



West Three Forks to Bear Canyon

Existing and Projected Conditions Report

DRAFT

July 31, 2026



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Acronyms

ADT	Average Daily Traffic	MCI	Miscellaneous Cracking Index
AADT	Annual Average Daily Traffic	MDT	Montana Department of Transportation
AASHTO	American Association of State Highway and Transportation Officials	MEPA	Montana Environmental Policy Act
ACI	Alligator Crack Index	MFWP	Montana Fish, Wildlife, and Parks
ACS	American Community Survey	MHP	Montana Highway Patrol
AOI	Area of Influence	mph	Miles Per Hour
CAGR	Compound Annual Growth Rate	MPO	Metropolitan Planning Organization
DHV	Design Hour Volume	MWTP	Montana Wildlife & Transportation Partnership
EB	Eastbound	NEPA	National Environmental Policy Act
FHWA	Federal Highway Administration	NHS	National Highway System
GCR	General Condition Rating	OPI	Overall Performance Index
GIS	Geographical Information Systems	pc/mi/ln	Passenger Cars Per Mile Per Lane
GVMPO	Gallatin Valley Metropolitan Planning Organization	PDO	Property Damage Only
HCM	Highway Capacity Manual	PvMS	Pavement Management System
HCS	Highway Capacity Software	RDM	Road Design Manual
HIN	High Injury Network	RI	Rut Index
I-90	Interstate 90	ROW	Right-of-Way
IRI	Ride Index	RP	Reference Post
K-Value	Rate of Vertical Curvature	SOGR	State of Good Repair
L_a	Acceleration Length	SS4A	Safe Streets for All
L_d	Deceleration Length	SSD	Stopping Sight Distance
L_g	Gap Acceptance Length	TDM	Travel Demand Model
LOS	Level of Service	TMC	Turning Movement Counts
LOSS	Level of Service of Safety	US 287	US Highway 287
MCA	Montana Code Annotated	vpd	Vehicles Per Day
MCS	Motor Carrier Services	WB	Westbound
		WWR	Wrong Way Radar

1.0 INTRODUCTION

The *I-90 Corridor Study – West Three Forks to Bear Canyon* is being completed to develop a comprehensive long-range plan for managing the Interstate corridor. The study evaluates transportation conditions, documents anticipated growth and travel demand, and identifies potential improvement strategies that balance mobility, safety, environmental considerations, and financial feasibility. The Montana Department of Transportation (MDT) is leading the study in coordination with the Federal Highway Administration (FHWA), local jurisdictions, resource agencies, and the public. The study is a pre-Montana/National Environmental Policy Act (MEPA/NEPA) planning effort and is intended to support future environmental review, transportation planning, and project development activities along the corridor.

This *Existing and Projected Conditions Report* provides a planning-level overview of transportation conditions within the corridor and identifies potential constraints and considerations that may influence future development of improvements in the corridor. This planning-level examination addresses demographic and economic conditions affecting traffic volumes, the physical roadway corridor and associated transportation facilities, geometric characteristics, current and projected traffic conditions, and safety conditions. Findings are based on available data, field observations, geographical information systems (GIS) analysis, aerial photography, and input from agencies and stakeholders. The information presented in this report provides the technical foundation for identifying corridor needs and objectives and for evaluating potential improvement strategies in subsequent phases of the corridor study.

1.1 Study Area

The study area extends along Interstate 90 (I-90) from the West Three Forks Interchange in Broadwater County (Reference Post [RP] 274.6) eastward through Gallatin County to the Bear Canyon Road Interchange east of Bozeman (RP 313.7), encompassing 11 existing interchanges along the corridor, as shown in **Figure 1**. This segment of I-90 serves as a critical regional facility that supports local commuter travel between the communities of Three Forks, Logan, Manhattan, Belgrade, and Bozeman, while also functioning as a nationally important freight corridor. The corridor is located within a rapidly growing region of Montana, where population growth, economic development, increased travel demand, and seasonal fluctuations are placing increasing pressure on Interstate operations and interchange performance.



View of I-90 within the study corridor, illustrating the regional context and surrounding landscape that defines much of the study area.

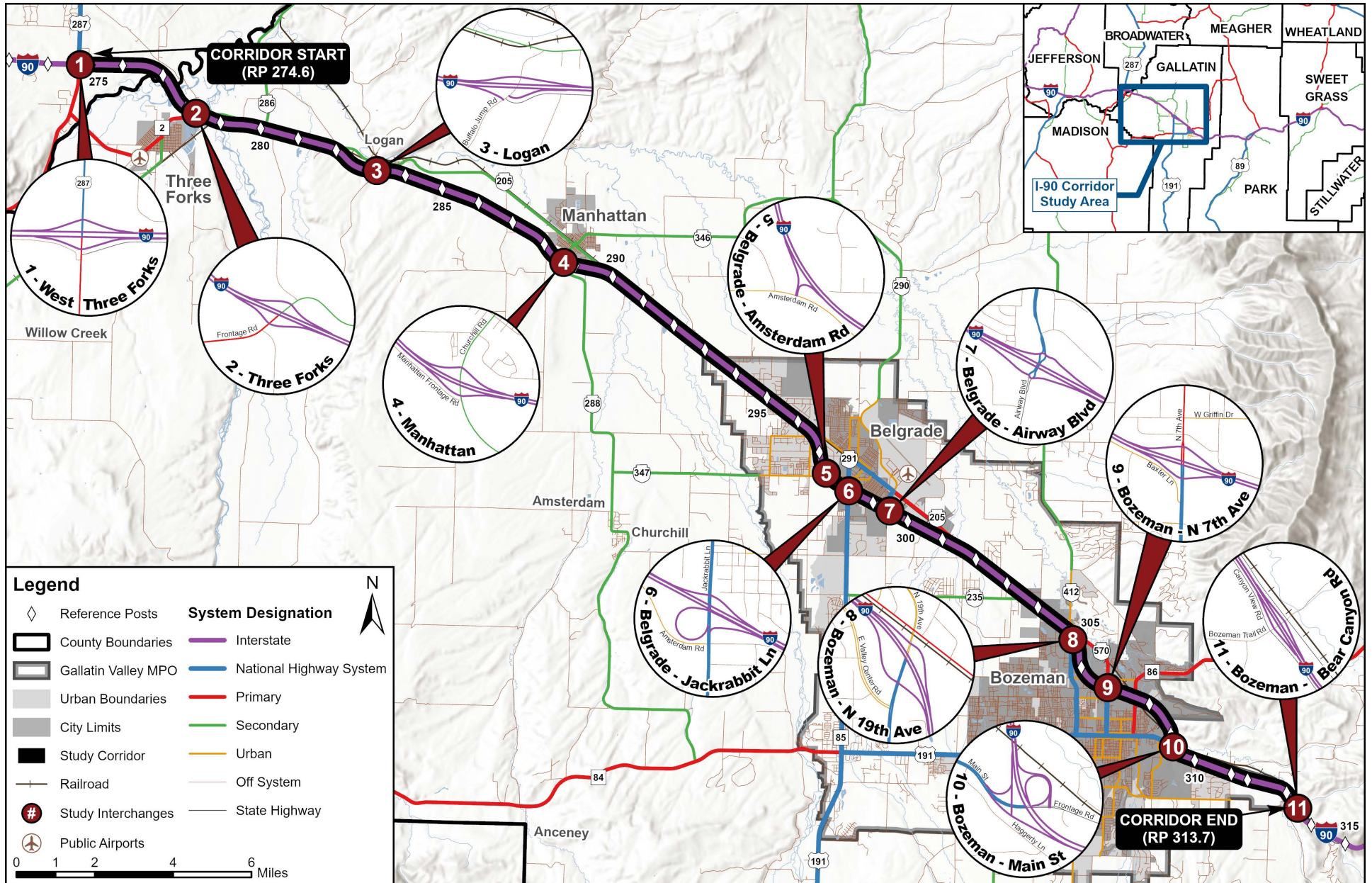


Figure 1: Study Area

1.2 Existing Plans and Regulations

Multiple state, county, and city plans and regulations relate to transportation and land use within the study area. The following sections provide a summary of relevant planning documents and regulations currently available for the study area.

1.2.1 State of Montana Planning

I-90 Three Forks to Billings Road Closure Analysis (2019)

The *I-90 Three Forks to Billings Road Closure Analysis*¹ identified several improvements within the study corridor intended to improve traveler information, safety, and incident response during weather- and traffic-related events. Proposed improvements included installation of permanent variable message signs near the Three Forks Interchange (Exit 274) and east of the Airway Boulevard Interchange (Exit 299) to provide early warning of weather and traffic conditions along I-90 and US Highway 287 (US 287). These signs were subsequently installed or implemented through comparable installations. Additional improvements identified near the Bozeman Interchange (Exit 313) included remotely activated static warning signs with flashers and automated closure gates to manage eastbound I-90 closures at the base of Bozeman Pass. While the warning signs with flashers were installed, the proposed automated closure gates have not been implemented.

Belgrade to Bozeman Frontage Road Corridor Study (2017)

The *Belgrade to Bozeman Frontage Road Corridor Study*² evaluated transportation conditions, safety issues, and improvement opportunities along the Frontage Road and adjacent roadways between Jackrabbit Lane in Belgrade and the westbound I-90 on/off ramp in Bozeman. The study assessed roadway geometry, operations, safety, and multimodal conditions and incorporated public and agency input to identify potential short- and long-term improvement options. The study includes evaluation of the interface between the Frontage Road and the westbound entrance and exit ramps at the N 7th Avenue Interchange and discusses circulation, access, and safety considerations associated with these connections. Improvements that were already under development at the time of the study include intersection signal and geometric upgrades at the intersections with East Valley Center Spur and Griffin Drive, both of which have since been constructed to address operational and safety concerns. The study also recommended long-term reconstruction of the Frontage Road corridor to include one travel lane in each direction, a center left-turn lane where appropriate, and eight-foot shoulders.

Speed Studies

Four speed studies have been conducted in the study area. Speed studies evaluate operating speeds along a roadway and are used to assess driver behavior, inform posted speed limits, and identify potential safety and operational considerations. One of the speed studies covered the majority of the study corridor, while the other three were conducted on crossroads at I-90 interchanges within the study area. **Table 1** presents speed studies along I-90 or at the interchange crossroads and the key findings of each.

Table 1: Relevant Speed Studies

Speed Study	Signed Route	Begin RP	End RP	Year	Status	Recommendation
N 7th Avenue – Bozeman	N 7th Ave	0.0	1.0	2026	Ongoing	Unknown
I-90 – Bozeman Speed Study	I-90	292.0	315.0	2025	Ongoing	Increase the existing 65 mph zone to 70 mph
US 287 – Wheatland	US 287	106.0	108.0	2024	Under Review	Unknown
Jackrabbit Lane – Belgrade ^(a)	Jackrabbit Ln	0.0	6.7	2020	Approved	Lower existing 70 mph zone to 45/55 mph

Sources: MDT. MDT Speed Studies. experience.arcgis.com/experience/8995b56fcac04914a171c3f63b85b85f (Accessed February 2026).

^(a)MDT. (2019). Speed limit recommendation: MT 85 – Jackrabbit Lane. mdt.mt.gov/other/webdata/External/Traffic/speed-studies/2019_C000085_000.0_RPT002.pdf

1.2.2 Gallatin County Planning and Regulations

Gallatin County Safe Streets for All (SS4A) Action Plan (2025)

The *Gallatin County SS4A Action Plan*³ establishes a data-driven framework to reduce fatal and serious injury crashes across the county through a combination of policy, planning, and infrastructure strategies. The plan evaluates crash trends, identifies high-risk locations and systemic safety issues, and recommends prioritized safety improvements and implementation actions consistent with the Safe System approach. One of the plan's recommended actions was to conduct a corridor study in coordination with MDT to evaluate safety concerns on I-90 through Gallatin County, which is being addressed through this *I-90 Corridor Study*. The *SS4A Action Plan* provides guidance for integrating safety considerations into future transportation planning and project development efforts across Gallatin County.

Gallatin Valley Sensitive Lands Protection Plan (2023)

The *Gallatin Valley Sensitive Lands Protection Plan*⁴ is a joint effort by the City of Bozeman, Gallatin County, and other regional partners to identify and protect ecologically sensitive lands throughout the valley as growth continues. The plan maps watercourses, wetlands, wildlife corridors, prime agricultural soils, and other natural resources and provides recommendations for balancing the growing county's needs with protection of lands essential for water quality and quantity, abundant fish and wildlife, healthy soils and more. Additional interchange locations and associated roadway connections considered in the I-90 Corridor Study have the potential to affect sensitive lands identified in the plan, making early coordination between corridor planning and resource protection efforts important.

Greater Triangle Area Transportation Plan (2022)

The *Greater Triangle Area Transportation Plan*⁵ provides a transportation-focused planning framework for the triangle area between Bozeman, Belgrade, and Four Corners in response to continued population and employment growth. The plan evaluates existing and future transportation conditions across roadway, transit, bicycle, pedestrian, and freight systems and identifies multimodal strategies to improve mobility, safety, and connectivity. The plan emphasizes coordinated transportation planning among jurisdictions and recognizes I-90 and its interchanges as key regional facilities influencing travel patterns and access within the triangle area. The plan identified several committed projects that have since been completed, including installation of high-tension cable median guardrail along I-90 between RP 275 and 314 and installation of advance warning devices on I-90 between Three Forks and Billings. The plan also recommended completion of a pre-MEPA/NEPA corridor planning study, which is being advanced through this *I-90 Corridor Study*.

Gallatin County Growth Policy (2021)

The Gallatin County growth policy update *Envision Gallatin*⁶ serves as the county's overarching land use policy document, replacing the previous growth policy completed in 2003. The growth policy is intended to guide other plans and regulations such as neighborhood plans, zoning districts, and subdivision regulations. The policy also provides a vision, goals, and policy statements to guide identification, evaluation, and mitigation of impacts resulting from new development as the county grows. Goals, policies and values relevant to the *I-90 Corridor Study* include the following:

- Transportation Goal 1: Plan for a safe and efficient transportation system.
 - Value land use and development patterns that ensure and prioritize public safety.
 - Multi-modal transportation facilities, including pedestrian and bicycle safety measures.
 - Explore the use of roundabouts to enhance safety features and efficiency at appropriate intersections.

1.2.3 Broadwater County Planning and Regulations

Broadwater County Growth Policy Update (2020)

The *Broadwater County Growth Policy Update*⁷ provides a framework for managing future growth while preserving the county's rural character, agricultural economy, and natural resource base. The policy addresses land use, housing, infrastructure, economic development, and environmental stewardship, with particular attention to development pressures near Three Forks and along major transportation corridors. I-90 and US 287 are identified as critical regional facilities that support mobility, freight movement, and access to services. The document emphasizes coordinated land use and transportation planning to ensure that growth near key corridors and interchange areas occurs in a manner that maintains safety, access, and long-term infrastructure capacity.

1.2.4 Gallatin Valley MPO

The Gallatin Valley Metropolitan Planning Organization (GVMPO) was established following the 2020 Census, when the Bozeman urbanized area exceeded the federal population threshold of 50,000 residents required for designation as a metropolitan area. Metropolitan Planning Organizations (MPOs) are federally mandated entities responsible for carrying out a continuing, cooperative, and comprehensive transportation planning process within urbanized areas. The GVMPO coordinates regional transportation planning efforts among local jurisdictions, MDT, and other transportation partners.

Gallatin Valley MPO Long Range Transportation Plan (Ongoing)

The GVMPO is currently developing its first Long-Range Transportation Plan,⁸ which will establish a regional transportation vision and identify transportation needs, priorities, and investments over a 20-year planning horizon. The plan evaluates all forms of transportation, including highways, local roadways, transit, bicycle and pedestrian facilities, and freight movement. Because the plan is still under development, its recommendations were not available for consideration in this study; however, it is expected to play an important role in guiding future transportation investments throughout the Gallatin Valley.

1.2.5 Bozeman Planning and Regulations

Northwest Bozeman Area Plan (Ongoing)

The *Northwest Bozeman Area Plan*⁹ is a long-range planning effort covering approximately 3,000 acres in the northwest corner of the Bozeman growth boundary, generally north of Durston Road and west of Harper Puckett Road. The plan is tied to the proposed Gooch Hill Sanitary Sewer Lift Station, which will provide the sewer infrastructure needed to support future development in the area, and will establish a long-term vision for land use, transportation connections, parks and open space, and natural resource protection once that infrastructure is in place. The planning area is directly adjacent to a portion of I-90 under study for a potential future interchange location.

Bozeman Community Plan (2025)

The *Bozeman Community Plan*¹⁰ is the City of Bozeman's growth policy, which was adopted to establish long-range vision, goals, and policies guiding land use, housing, transportation, and public infrastructure decisions within the city and its broader planning area. The plan addresses growth management, community character, environmental resources, and economic development while emphasizing the integration of land use and transportation planning. One of the plan's stated goals is to ensure multimodal accessibility and safety for all users. The plan recognizes I-90 as a primary regional transportation corridor and emphasizes coordinating land use decisions, access management, and transportation investments along major corridors to maintain mobility and system performance. It also calls for collaboration with MDT and neighboring jurisdictions to address increasing travel demand associated with continued growth.

Bozeman Health Subarea Plan (2024)

The *Bozeman Health Subarea Plan*¹¹ is an amendment to the Bozeman Community Plan that establishes a long-range vision for the 500 acres owned by Bozeman Health approximately between Highland Boulevard, Kagy Boulevard, Haggerty Lane, and Bozeman Trail Road, commonly referred to as Highland Glen. The plan reserves space for future growth of medical and commercial services that will support the system's health care mission and ensure the regional medical center can continue to serve the essential care needs of the region. Additional considerations aim to preserve and enhance Highland Glen as a protected open space with public access.

Though there are no current plans to develop Highland Glen, future development within the subarea could generate additional traffic on Highland Boulevard and Haggerty Lane, both of which intersect Main Street near the I-90/East Main Interchange. The plan identifies the Haggerty Lane/Main Street intersection, along with several others in the subarea, as requiring future traffic impact analysis, and notes that any resulting improvements will require coordination with MDT. Signalization of the Haggerty Lane/Main Street intersection has been discussed to address operational concerns and capacity constraints, though its proximity to adjacent signals along the state highway remains a challenge.

Bozeman Transportation Master Plan (2017)

The *Bozeman Transportation Master Plan*¹² evaluates existing and future transportation conditions in the Bozeman area and identifies strategies to address mobility, safety, and system performance in response to continued growth. The study assesses roadway operations, congestion, connectivity, and multimodal needs, including transit, bicycle, and pedestrian facilities. The plan identified several recommended projects that intersect the I-90 corridor, including construction of N 19th Avenue from I-90 to Springhill Road to a five-lane urban principal arterial standard and reconstruction of Kagy Boulevard from Bozeman Trail Road east to I-90 to a two-lane rural principal arterial standard. Neither of these projects have been implemented. The plan also recommended completion of a pre-MEPA/NEPA corridor planning study for I-90 between the West Belgrade Interchange and the Bear Canyon Road Exit, which is being advanced through this *I-90 Corridor Study*. In addition, the plan identified a signal at the N 19th Avenue and I-90 eastbound off-ramp intersection as a committed project, which has since been completed.

1.2.6 Belgrade Planning and Regulations

Belgrade Land Use Plan (2026)

The *Belgrade Land Use Plan*¹³ establishes the community's long-range vision and provides an updated future land use map, along with revised subdivision regulations, to guide growth management, community character, and coordination between land use and transportation planning. The plan identifies I-90, the BNSF rail line, Bozeman Yellowstone International Airport, Jackrabbit Lane, and the Gallatin River as physical barriers that limit connectivity within Belgrade, and notes that a lack of alternative routes and limited Interstate access are recurring community concerns as growth continues along the Jackrabbit Lane corridor. The plan's mobility goals call for continued coordination with MDT on regionally significant

projects, including alignment of local intersection control decisions with MDT requirements and coordination on multimodal improvements along state-maintained routes such as Jackrabbit Lane and Main Street/Frontage Road. The document provides updated policy guidance relevant to transportation demand, access management, and infrastructure improvements affecting major corridors and interchange areas serving Belgrade.

Belgrade Safety Action Plan (2025)

The *Belgrade Safety Action Plan*¹⁴ establishes a data-driven framework to reduce fatal and serious injury crashes within the City of Belgrade through a combination of policy, planning, and infrastructure strategies. The plan analyzes roadway safety conditions throughout Gallatin County, identifies locations and roadway characteristics associated with elevated crash risk, and develops strategies to reduce fatalities and serious injuries. The only specific recommendation related to I-90 includes traffic signal timing and phasing updates at the Jackrabbit Lane Interchange to address safety and operational concerns. The document provides guidance for integrating safety considerations into future transportation planning and project development efforts in Belgrade, particularly along major corridors and at key intersections.

Belgrade Long Range Transportation Plan (2018)

The *Belgrade Long Range Transportation Plan*¹⁵ evaluates existing and future transportation conditions in the Belgrade area and identifies roadway and multimodal improvements needed to support planned growth and mobility. The plan addresses roadway capacity, connectivity, access management, safety, and coordination with regional transportation facilities, including state highways and Interstate connections. The plan identified recommended projects affecting the I-90 corridor, including completion of a pre-MEPA/NEPA corridor planning study between Belgrade and Bozeman, which is being advanced through this *I-90 Corridor Study*. The plan also identified potential widening or reconstruction of the Jackrabbit Lane overpass and the I-90 westbound off-ramp; these improvements have not been completed.

1.2.7 Three Forks Planning and Regulations

Three Forks Growth Policy (2022)

The *Envision Three Forks*¹⁶ plan is the City of Three Forks' adopted growth policy. The plan addresses future growth and development within Three Forks by identifying community priorities related to land use, economic vitality, housing, public facilities, and municipal services. It also provides guidance for accommodating future growth while maintaining community character and supporting investments in transportation and other public infrastructure.

1.2.8 Manhattan Planning and Regulations

Manhattan City – County Growth Policy (2024)

The *Manhattan City–County Growth Policy*¹⁷ outlines a vision for Manhattan as a distinct community within the Gallatin Valley while acknowledging the opportunities and challenges associated with continued regional growth. The plan promotes development patterns that reinforce the community's existing character, support a vibrant downtown, and encourage efficient use of public infrastructure and services. The document emphasizes aligning land use and transportation planning to accommodate continued growth while maintaining mobility and access along key corridors serving Manhattan, including connections to I-90 and regional transportation facilities.

1.3 Anticipated Developments

Several planned and ongoing development projects are located within or adjacent to the study area and have the potential to influence travel demand and traffic patterns along the I-90 corridor. These developments include a mix of commercial, industrial, and residential uses and are primarily concentrated near interchange areas and key connecting roadways. Collectively, these projects may affect traffic volumes, turning movements, and peak-period conditions on I-90 and at study interchanges. **Table 2** summarizes the development projects considered in this analysis.

Table 2: Relevant Anticipated Developments

Development	Year	Status	Description	Location	Nearest Interchange
Bozeman Yellowstone International Airport Plaza	TBD	Ongoing	50-acre mixed use	Directly south of Bozeman Yellowstone International Airport	7: Belgrade - Airway Blvd
Jackrabbit Crossing	TBD	Ongoing	195-acre mixed use	Jackrabbit Lane, Belgrade, 0.75 miles south of the Interstate	6: Belgrade - Jackrabbit Ln
Silos Subdivision	TBD	Planned	400 lots residential	North of East Valley Center Road, east of Jackrabbit Lane and south of East Cameron Bridge Road.	6: Belgrade - Jackrabbit Ln
Chick-Fil-A Bozeman	2027	Ongoing	New restaurant with dual drive-through	Former MDT rest area at 4500 E Valley Center Road, northeast of North 19th Avenue and East Valley Center Road	8: Bozeman - N 19th Ave
West Post	2025	Ongoing	>250-acre mixed use	South of I-90 and the Bozeman Yellowstone International Airport	7: Belgrade - Airway Blvd
LoveHeart Farm Major Subdivision Pre-Application	2024	Ongoing	14 condos	North of I-90 RP 313	11: Bozeman - Bear Canyon Rd
Turnrow Master Site Plan	2023	Ongoing	115-acre mixed use	Southwest corner of E Valley Center Road & Davis Lane	8: Bozeman - N 19th Ave
North Park Master Site Plan	2022	Ongoing	140-acre industrial	North of Mandeville Ln, between I-90 and Frontage Rd. Modifications to the N 19th Avenue Interchange westbound off-ramp are being proposed to support access and capacity needs for the development.	8: Bozeman - N 19th Ave and 9: Bozeman - N 7th Ave

Source: City of Bozeman. Bozeman Planning Projects Map. public-bozeman.opendata.arcgis.com/maps/4b96dc8d9a6a4163b902b5ccf32df58c/about (Accessed March 2026).

1.4 Past, Current, and Planned Projects

MDT is responsible for 24 transportation projects within the study area that are either complete, ongoing, or planned, as detailed in **Table 3**. The majority of these projects are located on I-90 and include a mix of reconstruction, resurfacing, rehabilitation, maintenance, and safety improvements. Safety-related projects are the most common, followed by resurfacing and rehabilitation efforts, with additional projects addressing bridges, interchange improvements, and localized roadway upgrades on roads in close proximity to interchanges, including Jackrabbit Lane, N 7th Avenue, and N 19th Avenue. The projects generally span the period from 2021 through 2031, with a limited number of projects outside this 10-year window included due to their relevance to corridor operations and conditions. This list is based on current, readily available information and may not include all future or conceptual projects that could be identified through subsequent planning efforts.

Table 3: Past, Current, and Planned Transportation Projects

Project	Type	Signed Route	Begin RP	End RP	Year	Status
East Three Forks Interchange	Reconstruction	I-90	277.6	279.0	2006	Complete
East Belgrade I-90 Interchange	Reconstruction	I-90	298.0	301.0	2015	Complete
I-90 Structures - Three Forks	Maintenance	I-90	N/A	N/A	2021	Complete
I-90 Incident Management	Safety	I-90	274.0	442.7	2023	Complete
N 7th Ave & Griffin Drive- Boz	Safety	N 7th Ave	1.4	1.4	2023	Complete
SF 189 D2 HT Median Cable Rail	Safety	I-90	275.0	324.0	2023	Complete
Bozeman – East	Resurface	I-90	307.3	313.2	2024	Complete
Headwaters Rest Area	Construction	I-90	278.0	278.0	2024	Complete
SF 229 D2 I-90 Striping 6 In	Safety	I-90	289.0	337.7	2024	Complete
Three Forks-E&W	Rehabilitation	I-90	274.3	278.7	2024	Complete
Jackrabbit-Amsterdam Rd Int	Other	Amsterdam Rd/Jackrabbit Ln	6.1/6.5	6.2/6.6	2025	Complete
N 7th Ave Int Improv - Bozeman	Other	N 7th Ave	0.1	0.9	2025	Ongoing
N 19th Avenue – Bozeman	Rehabilitation	N 19th Ave	0.5	3.0	2025	Complete
Rocky Canyon (I-90)	Resurface	I-90	313.7	318.5	2025	Complete
Belgrade-Bozeman	Resurface	I-90	301.1	307.3	2026	Ongoing
Madison River-Bridge Scour	Bridge	I-90	278.6	276.1	2026	Planned
Three Forks Area Bridge Decks	Bridge	I-90	253.2	283.4	2026	Ongoing
Belgrade Intersection Improvements	Safety	Amsterdam Rd/Jackrabbit Ln	20.0/0.0	20.3/0.2	2027	Planned
Gallatin River- 3M E Manhattan	Bridge	I-90	292.0	292.4	2027	Planned
Belgrade - Urban Improvements	Rehabilitation	Jackrabbit Ln	0.3	0.8	2028	Planned
I-90 Bridge Removal - Three Forks	Safety	I-90	277.7	278.1	2028	Planned
Main Street – Belgrade	Reconstruction	Route 205	18.5	19.7	2031	Planned
West Three Forks Intch Improv	Safety	US 287	107.7	108.1	2031	Planned

Source: MDT. Statewide Transportation Improvement Program (STIP). mdt.mt.gov/pubinvolve/stip.aspx (Accessed March 2026).

MDT. (2026). Federal and State Tentative Construction Plan (TCP) 2026-2030. mdt.mt.gov/other/webdata/external/planning/maps/TCP/TCP-MONTANA.pdf

MDT. Active Projects GIS Map. experience.arcgis.com/experience/d07bdf27c2ec41acaba6f831d430d8d8 (Accessed March 2026).

2.0 DEMOGRAPHICS

This section provides an overview of the demographic and socioeconomic characteristics relevant to the *I-90 Corridor Study*. When available, the data includes information from Broadwater and Gallatin counties; the cities of Three Forks, Belgrade, and Bozeman; and the Town of Manhattan, along with comparative data for the State of Montana and the United States (US).

Demographic and socioeconomic data was analyzed to assess recent trends in population totals, age distributions, employment, economic status, and commuting patterns. Historical and current demographic trends help define existing conditions and support forecasting methods, as there is a direct relationship between motor vehicle travel and socioeconomic factors. Due to the time lag in the availability of socioeconomic data, this analysis presents the most current information and highlights recent and potential changes within the region.

While the data from Broadwater and Gallatin counties reflects the population living in the area, it may not fully represent the primary users of the corridor since I-90 is a regional route, frequently used by regional through traffic and freight carriers for transporting goods. As a result, the demographics of corridor users are difficult to directly characterize. However, analyzing the demographics of the surrounding communities may provide insight into the characteristics of some of the users in the corridor. Pertinent data from MDT's *Social and Economic Conditions: I-90 Three Forks to Bozeman Report*¹⁸ is incorporated throughout this section to provide additional context.

2.1 Population

A review of demographics within the study area is appropriate to understand historical trends in population and characteristics relevant to transportation planning. Understanding population composition is necessary, as the data may influence the types of improvements identified. For example, age distributions may influence travel demand and patterns, while areas experiencing rapid population growth may require capacity, operational, or access management improvements. Demographic information can also help identify disadvantaged populations that may be disproportionately affected by transportation investments and should be considered during project development and decision-making.

2.1.1 Historic and Recent Population Trends

According to MDT's *Social and Economic Conditions Report*,¹⁸ as of 2023, Gallatin County is the second most populated county in the State of Montana. From 2013 through 2023, Gallatin County's population grew by 34 percent, the highest growth rate among all Montana counties and approximately three times the statewide growth rate of 11 percent.

Table 4 provides historical and current population estimates for Gallatin and Broadwater counties, the cities of Bozeman, Belgrade, and Three Forks, the Town of Manhattan, the State of Montana, and the US. From 1970 through 2020, Gallatin County's population grew consistently at a compound annual growth rate (CAGR) of 2.63 percent, increasing from 32,505 to 118,960 residents. This rate exceeds both Montana (0.90 percent) and the US (0.98 percent), indicating that local growth has outpaced both state and national trends. Broadwater County also experienced steady growth during this period, though at a slower rate (1.99 percent). Within Gallatin County, Bozeman (2.12 percent) and Belgrade (4.25 percent) recorded substantial increases between 1970 and 2020, while Manhattan (1.89 percent) and Three Forks (1.04 percent) grew more gradually. Growth accelerated after 1990, particularly from 2000 through 2020, with no periods of sustained decline evident in the data.

Table 4: Population Change Since 1970

Area	1970	1980	1990	2000	2010	2020	CAGR (1970 – 2020)
Gallatin County	32,505	42,865	50,463	67,831	89,513	118,960	2.63%
Broadwater County	2,526	3,267	3,318	4,385	5,612	6,774	1.99%
City of Bozeman	18,670	21,645	22,660	27,509	37,280	53,293	2.12%
City of Belgrade	1,307	2,336	3,411	5,728	7,389	10,460	4.25%
City of Three Forks	1,188	1,247	1,203	1,728	1,869	1,989	1.04%
Town of Manhattan	816	988	1,034	1,396	1,520	2,086	1.89%
State of Montana	694,409	786,690	799,065	902,195	989,415	1,084,225	0.90%
United States	203.2M	226.5M	248.7M	281.4M	308.7M	331.4M	0.98%

Source: MT Census and Economic Information Center. (1970 – 2020). Population Estimates.
Montana Department of Commerce. (2020). 1970-2010 Census Divisions Dataset.

2.1.2 Population Projections

Gallatin County experienced a 12.9 percent increase in population and Broadwater County experienced a 22.5 percent increase in population between the American Community Survey (ACS) estimate periods ending in 2019 and 2024. In comparison, the State of Montana experienced approximately half that growth at 6.0 percent, while the US grew by 3.7 percent. Within Gallatin County, the cities of Bozeman and Belgrade experienced even higher population increases at 16.7 percent and 26.9 percent, respectively.

Looking ahead, the population in Gallatin County is projected to continue growing, with an estimated increase of 12.1 percent from 2025 through 2035, while Broadwater County is projected to decrease slightly at a rate of 1.7 percent. Additionally, the cities of Bozeman and Belgrade are expected to grow even faster, with projected increases of 20.1 percent and 21.8 percent, respectively. In comparison, Montana is expected to grow by 4.6 percent, and the national population is projected to increase by 3.8 percent. **Table 5** details the past and projected population trends in the region and country.

Table 5: Population Change

Parameter	City of Belgrade	City of Bozeman	Broadwater County	Gallatin County	State of Montana	United States
2015-2019 5-year Estimate	8,685	46,746	5,945	108,063	1,050,649	324,697,795
2020-2024 5-year Estimate	11,872	56,114	7,668	124,074	1,116,875	334,922,499
2025 Projection	13,367	61,060	7,330	142,662	1,160,666	338,016,000
2030 Projection	15,240	69,204	7,307	155,291	1,199,203	345,074,000
2035 Projection	17,095	77,104	7,184	162,372	1,217,232	350,861,000
Population Change (2019-2024)	26.9%	16.7%	22.5%	12.9%	6.0%	3.7%
Projected Population Change (2025-2035)	21.8%	20.1%	-1.7%	12.1%	4.6%	3.8%

Source: US Census Bureau. (2015-2019 and 2020-2024). ACS Five-Year Estimates.
Population Projection REMI. (n.d.). 2021 data vintage year.
US Census Bureau. (2023). National Population Projections Tables Main Series.

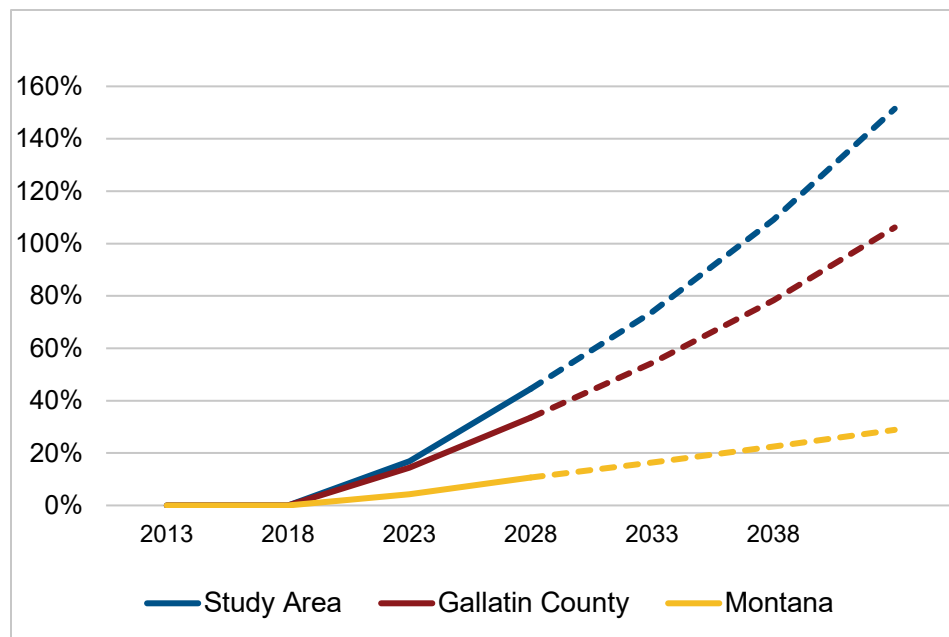


Figure 2: Percent Population Growth Projections (2013 - 2038)

Source: MDT. (2025). *Social and Economic Conditions: I-90 Three Forks to Bozeman Report*.

As one of the most heavily traveled corridors in Montana, I-90 serves communities that collectively house more than half of Gallatin County's population, including Three Forks, Belgrade, and Bozeman. For the purposes of the socioeconomic analysis, the study area includes these communities and the surrounding areas influenced by the corridor. According to the US Census Bureau's 2024 ACS five-year population estimates, approximately 54 percent of Gallatin County residents live in Bozeman and Belgrade combined. MDT's *Social and Economic Conditions Report*¹⁸ presents **Figure 2**, which illustrates population growth from 2013 through 2023 and projected growth through 2038. While Gallatin County has experienced substantial population growth since 2013, the communities within the study area, including Bozeman, Belgrade, and Three Forks, have expanded at an even faster pace, with growth rates approximately four times higher than the statewide average. The report indicates that if these trends continue, more than 60 percent of Gallatin County's population is projected to reside within these communities and surrounding study area by 2040.

2.1.3 Relocation and Residential Mobility

The ACS publishes detailed estimates on the US population's geographic mobility each year. Mobility measures key migration patterns including how many people moved to new homes in the past year, and from where. **Table 6** presents inbound residential mobility patterns for the City of Bozeman and Gallatin County as well as state and national percentages for 2024. Percentages represent each category as a share of the total population (over age one) in each geography. Outbound data is not available.

In 2024, approximately 28 percent of Bozeman residents aged one and older moved within the past year, compared to 18 percent in Gallatin County, 13 percent statewide, and 12 percent nationally. Across all geographies, most movers relocated within the same county. However, Bozeman has a higher share of residents moving from out of state compared to Gallatin County, the state, or the nation, reflecting its role as a regional growth center.

Table 6: Residential Mobility

Subject	City of Bozeman	Gallatin County	State of Montana	United States
Moved Within Same County	15.0%	9.7%	6.0%	5.9%
Moved From Different County within Same State	4.4%	3.3%	3.2%	3.0%
Moved From Different State	7.9%	4.8%	3.2%	2.1%
Moved From Abroad	1.0%	0.5%	0.3%	0.8%
Total Percent of Population that Moved	28.3%	18.3%	12.8%	11.8%
Total Population (Over Age 1)	57,176	125,636	1.1M	336.6M

Source: US Census Bureau. (2024). ACS 1-Year Estimate.

Overall, the study area has experienced continued population growth over the past five decades, outpacing statewide and national trends. According to MDT's *Social and Economic Conditions Report*,¹⁸ a major contributor to growth in the study area is in-migration. **Table 7** summarizes historic migration patterns in Gallatin County. Since 2013, about half of residents who relocated within Gallatin County have come from within Gallatin County while about one-third come from out of state. Over time, there has been a noticeable shift toward a greater proportion of residents arriving from out of state, increasing from 24 percent in 2013 to 38 percent in 2023, while the share of moves within the county and state has declined.

Table 7: Historic Migration Trends in Gallatin County

Timeframe	Total Residents Who Relocated	Moved within Gallatin County	Moved from different county in Montana	Moved from different state	Moved from abroad
2009-2013	16,629	52%	21%	24%	2%
2014-2018	15,539	51%	18%	29%	2%
2019-2023	17,714	44%	15%	38%	3%

Source: MDT. (2025). *Social and Economic Conditions: I-90 Three Forks to Bozeman Report*.
US Census Bureau. (2009-2013, 2014-2018, 2019-2023). ACS Five-Year Estimates.

2.1.4 Study Area Population Characteristics

NEPA/MEPA requires federal, state, and local agencies to evaluate the potential social and economic impacts of proposed actions. Guidelines recommend considering effects on neighborhoods and community cohesion local and/or regional economies, as well as potential growth and development resulting from transportation improvements. The demographic information provided in this section aims to help identify populations that may be impacted by the proposed improvements along the study corridor. **Table 8** summarizes recent demographic data for the region along with data for the State of Montana and the US for comparison. The data was obtained from the 2020 through 2024 ACS Five-Year Estimates,¹⁹ which provides detailed demographic, social, economic, and housing information by averaging five years of survey data to offer reliable insights for smaller geographic areas.

Gallatin County is predominantly White (88.8 percent), substantially higher than the national average (61.0 percent) and similar to Broadwater County (89.2 percent). Hispanic or Latino residents make up a relatively small portion of the population in both counties (about 5.0 percent) compared to the national rate (19.3 percent). Bozeman, Belgrade, Manhattan, and Three Forks reflect similar overall racial patterns to the counties, with relatively low racial and ethnic diversity compared to national averages.

Gallatin County's age distribution is centered on the working-age population, with 67.6 percent of residents ages 18 to 64, exceeding both state and national averages (around 60.0 percent). Residents age 65 and older comprise 13.6 percent of Gallatin County's population, notably lower than in Broadwater County (23.2 percent) and below statewide and national levels. At the community level, Manhattan and Three Forks have a higher proportion of residents under 18 and over 65 compared to Bozeman and Belgrade, indicating more varied age distributions across the study area.

Gallatin County has a fairly even gender distribution, with 52.3 percent male and 47.7 percent female residents, consistent with patterns observed across Bozeman, Belgrade, Manhattan, Three Forks, and broader state and national trends. Disability prevalence in Gallatin County (8.9 percent) is substantially lower than both Montana (14.5 percent) and the national average (13.3 percent), while Broadwater County reports a higher rate at 15.3 percent.

