between Storm Castle Road and Cascade Creek Road.
- **Bridge Decks Hwy 64 Big Sky:** Bridge rehabilitation on MT 64. Resurfacing of bridge #5905 on US 191 over the Gallatin River (RP 49.8) is included in this project.
- **HSIP Program:** Miscellaneous safety improvements. Specific projects have not yet been defined, projects may or may not be completed on US 191 through this program.



The 2020-2024 Statewide Transportation Improvement Program identifies five projects planned on US 191.

Other Planned Projects

In addition to the projects programmed by MDT, the following projects are expected to be completed or have been recently completed on US 191 within the study area:

- **MT 64 TIGER Grant:** Gallatin County, on behalf of Big Sky, will complete a project at the MT 64/US 191 intersection. The project will be fully funded by a TIGER grant. The project will include installation of northbound lead left-turn phasing at the existing signal.
- **Gateway Village Subdivision:** A two-way left-turn lane between Cottonwood Road and Mill Street (RP 75.83 to 76.20) was installed in 2020 to serve the planned subdivision.

3.3. Physical Features and Characteristics

US Highway 191 is a major north-south route across the US that connects Canada and Mexico. The highway passes through the states of Montana, Wyoming, Utah, and Arizona. Within the study area, US 191 connects the Montana communities of Four Corners, Gallatin Gateway, and Big Sky and passes through the Custer-Gallatin National Forest. The study corridor generally parallels the Gallatin River throughout the study area and passes through the Gallatin Canyon. The corridor is situated between the Gallatin and Madison Mountain Ranges of the Continental Divide.

3.3.1. Roadway Surfacing

MDT uses its pavement management system to monitor pavement condition with performance measures assessing ride, rutting, and cracking. The Overall Performance Index combines and weights these measures to describe a route's current general health, ranging from 100 (assigned to a new pavement with no flaw) to 0 (representing highly degraded pavement). As shown in **Table 2**, pavement is in fair condition for most of the corridor except US 191 between Squaw Creek Bridge and Cascade Creek Road (RP 61.4 and 65.2) which is in poor condition.

Most of the corridor was resurfaced or treated in 2012/2013 except RP 41.5 to 48.4 which was resurfaced in 2007, and RP 61.4 to 65.2 which was treated in 2008. MDT has programed a surface rehabilitation project for fiscal year 2023 for RP 61.4 to 65.2.

Table 2: Pavement Condition

Begin RP	End RP	Overall Performance Index	Constructed	Last Surface / Treatment
81.90	73.26	66.17 (Fair)	1964	2012 / 2012
73.26	70.20	71.38 (Fair)	1960	2012 / 2012
70.20	65.20	71.56 (Fair)	2013	2013 / 2013
65.20	61.40	59.30 (Poor)	1997	1997 / 2008
61.40	48.40	65.82 (Fair)	1987	2012 / 2012
48.40	41.50	64.40 (Fair)	1987	2007 / 2007

Source: MDT PvMS, 2018, https://app.mt.gov/cgi-bin/pvms/pavement.cgi

3.3.2. Posted Speeds

The posted speed limits within the study area vary from 45 miles per hour (mph) within the Four Corners and Big Sky communities to 70 mph between Gateway South Road and the mouth of Gallatin Canyon, as shown in **Figure 2**. Posted speeds differ for passenger cars and trucks and during daytime and nighttime periods. A reduced speed zone at the south end of the study area between Windy Pass Trail and Beaver Creek Road (near RP 45) is in effect during school hours.

3.3.3. Passing Zones

Passing opportunities are provided along the corridor in areas where roadway geometrics allow as illustrated in **Figure 3**. A total of 30 passing zones, 15 northbound and 15 southbound, exist along the corridor as designated by broken yellow center pavement markings. No passing zones are established in areas where there is insufficient passing sight distance or near public approaches. All but two passing zones appear to be in accordance with *MDT Road Design Manual*[19] guidelines. The two passing zones that do not appear to meet standards are both less than 50 feet short of the 1,000-foot length standard. There is one passing lane in the corridor. It is approximately 0.9 miles long and allows passing in the northbound direction between RP 70.6 and 71.5.

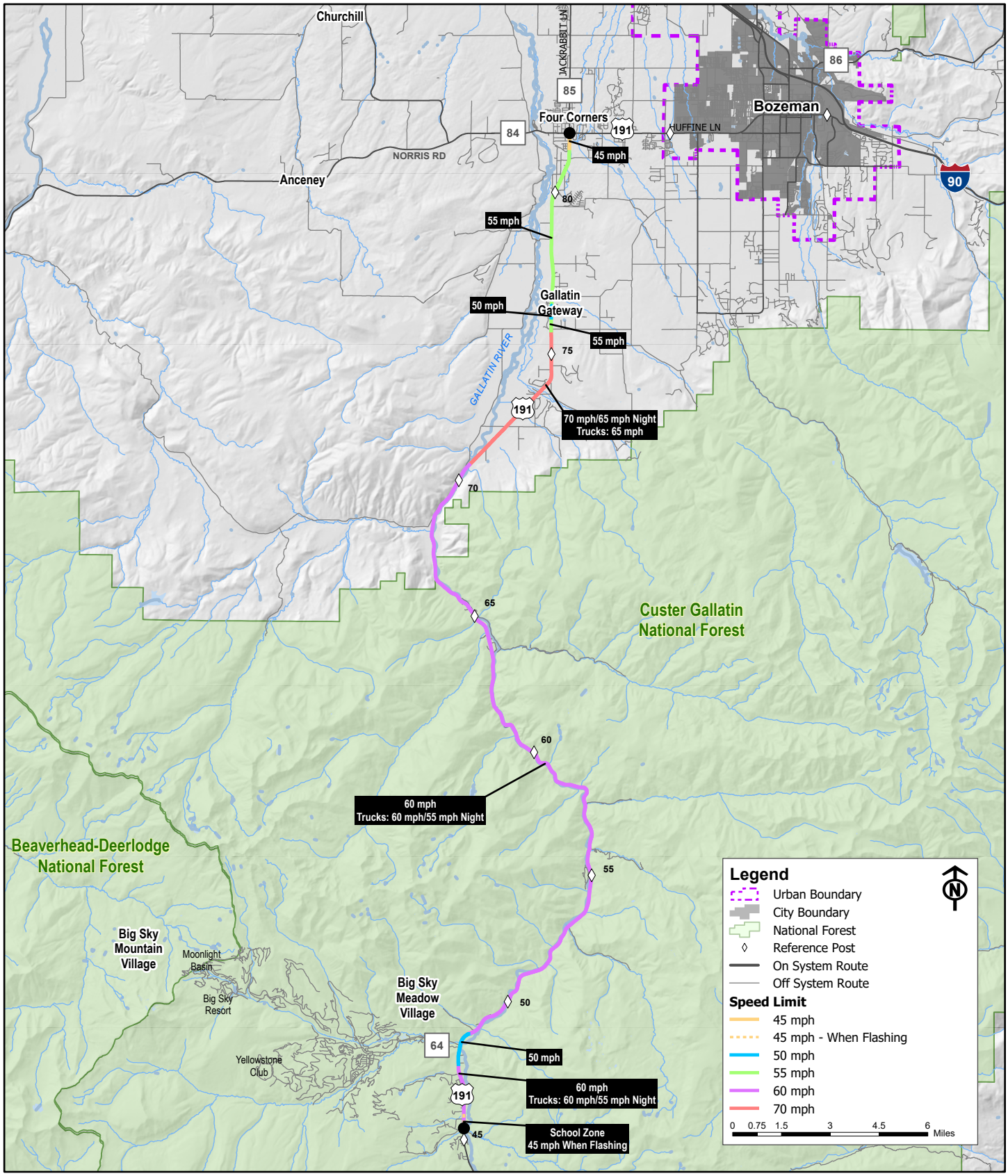


Figure 2: Posted Speeds

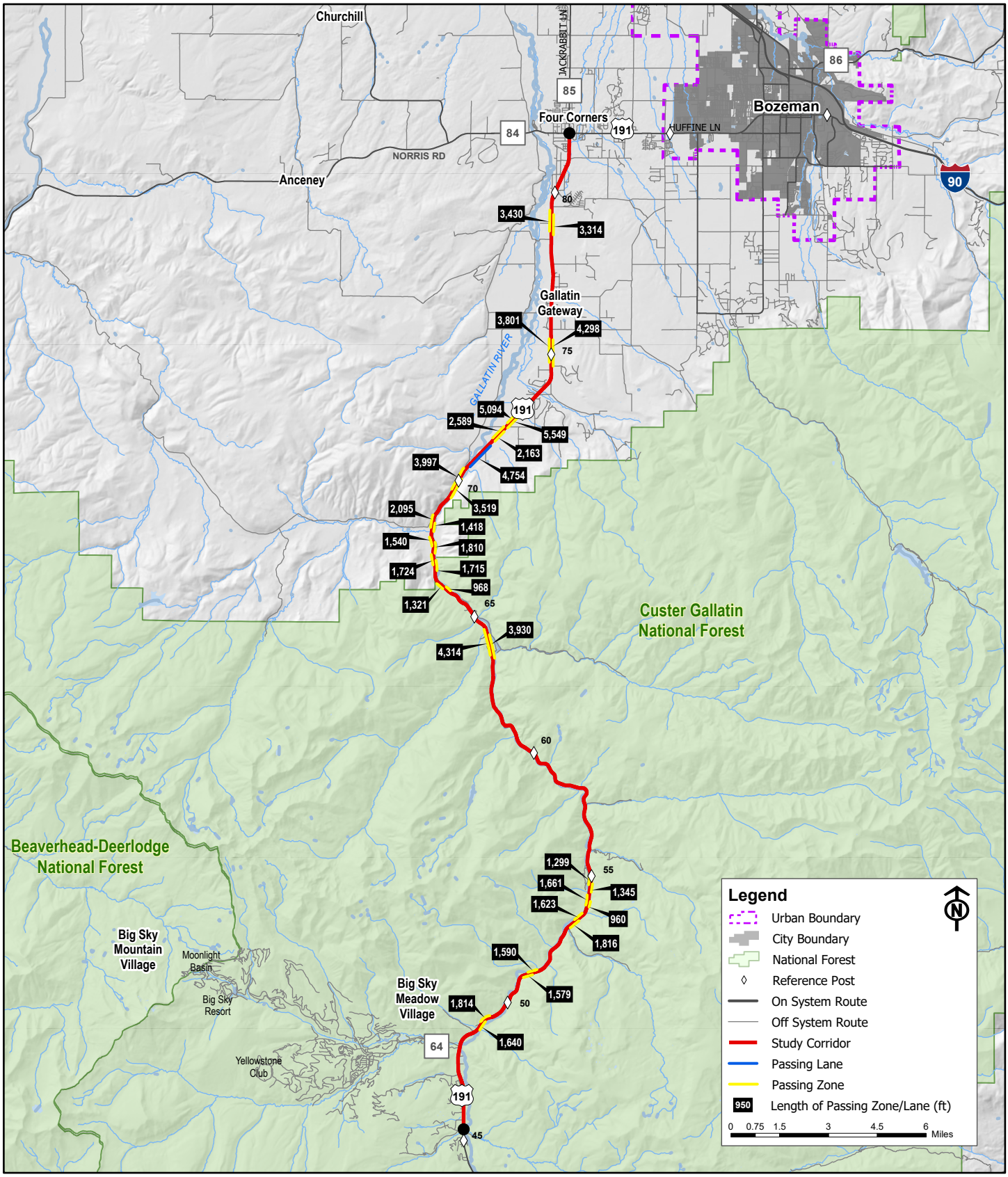


Figure 3: Passing Zones

3.3.4. Utilities

Northwestern Energy provides power and natural gas connections throughout the corridor. Overhead power lines are present intermittently along both sides of the highway and occasionally cross over or under the roadway. Telephone and broadband internet services are currently provided by 3 Rivers Communications using fiber optics and copper cables. Century Link provides telephone and internet services, and Qwest and Verizon each have one telephone line near Karst's Camp (RP 55). Montana Opticon has one fiber optic utility crossing near the Four Corners intersection. Four Corners and Gallatin Gateway Water and Sewer Districts serve property owners within their boundaries, while others obtain water and sewer services via wells and septic tanks.

There is overhead power along the corridor.

3.3.5. Approaches and Turnouts

A total of 386 public and private approaches were identified along the corridor, including those permitted through MDT and others that are unpermitted. Of the total, 79 were considered public roadways, 196 were private approaches, 49 were farm field approaches, 40 were recreation approaches, and 22 were designated turnouts. An *Access Control Resolution* addresses US 191 from Four Corners to Gateway South Road (RP 81.9 to 70.5). **Figure 4** provides a summary of corridor approaches.

Within the study corridor, there are 22 designated turnouts. Turnouts vary in length, width, and spacing but are provided where feasible to facilitate free flow traffic conditions. Per Montana Code Annotated (MCA) 61-8-311, the operator of a slow-moving vehicle followed by four or more vehicles shall use turnouts to allow vehicles to pass. Several turnouts within the corridor are used by recreationists for parking and river access. At times turnouts are not available for slower vehicles because of parked vehicles using the sites for recreation purposes.

The *Gallatin Canyon River Access Site Assessment* identified over 70 approaches within the study area used by the public for access to the Gallatin River, including turnouts and public approaches. Vehicles parked along the roadside in undesignated areas can cause safety concerns.

Parking for the Lava Lake trailhead often overflows into the adjacent turnout, making it difficult for slow moving vehicles to properly use the turnout.

3.3.6. Maintenance and Operations

MDT is responsible for maintenance of US 191 throughout the entire study area, including repairs and preventative maintenance of the roadway as well as maintenance of the signs and structures within the highway right-of-way. US 191 is under the jurisdiction of the Big Sky/Gallatin Gateway MDT Maintenance Section, a subsection of the Bozeman Maintenance Division.

Winter Operations

Winter snowplowing and sanding of the corridor are the responsibility of MDT maintenance personnel. According to the MDT *Maintenance Operations and Procedures Manual,*[20] US 191 from Four Corners to the mouth of the Gallatin Canyon is a Level I maintenance area, eligible to receive up to 24 hours-per-day coverage during a winter storm event. US 191 beginning at the Gallatin Canyon and extending through the end of the study area is a Level II maintenance area, eligible for 17 hours-per-day coverage, typically between 5:00 AM and 10:00 PM, during a winter storm event. Implementation of coverage is at the discretion of MDT's Bozeman Maintenance Chief.

MDT is responsible for winter snowplowing and sanding on US 191.

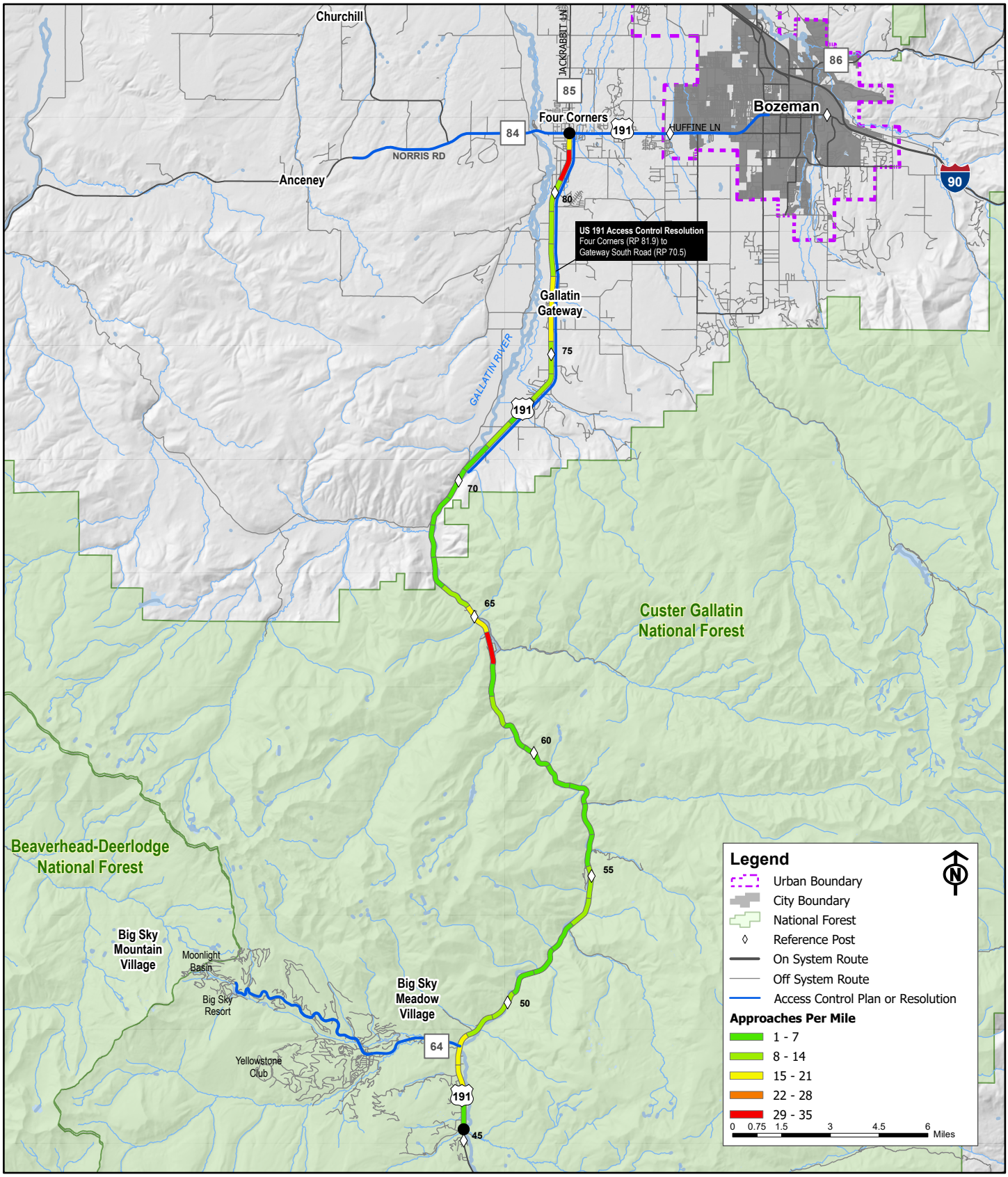


Figure 4: Approach Density

There are three emergency call boxes on US 191 within the study area.

Emergency Services

Gallatin County Emergency Management is responsible for coordination of public safety agencies, including fire, police, ambulances, public works, and volunteers before, during, and after an emergency. The agency serves the Four Corners, Gallatin Gateway, Big Sky, and unincorporated areas of Gallatin County within the study area.

The US 191 corridor is served by two rural fire districts, Gallatin Gateway and Big Sky, and by the Forest Service. The study area is patrolled by officers from several jurisdictions including the Gallatin and Madison County Sheriff's Offices, Montana Highway Patrol, West Yellowstone Police Department, Montana Department of Livestock, National Park Service, USFS, and FWP. Medical services for emergency situations are primarily provided by Bozeman Health's Big Sky Medical Center or Bozeman Deaconess Hospital.

Emergency Operations

MDT maintenance personnel have noted concerns with road closures and blockages due to crashes and rockfall along the corridor, especially through the canyon. Temporary variable messaging signs have been installed along the corridor at three locations (RP 72.1, 55.1, and 48.2) to alert oncoming traffic of road closures and other real-time traffic conditions. MDT maintenance personnel change the messaging on the boards as emergency situations occur.

There is limited cell coverage within the Gallatin Canyon. To aid in emergency situations and dispatch emergency services, five emergency call boxes are located along US 191, three of which are in the study area at Lava Lake (RP 61), Moose Creek (RP 56), and Karst's Camp (RP 55). All call boxes are installed and maintained by the Big Sky Rotary Club.

Heavy Vehicle Operations

Freight and heavy vehicle traffic operating on US 191 includes commercial truck traffic, construction vehicles, and smaller delivery trucks. An existing Motor Carrier Services (MCS) scale site is located near Four Corners at RP 81.8 on the west side of the highway. The scale site is used by MCS to inspect vehicles traveling on the highway to ensure the roadway is not compromised by an overweight vehicle. A traffic study was conducted in 2015 to evaluate site operations and safety. To accommodate future traffic demands, MCS determined relocation and expansion of the site would be necessary.

As of September 1994, commercial vehicles transporting hazardous materials with a Department of Transportation-required placard are prohibited from operating on sections of US 191 under National Park Service jurisdiction in and around Yellowstone National Park. Exceptions are permitted for local deliveries.

Between June 2008 and July 2010, US 191 was closed to semi trucks while a highway improvement project was completed to install turn bays, widen shoulders, flatten slopes, and install new guardrail. As a federal-aid highway, it would violate both state and federal laws to indefinitely restrict truck traffic on US 191.

US 191 is an important corridor for heavy vehicles including cross-country freight, local deliveries, and construction vehicles.

3.3.7. Hydraulics

Drainage along the study corridor is generally controlled by simple ditches. The Four Corners intersection includes curb and gutter, which ends 300 feet south of the intersection. While drainage is generally well controlled, some turnout areas may have poor drainage as evidenced by standing water. Other hydraulic structures within the study corridor include culverts and bridges.

