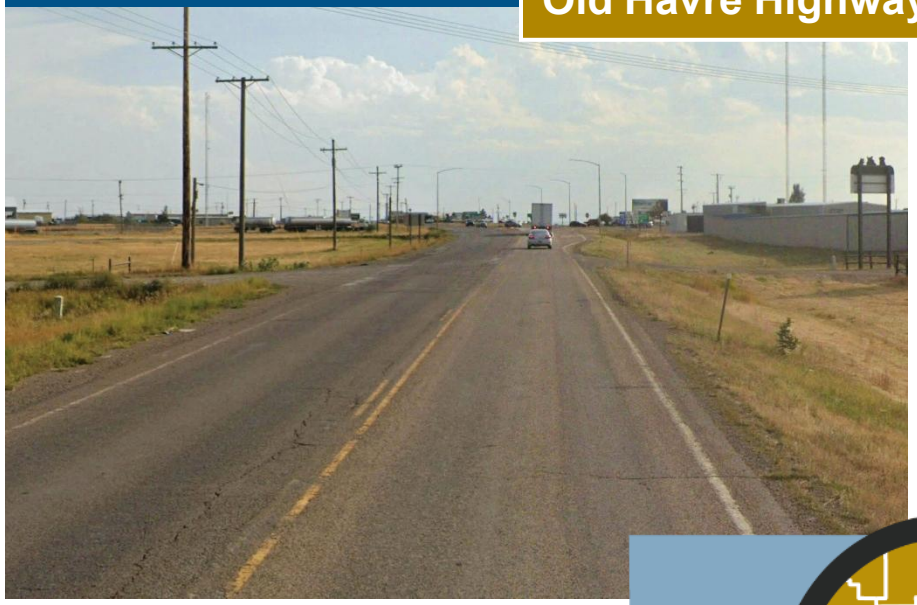
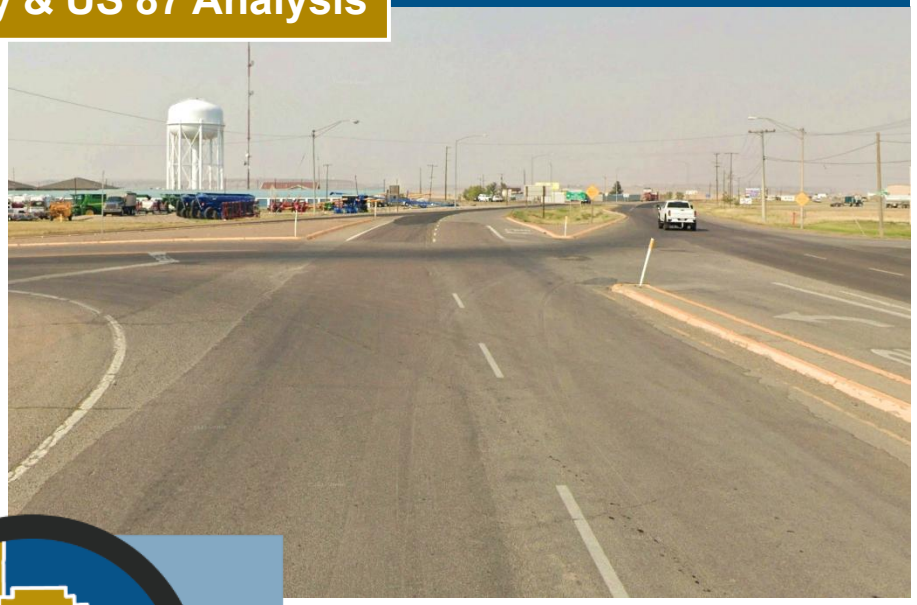
Central Montana Transportation Study

Existing and Projected Conditions Report

Old Havre Highway & US 87 Analysis







MONTANA
Department of Transportation

November 24, 2025

DRAFT

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1.0 INTRODUCTION

The Montana Department of Transportation (MDT) is developing the *Central Montana Transportation Study* to create a comprehensive long-term management plan addressing the anticipated impacts of planned development and military activities in the region. The pre-Montana/National Environmental Policy Act (MEPA/NEPA) regional study will be a collaborative process with MDT, the Federal Highway Administration (FHWA), military, local jurisdictions, resource agencies, and the public to identify transportation needs and potential solutions. In addition to evaluations encompassing the entire study area, several subcomponents were identified, including the *Old Havre Highway and US 87 Analysis* area.