Table 8: Race, Age, Sex, and Disability Data

Population Characteristics	City of Three Forks	Town of Manhattan	City of Belgrade	City of Bozeman	Broadwater County	Gallatin County	State of Montana	United States
Race								
White	94.9%	94.0%	85.6%	86.4%	89.2%	88.8%	85.0%	61.0%
African American	0.0%	0.0%	0.3%	0.8%	0.2%	0.4%	0.5%	12.2%
American Indian	0.0%	0.0%	0.8%	0.9%	1.2%	0.6%	5.6%	0.9%
Asian	1.6%	0.2%	0.5%	2.1%	0.2%	1.3%	0.8%	6.0%
Other Race/ Combination	3.5%	5.8%	12.7%	9.8%	9.2%	8.9%	8.2%	20.0%
Hispanic/Latino (any race)	2.3%	3.5%	6.9%	6.2%	2.8%	5.4%	4.6%	19.3%
Age								
Under 18	18.1%	28.9%	25.4%	13.2%	19.9%	18.8%	21.0%	22.0%
18-64	60.1%	55.4%	68.1%	75.3%	56.9%	67.6%	58.9%	60.8%
65 and over	21.8%	15.7%	6.5%	11.4%	23.2%	13.6%	20.1%	17.2%
Sex								
Male	47.6%	55.0%	51.9%	53.2%	49.7%	52.3%	50.7%	49.5%
Female	52.4%	45.0%	48.1%	46.8%	50.3%	47.7%	49.3%	50.5%
Disability Status^(a)								
% Persons with Disability	12.1%	8.2%	8.3%	9.4%	15.3%	8.9%	14.5%	13.3%
% Disabled (<18 years)	0.0%	0.0%	4.3%	3.2%	0.0%	3.3%	4.6%	4.9%
% Disabled (≥65 years)	22.1%	39.6%	24.1%	35.8%	45.6%	28.7%	32.4%	32.9%
Total Population	1,919	2,288	11,872	56,114	7,668	124,074	1.1M	334.9M

Source: US Census Bureau. (2020-2024). ACS Five-Year Estimates.

^(a)Disability status provided as a percentage of the noninstitutionalized population.

2.1.5 Housing Characteristics

From the five-year ACS period ending in 2019 through the period ending in 2024, total housing units in Gallatin County increased 14.1 percent, outpacing Montana (3.5 percent) and the US (4.4 percent) and similar to Broadwater County (13.9 percent). Growth was strongest in Manhattan (26.5 percent) and Belgrade (25.9 percent), followed by Bozeman (18.3 percent) and Three Forks (9.2 percent), as shown in **Table 9**.

Occupied units rose 14.5 percent in Gallatin County and 16.2 percent in Broadwater County, compared to 6.8 percent statewide and 6.6 percent nationally. Manhattan and Belgrade experienced the most substantial increases in occupied units, with Bozeman and Three Forks also exhibiting growth. Owner-occupancy rates increased in most cities, particularly Manhattan (22.8 percent), while Belgrade declined (-2.1 percent). The average number of bedrooms rose slightly in Gallatin County (0.8 percent) and increased even more across its cities, indicating modest growth in home size alongside overall housing expansion.

Table 9: Housing Occupancy and Tenure Characteristics

Subject	City of Three Forks	Town of Manhattan	City of Belgrade	City of Bozeman	Broadwater County	Gallatin County	State of Montana	United States
2020-2024 Total Housing Units	898	938	4,994	25,908	3,178	57,568	528,419	143,775,355
2020-2024 Occupied Housing Units	891	927	4,852	23,970	2,822	51,215	458,859	129,227,496
2020-2024 Owner Occupied	652	695	2,722	10,721	2,479	31,270	317,400	84,210,142
2020-2024 Renter Occupied	239	232	2,130	13,249	343	19,945	141,459	45,017,354
2020-2024 Vacant Housing Units	7	11	142	1,938	356	6,353	69,560	14,547,859
2020-2024 % Owner-Occupied	72.6%	74.1%	54.5%	41.4%	78.0%	54.3%	60.1%	58.6%
2020-2024 Average # of Bedrooms	2.90	2.71	2.93	2.63	2.88	2.84	2.78	2.72
2015-2019 Total Housing Units	815	689	3,699	21,093	2,736	49,478	510,180	137,428,986
2015-2019 Occupied Housing Units	728	649	3,492	19,505	2,364	43,777	427,871	120,756,048
2015-2019 Owner Occupied	490	394	2,059	8,414	1,951	26,781	291,471	77,274,381
2015-2019 Renter Occupied	238	255	1,433	11,091	413	16,996	136,400	43,481,667
2015-2019 Vacant Housing Units	87	40	207	1,588	372	5,701	82,309	16,672,938
2015-2019 % Owner-Occupied	67.1%	57.2%	55.7%	39.9%	71.3%	54.1%	57.1%	56.2%
2015-2019 Average # of Bedrooms	2.86	2.58	2.69	2.59	2.88	2.82	2.73	2.70
Change in Total Housing Units	9.2%	26.5%	25.9%	18.6%	13.9%	14.1%	3.5%	4.4%
Change in Occupied Housing Units	18.3%	30.0%	28.0%	18.6%	16.2%	14.5%	6.8%	6.6%
Change in Owner Occupancy Rate	17.2%	22.8%	-2.1%	3.6%	8.6%	0.4%	4.9%	4.0%
Change in Number of Bedrooms	1.5%	4.7%	8.3%	1.5%	0.1%	0.8%	1.6%	0.5%

Source: US Census Bureau. (2015-2019 and 2020-2024). ACS Five-Year Estimates.

2.1.6 Personal Travel and Commuting Characteristics

The ACS provides estimates of the total share of workers aged 16 years and older who commute or work at home, transportation modes used by commuters, and mean travel times to work for commuters. **Table 10** presents commuting characteristics for workers in Gallatin and Broadwater counties, the cities of Belgrade, Bozeman, and Three Forks, and the Town of Manhattan. Similar statistics for the State of Montana and the US are provided for comparison.

According to the 2020-2024 ACS data, most workers in Gallatin County and its communities commute by car. The dominant mode of transportation is driving alone, accounting for 68.6 percent of commuters in Gallatin County, which is slightly lower than Broadwater County (75.3 percent), but comparable to 71.1 percent statewide and 68.8 percent nationally. Among the communities in the study area, driving alone is most prevalent in Three Forks (82.2 percent), Manhattan and Belgrade (both 80.2 percent), and least prevalent in Bozeman (63.2 percent).

Working from home is also common in Gallatin County, comprising 15.5 percent of all workers. Similar trends are observed throughout the study area, with the lowest percentage of remote workers in Three Forks (9.0 percent) and highest percentage in Bozeman (16.1 percent). About 7.4 percent of commuters in Gallatin County carpool to work, compared to 12.7 percent in Broadwater County, 9.7 percent statewide, and 8.5 percent nationally. Walking to work is more common in Bozeman (8.5 percent) and Three Forks (6.8 percent) than in Gallatin County overall (5.3 percent) and exceeds both state (3.9 percent) and national (2.4 percent) trends. Public transportation use remains less than 1.0 percent across all Montana jurisdictions.

The average commute time in Gallatin County is 18.3 minutes, slightly below the state average (19.1 minutes) and well below the national average (26.4 minutes). Commute times range from a low of 15.5 minutes in Bozeman to a high of 29.3 minutes in Broadwater County.

Table 10: Mode of Transportation to Work

Subject	City of Three Forks	Town of Manhattan	City of Belgrade	City of Bozeman	Broadwater County	Gallatin County	State of Montana	United States
% Workers 16+ Years with Access to 1+ Vehicle	100.0%	100.0%	99.2%	97.8%	99.4%	98.6%	97.7%	95.6%
Number of Workers 16 Years and Older	1,076	1,235	6,889	33,706	3,720	70,276	540,910	159,114,094
% Who Commuted to Work	91.0%	88.9%	89.2%	83.9%	89.5%	84.5%	87.5%	84.9%
% Who Worked at Home	9.0%	11.1%	10.8%	16.1%	10.5%	15.5%	12.5%	15.1%
Drove alone (car, truck, van)	82.2%	80.2%	80.2%	63.2%	75.3%	68.6%	71.1%	68.8%
Carpooled	0.0%	3.9%	7.6%	7.2%	12.7%	7.4%	9.7%	8.5%
Public Transportation (excluding taxicabs)	0.0%	0.0%	0.2%	0.7%	0.0%	0.5%	0.6%	3.2%
Walked to Work	6.8%	4.8%	0.2%	8.5%	0.2%	5.3%	3.9%	2.4%
Bicycled to Work	0.0%	0.0%	0.0%	3.3%	0.8%	1.8%	1.0%	0.4%
Other means of commuting	2.0%	0.0%	1.0%	1.0%	0.5%	0.9%	1.2%	1.5%
Mean Travel Time to Work (minutes)	24.1	17.3	24.6	15.5	29.3	18.3	19.1	26.4

Source: US Census Bureau. (2020-2024). ACS Five-Year Estimates.

2.2 Economic Conditions and Income Characteristics

2.2.1 Employment Industries

Gallatin County and the communities along the I-90 study corridor represent some of the most dynamic regional economies in Montana. Gallatin County is the second most populous county in Montana and has experienced sustained population and employment growth over the past decade. The local economy is supported by a diverse mix of industries, including educational services, health care, and social assistance; professional, scientific, management, and administrative services; construction; retail trade; and arts, entertainment, recreation, and accommodation. Educational services, health care, and social assistance make up the largest percentage of employment in both Gallatin (22.2 percent) and Broadwater (19.7 percent) counties, followed by professional and technical services in Gallatin County (13.6 percent) and construction in Broadwater County (16.7 percent), sectors that also tend to be common statewide.

Retail trade and tourism-related industries are also contributors to the regional economy, reflecting Gallatin County's role as both a service center and a major visitor destination. The county benefits from a strong tourism and outdoor recreation sector supported by proximity to Yellowstone National Park, Big Sky Resort, Bridger Bowl, and the Custer Gallatin National Forest. Between 2023 and 2024, nonresident visitors spent an estimated \$887.3 million in Gallatin County, the highest annual average of any county in Montana, highlighting its strong draw for out-of-state travelers.²⁰ While Bozeman serves as a primary gateway for visitors, communities such as Belgrade, Manhattan, and Three Forks also benefit from access to public lands, state parks, and river-based recreation. These sectors contribute to a balanced and resilient local economy. **Table 11** presents the 2020 through 2024 employment estimates by industry for the region, state, and country.

Table 11: Employment by Industry

Industry	City of Three Forks	Town of Manhattan	City of Belgrade	City of Bozeman	Broadwater County	Gallatin County	State of Montana	United States
Agriculture, forestry, fishing, hunting, and mining	3.4%	9.3%	2.5%	2.3%	4.2%	3.3%	6.1%	1.6%
Construction	21.4%	16.4%	19.5%	7.6%	16.7%	11.4%	9.2%	6.9%
Manufacturing	6.4%	11.7%	7.1%	5.6%	7.3%	6.1%	4.7%	9.9%
Wholesale trade	2.9%	2.0%	1.9%	2.1%	2.1%	2.4%	2.0%	2.2%
Retail trade	16.9%	7.1%	13.8%	12.3%	7.1%	12.0%	11.7%	10.8%
Transportation, warehousing, and utilities	0.0%	3.7%	3.2%	2.3%	7.3%	2.7%	5.0%	5.9%
Information	1.9%	3.6%	0.9%	1.4%	0.6%	1.3%	1.5%	1.9%
Finance, insurance, real estate, rental and leasing	2.6%	10.6%	4.8%	5.8%	6.6%	5.4%	5.4%	6.7%
Professional, scientific, management, and administrative	0.5%	11.9%	13.1%	14.7%	5.3%	13.6%	9.8%	12.6%
Educational services, health care and social assistance	16.0%	13.8%	17.1%	25.5%	19.7%	22.2%	23.2%	23.5%
Arts, entertainment, recreation, and accommodation	6.3%	2.3%	8.6%	13.5%	10.6%	11.6%	10.5%	8.7%
Other services, except public administration	9.0%	5.2%	5.1%	4.9%	4.6%	5.2%	5.0%	4.7%
Public administration	12.6%	2.4%	2.5%	2.2%	7.8%	2.7%	5.8%	4.7%

Source: US Census Bureau. (2020-2024). ACS Five-Year Estimates.

2.2.2 Employment Status and Income Measures

Table 12 presents data on employment status and income levels for Gallatin and Broadwater counties, Three Forks, Manhattan, Belgrade, and Bozeman, as well as state and national data using 2020 through 2024 ACS estimates. Gallatin County reported a median household income of \$93,528, which is higher than both the state median of \$72,509 and the national median of \$80,734. The mean household income in Gallatin County was \$132,508, above both the state average of \$98,908 and the national average of \$113,530.

Consistent with population growth in the study area, the civilian labor force has expanded, resulting in high levels of employment, with approximately 97.7 percent of residents in Gallatin County and 96.5 percent in Broadwater County employed, slightly higher than state (96.4 percent) and national (94.8 percent) employment metrics. Unemployment rates reflect this trend, with Gallatin County experiencing lower unemployment compared to state and national levels.

Findings in the MDT *Social and Economic Conditions Report*¹⁸ indicate that Gallatin County has experienced the fastest earnings growth among Montana's five largest counties since 2014. Over this period, total earnings in Gallatin County more than doubled, surpassing growth rates in Yellowstone, Missoula, Flathead, and Lewis and Clark counties. This trend reflects sustained expansion in both population and private sector employment within the region.

The poverty rate in Gallatin County was 9.5 percent, below the state rate of 11.5 percent and well below the national rate of 12.5 percent, while Broadwater County is more comparable to the national average at 12.7 percent. Despite Gallatin County's lower poverty rate, the City of Bozeman has the highest poverty rate at 13.7 percent. Federal mapping tools, including the *SS4A Underserved Communities Tool*²¹ and the *BUILD Project Location Verification Tool*,²² identify several census tracts near Bozeman (tracts 11.02, 10.01, 11.01, 9, and 8) as Areas of Persistent Poverty.

Table 12: Employment Status and Income Statistics

Industry	City of Three Forks	Town of Manhattan	City of Belgrade	City of Bozeman	Broadwater County	Gallatin County	State of Montana	United States
Civilian Labor Force (16 years and older)	1,099	1,235	7,215	35,925	3,960	73,611	568,568	170,199,520
Employed %	100.0%	100.0%	97.0%	97.0%	96.5%	97.7%	96.4%	94.8%
Unemployed %	0.0%	0.0%	3.0%	3.0%	3.5%	2.3%	3.6%	5.2%
Median Household Income	\$79,784	\$87,865	\$97,328	\$85,747	\$70,374	\$93,528	\$72,509	\$80,734
Mean Household Income	\$84,021	\$108,798	\$134,396	\$123,277	\$92,049	\$132,508	\$98,908	\$113,530
Per Capita Income	\$39,088	\$42,029	\$54,900	\$52,507	\$39,058	\$54,482	\$41,711	\$44,673
Poverty Rate (all people)	6.2%	2.9%	11.2%	13.7%	12.7%	9.5%	11.5%	12.5%

Source: US Census Bureau. (2020-2024). ACS Five-Year Estimates.

Note: Civilian labor force is defined as workers 16 years and over not in the Armed Forces. Employment percentages calculated based on total civilian labor force.

3.0 PHYSICAL FEATURES AND CHARACTERISTICS

I-90 is a primary east-west transportation corridor in southwestern Montana and a critical component of local, state, and national transportation networks. Extending from Seattle, Washington, to Boston, Massachusetts, I-90 provides regional connectivity across Montana and serves as a major route for both passenger and freight travel. Within the study area, the corridor extends from the West Three Forks Interchange in Broadwater County through Gallatin County to the Bear Canyon Road Interchange east of Bozeman, connecting the communities of Three Forks, Logan, Manhattan, Belgrade, and Bozeman and supporting daily commuting, commercial activity, and regional travel.

The corridor traverses a variety of physical and environmental settings, including river valleys, agricultural lands, developed urban areas, and mountainous terrain near the Bozeman Pass. Within the study area, I-90 crosses the Jefferson, Madison, and Gallatin rivers, reflecting the corridor's role in connecting multiple river valleys across southwestern Montana. The corridor also parallels the BNSF Railway in several locations, reflecting the historic and ongoing importance of east-west transportation in the region. Land uses along the corridor range from primarily rural and agricultural in the western portions of the study area to more urbanized and industrial development near Belgrade and Bozeman.

I-90 within the study area accommodates substantial freight and commercial vehicle traffic and serves as a key link in regional and Interstate goods movement. This role is supported by multiple interchanges, frontage roads, rest areas, and connections to major arterial roadways that facilitate access to surrounding communities, employment centers, and services. In addition to freight and commuter travel, the corridor is heavily used by residents and visitors to access recreational destinations and supports tourist travel associated with Yellowstone National Park, Big Sky, and regional outdoor recreation areas. While I-90 is designed primarily for high-speed vehicular travel, pedestrian and bicycle activity is generally limited to areas near interchanges and parallel facilities, with non-motorized travel accommodated on adjacent local roadways and shared-use paths rather than within the Interstate corridor itself.

3.1 Land Ownership and Right-of-Way

The majority of land adjacent to the study corridor is owned by private landowners, accounting for approximately 83.2 percent of the total corridor frontage length. This is followed by Montana State Trust lands (7.8 percent), the Montana University System (3.8 percent), MDT (2.7 percent), and local county governments (1.3 percent). The remaining land is owned by Montana Fish, Wildlife, and Parks (MFWP), local government entities, and city government, each of which accounts for less than one percent of total corridor frontage. Coordination with public land management agencies and local jurisdictions is important in areas where the corridor borders publicly owned lands. A map of the publicly owned land surrounding the study corridor is shown in **Figure 3**. Additionally, several conservation easements are located near the corridor. Montana Land Reliance holds a conservation easement along the south side of the study corridor between RP 291.0 and RP 292.0. The Gallatin Valley Land Trust also holds a conservation easement between RP 312.0 and RP 313.0, located north of the railroad adjacent to the corridor. While other conservation easements exist within the broader study area, these are the only two in close proximity to the I-90 corridor.

Right-of-way (ROW) widths vary throughout the I-90 corridor and were determined based on a review of available as-built plans. In general, ROW is wider in the western portion of the corridor and becomes more constrained moving east, particularly on the north side where the BNSF Railway runs adjacent to the roadway for much of the corridor. Typical ROW widths range from approximately 100 to 180 feet, with wider sections reaching up to approximately 220 to 230 feet and narrower segments as low as 90 feet. The north side is generally more consistent but constrained due to the railroad, while the south side exhibits greater variance and often provides greater available width. At interchange ramp locations, ROW expands to accommodate ramp geometry, typically extending between approximately 100 and 200 feet from the ramp alignment. Overall, the proximity of the railroad and variability in ROW widths may present constraints for future improvements in certain segments of the corridor.

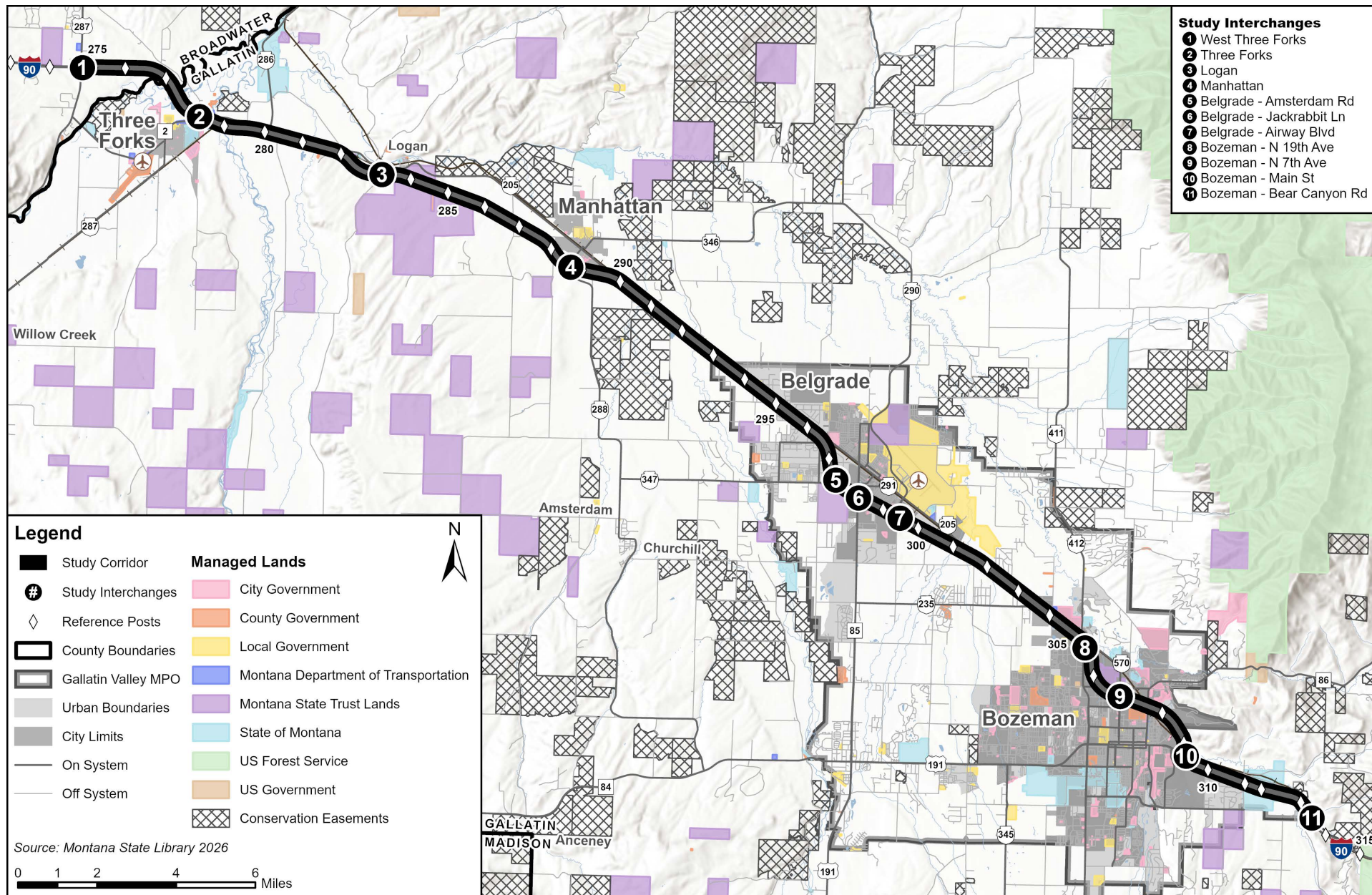


Figure 3: Managed Lands

3.2 Land Use

A variety of land uses surround the corridor, with patterns shifting as I-90 transitions between rural and urban areas, as illustrated in **Figure 4**. From RP 274.6 to RP 281.0, land use is predominantly agricultural and wetlands, as the corridor crosses the Madison and Jefferson Rivers just south of Missouri Headwaters State Park. Limited low- to medium-density development is present near the western end of the study area and between RP 278.0 and RP 279.0 as the corridor passes north of Three Forks.

Between RP 281.0 and RP 286.0, the surrounding land transitions to primarily shrubland with scattered agricultural uses. The corridor passes south of Logan near RP 283.0, where a small area of low- to medium-density development is present. From RP 286.0 to RP 288.0, land use returns to predominantly agricultural before transitioning to low- to medium-density development south of Manhattan between RP 288.0 and RP 290.0.

From RP 290.0 to RP 294.0, land use is largely agricultural, with wetlands present near the Gallatin River crossing. The corridor enters the GVMPO boundary near RP 293.2. Between RP 294.0 and RP 299.5, I-90 passes through Belgrade, where surrounding land use is primarily low- to medium-density development with pockets of higher-density commercial and industrial activity.

East of Belgrade, the corridor passes through approximately 1.5 miles of mining and resource extraction land uses, followed by agricultural and transitional developed vegetation areas between Belgrade and Bozeman. The corridor enters the Bozeman urban boundary near RP 304.0. From approximately RP 305.0 to RP 311.0, land use is predominantly urban, characterized by low- to medium-density development with limited remaining agricultural parcels. The remainder of the study corridor (RP 311.0 to RP 313.7) transitions back to agricultural land, grassland, and low-density development as the corridor approaches the base of Bozeman Pass.

Although these land uses reflect current conditions, the study area is experiencing rapid growth and development, and land use patterns are expected to continue evolving over time. Gallatin County's Growth Policy, summarized in **Section 1.2.2**, includes a future land use map intended to guide anticipated development. In addition, the cities of Bozeman, Belgrade, Manhattan, and Three Forks have adopted growth policies, summarized in **Section 1.2**, that establish local development priorities and expansion areas. The general development trend throughout the corridor reflects continued residential expansion beyond existing city limits and urban boundaries. Bozeman and Belgrade are also planning for increased industrial and commercial development along the I-90 corridor. Understanding both existing and planned land use patterns is important for anticipating future transportation demand and identifying potential operational and access considerations along the corridor.

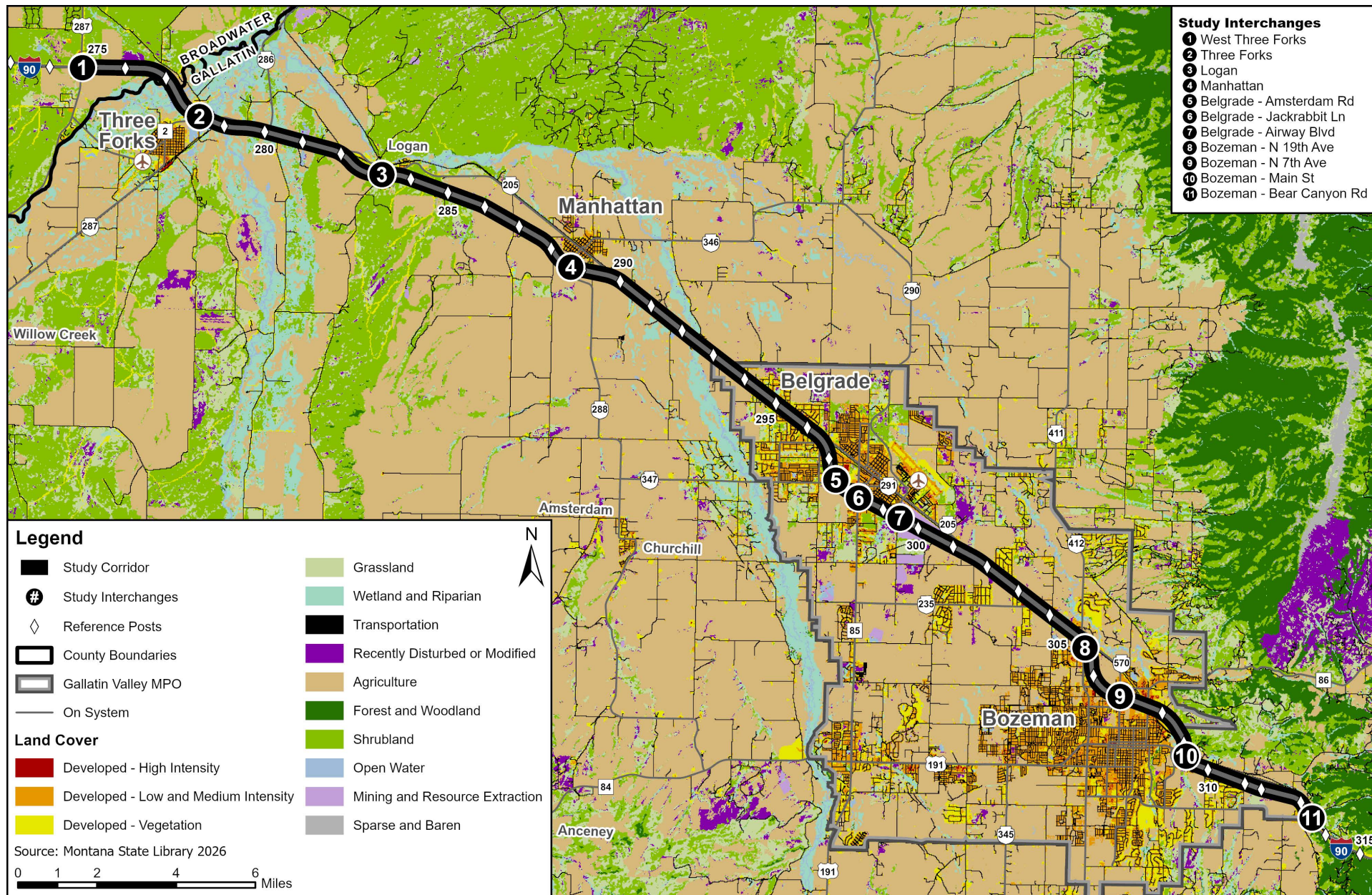


Figure 4: Land Use

3.3 Roadway Surfacing

Based on roadway surfacing information provided by MDT, the majority of the study corridor has a width of 37 to 39 feet in each direction, with the road paved along its entire length. The typical section for each direction of travel includes two 12-foot travel lanes, with four-foot inside shoulders and 10-foot outside shoulders according to aerial imagery.

Pavement condition indices are measured and tracked annually in the corridor. MDT's Pavement Management System (PvMS) is used to analyze the collected data to determine the relative performance of the pavement. Items of primary interest include the presence and degree of cracking and rutting. Performance measures and corresponding indices use a numerical value of 100 (assigned to a new pavement with no flaws) through 0 (representing highly degraded pavement).

- **Ride Index (IRI):** Determined by using an internationally applied roughness index in inches per mile.
- **Rut Index (RI):** Rut measurements are taken approximately every foot and averaged into 0.1-mile reported depths.
- **Alligator Crack Index (ACI):** Measured by combining all load associated cracking.
- **Miscellaneous Cracking Index (MCI):** Calculated by combining all non-load associate cracking.
- **Overall Performance Index (OPI):** Determined by combining and placing various weighting factors on the IRI, RI, ACI, and MCI figures. The OPI is calculated to provide a single index describing the current general health of a particular route or system.

In 2024, pavement conditions were assessed in 0.1-mile segments on both sides of the road. These values were averaged into five-mile segments, and the eastbound and westbound results were then combined, as summarized in **Table 13**. The maximum and minimum values for each segment are also provided to highlight the range of pavement performance throughout the study area. According to the *2024 Pavement Performance and Condition Report*,²³ the OPI ranges from 0 to 100, with values of 63 and above indicating good condition, values between 45 and 62 considered fair, and values below 45 indicating poor condition. The MDT *Transportation Asset Management Plan*²⁴ sets statewide performance targets for Interstate pavements, with a goal of maintaining at least 54 percent of Interstate pavement in good condition and no more than three percent in poor condition. MDT's State of Good Repair (SOGR) target for Interstate pavements is an IRI of 80 or greater. The 2024 OPI data indicates that, on average, the pavement was in good or fair condition, as shown in **Figure 5**. The figure displays the full pavement condition dataset, including OPI values recorded separately for each direction of travel in 0.1-mile segments throughout the corridor.

Since the pavement data was collected in 2024, multiple pavement rehabilitation and preservation projects have been completed or initiated within the corridor. As a result, pavement conditions in some areas may now be better than those reflected in **Table 13** and **Figure 5**. These projects include Three Forks E&W (RP 274.3 – 278.7), Belgrade-Bozeman (RP 301.1 to RP 307.3), and Bozeman-East (RP 307.3-313.2). Additional pavement preservation or maintenance activities may also have occurred outside of these limits.

Table 13: Pavement Condition Indices

Begin RP	End RP	ACI Average	ACI Minimum	ACI Maximum	MCI Average	MCI Minimum	MCI Maximum	IRI Average	IRI Minimum	IRI Maximum	RI Average	RI Minimum	RI Maximum	OPI Average	OPI Minimum	OPI Maximum
274.6	279.0	99.9 Good	94.2 Good	100.0 Good	92.5 Good	68.1 Fair	98.3 Good	79.8 Fair	54.7 Poor	86.8 Good	58.2 Fair	52.0 Fair	70.3 Good	62.5 Fair	44.7 Poor	71.0 Good
279.0	284.0	100.0 Good	99.0 Good	100.0 Good	89.8 Good	74.6 Fair	98.0 Good	83.4 Good	55.6 Poor	88.4 Good	58.4 Fair	52.5 Fair	67.3 Good	62.7 Fair	50.0 Fair	68.5 Good
284.0	289.0	99.9 Good	97.9 Good	100.0 Good	83.8 Good	66.8 Fair	93.4 Good	83.8 Good	75.1 Fair	87.6 Good	57.2 Fair	54.0 Fair	64.3 Good	59.6 Fair	52.3 Fair	65.6 Good
289.0	294.0	100.0 Good	97.5 Good	100.0 Good	91.9 Good	63.5 Fair	96.7 Good	N/A	N/A	N/A	N/A	N/A	N/A	91.9 Good	49.9 Fair	97.3 Good
294.0	299.0	100.0 Good	100.0 Good	100.0 Good	94.2 Good	87.4 Good	97.2 Good	N/A	N/A	N/A	N/A	N/A	N/A	95.6 Good	91.9 Good	97.8 Good
299.0	304.0	100.0 Good	96.2 Good	100.0 Good	85.8 Good	66.9 Fair	94.5 Good	86.0 Good	73.5 Fair	89.2 Good	47.4 Fair	42.2 Fair	51.7 Fair	73.0 Good	45.7 Fair	95.7 Good
304.0	309.0	98.7 Good	61.8 Fair	100.0 Good	88.2 Good	65.6 Fair	100.0 Good	84.3 Good	57.6 Poor	90.3 Good	62.0 Good	46.5 Fair	88.8 Good	64.9 Fair	43.8 Poor	86.3 Good
309.0	313.7	99.8 Good	92.9 Good	100.0 Good	93.5 Good	73.5 Fair	100.0 Good	82.5 Good	62.8 Fair	91.2 Good	65.1 Good	45.4 Fair	83.8 Good	70.9 Good	51.3 Fair	98.9 Good

Source: MDT. (2024). Pavement Performance GIS Map. https://gis.mtmdt.us/server/rest/services/MDTGIS/Pavement_Performance/MapServer/0.

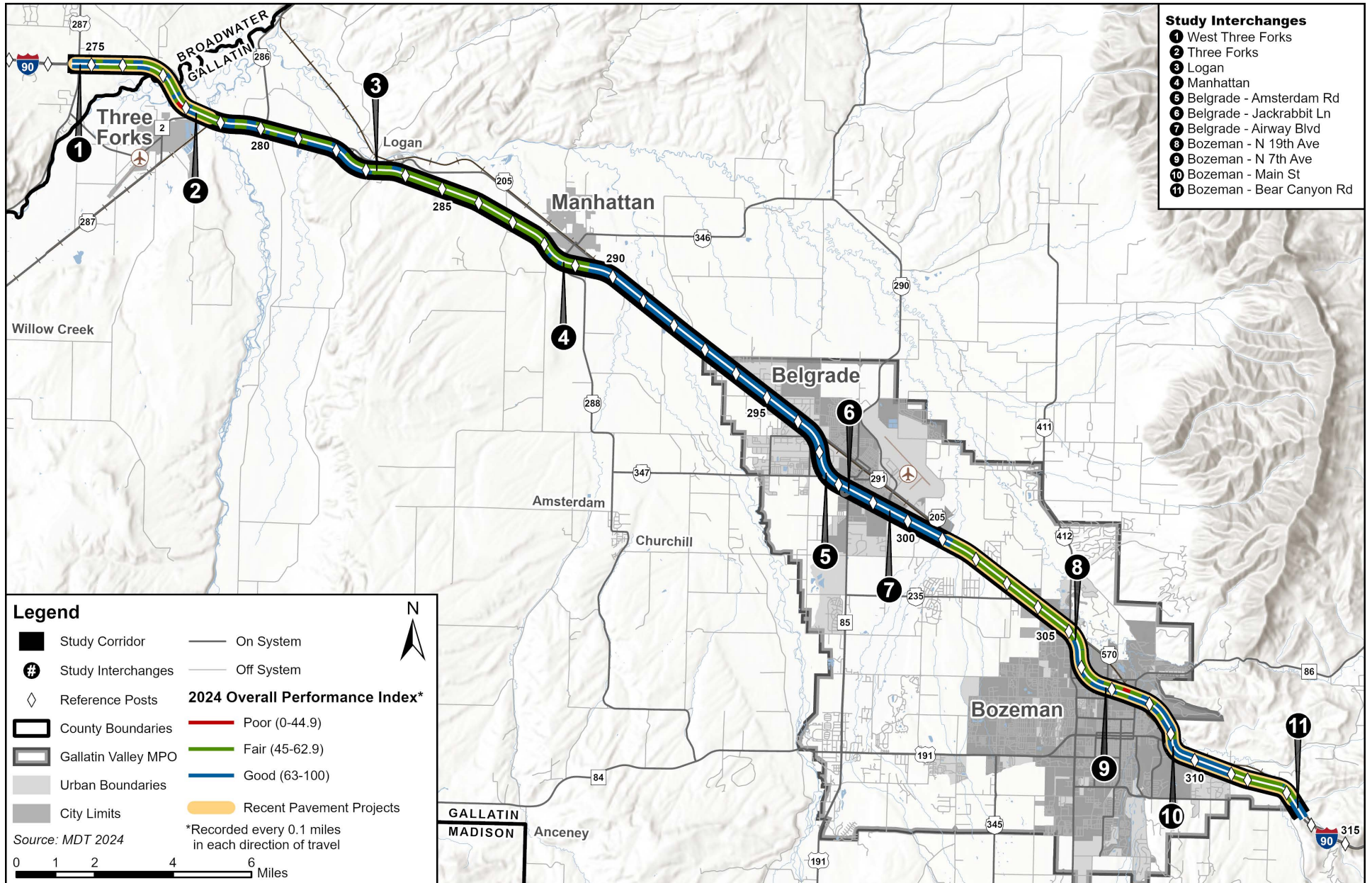


Figure 5: Pavement Condition

3.4 Access Points and Turnouts

According to *A Policy on Design Standards – Interstate System*,²⁵ access to the Interstate system, including ramps, shall be fully controlled. Access control for this corridor was established in 1970 when I-90 was originally constructed and is maintained by MDT through official access control documents.²⁶ Direct property access to the Interstate is not permitted, and access is limited to interchange ramps at selected public road crossings. Frontage roads, grade separations, and interchange spacing are used throughout the corridor to maintain traffic operations and safety.

3.5 Posted Speeds

In 2016, the Montana Transportation Commission approved special speed limit configurations for several segments of I-90. One of these segments, extending from west of Belgrade (RP 297.1) to Bear Canyon (RP 319.1), overlaps with the current study area and established a posted speed limit of 75 miles per hour (mph). In April 2024, the posted speed limit along I-90 was reduced from 75 mph to 65 mph between RP 303.6 and RP 313.7. This reduction was implemented in accordance with Montana statute, which requires a 65-mph speed limit on Interstate highways located within urbanized areas with populations exceeding 50,000.

Posted speed limits along the I-90 study corridor vary by location and jurisdiction, ranging from 65 mph within the GVMPO boundary to 80 mph west of Belgrade. Truck speed limits are posted at 70 mph where applicable. The existing posted speed limits within the study area are summarized below and shown in **Figure 6**.

- **Begin to RP 297.1:** 80-mph posted speed, 70 mph for trucks
- **RP 297.1 to RP 303.6:** 75-mph speed zone, 70 mph for trucks
- **RP 303.6 to RP 313.7 (Westbound [WB]) / RP 314.4 (Eastbound [EB]):** 65-mph speed zone, 65 mph for trucks
- **RP 313.7 (WB) / RP 314.4 (EB) to End:** 75-mph speed zone, 70 mph for trucks.

A review of historical Google Street View imagery indicated that the eastbound speed limit reduction originally began near RP 300.5 rather than at RP 303.6, as described by MDT. This discrepancy was corrected in May 2025 when speed limit signing was adjusted to match MDT's documented limits.

While speeds limits are typically statutory, based on guidance in Montana Code Annotated (MCA) 61-8-303,²⁷ speed limits can be modified to better fit the context of the roadway based on the results of a speed study. This involves data collection at specific locations to determine the 85th percentile speed, or the speed at or below which 85 percent of drivers travel under ideal conditions. This speed is typically used as a starting point for setting a rational speed limit and is considered the maximum safe speed for that area. A speed study was recently conducted, extending from RP 292.0 to RP 315.0, to evaluate the appropriateness of the recently implemented 65-mph speed limit within the Bozeman Urban Boundary as part of the newly designated GVMPO and to assess whether the current posted speed limits are reasonable given roadway conditions, operating speeds, traffic volumes, and safety performance. The speed study recommended that the 65-mph zone be increased to 70 mph, although this recommendation is still under review. The existing posted speed limits and MDT speed studies are shown in **Figure 6**.