Some of the unpaved turnouts have poor drainage conditions. There are also several locations with potential for rockfall events.

3.3.8. Geotechnical Conditions

MDT's *Rock Slope Asset Management Program* database identifies 14 areas within the Gallatin Canyon with rock slope conditions rated as "poor," indicating potential for rockfall events, possible emergency road closures, and disruption of normal traffic operations. No physical rockfall protection barriers are currently present in the canyon.

3.3.9. Bridges

Table 3 lists the location, age, physical characteristics, and condition ratings for the nine bridges within the corridor. All bridges meet current requirements to remain in place (28-foot width), but only the West Fork Gallatin River and Swan Creek bridges meet new construction standards (40-foot width).

Bridge condition is assessed based on the physical condition of the deck, superstructure, and substructure of the bridge. None of the bridges in the study area are structurally deficient. However, some of the bridges are in fair condition and eligible for repairs. The appropriate preservation and repair actions for the bridges in the corridor will need more in-depth field investigation and testing.

Some of the bridges in the study corridor are currently in need of repair and/or maintenance.

Table 3: Bridges in the Study Area

MDT ID	Location (RP)	Feature Crossed	Year Built	Length (ft)	Width (ft)
5913	81.5	Spain-Ferris Ditch	1964	21.2	38.0
5912	77.7	Farmer's Canal	1964	21.2	38.0
5911	76.7	South Cottonwood Creek	1964	21.2	38.0
5910	70.5	Gallatin River	1958	265.9	29.3
5909	68.2	Spanish Creek	1955	70.0	28.0
5908	61.3	Gallatin River	1950	233.9	28.0
5907	57.3	Swan Creek	2009	58.0	50.5
5905	49.8	Gallatin River	1952	160.0	28.0
5904	48.0	West Fork Gallatin River	2009	97.3	68.2

3.3.10. Other Transportation Modes

Pedestrians and Bicyclists

Bike activity is common in the Four Corners, Gallatin Gateway, and Big Sky areas, but uncommon through the canyon. Pedestrian activity along US 191 is higher in the Big Sky area than in the Four Corners and Gallatin Gateway areas. Through the canyon, pedestrian activity is limited to trail access branching from US 191 in the Gallatin Canyon.

There are two shared use paths along the study corridor. The Gateway shared use path begins on the east side of US 191 at the intersection of Zachariah Lane (RP 77.8) and ends at Rabel Lane/Mill Street (RP 76.3) with a pedestrian underpass. Approximately four miles remain to complete the trail connection into Four Corners. Sustained public use has created an informal trail adjacent to the shoulder on the west side of US 191. The Big Sky Trail is adjacent to US 191 on the west side of the highway. The trail begins at the junction of MT 64 (RP 48.0) and ends at Beaver Creek Road (RP 45.3).

An informal trail has been established on the west side of US 191 between the terminus of the existing shared use path (at Zachariah Lane) and the Four Corners intersection.

Transit

The following transit and shuttle services are available within the study area, many of which provide connections between Bozeman International Airport (about 10 miles north of the study area) and Big Sky Resort.

- The **Skyline Bus** is a year-round, scheduled, fare-based, public transit service between Bozeman and Big Sky. The service is operated by the Big Sky Transportation District (BSTD). The local Big Sky service is available by demand response Monday through Friday during the shoulder season and is fare free. In fiscal year 2019, Skyline provided 957,565 rides.
- The **West Yellowstone Foundation Bus** is a reservation-based public transit service between Bozeman and West Yellowstone. The bus provides fare-based weekly round trips for any purpose on a first come first served basis. The service provided 1,273 rides in fiscal year 2019.
- The **Yellowstone Club** provides a closed-door shuttle service from Four Corners to Yellowstone Club for Yellowstone Club employees residing in Bozeman and Four Corners.
- Local, regional, and national **tour and charter buses** operate on the corridor between April and October. Karst Stage, North of Yellowstone, and Big Sky Shuttle charter services for seasonal visitors between the Bozeman International Airport, Big Sky, and West Yellowstone.

The Skyline bus provides year-round public transit service between Bozeman and Big Sky.

Air Service

The following airports are located near the study area.

- The **Bozeman Yellowstone International Airport** is about 10 mile north of Four Corners. The airport provides year-round service. There are a number of shuttle options between the airport and Big Sky Resort, Yellowstone National Park, and surrounding areas.
- The **Yellowstone Airport**, located in West Yellowstone about 45 miles south of the study corridor, offers both commercial and general aviation services between May and October. Recreationists use the airport to access Yellowstone National Park, Big Sky, Island Park, Ennis, and Virginia City.
- The **Ennis – Big Sky Airport**, located in Ennis about 20 miles west of the study corridor, is a county-owned, public-use airport but does not offer commercial flights. A helicopter shuttle ride is offered from the airport to the resorts in Big Sky. Alternately, the resorts can be accessed via Jack Creek Road, a private 30-mile road connecting Ennis and Big Sky.
- The **Briar Creek Airport** is located in Gallatin Gateway about two miles east of the study corridor. The airport is privately owned and consists of two runways.

There are four airports near the study area. Many of the shuttle services utilize US 191 to provide access to visitor destinations from the airport.

3.4. Geometric Conditions

The study evaluated existing roadway geometrics within the corridor, including design features such as roadway dimensions, curve alignments, roadside recovery areas, and driver sight lines. These features influence safety and comfort for roadway users.

3.4.1. Design Criteria

The MDT *Geometric Design Standards*[21] specify general design principles and controls that determine the overall operational characteristics of the roadway and enhance its aesthetic appearance. MDT design criteria for rural principal arterials on the Non-Interstate National Highway System (NHS) apply to the study corridor. For this classification, design speed may vary depending on terrain conditions. The terrain through the Gallatin Canyon can generally be classified as mountainous terrain whereas the sections of roadway outside the canyon are generally level.

For the topography and roadway classification of US 191, the design speed ranges from 50 mph for mountainous terrain to 70 mph for level terrain. Posted speeds may differ from design speed. Design speed and terrain type will ultimately be determined, as necessary, during the project development process for any improvement options forwarded from this corridor study.

3.4.2. Roadway Width

Throughout most of the corridor, the roadway is a two-lane highway with occasional turn lanes and one 0.9-mile-long passing lane located north of the canyon. Roadway widths vary from 90 feet at the Four Corners intersection (RP 81.9) to 28 feet in the Gallatin Canyon. In several locations, the roadway has been widened to accommodate dedicated turn bays and center two-way left-turn lanes to facilitate access. Right-of-way widths vary throughout the corridor, ranging from approximately 100 feet to as wide as 400 feet in some locations. In the canyon, much of the roadway is located on USFS land easement.

The MDT *Geometric Design Standards* recommend a minimum travel lane width of 12 feet on rural NHS routes. The MDT *NHS Route Segment Plan*[22] suggests a width of 40 feet or greater for the corridor. While the corridor satisfies the 12-foot travel lane width, some locations do not satisfy the 40-foot minimum recommended roadway width, especially in the constrained Gallatin Canyon.

3.4.3. Horizontal and Vertical Alignment

Horizontal curvature refers to the turns and bends in a roadway. A total of 88 horizontal curves occur within the study area, and 16 of the curves do not meet standards for an NHS Non-Interstate route. Vertical curvature refers to the elevation rises and dips in a roadway. A total of 92 vertical curves occur in the study corridor, and only 1 curve does not meet standards for the route.

3.4.4. Clear Zone

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles and may include a shoulder and other recovery areas. The desired clear zone width for the US 191 corridor ranges from 22 to 46 feet depending on traffic volumes, speeds, and roadside geometry. It is generally desirable to attain adequate clear zones by removing or shielding obstacles.

The Gallatin Canyon is narrow with little room for road expansion. The Gallatin River and steep side slopes restrict the ability to provide recommended clear zone widths. Guardrail has been installed along the roadside to shield drivers from obstacles and in areas with steep side slopes.

3.4.5. Sight Distance

Sight distance is the length of roadway visible to a driver and is influenced by the horizontal or vertical curves and obstacles alongside the road. Under ideal conditions, the driver of a vehicle should have an unobstructed view and enough distance to perceive, react, and safely stop for or avoid approaching vehicles and other hazards. There are several locations throughout the corridor where sight distance is hindered, most of which occur through the curving sections of the Gallatin Canyon.

3.5. Traffic Conditions

The study evaluated existing and projected traffic characteristics for the study corridor, including the number and type of roadway users, the time required to reach a destination, congestion levels, and delays experienced at corridor intersections. These characteristics impact user mobility, efficiency, and comfort.

3.5.1. Traffic Volumes

Historic and Projected Volumes

Historic growth rates for the study corridor can help project future conditions as past growth may be indicative of future growth. Over the past 20 years, the study corridor has experienced a traffic growth rate of approximately 2.4 percent per year as illustrated in **Figure 5**. This trend is anticipated to be representative of predicted traffic growth over the next 20 years. The 2.4 percent growth rate was applied to existing traffic volumes for the projected operational analysis contained in this report.

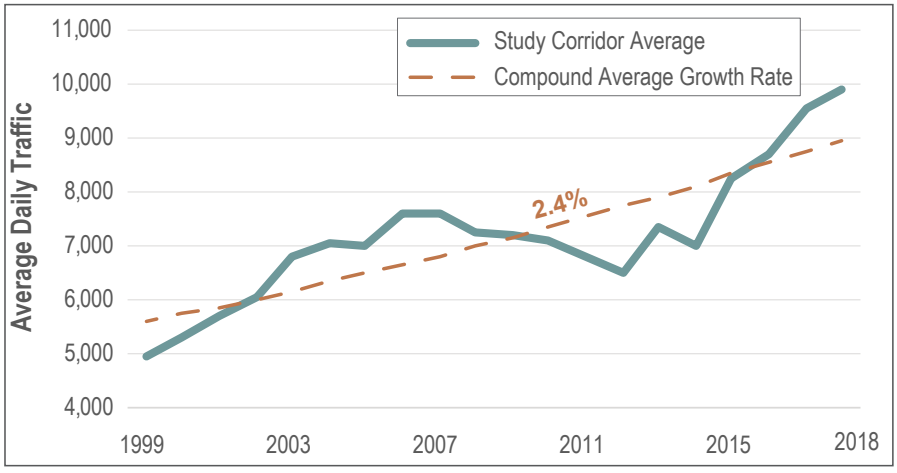


Figure 5: Average Daily Traffic Volumes (1999-2018)

Heavy Vehicle Traffic

Based on 2018 traffic data, commercial truck traffic accounts for over 12 percent of traffic near Big Sky and almost 9 percent of all traffic near Four Corners.

Daily Variation

The corridor experiences moderate fluctuations in traffic volumes throughout the week. Weekend traffic was, on average, between 23 and 31 percent lower on the weekends than during the weekdays. Much of this reduction in weekend traffic may be attributed to commuters to the Big Sky area.

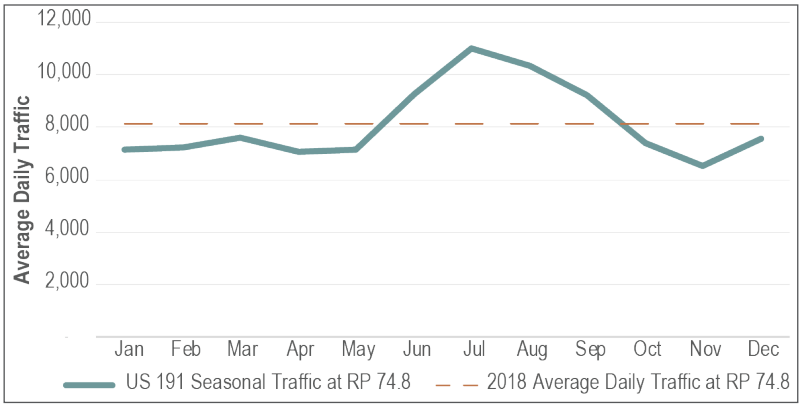


Figure 6: Seasonal Traffic Volumes (2019)

Seasonal Variation

Corridor traffic volumes are highest in the summer months (June through September) and lowest in the shoulder seasons (April to May and October to November) as illustrated in **Figure 7**. The winter ski season (December to March) sees traffic volumes typically between peak summer and off-peak months. Seasonal variation can largely be attributed to heavy recreational and tourism use of the corridor.

3.5.2. Highway Operations

Roadway operations are affected by the driver's perception of travel speeds, passing opportunities, heavy vehicles in the traffic stream, and roadway grades.

On an average annual basis, US 191 is currently experiencing poor to failing operating conditions in the northern portion of the corridor, poor operations in the canyon, and fair to poor operations north and south of the canyon, with the worst performance during the peak season. Under future traffic conditions, the roadway is projected to operate at failing conditions near Four Corners during the peak season and operate poorly on all other segments except for fair operating conditions between MT 64 and Beaver Creek during the average day.

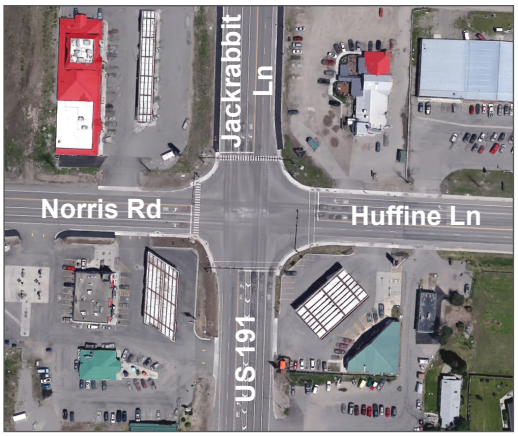
3.5.3. Travel Time

Travel times and vehicle speeds were collected on a Thursday and a Saturday during peak summer and winter conditions. During the summer counts, MDT was replacing guardrail on US 191 through the Gallatin Canyon. Speeds were reduced during construction, and traffic was closed to one lane within the work zones, causing some delay to traffic in the corridor. Construction occurred on weekdays, therefore the Saturday travel times and speeds are more indicative of free-flow travel. On average, there were about 11 percent fewer cars in December than August and about 23 percent fewer cars on Saturday than on Thursday.

Travel times in the north and southbound directions is fairly consistent, with a difference of a minute or less. No definitive peaks were identified. Travel times generally vary by about 5 to 10 minutes between Thursday and Saturday, though no consistent influencing factors were identified. Mean travel speeds are slightly slower in the winter than in the summer which may be attributed to weather or road conditions. Based on collected data, vehicles tend to travel slightly slower than the posted speeds.

3.5.4. Intersection Operations

Vehicle turning movement data was collected at three major intersections over a 24-hour period on a Thursday in August and December 2019 to capture peak summer and winter traffic. Traffic operations results are based on these volumes shown in **Figure 8**. Operational characteristics of the study intersections are discussed on the following page.

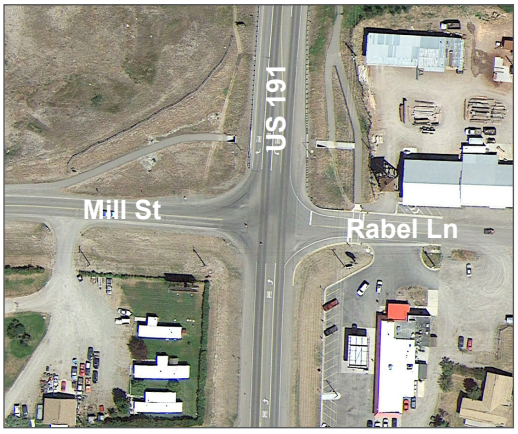


Four Corners Intersection

Four Corners

Under 2019 traffic conditions, this intersection operated at a fair level during all peak hours, except for poor performance during the August PM peak hour. The intersection experienced about 13 percent fewer vehicles during December than in August but generally operated the same during the peak travel periods. The eastbound approach (from Ennis) generated the highest delay during all peak hours. The northbound approach (from Big Sky) generated the second highest delay during all peak hours.

Under projected future traffic conditions, failing operations are predicted during the AM and PM peak hours, with poor performance during the noon peak hour. This means vehicles will experience unacceptably long delays by 2040.

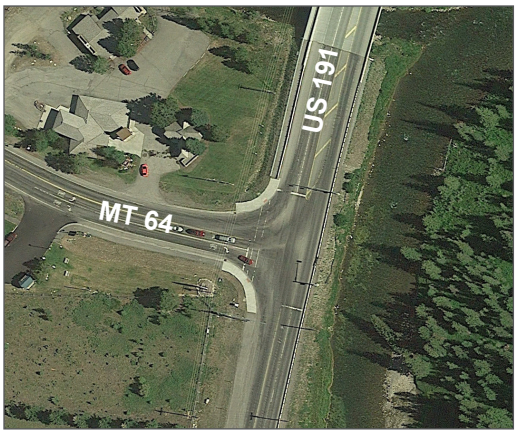


Mill Street Intersection

Mill Street

Under 2019 traffic conditions, this intersection experienced failing operations during the summer PM peak hour, poor operations during the summer and winter AM and the winter PM peak hours, and fair operations during the summer and winter Noon peak hours. During the winter, eastbound traffic volumes were nearly double those in the summer which is likely attributed to school traffic for Gallatin Gateway School. The eastbound approach generated the highest delay during all peak hours, while the north and southbound approaches experience little delay. During periods of high traffic volumes on US 191, there were limited acceptable gaps to make a left turn from the east and westbound approaches.

Under projected conditions, the Mill Street intersection is anticipated to operate at failing or poor conditions during all peak hours. If the intersection remains two-way stop controlled, the north and southbound approaches will continue to operate well while the east and westbound approaches are projected to experience long delays.



MT 64 Intersection

MT 64

Under 2019 traffic conditions, this intersection experienced good operations during the AM and Noon peak hours in both the summer and winter peak seasons. During the PM peak hour, the intersection operated fairly in August and poorly in December. Although the intersection experienced about 13 percent less traffic in the winter than the summer, the delay on individual approaches was worse during the winter. This increase in delay can likely be attributed to ski traffic at the resorts in Big Sky. During all peak hours, the eastbound approach (MT 64) generated the highest delay.

Under projected conditions, the MT 64 intersection is predicted to fail or operate poorly during the summer and winter AM and PM peak hours, with good operations during the Noon peak. With the current signal phasing, the delay is worst in the southbound direction during the AM peak hour, and in the eastbound direction during the PM peak hour.

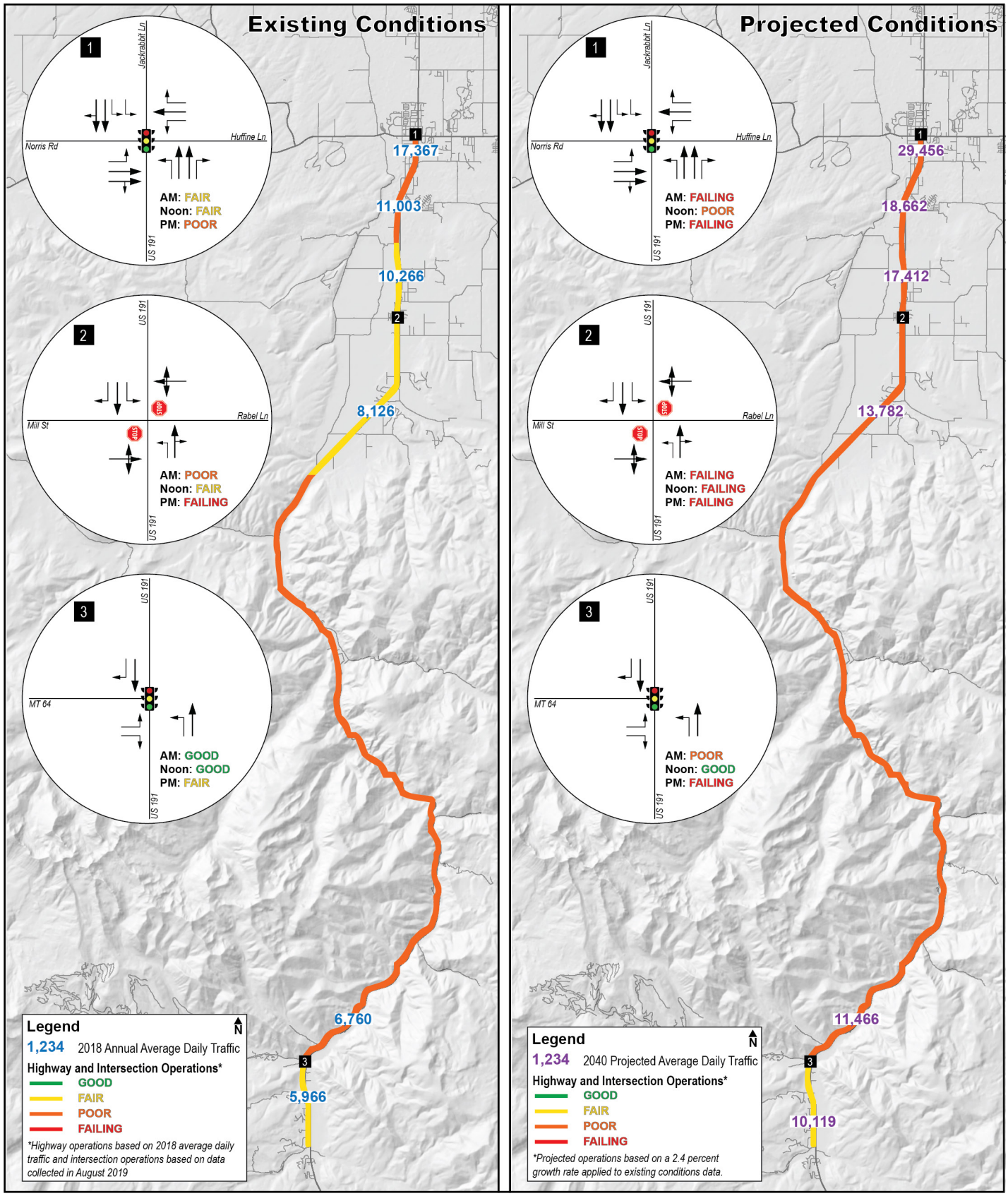


Figure 7: Existing and Projected Traffic Operations

3.6. Safety

Crash data for the corridor was provided by MDT for the 10-year period between January 1st, 2009, and December 31st, 2018. This information includes data from crash reports submitted to the Montana Highway Patrol from their patrol officers and from local city/county law enforcement. The crash reports are a summation of information from the scene of the crash provided by the responding officer. Some of the information contained in the crash reports may be subjective. Any crash records from other law enforcement agencies that were not reported to or by the Montana Highway Patrol are not included in this analysis.