The *Existing and Projected Transportation Conditions* technical memorandum for the *Old Havre Highway and US 87 Analysis* area provides a planning-level overview of transportation conditions within the subarea corridors and identifies potential constraints and considerations that may influence the development of improvement options for the subarea corridors. The planning-level examination addresses demographic and economic conditions affecting traffic volumes, the physical roadway corridors 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) and aerial photography, and input from agencies and stakeholders.

1.1 Subarea

The subarea includes Old Havre Highway from 25th Avenue NE to US Highway 87 (US 87)/15th Street NE and US 87 from 25th Avenue NE to Great Bear Avenue, as illustrated in **Figure 1**. The subarea is located in Cascade County, within the Great Falls city limits. The subarea includes the complex intersection of Old Havre Highway and US 87, where unfavorable geometrics lead to operational and safety issues.



The intersection of Old Havre Highway and US 87 is complex, with unfavorable geometry.

Traffic volumes at the intersection and on the surrounding roadway segments have increased in recent years. Additionally, increased commercial and industrial development has occurred to the north and east, along with residential growth to the west. These trends are expected to continue and may be heightened by the planned expansion of Malmstrom Air Force Base (MAFB) and the overall impact of future developments. This study assesses ways to improve the intersection and adjoining roads to address short-, mid-, and long-term needs.