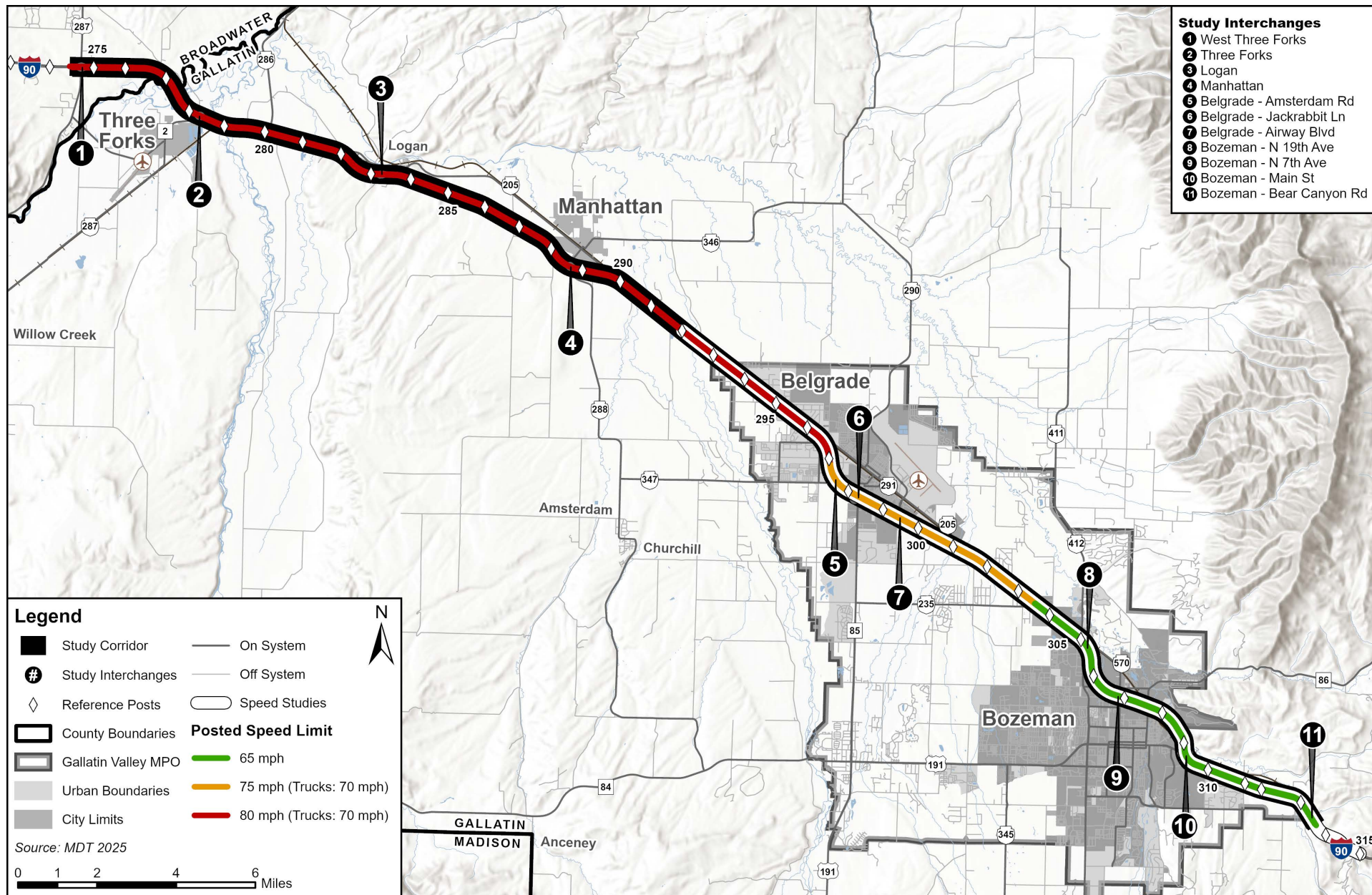


Figure 6: Posted Speed Limits

3.6 Maintenance and Operations

MDT is responsible for the maintenance of I-90 throughout the entire study corridor, including repairs and preventative maintenance of the roadway as well as maintenance of signs and structures within the Interstate ROW. The entire corridor is within MDT's Bozeman Maintenance Division and is part of the Bozeman and Three Forks Maintenance Sections. The Bozeman section house is located at the intersection of N Rouse Avenue and E Tamarack Street, and the Three Forks section house is located on the west side of the Three Forks Interchange. Each of these section houses includes one sand/salt stockpile, with two additional stockpiles located along the corridor near RP 300.0 and RP 288.5.²⁸

Winter Maintenance

Winter snowplowing and sanding are the responsibility of MDT maintenance personnel. Along the study corridor, I-90 is considered a Level I winter maintenance area according to the MDT *Maintenance Operations and Procedures Manual*.²⁹ The Level I category applies to MDT-maintained roadways with average daily traffic (ADT) of more than 5,000 vehicles per day (vpd). Level I routes are eligible to receive up to 24 hours-per-day of coverage during a winter storm event. Implementation of coverage is at the discretion of MDT's Bozeman Area Maintenance Chief. The primary objective is to keep at least one lane in each direction open to traffic and to provide intermittently bare pavement as soon as possible. Snow plowing, anti-icing, and deicing operations may continue after a storm event to restore intermittently bare pavement conditions in the primary travel lane. Remaining travel lanes and shoulders are cleared as quickly as available personnel and equipment allow.

Commercial Vehicle Operations

No scale sites are located along the study corridor. MDT's Motor Carrier Services (MCS) Division is responsible for enforcing all state and federal commercial motor carrier laws, rules, and regulations within the I-90 corridor. MCS also administers all policies and rules governing the issuance of oversize/overweight permits for travel on Montana highways. MCS plays a role in both reducing commercial vehicle involved crashes and protecting the condition of Interstate infrastructure.

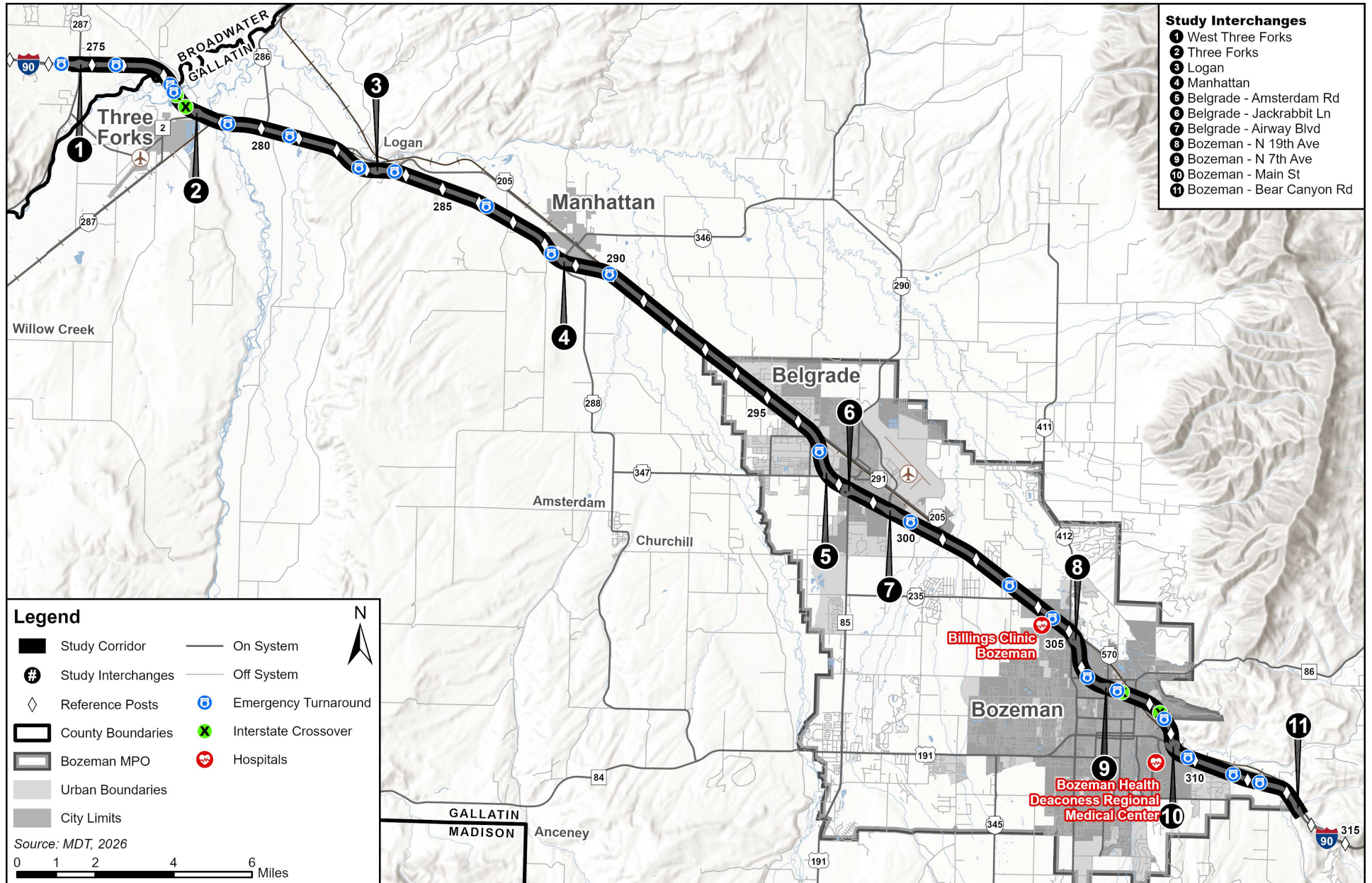
Emergency Services

Gallatin County Emergency Management Services is the umbrella organization for operations relating to emergency management, incident management, hazardous materials, fire service, and 9-1-1 calls. They work closely with Montana Disaster and Emergency Services as well as the local emergency medical services, rural volunteer fire districts, local fire departments, and the Community Emergency Response Teams in Bozeman, Belgrade, Manhattan, and Three Forks.

The study area is served by the Bozeman Fire Department, the Central Valley Rural Fire District, the Belgrade Fire Department, the Manhattan Rural Fire District, and the Three Forks Rural Fire District.³⁰ The Montana Highway Patrol (MHP) is responsible for patrolling I-90 through the study area, although local law enforcement may help with patrolling along the Interstate as needed.

Medical services for emergency situations are primarily served by Bozeman Health Deaconess Regional Medical Center, an American College of Surgeons Level 3 Trauma Center and a designated State Area Trauma Hospital. Bozeman Health Deaconess Regional Medical Center has an on-site helipad for air ambulance transport. Additional emergency air medical transport services are available in the region through MedFlight, which is operated through Billings Clinic Bozeman.

The I-90 corridor also includes emergency response infrastructure to support incident management as shown in **Figure 7**. Emergency turnarounds and Interstate crossovers are strategically located along the corridor to allow law enforcement, emergency medical services, fire departments, and maintenance personnel to quickly access incidents, reduce response times, and safely reverse direction or cross the median when needed.



Mutual Aid Agreements

The *Gallatin County Mutual Aid Agreement*³¹ allows the local governments, fire districts, or fire service areas in Gallatin County and/or agencies that border Gallatin County to request assistance and respond within each other's districts without prior approval from the elected body.

Under the *Intrastate Mutual Aid System* (MCA 10-3-901), member jurisdictions may request assistance from other member jurisdictions to prevent, mitigate, respond to or recover from an emergency or disaster, or in concert with drills or exercises. Any resource (personnel, assets and equipment) of a member jurisdiction may be made available to another member jurisdiction. All jurisdictions were automatically enrolled in the program when the agreement was codified in 2009 and must formally withdraw from the program if they do not wish to participate.

3.7 Geotechnical Conditions

Geologic information for the study corridor was provided by MDT³² and supplemented with information from the book *Roadside Geology of Montana*.³³ Throughout the study corridor, I-90 primarily traverses level terrain within the Gallatin Valley, with the Bridger Range located to the north and the Gallatin Range to the south. The corridor is underlain primarily by granular soil deposits consisting of sands and gravels with some silts and clays, which are typical of the Gallatin Valley and the drainages associated with the Gallatin, Madison, and Jefferson rivers. Mapped geologic units along the corridor include Tertiary Sixmile Creek and Renova Formations (Ts), Quaternary alluvial deposits (Qal), Quaternary sediments (Qs), and Quaternary gravel deposits (Qgr). Between approximately RP 281 and RP 285 near Logan, isolated areas of formation and bedrock are present, consisting primarily of siltstone, Madison Group limestone, and Jefferson Formation dolomite. Between Manhattan and Three Forks, the corridor crosses the southern extent of the Horseshoe Hills, which consist primarily of Proterozoic, Paleozoic, and Mesozoic sedimentary rocks. Near RP 310, the terrain adjacent to the corridor becomes more mountainous, although the I-90 traveled way generally remains level with some horizontal alignment changes. In this area, adjacent formations consist largely of sedimentary siltstone, sandstone, claystone, conglomerate, Mowry Shale, Cokedale siltstone and sandstone, and Eagle Formation sandstone. Additionally, I-90 crosses the Lombard Thrust Fault near RP 276.

Existing cut slopes within the corridor are limited and are concentrated primarily near Logan between approximately RP 282 and RP 285. These cuts are generally shallow, approximately 20 feet in height, with side slopes of approximately 2H:1V to 3H:1V, and have not exhibited notable signs of instability. Fill and embankment areas are more common throughout the corridor and are primarily associated with interchange structures, grade separations, and river crossings. Outside of these locations, roadway embankments are generally minor. Most major embankments have side slopes of approximately 2H:1V, which is typical for bridge approach embankments. MDT has not identified any rock slopes along this corridor for ongoing risk and monitoring under MDT's *Rockfall Asset Management Program*.³⁴

3.8 Structures and Hydraulic Conditions

MDT's Bridge Program emphasizes asset management and preservation. This emphasis promotes a "right treatment at the right time" philosophy in prioritizing and selecting projects on MDT's bridge system. MDT has defined bridge program objectives and performance measures to assist with this process. According to MDT's *Transportation Asset Management Plan*,²⁴ the agency has established performance targets for National Highway System (NHS) bridges that include maintaining at least 12 percent of NHS bridge deck area in good condition and limiting NHS bridge deck area in poor condition to no more than nine percent. The plan also establishes SOGR goals of maintaining at least 25 percent of NHS bridge deck area in good condition and no more than three percent in poor condition. The objectives and measures are intended to identify the right treatments for Montana's bridges, and promote cost-effective bridge preservation, appropriate safety-related work, and economic growth.

Bridge conditions are determined using the National Bridge Inventory General Condition Ratings (GCRs). The GCRs are used to describe the existing bridge as compared to its as-built condition. The material used, as well as the physical conditions of the deck, superstructure, substructure, and culvert are considered in the ratings. GCRs range from 0 (failed condition) to 9 (excellent condition) as described in the *FHWA Coding Guide*.³⁵ An overall structure rating is given based on the lowest substructure or superstructure rating for the structure. Structures are considered structurally deficient if the deck, superstructure, substructure, or culvert components are rated 4 or below on the scale. There are 56 major structures located along the study corridor with 50 deck-girder bridges, one concrete thru-arch, and five concrete or steel culverts. **Table 14** summarizes the structural ratings for bridges and large culverts within the study area, while detailed ratings for each structure are provided in **Appendix A**. **Figure 8** shows the locations of these structures, color coded according to their overall structural rating.

About half of the bridge decks have a rating of 7 which indicates they are in reasonably good shape and need no substantial repairs. The other half of the bridge decks have a rating of either 5 or 6 which indicates they could be potential candidates for minor repairs or overlays. There are 40 bridges with superstructures rated 7 or above, indicating repairs are not likely necessary. There are 10 bridges with superstructures rated 5 or 6, indicating repairs may be necessary depending on the type and location of the deterioration.

One bridge, the I-90 eastbound bridge over Bozeman Trail Rd (Bridge ID 01602) at the Bear Canyon Interchange, has a superstructure rating of 2. This bridge was struck by an over height load in January 2026 and was closed immediately. Two of the interior prestressed concrete beams in the middle span sustained major damages due to the impact including exposure of the beam rebar and prestressing strands. The Expedited I-90 Bear Canyon Bridge Repair project was awarded to replace the two damaged beams and repair the bridge deck back to functioning condition. This repair project is expected to improve the superstructure rating above the point of being considered structurally deficient. However, the deficient vertical clearance at this location continues to be a concern, especially since the bridge has already been struck once at its current height. Multiple additional bridges along the corridor also have deficient vertical clearances. The locations of these structures are identified in the inventory tables below.

There are 50 bridges with substructures rated 5 to 7. The I-90 westbound bridge over Abandoned Railroad (Bridge ID 01559) at RP 277.9 has a substructure rating of 4. This bridge has a history of deck-girder separation issues and abutment backwall deterioration with large quantities of delamination and spalling. The structure is programmed for replacement as part of MDT's I-90 Br Removal - Three Forks project.

The bridge data found in the MDT Structure Management System generally showed sufficient operating and inventory load ratings for the HS-20 or HL-93 load configurations. HL-93 is the current American Association of State Highway and Transportation Officials (AASHTO) design loading standard for Interstate bridges, while HS-20 represents an older design loading standard used for many existing structures. One exception is for I-90 eastbound/westbound over the railroad at RP 309.1. The eastbound structure (Bridge ID 01594) shows an operating rating factor of 0.8 and inventory rating factor of 0.6, and the westbound structure (Bridge ID 01595) shows an operating rating factor of 0.7 and inventory rating factor of 0.6. Rating factors below 1.0 indicate that the bridge does not fully meet the specified design loading and may necessitate load restrictions, strengthening, or further evaluation depending on the loading conditions.

In addition to the GCRs, MDT evaluates bridges for scour vulnerability. A scour-critical bridge is defined by MDT's Hydraulics Manual³⁶ as a bridge with a foundation element that has been determined to be unstable for the observed or evaluated scour condition. Although scour ratings were not available in the MDT Structure Management System for several structures, the MDT Scour Critical Bridge Map³⁷ identifies four bridges at two locations within the study corridor with an "Unstable (D)" scour status. These include the eastbound and westbound I-90 bridges over the Madison River (Bridge IDs 01560 and 01561) near Three Forks and the eastbound and westbound I-90 bridges over the West Gallatin River (Bridge IDs 01581 and 01582) near Manhattan. The West Gallatin River bridges are slated for replacement as part of the Gallatin River – 3M E Manhattan

project. The Madison River bridges will remain in service and are included in the Madison River-Bridge Scour project, which will install monitoring equipment to track scour conditions. Because the Madison River bridges are supported on shallow foundations, they are particularly susceptible to scour during major flood events, and continued monitoring is intended to safely extend their service life.

The channels at all the water crossing structures were rated 6 to 8 and may justify either minor improvements or no improvements at all. Four out of the five concrete or steel culverts are rated 5 to 7 and may justify only minor repairs. The rating of the steel culvert which conveys the Stockpass under I-90 (Bridge ID 01570) at RP 285.0 was recently changed from 7 to 5 due to fatigue cracking along the west wall of the culvert discovered in 2024. This culvert has not been inspected since then, and conditions may have worsened which could justify complete replacement to resolve this deficiency. Similarly, the culvert conveying Bear Creek under I-90 (Bridge ID 01601) at RP 312.3 is rated 4 due to fatigue cracking along the east wall of the culvert and currently requires an increased inspection frequency. This culvert will likely need to be completely replaced soon.

A double barrel culvert is located near RP 301.0 consisting of two 9'-4" span by 6'-3" rise structural plate pipe arches that are technically large enough for inspection based on the MDT *Bridge Inspection and Rating Manual*³⁸ criteria (8' span or greater). There is no bridge ID assigned or inspection data available for this culvert, and therefore it is not included in the table below.

Table 14: Bridge and Major Culvert Summary

Type of Structure	Total Structures	Overall Rating: New (9)	Overall Rating: Good (7-8)	Overall Rating: Fair (5-6)	Overall Rating: Poor (4 or less)
Deck-Girder Bridge	50	0	12	36	2
Concrete Thru-Arch	1	0	0	1	0
Culvert	5	0	1	3	1
Total	56	0	13	40	3

Source: MDT. Structure Management System. (Accessed March 2026).

While the MDT Structure Management System only documents major culverts that are 48 inches in diameter or larger, available as-built drawings were reviewed to identify smaller hydraulic structures within the corridor. Based on the as-built plans, approximately 300 minor drainage features are also present throughout the study area.

Among these, the structures conveying Bozeman Creek and the adjacent Mill Ditch under I-90 at approximate RP 307.7 have been identified as a specific concern. The City of Bozeman's *Bozeman Creek Flood Mitigation and Reclamation Preliminary Engineering Report*³⁹ found that these existing structures do not have sufficient capacity to pass a 100-year flood event, a limitation consistent with the broader corridor of hydraulic structures along Bozeman Creek. The report recommends further evaluation of potential improvements to the I-90 crossings as part of future design work.

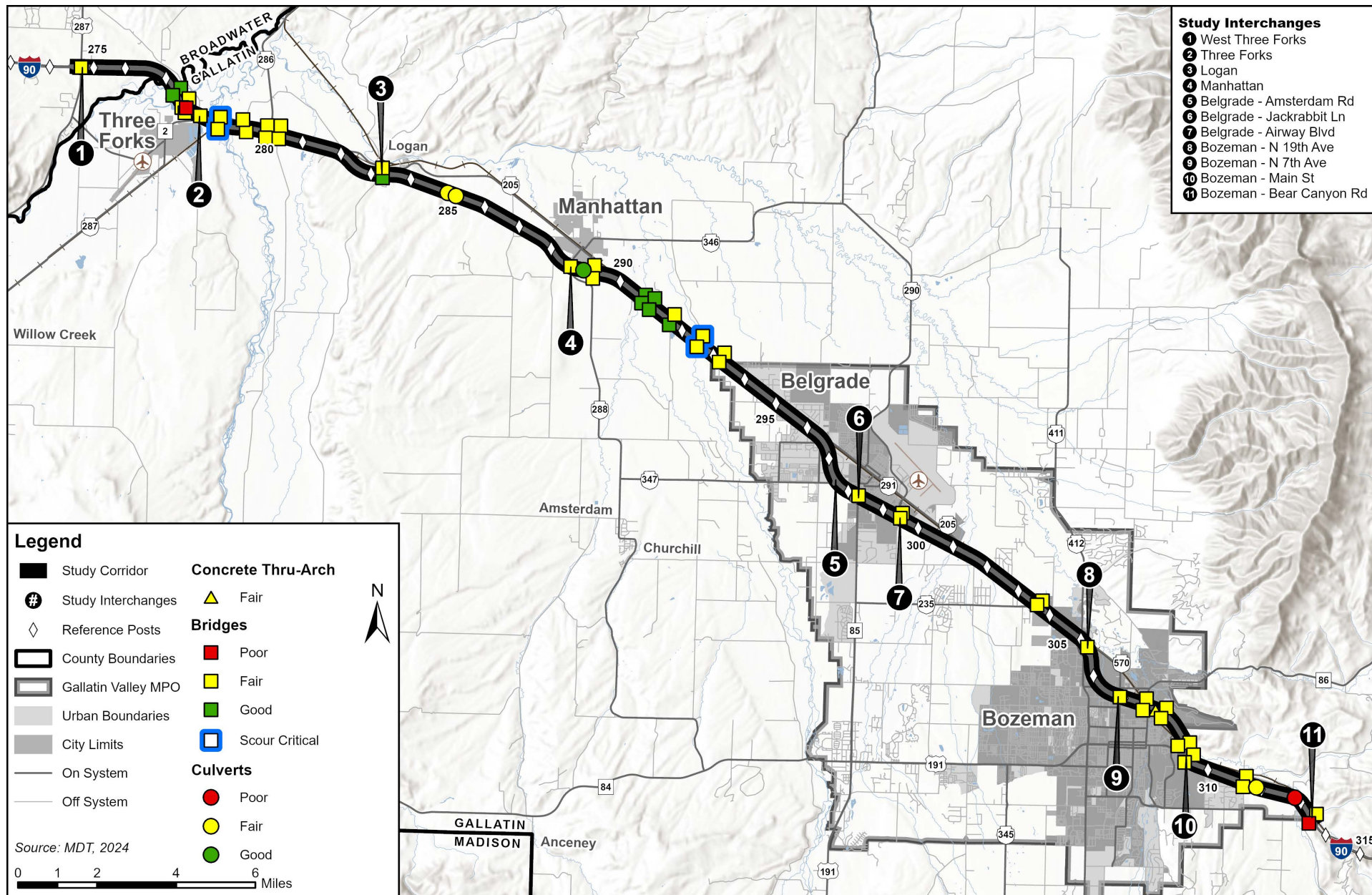


Figure 8: Bridges and Major Culverts

3.9 Utilities

Multiple utilities are present within the study corridor providing electrical, gas, communications, sewer, and water services. Electrical services are supplied by several providers including NorthWestern Energy, Vigilante Electric Cooperative, and Park Electric Cooperative. Electrical connections are primarily provided through overhead power lines paralleling the highway with occasional crossings over or under the roadway. Gas services in the corridor are provided by Northwestern Energy via underground gas lines. Communications services, including telephone, broadband, internet, and cable, are provided by AT&T, Blackfoot Communications, Century Link, Spectrum, and Montana Opticom. Most of these utilities are underground, though a few overhead telephone lines are also present within the study corridor. Underground water and sewer lines primarily serve nearby cities and towns (Bozeman, Belgrade, Manhattan, Logan, and Three Forks) but also serve local water and sewer districts such as Mount Ellis Meadows, Valley Grove, Riverside, River Rock, Countryside Estates, and 4 Dot Meadows.

Utility providers must obtain appropriate occupancy and/or encroachment permits prior to utility installation within MDT ROW. MDT's online Utilities Permitting Administration System facilitates the permitting process and maintains a repository of utility information including applicant name, utility location and size, utility service type, permit type, and approval date. If projects are advanced following this analysis, coordination with utility owners may be required to address potential impacts on utility infrastructure and associated mitigation.

3.10 Multimodal Transportation Facilities

Freight Facilities

I-90 is one of the primary east-west transportation corridors in the northern US and serves as a critical route for regional and Interstate freight movement. The corridor connects major population centers, industrial areas, and agricultural regions across the western and northern portions of the country, supporting the movement of goods between the Pacific Northwest, the Midwest, and beyond. Within Montana, I-90 functions as a major freight corridor for commercial trucking, providing access to local industries, distribution facilities, and regional communities. The corridor accommodates a substantial volume of commercial vehicle traffic, reflecting its importance to statewide commerce, agricultural transport, and national goods movement. Within the study area, MDT traffic counts from 2025 indicate that commercial vehicles account for approximately 7 to 20 percent of total traffic volumes along the corridor.

Rail Facilities

A railroad owned by BNSF Railway runs along the north side of I-90 throughout much of the study area. While the rail line generally does not interfere with travel along the I-90 mainline, it does affect operations at several interchange areas where local roadways cross the railroad at grade. Train movements can result in delays, vehicle queues, and congestion on the local roadway network, which in some cases may extend to nearby Interstate ramp terminals. These operational impacts have been a factor in the development of projects such as the proposed Jackrabbit Lane rail grade separation. The railroad also plays a key role in regional freight movement and transportation logistics.

The roadway and railroad ROW are adjacent to one another along portions of the north side of the corridor. The close proximity of the railroad is limiting, as acquiring easements from the railroad is often challenging, so improvements should attempt to minimize or avoid impacts to the railroad.

Pedestrian and Bike Facilities

No sidewalks, shared-use paths, or other dedicated pedestrian and bicycle facilities exist along the I-90 corridor within the study area. While pedestrian and bicycle activity on the Interstate itself is limited, bicycles are generally permitted on rural Interstate shoulders in Montana where no reasonable alternative route exists.

I-90 can influence non-motorized travel patterns by limiting the number of locations where pedestrians and bicyclists can cross the corridor. Crossing opportunities are generally restricted to roadway interchanges and local road crossings, which can result in indirect travel routes and potential conflicts with vehicular traffic. Recognizing these challenges, several ongoing and planned efforts seek to improve bicycle and pedestrian connectivity both between communities along the corridor and across I-90. These efforts include the *Manhattan Trail System Feasibility Study*,⁴⁰ which is evaluating opportunities to improve local and regional trail connections, and shared-use path improvements along the Bozeman–Belgrade Frontage Road corridor, which are intended to enhance non-motorized travel between two of the region's fastest-growing communities.

Traveler Facilities

Although located just west of the study corridor, the Headwaters Rest Area near the West Three Forks Interchange (Exit 274) serves travelers using I-90 through the corridor. The facility provides amenities for both passenger vehicles and commercial truck drivers, including truck parking, restrooms, drinking water, picnic areas, and pet exercise facilities. The rest area previously operated near the N 19th Avenue Interchange in Bozeman before being relocated to its current location.

4.0 GEOMETRIC CONDITIONS

The study corridor was generally constructed on its current alignment in the 1960s, with several improvement projects completed since that time. These projects include interchange reconstruction and reconfiguration, resurfacing, widening, the addition of auxiliary lanes, bridge rehabilitation, and other safety improvements. Additional interchanges have also been constructed since the original construction of the Interstate, including those at Amsterdam Road, Jackrabbit Lane, Airway Boulevard, and N 19th Avenue.

Existing roadway geometrics were evaluated and compared to current MDT standards including the *Baseline Criteria Practitioner's Guide*,⁴¹ the *Road Design Manual (RDM)*,⁴² and the *Traffic Engineering Manual*.⁴³ Additionally, the *AASHTO Green Book*⁴⁴ and *A Policy on Design Standards – Interstate System*²⁵ were used as supplemental materials. The analysis was conducted using MDT as-built drawings, GIS data, and aerial imagery. Original as-built plans were used to establish preliminary horizontal and vertical alignments for the corridor, while more recent as-built drawings for interchange additions and spot improvement projects were incorporated to account for changes in roadway geometry over time.

4.1 Mainline Interstate

The mainline Interstate is a controlled-access, four-lane divided highway designed to accommodate high travel speeds and efficient long-distance movement of traffic. The primary function of I-90 is to facilitate regional and Interstate travel while maintaining mobility and reliability for both passenger and freight traffic. The following subsections summarize the evaluation of existing geometric conditions along I-90 within the study area, including comparisons to current MDT design criteria. For geometric evaluation purposes, the urban area is defined as beginning where the posted speed limit decreases from 80 mph to 75 mph in Belgrade (RP 297.1), continuing east through the end of the study corridor.

Design criteria evolve over time, and roadway segments that do not meet current criteria may have been constructed in accordance with standards in place at the time of original design or subsequent reconstruction. In addition, design exceptions may have been approved during project development to address site-specific constraints or context-sensitive considerations.

4.1.1 Design Criteria

The MDT *Baseline Criteria Practitioner's Guide*⁴¹ specifies quantitative design criteria to be used as uniform baseline design dimensions or values. Baseline criteria are intended to serve as a starting point for evaluating existing conditions and developing improvement strategies. For any projects advanced from this corridor study, the MDT project team and engineer of record will consider the context of the facility and scope of the project to determine appropriate final design criteria. The criteria used for the study corridor are based on the current MDT baseline design criteria for Interstate facilities, as presented in **Table 16**.

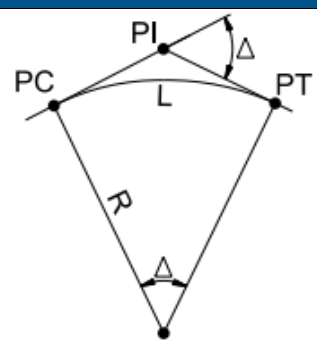
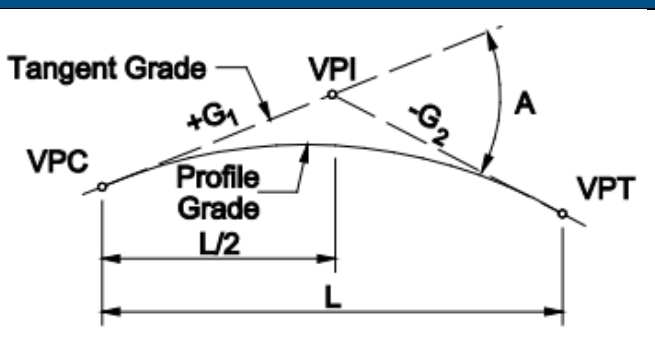
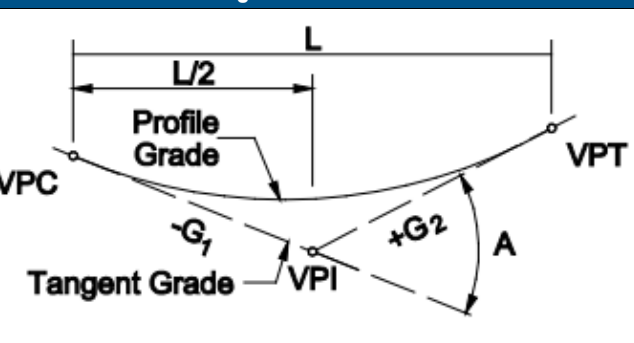
For this classification, the design speed ranges from 50 mph to 70 mph. Since the majority of posted speeds exceed the design speed along this corridor, posted speed limits were used for evaluation purposes. The *Baseline Criteria Practitioner's Guide*⁴¹ provides critical roadway design criteria depending on design speed and roadway classification. Design speed and terrain type will ultimately be confirmed during the project development process for any improvement options advanced from this analysis. Additionally, the MDT *RDM*⁴² provides guidance for roadway alignment elements, as summarized in **Table 17**.

Elements comprising horizontal alignment include curvature, superelevation (i.e., the bank on the road), and sight distance. These horizontal alignment elements influence traffic operation and safety and relate directly to the design speed of a corridor. MDT's baseline criteria for horizontal curves are defined in terms of curve radius, which varies based on design speed.

Vertical alignment is a measure of the elevation change of a roadway. The length and steepness of grades directly affect the operational characteristics of a roadway. The controlling design limits for vertical curves are Stopping Sight Distance (SSD), vertical curvature (K-value), and maximum grade. Vertical curves can be placed into two categories: crest and sag. A crest curve is created at the top of a hill or when the grade decreases. Conversely, a sag curve occurs at the bottom of a hill or when the grade increases.

Minimum lengths of crest or sag curves are commonly defined by the K-value, which represents the horizontal distance needed for a vertical curve to produce a one percent change in gradient. Minimum K-values relate lengths of vertical curves to the required sight distance on crest curves and to headlight beam distance on sag vertical curves. In this analysis, SSD was evaluated only for crest curves. Minimum K-values are provided in the *RDM*⁴² and vary based on design speed, and roadway grade. Additionally, a length of three times the design speed is recommended for vertical curves in rural areas. The geometric elements used to define roadway alignment are illustrated in **Table 15**.

Table 15: Alignment Diagrams

Horizontal Curve	Crest Vertical Curve	Sag Vertical Curve
		
PC: Point of curvature PI: Point of intersection PT: Point of tangency L: Length of curve R: Radius of curve Δ: Degree of curvature	VPC: Vertical point of curvature VPI: Vertical point of intersection VPT: Vertical point of tangency G ₁ and G ₂ : Grades of tangents (%) L: Length of Curve A: Algebraic difference of grades ($ G_1 - G_2 $)	VPC: Vertical point of curvature VPI: Vertical point of intersection VPT: Vertical point of tangency G ₁ and G ₂ : Grades of tangents (%) L: Length of Curve A: Algebraic difference of grades ($ G_1 - G_2 $)

Source: MDT. (2026). Road Design Manual. <https://www.mdt.mt.gov/other/webdata/external/cadd/RDM/50-RDM-COMPLETE.pdf>

Table 16: Baseline Criteria for Interstates

Design Element	Urban	Rural
Design Speed ^(a)	50-70 mph	70
Travel Lane Width ^(a)	12'	12'
Minimum Number of Lanes	2 in each direction	2 in each direction
Curbside Shoulder Width ^(a)	10'	10'
Inside Shoulder Width ^(a)	4'	4'
Cross Slope ^(a)	2%	2%
Ditch Inslope	6:1	6:1
Ditch Width	10'	10'
Ditch Slope	20:1	20:1
Backslope Cut Depth (0'-5')	Varies	5:1
Backslope Cut Depth (5'-10')	Varies	Level/Rolling 4:1, Mountainous 3:1
Backslope Cut Depth (10'-15')	Varies	Level/Rolling 3:1, Mountainous 2:1
Backslope Cut Depth (>15')	Varies	Level/Rolling 2:1, Mountainous 1.5:1
Fill height (0'-10')	Varies	6:1
Fill height (10'-20')	Varies	4:1
Fill height (20'-30')	Varies	3:1
Fill height (>30')	Varies	2:1
Median Width	10'	50' Minimum
Clear Zone	See RDM Section 9.2	See RDM Section 9.2
SSD ^(a)	See Table 17	See Table 17
Horizontal - Minimum Radius (e=8%) ^(a)	See Table 17	See Table 17
Horizontal - Spiral Curve Selection	See RDM Section 3.2	e≥7%
Horizontal - Superelevation Rate ^(a)	e _{max} =8%	e _{max} =8%
Vertical - Maximum Grade Level ^(a)	4%-5%	3%
Vertical - Maximum Grade Rolling ^(a)	5%-6%	4%
Vertical - Maximum Grade Mountainous ^(a)	6%-7%	6% for speeds < 65mph; 5% for speeds ≥ 65mph
Minimum Vertical Clearance ^(a)	17'	17'

Source: MDT. (2021). *Baseline Criteria Practitioner's Guide*. <ftp.mdt.mt.gov/other/webdata/external/cadd/RDM/STANDARDS/BASELINE-CRITERIA-PRACTITIONERS-GUIDE.pdf>

^(a)Controlling design criteria per FHWA. (2016). highways.dot.gov/federal-lands/pddm/dpg/about-controlling-criteria

Table 17: MDT Road Design Manual Alignment Criteria

Design Speed (mph)	SSD	Minimum Horizontal Radii (ft)	Crest Vertical Curve K-Value	Sag Vertical Curve K-Value
20	115	80	3	10
25	155	140	7	17
30	200	220	12	26
35	250	320	19	37
40	305	450	29	50
45	360	590	44	64
50	425	760	61	79
55	495	960	84	96
60	570	1,200	114	115
65	645	1,480	151	136
70	730	1,810	193	157
75	820	2,210	247	181
80	910	2,670	312	206

Source: MDT. (2026). *Road Design Manual*. mdt.mt.gov/other/webdata/external/cadd/RDM/50-RDM-COMPLETE.pdf

4.1.2 Roadway Width

Within the study area, I-90 typically consists of two 12-foot travel lanes, four-foot inside shoulders, and 10-foot outside shoulders in each direction, resulting in a typical roadway width of approximately 38 feet, with a few sections recorded as 37 feet based on MDT GIS data. The median separating the two directions of travel varies in width throughout the corridor and was measured at each RP using aerial imagery. From RP 274.6 to RP 278.0 and from RP 309.5 to RP 312.5, the median ranges from approximately 55 to 65 feet in width. Between RP 278.0 and RP 307.5, the median narrows to approximately 30 to 35 feet, and further narrows to approximately 20 to 25 feet from RP 307.5 to RP 309.5 and RP 312.5 to RP 313.7.

The MDT *Baseline Criteria Practitioner's Guide*⁴¹ recommends two travel lanes in each direction with widths of 12 feet on Interstate facilities, along with 10-foot outside shoulders and four-foot inside shoulders. The baseline criteria also specify a minimum 10-foot median in urban areas and a minimum 50-foot median in rural areas. While the width of the paved roadway meets the baseline criteria, the median width does not meet the recommended rural criteria in certain segments. Specifically, the median is narrower than recommended from approximately RP 278.0 to the western boundary of the GVMPO near RP 297.1.

4.1.3 Horizontal Alignment

Along the corridor, posted speeds range from 80 mph west of Bozeman, to 75 mph in the transition area approaching Bozeman, and 65 mph through Bozeman. Corresponding minimum horizontal alignment criteria include a radius of 1,670 feet and SSD of 1,200 feet for 80 mph, a radius of 2,210 feet and SSD of 1,125 feet for 75 mph, and a radius of 1,480 feet and SSD of 975 feet for 65 mph. Additionally, the *RDM*⁴² specifies that the minimum length of a horizontal curve in rural areas should be 15 times the design speed, while no minimum length is specified for urban curves. The baseline criteria also specify a maximum superelevation rate of eight percent, which all horizontal curves within the study corridor meet.

Appendix B provides a list of horizontal curves along the study corridor determined through a review of available as-builts. A determination of whether the curve meets baseline criteria was made based on the elements discussed previously. The controlling design criteria for the horizontal curves are radius and SSD. For a horizontal curve, SSD is evaluated based on the ability to see through the inside of the corner. Minimum sight obstruction distances were calculated based on MDT design criteria. The minimum sight obstruction distance is measured from the center of the inside travel lane and defines the area that should be clear of obstructions to allow for the recommended SSD.

Table 18 summarizes the horizontal curves and the design speed that each of the curves meets. There are 24 existing horizontal curves along the study corridor. Of these, 21 meet a design speed of 80 mph, two meet a design speed of 75 mph, and one meets a design speed of 70 mph. All curves with design speeds lower than 80 mph are located within the segment of the corridor with a posted speed of 65 mph.

Table 18: Horizontal Alignment Summary

Design Speed Met (mph)	Number of Curves	Percent of Curves
80	21	87.5%
75	2	8.3%
70	1	4.2%
TOTAL	24	100.0%

Source: MDT. (1962-1995). As-Builts.

Note: Data is based on available as-builts.

4.1.4 Vertical Alignment

Appendix B lists the locations and controlling design features for the vertical curves along the study corridor. According to the MDT *Baseline Criteria Practitioner's Guide*,⁴¹ the maximum allowable grade in a rural area is three percent for level terrain, four percent for rolling terrain, and five percent for mountainous terrain. In an urban area, the maximum allowable grade is five percent for level terrain, six percent for rolling terrain, and seven percent for mountainous terrain. Based on the observed grades, all vertical curves within the study area are classified as level terrain.

As shown in **Table 17**, the minimum design criteria for vertical curves on level terrain include an SSD of 910 feet with K-values of 384 (crest) and 231 (sag) at 80 mph; an SSD of 820 feet with K-values of 312 (crest) and 206 (sag) at 75 mph; and an SSD of 645 feet with K-values of 193 (crest) and 157 (sag) at 65 mph.

Vertical curvature varies throughout the corridor depending on direction of travel; therefore, each direction was analyzed separately. **Table 19** summarizes the vertical curves in each direction of the study corridor and the design speed met by each curve.

A total of 26 curves do not meet the posted speed criteria, with an equal distribution between eastbound and westbound directions. All of these curves are located within the segment of the corridor with a posted speed of 80 mph, and the design speeds met by these curves range from 65 to 75 mph. **Figure 9** shows the locations of the curves with design speeds lower than the posted speed.

Table 19: Vertical Alignment Summary

Design Speed Met (mph)	EB 65 mph zone	EB 75 mph zone	EB 80 mph zone	WB 65 mph zone	WB 75 mph zone	WB 80 mph zone	Total
80	22	7	37	20	7	36	129
75	0	0	3	2	0	2	7
70	2	0	9	2	0	9	22
65	1	0	1	1	0	2	5
Total	25	7	50	25	7	49	163
Curves Below Posted Speed	0	0	13	0	0	13	26

Source: MDT. (1962-1971). As-Built.

Note: Data is based on available as-builts.