A total of 1,077 crashes were reported during the 10-year analysis period, including seven fatal crashes (0.6 percent) resulting in seven fatalities and 27 suspected serious injury crashes (2.5 percent) resulting in 32 suspected serious injuries. Crash locations are shown in **Figure 9**.

Total Crashes

High numbers of crashes tended to be concentrated at or near intersections and in areas with higher traffic volumes. Over 100 crashes were reported at the Four Corners intersection and 18 at the MT 64 intersection. Other locations with high volumes of crashes included 52 crashes at the s-curve at the Lava Lake trailhead (RP 61), 31 crashes in the canyon between RP 50 and 51, 15 crashes at the mouth of the canyon (RP 70.5), 14 crashes in the canyon between RP 55.7 and 56.1, 14 crashes at the curve between RP 57.5 and 58.1, and 7 crashes at the curve at RP 59.5.

Wild Animal Crashes

Wild animal crashes were the most common crash type, accounting for 24 percent of all crashes over the past 10 years. An additional 18 crashes reported an animal in the roadway as a contributing circumstance.

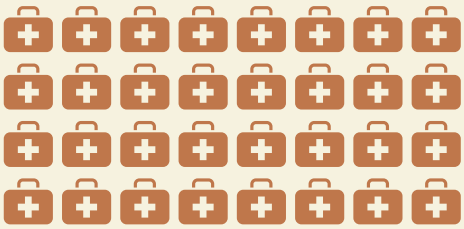
Clusters of wild animal crashes were seen north of Gallatin Canyon (RP 64 to 82) and north of the MT 64 intersection (RP 48 to 53), aligning with MDT carcass data. Wild animal crashes were more common at night, with 68 percent occurring under dark-not lighted conditions. The crashes mainly occurred under dry road conditions, with 19 percent occurring when roads were snowy, icy, frost-covered, slushy, or wet. Wild animal crashes were typically not severe; 96 percent caused property damage only and two crashes caused serious injury.

Rear-End Crashes

A total of 101 rear-end crashes were reported between Four Corners and Gallatin Gateway (RP 81.9 to 75.8), which exhibits closely spaced intersections and approaches. Throughout the canyon, rear-end crashes tended to occur near rural subdivisions, at driveways, and at turnouts. Additionally, seven rear-end crashes occurred at the intersection of US 191 and MT 64. Corridor wide, 58 percent of the reported rear-end crashes occurred at or were related to an intersection. The majority (63 percent) occurred on dry roads.

KEY CRASH STATISTICS*

1,077 TOTAL CRASHES (2009 - 2018)



32 SERIOUS INJURIES

7 FATAL INJURIES

24% were WILD ANIMAL crashes

58% of REAR-END crashes occurred at an INTERSECTION

** Crashes reported on US 191 study corridor between January 1, 2009 - December 31, 2018*

Fixed Object Crashes

Fixed object crashes were the second most common crash type accounting for 22 percent of all crashes over the past 10 years. The most common objects were guardrail (100 crashes, 41 percent); a ditch, embankment, or fence (61 crashes, 25 percent); a pole or support (32 crashes, 13 percent); or a tree (20 crashes, 8 percent). Fixed object crashes typically occurred on tight curves or narrow sections throughout the canyon.

A cluster of fixed object crashes occurred near the Lava Lake trailhead (RP 61). Fixed object crashes were more common under adverse weather conditions, with 153 crashes (63 percent) occurring on snowy, icy, frost-covered, slushy, or wet roads.

Rollover Crashes

Rollover crashes accounted for 12 percent of all crashes over the past 10 years. They were most common through the canyon with a noticeable cluster of crashes in areas north and south of Spanish Creek Road (between RP 64.5 and 66.5 and RP 69.1 to 69.9). Most rollover crashes (130 crashes, 68 percent) occurred when roads were snowy, icy, frost-covered, slushy, or wet. Approximately 63 percent did not cause injury, however, seven crashes resulted in suspected serious injuries and one crash resulted in a fatality.

Snow and Ice

Crashes occurring on poor road conditions (snow, ice, frost, slush, or wet) were common throughout the Gallatin Canyon (RP 49 to 68), especially in the narrow and curvy sections of the roadway. A cluster was reported near the Lava Lake trailhead (RP 61 to 62.5). Crashes occurring during poor conditions included fixed object (34 percent), rollover (20 percent), and rear-end (14 percent) crash types. Approximately 35 percent of crashes on poor road conditions were under dark-not lighted conditions.

Dark–Not Lighted Conditions

The Four Corners, Gallatin Gateway, and Big Sky areas have some streetlights, but most of the corridor is not lighted. Approximately 35 percent of crashes along the corridor occurred under dark-not lighted conditions. Most of these crashes were wild animal crashes (174 crashes, 46 percent), while 94 crashes were collisions with fixed objects (25 percent), and 47 were rollover crashes (12 percent). Several small clusters of dark-not lighted crashes occurred at Riverview Lane (RP 46.2, 5 crashes), the curve at RP 52.3 (4 crashes), the curve at RP 61.1 (8 crashes), and at the mouth of the canyon (RP 70.5, 5 crashes), and through the Four Corners and Gallatin Gateway areas.

Impaired Driving

Impaired driving was a contributing factor in many of the severe crashes. An impaired driver was involved in 5 of the 7 fatal crashes (71 percent), 14 of 27 serious injury crashes (52 percent), and 116 crashes overall (11 percent).

KEY CRASH STATISTICS*

22%
were collisions with a **FIXED OBJECT**
(i.e. guardrail, ditch)

12%
resulted in a **ROLL OVER**

31%
of crashes occurred under **ADVERSE ROAD CONDITIONS**

35%
occurred at **NIGHT** with **NO LIGHTING**

56%
of **SERIOUS** crashes involved an **IMPAIRED** driver

** Crashes reported on US 191 study corridor between January 1, 2009 - December 31, 2018*

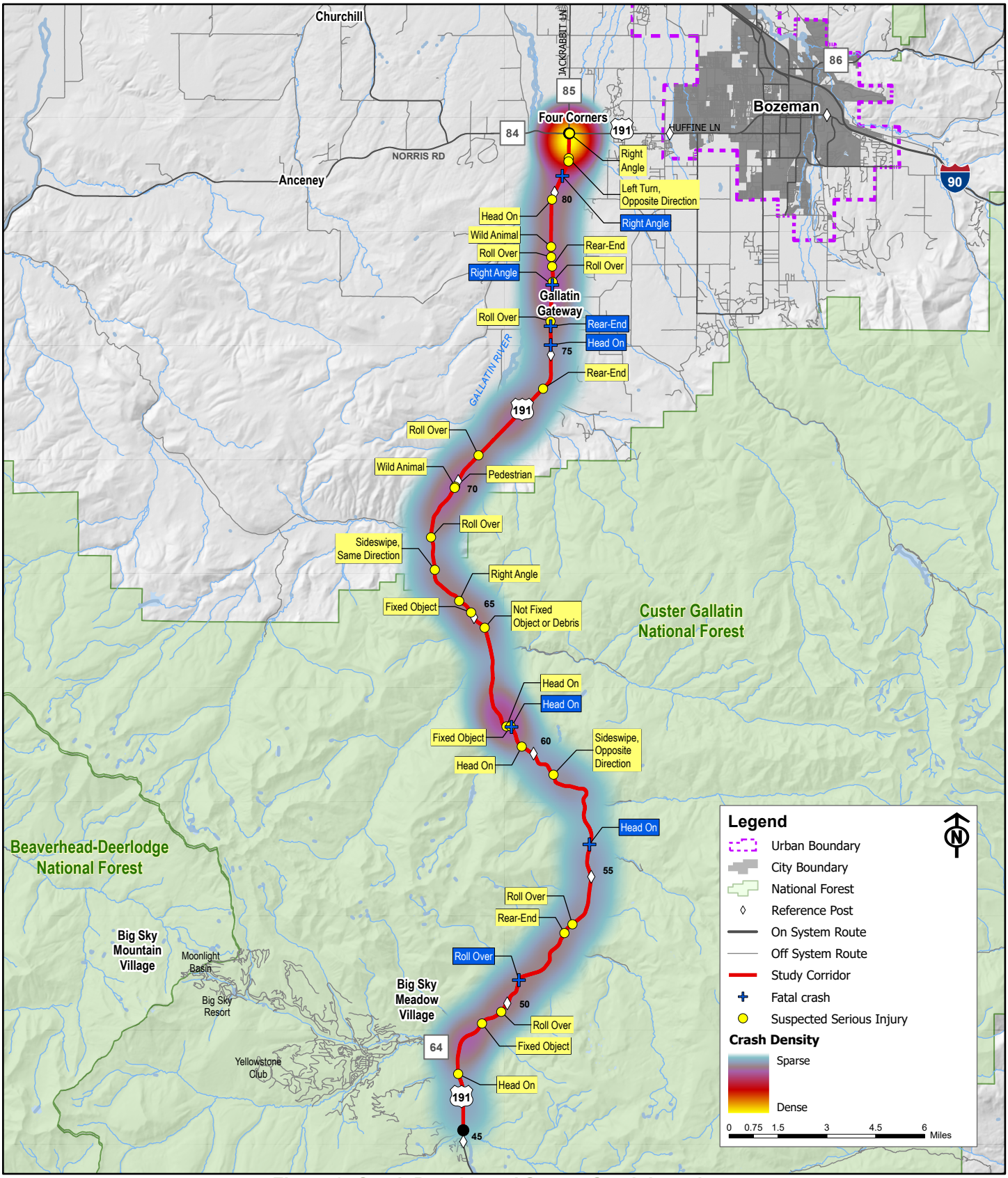


Figure 8: Crash Density and Severe Crash Locations

04

4.0. ENVIRONMENTAL SETTING

The environmental setting includes naturally occurring features and populations as well as human influences and characteristics. These elements provide context for transportation projects and may serve as potential constraints or opportunities during the project development process. Summaries reflect available environmental information as of October 2019. Additional detail is provided in the *Environmental Scan* (**Appendix 3**).

If improvement options are forwarded from this study into project development, an analysis for compliance with the National and Montana Environmental Policy Acts must be completed as part of the project development process. Information contained in the study may be used to support future environmental documentation.

MDT strives to avoid, minimize, and mitigate impacts to environmental resources when improving a highway corridor.

4.1. Physical Environment

The physical environment includes natural elements such as soil and rock features, water sources, wetlands, floodplain areas, air quality, and human influences such as developed land areas, farmlands, hazardous materials sites, residences, and areas sensitive to noise impacts.

4.1.1. Land Ownership, Land Use, and Zoning

Land ownership in the corridor is a mix of private and public, including land holdings by the USFS, FWP, and Montana State Trust. Some areas are held in easement by nongovernmental conservation groups including Montana Land Resilience, the Nature Conservancy, and Gallatin Valley Land Trust. The Gallatin Wildlife Management Area is located along the eastern side of US 191 south of MT 64 to conserve important wildlife habitat.

Adjacent to the roadway, much of the land is privately owned with low density development zones designated in the Four Corners, North Gallatin Canyon, and Gallatin Canyon/Big Sky zoning districts. The land immediately adjacent to US 191 is zoned as commercial, mixed, public, and residential use varying in density. The study area and adjacent lands are primarily used for residential use, grazing, timber activity, and recreation.

Additional research and coordination are needed to determine impacts to existing right-of-way or easements on private and USFS lands for improvements forwarded from the corridor study.

4.1.2. Geologic Hazards

The study area is located within the Upper Gallatin Watershed and is situated between the Gallatin and Madison Mountain Ranges. The areas from Four Corners to the mouth of the Gallatin Canyon and from MT 64 to the end of the study area are relatively flat and open with no prominent geological features. From the mouth of the Gallatin Canyon to MT 64, US 191 lies in a narrow river canyon formed by the Gallatin River bounded on both sides by steep mountainous terrain. This area exhibits multiple geological features, varied soil characteristics, and moderate to high activity for seismic events with numerous slopes that could become unstable if disturbed. Several small earthquakes occurred in the Gallatin Gateway area in late 1989/early 1990 ranging in magnitude from 0.5 to 2.5 with depths shallower than 6 miles. Earthquake events near US 191 through the canyon appear to be uncommon historically.

4.1.3. Soil Resources and Prime Farmland

Soils classified as prime farmland, prime farmland if irrigated, and farmland of local and statewide importance occur north of the Gallatin Canyon. If any improvement options are advanced from this study, coordination with the US Department of Agriculture Natural Resources Conservation Service may be required.

4.1.4. Surface Waters

The study area lies entirely within the Gallatin River Watershed and lies partially within the Big Bear Creek, Lava Lake, and Porcupine Creek sub watersheds. US 191 generally parallels the Gallatin River throughout the entire study area. US 191 crosses several named perennial, fish-bearing streams. Additional unnamed streams, wetlands, irrigation canals and ditches, and other waterbodies are also present in the study area.

Road construction and reconstruction activities such as bridge or culvert installation or replacement, placement of fill, or bank stabilization have the potential to impact surface waters. Coordination with federal, state, and local agencies would be necessary to determine the appropriate permits based on the improvement options forwarded from this study. Impacts should be avoided and minimized to the maximum extent practicable. Impacts to streams and wetlands may trigger compensatory mitigation requirements.

US 191 parallels the Gallatin River throughout the study area. Impacts to the Gallatin River due to roadway improvements are subject to federal, state, and local mitigation requirements.

Water Quality

Within the study area, the Gallatin River, South Cottonwood Creek, Storm Castle Creek and the West Fork Gallatin River are listed as impaired or threatened. Pollution limits have been established and Watershed Restoration Plans have been prepared to address impairments identified by DEQ, improve water quality, and improve habitat conditions.

In Montana, stormwater management is regulated by DEQ. Stormwater permitting for US 191 would need to be reviewed for any projects that may be brought forward from the corridor study. Incorporation of permanent erosion and sediment control measures should be considered with any projects advanced from this study that impact one acre or more, or if the project adversely affects water quality.

The Gallatin River has been preliminarily classified as a Recreational River and is eligible for extra protections.

Wild and Scenic Rivers

In 1976, Congress designated portions of the Flathead and Missouri Rivers as protected by the *Wild and Scenic Rivers Act* of 1968. Neither of these rivers are within the study area, however, during revision of the *Forest Plan*, a study was conducted to determine if any of the rivers within the Custer-Gallatin National Forest are found eligible as a wild and scenic river. For eligible rivers, national forest lands in a 0.25-mile-wide buffer will be managed to protect the identified river-related outstandingly remarkable values and tentative classification, along with retaining the free-flowing nature of the waterway. The Gallatin River has been determined eligible for wild and scenic designation based on the values identified for river, including recreation, scenery, and heritage. The Gallatin River has received a preliminary classification of Recreational River.

Irrigation Features

The Gallatin River is the source of irrigation water for about three-fourths of the irrigated land in the Gallatin Valley. Most of the water taken from the main stem of the Gallatin River is diverted between the mouth of the canyon and Four Corners. Groundwater provides a supplemental source of water for irrigation in the Gallatin Watershed.

In Gallatin County, most of the current canals and ditches are privately owned and managed by local irrigators. There are over 60 irrigation features in the county with nearly 30 of the features existing in the Four Corners/ Gallatin Gateway area. Coordination with appropriate overseeing authorities and affected landowners should be undertaken if irrigation facilities may be affected by improvement options advanced from this planning project to help avoid or minimize impacts to agricultural operations and downstream water users.

4.1.5. Groundwater

Groundwater resources in Gallatin County are under increasing pressure from land use change from irrigated cropland to residential and commercial development. Much of the new development is dependent on individual household wells for potable water and on septic systems for wastewater disposal. With increased use, there is a potential for groundwater resources to become over utilized in some locations. Based on available data, more than 900 wells are located within the study area, about 50 of which are public water supply wells for local businesses, schools, or neighborhoods. Two water and sewer districts serve users at Four Corners and Gallatin Gateway by supplying water for use in homes and businesses and/or providing wastewater treatment and disposal. Impacts to the groundwater supply should be considered in any improvement option advanced from this study.

4.1.6. Wetlands

Freshwater emergent wetlands and freshwater forested/shrub wetlands occur along the Gallatin River and other intermittent rivers, streams, and drainages. Wetland delineations would be required if improvement options are forwarded from the corridor study that could potentially affect wetlands. Future projects would need to incorporate design features to avoid and minimize adverse impacts on wetlands to the maximum extent practicable, and state and federal water quality permits may be required. Compensatory mitigation may also be required for unavoidable impacts.

4.1.7. Floodplains and Floodways

From Four Corners to the mouth of the Gallatin Canyon, US 191 lies adjacent to the Gallatin River floodplain but the roadway itself lies outside the floodplain boundary in an area of minimal flood hazard. Most of the area through Gallatin Canyon lies within an area of undetermined flood hazard. However, areas designated as a 100-year floodplain of the Gallatin River occur near Karst's Camp (approximate RP 56 to 54) and from RP 51 through the end of the study area. Flooding due to high precipitation events and snowmelt has occurred in the Gallatin River Watershed in the past but most often affects the smaller streams and creeks within the study area. The *Gallatin County Floodplain Regulations* regulate development activities in flood hazard areas. DNRC has recently completed more detailed floodplain mapping for segments of the Gallatin River. If any improvement options advanced from this study cross or encroach on a regulated flood hazard area, it will be necessary to coordinate with and obtain a floodplain permit from the county floodplain administrator.

4.1.8. Hazardous Substances

If a project were to overlap any of the following known hazardous substance sites, a soil investigation would likely be needed to determine the extent of contamination and the need for remediation. The presence of contaminated soils may require special provisions for handling hazardous materials.

The Karst Asbestos Mine is accessible by trail. Areas of asbestos may be present in the study area.

Hazardous Waste Release Sites

Five hazardous waste release sites occur in the study area: the NorthWestern Energy Non-PCB Oil Release site (RP 79.5); the Horkley Oil Inc diesel spill (RP 71); the Gallatin Gateway Tanker Release (RP 70.4); the Idaho Asphalt Supply hazardous waste release site (RP 59); and the Southern Idaho Supply ammonium nitrate spill (RP 50). All sites have been remediated and delisted.

Remediation Response Sites

The CMC Asbestos Gallatin Gateway site is an inactive railroad facility located near Gooch Hill Road (RP 77) which was used for storage and transport of asbestos ore. This site was delisted in 1996 following cleanup activities. The Karst Asbestos Mine (RP 56) is located about a mile from US 191 and is accessed by a foot trail. The site has been declared as "No Further Action" and has been referred to other federal cleanup programs. Additional site assessment activities occurred in 1990 and the USFS has rerouted trails to bypass the mine locations. Undiscovered areas of Karst asbestos may be present throughout the study area.

Underground Storage Tanks

A total of 28 active underground storage tanks, 17 tanks permanently out of use, and 1 tank temporarily out of use are located within the study area. The tanks are located at: Town Pump, Casey's Corner, and Thriftway Super Stops in Four Corners (RP 82); the Casey's Corner in Gallatin Gateway (RP 76.2); and the Conoco and Casey's Corner in Big Sky (RP 48 and 47.6).

Gas stations along the study corridor contain underground storage tanks.

Petroleum Tank Releases

Several petroleum tank releases have occurred in the past in and near the US 191 corridor. All of the following claims filed for assistance from the Petroleum Tank Release Compensation Board and Cleanup Fund have been resolved: Thriftway Super Stop (Site 1605064), located in Four Corners; Buffalo Station (Site 5614002) in Gallatin Gateway; Elkhorn Ranch (Site 1603427) south of RP 72; Jasper's Big Sky Exxon (Site 1606923) in Big Sky; and Frontier Construction (Site 9995003) in Big Sky.