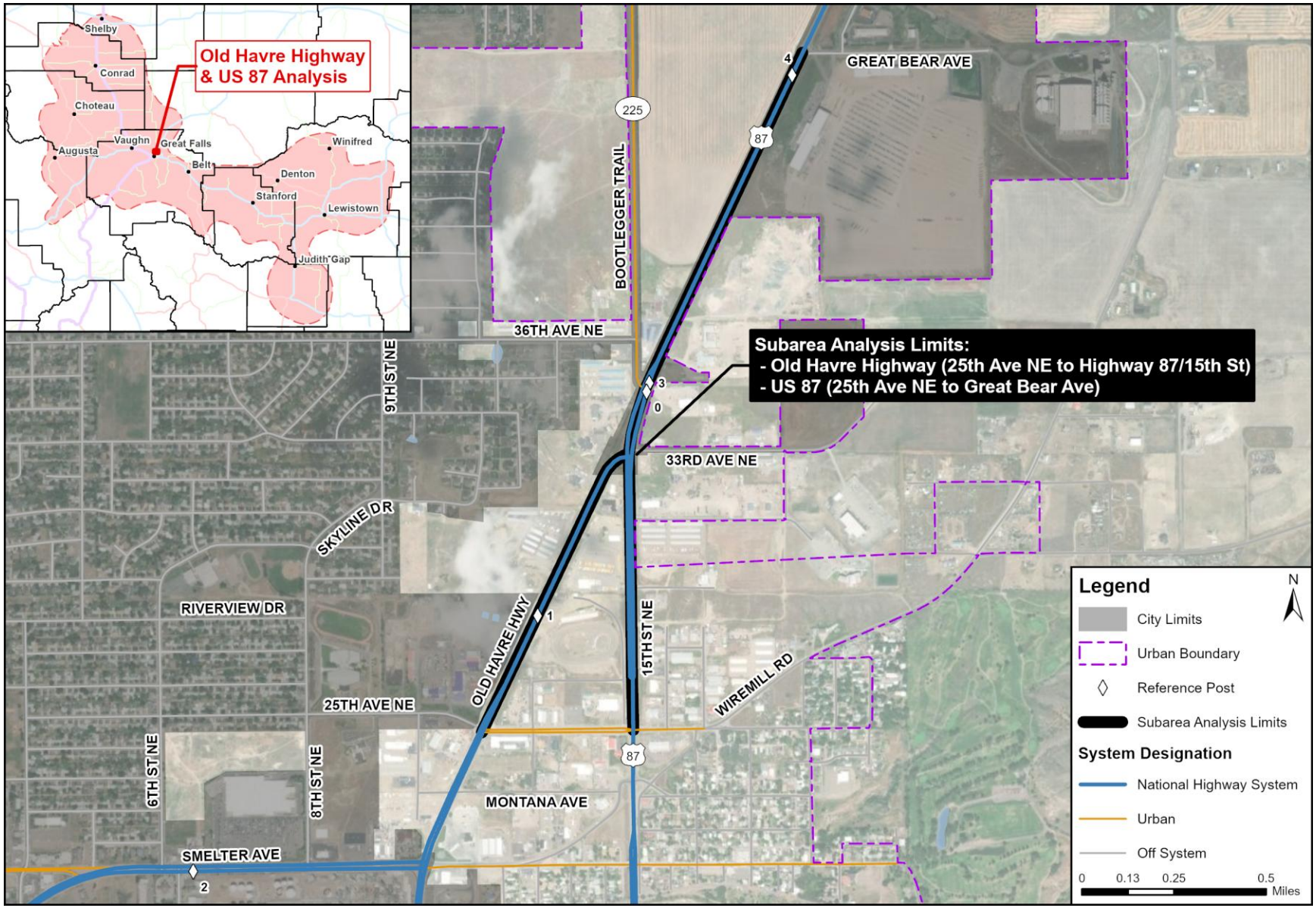


Figure 1: Subarea

1.2 Existing Plans, Regulations, and Programs

Multiple federal, state and local plans, regulations, and programs relate to transportation and land use within the subarea. The following sections provide a summary of relevant planning documents and regulations currently available for the subarea.

1.2.1 United States Department of Defense Planning and Programs

US Air Force Sentinel Project

The U.S. Air Force has proposed the Sentinel[1] system as the replacement for the aging Minuteman III intercontinental ballistic missile system (ICBM), modernizing the U.S. land-based nuclear triad and extending its capabilities through 2075. The project involves the MAFB in Montana, F.E. Warren Air Force Base in Wyoming, and Minot Air Force Base in North Dakota. The following details of the MAFB project are particularly relevant to this planning effort:

- Establish a workforce hub in Great Falls, Montana.
  - 50–60 acres in size
  - 2,500–3,000 residents during peaks for three to five years
- Establish construction laydown/staging areas in Belt, Lewistown, and Stanford, Montana, all of which are connected to Great Falls by US 87.
  - About 13 acres in size
  - In place for three to five years

Defense Access Road Program (DAR)

The DAR Program[2] has been an essential partnership between the Department of Defense (DOD) and the predecessors of the FHWA since 1919, ensuring that military needs are considered in the nation's Federal-aid Highway Program. This collaboration continued with the establishment of the FHWA in 1966. The DAR Program helps address the unique transportation needs that arise due to defense activities, such as the access and mobility requirements for military bases and facilities. Under this program, the military can contribute to the costs of public highway improvements necessary to mitigate the impact of their operations on local transportation infrastructure. When a military base identifies a transportation need, it submits the request to the Military Surface Deployment and Distribution Command (SDDC) for evaluation. Once approved by Congress, funds are allocated through the FHWA, and the project follows Federal Highway procedures.

The FHWA collaborates with the Military SDDC to support the US Air Force's ICBM Program. As part of the DAR Program, the DOD provides annual funding for the extraordinary maintenance of transporter erector routes, including tasks such as snow removal and regravelling, to ensure access to missile sites. Since its inception in 1957, the DAR Program has averaged $20 million per year in funding to maintain these critical transportation routes that support the nation's nuclear deterrence capabilities.

The National Defense Authorization Act (NDAA) for Fiscal Year 2024

The National Defense Authorization Act for Fiscal Year 2024[3] authorizes funding for military operations, construction projects, and defense programs, and sets the number of service members for the year. Section 362 establishes new regulations for antenna structure and energy projects with towers over 200 feet located within two nautical miles of active intercontinental ballistic missile (ICBM) facilities. These projects are subject to national security risk assessments by the Department of Defense and may be blocked if risks cannot be mitigated. However, the rule excludes structures built before the Act's enactment, including upgrades that do not increase height. The affected ICBM facilities include Francis E. Warren, Malmstrom, and Minot Air Force Bases, along with their missile fields.