4.1.5 Sight Distance and Clear Zone

Sight distance is the length of roadway visible to a driver and is influenced by the geometry of the road (horizontal or vertical curves) and obstacles alongside the road. Sight distance is commonly defined in three ways: passing sight distance, SSD, and intersection sight distance. In general, drivers should have an unobstructed line of sight and sufficient distance to perceive, react, and safely stop for or avoid potential hazards.

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a recovery area. The desired clear zone width for the study corridor ranges from approximately 20 to 50 feet, depending on traffic volumes, speeds, and roadside geometry. Clear zones are evaluated on a site-specific basis using the existing roadside cross section. It is generally desirable to attain adequate clear zones by removing or shielding obstacles if costs are reasonable.

In some locations along the study corridor, it may be impractical to remove or protect all obstacles within the clear zone due to physical or environmental constraints. As improvement options develop, roadside clear zones should be designated, to a practical extent, to meet current MDT baseline criteria. This may include slope flattening, clearing trees along the roadside, relocating signage, and/or widening shoulders.

4.2 Interchanges

The purpose of an interchange is to provide access to and from the Interstate while minimizing disruption to the mainline traffic stream. This is achieved through the use of grade-separated crossings connected by ramps. Within the study area, 11 interchanges are located along I-90, and this section describes their geometric characteristics.

4.2.1 Standards

The 11 interchanges within the study area were evaluated based on a variety of standards. The *RDM*⁴² provides general geometric standards for horizontal and vertical curvature for interchange ramps. Minimum radii and maximum superelevation for horizontal curves, as well as SSD and K-values for vertical curves, are consistent with the criteria used for the Interstate mainline, as shown previously in **Table 17**. Ramp length criteria for

vehicle acceleration and deceleration are based on the AASHTO *Green Book*⁴⁴ and are incorporated into the MDT *Traffic Engineering Manual*,⁴³ which also provides guidance for taper lengths, gap acceptance, and ramp spacing. Guidance for interchange crossroad spacing is based on AASHTO's *A Policy on Design Standards – Interstate System*.²⁵ **Table 20** provides the interchange ramp standards used to evaluate the interchanges as defined by MDT and AASHTO.

Ensuring adequate ramp lengths and appropriate geometric design is critical to providing safe vehicle interactions at Interstate entrance and exit points. In addition, the spacing between interchange ramps influences vehicle operations and can affect both traffic flow and safety. Closely spaced interchanges and intersections can require drivers to make multiple lane changes within a limited distance to reach their intended path. Therefore, ramps that are spaced too closely may increase vehicle conflicts due to frequent merging and diverging movements. If sufficient distance is not provided for these maneuvers, operational inefficiencies and safety concerns may result.

Table 20: Interchange Ramp Standards

Standard Type	Condition / Notes	Standard
Ramp Design Speed	—	See Table 21
Lane Width	Loop Ramp	26 ft
Lane Width	Diamond Ramp	25 ft
Maximum Ramp Grade	≤ 20 mph design speed	8%
Maximum Ramp Grade	21–30 mph design speed	7%
Maximum Ramp Grade	31–44 mph design speed	6%
Maximum Ramp Grade	≥ 45 mph design speed	5%
Exit Ramp Taper Rate	Taper Design	2-5 degrees
Exit Ramp Taper Length	Parallel Design	220 ft minimum
Entry Ramp Taper Rate	Taper Design	50:1-70:1
Entry Ramp Taper Length	Parallel Design	350 ft minimum
Acceleration Length (L _a)	—	See AASHTO Green Book Tables 10-4 and 10-5
Deceleration Length (L _d)	—	See AASHTO Green Book Tables 10-6 and 10-5
Gap Acceptance Length (L _g)	Taper Design	300 ft minimum
Gap Acceptance Length (L _g)	Parallel Design	350 ft minimum
Cross Road Spacing Between Ramps	Rural	3 miles
Cross Road Spacing Between Ramps	Urban	1 mile
Exit to Entrance Spacing	—	500 ft
Entrance to Exit Spacing	—	2,000 ft
Auxiliary Lane Drop Length ^(a)	Within an Interchange	500-1,000 ft

Sources:MDT. (2026). Road Design Manual. mdt.mt.gov/other/webdata/external/cadd/RDM/50-RDM-COMPLETE.pdf

MDT. (2007). Traffic Engineering Manual. mdt.mt.gov/publications/manuals.aspx

AASHTO. (2018). A Policy on Geometric Design of Highways and Streets.

AASHTO. (2016). A Policy on Design Standards—Interstate System.

^(a)An auxiliary lane should be provided where the distance between the end of the entrance terminal and the beginning of an exit terminal is less than 1,500 feet. An auxiliary lane may be dropped at an exit if properly signed and designed.

Ramp design speed is a key factor in evaluating interchange geometry because it influences driver comfort, operating speed, and safety. MDT's *Traffic Engineering Manual*⁴³ provides recommended ramp design speed ranges based on the design speed of the Interstate mainline and the type of ramp configuration. Directional ramps guide traffic directly into the desired movement using broad, sweeping curves and include the diagonal ramps commonly found at diamond interchanges. Semi-directional ramps provide an indirect turning movement that is less direct than a directional ramp but does not require the full 270-degree turn characteristic of a loop ramp. Loop ramps require vehicles to navigate a tight 270-degree turn and generally operate at lower speeds than directional or semi-directional ramps. **Table 21** summarizes the recommended ramp design speed ranges used in this evaluation.

Table 21: Ramp Design Speeds

Interstate Design Speed (mph)	Upper Range ^(a) (85%)	Middle Range ^(b) (70%)	Lower Range ^(c) (50%)
65	55	45	30
75	65	55	40
80	70	60	45

Sources: MDT. (2007). *Traffic Engineering Manual*. mdt.mt.gov/publications/manuals.aspx

^(a)Directional ramps should be in the upper range.

^(b)Semi directional and diagonal ramps should be in the middle range.

^(c)Urban loop ramps should be a minimum of 25 mph and rural 30 mph.

4.2.2 Ramp Alignment

Ramp alignment is governed by both horizontal and vertical geometric characteristics, including curve radius, superelevation, taper rate, taper length, gap acceptance length (L_g), acceleration and deceleration lengths (L_a/L_d), vertical grade, and K-value. The limiting values for these characteristics are functions of ramp design speed and are based on MDT and AASHTO guidance.

For this analysis, each ramp was evaluated based on a design speed derived from either the posted ramp speed or, if a speed limit was not posted, the applicable design speed range presented in **Table 21** was used. The design speed met for each ramp was determined based on the most restrictive geometric feature, including horizontal curvature, vertical curvature, or grade. Vertical curvature was evaluated using minimum K-values for all vertical curves and SSD for crest curves. For horizontal curves, ramps were evaluated based on curve radius and superelevation. All horizontal curves on ramps were found to meet applicable standards, so these values are not shown in **Table 22**.

Additional ramp characteristics, including width, taper rate, acceleration and deceleration length, and gap acceptance length, were evaluated on a meets or does not meet basis. Standard values for width, taper rate, and gap acceptance length were provided in **Table 20**. Acceleration and deceleration lengths were evaluated based on the Interstate mainline design speed (posted speed) and the controlling design feature on the ramp, specifically, the last controlling feature for entrance ramps and the first controlling feature for exit ramps. Controlling design features were defined as elements with a design speed of 50 mph or less. If no controlling feature was identified, the stop condition was used, and the full ramp length was considered for acceleration or deceleration. Design acceleration, deceleration, and gap acceptance lengths are calculated based on passenger car performance and were adjusted for ramp grades steeper than three percent in accordance with MDT and AASHTO guidance.

Table 22 summarizes the geometric characteristics and operational performance of each ramp within the study area, including achieved design speed, limiting features, and conformance with applicable standards. **Figure 9** shows the locations of Interstate ramps with elements that do not meet MDT and AASHTO standards.

Table 22: Interchange Alignment Attributes

Interchange	Ramp	Ramp Design Speed (mph)	Design Speed Met (mph)	Controlling Feature	Width (ft)	Taper Rate	L _a /L _d ^(a) (ft)	L _g ^(a) (ft)	Meets Standards	Comments
1-West Three Forks	WB On	60	45	K-value of first vertical curve.	25	1:50	1,310	160	NO	Does not meet standards based on L _g .
1-West Three Forks	WB Off	60	45	K-value and SSD of first vertical curve.	25	3°30'36"	1,310	-	YES	
1-West Three Forks	EB On	60	40	K-value of first vertical curve and maximum grade.	25	1:50	1,310	160	NO	Does not meet standards based on L _g .
1-West Three Forks	EB Off	60	50	K-value of both vertical curves and SSD of second vertical curve.	25	3°30'36"	1,250	-	YES	
2-Three Forks	WB On	60	40	K-value of both vertical curves and radius of first horizontal curve.	27	1:50	980	270	NO	Does not meet standards based on L _g .
2-Three Forks	WB Off	60	40	K-value of both vertical curves.	26	4°30'	1,170	-	YES	
2-Three Forks	EB On	60	40	K value of first vertical curve and maximum grade.	27	1:50	850	130	NO	Does not meet standards based on L _g .
2-Three Forks	EB Off	60	50	K value of both vertical curves and SSD of last vertical curve.	26	- (b)	1,100	-	YES	
3-Logan	WB On	60	40	K-value of both vertical curves.	25	- (b)	1,560	270	NO	Does not meet standards based on L _g and L _a .
3-Logan	WB Off	60	40	K-value of both vertical curves.	25	1°02'16"	1,410	-	YES	
3-Logan	EB On	60	30	Radius of first horizontal curve.	26	- (b)	260	220	NO	Does not meet standards based on L _g and L _a .
3-Logan	EB Off	60	30	K-value of vertical curve.	25	- (b)	920	-	YES	
4-Manhattan	WB On	60	40	K-value and SSD of first vertical curve.	25	- (b)	1,230	150	NO	Does not meet standards based on L _g .
4-Manhattan	WB Off	60	45	K-value of both vertical curves.	25	4°25'00"	1,200	-	YES	
4-Manhattan	EB On	60	40	K-value of both vertical curves.	25	- (b)	900	200	NO	Does not meet standards based on L _a and L _d .

Interchange	Ramp	Ramp Design Speed (mph)	Design Speed Met (mph)	Controlling Feature	Width (ft)	Taper Rate	L _a /L _d ^(a) (ft)	L _g ^(a) (ft)	Meets Standards	Comments
4-Manhattan	EB Off	60	40	K-value and SSD of last vertical curve.	25	- (b)	750	-	YES	
5-Amsterdam Rd	EB On	55	20	Radius of first horizontal curve.	26	- (b)	1,476	1,350	YES	
5-Amsterdam Rd	EB Off	30 ^(c)	40	K-value of last vertical curve.	33	- (b)	640	-	YES	
6-Jackrabbit Ln	WB On	55	55	K-value of last vertical curve.	26	- (b)	1,810	800	YES	
6-Jackrabbit Ln	WB Off	55	50	Radius of last horizontal curve.	27	4°34'26"	980	-	YES	
6-Jackrabbit Ln	EB On	25	35	Radius of first horizontal curve.	30	- (b)	3,100	730	YES	
6-Jackrabbit Ln	EB On	55	75	K-value of vertical curve and radius of horizontal curve.	26	- (b)	2,340	700	YES	
7-Airway Blvd	WB On	55	40	Radius of first horizontal curve.	26	- (b)	2,740	430	YES	
7-Airway Blvd	WB Off	55	20	Radius of last horizontal curve.	26	- (b)	1,380	-	YES	
7-Airway Blvd	EB On	55	45	Radius of first horizontal curve.	26	- (b)	2,290	1,180	YES	
7-Airway Blvd	EB Off	55	20	Radius of last horizontal curve.	26	- (b)	1,430	-	YES	
8-N 19th Ave	WB On	45	55	K-value of both vertical curves.	24	- (b)	1,620	270	NO	Does not meet standards based on L _q and width.
8-N 19th Ave	WB Off	45	40	Radius of last horizontal curve.	25	4°34'26"	1,180	-	YES	
8-N 19th Ave	EB On	45	50	Radius of horizontal curve.	25	- (b)	100	270	NO	Does not meet standards based on L _q and L _a .
8-N 19th Ave	EB Off	45	40	Radius of last horizontal curve.	25	4°34'26"	1,600	-	YES	
9-N 7th Ave	WB On	45	45	K-value of last vertical curve.	26	1:50	3,180	3,180	YES	
9-N 7th Ave	WB Off	45	40	K-value of last vertical curve.	25	4°30'47"	300	-	YES	

Interchange	Ramp	Ramp Design Speed (mph)	Design Speed Met (mph)	Controlling Feature	Width (ft)	Taper Rate	L _a /L _d ^(a) (ft)	L _g ^(a) (ft)	Meets Standards	Comments
9-N 7th Ave	EB On	45	40	K-value of last vertical curve.	26	1:50	320	250	NO	Does not meet standards based on L _g .
9-N 7th Ave	EB Off	45	30	Radius of last horizontal curve.	25	4°30'47"	1,280	-	YES	
10-Main St	WB On	45	30	Radius of first horizontal curve.	24	- (b)	140	130	NO	Does not meet standards based on L _a , L _a , and width.
10-Main St	WB Off	25	30	Radius of second horizontal curve.	25	- (b)	150	-	NO	Does not meet standards based on L _d and width.
10-Main St	WB Off (slip)	25	30	Radius of second horizontal curve.	25	- (b)	150	-	NO	Does not meet standards based on L _d .
10-Main St	EB On	55	65	K-value of vertical curve.	25	- (b)	2,080	270	NO	Does not meet standards based on L _g .
10-Main St	EB Off	25 ^(c)	25	K-value of last vertical curve.	25	- (b)	1,250	-	YES	
10-Main St	EB Off (slip)	25	25	K-value of last vertical curve.	25	- (b)	700	-	YES	
11-Bear Canyon	WB On	45	30	K-value of first vertical curve.	25	- (b)	920	120	NO	Does not meet standards based on L _g and L _a .
11-Bear Canyon	WB Off	45	25	K-value of last vertical curve.	25	- (b)	960	-	YES	
11-Bear Canyon	EB On	45	25	K-value of first vertical curve.	25	- (b)	900	180	NO	Does not meet standards based on L _g and L _a .
11-Bear Canyon	EB Off	45	35	K-value of both vertical curves.	25	- (b)	850	-	YES	

Source: MDT. (1962-2016). As-Built.

(a) Estimated based on aerial photography.

(b) Information unavailable.

(c) Posted speed.

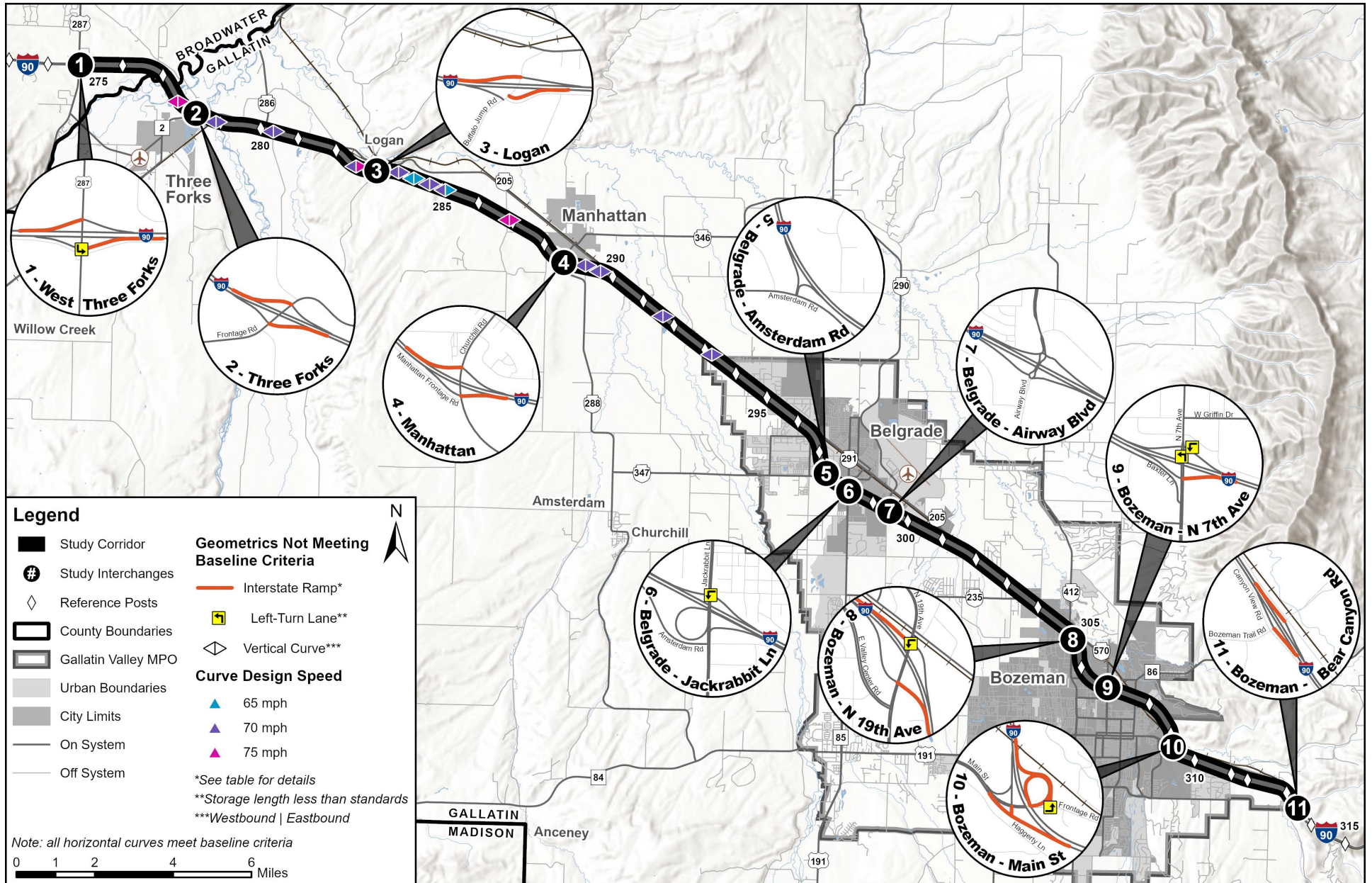


Figure 9: Existing Geometric Conditions

4.2.3 Interchange Spacing

Proper interchange spacing is necessary to accommodate vehicular maneuvers, provide adequate distance for signing, and maintain operational efficiency and capacity along the corridor. In urban areas, interchanges are typically spaced more closely than in rural areas due to increased development and access needs. Based on crossroad-to-crossroad distance, minimum interchange spacing should generally be greater than one mile in urban areas and three miles in rural areas. In addition, general ramp spacing guidance recommends a minimum of approximately 500 feet between an exit ramp and the subsequent entrance ramp, and 2,000 feet between an entrance ramp and the next exit ramp. Additional guidance recommends minimum spacing of approximately 300 feet between successive entrance ramps and 1,000 feet between successive exit ramps on full freeways. These values represent initial recommendations, and further evaluation using procedures outlined in the *Highway Capacity Manual (HCM)*⁴⁵ may be warranted.

Table 23 summarizes interchange spacing characteristics within the study area. All interchanges in the study corridor are spaced 1.0 mile or greater apart, with the exception of the Amsterdam Road and Jackrabbit Lane Interchanges, which are separated by approximately 0.7 miles. Although this spacing is less than the generally recommended one-mile urban interchange spacing, the two interchanges function together to provide access to the Belgrade area. Amsterdam Road serves a partial interchange, while Jackrabbit Lane provides additional access movements but does not include an eastbound off-ramp. As a result, the 300-foot successive entrance ramp spacing between the two interchanges is the controlling spacing condition. Additionally, all ramp spacing distances exceed minimum recommendations.

Where recommended spacing distances cannot be achieved, auxiliary lanes may be used to accommodate weaving and merging/diverging traffic movements. Auxiliary lanes are typically considered when the spacing between entrance and exit ramps is less than approximately 1,500 feet. One auxiliary lane is present along the corridor in the eastbound direction between the Jackrabbit Lane entrance ramp and the Airway Boulevard exit ramp. Although the spacing between these ramps exceeds 1,500 feet, they are the closest full interchange pair within the study area. The auxiliary lane facilitates a smoother transition by accommodating traffic entering from the eastbound entrance ramps at the Jackrabbit Lane Interchange and exiting at the Airway Boulevard Interchange.

All interchange spacing within the study corridor meets or exceeds recommended values. As a result, weaving activity related to closely spaced interchanges is not anticipated to be an operational concern. All distances were measured using aerial imagery and are considered approximate for planning-level analysis.

Table 23: Interchange Spacing Attributes

Interchange Pair	Crossroad Spacing (mi) 1 mi Urban 3 mi Rural	EB Exit to Entrance (ft) 500 ft min	EB Entrance to Exit (ft) 2,000 ft min	EB Entrance to Entrance (ft) 300 ft min	WB Exit to Entrance (ft) 500 ft min	WB Entrance to Exit (ft) 2,000 ft min	Meets Standards
West Three Forks – Three Forks	3.54	2,045	16,296	-	2,187	12,119	YES
Three Forks – Logan	4.93	1,972	23,970	-	2,732	23,463	YES
Logan – Manhattan	5.41	1,744	26,907	-	2,278	25,936	YES
Manhattan – Amsterdam Rd	9.60	1,458	45,218	-	2,187	48,374	YES
Amsterdam Rd – Jackrabbit Ln	0.72 ^(a)	-	-	5,072	-	-	YES
Jackrabbit Ln – Airway Blvd	1.21	3,599	2,325	-	2,397	2,165	YES
Airway Blvd – N 19th Ave	5.75	3,718	26,948	-	4,784	26,715	YES
N 19th Ave – N 7th Ave	1.65	2,302	5,769	-	3,358	5,854	YES
N 7th Ave – Main St	2.49	2,610	10,580	-	2,535	10,741	YES
Main St – Bear Canyon	3.63	1,708	17,084	-	1,830	18,376	YES

Source: Measurements derived from aerial imagery by RPA. (2026).

^(a) Amsterdam Road is a partial interchange; therefore, this spacing condition is not controlling.

4.2.4 Access

The placement of intersections at ramp termini can affect the operation of both the Interstate and the crossing roadway. If intersections are spaced too closely, queuing may occur and extend onto the Interstate mainline, creating potential safety and operational concerns. Queuing can also affect the operation of the crossroad by increasing delay and reducing intersection efficiency. Therefore, intersection spacing and layout should be carefully considered to provide adequate storage for turn lanes and to minimize the potential for queue spillback.

In addition to spacing, the geometric design of ramp terminal intersections should accommodate appropriate design vehicles. Intersections that do not adequately accommodate turning movements for large vehicles may result in operational inefficiencies and conflicts with other traffic. Interchange ramps and intersections should be designed to accommodate a WB-67 (53-foot tractor-semitrailer) design vehicle.

Table 24 summarizes the evaluation of left-turn storage at ramp terminal intersections within the study area. The table includes recommended storage lengths based on MDT standards and the 95th percentile queue lengths derived from peak hour traffic analysis. The 95th percentile queue represents the queue length that is not exceeded 95 percent of the time, meaning queues are longer only five percent of the time.

Table 24: Left-Turn Bay Lengths

Intersection	Turning Movement	Peak Hour Turning Volume (vph)	Recommended Length (ft)	95th Percentile Queue (ft)	Existing Length (ft) ^(a)	Meets Standards	Comments
Hwy 287 / West Three Forks EB Ramps	SB Left	367	306	38	165	NO	Does not meet recommended turn bay length. Existing queues do not exceed existing length.
Hwy 287 / West Three Forks WB Ramps	NB Left	20	17	3	145	YES	
Amsterdam Rd / Amsterdam Rd EB Ramps ^(b)	EB Left	427	556	370	575	YES	Turning volumes exceed 300 vph, consider dual turn lanes.
Jackrabbit Ln / Jackrabbit Ln WB Ramps ^(b)	NB Left	241	216	278	445	YES	
Jackrabbit Ln WB Exit Ramp / Jackrabbit Ln ^(b)	WB Left	409	300	1,635	395	NO	Vehicle queuing along interchange ramp. Turning volumes exceed 300 vph, consider dual turn lanes.
N 19th Ave/ N 19th Ave EB Ramps ^(b)	SB Left	78	94	30	265	YES	
N 19th Ave WB Exit Ramp / N 19th Ave ^(b)	WB Left	273	250	858	265	NO	Vehicle queuing along interchange ramp.
N 7th Ave EB Exit Ramp / N 7th Ave ^(b)	EB Left	176	165	53	400	YES	
N 7th Ave/ N 7th Ave EB Ramps ^(b)	SB Left	64	71	10	190	YES	
N 7th Ave/ N 7th Ave WB Ramps ^(b)	NB Left	390	273	80	220	NO	Does not meet recommended turn bay length. Existing dual left turn lanes, queues do not exceed existing length.
N 7th Ave WB Exit Ramp / N 7th Ave ^(b)	WB Left	181	272	88	145	NO	Does not meet recommended turn bay length. Existing queues do not exceed existing length.
Main St / Main St EB straight exit ramp	WB Left	3	50	-	60	YES	
Main St / Main St WB Entrance Ramp	EB Left	553	461	58	105	NO	Does not meet recommended turn bay length. Existing queues do not exceed existing length.

Source: RPA. (2026). Existing conditions traffic analysis.

^(a)Estimated based on aerial photography.

^(b)Signalized intersection.

Table 24 indicates that 10 intersections at ramp terminals have left turn bays, with some having turn bays for multiple left-turning movements, for a total of 13 turn bays analyzed. Of those 13 turn bays, seven do not meet standards. Five of the left-turn bays do not meet standards based on calculated turn bay lengths, however, the existing conditions traffic analysis indicates that queues typically do not exceed the existing turn bay length at all five intersections. The remaining two turning movements, the westbound left turn lanes on the westbound off ramps at both the Jackrabbit Lane Interchange in Belgrade and the N 19th Avenue Interchange in Bozeman, don't meet standards due to queues that exceed existing turn bay lengths, despite the turn bays meeting minimum length standards. According to MDT design criteria, dual turn lanes should be considered for turning movements at signalized intersections with more than 300 turning vehicles per hour. Three intersections meet this criterion, though there are already dual northbound left turn lanes at the N 7th Avenue and westbound ramps intersection, and existing queues do not exceed the existing turn bay length at the Amsterdam Road and eastbound ramps intersection.

5.0 TRAFFIC CONDITIONS

An evaluation of traffic operations for the study corridor was completed using available data provided by MDT in addition to supplemental field-collected data. Turning-movement counts were conducted at 32 intersections along the corridor, including interchange ramp terminals and adjacent high-volume intersections, over a 24-hour period in April 2026. Mainline traffic volume data for existing and historic conditions was available at multiple locations within the corridor. The following sections provide details about the existing and projected traffic characteristics for the study area. Detailed data is available in **Appendix C**.

5.1 Average Traffic Volumes

Traffic volumes along I-90 are typically collected annually as part of MDT's traffic data collection program. Eight sites are located within the study corridor and one of the sites, located at RP 284.7, is both a continuous count site and a weigh-in-motion site. Short-term counts are typically completed annually at the other seven count sites. Traffic volume data from these sites is used to determine annual average daily traffic (AADT) volumes within the corridor. **Figure 10** plots the AADTs for the count sites along the corridor over the past 20 years.

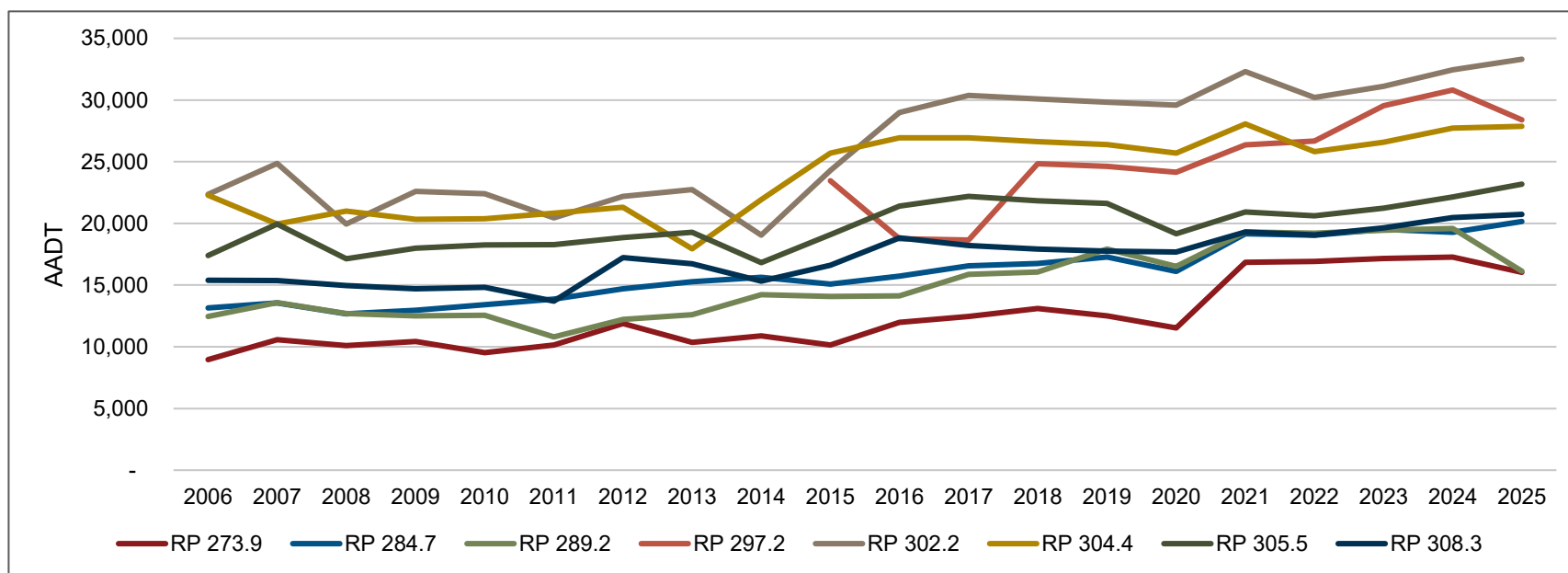


Figure 10: Historic Traffic Volumes

As shown in the figure, traffic volumes are generally highest at the count site west of the N 19th Avenue Interchange (RP 302.2) and lowest east of the Three Forks Interchange (RP 273.9). Existing volumes on I-90 range from a low of about 16,000 vpd to a high of 33,300 vpd. When averaged together, traffic volumes have increased at an annual rate of 2.28 percent per year since 2006. Detailed data on growth rates is shown in **Table 25**.

Table 25: Historic Traffic Growth

Site ID	Location	RP	2006 AADT	2025 AADT	20-Year Annual Growth (2006 – 2025)	10-Year Annual Growth (2016 – 2025)	5-Year Annual Growth (2021 – 2025)
04-2-008	E of W Three Forks Interchange	273.9	8,960	16,033	3.30%	4.20%	-0.63%
W-104	NW of Manhattan Interchange	284.7	13,140	20,156	2.49%	2.50%	0.91%
16-1-002	Btwn Manhattan & Belgrade Interchanges	289.2	12,450	16,122	2.74%	2.20%	-2.68%
16-3-084	Btwn Belgrade and E Belgrade Interchanges	297.2	--	28,404	--	4.71%	2.38%
16-3A-039	W of N 19th Ave Interchange	302.2	22,360	33,305	2.66%	1.10%	1.06%
16-3A-001	Btwn N 19th & N 7th Interchanges	304.4	22,280	27,879	1.98%	0.29%	0.47%
16-3A-002	W of RR bridge & E of N 7th Interchange	305.5	17,400	23,181	1.26%	0.28%	2.23%
16-3A-003	E of Main St/E Bozeman Interchange	308.3	15,400	20,732	1.85%	1.35%	1.73%
Weighted Average I-90 Traffic Growth					2.28%	1.97%	0.91%

Source: MDT. (2025). Traffic Count Database System. mdt.public.ms2soft.com/tcds/tsearch.asp?loc=Mdt&mod=. Calculations by RPA.

At all traffic count sites, traffic volumes stagnated between 2006 and 2014, with growth ramping up in the following years. Since 2014, traffic volumes have steadily increased, with the most noticeable increases in the Bozeman and Belgrade areas. Traffic volumes dipped slightly in 2020 during the COVID-19 pandemic but have since returned to pre-pandemic volumes or greater. Growth in the past five years has increased, albeit at a slower pace than earlier years. When all count sites are averaged, the 20-year CAGR is calculated at 2.28 percent. Shorter timeframe growth rates are lower, with the 10-year CAGR being 1.97 percent and the five-year CAGR being 0.91 percent. Traffic volumes near the Three Forks Interchange and between the Manhattan and Belgrade Interchanges experienced decreases and greater fluctuations within the last five years, likely bringing the weighted average CAGR down for the entire corridor.

5.2 Projected Traffic Volumes - Travel Demand Model

Due to the variation in historic traffic volumes throughout the corridor, as well as recognition of potential future growth in the Gallatin Valley, future traffic volumes for the study corridor were developed using a Travel Demand Model (TDM) developed by MDT for the GVMPO's long range transportation plan update. The model covers nearly the entire study corridor, with the exception of the West Three Forks Interchange area. The base year TDM is calibrated to 2022 traffic volumes while the future year (2050) model was developed using land use projections for the next 25+ years.

Growth rates were calculated by comparing the modeled 2022 and 2050 traffic volumes for each roadway segment. These growth rates were then applied to the study corridor to develop future traffic projections for both the interchange and mainline analyses. For interchange analyses, growth rates were assigned to individual ramp terminals and applied to each approach of the study intersections. For the mainline analysis, each direction of travel was segmented at entrance and exit ramps, resulting in separate growth rates for areas approaching an exit ramp, between adjacent ramps, and beyond an entrance ramp. This approach accounts for traffic entering and exiting the Interstate at each interchange and allows projected traffic volumes to reflect the growth patterns identified by the regional TDM.

All traffic growth rates within the modeled area were derived from the GVMPO 2050 TDM. Because the West Three Forks Interchange falls outside the model limits, growth rates for that location were developed using historical traffic growth observed on the adjacent I-90 mainline segment between the West Three Forks and Three Forks Interchanges, as well as historical traffic counts on the interchange ramps. These growth rates were then applied to develop projected future traffic volumes for the operational analyses presented in this report. Growth rates range from 0.98 percent to 3.00 percent.

5.2.1 Growth Rate Considerations

The City of Bozeman's recently prepared *2025-2045 Bozeman Population and Housing Forecast*⁴⁶ acknowledges the rapid population growth Bozeman has experienced over the past decade but projects that this growth will moderate going forward, citing constraints related to housing cost and land availability. Though the TDM-derived growth rates used in this report are more aligned with the rapid growth seen in recent years rather than the moderated growth projected in the forecast, they were retained for consistency with the GVMPO 2050 TDM, which is informing the region's ongoing long-range transportation planning efforts.

Like any forecasting tool, the GVMPO 2050 TDM assumes that current traffic characteristics and socioeconomic trends will remain similar over the model's planning horizon. Actual growth may occur faster or slower than modeled, and projected traffic volumes and associated capacity constraints may be realized sooner or later than the 2050 horizon year as a result. Regardless of the exact year in which these conditions are realized, this report is intended to identify long-term corridor needs and support planning for future improvements, rather than predict a precise date by which specific volumes will occur.

5.3 Commercial Vehicle Volumes

An evaluation of commercial vehicle traffic within the study corridor was conducted using data collected at MDT count stations along I-90. Commercial vehicle percentages generally range from 13 to 20 percent throughout the corridor, with the highest percentages observed northwest of the Manhattan Interchange (20 percent), east of the West Three Forks Interchange (18 percent), and east of the Main Street Interchange (19 percent). MDT Count Site 16-1-002 recorded a commercial vehicle percentage of seven percent, which is notably lower than adjacent count stations and historical observations. Historical counts at this location recorded commercial vehicle percentages of approximately 19 to 20 percent, indicating the 2025 count is an outlier.

Although the Bozeman area has lower commercial vehicle percentages (13 to 16 percent) than the western and eastern ends of the corridor, it carries the highest overall traffic volumes. As a result, the greatest number of commercial vehicles occurs near the East Belgrade and N 19th Avenue interchanges, where approximately 4,500 commercial vehicles travel through the corridor each day. Across the remainder of the study corridor, commercial vehicle volumes generally range from approximately 3,000 to 4,100 vehicles per day.

The substantial presence of commercial vehicles along I-90 highlights the corridor's importance as a regional freight route and emphasizes the need to consider truck operations in future planning, design, and capacity improvement efforts. **Table 26** summarizes the commercial vehicle percentages reported by MDT in 2025 for count locations throughout the study corridor.

Table 26: Commercial Truck Traffic

Site ID	Location	RP	2025 AADT	Commercial Vehicle Volume	Commercial Vehicle Percentage
04-2-008	E of W Three Forks Interchange	273.9	16,033	2,965	18%
W-104	NW of Manhattan Interchange	284.7	20,156	4,101	20%
16-1-002	Btwn Manhattan & Amsterdam Rd Interchanges	289.2	16,122	1,070	7%
16-3-084	Btwn Jackrabbit Ln and Airway Blvd Interchanges	297.2	28,404	4,545	16%
16-3A-039	W of N 19th Ave Interchange	302.2	33,305	4,481	13%
16-3A-001	Btwn N 19th Ave & N 7th Ave Interchanges	304.4	27,879	3,943	14%
16-3A-002	E of N 7th Ave Interchange	305.5	23,181	3,575	15%
16-3A-003	E of Main St Interchange	308.3	20,732	3,982	19%

Source: MDT. 2025. Traffic Count Database System. mdt.public.ms2soft.com/tcds/tsearch.asp?loc=Mdt&mod=

5.4 Mainline Operations

Corridor segment level of service (LOS) was determined utilizing the *Highway Capacity Software 2024* (HCS). HCS follows the *HCM 7th Edition*⁴⁵ methodology. The HCM methodology has been updated for the seventh edition of the HCM. This method takes into account speed limit, traffic volumes, commercial vehicle percentages, vertical grades, lane and shoulder widths, and interchange density. For freeway facilities, LOS is determined based on traffic density, which is a measure of the number of passenger cars occupying a mile of a single lane at a given point in time. LOS is reported on a scale from A to F, where LOS A represents free-flow conditions with minimal traffic interaction and LOS F represents highly congested conditions. Density is reported in passenger cars per mile per lane (pc/mi/ln), with lower density values indicating more free-flowing conditions and higher density values indicating increased congestion and reduced maneuverability.

For the corridor analysis, I-90 was divided into eastbound and westbound segments. Each direction was then further subdivided based on the locations of interchange ramps. The resulting subsegments included: (1) the area of influence (AOI) upstream of an exit ramp, typically extending 1,500 feet in advance of the gore; (2) the section between an exit ramp and the subsequent entrance ramp; (3) the AOI downstream of an entrance ramp, typically extending 1,500 feet beyond the gore; and (4) the segment between the AOI of one interchange and the AOI of the next interchange. This segmentation approach accounts for traffic entering and exiting the Interstate and allows traffic operations to be evaluated at a more detailed level throughout the corridor.

The mainline analysis was performed using the design hour volume (DHV) given by MDT as part of their annual count program.⁴⁷ The HCS utilizes a mainline volume input at the beginning of the analysis corridor and the ramp volumes along the corridor to determine the mainline volume for each segment. To determine the initial segment analysis volume, the 2025 DHV for the segment between the Logan and Manhattan Interchanges was used as a starting point. This location was selected as it is a permanent weigh-in-motion continuous count site and was therefore deemed to provide the most accurate DHV. The analysis volume for subsequent, eastbound and westbound, segments was determined by using the DHV of each ramp along the mainline. If no current DHV was given for a ramp, the most recent DHV and total volume were used to determine a percentage of traffic for which the DHV accounted. This percentage was then applied to the most recent given count to determine a ramp DHV. Using the ramp volumes, the mainline volume for each segment was determined by either adding or subtracting the ramp volumes. Detailed mainline analysis results are provided in **Appendix D**.

For this analysis, the following assumptions were made:

- All terrain was assumed to be level for both directions.
- All travel lanes were assumed to be 12.0 feet wide.
- The right side paved shoulders were assumed to be 10.0 feet wide.
- The speed limit was based on the posted speed or, where available, the 85th percentile speed reported in the I-90 - Bozeman Speed Study.⁴⁸
- The average peak hour factor from the turning movement counts (TMCs) was 0.92 and was used for all segments.

The results of the existing conditions analysis are presented in **Table 27** and **Figure 11**. For both urban and rural freeways, MDT targets a LOS of B or better. The LOS is currently A or B for all westbound segments and for most eastbound segments. The segment between the Airway Boulevard and N 7th Avenue Interchanges is the only exception, operating at LOS C.