Abandoned and Inactive Mine Sites

Four mining prospects or abandoned mines occur in the study area: Bozeman Hot Springs geothermal site (RP 81.3); the Spanish Creek Resource Study gold prospect (RP 68.2); Deer Creek Prospect (RP 51.3); and a copper containing Unnamed Location (RP 49.8). The Karst Asbestos Mine, (RP 56), is an DEQ Abandoned Mine Priority Site. Two mining features occur in the study area: an open pit mine/quarry (RP 72) and an adit (RP 64). Several closed lode, placer, and millsite mining claims also exist.

Opencut Permits

Three permitted opencut mine sites occur in the study area: Morgan Family LLC (Site 1737, RP 78) operated by TMC Inc.; Ponderosa (Site 2815, RP 47.7) operated by Kenyon Noble Ready Mix; and Section 5 North (Site 3023, RP 47.4) operated by TMC Inc. A pre-application request was filed for Simpson (Site 2866, RP 81). The Gateway Pit (Site 2520, RP 76), is operated by Gateway Village LLC and has a voided permit. The permit for Big Sky Pit (Site 618, RP 47.6) has been released. The permit for Section 5 North (Site 1414, RP 47.4) operated by Knife River-Belgrade has been released. A permit is pending for Section 5 North (Site 2861, RP 47.4).

4.1.9. Air Quality

Gallatin County is considered an attainment area for all pollutants, and no non-attainment areas occur nearby. Federally funded transportation projects on US 191 would not be subject to conformity requirements.

4.1.10. Noise

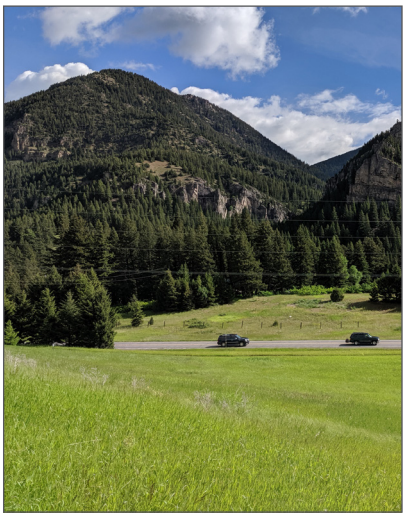
Residences and sites protected under Section 4(f) of the *Department of Transportation Act* of 1966 and Section 6(f) of the *Land and Water Conservation Fund Act* within the study area are considered sensitive noise receptors that could be affected by roadway improvements on US 191. A noise analysis will likely be required for improvements on US 191 given the potential for noise impacts from substantial changes in roadway design or configuration. Construction activities associated with improvements to US 191 may result in localized and temporary noise impacts in the vicinity of residences. These impacts can be minimized by incorporating measures to control of noise sources during construction.

4.2. Biological Resources

The biological environment includes plants and animals known or likely to occur in the study area, including sensitive species protected by state and federal regulations.

4.2.1. Vegetation

Vegetation below tree line consists of coniferous forest, grasslands, shrublands, and willow and aspen groves in the riparian areas. The coniferous forest community is dominated by plant species such as lodgepole pine and Douglas fir and includes some Engelmann spruce and subalpine fir. Big sagebrush dominates the grassland shrubland community, with other co-dominant shrubs including silver sagebrush, antelope bitterbrush, three tip sagebrush, Idaho fescue, spike fescue, and poverty oatgrass. The riparian community is dominated by black cottonwood, snowberry, Wood's rose, white spirea, red-osier dogwood, pacific willow, sandbar willow, reed canarygrass, and smooth scouring rush. Areas of cultivated cropland and developed lands are present in the study area, primarily from Four Corners to the mouth of Gallatin Canyon.



The diverse biological environment within the study area provides habitat for deer, elk, moose, bighorn sheep, birds, fish, and various other species.

Noxious Weeds

Invasive weeds are a growing issue in Gallatin County. Spotted knapweed and Canada thistle are of greatest concern, with the potential for expansion of hound's tongue, yellow toadflax, sulfur cinquefoil, common tansy, and oxeye daisy. If improvement options are forwarded from this study, field surveys for noxious weeds should take place before any ground disturbance occurs. Practices outlined by the Gallatin County Weed Control District and USFS policies would need to be followed as appropriate.

4.2.2. Biological Community

The historic conversion of previously native riparian and foothill habitat to agricultural operation and, more recently, to commercial and residential developments between Four Corners and the mouth of the Gallatin Canyon has negatively impacted the quantity and quality of wildlife habitat available in this area. If improvement projects are advanced from the corridor study, project planners should coordinate with FWP, USFWS, and USFS to gain further insight into management of wildlife species and measures for avoiding, minimizing, or mitigating adverse effects on species and habitat.

Mammals

The Gallatin Range provides suitable habitat for resident elk, moose, mountain goats, and bighorn sheep and plays a role in maintaining habitat connectivity for wide-ranging wildlife species such as wolverine, lynx, grizzly bear, mountain lion, and wolf. Known populations of elk and big horn sheep exist in the study area.

MDT documented 1,247 animal carcasses along the study corridor from January 1, 2009, to December 31, 2018. Most carcasses (90 percent) were deer (primarily whitetail), with concentrated occurrence north of Gallatin Canyon between RP 64 and 82. Large mammal carcasses were more dispersed along the corridor with some concentrations north of Gallatin Canyon and near the Big Sky Meadow Village area. Concentrations of elk carcasses were noted between RP 70 and 76 and between RP 45 and 50 near the MT 64 intersection. Bighorn sheep carcasses were collected mostly between RP 52 and 53. Moose carcasses were more distributed throughout the heart of the canyon.

Wildlife crossing the roadway or congregating on the roadside are common within the Gallatin Canyon.

Birds

More than 200 species of birds have been documented in Gallatin County, with potential to occur or reside in the study area. These species include a wide variety of songbirds, birds of prey, waterfowl, owls, and shorebirds, including several listed as species of concern. Many of the bird species are protected under or included in the USFWS *Migratory Bird Treaty Act*, *Birds of Conservation Concern 2008*, or *Bald and Golden Eagle Protection Act of 1940* listings. Any improvements advanced from this study should consider potential constraints that may result from nesting times of migratory birds and/or the presence of bald and golden eagle nests.

Fisheries

The Gallatin River and its tributaries support a variety of Montana native and game fish. Several fish species are present in the waters within the study area including six species of trout, longnose dace, mottled sculpin, mountain whitefish, and white sucker. Fish passage and/or barrier installation opportunities may need to be considered at affected drainages if a project is advanced from this study. Permit conditions and management objectives from regulatory and resource agencies may require incorporation of design measures to facilitate aquatic organism passage.

Amphibians, Reptiles, and Invertebrates

Amphibian and reptile species known or expected to occur in the study area include but are not limited to the western toad, northern leapord frog, western milksnake, greater short-horned lizard, and snapping turtle. Nearly 30 invertebrate species, many of them listed as a Montana species of concern, have been observed or are expected to occur in the study area.

4.2.3. Threatened and Endangered Species

The Canada lynx, grizzly bear, and wolverine are listed or proposed for listing in the Endangered Species Act. All three wildlife species have been observed and documented as likely to occur in the study area. The whitebark pine, a candidate species, has been observed near the study corridor, however, it is unlikely to be present within the study area. The Ute ladies' tresses, a listed series, has not been observed in the study area, although its presence is known in Gallatin County. Any improvements advanced from the study would need to undergo review for compliance with the Endangered Species Act. The listing status of species and critical habitat can change over time; therefore, an updated list of potentially affected species and designated critical habitat should be reviewed for each project.

4.2.4. Other Species of Concern

Species of concern are native animals or plants that are at risk due to declining population trends, threats to their habitats, and restricted distribution, among other factors. Six mammals, six birds, one fish, one amphibian, three plants, and three invertebrates have documented study area occurrences, representing an area of land or water in which a species is, or was, present. If projects are advanced from the study, a thorough review of natural heritage observation databases should be conducted, and habitats near any proposed project sites should be evaluated to determine their suitability for species of concern. Measures to avoid or minimize disturbance of these species or their habitat should be incorporated into project design and implementation.

4.3. Social and Cultural Resources

The study evaluated the social and cultural environment within the study area, including characteristics of the human population, living and working conditions, recreation uses, culturally important sites, and visual character. These elements reflect human experiences and values.

4.3.1. Socioeconomic Conditions

Transportation projects can affect neighborhoods and community cohesion, social groups including minority populations, and local and/or regional economies, as well as growth and development that may be induced by transportation improvements. Understanding historic and recent demographic trends can aid in forecasting techniques due to the direct correlation between motor vehicle travel and socioeconomic indicators.

Historic Population Trends and Projected Growth

Gallatin County has been, and continues to be, one of Montana's fastest growing counties. In 2018, Gallatin County's population was estimated at nearly 112,000 residents. As illustrated in **Figure 10**, the county grew by nearly 80,000 residents between 1970 and 2018—representing a 250 percent overall increase in population and an average annual growth of 2.6 percent per year. Unincorporated areas of the county—representing about 44 percent of the county's population—grew even faster at 3.4 percent per year. In comparison, the total population of Montana grew at a rate of about 1 percent per year.

Population projections for the county from various sources predict an annual growth rate ranging from one to three percent. These projected growth rates, applied to the 2018 population, result in projected 2040 populations ranging from about 140,000 to 215,000.

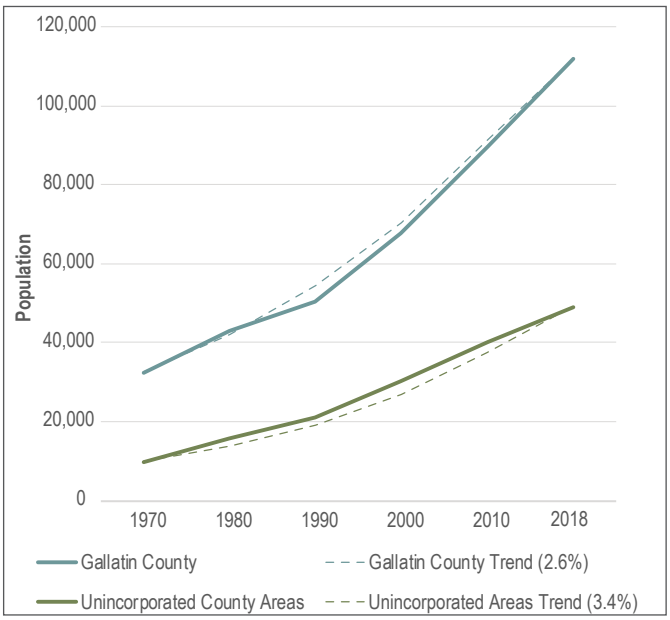


Figure 9: Historic Population Growth (1970 to 2018)

Population Characteristics and Environmental Justice

The populations of Gallatin County and its geographic subareas are predominately white with percentages of minority populations generally at or lower than the state. The Big Sky area's population, however, has a higher percentage of Hispanic/Latinos residents.

Gallatin County's population is younger when compared to all Montana residents. The Big Sky area has the lowest percentages of residents under 18 years and residents over age 65, while the Gallatin Gateway area has the highest median age of residents compared to other county areas.

The percentages of Gallatin County residents with disabilities is well below that for all residents of the state. However, within the Gallatin Gateway area, the percentage of disabled residents age 65 and older was well above the percentages seen for the county and state.

Title VI of the *United States Civil Rights Act of 1964* prohibits recipients of federal financial assistance (states, grantees, etc.) from discriminating based on race, color, or national origin in any program or activity. Based on screening results for this study, minority and/or low-income populations are unlikely to be adversely affected by corridor projects. If improvement options are advanced from this study, environmental justice would need to be further evaluated during the project development process.

Housing and Commuting Characteristics

According to recent data, about 14 percent of housing units in Gallatin County are vacant, about 53 percent of which are considered seasonal, recreational, or occasional use. The Four Corners area has high percentages of owner-occupied units while the Gallatin Gateway and Big Sky areas have higher shares of rental units. Approximately 72 percent of the total housing units in the Big Sky area were vacant with 75 percent identified as seasonal, recreational, or occasional units.

About 96 percent of residents within Gallatin County have access to at least one vehicle, and about 83 percent of the commuting workers in Gallatin County rely on personal vehicles or carpools for transportation to work destinations. The share of workers who walked to work or used other means to commute is higher in Gallatin County and the Big Sky area than for Montana. Workers in Gallatin County have slightly longer commute times than elsewhere in the state.

Historic Employment Trends and Projected Growth

The economy of Gallatin County is diverse with services and technology, construction, finance and real estate, manufacturing, wholesale and retail trade, and government all playing notable roles. As illustrated in Figure 11, total full- and part-time employment in Gallatin County grew at a rate of approximately 3.8 percent per year between 1980 and 2017, with the most notable net increases in the services industry; finance, insurance and real estate; construction; retail trade; state and local government; and manufacturing.

While approximately 43 percent of the Gallatin County population resides in Bozeman, the city represents approximately 77 percent of the total county employment. For this reason, future economic trends in the county will be strongly influenced by economic conditions in the Bozeman area. Recent employment projections for Bozeman predict an average annual job growth rate of 1.5 percent for the 2017-2045 period—an annual increase of about 1,500 jobs.

For the past three decades, the Big Sky area has been a growth center in Gallatin County for both jobs and housing. Continued construction employment and development of retail trade and service businesses in the Big Sky area is likely in the future.

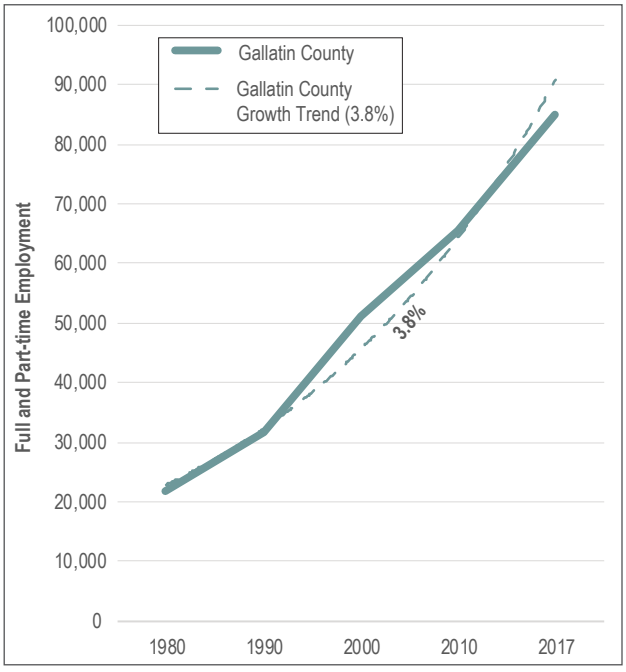


Figure 10: Gallatin County Employment Growth (1980 to 2017)

Employment Characteristics

The Four Corners and Gallatin Gateway areas have higher percentages of workers in the construction, finance and real estate, and agricultural industries than the county as a whole, while the Big Sky area has a higher percentage of workers in the entertainment, recreation, accommodations, and food services industry.

The percentage of the employed workforce in the county is similar to Montana as a whole. The Four Corners area has a slightly higher percentage of employed workers, while the Gallatin Gateway area's unemployment rate is nearly double compared to the county and state.

Median household income levels in the Four Corners, Gallatin Gateway, and Big Sky areas are above Gallatin County and state averages, and per capita income levels are higher than the state. The Four Corners and Gallatin Gateway areas had fewer residents living below the poverty line compared to the county and state, while the poverty rate in the Big Sky area was slightly higher than Gallatin County.

4.3.2. Recreational Resources

The US 191 corridor provides direct access to the Custer Gallatin National Forest and indirect access to the Beaverhead-Deerlodge National Forest. Recreationists use the area for hiking, backpacking, camping, rock climbing, rafting, kayaking, fishing, hunting, and wildlife viewing. The Big Sky Resort, Moonlight Basin, and Yellowstone Club ski areas are accessible via the study corridor. Several designated trails, campgrounds, day use areas, fishing access sites, and wildlife management areas exist along the US 191 corridor or are accessed via US 191. The use of lands accessed by US 191 provides tourism traffic and economic subsistence for local outfitters and the rural communities along the corridor.

4.3.3. Cultural and Historic Resources

A search of historic properties identified 73 properties within the general vicinity of US 191 including: 2 sites listed on the National Register of Historic Places—Gallatin Gateway Inn and Little Bear School; 18 sites determined eligible for listing; and 53 sites with undetermined eligibility status. Five tribes that may have current or traditional interests in Gallatin County include the Apache Tribe of Oklahoma, Crow Tribe of Montana, Fort Belknap Indian Community of the Fort Belknap Reservation of Montana, Nez Perce Tribe, and Shoshone-Bannock Tribes of the Fort Hall Reservation. A cultural resource survey for unrecorded historic and archaeological properties would be required within the Area of Potential Effect defined for each project forwarded from this study.

4.3.4. Section 4(f) Resources

Recreational and historic sites within the corridor may qualify for protection under Section 4(f). If improvement options are advanced from the corridor study, potential effects on recreational use and historic sites should be investigated and appropriately considered in accordance with Section 4(f).

4.3.5. Section 6(f) Resources

The Gallatin Gateway Recreation Facilities project is the only project implemented near the study area that qualifies for protection under Section 6(f). It is unclear if any of the facilities are within the study area and whether they would be affected by potential improvements to US 191. The Gallatin Wildlife Management Area was acquired with federal funding through the *Pittman Robertson Wildlife Restoration Act* which requires replacement land mitigation for the use of federally encumbered lands similar to Section 6(f).

4.3.6. Visual Resources

The study area encompasses a wide variety of settings including roads, highway commercial developments, scattered rural residences, forested lands, mountainous terrain, riparian areas, and wetlands. Actions that may have visual impacts include projects on new locations or that involve expansion, realignment or other changes that could alter the character of an existing landscape or move the roadway closer to residential areas, parks, recreation areas, and historic/culturally important resources.

The US 191 corridor provides access to several recreation sites that may be subject to Section 4(f) or 6(f) protections.

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5.0. IMPROVEMENT OPTIONS

Recommended improvement options were identified to address issues and areas of concern for the study corridor. The improvement options reflect input from stakeholders and the public, as well as information gathered from a thorough evaluation of the existing and projected conditions of the study corridor. This baseline information was used to:

1. Identify corridor needs and objectives.
2. Develop a range of improvement options addressing corridor needs and objectives.

Recommendations include a description of the improvement option, project implementation considerations, implementation agency/partners, timeframe, and estimated cost. Additional detail is provided in the *Improvement Options Memorandum* (**Appendix 4**).

Proposed improvements on US 191 include short- and long-term projects ranging from small spot improvements to major roadway reconstruction.

5.1. Needs and Objectives

Needs and objectives for the *US 191 Corridor Study* were developed based on a review of local plans; input from resource agencies, stakeholders and the public; and social, environmental, and engineering conditions described in the *Existing and Projected Conditions Report*. Needs and objectives provide statements to guide the improvement options development and evaluation process. Improvement options identified in this study attempt to address the needs and objectives to the extent feasible within the other considerations listed below. As projects are advanced from this study, needs and objectives may be incorporated in purpose and need statements for future environmental documentation.

Need 1: Improve the Safety of the Corridor

Objectives

- Reduce fatalities and serious injuries in support of Vision Zero.
- Improve roadway elements to meet current design standards.
- Reduce animal-vehicle conflicts.
- Reduce roadside hazards.
- Reduce vehicle conflicts.

Need 2: Improve the Operations of the Corridor

Objectives

- Accommodate existing and future travel demands.
- Provide reasonable access to adjacent lands.
- Improve non-motorized mobility and accessibility.
- Improve travel demand management.
- Accommodate wildlife movement.

Other Considerations

- Impacts to environmental resources
- Local and regional planning
- Temporary construction impacts
- Funding availability
- Construction feasibility and physical constraints
- Corridor context, function, and use
- Maintenance cost and responsibility

Needs and objectives were developed based on a review of relevant past plans while considering current and future conditions.

5.2. Project Implementation

Implementation of improvement options is dependent on factors including project size, availability of funding, environmental review, right-of-way needs, and other factors. A preliminary evaluation of project implementation agencies and partners, timeframes, costs, and other project development considerations was conducted for each recommended improvement option, as discussed below.

Project Development Considerations

Improvement options forwarded from this study will be subject to MDT's standard project development process, which typically includes project-specific design activities such as stakeholder coordination, environmental impact analysis and permitting, utility conflict mitigation, traffic and safety analysis, hydraulic and geotechnical investigations, and right-of-way acquisition based on project location and design features.[23] For projects initiated outside of MDT that may substantially and permanently impact the transportation system (such as new developments), the MDT *Systems Impact Action Process*[24] (SIAP) and other collaborative processes may apply. Notable project development considerations have been identified for each option such as potential stakeholder interests, resources and site features, indirect effects, and other factors to be addressed during project development.

If improvements are forwarded from this study, detailed analysis would be required during the project development process to quantify specific resource impacts and identify associated permits, laws, and regulations that may apply. Information contained in this report may be used to support future project development and environmental documentation.

Implementation Agency/Partners

Successful implementation of improvements may require cooperation and effort from multiple entities with the resources, funds, jurisdiction, or special expertise necessary to accomplish the improvement options. Implementation agencies and partners include MDT, federal and state agencies, transit operators, school districts, local task forces and community groups, private landowners and developers, wildlife organizations, and other parties with interest or authority.