Table 27: Existing (2026) Corridor LOS

EB #	WB #	Section Description	EB LOS	EB Density (pc/mi/ln)	WB LOS	WB Density (pc/mi/h)
1	36	West Three Forks EB On/WB Off AOI	A	8.8	A	12.3
2	35	Btwn West Three Forks and Three Forks	A	7.8	A	9.7
3	34	Three Forks EB Off/WB On AOI	A	9.8	B	11.1
4	33	Btwn Three Forks Ramps	A	7.3	A	9.0
5	32	Three Forks EB On/WB Off AOI	B	10.0	A	13.2
6	31	Btwn Three Forks and Logan	A	8.8	A	10.5
7	30	Logan EB Off/WB On AOI	B	10.9	A	10.4
8	29	Btwn Logan Ramps	A	8.5	A	10.1
9	28	Logan EB On/WB Off AOI	B	11.1	A	13.7
10	27	Btwn Logan and Manhattan	A	9.7	B	11.1
11	26	Manhattan EB Off/WB On AOI	B	12.0	B	12.4
12	25	Btwn Manhattan Ramps	A	8.0	A	9.6
13	24	Manhattan EB On/WB Off AOI	B	11.2	A	14.4
14	-	Btwn Manhattan and Amsterdam Rd	A	9.2	-	-
15	-	Amsterdam Rd EB Off AOI	B	12.4	-	-
16	-	Btwn Amsterdam Rd Ramps	A	6.9	-	-
17	-	Amsterdam Rd EB On AOI	A	7.0	-	-
18	23	Btwn Amsterdam Rd/Manhattan (WB) and Jackrabbit Ln	A	10.6	B	11.2
-	22	Jackrabbit Ln WB On AOI	-	-	A	7.5
-	21	Btwn Jackrabbit Ln Ramps	-	-	A	8.2
19	20	Jackrabbit Ln EB On/WB Off AOI	B	11.2	B	19.3
20	-	Btwn Jackrabbit Ln and Airway Blvd	B	11.2	-	-
21	19	Airway Blvd EB Off/WB On AOI	B	11.2	B	14.8
22	18	Btwn Airway Blvd Ramps	B	15.4	B	12.4
23	17	Airway Blvd EB On/WB Off AOI	C	22.6	A	11.0
-	16	Btwn Airway Blvd and N 19th Ave (3 lanes)	-	-	B	11.2
24	15	Btwn Airway Blvd and N 19th Ave (2 lanes)	C	20.2	B	17.1
25	14	N 19th Ave EB Off/WB On AOI	C	25.9	B	17.6
26	13	Btwn N 19th Ave Ramps	B	15.1	B	12.8

EB #	WB #	Section Description	EB LOS	EB Density (pc/mi/ln)	WB LOS	WB Density (pc/mi/h)
27	12	N 19th Ave EB On/WB Off AOI	C	20.2	B	18.8
28	11	Btwn N 19th Ave and N 7th Ave (2 lanes)	C	18.2	B	15.0
-	10	Btwn N 19th Ave and N 7th Ave (3 lanes)	-	-	A	10.0
29	9	N 7th Ave EB Off/WB On AOI	C	22.7	A	10.0
30	8	Btwn N 7th Ave Ramps	B	11.9	A	10.4
31	7	N 7th Ave EB On/WB Off AOI	B	15.5	B	16.6
32	6	Btwn N 7th Ave and Main St	B	13.4	B	13.3
33	5	Main St EB Off/WB On AOI	B	17.0	B	15.3
34	4	Btwn Main St Ramps	A	8.9	A	8.5
35	3	Main St EB On/WB Off AOI	B	12.4	B	11.7
36	2	Btwn Main St and Bear Canyon	A	10.9	A	10.0
37	1	Bear Canyon EB Off/WB On AOI	B	13.4	B	11.4

Source: HCS analysis conducted by RPA in May 2026.

Projected 2046 traffic volumes were developed by applying growth factors derived from the GVMPO 2050 TDM and historical traffic trends where applicable, as discussed in **Section 5.2**. These projected volumes were then used to evaluate future operating conditions along the corridor under no-build conditions, if all infrastructure were to stay the same as it is today. The results of the projected conditions analysis are presented in **Table 28** and **Figure 13**, which summarize the projected 2046 LOS for each mainline segment.

Table 28: Projected (2046) Corridor LOS

EB #	WB #	Section Description	EB LOS	EB Density (pc/mi/ln)	WB LOS	WB Density (pc/mi/h)
1	36	West Three Forks EB On/WB Off AOI	B	12.8	B	18.0
2	35	Btwn West Three Forks and Three Forks	B	11.4	B	15.8
3	34	Three Forks EB Off/WB On AOI	A	14.4	B	18.4
4	33	Btwn Three Forks Ramps	A	10.7	B	12.8
5	32	Three Forks EB On/WB Off AOI	B	14.5	B	23.4
6	31	Btwn Three Forks and Logan	B	12.7	B	20.4
7	30	Logan EB Off/WB On AOI	B	15.7	B	24.9
8	29	Btwn Logan Ramps	B	12.1	B	16.4
9	28	Logan EB On/WB Off AOI	B	15.6	B	14.9
10	27	Btwn Logan and Manhattan	B	13.4	B	14.8
11	26	Manhattan EB Off/WB On AOI	B	16.9	B	23.6
12	25	Btwn Manhattan Ramps	A	10.8	B	27.9
13	24	Manhattan EB On/WB Off AOI	B	15.8	B	20.1
14	-	Btwn Manhattan and Amsterdam Rd	B	13.2	-	-
15	-	Amsterdam Rd EB Off AOI	B	17.7	-	-
16	-	Btwn Amsterdam Rd Ramps	A	9.8	-	-
17	-	Amsterdam Rd EB On AOI	A	9.3	-	-
18	23	Btwn Amsterdam Rd/Manhattan (WB) and Jackrabbit Ln	B	13.9	B	27.6
-	22	Jackrabbit Ln WB On AOI	-	-	A	26.7
-	21	Btwn Jackrabbit Ln Ramps	-	-	B	15.8
19	20	Jackrabbit Ln EB On/WB Off AOI	B	15.6	C	15.7

EB #	WB #	Section Description	EB LOS	EB Density (pc/mi/ln)	WB LOS	WB Density (pc/mi/h)
20	-	Btwn Jackrabbit Ln and Airway Blvd	B	15.7	-	-
21	19	Airway Blvd EB Off/WB On AOI	B	15.7	C	16.0
22	18	Btwn Airway Blvd Ramps	C	22.3	B	20.8
23	17	Airway Blvd EB On/WB Off AOI	D	34.7	B	26.0
-	16	Btwn Airway Blvd and N 19th Ave (3 lanes)	-	-	B	12.2
24	15	Btwn Airway Blvd and N 19th Ave (2 lanes)	D	34.4	D	11.0
25	14	19th N Ave EB Off/WB On AOI	E	36.4	D	16.9
26	13	Btwn N 19th Ave Ramps	C	23.1	C	21.4
27	12	N 19th Ave EB On/WB Off AOI	D	31.7	C	13.3
28	11	Btwn N 19th Ave and N 7th Ave (2 lanes)	D	29.1	C	17.3
-	10	Btwn N 19th Ave and N 7th Ave (3 lanes)	-	-	B	15.5
29	9	N 7th Ave EB Off/WB On AOI	D	33.3	B	19.1
30	8	Btwn N 7th Ave Ramps	C	18.4	B	14.4
31	7	N 7th Ave EB On/WB Off AOI	C	23.9	C	15.0
32	6	Btwn N 7th Ave and Main St	C	21.0	C	15.1
33	5	Main St EB Off/WB On AOI	C	25.9	C	18.9
34	4	Btwn Main St Ramps	B	14.2	B	13.2
35	3	Main St EB On/WB Off AOI	B	19.0	C	16.2
36	2	Btwn Main St and Bear Canyon	B	16.5	B	14.2
37	1	Bear Canyon EB Off/WB On AOI	C	20.4	B	18.1

Source: HCS analysis conducted by RPA in May 2026.

Under projected 2046 traffic volumes, operating conditions are expected to degrade throughout portions of the corridor as traffic growth increases mainline densities. Most segments west of Airway Boulevard are projected to continue operating at LOS A or B, although several segments that currently operate at LOS A are projected to degrade to LOS B. The most notable reductions in service are expected in the Bozeman urban area between Airway Boulevard and Bear Canyon Road. Eastbound segments between Airway Boulevard and N 19th Avenue are projected to operate at LOS D or E, while adjacent eastbound segments between N 19th Avenue and Main Street are projected to operate at LOS C or D. Westbound operations are projected to remain generally better than eastbound operations, with most segments operating at LOS B or C. LOS D conditions are limited primarily to the eastbound direction between Airway Boulevard and N 7th Avenue, including segments within the Airway Boulevard, N 19th Avenue, and N 7th Avenue Interchange influence areas. The segment between Airway Boulevard and N 19th Avenue is the only westbound segment projected to operate at LOS D. Overall, the projected conditions analysis indicates that future congestion will be concentrated in the Bozeman and Belgrade urban areas, while the remainder of the corridor is expected to continue operating at acceptable levels of service.

5.5 Interchange Ramp Operations

Connection between the mainline Interstate and crossroads is provided by a dedicated ramp road. Similar to the Interstate mainline, the performance of the interchange ramps can be evaluated for LOS. As with traditional roadways, interchange ramps are impacted by the amount of traffic congestion present. For on-ramps, the capacity of the ramp roadway is rarely an issue due to generally free-flowing conditions with no traffic control. For off-ramps, however, congestion on the ramp can cause queuing that may cause failure at the ramp-to-freeway junction.

Reported LOS values represent conditions at the ramp-freeway junctions where vehicles merge with or diverge from the Interstate, rather than along the entire ramp roadway or AOI segment. Consistent with the HCM, LOS is determined based on density within the merge and diverge influence area and is reported for the junction location. As a result, the LOS values shown in this report should be interpreted as measures of operational performance at the merge/diverge point rather than across the full length of the associated roadway segment.

As with the Interstate mainline, a LOS of B or better is recommended for the interchange ramp junctions. **Table 29** provides the results of the LOS analysis for the interchange ramps. Detailed interchange ramp analysis results are provided in **Appendix D**.

Most interchange ramp junctions currently operate at LOS A or B. Ramp junctions operating below LOS B are concentrated in the Bozeman and Belgrade areas, particularly at the Airway Boulevard, N 19th Avenue, N 7th Avenue, and Main Street Interchanges. The lowest observed LOS is D at the westbound on-ramp junction at N 19th Avenue. This location corresponds to a westbound mainline segment that also operates at LOS D, suggesting that mainline congestion is affecting ramp operations and creating occasional queues on the entrance ramp.

Table 29: Existing (2026) Interchange Ramp LOS

Interchange	EB On LOS	EB On Density (pc/mi/ln)	EB Off LOS	EB Off Density (pc/mi/ln)	WB On LOS	WB On Density (pc/mi/ln)	WB Off LOS	WB Off Density (pc/mi/ln)
West Three Forks	A	6.4	-	-	-	-	B	10.8
Three Forks	B	10.6	A	4.6	B	16.2	B	13.3
Logan	B	15.2	B	10.9	B	15.0	B	11.6
Manhattan	B	12.1	B	13.2	B	15.9	B	15.5
Amsterdam Rd	A	7.0	B	13.5	-	-	-	-
Jackrabbit Ln	B	11.2	-	-	A	11	C	21.4
Airway Blvd	C	23.2	B	11.2	C	20.8	B	15.7
N 19th Ave	C	20.2	C	25.9	D	27.6	C	21.5
N 7th Ave	B	15.5	C	22.5	B	14.9	C	26.4
Main St	B	12.8	B	17.3	C	26.8	C	21.5
Bear Canyon	-	-	B	14.3	B	18.0	-	-

Source: HCS analysis conducted by RPA in May 2026.

Projected 2046 traffic volumes for interchange ramps were also developed using growth rates derived from the GVMPO 2050 TDM and historical traffic trends where applicable. These projected volumes were used to evaluate future operating conditions at the interchange ramp junctions. The resulting ramp junction LOS and densities under projected conditions are summarized in **Table 30**.

Table 30: Projected (2046) Interchange Ramp LOS

Interchange	EB On LOS	EB On Density (pc/mi/ln)	EB Off LOS	EB Off Density (pc/mi/ln)	WB On LOS	WB On Density (pc/mi/ln)	WB Off LOS	WB Off Density (pc/mi/ln)
West Three Forks	B	10.5	-	-	-	-	B	10.8

Three Forks	B	15.1	A	9.4	B	16.2	B	13.3
Logan	B	19.7	B	17.2	B	15.0	B	11.6
Manhattan	B	16.7	B	18.1	B	15.9	B	15.5
Amsterdam Rd	A	9.3	B	18.8	-	-	-	-
Jackrabbit Ln	B	15.6	-	-	A	11.0	C	21.4
Airway Blvd	D	32.2	B	15.7	C	20.8	B	15.7
N 19th Ave	D	29.1	E	36.1	D	27.6	C	21.5
N 7th Ave	C	23.3	D	32.4	B	14.9	C	26.4
Main St	B	19.2	C	25.9	C	26.8	C	21.5
Bear Canyon	-	-	C	21.3	B	18.0	-	-

Source: HCS analysis conducted by RPA in May 2026.

Under projected 2046 traffic volumes, operational performance at several interchange ramp junctions is expected to decline, particularly in the Bozeman urban area. The most notable reductions occur at the Airway Boulevard, N 19th Avenue, and N 7th Avenue Interchanges, where several ramp junctions are projected to operate at LOS D or E. The N 19th Avenue Interchange is projected to experience the lowest LOS, with the eastbound off-ramp junction operating at LOS E. Most ramp junctions west of Bozeman are projected to continue operating at LOS A or B, while the urban interchanges generally operate at LOS C or worse. Overall, the projected conditions analysis indicates that future operational deficiencies will be concentrated in the eastern portion of the corridor.

5.6 Intersection Operations

A LOS analysis was performed for 32 intersections within the study area using intersection TMCs. The analysis included the Interstate ramp terminal intersections as well as nearby intersections that may influence Interstate traffic operations. Vehicle turning movement data was collected at each intersection over a 24-hour period on weekdays in April 2026, with the exception of the N 7th Avenue ramp terminal intersections, which were collected in April 2025. Seasonal adjustment factors⁴⁹ were applied to the traffic counts, and the analysis was performed using Synchro traffic simulation software.

The intersections were evaluated during the a.m. and p.m. peak hours. For two-way stop-controlled intersections, LOS is based on the delay experienced by the movement with the greatest delay rather than the average delay for all vehicles at the intersection. As a result, the reported LOS may not reflect the performance experienced by the majority of motorists. For example, a minor-street left-turn movement may experience substantial delay while representing only a small percentage of the total intersection traffic. For signalized intersections, LOS is based on the average control delay experienced by all vehicles. For roundabouts, LOS is based on the average delay across all approaches. **Table 31** and **Figure 12** summarize the results of the existing 2026 operational analysis. Detailed intersection analysis results are provided in **Appendix E**.

The majority of intersections in the study area currently operate at LOS A, B, or C during both the a.m. and p.m. peak hours. The poorest operating conditions occur at ramp terminal intersections in the Bozeman and Belgrade areas, particularly at the Jackrabbit Lane westbound ramp intersection, the N 19th Avenue westbound ramp intersection, and the Main Street/Frontage Road westbound ramp intersection, which operate at LOS F during the p.m. peak hour. In general, delays are highest during the p.m. peak hour, reflecting increased commuter traffic throughout the corridor. Despite these localized deficiencies, most intersections currently provide acceptable levels of service under existing traffic conditions.

Table 31: Existing (2026) Intersection LOS

Intersection #	Intersection Name	Control Type	A.M. Peak Hour LOS	A.M. Peak Hour Delay (s/veh)	P.M. Peak Hour LOS	P.M. Peak Hour Delay (s/veh)
1A	US 287 & I-90 EB	Two-Way Stop	C	19.2	C	15.6
1B	US 287 & I-90 WB	Two-Way Stop	B	13.3	D	34.4
2A	Three Forks Frontage Rd & I-90 EB	Two-Way Stop	B	11.4	B	12.1
2B	Three Forks Frontage Rd & I-90 WB	Two-Way Stop	B	14.4	C	16.6
3A	Buffalo Jump Rd & I-90 EB Exit	Two-Way Stop	A	9.7	B	10.1
3B	Buffalo Jump Rd & I-90 EB Entrance	Uncontrolled	A	4.0	A	2.6
3C	Buffalo Jump Rd & I-90 WB	Two-Way Stop	A	9.6	A	9.4
4A	Churchill Rd & I-90 EB	Two-Way Stop	D	31.0	B	14.3
4B	Churchill Rd & I-90 WB	Two-Way Stop	B	10.7	B	11.8
4C	Churchill Rd & Manhattan Frontage Rd	Two-Way Stop	B	10.7	B	10.3
5A	Amsterdam Rd & I-90 EB	Signalized	C	34.5	C	31.6
6A	Northbound Jackrabbit Ln & I-90 EB	Uncontrolled	A	0.0	A	0.0
6B	Southbound Jackrabbit Ln & I-90 EB	Uncontrolled	A	0.0	A	0.0
6C	Jackrabbit Ln & I-90 WB	Signalized	B	10.1	F	144.9
6D	Jackrabbit Ln & Amsterdam Rd	Signalized	B	17.7	B	17.2
6E	Jackrabbit Ln & Madison Ave	Signalized	B	17.6	C	21.2
7A	Airway Blvd & I-90 EB	Roundabout	A	7.8	A	7.0
7B	Airway Blvd & I-90 WB	Roundabout	A	6.9	A	8.7
8A	N 19th Ave & I-90 EB	Signalized	B	19.8	C	26.8
8B	N 19th Ave & I-90 WB	Signalized	B	10.2	F	85.3
8C	N 19th Ave & E Valley Center Rd	Signalized	B	11.9	B	14.6
8D	N 19th Ave & Springhill Rd	Signalized	A	8.0	A	8.9
9A	N 7th Ave & Baxter Ln	Two-Way Stop	C	15.8	C	21.8
9B	N 7th Ave & I-90 EB	Signalized	B	10.5	A	9.8
9C	N 7th Ave & I-90 WB	Signalized	A	9.8	B	13.0
10A	Frontage Rd & I-90 EB	Two-Way Stop	C	16.7	B	14.5
10B	Frontage Rd & I-90 WB	Two-Way Stop	C	16.7	F	70.1
10C	E Main St & Haggerty Ln	Two-Way Stop	D	34.4	E	41.9
11A	Bozeman Trail Rd & I-90 EB	Two-Way Stop	A	9.1	A	8.8
11B	Bozeman Trail Rd & I-90 WB	Two-Way Stop	B	10.1	A	9.2
11C	Bozeman Trail Rd & Canyon View Rd	Two-Way Stop	B	10.1	A	9.6
11D	Bozeman Trail Rd & Frontage Rd	All-Way Stop	A	7.2	A	7.2

Source: Analysis conducted by RPA using Synchro in May 2026.

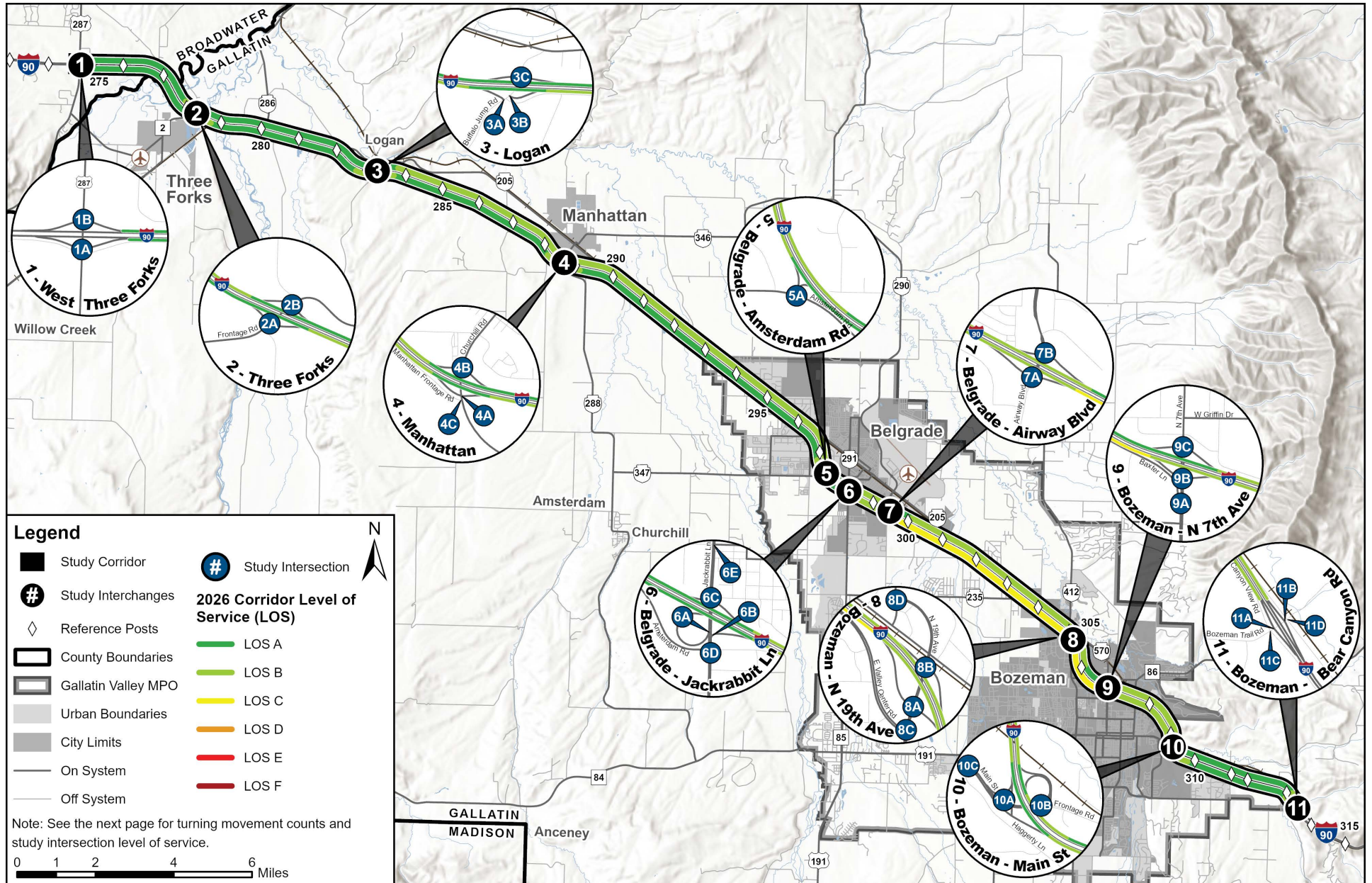


Figure 11: Existing Conditions Traffic Operations (2026)

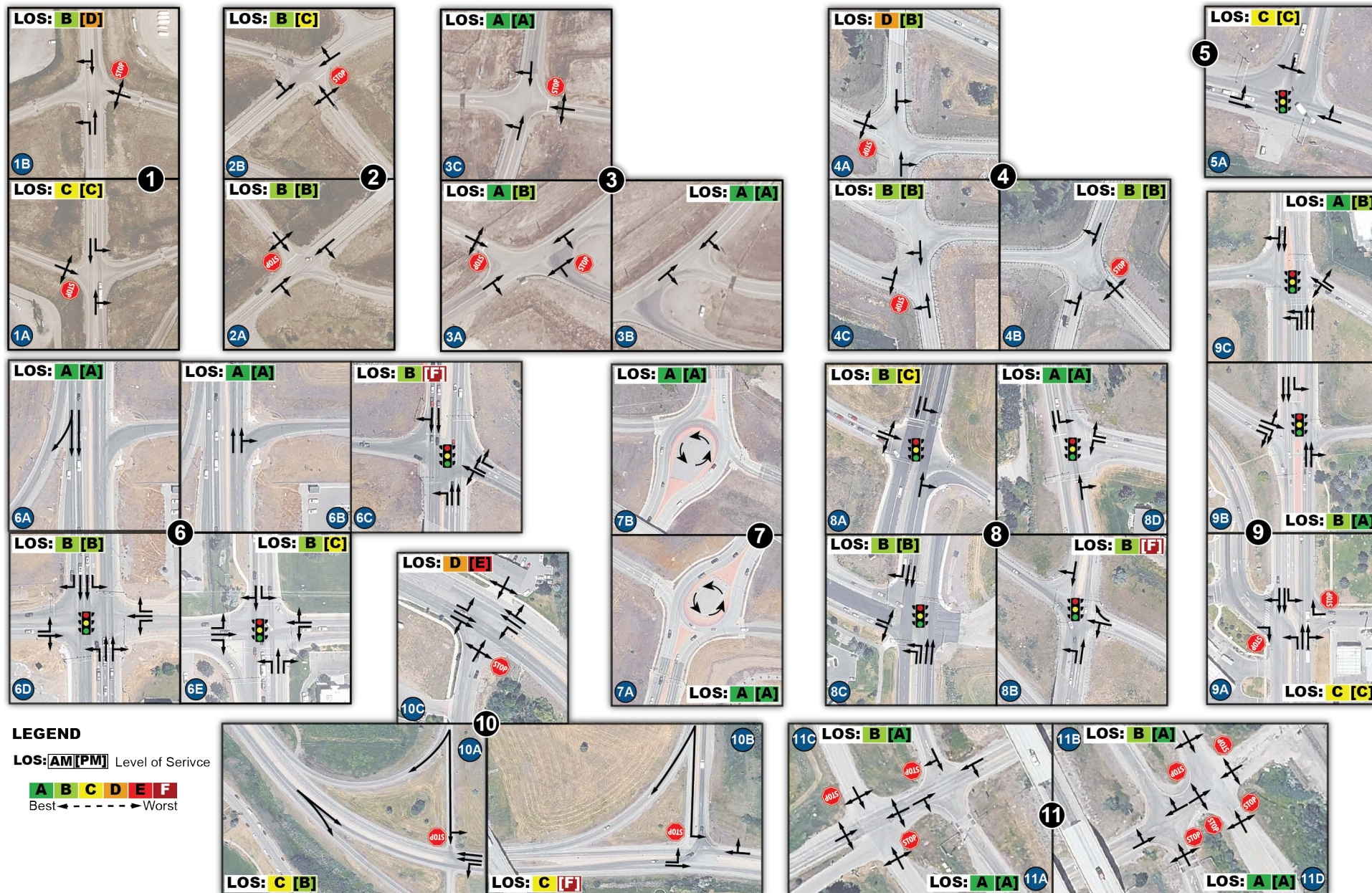


Figure 12: Existing Intersection Configurations and Operations (2026)

Table 32 and **Figure 14** present the analysis results for the future 2046 traffic volumes. All of the 2026 traffic volumes were increased using TDM growth rates previously discussed to represent projected 2046 conditions. All intersection control remained the same as under the existing 2026 conditions. Detailed projected operational analysis results are located in **Appendix E**.

Under projected 2046 traffic volumes, intersection operations are expected to deteriorate at several locations throughout the corridor. While many intersections continue to operate at LOS A through C, numerous ramp terminal and adjacent intersections are projected to operate at LOS D, E, or F during one or both peak hours. The largest operational deficiencies are projected at the US 287 ramp terminals, Churchill Road eastbound ramp, Jackrabbit Lane westbound ramp, Airway Boulevard westbound ramp, N 19th Avenue ramp terminals, Frontage Road ramp terminals, and E Main Street/Haggerty Lane intersections. Delays are generally greatest during the p.m. peak hour, particularly in the Bozeman urban area. Overall, the projected conditions analysis indicates that future congestion will become more widespread and severe, with several intersections experiencing substantial delays under no-build conditions.

Table 32: Projected (2046) Intersection LOS

Intersection #	Intersection Name	Control Type	A.M. Peak Hour LOS	A.M. Peak Hour Delay (s/veh)	P.M. Peak Hour LOS	P.M. Peak Hour Delay (s/veh)
1A	US 287 & I-90 EB	Two-Way Stop	F	>300	F	>300
1B	US 287 & I-90 WB	Two-Way Stop	E	48.2	F	>300
2A	Three Forks Frontage Rd & I-90 EB	Two-Way Stop	B	13.8	B	14.1
2B	Three Forks Frontage Rd & I-90 WB	Two-Way Stop	C	19.9	D	30.0
3A	Buffalo Jump Rd & I-90 EB Exit	Two-Way Stop	B	10.1	B	10.7
3B	Buffalo Jump Rd & I-90 EB Entrance	Uncontrolled	A	4.0	A	2.6
3C	Buffalo Jump Rd & I-90 WB	Two-Way Stop	A	9.9	A	9.7
4A	Churchill Rd & I-90 EB	Two-Way Stop	F	>300	F	55.2
4B	Churchill Rd & I-90 WB	Two-Way Stop	B	14.2	C	23.4
4C	Churchill Rd & Manhattan Frontage Rd	Two-Way Stop	C	19.0	B	14.4
5A	Amsterdam Rd & I-90 EB	Signalized	D	35.3	C	32.2
6A	Northbound Jackrabbit Ln & I-90 EB	Uncontrolled	A	0.0	A	0.0
6B	Southbound Jackrabbit Ln & I-90 EB	Uncontrolled	A	0.0	A	0.0
6C	Jackrabbit Ln & I-90 WB	Signalized	B	12.0	F	205.8
6D	Jackrabbit Ln & Amsterdam Rd	Signalized	C	34.9	D	49.3
6E	Jackrabbit Ln & Madison Ave	Signalized	C	23.1	C	25.3
7A	Airway Blvd & I-90 EB	Roundabout	C	19.4	C	17.4
7B	Airway Blvd & I-90 WB	Roundabout	B	14.1	F	90.1
8A	N 19th Ave & I-90 EB	Signalized	D	40.6	E	73.3
8B	N 19th Ave & I-90 WB	Signalized	B	12.0	F	132.6
8C	N 19th Ave & E Valley Center Rd	Signalized	B	18.6	C	27.9
8D	N 19th Ave & Springhill Rd	Signalized	A	9.0	B	10.2
9A	N 7th Ave & Baxter Ln	Two-Way Stop	C	22.7	E	49.4
9B	N 7th Ave & I-90 EB	Signalized	B	12.7	B	12.2
9C	N 7th Ave & I-90 WB	Signalized	B	11.0	B	17.0
10A	Frontage Rd & I-90 EB	Two-Way Stop	F	67.5	E	38.0
10B	Frontage Rd & I-90 WB	Two-Way Stop	C	24.8	F	>300
10C	E Main St & Haggerty Ln	Two-Way Stop	F	91.9	F	268.6
11A	Bozeman Trail Rd & I-90 EB	Two-Way Stop	A	9.8	A	9.2
11B	Bozeman Trail Rd & I-90 WB	Two-Way Stop	B	11.2	A	9.5
11C	Bozeman Trail Rd & Canyon View Rd	Two-Way Stop	B	12.6	B	12.2
11D	Bozeman Trail Rd & Frontage Rd	All-Way Stop	A	7.3	A	7.3

Source: Analysis conducted by RPA using Synchro in May 2026.

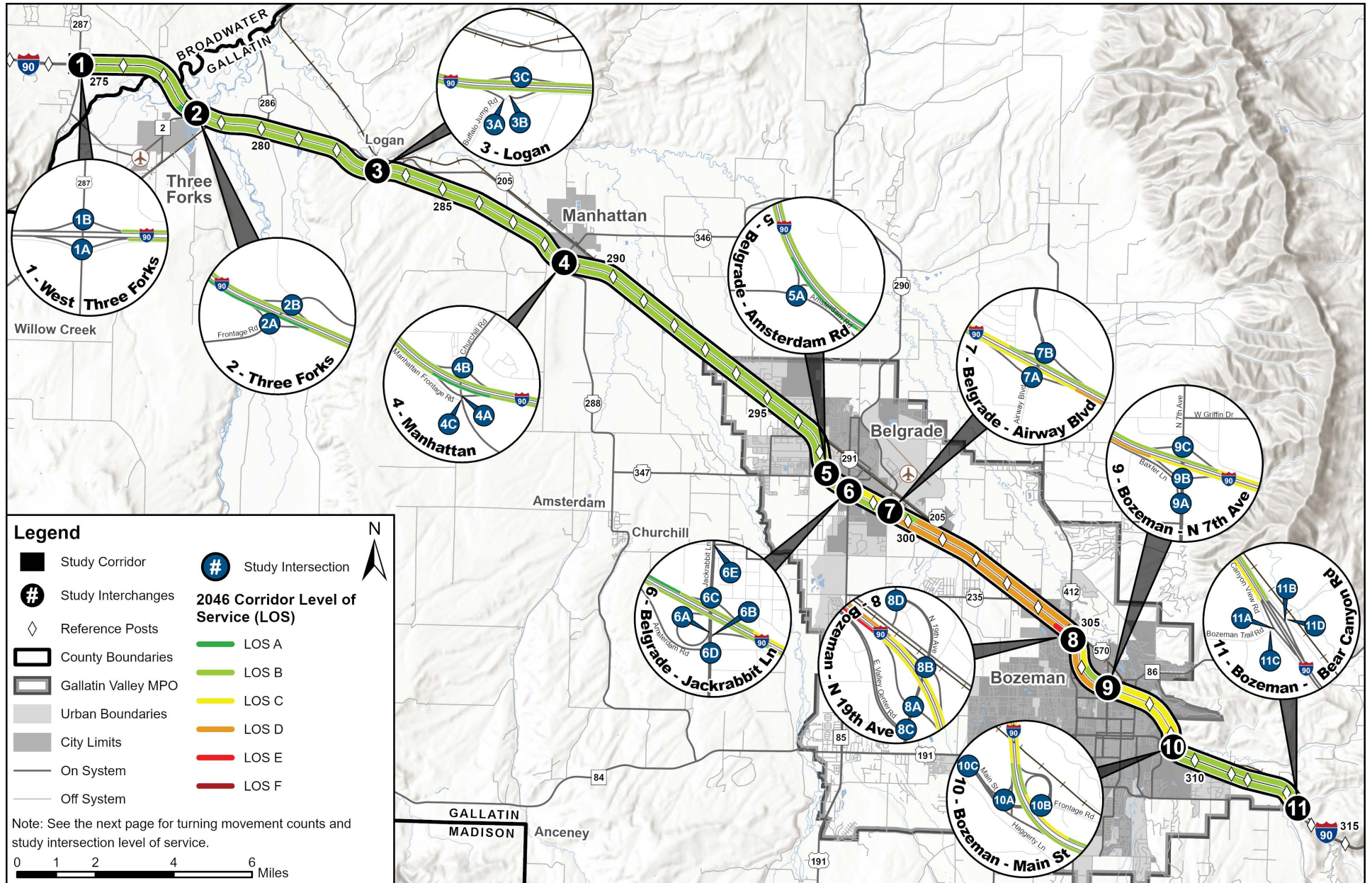


Figure 13: Projected Conditions Traffic Operations (2046)

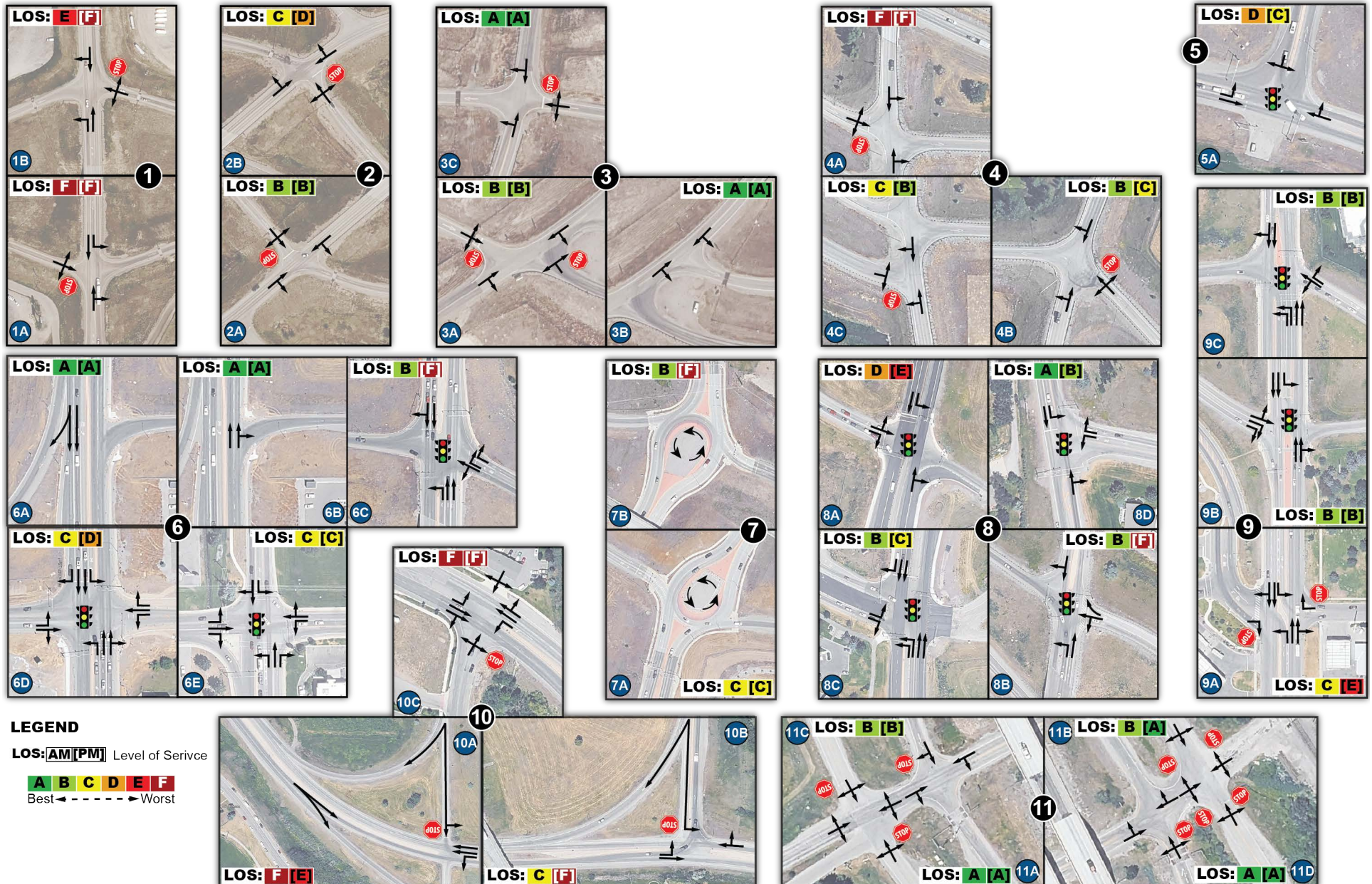


Figure 14: Projected Intersection Configurations and Operations (2046)

5.7 Seasonal and Daily Variation

The permanent MDT traffic count station located northwest of Manhattan continuously collects traffic data throughout the year, providing valuable information regarding both daily and seasonal traffic patterns within the study corridor. Analysis of the 2025 continuous count data helps characterize how travel demand varies by day of the week and throughout the year. The following sections summarize observed daily and seasonal traffic variations.

Daily Variation

Traffic volumes along the corridor exhibit moderate variation throughout the week, reflecting a combination of commuter, local, and recreational travel. Traffic volumes generally increase during the workweek, with the highest volumes occurring on Fridays. Average Friday traffic volumes are approximately 11 percent greater than the annual average, likely due to a combination of weekday commuting and increased weekend travel activity. Traffic volumes decrease during the weekend, with Sundays experiencing the lowest traffic levels at approximately 9 percent below the annual average. Overall, the corridor carries relatively consistent traffic throughout the week, although the higher Friday volumes indicate increased travel demand at the beginning of the weekend period. **Figure 15** illustrates the daily variation in traffic volumes recorded at the continuous count site within the study corridor.

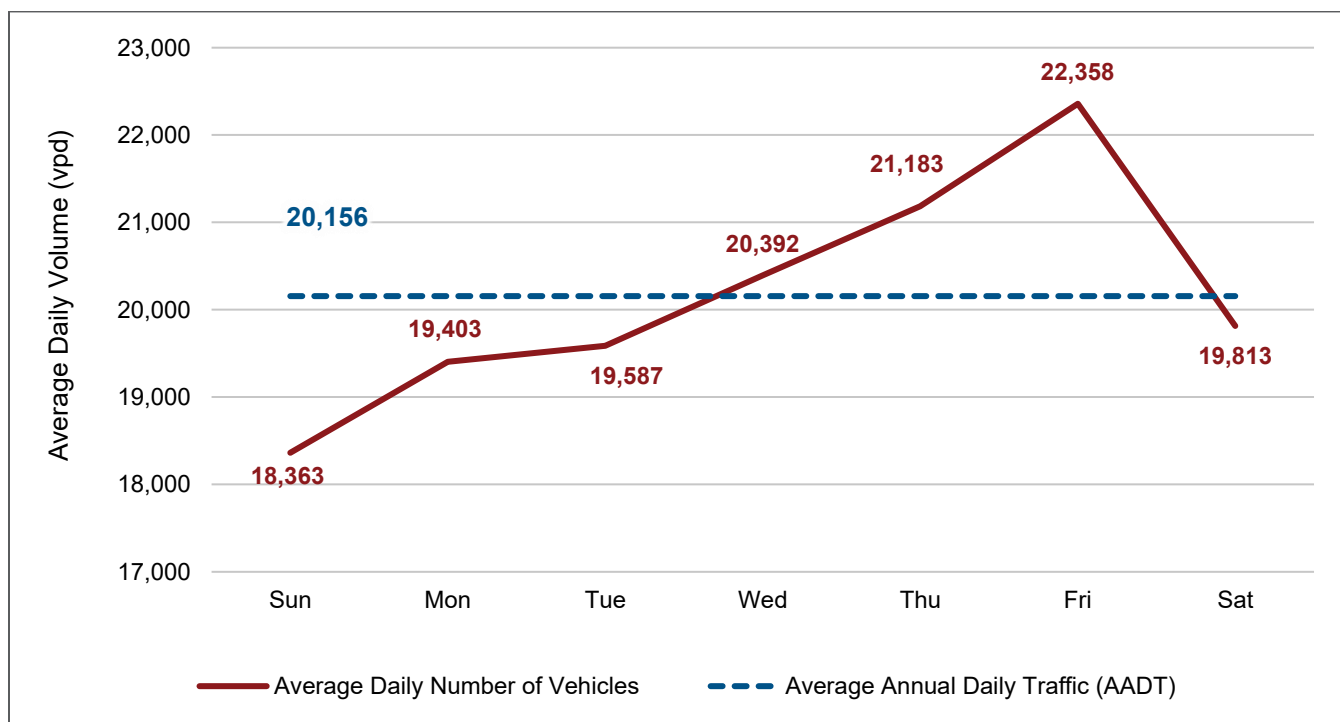


Figure 15: Daily Traffic Variation (2025)

Seasonal Variation

Traffic volumes along the corridor exhibit notable seasonal variation, with the highest traffic levels occurring during the summer months of June through August, when average daily traffic volumes are approximately 20 to 25 percent greater than the annual average. Conversely, the lowest traffic volumes occur during the winter months, when traffic is nearly 30 percent below annual average conditions. While a substantial portion of corridor traffic consists of commuter and local trips that are expected to remain relatively consistent throughout the year, I-90 serves as the primary east-west route across Montana and accommodates tourism and recreational travel during the summer season. Increased visitor travel likely contributes to the elevated summer traffic volumes observed along the corridor. In contrast, winter weather conditions and reduced recreational travel activity likely contribute to lower traffic demand during the winter months. The seasonal traffic patterns are illustrated in **Figure 16**.

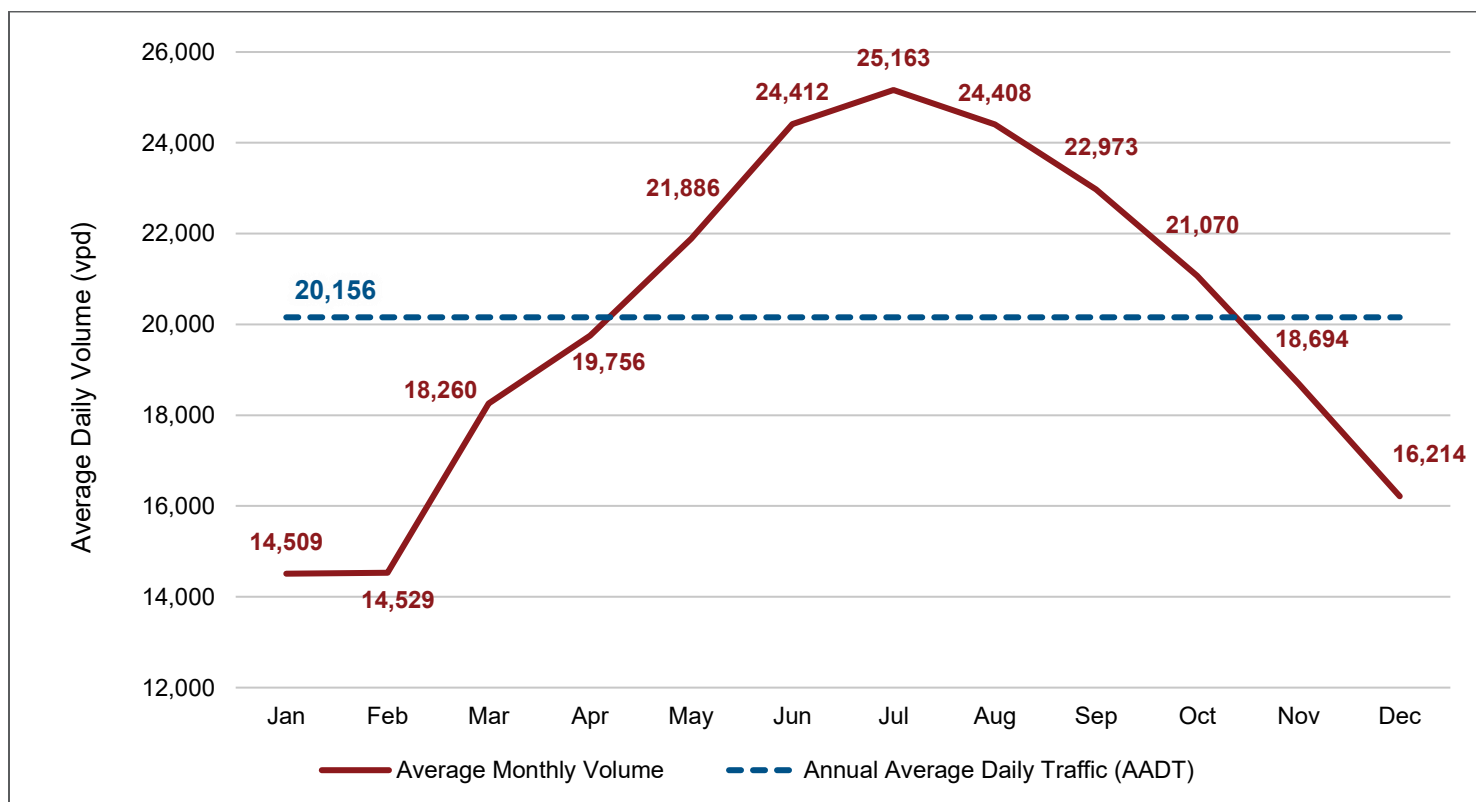


Figure 16: Seasonal Traffic Variation (2025)

6.0 SAFETY CONDITIONS

The MDT Traffic and Safety Bureau provided crash data for the study area for the five-year period from January 1, 2020, through December 31, 2024.¹ According to the records, a total of 1,559 crashes were reported within the study area during this period. This information includes data from crash reports submitted to MHP from their patrol officers and by local 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 MHP were not contained in the database and are not included in this analysis.

6.1 Data Limitations

Although crash data can help identify trends in behavioral and circumstantial contributors to crashes along the study corridor, limitations include unreported and inconsistent data. Many crash records include blank fields, and occasionally a report will list “unknown” rather than a blank field. Similarly, many crashes, especially those where individuals and vehicles are unharmed, may not be reported to the police. Underreporting can limit the ability to properly and effectively manage road safety, since the analyses in this report are based only on reported crash data. Another limitation may be inconsistencies with reporting. Although protocol has been established and training for filling out crash reports is provided to law enforcement, there may still be inconsistencies or errors in the reporting. The data analysis in the following sections is based solely on the information contained in the crash records. These records are evaluated as reported, with no attempts made to correct errors or fill in missing information.

High-tension cable median barriers were installed along portions of the study corridor in October 2023. Because the barriers were installed near the end of the five-year crash analysis period, limited post-installation crash data are available to evaluate their effectiveness, although slight decreases in run-off-the-road and head-on crashes were observed following installation.

6.2 Crash Location

The crash locations were plotted using latitude and longitude assigned to each record. According to the records, a total of 1,559 crashes were reported within the study area during the five-year analysis period. The crash records were reviewed to identify trends, contributing factors, and characteristics, as discussed in the following sections.

- **Mainline Crashes:** A total of 1,220 crashes occurred along the I-90 mainline. The density of these crashes is shown in **Figure 17**. The highest crash densities were observed between RP 303 and RP 304, with approximately 72 crashes per mile, and between RP 307 and RP 308, with approximately 63 crashes per mile. Overall, crash concentrations were greatest in the segment immediately east of Belgrade, continuing through Bozeman city limits.
- **Interchange Crashes:** A total of 339 crashes occurred within interchange areas. The Jackrabbit Lane Interchange experienced the highest number of crashes, with 100 crashes reported during the five-year analysis period. The Airway Boulevard Interchange had the second highest number of crashes (58), followed by the Amsterdam Road and N 19th Avenue Interchanges with 35 and 31 crashes, respectively.

¹ Pursuant to 23 U.S.C. § 407, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of Title 23, U.S.C., or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data. This publication is not intended to waive any of the State of Montana's rights or privileges under 23 U.S.C. § 407.

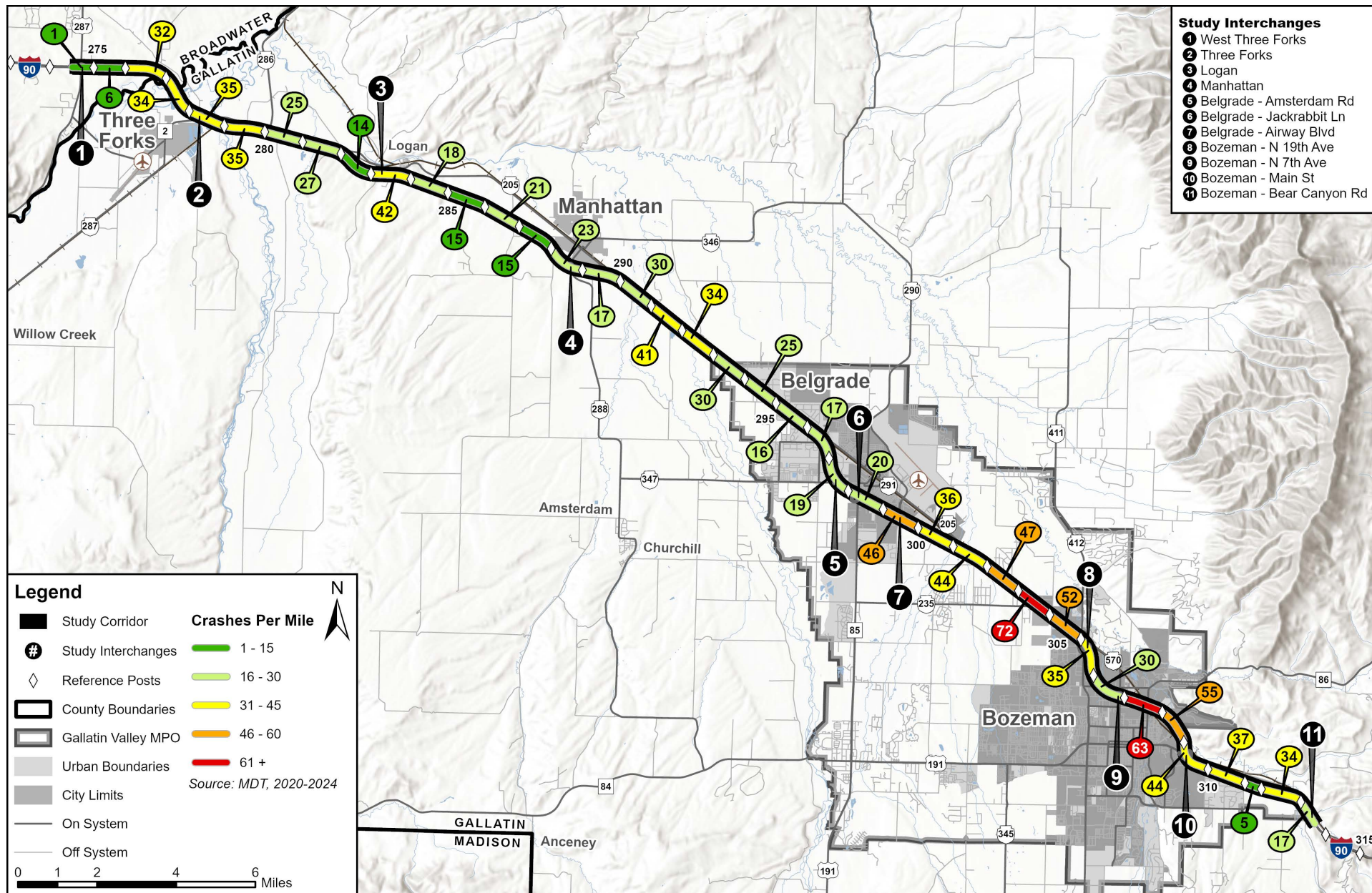


Figure 17: Crash Density

6.3 Crash Severity

Crashes can be categorized by the severity of injuries reported. The most severe injury defines the severity of the crash. For example, if a crash results in a fatality and a minor injury, the crash would be defined as a fatal crash. Crash severity includes, from least severe to most, property damage only (PDO), possible injury, suspected minor injury, suspected serious injury, and fatal injury. Severe crashes include those resulting in a fatality or suspected serious injury.

Mainline Crashes

The distribution of reported mainline crash severity is presented in **Figure 18**. There were 12 fatal crashes (1.0 percent of all crashes) and a total of 16 fatalities. There were 31 suspected serious injury crashes (2.5 percent) and a total of 39 suspected serious injuries. This adds up to 3.5 percent of crashes resulting in severe outcomes, 11.0 percent resulting in suspected minor injuries, 4.4 percent resulting in possible injuries, 80.2 percent resulting in PDO, and 0.8 percent with unknown severity outcomes. The locations of severe crashes along the mainline are shown in **Figure 20**.

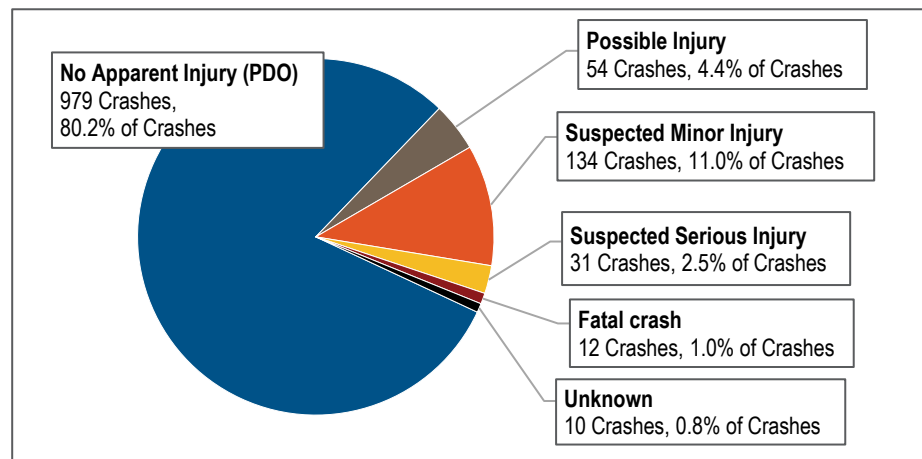


Figure 18: Mainline Crash Severity

Interchange Crashes

The distribution of reported interchange crash severity is presented in **Figure 19**. There were two fatal crashes (0.6 percent) and a total of two fatalities. There were seven suspected serious injury crashes (2.1 percent) and a total of nine suspected serious injuries. This adds up to 2.7 percent of crashes resulting in severe outcomes, 10.3 percent resulting in suspected minor injuries, 6.2 percent resulting in possible injuries, 79.6 percent resulting in PDO, and 1.2 percent with unknown severity outcomes. The locations of severe crashes on the interchanges are shown in **Figure 20**.

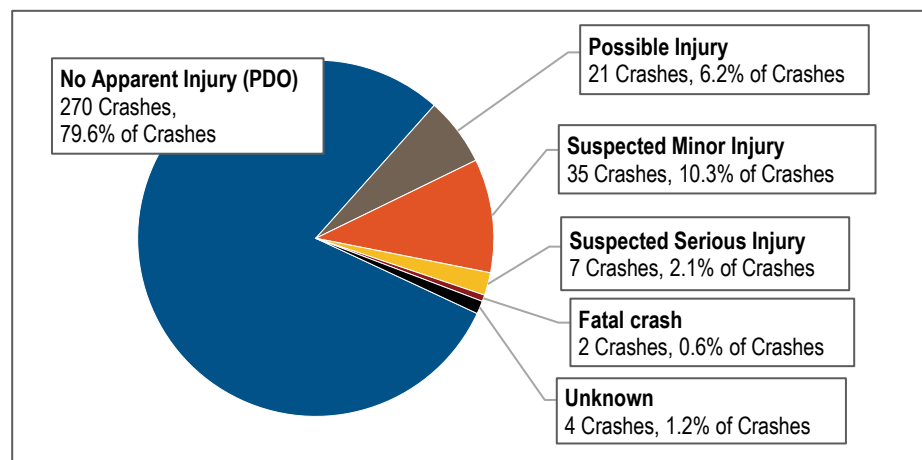


Figure 19: Interchange Crash Severity

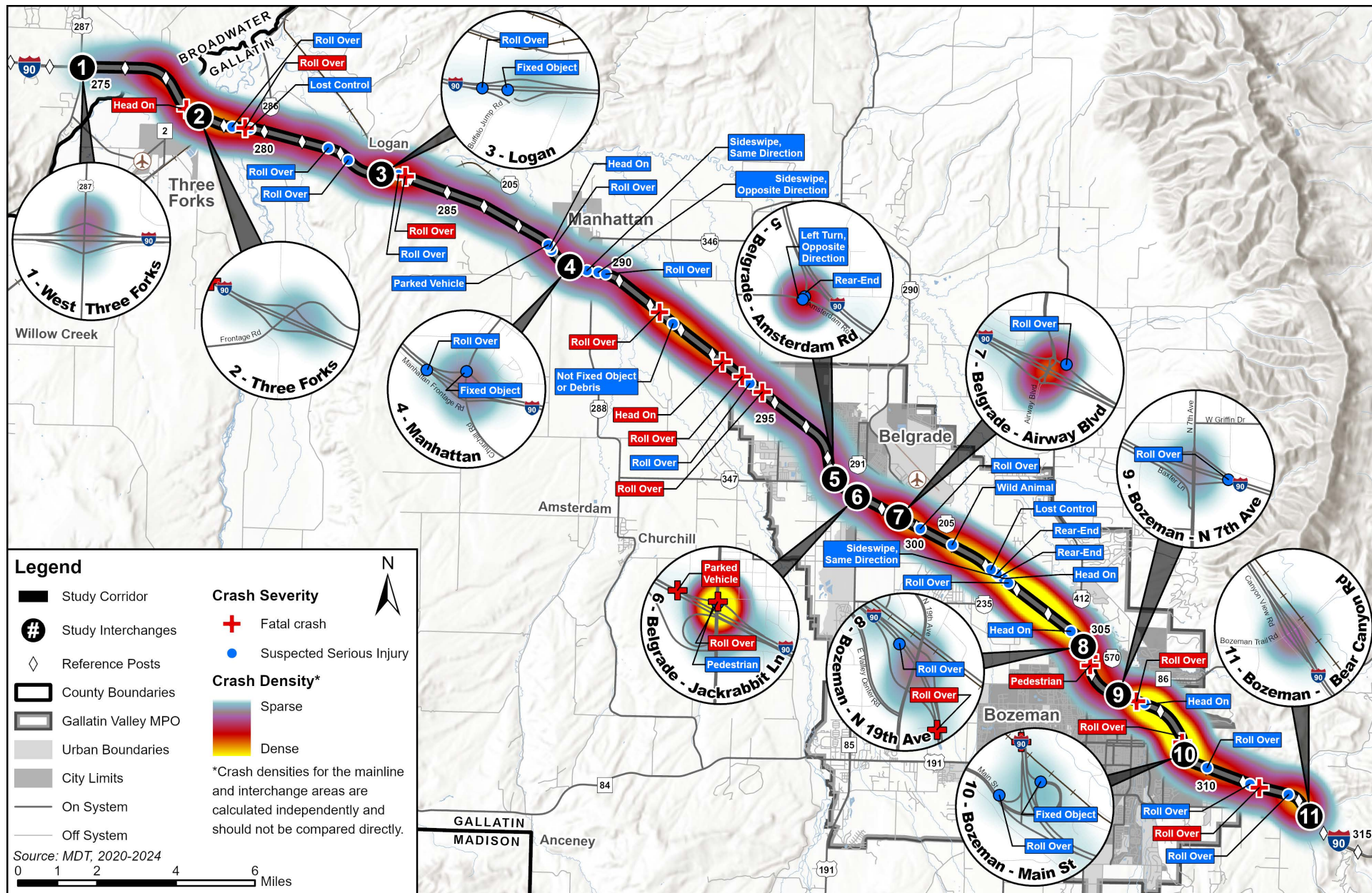


Figure 20: Crash Severity

6.3.1 Crash Report Narratives

Crash narratives were reviewed to better understand the circumstances surrounding fatal and suspected serious injury crashes. The narrative review included information documented by responding officers and statements from involved parties, providing additional context beyond the coded crash data and helping identify recurring circumstances and contributing factors that may inform future safety improvements. Because the analysis is based on the information documented in the crash reports, some contributing circumstances may not have been recorded.

The crash narrative review identified several recurring driver behaviors that contributed to fatal and suspected serious injury crashes. Impairment was one of the most common factors, occurring in more than half of the fatal crashes and over 40 percent of the suspected serious injury crashes. Although alcohol was frequently involved, several crashes also included marijuana, prescription medications, or other drugs. Failure to properly use occupant restraints was another common trend, with many unrestrained occupants being ejected from their vehicles, contributing to crash severity. The narratives also frequently described drivers overcorrecting after departing the roadway, particularly following roadway departures on curves or poor roadway conditions. In several cases, overcorrection caused vehicles to reenter the roadway or cross into opposing traffic, resulting in multi-vehicle crashes. Excessive speed, wrong-way driving, distraction, fatigue, and medical episodes were also identified as contributing factors in several severe crashes.

The crash narratives identified several recurring roadway and crash characteristics. Roadway departures while negotiating curves contributed to one fatal and six suspected serious injury crashes, most of which resulted in single-vehicle rollovers. Four crashes involved vehicles striking the high-tension cable median barrier, which may have prevented cross-median crashes. The narratives also documented two secondary crashes associated with earlier incidents, including one involving roadway debris and another involving a chain-reaction crash as traffic slowed for a previous collision. Weather was a contributing factor in a small number of crashes, including two that occurred on icy bridge surfaces. Despite the high frequency of wildlife crashes along the corridor, only one suspected serious injury crash reviewed in the narratives involved an animal.

Several fatal and suspected serious injury crashes involved commercial vehicles, motorcycles, or passenger vehicles towing trailers. Commercial vehicles were involved in two fatal and six suspected serious injury crashes, with narratives commonly describing trucks being unable to stop in time after another vehicle crossed into their path. Motorcycles were involved in one fatal and five suspected serious injury crashes, most of which were single-vehicle crashes in which the rider lost control. Speed, hydroplaning, a tire failure, and a wrong-way maneuver were identified as contributing factors in the motorcycle crashes. Three additional suspected serious injury crashes involved passenger vehicles towing trailers, including one in which a disconnected trailer contributed to a secondary crash.

6.4 Crash Type

Crash types were grouped into two categories: single- and multiple-vehicle crashes. Single-vehicle crashes are those that involve only one vehicle while multiple-vehicle crashes involve two or more vehicles.

Mainline Crashes

Along the I-90 mainline, single-vehicle crashes accounted for 75 percent (909 crashes) of all reported crashes. Among single-vehicle crashes, collisions with fixed objects were the most common, representing 28 percent of all crashes. Wild-animal crashes were the second most common, accounting for 22 percent of crashes. Despite their frequency, only one wild-animal crash resulted in a fatal or suspected serious injury.

Rollover crashes represented 15 percent of crashes. Bridge locations were evaluated as a potential contributing factor to rollover crashes. Only six rollover crashes occurred on bridges and an additional 12 occurred near bridges, indicating rollover crashes are not substantially concentrated at bridge locations.

Multiple-vehicle crashes accounted for the remaining 25 percent (311 crashes) of reported crashes. The most common multiple-vehicle crash types were rear-end crashes and same-direction sideswipe crashes, representing 9.5 percent and 8.8 percent of all crashes, respectively. **Figure 21** illustrates the distribution of crash types along the mainline corridor.

Fatal crashes were predominantly associated with rollover crashes, which accounted for 75 percent of all fatal crashes. Head-on crashes accounted for an additional 17 percent of fatal crashes.

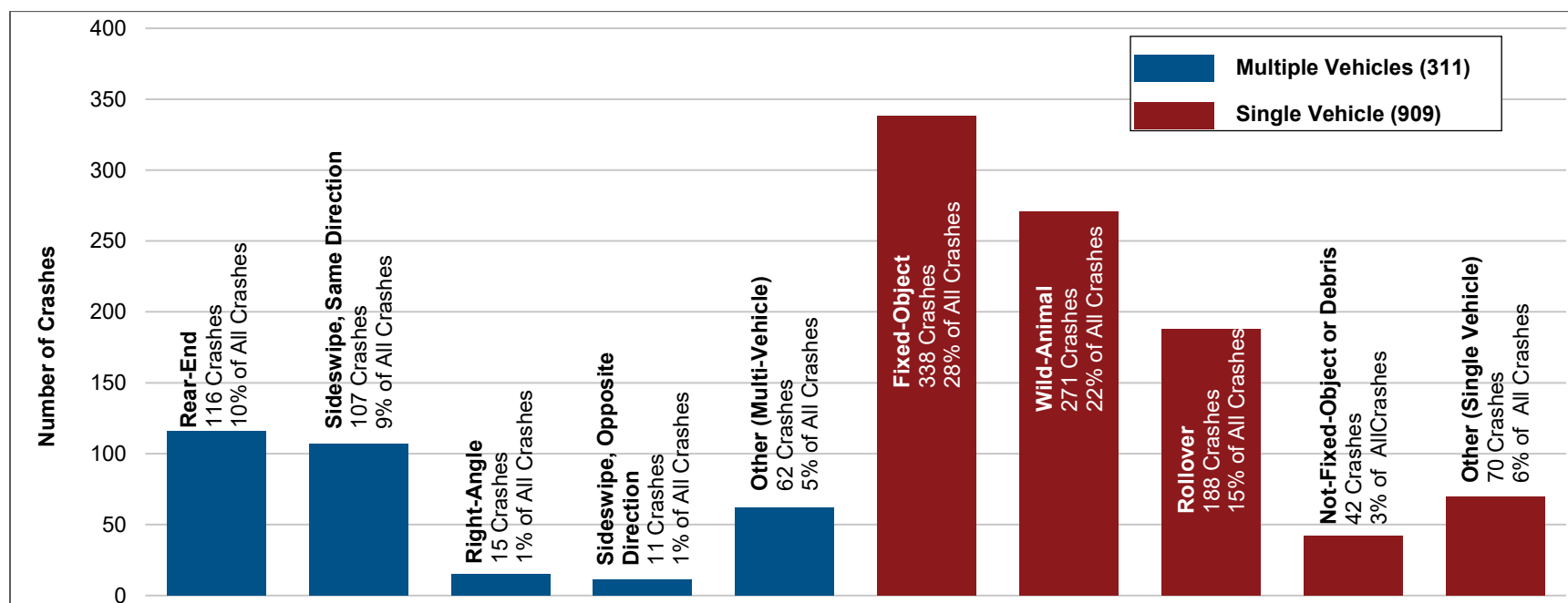


Figure 21: Mainline Crash Type

Interchange Crashes

Within interchange areas, single-vehicle crashes accounted for 31 percent (105 crashes) of all reported crashes. Among these crashes, collisions with fixed objects were the most common, representing 21 percent of all crashes. Rollover crashes and wild-animal crashes were less frequent, accounting for 3.2 percent and 2.7 percent of all crashes, respectively. However, rollover crashes represented one-third of severe interchange crashes, including two suspected serious injury crashes and one fatal crash.

Multiple-vehicle crashes accounted for the remaining 69 percent (234 crashes) of reported crashes. Rear-end crashes were the most common crash type, representing 40 percent of all crashes, followed by right-angle crashes (13 percent) and same-direction sideswipe crashes (8.6 percent). **Figure 22** illustrates the distribution of crash types within interchange areas.

Crash types within interchange areas are often influenced by the presence of junctions, including ramp terminals and crossroad intersections. The higher proportion of rear-end and right-angle crashes likely reflects the increased number of conflict points associated with turning, stopping, merging, and crossing movements.

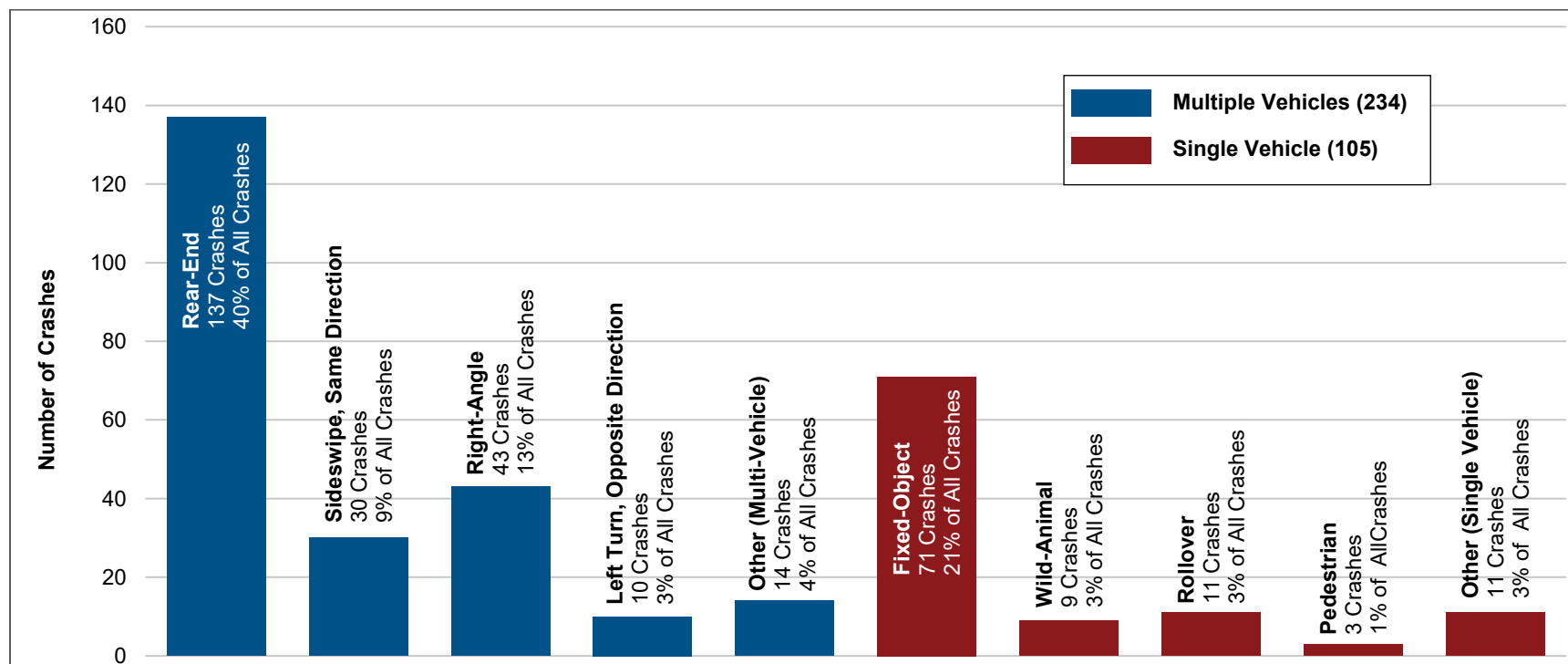


Figure 22: Interchange Crash Type

6.5 Crash Period

Each crash record includes the date and time when the crash occurred. This information can be used to identify time-dependent and seasonal crash trends within the study area.

6.5.1 Time of Day Trends

Time-of-day data was analyzed to determine whether any specific trends were present for mainline and interchange crashes. The data was plotted based on the hour of occurrence and whether the crash occurred on a weekday (Monday through Friday) or weekend (Saturday through Sunday).

Mainline Crashes

For weekday crashes along the mainline (74 percent of mainline crashes), one main peak is apparent. This peak occurred during the morning commuting hours of 6:00 a.m. to 8:00 a.m., which accounted for 20 percent of weekday crashes. Crash volumes are generally elevated during the morning hours, from 6:00 a.m. to 11:00 a.m., which accounted for 36 percent of weekday crashes. From 1:00 p.m. to 8:00 p.m., crash volumes were lower but generally consistent, with small peaks around 1:00 p.m. and 5:00 p.m. corresponding to midday and evening commuting hours. For the weekend crashes (26 percent of mainline crashes), peak periods were less defined in the absence of commute patterns as the crashes were more distributed throughout the day. A small peak occurs from 7:00 a.m. to 9:00 a.m. that accounts for 21 percent of weekend crashes. Both periods saw a decrease in crashes around noon. **Figure 23** presents the distribution of crashes with respect to the time of day that the crashes occurred.

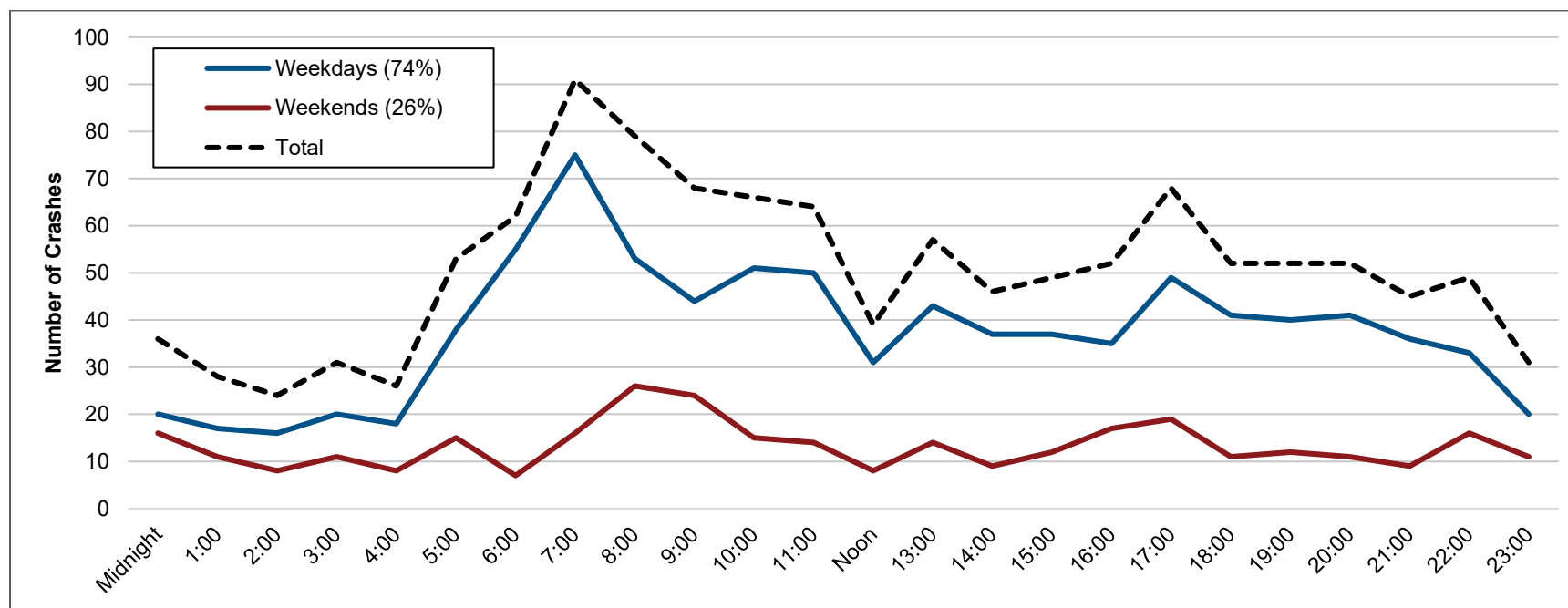


Figure 23: Mainline Crash Occurrence by Time of Day

Interchange Crashes

For weekday crashes at the interchanges (77 percent of interchange crashes), most crashes happen during the day. About 84 percent of all weekday crashes occurred from 6:00 a.m. to 6:00 p.m. During this range, two peaks were observed. The first peak corresponds to morning commuting hours from 6:00 a.m. to 9:00 a.m., and accounts for 24 percent of weekday crashes. The second peak occurs from 3:00 p.m. to 6:00 p.m. and accounts for 35 percent of weekday crashes. For the weekend crashes (23 percent of interchange crashes), peak periods were less defined in the absence of commute patterns as the crashes were more distributed throughout the day. They generally are higher during the day with a peak from 10:00 a.m. to 2:00 p.m., which represents 45 percent of weekend crashes. **Figure 24** presents the distribution of crashes with respect to the time of day that the crashes occurred.

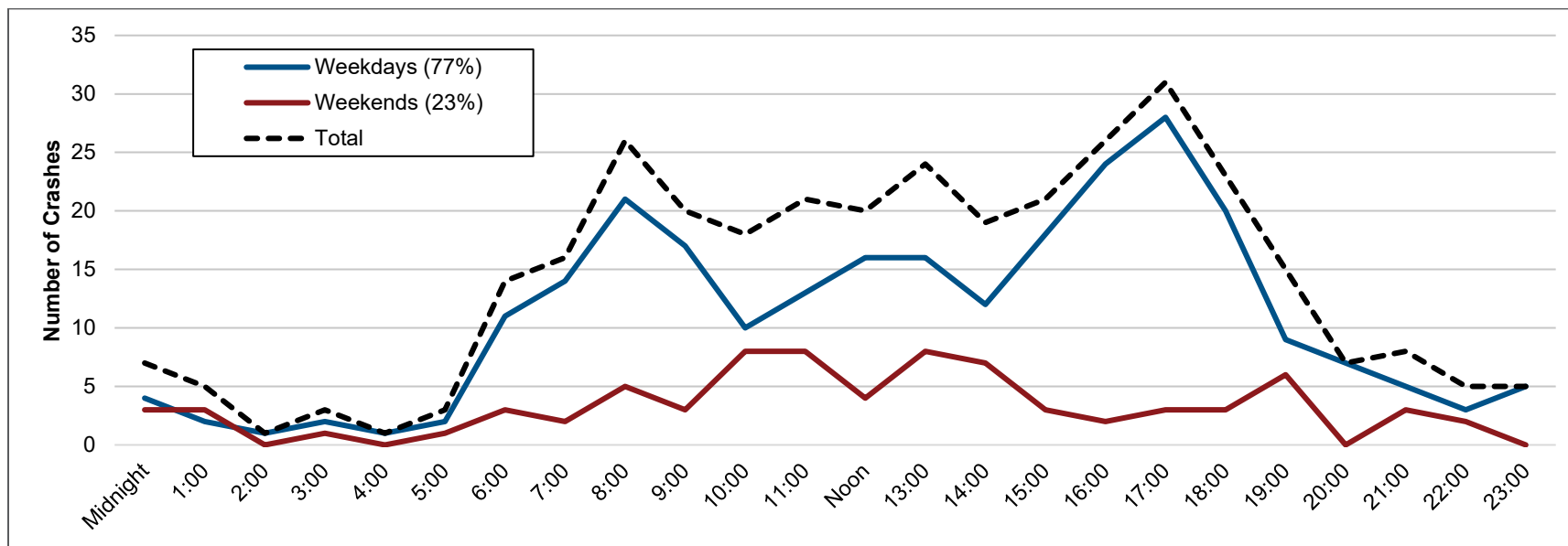


Figure 24: Interchange Crash Occurrence by Time of Day

6.5.2 Day of the Week and Seasonal Trends

Mainline Crashes

The frequency of mainline crashes occurring during each month and on a given day of the week were plotted in **Figure 25**. In general, the crashes were fairly evenly distributed across weekdays, with the greatest number of crashes occurring on Fridays (17 percent) and the fewest crashes occurring on Saturdays and Sundays (13 percent each). In general, the highest number of crashes were observed during the winter months (November through February), when 45 percent of crashes occurred, while crashes were the lowest during the shoulder seasons (March through May and August through September). An increase in monthly crashes is also observed during summer months (June and July), however, the greatest number of crashes occurred in December (13 percent) and November (12 percent).

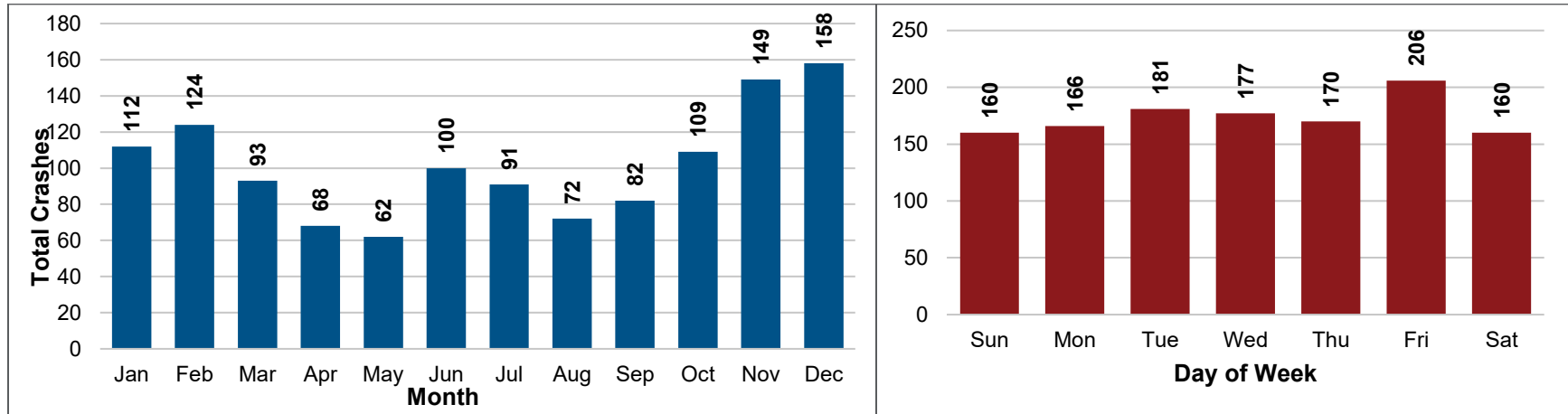


Figure 25: Mainline Crash Occurrence by Month and Day of the Week

Interchange Crashes

The frequency of crashes occurring during each month and on a given day within the interchanges were plotted in **Figure 26**. In general, the crashes were evenly distributed with a slight downward trend throughout the week. The greatest number of crashes occurred on Mondays (17 percent) and the fewest crashes occurring on Sundays (10 percent). In general, the highest number of crashes were observed during the winter months (particularly December through February), when 31 percent of crashes occurred. A second increase in crashes was observed during late spring (May) and early fall, with September recording the same number of crashes as February. Crashes were the lowest during the early spring months in March and April (six percent each).