Timeframe

The timing and ability to implement improvement options depends on multiple factors, including funding availability, right-of-way needs, and other project delivery elements. Implementation timeframes were estimated for each improvement option based on potential anticipated project delivery. These implementation timeframes are not a commitment to developing the recommendations, rather, they are intended to recognize the need, complexity, and potential funding sources for the options. Implementation timeframes were defined as follows:

- **Short-term:** Implementation is feasible within a 0- to 5-year period.
- **Mid-term:** Implementation is feasible within a 5- to 10-year period.
- **Long-term:** Implementation is feasible within a 10- to 20-year period.
- **As needed:** Implementation could occur at any time based on observed need.

Estimated Cost

Planning-level cost estimates were developed for each improvement option in accordance with procedures outlined by MDT.[25] The costs include estimates for construction, engineering, right-of-way, utilities, drainage, and indirect costs. In addition, an inflationary factor of three percent per year was applied to the planning level costs to account for an estimated year of expenditure. Cost ranges are provided in some cases, indicating unknown factors at the planning-level stage.

Potential Funding Sources

MDT administers multiple programs funded from state and federal sources. Additionally, local and private funds may be available for certain projects. No funding has been identified or dedicated for any improvements recommended in this study. Refer to **Section 6** and **Appendix 5** for more information on potential funding mechanisms.

5.3. Recommended Improvement Options

Recommended improvement options are intended to address needs and objectives for the US 191 corridor and identified areas of concern. The options are grouped as small-scale spot improvements, minor and systematic corridor-wide improvements, improvements to address the needs of alternate transportation modes, and large-scale roadway reconstruction improvements. The recommended improvements can be developed as stand-alone projects, or, in some cases, combined as larger projects as appropriate. There may be cost savings and efficiencies gained by packaging improvement options together.

5.3.1. Spot Improvements

The improvement options contained in this section address traffic operations, safety, and roadway geometrics at several intersections and spot locations along the corridor. About 21 percent of crashes reported over the past 10 years (2009-2018) occurred at an intersection or were related to an intersection. As more growth is expected in the future, several locations within the study area may experience additional safety concerns and poor intersection operations.

Input from the public and stakeholders indicates that it can be difficult to enter and exit the highway due to high traffic volumes and minimal gaps in traffic, especially during peak travel times. The use of traffic control periodically along the highway could help regulate and facilitate access to US 191 from approaches. Implementing standard-sized turnouts along the highway can also help ease congestion and improve safety.

Historic crash trends and safety concerns are noted where relevant to development of improvement options. To address safety trends, geometric improvements--including realignment of intersection legs, additional turn bays, substandard curve modification, and bridge widening--may be necessary.

Note that some of the improvement options involve the addition of traffic control, which could involve traffic signals, roundabouts, or other innovative intersection designs. For a traffic signal to be considered, intersections must meet at least one of eight signal warrants as required by the *Manual on Uniform Traffic Control Devices.*[26]

S1. Four Corners Intersection (RP 81.9)

Over 100 crashes were reported at the Four Corners intersection over the 10-year analysis period. The most common crash types were rear-end, right angle, sideswipe, and left turn. Eliminating left turns out of driveways near the intersection, installing centerline medians, or consolidating/closing approaches can be effective in decreasing crash potential and increasing safety. Implementation and enforcement of the access control plans for the intersecting roadways within a half-mile of the intersection could help improve safety at the intersection (see **C7** and **C8**).

The Four Corners intersection is predicted to experience failing operations during the AM and PM peak hours by 2040. The westbound left-turn generates lengthy delay, and a second westbound left-turn lane could help improve operations during the peak hours. However, if a second left-turn lane is added, the two-lane section in the southbound direction on the south leg would have to be continued. Pedestrian accommodations, such as modified crosswalks and/or pedestrian signals, could be included at this intersection if improvements are made (see **A3**).

Recommendation: Modify business access; install second westbound left-turn lane; add pedestrian crossing treatments

Project Development Considerations:

- Business owners may not support modified access
- Second westbound left-turn lane would require southbound widening on US 191
- Hazardous materials and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Mid-term

Estimated Cost: $2.5M

Potential Funding Sources: NH, HSIP, TA

S2. 3rd Street to 2nd Street (RP 81.4 – 81.3)

A total of 24 crashes were reported over the 10-year analysis period between 3rd Street and 2nd Street. The most common crash types were rear-end, fixed object collisions with guardrail, and wild animal crashes. Of the 24 crashes, six caused injuries.

In this section, the highway tapers from a three-lane section to two lanes and back to three lanes. The two-lane section is due to constraints with the bridge over the Spain-Ferris Ditch (RP 81.5), which is not wide enough to accommodate three or more lanes. This roadway configuration does not include left-turn lanes at the 3rd and 2nd Street intersections. There is a small coffee stand in the southwest quadrant of the US 191/2nd Street intersection with a second driveway about 175 feet south of the 2nd Street intersection. Replacement or widening of the bridge based on future needs of the highway (see **R1**) could help improve safety through this section.

Recommendation: Replace or widen bridge based on future needs of the highway

Project Development Considerations:

- Irrigation features, farmland, wetlands, vegetation, habitat, wildlife, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Mid-term

Estimated Cost: $2.2M

Potential Funding Sources: NH

S3. Bozeman Hot Springs/Cobb Hill/Lower Rainbow Road (RP 81.1 – 81.0)

Over the 10-year crash analysis period, 12 crashes were reported between the Bozeman Hot Springs driveway (RP 81.1) and Lower Rainbow Road (RP 81.0). About half of the crashes caused injury. All but one of the crashes occurred under dark lighting conditions or at dusk. Reported crash types included sideswipe, rear-end, left turn opposite direction, fixed object, rollover, and right angle. Half of the crashes involved an impaired driver.

Four approaches are located through this section, including two on the left and two on the right that are not aligned with each other. To address safety concerns, multiple approaches could be consolidated and realigned to meet at a single approach. If approaches are consolidated, the intersections should be evaluated for additional traffic control. Intersection lighting could be installed to help address trend of crashes occurring at dark.

Recommendation: Consolidate approaches and realign intersection; improve intersection/roadway lighting

Project Development Considerations:

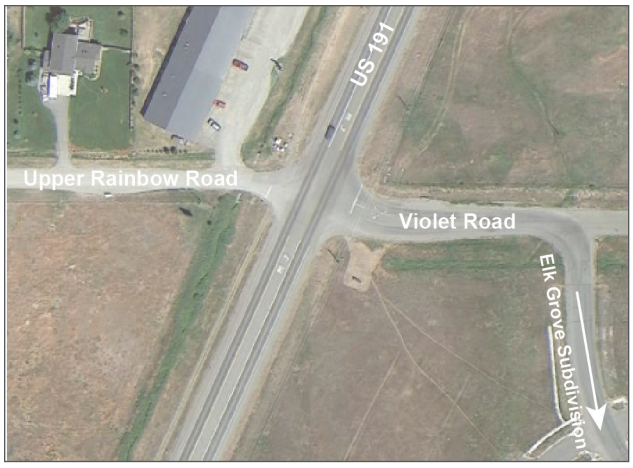
- Additional right-of-way may be required for intersection realignment
- Farmland, wetlands, vegetation, habitat, wildlife, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Mid-term

Estimated Cost: $810,000

Potential Funding Sources: NH, HSIP, Local, Private



S4. Violet Road/Upper Rainbow Road (RP 80.1)

The intersection of Violet Road/Upper Rainbow Road/US 191 is one of two main ingress/egress points for the Elk Grove Subdivision, a 300-lot single family home subdivision on the east side of US 191, and homes and businesses on the west side of US 191. Over the 10-year crash analysis period, two property damage only crashes were reported at the intersection.

Traffic data for this intersection was not collected as part of the corridor study planning effort so it is unknown if additional traffic control is warranted at this time. The intersection should be monitored to determine if additional traffic control is needed in the future, particularly if new development occurs.

Recommendation: Install additional traffic control as warranted

Project Development Considerations:

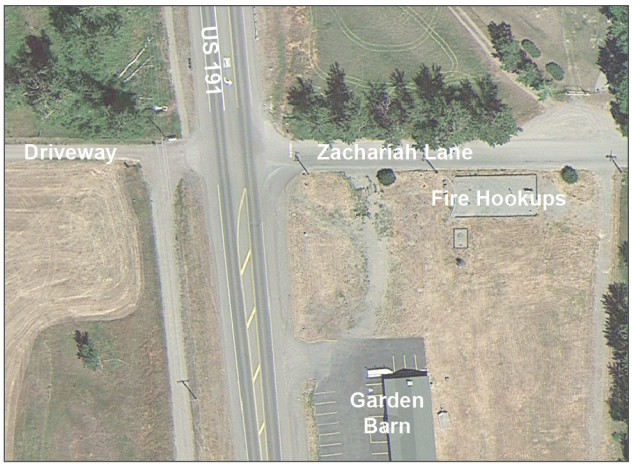
- Installation of a traffic signal would require a warrant analysis
- Additional right-of-way may be required for roundabout
- Farmland, vegetation, habitat, wildlife, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Long-term

Estimated Cost: $2.1M (traffic signal); $4.5M (roundabout)

Potential Funding Sources: NH, HSIP, Local, Private



S5. Zachariah Lane (RP 77.8)

Over the 10-year analysis period, eight crashes were reported at the intersection. Half of the crashes involved wild animals during dark lighting conditions. One crash was intersection-related, with weather conditions contributing to the crash.

In the future, increased development and/or traffic volumes may warrant a northbound right-turn lane at the intersection. At this time, traffic control does not appear to be warranted at the intersection. However, if conditions change, the intersection could be monitored for signal warrants. Relocating the main access point for the Garden Barn to Zachariah Lane would allow space for a turn lane and reduce conflict points. Intersection lighting at this location may be desirable. Firetrucks using the intersection should be considered.

Recommendation: Consolidate approaches; improve intersection lighting; install turn lane as warranted.

Project Development Considerations:

- Installation of turn lane is subject to traffic volume criteria as outlined in MDT guidelines
- Farmland, irrigation features, wetlands, vegetation, habitat, wildlife, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Mid-term

Estimated Cost: $480,000

Potential Funding Sources: NH, HSIP, Local, Private

S6. Mill Street/Rabel Lane (RP 76.3)

Over the 10-year analysis period, five crashes were recorded at this intersection, two of which resulted in minor or possible injuries. Reported crash types included head on, right angle, right turn, and left turn.

The intersection experiences failing operational conditions during the morning and evening peak hours under existing conditions. With future growth in the area, deteriorating traffic operations are anticipated. Intersection traffic control, such as a roundabout, traffic signal, or other innovative intersection design, could be installed at this location to improve traffic operations. Additionally, a preemptive traffic device at this intersection could provide safer access to the highway for the Gallatin Gateway Fire Department.

Recommendation: Install additional traffic control as warranted

Project Development Considerations:

- Installation of a traffic signal would require a warrant analysis
- Additional right-of-way may be required for roundabout
- Farmland, vegetation, habitat, wildlife, protected species, hazardous materials, and historic/ cultural properties

Implementation Agency/Partners: MDT, Gallatin County

Timeframe: Mid-term

Estimated Cost: $910,000 (traffic signal); $2.3M (roundabout)

Potential Funding Sources: NH, HSIP, Local

S7. Cottonwood Road (RP 75.7)

Over the 10-year crash analysis period, seven crashes were reported at the intersection. The crash types reported at the intersection included rear-end, right angle, and fixed object. One of the rear end crashes resulted in a fatality, and the other six crashes resulted in property damage only.

A new 600-parcel development, Gateway Subdivision, is planned north of the intersection. Traffic mitigation for this subdivision requires the developer to install a two-way left turn lane between Cottonwood Road and Mill Street (RP 75.83 to 76.20). With increasing development in the areas around the intersection, additional traffic control may be warranted at the intersection within the planning horizon. If additional traffic control is installed, the approaches of Cottonwood Road to the east and Jays Way to the west should be better realigned.

Recommendation: Install additional traffic control and realign intersection as warranted.

Project Development Considerations:

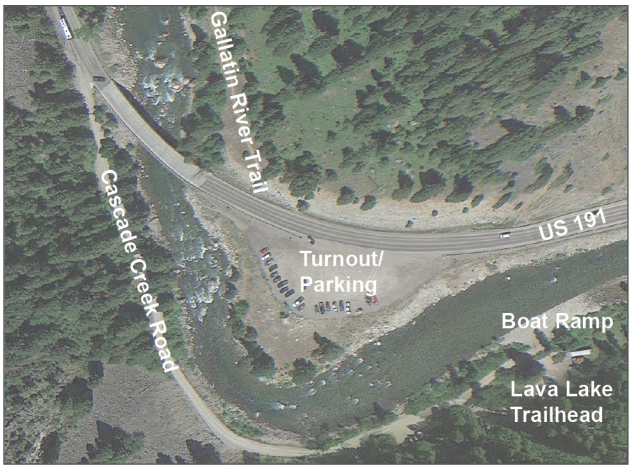
- Installation of a traffic signal would require a warrant analysis
- Additional right-of-way may be required for roundabout and realignment
- Farmland, vegetation, habitat, wildlife, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Long-term

Estimated Cost: $1.5M (traffic signal); $4.7M (roundabout)

Potential Funding Sources: NH, HSIP, Local, Private



S8. Lava Lake (RP 61.4)

The Lava Lake Trailhead is located on a sharp, substandard s-curve on US 191. Due to site constraints, access to the trailhead/parking lot is only allowed from the southbound direction. Drivers wishing to access the trailhead from the northbound direction must pass the access road and use a turnout located about 0.4 miles north of the trailhead to turn around. A large turnout located on the south side curve is used as overflow parking for the trailhead. Users who wish to access the trailhead from the turnout must walk along the narrow US 191 bridge to the access road.

Over the 10-year crash analysis period, 16 crashes were recorded at the site. To improve safety, the existing bridge could be replaced with a wider structure in conjunction with horizontal curve flattening. Cutting back the side slope on the north side of the curve could help improve sight distance. A northbound left-turn lane could be added to the new structure to eliminate the need for the turnaround to the north.

Recommendation: Reconfigure access to Lava Lake trailhead; flatten horizontal curve; reconstruct bridge

Project Development Considerations:

- Additional right-of-way may be required
- Farmland, surface waters, wetlands, vegetation, habitat, wildlife, protected species, recreational sites, and historic/cultural properties

Implementation Agency/Partners: MDT, FWP, USFS, Gallatin River Task Force (GRTF)

Timeframe: Mid- to Long-term

Estimated Cost: $10.4M (bridge/curve); $1.3M (pedestrian bridge); $560,000 (parking area)

Potential Funding Sources: NH, HSIP, FLAP

S9. Big Sky Trail Guardrail Improvements

The Big Sky Trail shared use path is separated from the roadway by guardrail, which was requested by the public to provide pedestrian protection at the time the path was installed. Buildup of snow around the guardrail at intersections can block intersection sight triangles during the winter months. Since the guardrail was installed, 18 fixed object crashes have occurred in this section of US 191, 13 of which involved collision with the guardrail. Of the 13 crashes involving guardrail, 7 were collisions at an intersection and nine were reported as collisions with the guardrail end (as opposed to guardrail face).

To improve safety, alternative guardrail end terminal treatments could be added to meet current design standards and aid winter maintenance efforts.

Recommendation: Install alternative guardrail end treatments

Project Development Considerations:

- None identified

Implementation Agency/Partners: MDT

Timeframe: Short-term

Estimated Cost: $50,000

Potential Funding Sources: HSIP, Maintenance

S10. Weigh Station

A permanent MCS scale site is located near the Four Corners intersection to inspect the weight of vehicles traveling on the highway. Previous study efforts have identified concerns regarding safety, intersection and corridor operations, scale site congestion, and driver confusion. MCS anticipates relocation and expansion of the site will be necessary to accommodate future traffic demands. Potential locations to be further evaluated for site feasibility are discussed below.

S10-a. South of Williams Road

MDT currently owns land south of Williams Road on the west side of US 191. MDT uses the site as a maintenance house and sand/salt stockpile. These functions could be relocated to allow construction of a new weigh station at the site. Alternately, a new weigh station could be constructed south of the Bush Etherington Ditch on the south side of the stockpile site. If this section of roadway is expanded to four or five lanes (see **R3**), trucks crossing several lanes of traffic to enter or exit the station may create safety concerns. Constructing two sites on opposite sides of the highway may help remedy this situation.

S10-b. Spanish Creek Area

South of Spanish Creek Road, about one mile of open space could be used for a weigh station. Similar to **S10-a**, if additional lanes are added through this section, safety concerns may arise. Additionally, constructing a weigh station in this location may compete with the potential for adding additional lanes (see **R5-a**) due to limited space. If there is not enough room to construct two weigh stations at this location, the stations could be offset, with one located further north at a recreational turnout that FWP uses seasonally for game checks (RP 70.3).

S10-c. South of Study Area

A new weigh station south of the study area was suggested by the public to serve northbound vehicles. If this option is pursued, the weigh station at Four Corners, either in its current or new location, could serve only southbound vehicles. By having two weigh stations, one at each end of the Gallatin Canyon, MDT could control truck traffic through the canyon and help preserve the corridor's recreational and scenic aspects.

Recommendation: Relocate weigh station

Project Development Considerations:

- Additional right-of-way or easement may be required
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, protected species, hazardous materials, and historic/ cultural properties depending on location of weigh station
- Additional evaluations would be needed during project development to determine specific siting requirements
- Weigh station siting may compete with the potential for adding additional lanes due to space limitations
- Construction of directional weigh stations (one on each side of the highway) may improve access but increase cost

Implementation Agency/Partners: MDT

Timeframe: Mid- to Long-term

Estimated Cost: $5.6M (S10-a); $7.8M (S10-b); $4.9M (S10-c)

Potential Funding Sources: NH

S11. Turn Lanes at Spot Locations

Constructing auxiliary turn lanes at intersections along US 191 is recommended as warranted based on the speed of the highway, hourly traffic volumes, hourly turning volumes, and crash trends. When considering right-turn lanes, specific attention should be given to visibility on the side street as decelerating vehicles in the auxiliary lane can create a moving sight obstruction for drivers on the side street.

Potential locations to monitor for turn lane warrants were gathered from public comments and past planning documents. Additional evaluation of traffic conditions may be necessary to determine if turn lanes are warranted at the following locations:

- Axtell-Anceny Road (RP 78.5)
- Zachariah Lane (RP 77.8)
- Cottonwood Road (RP 75.7)
- Hawk Hill Road (RP 74.6)
- Ruby Mountain Way (RP 74.5)
- Little Bear Road (RP 74.1)
- Low Bench Road (RP 73.9)
- Williams Road (RP 72.7)
- Gateway South Road (RP 70.4)
- Rockhaven Camp (RP 66.9)
- Indian Ridge Trailhead (RP 64.7)
- Lava Lake Trailhead (RP 61.4)
- Golden Gate (RP 50.5)

Recommendation: Install turn lanes at spot locations as warranted

Project Development Considerations:

- Additional right-of-way or easement may be required
- Installation of turn lane is subject to traffic volume criteria as outlined in MDT guidelines
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Mid- to Long-term

Estimated Cost: $230,000 to $1.1M

Potential Funding Sources: NH, Local, Private

S12. Turnouts for Slow-moving Vehicles

To increase use by slow-moving vehicles, some turnouts could be lengthened and/or widened so trucks, buses, and other large vehicles can more easily exit the highway and to provide designated parking areas. The extent of lengthening and widening in each location is dependent on site constraints. Static signage is required at each turnout location to remind drivers that slow-moving vehicles must use turnouts. Currently, signage only occurs at the northern and southern entrances to the canyon.

In several locations, informal turnouts have been established by recreationists and other roadway users (see **S13**). These locations could be formalized if turnouts can safely be accommodated. In addition to length, width, and sight distance considerations, turnouts should be located so approaching drivers have a clear view to determine if a turnout is available.

The following are potential locations reviewed for turnout improvements based on preliminary review of roadway geometrics, terrain, safety, and known use areas.

- Gallatin Tower (RP 62.2) – *improve safety*
- House Rock (RP 62) – *improve safety*
- Screaming Left (RP 59.2) – *remove turnout signing*
- RP 52.8 – *new turnout roadside left*
- RP 51.1 – *new turnout roadside right*
- Golden Gate (RP 50.6) – *lengthen turnout for residential use/improve safety*

Recommendation: Construct/modify turnouts as appropriate to improve function and safety; add signage at each location indicating slow moving vehicles must use turnouts

Project Development Considerations:

- Additional right-of-way or easements may be required
- Sight distance and physical constraints adjacent to the roadway may present limitations for new turnouts
- Surface waters, irrigation features, floodplains, wetlands, vegetation, habitat, wildlife, protected species, recreational sites, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Mid- to Long-term

Estimated Cost: $80,000 to $1.1M each (construct/modify); $600 each (sign)

Potential Funding Sources: NH, HSIP

S13. Recreational Access

In some cases, informal pullouts are starting to become established through sustained public use at Gallatin River access points. These high-use pullouts could be formalized by paving, developing dedicated ingress/egress points, and providing designated parking. Additionally, advanced signing may aid with wayfinding and reduce instances of stopping in the driving lane to view wildlife.

FWP, USFS, and GRTF should be consulted to determine appropriate locations for new, formalized, or closed/consolidated recreational access.

- Mouth of Canyon (RP 70.6) – *formalize*
- Upstream of Spanish Creek (RP 67.5) – *new*
- Gallatin National Forest Sign (RP 66.5) – *formalize across highway*
- Low Water Take-out (RP 63.1) – *new*
- Downstream of Mad Mile (RP 62.5) – *new*
- Ender Spot (RP 58.3) – *close*
- No Tell (RP 57.6) – *close/move*
- Karst Camp (RP 54.2) – *new*
- Durnam Meadow (RP 53.7) – *new*
- Portal Creek (RP 53.2) – *new*
- Deer Creek (RP 51.5) – *new*
- Baetis Alley (RP 51) – *new*

Recommendation: Formalize and improve recreational access at existing high-use locations; install additional advance warning signage as appropriate

Project Development Considerations:

- Additional right-of-way or easement may be needed to expand parking at recreational approaches
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, recreational sites, and historic/cultural properties

Implementation Agency/Partners: MDT, USFS, FWP, GRTF

Timeframe: Short- to Long-term

Estimated Cost: $70,000 (modify); $840,000 (new); $5,000 (close)

Potential Funding Sources: NH, HSIP, TA, FLAP

S14. Bridge Replacements

Replacement or widening of corridor bridges is recommended to improve safety and accommodate additional travel lanes associated with roadway reconstruction (see **Section 2.4**). While widening/replacement of the bridges may occur as a stand-alone project, it may be more cost effective to include with future roadway expansion. During project development, selection of an appropriate structure would depend on constructability and site constraints, hydraulic considerations, geotechnical conditions, environmental impacts, costs, and other considerations. Width assumed for cost estimates is based on long-term roadway reconstruction configuration, as noted in the list below.

- RP 81.5 – Spain Ferris Ditch (5913): Replace with 5-lane structure
- RP 76.7 – South Cottonwood Creek (5911): Replace with 5-lane structure
- RP 70.5 – Gallatin River (5910): Replace with 4-lane structure
- RP 68.2 – Spanish Creek (5909): Replace with 4-lane structure
- RP 49.8– Gallatin River (5905): Replace with 3-lane structure

Recommendation: Replace or widen existing bridges to meet current standards

Project Development Considerations:

- Additional right-of-way or easement may be required
- Surface waters, irrigation features, floodplains, wetlands, vegetation, habitat, wildlife, fisheries, protected species, recreational sites and historic/cultural properties
- Replacement structure type, size, and location would be determined during project development

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Short- to Long-term

Estimated Cost: $1.1M (RP 81.5); $1.1M (RP 76.7); $8.9M (RP 70.5); $1.7M (RP 68.2); $4.6M (RP 49.8)

Potential Funding Sources: NH

S15. Rockfall Hazard Mitigation

Completing rockfall hazard mitigation at the following sites is recommended to improve roadside clear zone and decrease the potential for rockfall events. Mitigation activities may include blasting, scaling, rock bolting, netting and drapery, rockfall retention structures/fences, and improved or reconfigured roadside ditch configurations. Site-specific needs may change estimated costs.

- RP 63.1
- RP 62.6
- RP 62.1
- RP 61.4
- RP 61.2
- RP 60.8
- RP 59.3
- RP 57.8
- RP 55.7
- RP 52.9
- RP 52.8
- RP 52.4
- RP 52.1
- RP 50.7

Recommendation: Conduct rockfall hazard mitigation

Project Development Considerations:

- Temporary road closure/detours may be required during blasting and other mitigation activities
- Geologic resources, surface waters, vegetation, habitat, wildlife, fisheries, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Mid- to Long-term

Estimated Cost: $25.4M (improve all sites one condition state); $59.8M (improve all sites to good condition)

Potential Funding Sources: NH, HSIP

S16. Advance Warning Signs

Advance warning signs are recommended at locations along US 191 where substandard roadway elements occur. Approximately 18 percent of horizontal curves (16) within the study area do not meet minimum design standards. Signage for substandard curves may include retroreflective signing and/or flashing/feedback signs. The following locations have been identified as potential locations for warning signs: RP 61.2, RP 56.3, RP 55.8, and 55.7

Recommendation: Install curve warning signs for substandard roadway elements

Project Development Considerations:

- None identified

Implementation Agency/Partners: MDT

Timeframe: Short-term

Estimated Cost: Varies

Potential Funding Sources: HSIP, Maintenance

S17. Substandard Curve Modifications at Spot Locations

Spot reconstruction of horizontal and vertical curves that do not meet minimum design standards is recommended to address crash trends. Before flattening curves into canyon hillsides, geotechnical, environmental, and other investigations would need to be conducted to determine construction feasibility, slope stability, specific environmental resource impacts, and other limitations.

S17-a. North of Spanish Creek (RP 69.2 to 68.5)

Over the 10-year crash analysis period, 30 crashes were reported in this section. The primary crash types included roll over, fixed object, sideswipe, and rear-end. About half of the crashes occurred when road conditions were poor, and eight crashes caused injuries. To help improve safety through this section, two of the curves could be flattened (RP 68.8 and 68.6). Potential impacts to slope stability and nearby houses would need to be evaluated during project development.

S17-b. Rockhaven Camp (RP 66.9 to 66.5)

Over the 10-year crash analysis period, 20 crashes were reported in this location. The primary crash types included roll overs, fixed object, and head-on crashes. About half of the crashes occurred under adverse road conditions, and four of the crashes caused injuries. To improve safety along this section, the vertical curve could be flattened, as determined feasible. Safety could be improved by removing the passing zones on either end of the curve, moving the passing zones further from the curve, closing the river access, adding warning signs and moving to the east side of the highway to reduce pedestrians crossing the highway on a curve with limited sight distance (see **S13**).

S17-c. Greek Creek (RP 57.6)

Several crashes were reported at the beginning and end of the large horizontal curve following a bend in the Gallatin River in this location. A second substandard horizontal curve to the north could be flattened to provide a better approach angle leading into the large curve and improve safety.

S17-d. North of Goose Creek (RP 52.0)

Over the 10-year crash analysis period, 17 crashes occurred along this curve. The majority of crashes were rollover and fixed object crashes occurring on the east side of the highway. Three of the crashes caused minor or possible injuries, and 12 of the 17 crashes occurred under adverse road conditions.

Recommendation: Reconstruct horizontal and vertical curves at spot locations that do not meet minimum design standards

Project Development Considerations:

- Additional right-of-way, easement, or property acquisition may be required
- Physical and environmental constraints may limit viability of flattening curves
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, geologic features, wildlife, fisheries, protected species, recreational sites, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Mid- to Long-term

Estimated Cost: $5.5M (S17-a); $4.4M (S17-b); $2.4M (S17-c); $1.7M (S17-d)

Potential Funding Sources: NH, HSIP

S18. Emergency Call Boxes

Signage could be installed at each end of the Gallatin Canyon notifying the traveling public of emergency call box locations along the corridor, as well as advance warning signs telling drivers where to pull off the highway to access the call boxes. If desired, more call boxes could be installed where feasible.

Recommendation: Install signage to notify drivers of upcoming call boxes; install additional call boxes as needed

Project Development Considerations:

- None identified

Implementation Agency/Partners: MDT, Big Sky Rotary Club

Timeframe: Short- to Mid-term

Estimated Cost: $600 each (sign); $16,000 each (call box)

Potential Funding Sources: HSIP, Private

5.3.2. Corridor-Wide Improvements

The improvement options contained in this section address traffic operations, safety, and roadway geometrics at the corridor-wide level. These improvements are more systematic and do not require major reconstruction of the roadway. The options include low-cost options such as revising striping and pavement markings, installing or replacing guardrail, adjusting speed limits, or consolidating mailboxes. Larger scale options, such as shoulder widening, access management, or wildlife-vehicle conflict mitigation, are applicable to the entire corridor but may be more cost effective to complete in coordination with spot improvements or major roadway reconstruction. Other improvement options provided in this section are generic to the entire corridor and do not directly address operations or roadway geometrics. These improvement options are, however, important to addressing the overall needs and objectives for the corridor including improved safety, reduced environmental impacts, and enhanced corridor maintenance practices.

While the corridor is generally well maintained during winter storm events, the turnouts can be icy causing safety issues.

C1. Highway Maintenance Practices

Potential areas for maintenance improvement include reducing sediment loading in the Gallatin River, vegetation management, and additional winter maintenance.

Sedimentation and siltation sources include erosion from borrow ditches and fill slopes, bridge deck drainage, and traction sand applied to road surfaces during winter months. Elevated temperatures are often caused by vegetation removal along riverbanks and loss of riparian habitat. By implementing MDT's *Erosion and Sediment Control Best Management Practices Manual*[27] and *Permanent Erosion and Sediment Control Design Guidelines*[28] these negative effects can be minimized.

During the winter, especially after large snowstorms, snow management can be difficult. Snow fencing could help provide additional snow storage and improve driver visibility throughout the corridor. In particular, the Spanish Creek area is susceptible to snow drifting. The potential for vegetation removal to improve driver visibility is discussed in **C8**.

In some locations, buildup of snow from plowing activities was observed at the ends of guardrail and at the corners of intersections, potentially obstructing driver sight lines.

Although turnouts on US 191 are well plowed, a layer of snow and ice can accumulate due to limited use. To help gain more use of turnouts (see **C2**), exploring ways to deice turnouts could be beneficial. In the same regard, deicing bridge decks throughout the corridor may help improve safety.

MDT will pursue opportunities with the neighboring states of Wyoming and Idaho to develop, communicate, and implement compatible maintenance and construction strategies for routes connecting to the US 191 corridor to facilitate consistency in snow removal, traffic control during construction, and other activities that cross state lines.

Recommendation: Address highway maintenance issues and continue to research and implement best practices

Project Development Considerations:

- Stormwater, surface waters, water quality, fisheries, wildlife, vegetation, and protected species

Implementation Agency/Partners: MDT

Timeframe: As needed

Estimated Cost: Varies annually, estimated at $366,000 in 2019

Potential Funding Sources: Maintenance

C2. Passing/No-Passing Zones

An engineering study should be completed to evaluate passing zones and determine if removal or addition of no-passing zones is warranted. Locations to examine include those where passing zones are short, as well as locations where passing may be unsafe. For example, the area around Luhn Lane allows for passing in both directions. The location is generally flat, straight, and free from sight obstructions. However, this location passes more than 30 approaches, five of which are public approaches. Since MDT guidelines note that no passing zones should be established in areas near public approaches, passing zones in this location may not be appropriate.

Recommendation: Evaluate and modify existing passing/no-passing signing and striping for compliance with current standards

Project Development Considerations:

- May result in increased driver frustration due to decreased passing opportunities

Implementation Agency/Partners: MDT

Timeframe: Short-term

Estimated Cost: $13,000 per mile

Potential Funding Sources: NH, HSIP, Maintenance

C3. Shoulder Widening

Current standards recommend that the highway have eight-foot shoulders. While this may be feasible for some of the corridor, existing physical constraints within the canyon may limit the ability to widen the roadway to meet current recommendations.

C3-a. US 191/MT 84/MT 85 to Gateway South Road (RP 81.9 to 75.7)

Widening the shoulders to the recommended eight feet would improve the roadside clear zone and improve the chances of drivers being able to recover in run-off-the-road situations. Wider shoulders make it easier for a driver to steer the vehicle back onto the road at a shallower angle, reducing the chances that the driver will overcorrect and travel into oncoming traffic. This segment is recommended for larger reconstruction in **R1** and **R2**.

C3-b. Gateway South Road to MT 64 (RP 75.7 to 48.0)

Widening the shoulders to eight feet may be difficult throughout the canyon due to environmental constraints and limited available space. However, it may be possible to widen the shoulders to four feet, or greater, in most places throughout the canyon. Widened shoulders would increase roadside clear zones and could help improve safety by reducing run-off-the-road crashes. In areas with steep side slopes and where run-off-the-road crashes are known to occur, installation of guardrail could help improve safety (see **C4**). Portions of this segment are recommended for larger reconstruction in **R3**, **R4**, and **R5**.

Recommendation: Widen roadway shoulders where feasible

Project Development Considerations:

- Increased potential for roadside parking and higher vehicle speeds
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, and historic/cultural properties
- Physical constraints may prohibit widening in some areas

Implementation Agency/Partners: MDT

Timeframe: Mid- to Long-term

Estimated Cost: $1.3M per mile (C3-a); $1.8M per mile (C3-b)

Potential Funding Sources: NH, HSIP

C4. Guardrail Improvements

Work was recently done during the summer of 2019 to upgrade and replace guardrail in the Gallatin Canyon between the Hellroaring Creek Trailhead and Moose Creek Campground. Guardrail through the remainder of the canyon should be upgraded and replaced as appropriate. This would involve upgrading to current standards, replacing damaged or old guardrail, and reviewing locations where guardrail can be added, or removed.

At the mouth of the canyon, between approximately RP 70 and 69, steep side slopes lead directly to the Gallatin River with no guardrail. In some locations, pedestrians have been observed walking along the roadside to access fishing sites or to watch rafters and kayakers. To separate pedestrians from vehicles, the guardrail could be modified with space added behind for pedestrians. This is especially true downstream of the Gallatin River "mad mile" (RP 62.1 to 61.9) where several turnouts are used by photographers capturing rafting runs through this river stretch. Guardrail can be a roadside hazard, so it is prudent to place in locations only where it is needed to protect vehicles from higher risk hazards behind the guardrail.

Recommendation: Add, remove, repair, and upgrade guardrail as appropriate through the Gallatin Canyon

Project Development Considerations:

- Surface waters, wetlands, vegetation, habitat, wildlife, fisheries, and protected species

Implementation Agency/Partners: MDT

Timeframe: Short- to Mid-term

Estimated Cost: Varies

Potential Funding Sources: Maintenance

C5. Speed Considerations

Public comments have indicated that multiple changes in speed limits in the corridor can be confusing and seem illogical for drivers. Speed limit investigations should be conducted in cooperation with MDT and local officials to determine the appropriate speed limit along the corridor in response to a local government request. Ultimately, the Transportation Commission is responsible for setting the speed limit for the highway.

Installation of variable speed limit signs within the canyon may help to increase safety and provide clear speed guidance for drivers based on current weather, traffic, and wildlife conditions. Since weather and road conditions in the canyon often vary and change quickly, many of the crashes reported over the 10-year analysis period were related to adverse weather or road conditions. Congestion is common in the canyon due to lower roadway capacity and fewer passing opportunities. This sometimes leads to safety concerns when vehicles traveling at the posted speed limit turn a corner and meet a platoon of slow-moving vehicles. Reducing the speed limit during periods of high congestion, may help reduce rear-end crashes (about 10 percent of crashes in the canyon) and other congestion-related crashes. Additionally, lowering speed limits seasonally in areas where wildlife is routinely near or crossing the highway may help slow down drivers and reduce wildlife-vehicle conflicts.

Recommendation: Install variable speed limit signage through the Gallatin Canyon; conduct speed studies in response to a local government request

Project Development Considerations:

- Variable speed limits may be initially confusing to drivers since they have not yet been used in Montana
- Effectiveness of signage is dependent on enforcement

Implementation Agency/Partners: MDT

Timeframe: Mid-term

Estimated Cost: $350,000

Potential Funding Sources: HSIP, Local

C6. Mailbox Relocation

Private mailboxes are placed sporadically on the highway across from driveways, or at small turnouts. When postal workers and residents pull off the highway to retrieve mail, it can present a safety issue and impede traffic flow, especially if there is inadequate room for the driver to pull completely out of the travel lane. Safety is a concern for residents who have to cross the highway by foot to access their mailbox.

Consolidating individual mailboxes to cluster mailbox units would move the mailboxes to side streets outside the highway right-of-way and require postal workers to exit the highway to deliver mail. If cluster mailboxes are not a viable solution, singular mailboxes could be moved and consolidated to existing turnouts with enough space to completely exit the travel lane and safely exit the vehicle to retrieve mail.

Recommendation: Consolidate individual mailboxes and move clusters to mailbox turnouts or side streets

Project Development Considerations:

- None identified

Implementation Agency/Partners: MDT, Gallatin County, US Postal Service, Private

Timeframe: As needed

Estimated Cost: Unknown

Potential Funding Sources: HSIP, Maintenance, Local, Private

C7. Access Management

Appropriate management of access within a highway corridor can help improve traffic flow and reduce driveway-related crashes. Good access management practices include enforcing minimum spacing distance standards between adjacent approaches and minimizing or eliminating direct access to the highway if a reasonable alternative access to a local street system currently exists. To achieve appropriate spacing on US 191, it may be necessary to provide frontage roads to consolidate several approaches. It may be appropriate to realign closely spaced approaches so they meet at a single approach. Access management could occur during the project development process and as needed due to safety or operational concerns.

Recommendation: Manage existing approaches as needed

Project Development Considerations:

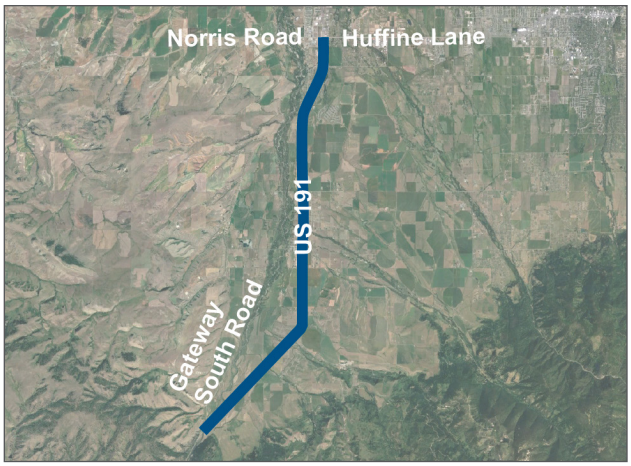
- Additional right-of-way or easement may be required
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, hazardous materials, and historic/cultural properties

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: As needed

Estimated Cost: Unknown

Potential Funding Sources: NH, HSIP, Local, Private



C8. Access Control Plan

An Access Control Resolution has previously been adopted for the segment of US 191 from Four Corners (RP 81.9) to Gateway South Road (RP 70.5). This resolution designates the defined segment as a controlled access highway which allows MDT to implement limited access control. The next step to manage existing access and future approaches is to develop an Access Control Plan. A plan of this type includes specific recommendations as to the number, location, and spacing of both public and private approaches allowed to access the highway directly. It also includes frontage roads, lane treatments, intersection control, and other features necessary to address identified traffic issues.

Recommendation: Develop and execute an Access Control Plan between RP 81.9 and 70.5

Project Development Considerations:

- Additional right-of-way or easement may be required
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, hazardous materials, and historic/cultural properties

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Short-term

Estimated Cost: $150,000

Potential Funding Sources: NH, HSIP, Local, Private

C9. Vegetation Management Plan

Areas of unmaintained or dense vegetation were identified throughout the US 191 corridor, especially within the Gallatin Canyon. Vegetation within the clear zone can contribute to decreased sight distances. Several locations, including horizontal curves throughout the canyon, were noted as having sight distance issues due to trees blocking sight lines. Before vegetation removal activities are initiated, a *Vegetation Management Plan* could be developed for the entire corridor to achieve improved sight distance for driver detection of animals in the clear zone, maintenance of quality wildlife habitat along the corridor, cover for animal movements across the highway in appropriate locations, maintenance of riparian zone integrity and wetland function, improved winter maintenance and snow removal activities, and sediment/runoff control along the Gallatin River and its tributaries adjacent to the highway. Vegetation management may include vegetation removal, revegetation, or planting of new vegetation, depending on location.

Recommendation: Develop and implement Vegetation Management Plan

Project Development Considerations:

- Surface waters, irrigation features, wetlands, vegetation, habitat, wildlife, fisheries, protected species
- Vegetation removal would have to comply with USFS and other regulatory agency restrictions and requirements

Implementation Agency/Partners: MDT, Gallatin County, USFS

Timeframe: Mid-term

Estimated Cost: $70,000

Potential Funding Sources: Maintenance, Local, Other Agencies

C10. Wildlife-Vehicle Conflict Mitigation and Wildlife Movement Accommodation

Wildlife-vehicle conflicts commonly occur throughout the study area and present a danger to human safety as well as wildlife survival. The following locations have been identified through preliminary planning-level analysis as general areas of wildlife-vehicle conflict:

- RP 82 to 64 – *deer crossing & mortality*
- RP 76 to 70 – *elk crossing & mortality*
- RP 67 to 49 – *moose mortality*
- RP 55 to 48 – *bighorn sheep on the roadway & mortality*
- RP 50 to 45 – *elk crossing & mortality*

Industry-accepted mitigation strategies attempting to reduce wildlife-vehicle conflict include influencing driver behavior, influencing animal behavior, reducing wildlife population size, and physically separating animals from the roadway. MDT will evaluate site-specific wildlife accommodations based on need and feasibility on a case-by-case basis. Any improvement project implemented by MDT within the study corridor will include evaluation of wildlife needs, current and planned development impacts to habitat, and the feasibility of wildlife accommodations as part of MDT's *Wildlife Accommodation Process* and MDT's standard transportation project development process. Wildlife accommodations could include a combination of fencing, crossing structures, animal detection systems, vegetation management, or strategic signage.