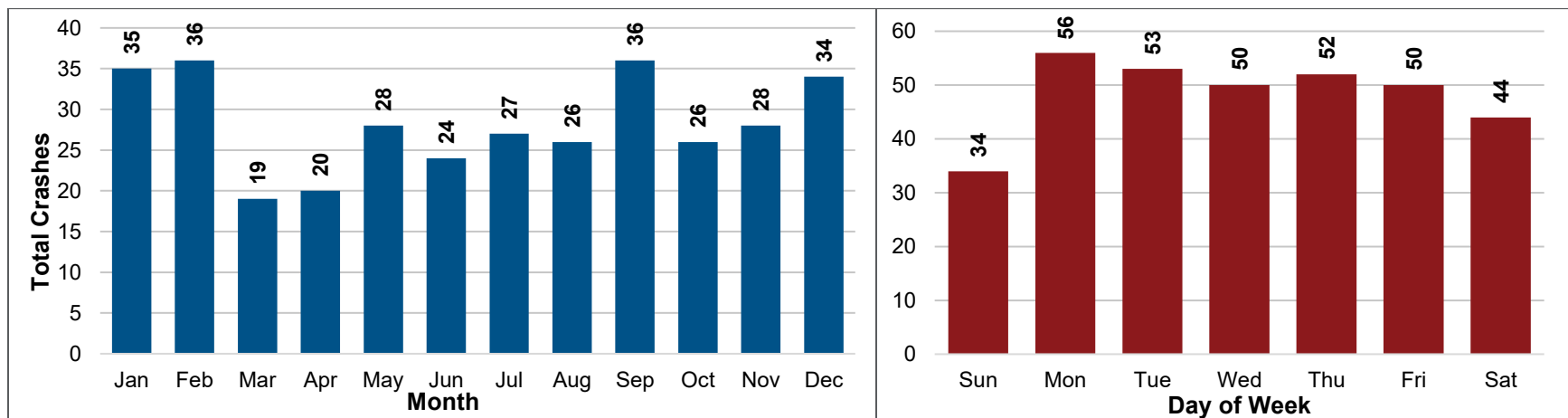


Figure 26: Interchange Crash Occurrence by Month and Day of the Week

6.5.3 Annual Trends

Mainline Crashes

Figure 27 shows the frequency of mainline crashes occurring per year. As shown in the figure, the number of crashes per year has fluctuated over time, with a peak in 2021 accounting for 22 percent of the crashes over the analysis period. During the same year, the number of severe crashes resulting in a fatality or suspected serious injury was second highest with 11 severe crashes. Although 2023 had slightly fewer total crashes than 2021 and 2022, it recorded the highest number of severe crashes, with 13 reported during the year. Both total crashes and severe crashes were lowest in 2020, likely corresponding to lower traffic volumes due to the COVID-19 pandemic. Overall, crash frequencies were lower in 2020 and 2024 and generally higher from 2021 through 2023.

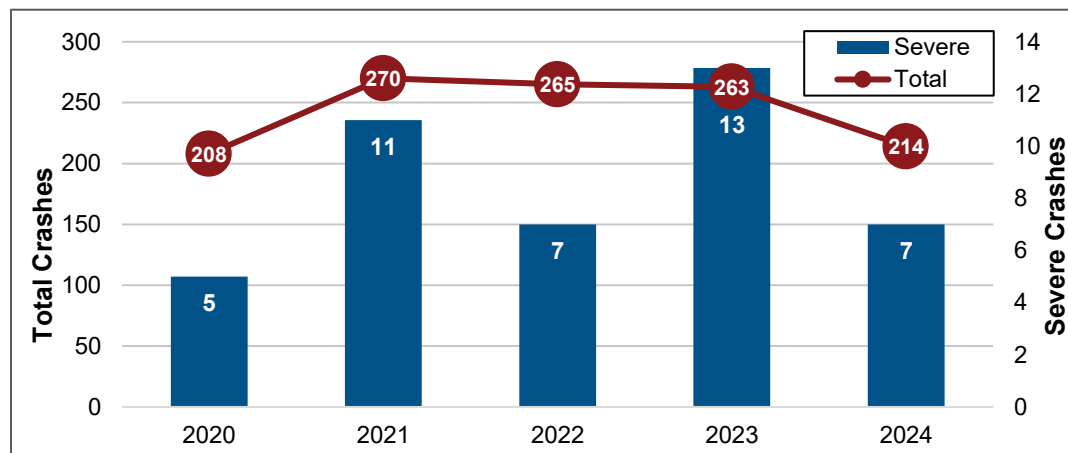


Figure 27: Mainline Crashes per Year

Interchange Crashes

Figure 28 shows the frequency of interchange crashes occurring per year. As shown in the figure, the number of crashes per year has remained relatively constant with a slight decrease in later years (2023 and 2024). Crash frequencies peaked in 2021, which accounted for 22 percent of all interchange crashes during the analysis period. The number of severe crashes resulting in a fatality or suspected serious injury were highest in 2020 and 2021, with four severe crashes reported in each year. Following 2021, only one severe crash was reported during the three-year period from 2022 through 2024.

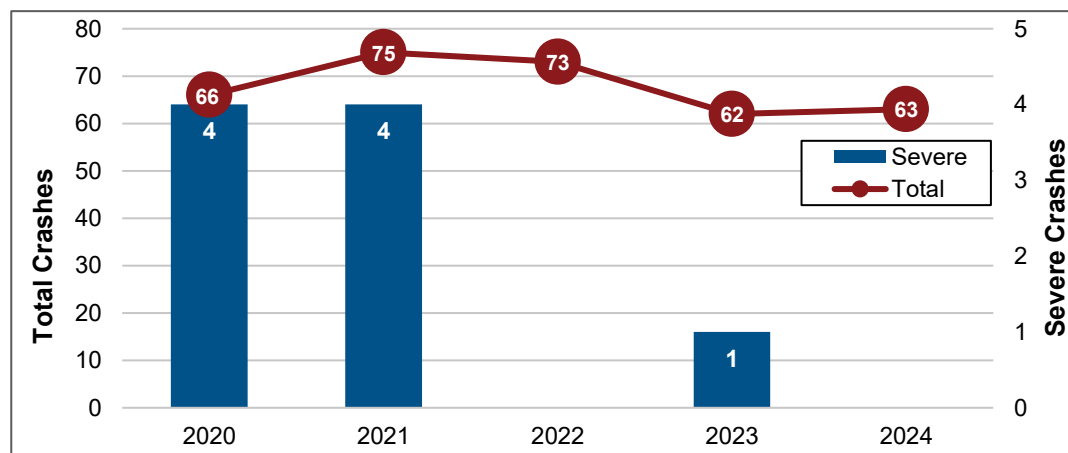


Figure 28: Interchange Crashes Per Year

6.6 Environmental Factors

Crash data was reviewed to determine if any trends exist in relation to environmental factors such as weather, roadway surface, and lighting conditions.

Mainline Crashes

The weather condition was reported as clear or cloudy in 75 percent of all mainline crashes and 81 percent of severe crashes. Approximately 24 percent of crashes occurred during adverse weather conditions, including snow (19 percent) and rain (three percent). **Figure 29** presents the distribution of crashes based on weather conditions. The “other” category includes fog, smog, or smoke, sleet/hail/freezing rain/drizzle, blowing snow, and unknown.

The reported road surface condition for crashes within the study area is also presented in **Figure 29**. Approximately 57 percent of all crashes occurred on dry road surfaces, while a combined 41 percent occurred on wet (six percent), snow-covered (10 percent), or icy/frost-covered (25 percent) roadways. Icy or frost-covered roads was the most common adverse surface condition, contributing to approximately one-quarter of all crashes and 14 percent of severe crashes. Severe crashes occurred primarily on dry roads (72 percent). The “other” category includes standing water and slush.

About 55 percent of all mainline crashes were reported as having occurred under daylight conditions. An additional 38 percent of crashes were reported as occurring at dark, and about 91 percent of those occurred where street lighting was not present. Severe crashes occurred during daylight hours approximately 51 percent of the time, and at dark without street lighting approximately 44 percent of the time. The distribution of crashes occurring under the different lighting conditions is presented in **Figure 29**. The “other” category includes dusk, dawn, and unknown.

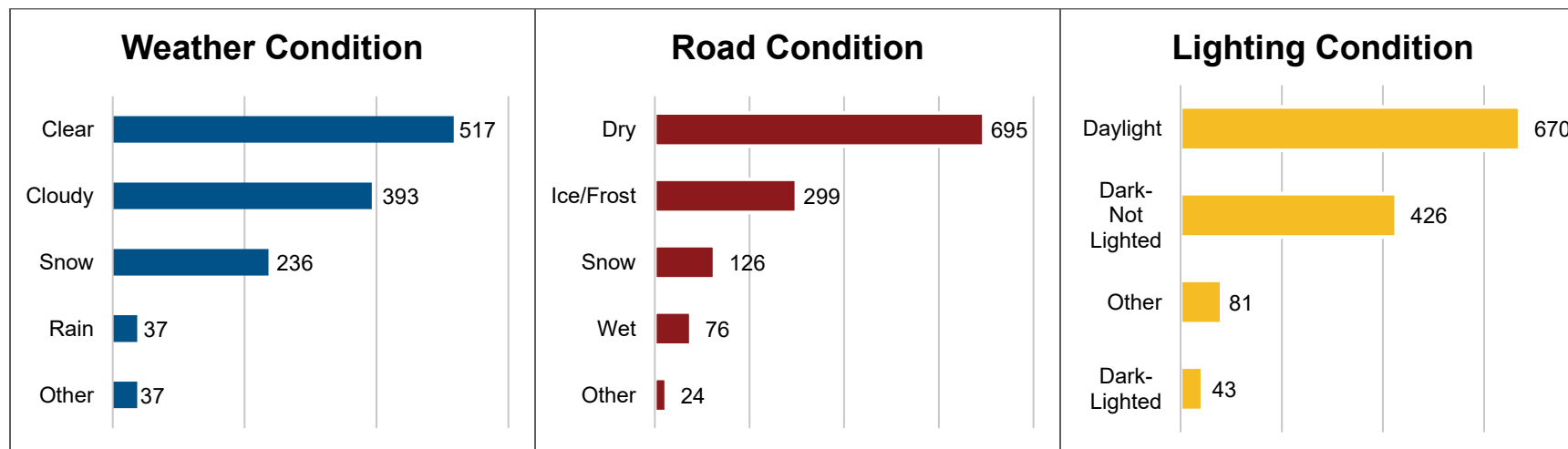


Figure 29: Mainline Crash Environmental Factors

Interchange Crashes

The weather condition was reported as clear or cloudy in 85 percent of all interchange crashes and 78 percent of severe crashes. Adverse weather conditions, including snow and rain, were reported in approximately 15 percent of all crashes and 22 percent of severe crashes. **Figure 30** presents the distribution of crashes based on weather conditions. The “other” category includes fog, smog, or smoke, sleet/hail/freezing rain/drizzle, blowing snow, and unknown.

The reported road surface condition for crashes within the study area is also presented in **Figure 30**. Approximately 65 percent of all crashes were reported as having occurred on dry roads, while 35 percent of crashes were reported as having occurred on wet, snowy, or icy/frost-covered roads. Severe crashes occurred primarily on dry roads (78 percent) with the other crashes occurring on wet (11 percent) or snowy roads (11 percent). The “other” category includes standing water and slush.

About 75 percent of all interchange crashes were reported as having occurred under daylight conditions. An additional 20 percent of crashes were reported as occurring at dark, about 39 percent of those occurred where street lighting was not present. Similarly, severe crashes occurred during daylight hours approximately 56 percent of the time, and at dark with street lighting approximately 44 percent of the time. The distribution of crashes occurring under the different lighting conditions is presented in **Figure 30**. The “other” category includes dusk, dawn, and unknown.

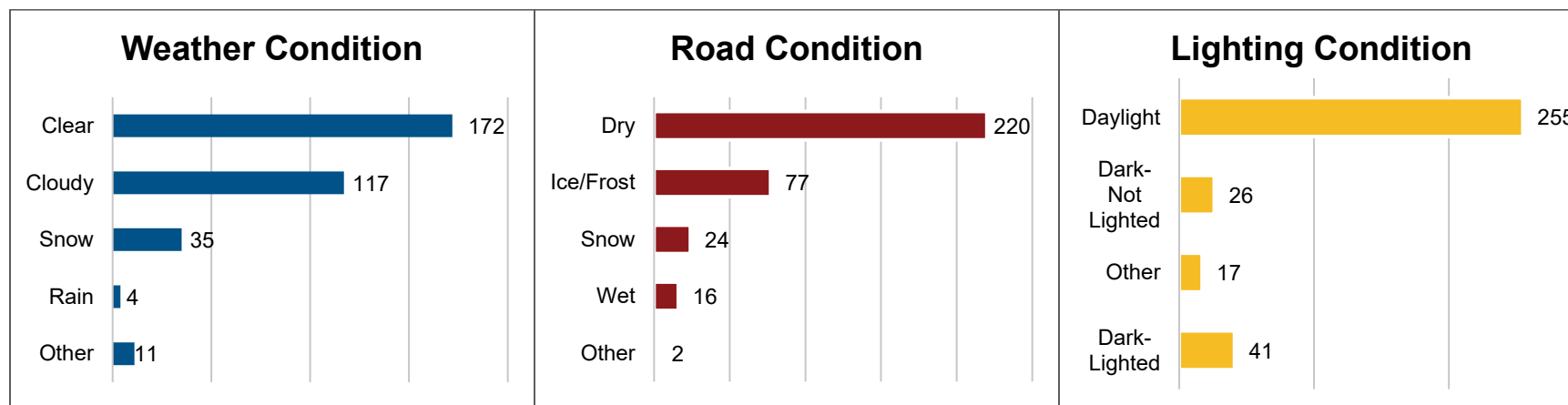


Figure 30: Interchange Crash Environmental Factors

6.7 Person Details

Mainline Crashes

A total of 2,097 people were involved in the 1,220 mainline crashes in the study corridor over the analysis period. Approximately 73 percent of the people involved in crashes were drivers and 26 percent were passengers. More crashes involved male drivers. About 68 percent of drivers involved in crashes were male and 32 percent were female. Among the severe crashes, 60 percent of drivers were male, and the other 40 percent were female. With respect to age, about 8.2 percent of drivers were over the age of 65 and about 15 percent of drivers were under the age of 21. Drivers under the age of 21 and drivers age 65 and older were each involved in seven percent of severe crashes.

Interchange Crashes

A total of 749 people were involved in the 339 interchange crashes over the analysis period. Approximately 75 percent of the people involved in crashes were drivers, and 20 percent were passengers. About 64 percent of drivers involved in crashes were male and 36 percent were female. For severe crashes, 83 percent of drivers involved were male while 17 percent were female. With respect to age, about 9.5 percent of drivers were over the age of 65 and about 13 percent of drivers were under the age of 21. Drivers under 21 were involved in 18 percent of severe crashes.

6.7.1 Vulnerable Road Users

Mainline Crashes

Of the 1,220 crashes that occurred during the five-year analysis period, less than one percent involved vulnerable road users (pedestrians or bicyclists). There were five pedestrian-related crashes and three crashes involving occupants of motor vehicles not in transport that occurred on the mainline, which involved a total of 10 non-motorists. One pedestrian, who suffered fatal injuries, was reported to be under the influence and improperly in the roadway. Two pedestrians were reported as having suspected injuries. All pedestrians were male and ranged in ages from 14 to 66. Upon further investigation of the crash records, it appears that two of the non-motorists were incorrectly coded in the database.

Interchange Crashes

Of the 339 crashes that occurred at interchanges, 1.5 percent involved vulnerable road users. A total of three pedestrian-related crashes and two bicycle-related crashes occurred over the five-year analysis period, involving a total of 11 non-motorists. Of these 11 individuals, two were listed as impaired from alcohol. Five non-motorists were involved in rear-end crashes, and one was involved in a right-angle crash. Although the crash reports do not clearly indicate the role of the non-motorists, these crashes may have occurred when motorists slowed or stopped to yield to pedestrians, resulting in secondary vehicle-to-vehicle collisions. Of the vulnerable road users involved in crashes, one pedestrian had a suspected serious injury and one had a suspected minor injury. Both bicyclists had suspected minor injuries. The pedestrians and bicyclists were all male and the majority were 31 or younger.

6.7.2 Driver Condition

Driver conditions at the time of the crash can point to driver behavior issues that may need to be addressed. The crash records indicate whether each crash involved fatigued, distracted, and/or impaired drivers. These behaviors are determined and reported based upon the reporting officer's assessment or driver admission. Impaired driving is defined as operating a vehicle while under the influence of drugs or alcohol. In Montana, driving under the influence is when the driver's blood alcohol concentration is 0.08 or higher. Impairment of marijuana in Montana is defined as exceeding a five nanogram (ng)/ml threshold for tetrahydrocannabinol (THC) in blood for anyone operating a motor vehicle.

Mainline Crashes

Records for mainline crashes indicate that 29 drivers (1.9 percent) were fatigued at the time of the crash and 43 drivers (2.8 percent) were distracted at the time of the crash. Of the distracted drivers, 42 percent were distracted by electronic devices and 33 percent were distracted by an external distraction.

Approximately 7.5 percent of mainline crashes (92 crashes) were determined to have involved an impaired driver. Impaired drivers were also more likely to be involved in severe crashes. Approximately 51 percent of severe crashes (22 crashes) involved an impaired driver. Of the 12 fatal crashes, eight crashes (67 percent) involved an impaired driver. Overall, of the 1,528 drivers involved in all mainline crashes, 118 drivers (7.7 percent) were suspected and/or determined to be under the influence of drugs or alcohol at the time of the crash.

Interchange Crashes

At interchanges within the study area, crash records indicate that one driver was fatigued at the time of the crash and 30 drivers were distracted. Of the distracted drivers, 40 percent were distracted by something inside the vehicle (excluding electronic devices) and 33 were distracted by an external distraction.

Approximately 11 percent of crashes occurring at interchanges (36 crashes) were determined to have involved an impaired driver. Two of the nine severe crashes involved an impaired driver. Overall, of the 558 drivers involved in interchange crashes, 54 drivers (9.7 percent) were suspected and/or determined to be under the influence of drugs or alcohol at the time of the crash.

6.7.3 Contributing Actions

Up to four contributing actions can be reported for each driver involved in a crash. These are actions that occurred which led to the occurrence of a crash. When the driver had no contributing action, all fields are left blank or "no contributing action" is listed in one or more fields. When calculating the top contributing actions by drivers, the sum of the occurrences of each contributing action in all four fields was divided by the total number of reported driver records. Since a driver can have up to four contributing actions, the percentages do not add up to 100 percent.

Mainline Crashes

Figure 31 shows the top contributing factors in mainline crashes within the analysis period. The most common contributing actions were driving too fast for conditions, accounting for about 24 percent of drivers, and running off the roadway, accounting for about 22 percent of drivers. Driving in a distracted, inattentive, or careless manner, over-correcting/over-steering, and failing to keep in the proper lane were listed as contributing actions for a combined 34 percent of drivers. About 45 percent of drivers were found to have no contributing action in the crash.

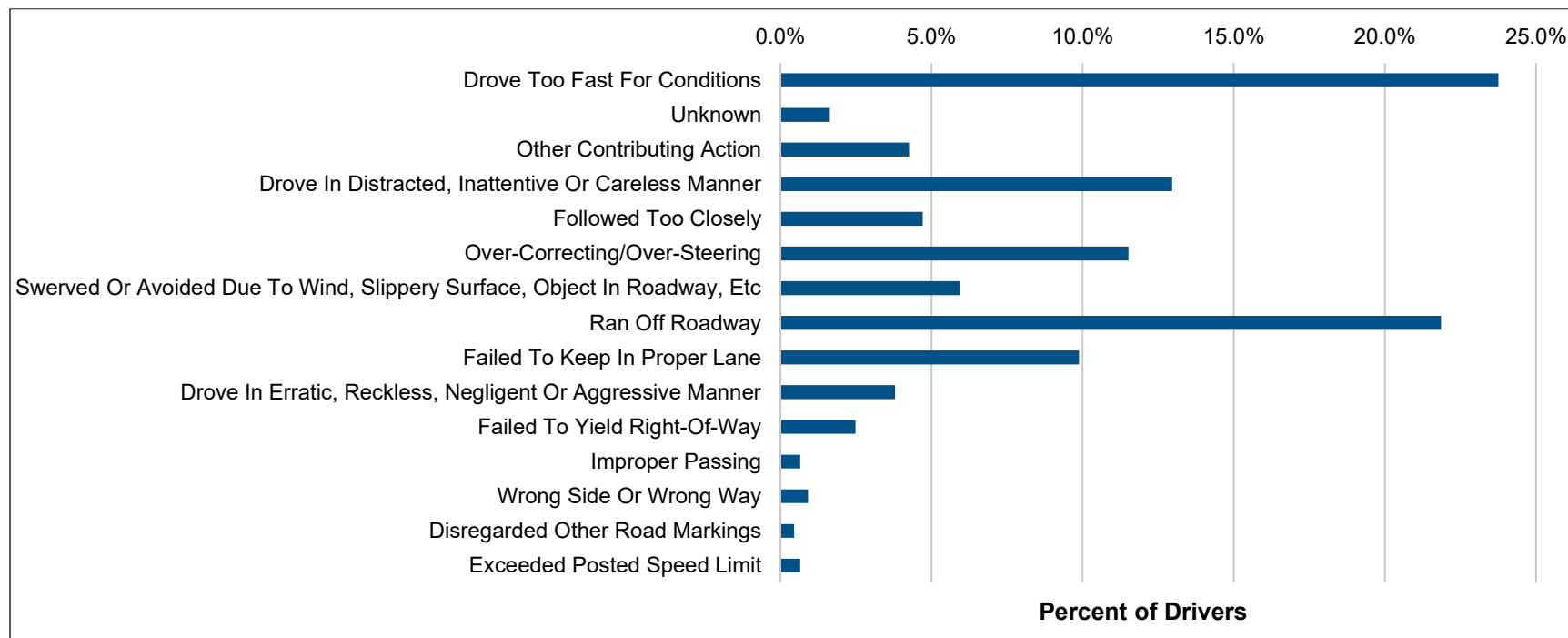


Figure 31: Mainline Driver Contributing Actions

Interchange Crashes

Figure 32 shows the top contributing factors in interchange crashes within the analysis period. The most common contributing action was driving in a distracted, inattentive, or careless manner, accounting for about 27 percent of drivers. Driving too fast for conditions, running off the roadway, failing to yield ROW, and following too closely were each listed as contributing actions for seven to 10 percent of drivers, for a combined 38 percent of drivers. About 47 percent of drivers were found to have no contributing action in interchange crashes.

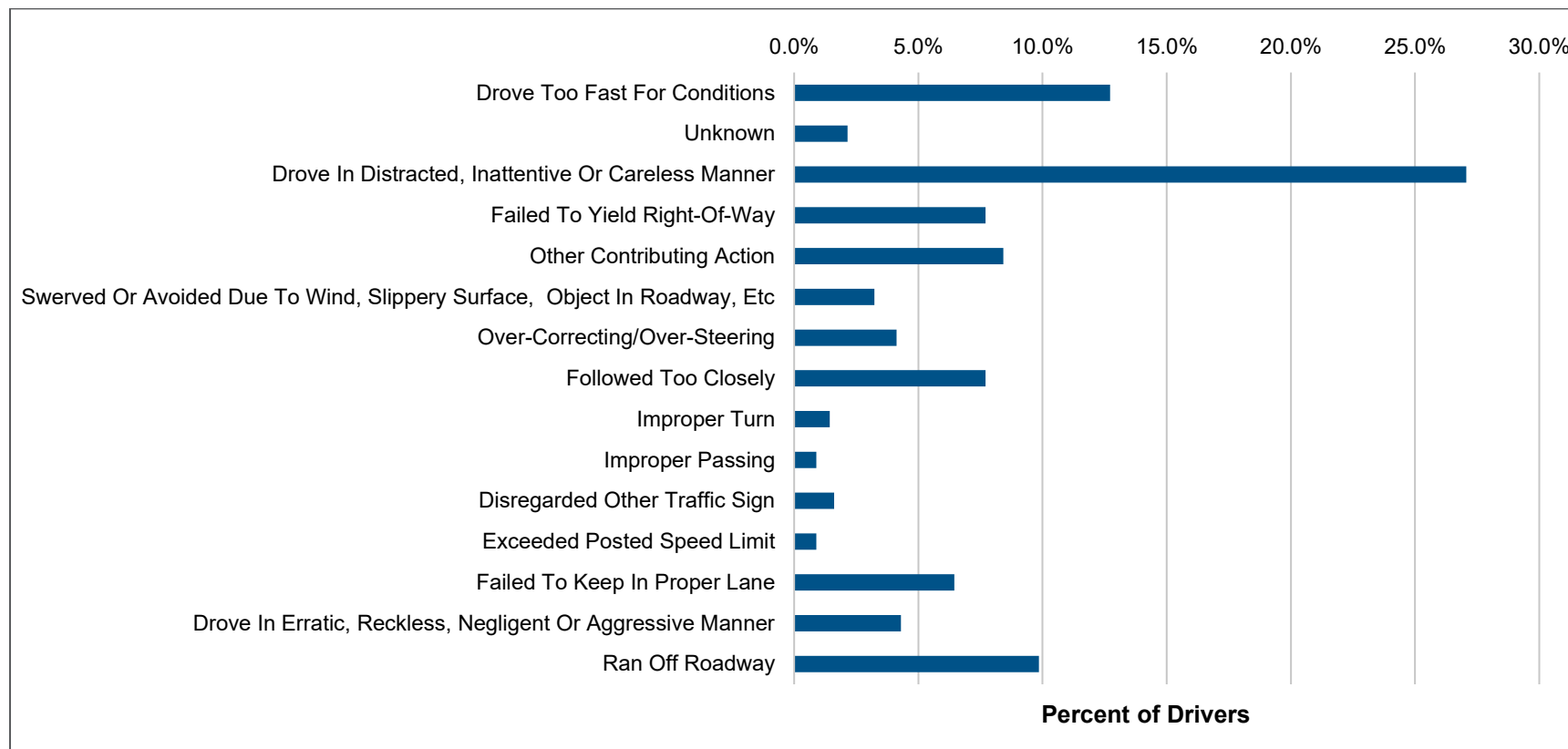


Figure 32: Interchange Driver Contributing Actions

6.7.4 Wrong-Way Drivers

Although wrong-way driving crashes represent a small percentage of crashes along the I-90 corridor, they often result in severe outcomes due to the high likelihood of head-on collisions. Given the severity of these crashes and recent mitigation efforts along the corridor, wrong-way driving was evaluated in greater detail using crash data, crash narratives, and citation records.

Potential wrong-way driving crashes were identified by filtering the crash database for crashes in which at least one driver was assigned the contributing action of "Wrong Side or Wrong Way." This screening identified 18 crashes, including two fatal and four suspected serious injury crashes. Fifteen of the crashes occurred between 2022 and 2024, with head-on collisions accounting for nearly half of the crashes (eight crashes). Half of the crashes occurred during darkness without roadway lighting, and 10 involved impaired drivers. Spatially, five crashes occurred between the 7th Avenue and Main Street Interchanges, while two were associated with the Three Forks Interchange. Only four wrong-way drivers held out-of-state driver's licenses, suggesting that wrong-way driving crashes in the corridor are not primarily associated with drivers who are unfamiliar with the area.

Crash narratives were reviewed to distinguish true wrong-way driving events from crossover crashes. The review determined that only half of the 18 crashes identified through the crash database (nine crashes) involved drivers traveling the wrong direction on the Interstate, while the remaining nine crashes were crossover crashes in which vehicles entered opposing traffic after losing control. The confirmed wrong-way driving crashes included two fatal and three suspected serious injury crashes. Impairment was identified as a contributing factor in seven of the nine wrong-way driving crashes. Of the remaining two crashes, one involved a driver experiencing a medical emergency, while the other involved a commercial vehicle driver attempting to make a U-turn at the Amsterdam Road Interchange.

Where sufficient information was available, the crash narratives were also reviewed to identify where wrong-way drivers entered the Interstate. Two crashes were confirmed to have originated at the Amsterdam Road Interchange, and one was confirmed at the N 7th Avenue Interchange. Based on the available evidence in the crash narratives, an additional crash likely originated at either the N 7th Avenue or N 19th Avenue Interchange, two likely originated at the Airway Boulevard Interchange, and one likely originated at the Main Street Interchange. The entry location could not be determined for the remaining crashes. The crash narratives also indicated that wrong-way events more frequently involved westbound drivers entering the eastbound lanes, accounting for six of the nine confirmed wrong-way driving crashes, while the remaining three involved eastbound drivers entering the westbound lanes.

Wrong-way driving citations were also reviewed to identify patterns in enforcement; however, citation data have limitations because there is no single citation code consistently used for wrong-way driving. Many wrong-way drivers are likely cited under broader offenses, such as careless driving, reckless driving, negligent endangerment, or driving under the influence, making them difficult to identify. Only four citations were definitively associated with wrong-way driving based on the citation classifications "Drive on Other Than Right-Hand Roadway of Divided Highway" or "Travel Wrong Direction – One Way Street or Highway." All four citations involved drivers traveling westbound in the eastbound lanes. Based on the available information, these drivers likely entered the Interstate in the wrong direction at the North 19th Avenue, 7th Avenue, Amsterdam Road, and West Three Forks Interchanges.

In response to recurring wrong-way driving crashes along the I-90 corridor, MDT partnered with Gallatin County Sheriff's Office, Broadwater County Sheriff's Office, and the Montana Highway Patrol to install radar-activated wrong-way detection systems at several interchanges. The systems became operational in April 2024 during the last year of the 2020-2024 safety analysis period, and therefore system performance is not reflected in the majority of crash data assessed for this study. The systems include flashing red wrong-way signs that activate when a vehicle is detected traveling in the wrong direction. The solar-powered systems were installed at the following locations:

- West Three Forks Interchange: one wrong-way radar (WWR) on the westbound exit ramp
- Manhattan Interchange: one WWR on each exit ramp
- Amsterdam Road Interchange: one WWR on the eastbound exit ramp
- Jackrabbit Lane Interchange: one WWR on the westbound exit ramp
- N 19th Avenue Interchange: one WWR on each exit ramp
- N 7th Avenue Interchange: one WWR on each exit ramp

Many of the confirmed or likely wrong-way entry locations identified through the crash narrative review correspond to Interchanges where MDT has installed these detection systems, including the West Three Forks, Amsterdam Road, North 19th Avenue, and North 7th Avenue Interchanges.

6.8 Vehicle Details

Mainline Crashes

Over the analysis period, 1,563 vehicles were involved in crashes on the mainline of the Interstate. Of these vehicles, 30 percent were passenger cars/vans, 27 percent were pickups, and 27 percent were sport utility vehicles. Commercial trucks were involved in about 12 percent of crashes while motorcycles were involved in 0.5 percent of crashes. Other vehicles involved in crashes included light trucks/cargo vans (two percent), motorhomes (less than one percent), and snowplows (less than one percent). The majority of severe crashes involved passenger vehicles (89 percent) while 5.7 percent involved commercial vehicles and 3.2 percent involved motorcycles. Commercial vehicles were involved in 19 percent of all crashes and one of the fatal crashes (resulting in two fatalities) involved a commercial vehicle. The driver in the fatal crash was determined to be under the influence.

Interchange Crashes

Over the analysis period, 591 vehicles were involved in interchange crashes. Of these vehicles, 31 percent were passenger cars/vans, 28 percent were pickups, and 26 percent were sport utility vehicles. Commercial vehicles were involved in 9.8 percent of crashes while motorcycles were involved in 1.4 percent of crashes. Other vehicles involved in crashes included light trucks/cargo vans, farm equipment, and motorhomes (all less than one percent). There was one crash involving a school bus, with no injuries reported. The majority of severe crashes involved passenger vehicles (88 percent) while about 10 percent involved motorcycles, and two percent involved commercial vehicles.

6.9 Level of Service of Safety

A level of service of safety (LOSS) analysis was completed by MDT for the study corridor using the five years of crash data and a Montana LOSS model developed for various terrain types and corridor configurations. The LOSS analysis applies only to non-junction (mainline) crashes and does not include crashes occurring at interchanges, ramp terminals, or other junction-related locations. For this analysis the study corridor was broken into five sections. These models only pertain to non-junction crashes and provide both a quantitative and qualitative performance of the corridor based on other Montana roadways that have similar traffic volumes and terrain types. These models are only relevant to the mainline section. Based on the modeling results, the study corridor as a whole is performing at a LOSS II or III rating for all non-junction crashes depending on the section. A LOSS II rating indicates a low to moderate potential for crash reduction, while a LOSS rating III indicates a moderate to high potential for crash reduction. When considering fatal and suspected serious injury non-junction crashes, the corridor is also found to perform at LOSS II or III rating for these severe crash types. LOSS results were not provided for Segment 4, therefore, no LOSS rating is available for that section. A summary of the LOSS ratings for each section is shown in **Table 33**.

Table 33: Level of Service of Safety for Mainline Crashes

Segment Number	Start RP	End RP	LOSS Model	Total Model LOSS Rating ^(a) (All Crashes)	Severity Model LOSS Rating ^(a) (Fatal and Injury Crashes)
Segment 1	274.000	294.810	Rural, Flat, Rolling 4-Lane Freeway	II	II
Segment 2	294.810	311.230	Urban 4-Lane Freeway	III	III
Segment 3	311.230	312.990	Rural, Flat, Rolling 4-Lane Freeway	II	II
Segment 4	312.990	313.490	No Model	N/A	N/A
Segment 5	313.490	314.000	3 Rural, Mountainous 4-Lane Freeway	II	II

Source: MDT. (2024). LOSS Summary.

^(a)Based On Non-Junction Related Crashes Only.

6.10 High Injury Network

A high injury network (HIN) is a screening methodology that identifies areas within the transportation system with the greatest safety concerns. Jurisdictions across the country use various methodologies to develop local HINs depending on the availability of data in their jurisdiction. A HIN was created for the study corridor by considering the frequency of crashes, rate of crashes in comparison to traffic volumes, and severity of injuries resulting from crashes. This method helps identify and prioritize locations with unusually high crash occurrences or especially severe crashes.

The segment-based HIN analysis evaluated the roadway network using a “sliding window” method, as recommended by the *Highway Safety Manual*,⁵⁰ to effectively compare roadway segments of equal length. The sliding window method evaluates crashes and injuries occurring in 0.5-mile segments (i.e., “windows”) and then slides the window 0.1-miles at a time, as demonstrated in **Figure 33**. This method helps identify locations with the highest concentrations of crashes and/or severe injuries and reduces the possibility of splitting locations with high concentrations of crashes into separate segments.

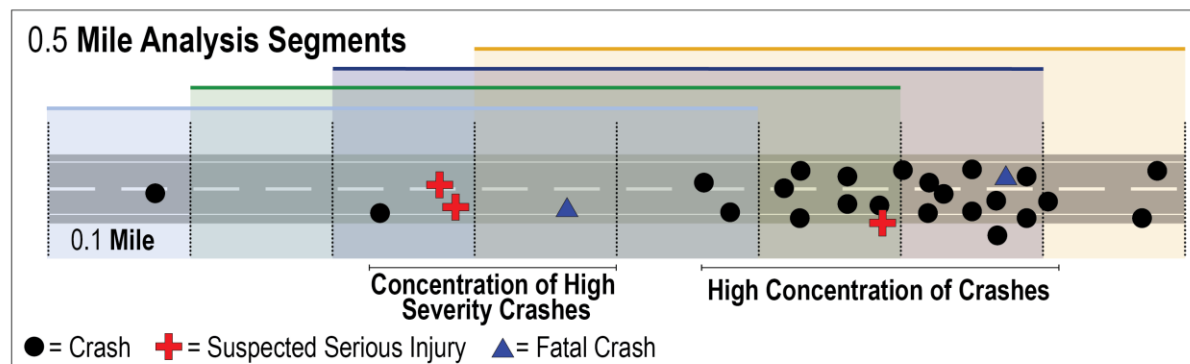


Figure 33: Sliding Window Method

Given the nature of the corridor, the HIN was calculated for the I-90 mainline and the interchanges separately. The sliding window method was used to identify high-crash locations along the I-90 mainline. Due to their shorter lengths, each ramp and the associated crossroad segment between the eastbound and westbound ramps within each interchange were evaluated as individual segments. The mainline and interchange analyses were conducted separately, and segments were compared only to others within the same category. As a result, crash frequencies, crash rates, and high-crash rankings for mainline segments should not be directly compared to those for interchange segments.

Figure 34 depicts the segments of the corridor with the highest resulting safety scores, and **Table 34** presents the characteristics of these segments. For the mainline analysis, the highest-scoring segments were grouped into four analysis areas, plus a separate analysis of the study interchanges. The following sections summarize crash characteristics and trends within each analysis area. For interchange areas, each interchange was included in the analysis and evaluated independently based on its resulting safety score.

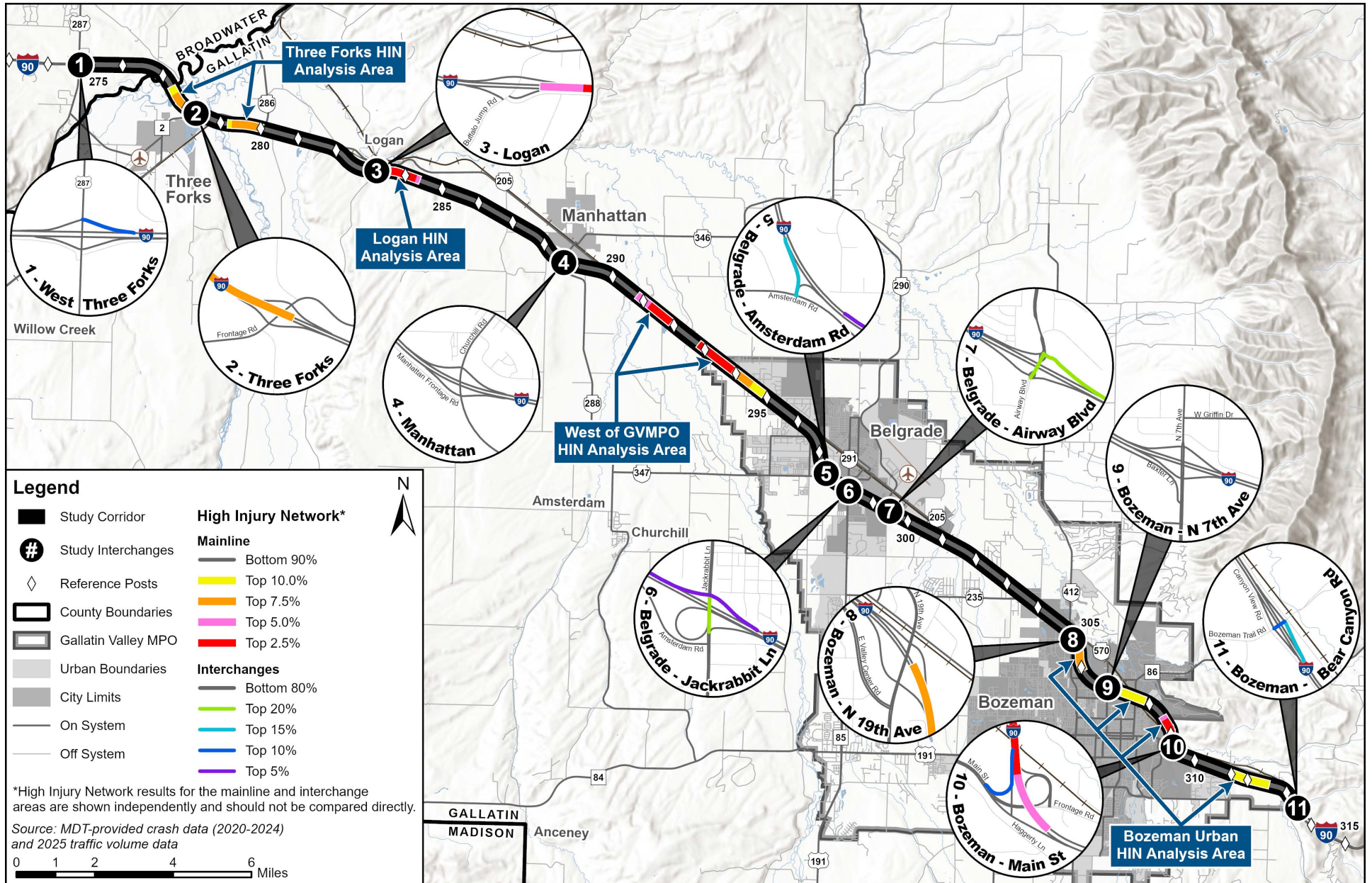


Figure 34: High Injury Network

Table 34: HIN - Highest Scoring Segments

HIN Analysis Area	Segment Location	Total Crashes	No Injuries	Minor/ Possible Injuries	Severe Injuries	HIN Ranking
Three Forks	RP 277.5 - 278.4	34	29	4	1	Top 7.5% - Top 10.0%
Three Forks	RP 279.3 – 280.0	17	15	0	2	Top 7.5% - Top 10.0%
Logan	RP 283.4 – 284.3	29	23	4	2	Top 2.5% - Top 5.0%
West of GVMPO	RP 290.9 – 291.8	41	33	6	2	Top 2.5% - Top 5.0%
West of GVMPO	RP 292.9 – 294.9	50	36	10	4	Top 2.5% - Top 10.0%
Bozeman Urban Area	RP 305.3 – 306.0	26	16	8	2	Top 7.5%
Bozeman Urban Area	RP 307.3 – 307.8	47	32	13	2	Top 10.0%
Bozeman Urban Area	RP 308.6 – 309.5	64	52	11	1	Top 2.5 – Top 5.0%%
Bozeman Urban Area	RP 311.1 – 312.5	16	10	4	2	Top 10.0%
Interchanges	1: West Three Forks	19	16	3	0	Top 10%
Interchanges	2: Three Forks	14	12	2	0	No components on HIN
Interchanges	3: Logan	8	8	0	0	No components on HIN
Interchanges	4: Manhattan	23	19	3	1	No components on HIN
Interchanges	5: Belgrade – Amsterdam Rd	35	24	9	2	Top 15% - Top 20%
Interchanges	6: Belgrade – Jackrabbit Ln	100	83	14	3	Top 5% - Top 10%
Interchanges	7: Belgrade – Airway Blvd	58	51	6	1	Top 15%
Interchanges	8: Bozeman – N 19th Ave	31	21	10	0	Top 20%
Interchanges	9: Bozeman – N 7th Ave	16	11	5	0	No components on HIN
Interchanges	10: Bozeman – Main St	14	11	1	2	Top 15%
Interchanges	11: Bozeman – Bear Canyon Rd	21	18	3	0	Top 10% - Top 20%

Source: Calculated by RPA based on crash data provided by MDT. (2020-2024).