MDT will also continue to coordinate wildlife and transportation issues with agency partners and to discuss wildlife issues, challenges, and opportunities at multi-stakeholder forums, including regular meetings with the Montana Wildlife & Transportation Steering Committee (MWTSC). The committee is comprised of representatives from MDT, FWP, and Montanans for Safe Wildlife Passage and is dedicated to providing collaborative leadership and strategic direction on wildlife and transportation issues across Montana. MDT will consider the potential for targeted wildlife study and standalone wildlife accommodation projects within the corridor based on MWTSC efforts or through partnerships with other interested stakeholders resulting in identification of data collection gaps, research needs, and funding opportunities.

Additionally, resource agencies, non-profit organizations, and private landowners may pursue

opportunities within and outside of the highway corridor, independent of MDT efforts. These efforts could include public outreach and educational campaigns, comment and input on private development proposals within wildlife movement areas, and projects to protect habitat and facilitate wildlife movement on adjoining lands. Coordination of these efforts could complement the planning for wildlife accommodations on the highway, increasing their feasibility and the likelihood of long-term success.

Recommendation: Install appropriate wildlife accommodations resulting from MDT project development process; coordinate with MWTSC and other organizations to identify partnership opportunities that will advance wildlife accommodation priorities

Project Development Considerations:

- Additional right-of-way or easement may be required, depending on accommodation
- Surface waters, irrigation features, wetlands, vegetation, habitat, wildlife, fisheries, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT, USFS, FWP, Gallatin County, Montana Water Trust, Various Wildlife Organizations

Timeframe: Short- to Long-term

Estimated Cost: $500,000 (Underpass); $4.2M (Overpass); $80,000 per mile (Fencing); $630,000 per mile (Animal Detection); Varies (Wildlife Signage)

Potential Funding Sources: Other Programmed Projects (NH, HSIP), Other Agencies, Private

5.3.3. Alternate Transportation Modes

There are two shared use paths adjacent to US 191 within the study area: Gateway Shared Use Path and Big Sky Trail Shared Use Path. Protected pedestrian highway crossing opportunities on US 191 are limited to the pedestrian underpass at the Mill Street/Rabel Lane intersection. Aside from the shared use paths, there are no dedicated bicycle facilities within the corridor.

Preservation and maintenance activities are essential to extending the life of a pedestrian and bicycle facilities. There are a variety of activities involved in maintenance of non-motorized facilities including snow removal, striping, sweeping, repairs, and pavement preservation. Shared use path facilities would need to abide by applicable policies and design standards.

As US 191 continues to experience increasing traffic volumes and congestion, providing public transportation has become critical. Since adding capacity for the highway, especially through the Gallatin Canyon, is expensive and potentially infeasible in places due to environmental constraints, the use of public transportation is important in getting residents, commuters, and visitors through the corridor and reducing the overall number of private vehicle trips. Transit also helps increase mobility for those who don't or can't drive. Current transit options include the Skyline Bus, West Yellowstone Foundation Bus, Yellowstone Club Bus, and several other private and shared ride services from Bozeman to West Yellowstone including transportation in and around Big Sky. Desires for additional transit opportunities for visitors and commuters between Bozeman, Big Sky, and West Yellowstone have been expressed.

A1. Four Corners to Gallatin Gateway Shared Use Path

Local desire exists to complete the shared use path connection from Zachariah Lane into Four Corners, approximately four miles. Sustained public use has created an informal trail adjacent to the shoulder on the west side of US 191. There is opportunity to formally develop the informal trail on the west side of the highway with an underpass at Zachariah Lane, or to continue the existing path along the east side of the highway. Highway crossing treatments may be necessary to facilitate safe access to the path.

The path was completed using funds from the Community Transportation Enhancement Program – a program no longer active. The receiving entity (Gallatin County) is responsible for maintaining or causing the maintenance of the path for the life of the path. In 2015, an MDT site assessment concluded that the path has major oxidation, transverse cracking, edge raveling, and minor potholes, and it needs major crack sealing and a fog seal.[29] If/when the path is completed, all parties involved should have a clear understanding of funding and maintenance responsibilities.

Recommendation: Extend the existing shared use path from its terminus at Zachariah Lane to the Four Corners intersection

Project Development Considerations:

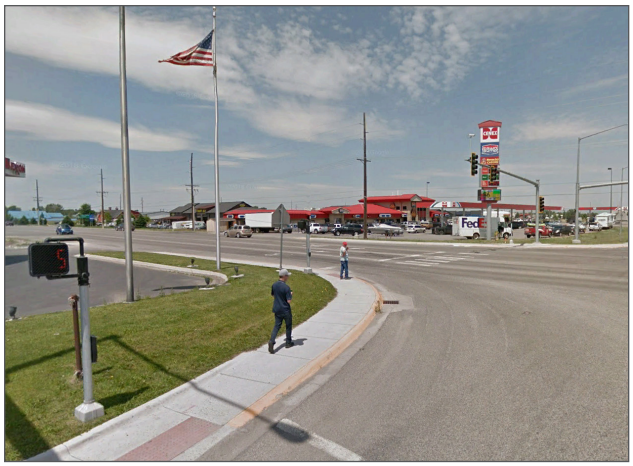
- Additional right-of-way may be required
- Irrigation features, farmland, wetlands, vegetation, habitat, wildlife, protected species, and historic/cultural properties
- Funding and responsibility for maintenance

Implementation Agency/Partners: MDT, Gallatin County, Private

Timeframe: Mid-term

Estimated Cost: $3.5M

Potential Funding Sources: TA, Local, Private



A2. Four Corners Intersection Pedestrian Improvements (RP 81.9)

Input from the public indicates that crossing the Four Corners intersection is difficult, and the crossing distance is too large for the given crossing time. To improve pedestrian accommodations at this intersection, the pedestrian signals could be upgraded to include audible beacons and LED countdowns. Retiming the pedestrian signals to be consistent with current design standards is recommended. Installing consistent crosswalk markings on all legs of the intersection could be beneficial. Patterned or colored crosswalks could be utilized to increase visibility and deter drivers from stopping on the crosswalks.

Recommendation: Install pedestrian accommodations at the intersection

Project Development Considerations:

- Refuge islands and bulbouts may be infeasible due to site constraints
- Winter maintenance practices may limit feasibility for some improvements

Implementation Agency/Partners: MDT

Timeframe: Mid-term

Estimated Cost: $230,000

Potential Funding Sources: TA

A3. Beaver Creek Road Pedestrian Crossing (RP 45.3)

Pedestrians from Ophir School often cross Beaver Creek and US 191 to access Porcupine Creek Road and the Gallatin River for educational activities. Historically there was space along the highway shoulder to walk across Beaver Creek. When the roadway was recently expanded to accommodate a southbound left-turn lane, the shoulder was narrowed, leaving little room for pedestrians. Today, pedestrians typically cross along a narrow strip of land on top of the culvert and outside of the guardrail. An enhanced pedestrian crossing, including high visibility signing and/or flashing beacon, could be installed at the Beaver Creek Road intersection to facilitate access across the highway and connect to improvements being undertaken by other agencies outside the study area.

Recommendation: Install enhanced pedestrian crossing if warranted

Project Development Considerations:

- A pedestrian crossing study would need to be conducted

Implementation Agency/Partners: MDT, FWP, GRTF

Timeframe: Short-term

Estimated Cost: $9,000 (signing); $65,000 (beacon)

Potential Funding Sources: TA

A4. Skyline Bus

With the continued growth in Big Sky and the lack of affordable housing, more and more employees are expected to commute on a daily basis from the greater Bozeman area to Big Sky. To accommodate these passengers and offer more frequent service, BSTD anticipates the need for 18 roundtrip buses each day during the winter season, 8 roundtrip buses during the summer season, and 4 roundtrip buses during the shoulder seasons.

The recently awarded TIGER grant for improvements to MT 64 includes the addition of four motorcoaches and six vans to the existing fleet. To accommodate the desired expanded services as discussed above, BSTD anticipates the need to purchase an additional three motorcoaches.

Recommendation: Add additional Skyline bus trips between Bozeman and Big Sky; purchase additional motorcoaches

Project Development Considerations:

- Bus service improvements would be dependent on capital and operational funding secured by transit operator

Implementation Agency/Partners: BSTD, Private

Timeframe: Short-term

Estimated Cost: $1.8M (capital); $350,000 per year (operations)

Potential Funding Sources: Transit Programs, Local, Private

A5. Bus Stop Turnouts

Public concern was raised regarding the safety of public transit and school bus passengers while loading and unloading. Experiences of vehicles illegally passing stopped buses and concerns for the impedance of traffic were noted. Designate bus stop turnouts may help improve safety for loading and unloading operations. These turnouts could be outfitted with ADA-compliant shelters, if desired. If bus turnouts are pursued, coordination with transit operators and school districts should occur to ensure optimal placement and design of turnouts.

Recommendation: Install bus stop turnouts

Project Development Considerations:

- Additional right-of-way or easement may be required
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, hazardous materials, and historic/cultural properties depending on location of bus stops

Implementation Agency/Partners: MDT, Transit Operators, School Districts

Timeframe: Mid-term

Estimated Cost: $140,000 each

Potential Funding Sources: NH, Transit Programs, Local

A6. Airport – Big Sky Shuttles

Karst Stage, North of Yellowstone, and Big Sky Shuttle currently use 191 to provide charter transportation services for seasonal visitors between the Bozeman International Airport, Big Sky, and West Yellowstone. The Skyline bus does not provide airport service as it is currently not allowed by the airport. BSTD anticipates needing five to six scheduled airport pick-up times per day to transport visitors and residents between the airport and Big Sky. Continued, and expanded, operation of airport to Big Sky bus services could be pursued to reduce the number of single occupant trips on US 191.

Recommendation: Expand bus service to Airport

Project Development Considerations:

- Bus service expansion would be dependent on capital and operational funding administered by transit operators
- Transit service is currently not allowed at the airport

Implementation Agency/Partners: Transit Operators, Bozeman Yellowstone International Airport

Timeframe: Short- to Mid-term

Estimated Cost: Unknown

Potential Funding Sources: Transit Programs, Local

A7. Park-and-Ride/Carpool Lots

Carpooling can be a solution to reduce single occupant vehicle trips and providing designated parking lots can help promote the use of carpools along the US 191 corridor. Stakeholder input indicates a park-and-ride or carpool lot is needed in the Four Corners area due to the existing site being sold. If the weigh station at Four Corners is relocated (see **S10**), the current site could possibly be redeveloped into a park-and-ride/carpool lot if feasible. Designated bus stops and/or carpool lots could be constructed at future large developments along the US 191 corridor.

Recommendation: Construct a park-and-ride/carpool lot in the Four Corners area and as warranted with future large developments along corridor

Project Development Considerations:

- Additional right-of-way or easement may be required
- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, hazardous materials, and historic/cultural properties depending on location of park-and-ride lots

Implementation Agency/Partners: MDT, Transit Operators, Gallatin County, Private

Timeframe: Mid-term

Estimated Cost: $390,000

Potential Funding Sources: Transit Programs, Local, Private

5.3.4. Roadway Reconstruction

The following improvement options aim to increase capacity and improve traffic operations on US 191. Portions of the highway are projected to operate below current standards. Since reducing vehicular traffic is unlikely over the planning horizon, the performance of the highway can be improved by increasing roadway capacity through reducing access density, providing additional passing opportunities, and adding additional travel or turn lanes.

These options will require major reconstruction of the highway and are more costly and may have greater impacts than previously listed options. For this reason, the corridor has been broken up into several smaller sections based on roadway context, existing/future traffic demands, and logical project limits. It is envisioned that these improvements could be implemented over the long term when funding becomes available. There may be opportunity to combine these options with some of those discussed previously.

The performance of the highway can be improved by increasing roadway capacity.

R1. US 191/MT 84/MT 85 to Blackwood Road (RP 81.9 to 79.5)

Providing additional continuous northbound and southbound lanes in each direction through this section would accommodate greater volumes of traffic, reduce congestion and peak hour travel times, and increase passing opportunities. A center two-way left-turn lane could be constructed through this section to provide space for turning movements. This option allows for higher roadway capacity and increased unopposed passing opportunities. The Spain Ferris Ditch bridge would need to be widened/replaced with this option (see **S14**).

Recommendation: Construct additional lane in each direction with center two-way left-turn lane

Project Development Considerations:

- Additional right-of-way or easements may be required
- Surface waters, irrigation features, farmland, floodplains, wetlands, vegetation, habitat, wildlife, fisheries, protected species, hazardous substances, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Long-term

Estimated Cost: $21.1M

Potential Funding Sources: NH

R2. Blackwood Road to Cottonwood Road (RP 79.5 to 75.7)

Providing an additional travel lane in each the northbound and southbound direction through this section would provide additional capacity for anticipated future development, reduce congestion, increase passing opportunities, and ease access on and off the highway. A center two-way left-turn lane could be constructed between Zachariah Lane and Cottonwood Road to provide space for safe turning movements. The bridge across South Cottonwood Creek would need to be widened/replaced with this option (see **S14**).

Recommendation: Construct additional lane in each direction with center two-way left-turn lane between Zachariah Lane and Cottonwood Road

Project Development Considerations:

- Additional right-of-way or easements may be required
- Surface waters, irrigation features, floodplains, wetlands, vegetation, farmland, habitat, wildlife, fisheries, protected species, hazardous substances, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Long-term

Estimated Cost: $31.6M

Potential Funding Sources: NH

R3. Cottonwood Road to Wilson Creek Road (RP 75.7 to 73.5)

It is anticipated that this section of US 191 could experience additional development in the future. A center two-way left-turn lane or dedicated left-turn bays could be constructed in this section to facilitate access for existing and future developments. At a minimum, a center two-way left-turn lane between Hawk Hill Road and Wilson Creek Road would provide turning opportunities for residences in this area.

Recommendation: Construct a consistent three-lane configuration with center two-way left-turn lane or dedicated left-turn bays

Project Development Considerations:

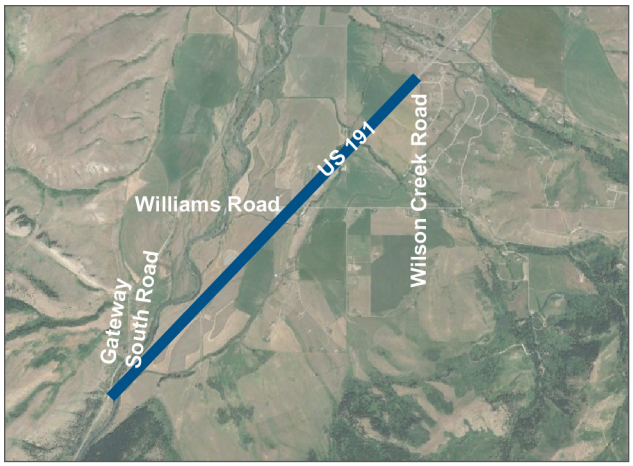
- Surface waters, irrigation features, farmland, floodplains, wetlands, vegetation, habitat, wildlife, fisheries, protected species, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Long-term

Estimated Cost: $13.5M

Potential Funding Sources: NH



R4. Wilson Creek Road to Gateway South Road (RP 73.5 to 70.5)

By providing additional lanes through this section, drivers would have the opportunity to pass slow moving vehicles that they would otherwise not be able to pass within the canyon. Replacing the existing northbound passing lane with a continuous travel lane could help reduce some of the safety issues currently experienced in this area. Reconstruction of this segment would require widening/replacing the bridge across the Gallatin River (see **S14**).

Recommendation: Construct a passing lane in each direction with left-turn bays at major intersections

Project Development Considerations:

- Surface waters, irrigation features, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, recreational sites, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Long-term

Estimated Cost: $30.2M

Potential Funding Sources: NH

R5. Gallatin Canyon (RP 70.5 to 48.0)

To accommodate projected Gallatin Canyon traffic volumes, additional capacity/passing opportunities may be necessary. Constructing additional lanes in the canyon may require roadway realignment to flatten horizontal curves and reduce sight distance issues. With additional traffic anticipated in the future, passing lanes of 1.0 to 2.0 miles are desirable.

In the areas where public and private approaches are more frequent, the addition of a two-way left-turn lane or dedicated left-turn bays would be appropriate to accommodate frequent turning movements. In some locations, it may be appropriate to consolidate several closely spaced private approaches to a single approach in order to reduce the number of turn bays needed (see **C7**).

R5-a. Spanish Creek Road to Sheep Rock (RP 68.7 to 67.0)

If the centerline of the roadway were to be shifted west, an additional passing lane in each direction could be accommodated in this section and curves could be straightened. The bridge across Spanish Creek would need to be widened/replaced with this option (see **S14**).

R5-b. Shenango Creek to Storm Castle (RP 64.8 to 63.5)

To improve safety and facilitate access for the residences in this area, a center two-way left-turn lane could be implemented in this section, particularly through the Luhn Lane area. Alternatively, the approaches could be consolidated by creating a frontage road and dedicated left-turn bays could be provided on US 191 at a single approach for the frontage road. While the roadway south of the Luhn Lane area narrows, there appears to be enough room to accommodate left-turn bays for the trailhead and river access.

R5-c. Karst Camp to Portal Creek (RP 55.4 to 53.1)

There is opportunity to construct a center two-way left-turn lane or dedicated left-turn bays to facilitate access to residences and businesses in this section. There is some evidence of efforts to consolidate approaches through this section by implementing a frontage road. Further consolidation of approaches in this section could be more cost effective to implement than a center two-way left-turn lane.

R5-d. Jack Smith Bridge to Dudley Creek (RP 49.8 to 48.3)

Since there are relatively few approaches in this section and some open space, a passing lane could be constructed in the northbound direction, which would provide a passing opportunity for vehicles before entering the heart of canyon where passing opportunities are currently limited. However, the topography of this section may require roadway realignment to straighten curves and increase driver sight distance. This is a location where bighorn sheep are known to frequently occupy, and impacts to wildlife and/or habitat may pose challenges to implementing this option.

Recommendation: Reconstruct the corridor at incremental locations within the canyon

Project Development Considerations:

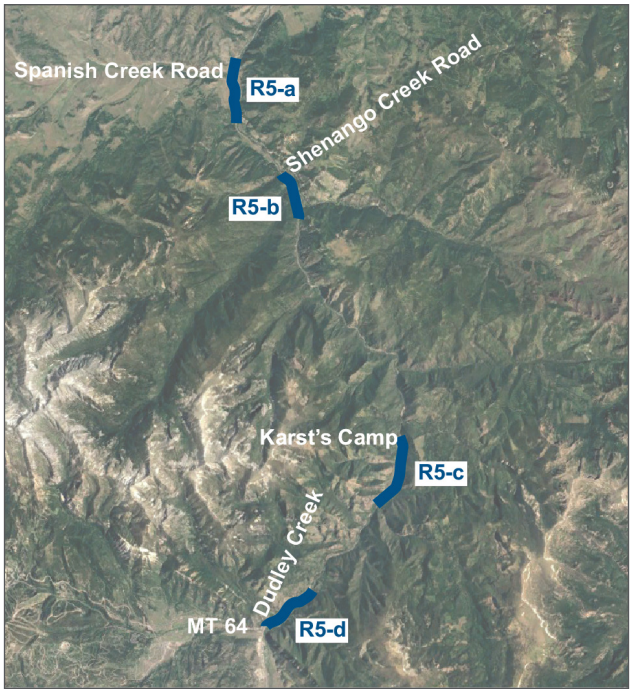
- Additional right-of-way or easements may be required
- Surface waters, floodplains, farmland, wetlands, vegetation, habitat, wildlife, fisheries, protected species, recreational sites, and historic/cultural properties

Implementation Agency/Partners: MDT

Timeframe: Long-term

Estimated Cost: $20.5M (R5-a); $11.5M (R5-b); $19.2M (R5-c); $11.9M (R5-d)

Potential Funding Sources: NH



5.3.5. Options Eliminated from Further Consideration

Through public and stakeholder involvement efforts, several additional concerns were expressed. Ultimately, options to address these concerns were eliminated from further consideration because they are either outside the purview of the *US 191 Corridor Study* or the options were determined infeasible. The following provides a discussion of the options that were considered but not advanced as part of this study.

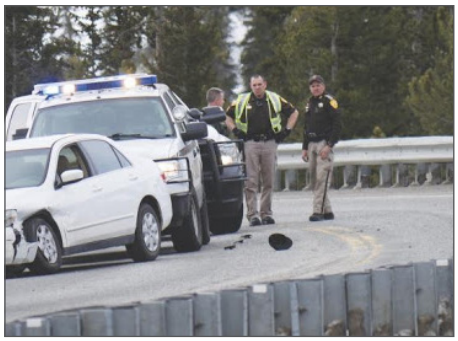
Scenic Byway Designation

Several members of the public encouraged designation of US 191 as a Scenic Byway as a way to impose truck restrictions and protect the environmental resources in the corridor. While a designation of this type cannot prohibit use by truck traffic on the highway, it could help with conservation and preservation of the corridor. However, per Administrative Rules of Montana 18.14.205, all land abutting the scenic-historic byway must be either in tribal government ownership, within the boundaries of an Indian reservation, or in public ownership.29 There are several parcels along US 191 through the Gallatin Canyon which are privately owned, thereby making US 191 currently ineligible for state scenic byway designation. However, local governments can enact zoning regulations stipulating acceptable land uses, which could help preserve the valued aesthetic qualities of the corridor.