Each of the five analysis areas were examined in detail to understand the circumstances around the crashes that occurred to understand whether crashes occurred due to problematic infrastructure conditions, repeated improper driver behaviors, or chance occurrences that could not have been otherwise prevented. Findings from the HIN analysis are summarized in the following sections.

Three Forks Analysis Area (RP 277.5 – 278.4 and RP 279.3 – 280.0)

The Three Forks analysis area is made up of two HIN segments which are both east of the Three Forks Interchange. The roadway has a speed limit of 80 mph with gradual horizontal curves and level terrain, passing through a predominantly rural area consisting of agricultural lands and wetlands. This analysis area includes 51 reported crashes, including two fatal crashes and one suspected serious injury crash, resulting in four severe injuries overall. Traffic volumes within the area are approximately 18,000 vpd. These segments received relatively high safety scores due to a combination of moderately high crash frequencies, crash rates, and crash severities. The following crash trends were identified.

- Crashes occurred most often in the late fall and early winter months (October through January, [57 percent]). Crashes were more likely to occur on weekdays. A spike in crashes occurred in the evenings, after typical commuting hours (6:00 p.m. to 9:00 p.m., [22 percent]).
- The majority of crashes were fixed-object crashes and wild-animal collisions (39 and 33 percent, respectively). Other common crash types included rollover (eight percent), non-fixed-object (six percent), and rear-end (four percent). The severe crashes included a rollover, a head-on collision, and a loss of control crash.
- Crashes occurring under adverse weather conditions (snow and wind) made up 24 percent of crashes while crashes occurring on adverse roadways (wet, icy, slushy, or snowy) made up 33 percent of crashes. The road surface condition was believed to be a factor in 24 percent of crashes.
- Just under 40 percent of crashes occurred at night with no street lighting present. About half of those crashes involved a wild animal.
- Passenger vehicles made up 88 percent of vehicles involved in crashes and seven percent were commercial vehicles.
- The most common contributing action was running off the roadway (29 percent) followed closely by driving too fast for conditions (28 percent). Impaired drivers were involved in 12 percent of crashes. All three severe crashes involved impaired drivers.
- Male drivers accounted for 67 percent of drivers involved in crashes, compared to 33 percent for female drivers. Drivers younger than 25 years old represented 26 percent of those involved in crashes, while drivers age 65 and older accounted for nine percent.

Logan Analysis Area (RP 283.4 – 284.3)

The Logan analysis area consists of a single high-scoring segment located immediately east of the Logan Interchange. The roadway is generally straight and traverses level terrain with a posted speed limit of 80 mph. Surrounding land uses are primarily agricultural, with limited residential development located along the north side of the corridor near Logan. There were 29 total crashes along this segment. One of the crashes was fatal, resulting in two fatalities and two suspected serious injuries. There was also one suspected serious crash resulting in one suspected serious injury. Traffic volumes in this segment are approximately 20,000 vpd. This segment received the highest crash severity score in the study area, which was the primary factor contributing to its ranking. The following crash trends were identified.

- Crashes occurred most often in the winter months (December through February, [55 percent]). Crashes were more likely to occur on weekdays. A spike in crashes occurred during the morning commuting hours (8:00 a.m. to 10:00 a.m., [45 percent]).
- The most common crash types were fixed-object (45 percent) and rollover (21 percent). Other common crash types include rear-end and wild-animal (10 percent each). Both of the severe crashes were rollovers.
- Crashes occurring under adverse weather conditions (rain, snow, fog) made up 21 percent of crashes while crashes occurring on adverse roadways (wet, icy, or snowy) made up 52 percent of crashes. The road surface condition was believed to be a factor in 48 percent of crashes. About 17 percent of crashes occurred at night with no street lighting present.
- Almost all vehicles involved in crashes were passenger vehicles with four commercial vehicles reportedly involved.
- The most common contributing factor was running off the roadway (35 percent) followed by driving too fast for conditions (28 percent). Seven percent of the crashes involved an impaired driver, including the suspected serious injury crash.
- Male drivers accounted for 53 percent of drivers involved in crashes, compared to 47 percent for female drivers. Drivers younger than 25 years old represented 21 percent of those involved in crashes, while drivers age 65 and older accounted for 12 percent.

West of GVMPO Analysis Area (RP 290.9 – 291.8 and RP 292.9 – 294.9)

This analysis area is located between the Manhattan and Amsterdam Road Interchanges and consists of two high-scoring segments. The roadway is generally straight, has a posted speed limit of 80 mph, and traverses level terrain through predominantly agricultural land uses. Traffic volumes along this section of the corridor are approximately 16,000 vpd. There were 91 crashes recorded within the high-scoring segments, including four fatal crashes resulting in four fatalities and two suspected serious injury crashes resulting in two suspected serious injuries. These segments ranked highly due to their elevated crash severity score, as well as moderately high crash frequency and crash rate scores. The following crash trends were identified.

- Crashes occurred most often in the late fall and early winter months (October through January, [57 percent]). Crashes were more likely to occur on weekdays. A spike in crashes occurred during the evening commute (5:00 p.m. to 7:00 p.m., [20 percent]).
- The most common crash types were fixed-object (54 percent), rollover (38 percent), sideswipe same direction (21 percent), and wild-animal collisions (20 percent). The severe injury crashes were all rollover crashes except for one non-fixed-object or debris collision.
- Crashes occurring under adverse weather conditions (rain, snow, fog) made up 19 percent of crashes while crashes occurring on adverse roadways (wet, icy, or snowy) made up 36 percent of crashes. The road surface condition was believed to be a factor in 26 percent of crashes, including one of the severe crashes. About half of the crashes (48 percent) occurred at night with no street lighting.
- Almost all vehicles involved in crashes were passenger vehicles (85 percent), with a few commercial vehicles involved (six percent).
- The most common contributing actions were running off the roadway (27 percent), driving too fast for conditions (24 percent), and driving in a distracted or inattentive manner (10 percent). An impaired driver was involved in 12 percent of the crashes, including three of the fatal collisions and one of the suspected serious crashes.
- Male drivers accounted for 87 percent of drivers involved in crashes, compared to 13 percent for female drivers. Drivers younger than 25 years old represented 20 percent of those involved in crashes, while drivers age 65 and older accounted for eight percent.

Bozeman Urban Analysis Area (RP 305.3 – 306.0, RP 307.3 – 307.8, RP 308.6 – 309.5, and RP 311.1 – 312.5)

The Bozeman Urban analysis area consists of four high-scoring segments located between the N 19th Avenue and Bear Canyon Interchanges. The roadway generally traverses level terrain and includes broad horizontal curves with a posted speed limit of 65 mph. Surrounding land uses are primarily urban and commercial, reflecting the developed nature of the Bozeman area. A total of 153 crashes were recorded within these four segments, including five fatal crashes and two suspected serious injury crashes. These severe crashes resulted in six fatalities and two suspected serious injuries. Traffic volumes within this area range from approximately 20,000 to 27,000 vpd. These segments ranked highly due to their elevated crash frequency and crash rate scores. In fact, the highest crash rate score in the study area occurred within these segments. While crash severity was not the primary factor driving their ranking, several severe crashes contributed to a moderately elevated crash severity score. The following crash trends were identified.

- The most crashes in this segment occurred in the fall and early winter (October through December [31 percent]) and in the spring (February through April [31 percent]). Crashes were more common on weekend days than weekdays. A spike in crashes occurred around the lunch hour (10:00 a.m. to 2:00 p.m., [25 percent]).
- The most common crash types were fixed-object (32 percent), rollover (23 percent), sideswipe same direction (12 percent), and wild-animal (12 percent). Five of the severe crashes were rollovers with the remaining two being a head-on collision and a pedestrian crash.
- Crashes occurring under adverse weather conditions (rain, snow, sleet, fog) made up 31 percent of crashes while crashes occurring on adverse roadways (wet, icy, frosty, slushy, or snowy) made up 59 percent of crashes. The road surface condition was believed to be a factor

in 17 percent of crashes and weather conditions were a factor in 47 percent of crashes. About one-third of the crashes (37 percent) occurred at night with no street lighting present. Five of the seven severe injury crashes occurred at night with no street lighting.

- Passenger vehicles make up 79 percent of the vehicles involved in crashes and commercial vehicles make up 17 percent. Two of the vehicles were motorcycles, one of which was involved in one of the severe crashes.
- The most common actions at the time of the crash were running off the roadway (25 percent) and driving too fast for conditions (13 percent). About 10 percent of crashes involved impaired drivers, and four of the seven severe crashes involved impaired drivers.
- Male drivers accounted for 71 percent of drivers involved in crashes, compared to 29 percent for female drivers. Drivers younger than 25 years old represented 25 percent of those involved in crashes, while drivers aged 65 and older accounted for 12 percent.

Interchange Analysis Area

All interchanges within the study corridor were reviewed as part of the interchange HIN analysis. The following sections summarize crash characteristics at each interchange, with particular emphasis on crash type and the relationship of crashes to intersections, ramp terminals, and other junctions. Interchanges containing HIN segments are discussed in greater detail to identify common crash patterns and potential contributing factors associated with their elevated safety scores.

- **West Three Forks:**
 - A total of 19 crashes were reported at the interchange during the analysis period, none of which were severe.
 - The most common crash types were rear-end collisions (12 crashes) and right-angle crashes (three crashes).
 - It appears that 12 crashes occurred at the intersection of the westbound exit ramp and US 287, most of which were rear-end collisions. This ramp appears in the top 10 percent of segments on the interchange HIN.
 - The westbound exit ramp accounts for 12 of the 19 crashes at the interchange. This ramp has a traffic volume of about 4,800 vpd.
- **Three Forks:**
 - A total of 14 crashes were reported at this interchange, none of which were severe.
 - Although a nearby mainline segment was identified as part of the Three Forks HIN analysis area, none of the interchange components were identified as HIN segments. As a result, no further interchange-specific analysis was performed.
- **Logan:**
 - A total of eight crashes were reported at this interchange, none of which were severe.
 - Although a nearby mainline segment was identified as part of the Logan HIN analysis area, none of the interchange components were identified as HIN segments. As a result, no further interchange-specific analysis was performed.
- **Manhattan:**
 - A total of 23 crashes were reported at the interchange, one of which resulted in a suspected serious injury.
 - No mainline segments or interchange components associated with this interchange were identified as HIN segments. Therefore, no additional analysis was conducted for this interchange.
- **Belgrade – Amsterdam Road:**
 - A total of 35 crashes were identified at this interchange, two of which resulted in suspected serious injuries.
 - The most common crash types were rear-end crashes (14 crashes) and right-angle collisions (nine crashes). One of the severe crashes was a rear-end collision and the other was a left turn, opposite direction conflict.
 - It appears that 33 of the crashes at the interchange occurred at the intersection of Amsterdam Road and the eastbound ramps.
 - Left turning movements stood out at this intersection, accounting for 17 percent of vehicles involved in crashes.

- Two interchange components were identified as HIN segments: the eastbound exit ramp and Amsterdam Road between the eastbound and westbound ramps. A review of the crash locations indicates that many of the crashes occurred in close proximity to the ramp terminal intersections, suggesting that the elevated safety score is primarily associated with intersection-related conflicts rather than the individual interchange components themselves.
- **Belgrade – Jackrabbit Lane:**
 - A total of 100 crashes were reported at the interchange, two of which resulted in fatalities and one resulted in a suspected serious injury.
 - The most common crash types were rear-end crashes (70 crashes), fixed-object collisions (seven crashes), and sideswipe, same direction (six crashes). One of the fatal crashes was a rollover while the other was a parked vehicle, and the suspected serious injury crash was a pedestrian collision.
 - Based on crash locations, over half of the crashes at the interchange were at the intersection of the westbound ramps and Jackrabbit Lane. Three of the four legs of this intersection are identified on the HIN.
 - The westbound entrance ramp is a part of the HIN and accounts for seven crashes. One of these crashes was the fatal parked vehicle crash. Other crash types on this ramp include three rear-ends, a left turn opposite direction, a sideswipe same direction, and a rollover. The volume on this ramp is about 3,900 vpd.
 - The westbound exit ramp is also a part of the HIN accounting for 37 crashes, one of which was the fatal rollover. Other crash types include rear-end collisions (33 crashes), two rear to front crashes, and one left turn opposite direction crash. The volume on this ramp is about 7,650 vpd.
 - Jackrabbit Lane between the eastbound and westbound ramps is the final segment of this interchange on the HIN. This segment had 37 crashes, one of which was the suspected serious injury pedestrian crash. The other crash types were rear-end (25 crashes), right-angle (four crashes), sideswipe (four crashes), one fixed-object, one left turn, and one non fixed-object. The volume on this segment is about 35,500 vpd.
- **Belgrade – Airway Boulevard:**
 - A total of 58 crashes occurred at this interchange, with one being a suspected serious injury crash. The suspected serious injury collision was a rollover and occurred on a segment that is part of the HIN.
 - The most common crash types at the interchange are fixed-object collisions (16 crashes), rear-end crashes (15 crashes), and sideswipe, same direction (10 crashes).
 - The roundabout at this interchange appears on the HIN accounting for 28 crashes. The volume around this roundabout is about 16,900 vpd.
 - The westbound exit ramp also appears on the HIN with 11 crashes, one of which was the suspected serious injury rollover. The volume of this ramp is about 5,000 vpd.
- **Bozeman – N 19th Avenue:**
 - A total of 31 crashes occurred at this interchange, none of which were severe.
 - Although a nearby mainline segment was identified as part of the Bozeman Urban HIN analysis area, none of the interchange components were identified as HIN segments. As a result, no further interchange-specific analysis was performed.
- **Bozeman – N 7th Avenue:**
 - A total of 16 crashes were reported at the interchange, none of which were severe.

- No mainline segments or interchange components associated with this interchange were identified as HIN segments. Therefore, no additional analysis was conducted for this interchange.
- **Bozeman – Main Street:**
 - This interchange had 14 crashes in the analysis period, two of which resulted in suspected serious injuries.
 - The most common crash type at this interchange was fixed-object collisions, accounting for eight crashes. The severe crashes were a rollover and a fixed-object collision.
 - The most common vehicle maneuver at the time of the crash was negotiating a curve, making up almost half of the vehicles. This ramp has multiple curves as a part of the acceleration or deceleration maneuvers.
 - The eastbound exit ramp is a part of the HIN with two crashes, and one being the severe rollover. The volume on the ramp is about 3,300 vpd.
- **Bozeman – Bear Canyon:**
 - A total of 21 crashes occurred at this interchange, none of which were severe.
 - The most common crash type was fixed-object collisions, accounting for 15 crashes.
 - There are two segments at this interchange that show up on the HIN: the westbound exit ramp and Bozeman Trail Road between the eastbound and westbound ramps.
 - The westbound exit ramp had four crashes. Two of the crashes were fixed-object collision and two were sideswipe, same direction. The volume on this ramp is about 1,400 vpd.
 - Bozeman Trail Road had six crashes. All of the crashes were fixed-object collisions except for one U turn.

6.11 Citations

Citation data for the mainline and the interchanges was obtained from the MDT Traffic and Safety Bureau for the same five-year analysis period (2020 through 2024). This data includes citations issued primarily by MHP for violations reflecting state and federal traffic codes. **Figure 35** shows the locations of citations issued within the study corridor. As shown in the figure, citations are most common in the GVMPO, with the highest concentrations around the N 19th Avenue and Main Street Interchanges.

A total of 7,108 citations were issued, with the greatest number being related to speeding, license/registration/insurance violations, seatbelt violations, reckless/careless driving, and DUIs. Speeding contributed to the greatest number of citations, accounting for 53 percent (3,732 citations). The dataset indicates that 9.4 percent of the citations were issued as a result of a crash and about 2.4 percent were issued as a result of a crash causing injury. **Table 35** shows the distribution of citation types throughout the study area.

According to year, most citations were issued in 2023 (1,617 citations) with the lowest numbers of citations in 2020 (961 citations). Overall, aside from a decline in 2020, citations appear to be consistent over the years. Citations are highest in September (12.3 percent), and lowest in February (6.4 percent), compared to other months. Citations see a decrease from September through December with no distinct trend the rest of the year. There are a lot more citations in the latter half of the day with the most citations occurring from 9:00 p.m. to midnight. The morning sees a decrease in citations with the least citations happening from 8:00 to 11:00 a.m. Citations do not appear to be related to peak commuting hours and see a decrease in numbers during these times.

Table 35: Citations

Violation	Number of Citations	Percent of Citations
DUI	227	3.2%
Other Drug/Alcohol	176	2.5%
License/Registration/Insurance	1,600	22.5%
Improper Vehicle	67	0.9%
Improper Maneuver	144	2.0%
Reckless/Careless	459	6.5%
Speeding	3,732	52.5%
Restraint	564	7.9%
ROW Violation	36	0.5%
Pedestrian	9	0.1%
Other (Criminal)	92	1.3%
Other	2	0.0%

Source: MDT. (2020-2024). Citation Data.

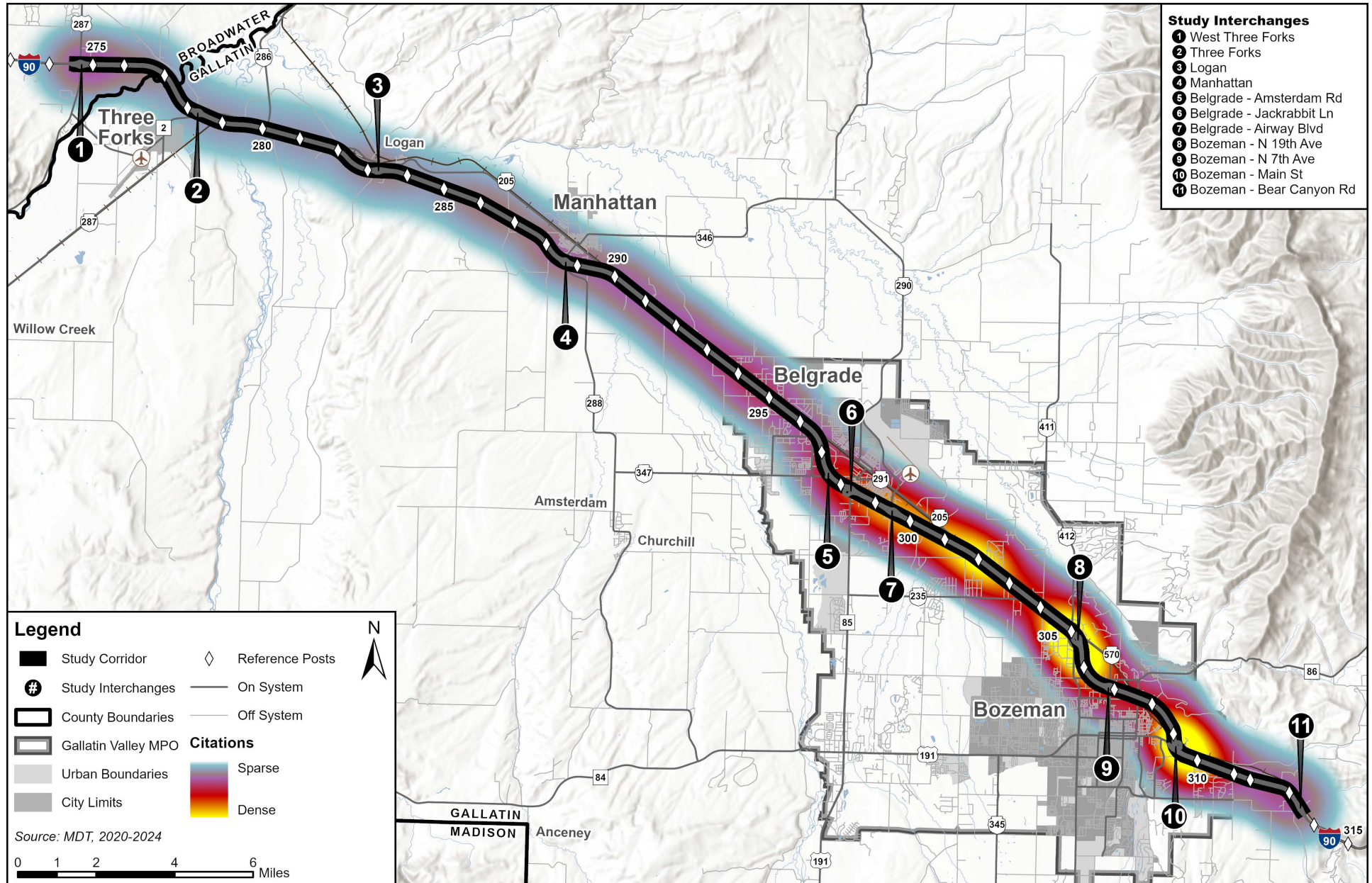


Figure 35: Citation Locations

6.12 Wildlife Conflicts

Animal Carcasses

Data from the MDT Maintenance Animal Incident Database from January 1, 2020, through December 31, 2024, indicates that a minimum of 151 animal carcasses were collected and documented along the study corridor. The database contains information on carcasses collected by MDT maintenance personnel on MDT-maintained routes only. However, not all carcass collection is reported consistently or on a regular schedule. This makes the information useful for pattern identification, but it is not statistically valid. This information was only collected for the mainline portion of the study corridor.

Figure 36 shows the number of carcasses collected by month and year. Overall animal mortality varies throughout the year but is highest in the fall (September through November [37 percent]), with the most carcasses collected in January (19 percent). A decrease in carcass collection is observed during spring (March through May). The number of carcasses collected varies between years, with the lowest numbers of carcasses (11) collected. The most carcasses (46 carcasses, 30 percent) were collected in 2022. Yearly differences could be attributable to differences in staffing availability, frequency of reporting/pick up, or any other number of outside factors and do not necessarily indicate an increase or decrease in wildlife activity or mortality.

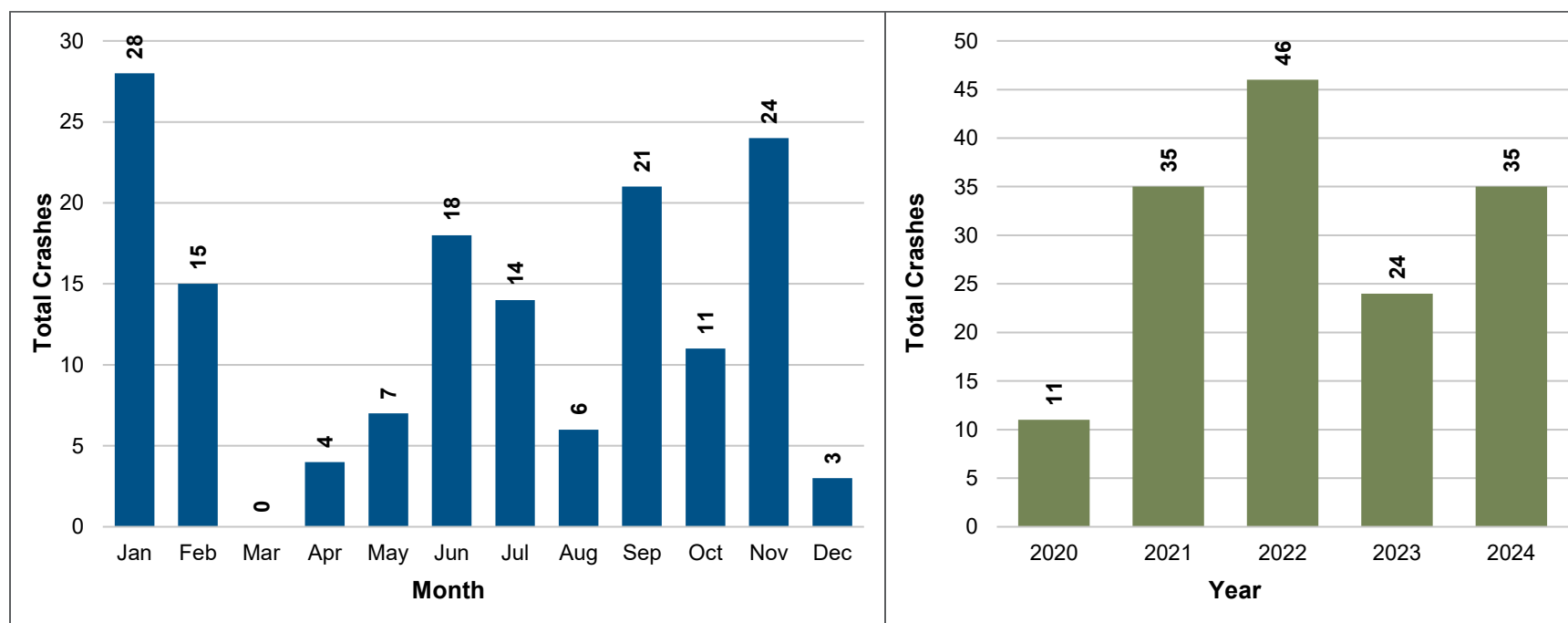


Figure 36: Mainline Seasonal and Yearly Distribution of Carcasses Collected

Table 36 shows the types of carcasses that were collected. The most common were white-tailed deer (64 percent) and mule deer (27 percent) making up a combined 91 percent of the total carcasses collected. Other carcasses collected were elk, black bear, and moose.

Table 36: Carcass Types Collected

Animal	Carcasses Collected	Percent of Total
White-tailed Deer	97	64.2%
Mule Deer	41	27.2%
Elk	5	3.3%
Black Bear	4	2.6%
Moose	1	0.7%
Other Wild Animal	3	2.0%
Total	151	100%

Source: MDT. (2020-2024). Maintenance Animal Incident Database.

Figure 37 shows the density of deer carcasses collected within the study area, and has specific locations marked for other types of carcasses retrieved along the corridor. There were four elk carcasses collected between RP 284 and RP 286, as well as a high concentration of deer carcasses at RP 310. Carcass locations do not necessarily correspond to a crash occurrence or crash location. Future projects should use the latest data to assess carcass retrieval and animal mortality in the corridor.

Salvage Permits

In 2013, Montana passed a bill that allows the public to salvage deer, elk, moose, and antelope killed as a result of a motor vehicle collision. To possess salvaged wildlife, a salvage permit must be obtained from a law enforcement officer at the scene or online via the MFWP website. A person has 24 hours from the collision to apply for and obtain a salvage permit.

Montana Fish, Wildlife & Parks (MFWP) salvage data indicates that 33 wildlife salvage permits were issued within 300 feet of the study corridor between 2020 and 2024. More than half of the permits were for white-tailed deer, with elk accounting for the second-highest number of salvage permits.

Wildlife Needs Assessment

The Montana Wildlife & Transportation Partnership (MWTP) Steering Committee developed a planning tool⁵¹ as a statewide resource for evaluating highway segments of interest for wildlife accommodations, based on wildlife-vehicle conflicts and important areas for wildlife movement and conservation. A team of biologists, road ecologists, engineers, and GIS specialists from MDT, MFWP, and Montanans for Safe Wildlife Passage created the tool. Its purpose is to assist stakeholders and the interested public in working collaboratively to identify potential conservation efforts on and adjacent to transportation corridors throughout Montana.

The planning tool is structured around five Needs Assessment Criteria, scored on a 100-point scale using data from state, federal, and private sources. The five criteria are as follows:

1. Risk to human safety and property damage resulting from wildlife-vehicle conflict. (35 percent)

2. Important daily and seasonal habitats for big game and carnivores. (19 percent)
3. Important habitats for struggling or at-risk species. (12 percent)
4. Important habitats for a wide range of species. (13 percent)
5. Highway and adjacent linear infrastructure that may impede wildlife movement. (21 percent)

A review of the tool results indicates that the study corridor scored between 25 and 76, representing varying levels of need for wildlife accommodations throughout the corridor. The highest scoring portion of the corridor is between RP 308 and RP 313 with an average score of 74. This also corresponds with a concentration of animal carcasses retrieved over the five-year analysis period (see **Figure 37**).

The MWTP Steering Committee uses this planning tool to support a standardized approach for evaluating and selecting project proposals for the implementation of standalone wildlife accommodation projects. The statewide project selection process integrates the planning tool's output with additional evaluation criteria and considerations—such as community support, surrounding land use, and engineering feasibility—to prioritize projects that reduce wildlife-vehicle conflicts and improve safe wildlife passage across Montana highways.

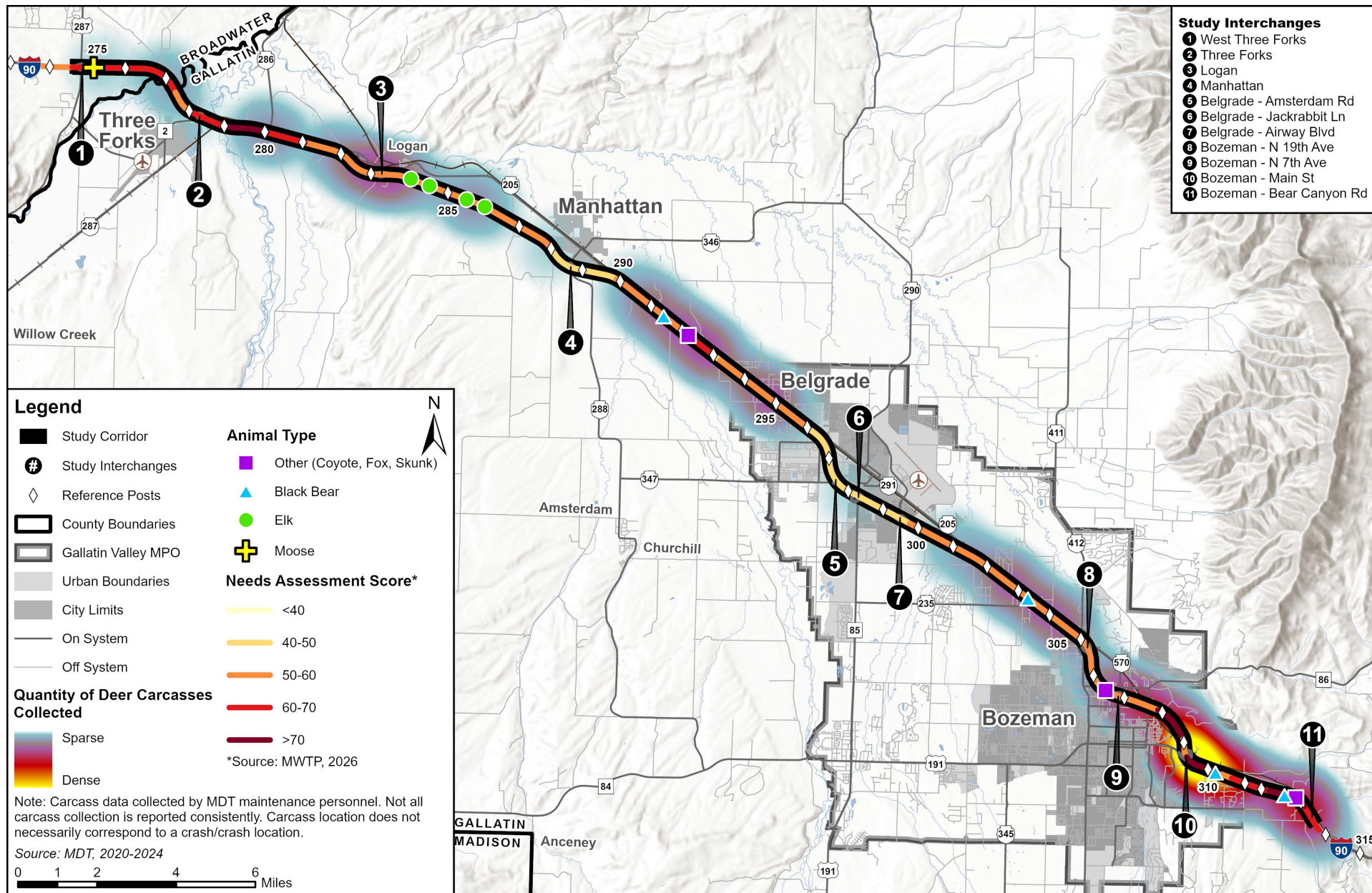


Figure 37: Carcass Collection Location

7.0 AREAS OF CONCERN AND CONSIDERATION

This section provides a list and description of areas of concern and consideration within the study corridor. These items were identified through review of as-built drawings, field review, public databases, and other resources. More discussion has been provided in the previous sections, and it is reiterated here as appropriate.

7.1 Demographics

- While local demographic data may not reflect the primary users of the I-90 corridor, it can still offer insight into some user characteristics.
- From 1970 through 2020, Gallatin County saw a CAGR of approximately 1.6 percent. During the same time, the cities of Bozeman, Belgrade, and Three Forks saw CAGRs of about 2.1 percent, 4.3 percent, and 1.0 percent, respectively. Montana and the nation grew at slower paces, with CAGRs of 0.87 and 1.00 percent, respectively, during the same 50-year period.
- From 2000 through 2020, Gallatin County experienced substantial population growth, with a collective increase of over 75 percent, bringing the estimated population to almost 119,000 residents. Approximately 45 percent of this population resides in Bozeman.
- Population growth in the study area is driven largely by in-migration, with the share of new residents arriving from outside Montana increasing from 24 percent in 2013 to 38 percent in 2023.
- The study area has relatively low racial and ethnic diversity compared to national averages, with White residents comprising approximately 89 percent of the population in Gallatin and Broadwater counties.
- Continued population growth is projected throughout much of the study area, particularly in Bozeman and Belgrade, which are expected to grow by more than 20 percent from 2025 through 2035.
- Rapid housing growth has occurred throughout the study area, particularly in Manhattan and Belgrade, reflecting continued population growth and increasing transportation demand.
- Personal vehicles are the primary mode of travel throughout the study area, with driving alone accounting for approximately 69 percent of commuters in Gallatin County. Mean travel time to work in the county was about 18 minutes.
- The study area supports a diverse economy and tourism industry, both of which contribute to increasing travel demand and freight movement along the I-90 corridor.
- Gallatin County has experienced strong economic growth, with earnings more than doubling since 2014 and employment rates exceeding state and national averages.

7.2 Transportation Conditions

Physical Features

- Approximately 83 percent of land adjacent to the corridor is privately owned.
- There is one conservation easement bordering the corridor from RP 291 to RP 292.
- ROW widths vary throughout the corridor, generally ranging from approximately 100 to 180 feet, with some sections as narrow as 90 feet.
- The corridor passes through a mix of rural and urban environments, requiring consideration of differing access, mobility, and operational needs throughout the study area.
- The I-90 corridor generally consists of two 12-foot travel lanes in each direction with four-foot inside shoulders and 10-foot outside shoulders.

- Pavement conditions are generally in good to fair condition; however, condition varies throughout the corridor.
- Access to I-90 is fully controlled, with access limited to designated interchanges and ramps.
- Posted speed limits along the corridor range from 65 mph within the Bozeman urban area to 80 mph west of Belgrade, reflecting the transition from urban to rural operating environments.
- The entire study corridor is classified as a Level I winter maintenance route, MDT's highest winter maintenance priority, which is eligible for up to 24-hour snow and ice control operations during storm events.
- Emergency response services are provided by local fire districts, the Montana Highway Patrol, Bozeman Health Deaconess Regional Medical Center (Level III Trauma Center), and MedFlight ambulance services, supported by local and statewide mutual aid agreements.
- MDT has identified no hazardous rock slopes along the study corridor.
- The corridor contains 56 major structures, including bridges and large culverts (48 inches or larger), most of which are in fair to good condition and generally meet MDT performance targets.
- Along the study corridor, approximately 300 drainage crossings pass beneath the highway. Most are small culverts or conduits ranging in size from 15 to 42 inches. Of the total, five are considered major structures, sized 48 inches or larger.
- The corridor contains extensive utility infrastructure, including electric, gas, communications, water, and sewer facilities, which may present design and coordination considerations for future transportation improvements.
- Utilities along the study corridor include electrical, gas, communications, sewer, and water services.
- The BNSF Railway parallels much of the corridor and can affect operations at several interchanges where local roadways cross the railroad at grade, resulting in delays, queues, and potential spillback toward Interstate ramps.
- There are no dedicated pedestrian or bicycle facilities along the I-90 corridor within the study area, however, bikes are allowed to ride in the shoulder throughout the entire corridor.
- Crossing opportunities for pedestrians and bicyclists are generally limited to interchanges and local road crossings.

Geometric Conditions

- The I-90 corridor was originally constructed in the 1960s, and portions of the facility were designed to standards that differ pre-date current MDT design criteria.
- Numerous improvements have been completed along the corridor since original construction, including interchange modifications, roadway widening, auxiliary lanes, bridge improvements, and safety enhancements.
- The corridor generally meets MDT baseline criteria for lane and shoulder widths.
- All horizontal curves along the corridor meet a design speed equal to or greater than the posted speed.
- A total of 26 vertical curves do not meet design criteria based on current posted speeds, with an equal distribution between eastbound and westbound directions.
- Several interchange ramps do not meet current MDT and AASHTO geometric design guidance, including criteria related to ramp design speed, acceleration and deceleration lengths, vertical curvature, and gap acceptance lengths.
- All interchange and ramp spacing within the study corridor meets or exceeds recommended spacing guidance.
- Seven of the 13 evaluated left-turn bays at ramp terminal intersections do not meet current MDT storage length guidance.

Traffic Conditions

- Future traffic volumes were developed using projected growth rates derived from the GVMPO 2050 TDM.
- Traffic growth is projected throughout the study area, particularly within the Gallatin Valley, resulting in increased demand at key interchanges and along the Interstate mainline.
- Commercial vehicles comprise approximately seven to 20 percent of traffic along the I-90 corridor, underscoring the corridor's importance as a regional and Interstate freight route.
- The corridor currently operates at LOS A to B throughout nearly its entire length, with only one segment operating at LOS C.
- Future traffic growth is projected to reduce mainline operating conditions, particularly in the Belgrade and Bozeman urban areas, with LOS as low as E.
- Most interchange ramp junctions currently operate at LOS A or B, with the lowest existing LOS occurring at the N 19th Avenue Interchange.
- Future traffic growth is projected to reduce ramp junction operations at several interchanges, particularly Airway Boulevard, N 19th Avenue, and N 7th Avenue. The N 19th Avenue Interchange is projected to experience the most operational deficiencies, with the eastbound off-ramp junction operating at LOS E under future conditions.
- Most study intersections currently operate at LOS A, B, or C during both a.m. and p.m. peak hours.
- Several intersections are projected to operate at LOS D, E, or F under 2046 traffic volumes, indicating increasing congestion throughout the corridor. Future intersection congestion is expected to be most pronounced during the p.m. peak hour, particularly in the Bozeman area.

Safety²

- A total of 1,559 crashes were reported within the study corridor from 2020 through 2024, including 1,220 mainline crashes and 339 interchange crashes.
- The highest mainline crash concentrations occurred in the Belgrade–Bozeman area, particularly between RP 303–304 and RP 307–308.
- The Jackrabbit Lane Interchange experienced the highest number of interchange crashes, with 100 crashes reported during the five-year analysis period.
- Approximately 3.5 percent of mainline crashes and 2.7 percent of interchange crashes resulted in fatal or suspected serious injuries.
- Mainline crashes accounted for 12 fatal crashes and 31 suspected serious injury crashes, compared to two fatal crashes and seven suspected serious injury crashes at interchanges.
- Single-vehicle crashes dominate the mainline, accounting for 75 percent of all crashes, with fixed-object, wildlife, and rollover crashes occurring most frequently.
- Multiple-vehicle crashes dominate interchange areas, accounting for 69 percent of all crashes, with rear-end and right-angle crashes representing the most common crash types.
- Mainline crashes are most common during the winter months and occur more frequently on Fridays than other days of the week.

² Pursuant to 23 U.S.C. § 407, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of Title 23, U.S.C., or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data. This publication is not intended to waive any of the State of Montana's rights or privileges under 23 U.S.C. § 407.

- Interchange crashes are concentrated during weekday commuter periods and exhibit elevated crash frequencies during winter months, as well as secondary peaks during late spring and early fall.
- Mainline crashes are most common during peak travel periods, especially in the morning, while interchange crashes are concentrated during the afternoon commuter peak.
- Approximately 41 percent of mainline crashes occurred on wet, snowy, or icy roadways, while about 25 percent occurred on icy or frost-covered surfaces.
- Driving too fast for conditions, roadway departures, distracted driving, and impaired driving are recurring factors in crashes throughout the corridor.
- Impaired driving was involved in approximately 7.5 percent of mainline crashes and 11 percent of interchange crashes and was associated with over half of severe mainline crashes and approximately 22 percent of severe interchange crashes.
- A detailed review of wrong-way driving crashes confirmed nine wrong-way events, found impairment to be the primary contributing factor, and identified recurring wrong-way entry locations that align with MDT's recent mitigation efforts.
- MDT's LOSS analysis indicates a low-to-moderate potential for crash reduction (LOSS II) along most of the corridor; however, the segment between approximately RP 294.8 and RP 311.2 is rated LOSS III, indicating a moderate-to-high potential for crash reduction.
- Mainline HIN locations were identified near Three Forks, Logan, west of the GVMPO boundary, and within the Bozeman urban area.
- Based on the interchange HIN, the Jackrabbit Lane Interchange is the highest-priority interchange safety location, with elevated crash frequencies concentrated near the westbound ramp terminal intersections. Additional interchange safety concerns were identified at the Amsterdam Road, Airway Boulevard, Main Street, and Bear Canyon Interchanges.
- More than 7,100 citations were issued within the study corridor from 2020 through 2024, with speeding accounting for over half of all citations.
- Wildlife-vehicle conflicts remain a safety concern throughout the corridor, with at least 151 documented animal carcasses collected from 2020 through 2024. There is a high density of animal carcasses collected from RP 309 to RP 310, which also corresponds to a high score from the MWTP needs assessment tool.

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