Since much of the land surrounding the study corridor is privately owned, US 191 is not eligible for designation as a Scenic Byway.

Enforcement

Input received from the public and stakeholders indicated that more enforcement is needed within the study area. Aggressive driving was one of the top concerns brought forward by the public. Drivers in the corridor are often observed not obeying the posted speed limits, tailgating, passing in no passing zones, passing stopped buses, and generally driving in an otherwise reckless or aggressive manner. Other desires include additional enforcement of driver impairment, the slow-moving vehicle law (MCA 61-8-311), and truck related laws/restrictions.



Enforcement and emergency service response can be difficult in the Gallatin Canyon due to narrow shoulders and limited opportunities to pull off the roadway.

The corridor is currently patrolled by several agencies including the Gallatin and Madison County Sheriff's Offices, Montana Highway Patrol, USFS, FWP, and others. While there are often several patrols throughout the corridor, enforcement in the canyon can be difficult due to lack of shoulders and limited sight distances. High traffic volumes and the topography of the Gallatin Canyon can make it difficult for patrols to pull over a vehicle several cars ahead or to exit the traffic stream and turn around to pull over a vehicle traveling in the opposite direction.[30]

It is outside the scope of this corridor study to recommend increased enforcement. However, there are roadway improvements that can be implemented to make enforcement easier for officers. These improvements include: widening shoulders (see **C3**) and lengthening turnouts (see **S12** and **S13**) to improve the safety and ability to make enforcement stops; opening the weigh station (see **S10**) to enforce truck restrictions; and providing alternative transportation to reduce impaired driving (see **A4**).

Truck Restrictions

Public comments expressed desires to more effectively manage truck traffic on US 191, noting noise, speed, safety, and environmental concerns. Public suggestions to remedy these concerns included encouraging trucks to use Interstate 15, prohibiting hazardous material transport, banning trucks from the corridor, limiting hours of operation for trucks on the corridor, and increasing enforcement.

Comments from the public indicate that noise from trucks on US 191 is a concern.

As an NHS route and federal-aid highway, it would violate both state and federal laws to indefinitely restrict truck traffic on US 191. The freight and heavy vehicle traffic operating on US 191 consists mainly of commercial truck traffic, construction vehicles, and small delivery trucks. The US 191 corridor serves as a major freight corridor for both cross-country goods movement as well as for local deliveries to the communities along the corridor. Traffic data indicates roughly one-third of the heavy vehicle traffic on US 191 exits the highway and travels towards Big Sky on MT 64.

Having a fully operational weigh station (see **S10**) would help increase enforcement of truck loads and the use of compression brakes along the corridor. By law (MCA 61-9-321) commercial vehicles with compression brakes must be equipped with mufflers. However, the general use of compression brakes cannot be prohibited in Montana. Currently, there is signage in the Karst Camp area (RP 55) reiterating the compression brake muffler law. Since compression brake mufflers are required by law, signage is no longer needed and is being removed as dictated by damage and wear.

Alternate Routes

Due to limited space and environmental constraints within the Gallatin Canyon, opportunities for roadway expansion along the current alignment are limited. Instead of expanding the highway on its current alignment, and to preserve the beauty and recreational values of the Gallatin Canyon, alternative routes and new alignments were proposed by the public. Public comments recommended opening Jack Creek Road, encouraging drivers and trucks to use alternate routes, and constructing a new parallel route outside of the Gallatin Canyon.

Jack Creek Road is a private road connecting Ennis and Big Sky. The road is currently owned and maintained by Moonlight Basin Resort. Access to Jack Creek Road is granted via membership to the Madison Valley Ski Club with permission from Moonlight Basin Ranch. Access is granted on a year-to-year basis with no expressed or implied guarantees of continued access in years to come. Presently, nighttime access to the road is prohibited.

By opening Jack Creek Road for public use, US 287 (west of US 191, through Ennis) could be used as an alternate route to the Big Sky area and Jack Creek Road could provide an alternate route for emergency access within the Gallatin Canyon. However, the decision to open Jack Creek Road for public access would be at the discretion of the roadway owner. If opened, the roadway would be considered a county road under the jurisdiction of Madison County, not MDT. It is likely that opening Jack Creek Road would shift some traffic pressure from US 191 to US 287, but would not adequately address the traffic concerns pertaining to recreational traffic through the canyon or local commercial delivery services in the Four Corners, Gallatin Gateway, and Big Sky areas.

A bypass route was suggested to provide additional capacity and to alleviate truck concerns on US 191. US 89 to the east, and US 287 and Interstate 15 to the west, are viable existing alternate routes. Conversely, construction of a new parallel route outside the Gallatin Canyon was suggested. In order to complete an alternate route, a tunnel system would likely be required due to the topography of the canyon and the bordering mountain ranges. A project of this scale is likely to be cost prohibitive, would result in substantial environmental impacts, and would not adequately address traffic and safety concerns on the existing corridor.

Jack Creek Road is privately owned by Moonlight Basin and requires prior authorization and a gate code to use. Opening the road for public use is at the discretion of the roadway owner.

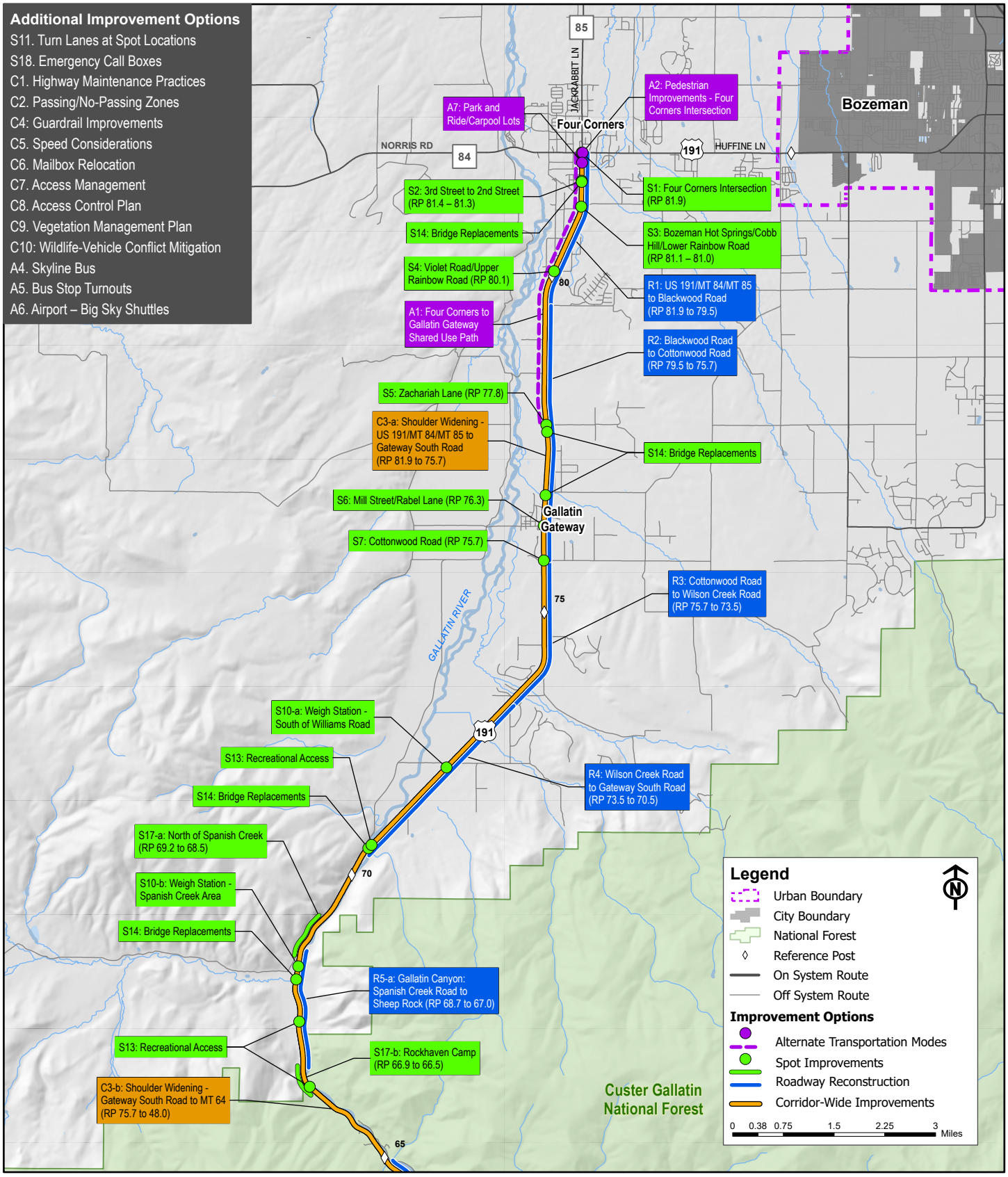


Figure 11: Improvement Options (RP 81.9 to 65.0)

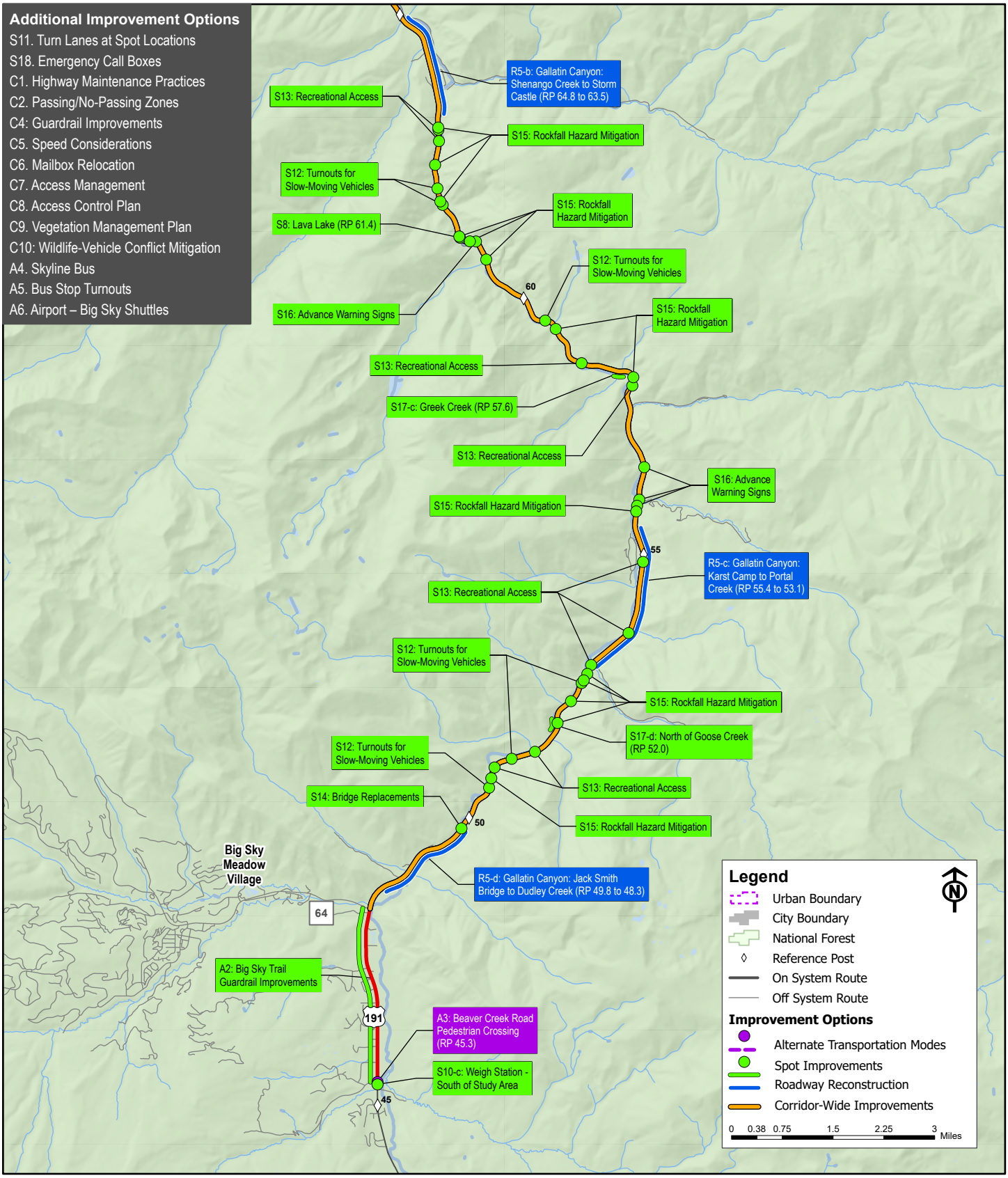


Figure 12: Improvement Options (RP 65.0 to 45.3)

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6.0. CONCLUSIONS AND NEXT STEPS

This study evaluated the segment of US 191 from its intersection with Huffine Lane/Norris Road/ Jackrabbit Lane in Four Corners (RP 81.9) to the intersection with Beaver Creek Road (RP 45.3) near Ophir School south of MT 64 to understand corridor needs, objectives, constraints, and opportunities and develop a package of improvement options to address study findings. The purpose of the study was to develop a comprehensive long-range plan for managing the corridor and to identify feasible improvement options to address needs identified by the public, study partners, and resource agencies.

After a comprehensive review of available information on environmental resources and existing infrastructure, coupled with focused outreach with the public, stakeholders, and various resource agencies, the study identified multiple short- and long-term recommendations to address corridor needs and objectives over the 2040 planning horizon. These recommendations will assist implementing agencies in targeting the most critical needs and allocation of resources. This study provides a diverse list of improvement options and strategies that may be considered as funding becomes available.

Recommended improvements are intended to address the needs of the highway over the next 20 years, with implementation depending on available funding.

6.1. Funding

The ability to advance recommendations from this study and develop projects on US 191 depends on the availability of existing and future federal, state, local, and private funding sources. Projects identified in this study may be eligible for funding through the following programs and sources. Currently, no funding has been identified to complete any of the recommended improvement options contained in this study. Additional detail on funding sources is provided in **Appendix 5**.

Federal Funding

Federal transportation revenues are generated from gasoline and diesel fuel taxes and apportioned to states according to specific transportation programs, eligible fund uses, and required state participation (or match percentage), which is determined based on population and miles of federal highway within each state. Most federal transportation expenditures in Montana require approximately 13 percent state matching funds, with approximately 87 percent of project costs covered by federal dollars. Improvements to US 191 may be eligible for funding through the following federal programs administered by MDT.

- **National Highway Performance Program (NH)**: Funding for highway and bridge projects to rehabilitate, restore, resurface, and reconstruct National Highway System routes; allocated by the Montana Transportation Commission.
- **Transportation Alternatives Program (TA)**: Funding for smaller-scale transportation projects such as pedestrian and bicycle facilities, recreational trails, and environmental mitigation related to stormwater and habitat connectivity; awards granted to projects through a competitive process.
- **Highway Safety Improvement Program (HSIP)**: Funding for highway safety improvement projects on any public road, bicycle/pedestrian pathway, or trail; project applications from local governments prioritized by MDT and approved by the Montana Transportation Commission.
- **Federal Lands Access Program (FLAP)**: Funding to improve access to federal lands through improvements to non-federal infrastructure (including state highways and local roadways); project selection determined by Program Decisions Committee.
- **Transit Programs**: Funding to support transit operations and public transportation projects, including specific programs for rural areas and mobility for seniors and individuals with disabilities; allocated by MDT to local governments and private organizations.

State Funding

- **State Fuel Tax**: Funding for the construction, reconstruction, maintenance, and repair of local roadways; allocated to incorporated cities and towns based on population and street mileage ratios across the state.
- **State Special Revenue**: Funding for projects to preserve the condition and extend the service life of state-maintained highways that are not eligible for federal funds; MDT District priorities approved by the Montana Transportation Commission.

Local Funding

Gallatin County generates revenues through intergovernmental transfers (including state gas tax apportionment and motor vehicle fees) and a mill levy assessed against county residents living outside cities and towns.

- **Road Fund**: Provides financing for construction, maintenance, and repair of county roads outside the corporate limits of cities and towns in Gallatin County.
- **Bridge Fund**: Provides financing for engineering services, capital outlays, and necessary maintenance for bridges on all off-system and secondary routes within the county.
- **Special Revenue Funds**: Used to budget and distribute revenues legally restricted to a specific purpose, such as major capital improvements, rural special improvement districts, special bond funds, or a specialized transportation fund.

Private Funding

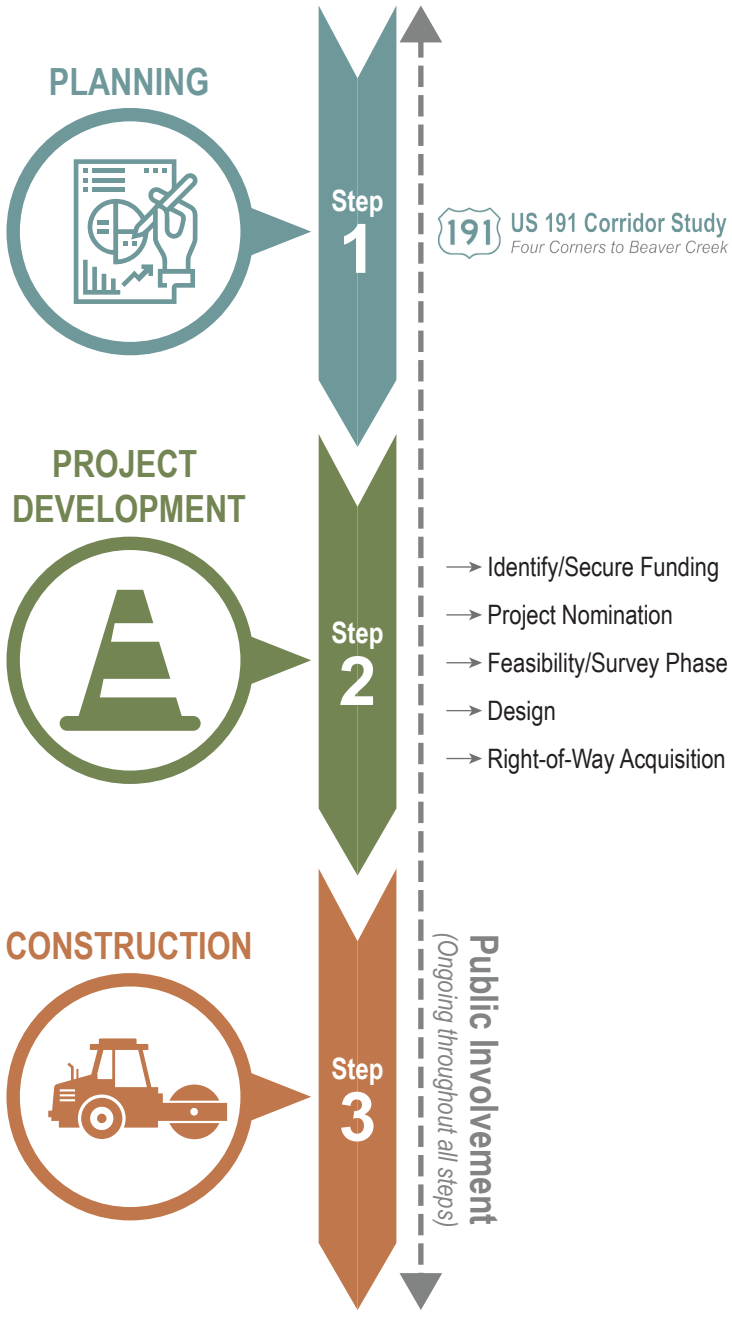
The private sector has recognized that better access and improved facilities can be profitable due to increased land values and commercial development possibilities. Improvements to US 191 could be partially funded through various forms of private financing, such as right-of-way donations, cash contributions, cost-sharing for operating and/or capital costs, impact fees, and improvement districts.

6.2. Next Steps and Other Project Development Considerations

To continue with the development of a project (or projects), the following steps are needed.

- Identify and secure a funding source or sources.
- For MDT-led projects, follow MDT guidelines for project nomination and development, including a public involvement process and environmental documentation.
- For projects that are developed by others and may impact MDT routes, coordinate with MDT via the SIAP or other appropriate collaborative processes.

The purpose and need statement for any future project should be consistent with and address one or more of the needs and objectives contained in this study. Should this corridor planning study lead to a project or projects, compliance with state and federal environmental regulations will be required. This corridor planning study will be used as the basis for determining the impacts and subsequent mitigation for the improvement options in future environmental documentation. Any future project must comply with Code of Federal Regulations Title 23 Part 771 and Administrative Rules of Montana 18, sub-chapter 2, which outline the requirements for documenting environmental impacts on highway projects.



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