1.2.2 Great Falls Planning

Great Falls Growth Policy Update

The City of Great Falls is initiating an update of its Growth Policy Plan with the development of *Future Great Falls 2045*,[4] a document designed to guide decisions on growth, development, policy, and capital improvements. This document indicates that non-residential and industrial growth is expected on the east side of US 87 within the subarea. The most recent growth policy update, *2013-2025: Imagine Great Falls*, was initiated in December 2011 and adopted in August 2013. The update is ongoing, with the new plan expected to be adopted in November 2025.

Great Falls Area Long Range Transportation Plan (LRTP)

The recently completed *Great Falls Area Long Range Transportation Plan*[5] serves as a strategic guide for investing in the city's multimodal transportation systems over a 20-year planning horizon. The plan offers a comprehensive approach to improving transportation safety, efficiency, and accessibility for all users, focusing on both motorized and non-motorized networks. The plan seeks to strengthen existing infrastructure while planning for future connections to enhance safe and efficient travel, particularly between rapidly growing areas of the community. The LRTP addresses current and future land use, regional transportation issues, connectivity, sustainability, new technologies, transportation demand management, and environmental and fiscal constraints.

Several committed projects, which were already funded, were outlined in the plan, including signing and striping improvements, pavement preservation, pedestrian enhancements, bridge rehabilitation, and accommodations for electric vehicles. The plan also outlines annual programs to maintain infrastructure and enhance safety features. Within the subarea, the plan proposes restriping 25th Avenue NE as a three-lane roadway and installing a shared use path (SUP) between Old Havre Highway and 15th Street NE. It also recommends a feasibility study for a new principal arterial corridor connecting US 87 and Interstate 15 (I-15). This future connection could potentially result in impacts within the subarea and should be considered with any future improvements. Additional proposed projects include pedestrian improvements, intersection upgrades, added lanes, traffic calming measures, and roadway reconstruction to meet current standards. These projects were designed to address current operational concerns, enhance safety features, and meet traffic demands projected for 2045.

North Great Falls Subarea Transportation Study

The North Great Falls Subarea Transportation Study[6] was developed in 2022 in response to the development occurring in the northwest portion of Great Falls and subsequent concerns about traffic impacts. The purpose of the study was to develop a vision for expansion of and improvements to the multimodal transportation network to maximize safety, accessibility, and efficiency for all users. The study identified nine short-term projects and six long-term projects for implementation based upon the future modeling and capacity analysis, safety analysis, and public input. Two of these projects impact the *Central Montana Transportation Study Old Havre Highway & US 87 Analysis* area. The proposed improvements include extending 43rd Avenue NE to create a new intersection at US 87 and installation of a traffic signal or roundabout at the intersection of US 87 and Bootlegger Trail.

Malmstrom AFB Joint Land Use Study (JLUS)

The *Malmstrom AFB Joint Land Use Study,*[7] completed in March 2012, was a proactive effort to ensure compatible growth and development between MAFB—including its nearly 25,000-acre Missile Complex, which closely aligns with the *Central Montana Transportation Study* area—and the surrounding communities. The JLUS was a collaborative planning process that involved key stakeholders working to identify compatible land uses and growth management strategies for areas adjacent to active military installations. The primary goal of the study was to protect the viability of current and future missions at MAFB and the Malmstrom Missile Complex while guiding regional growth and sustaining economic health, public safety, and welfare.

The JLUS had two unique study areas: one covering lands near MAFB and another focusing on areas within the Malmstrom Missile Complex, which is a network of missile alert facilities (MAF) and launch facilities (LF) from which the Minuteman III intercontinental ballistic missiles are deployed. The study included a set of implementation strategies to address issues such as land use, noise, safety, frequency interference, vertical obstructions, endangered species, water quality, and ground transportation. For the Malmstrom Missile Complex, the study also addressed infrastructure, alternative energy, legislative initiatives, and trespassing. The study's three main objectives were to understand issues and viewpoints, foster collaboration, and develop actions to mitigate impacts on both the installation and surrounding communities.

1.3 Past, Current, and Planned Projects

The following projects have been recently completed, or are planned to be completed, by MDT within or near the subarea.

- ***Great Falls – North*** - In 2022, nearly seven miles of US 87 were reconstructed and widened between Great Bear Avenue (RP 4.1) and Dent Bridge Road (RP 11.5). The project included the addition of passing and turn lanes to improve traffic flow and safety.
- ***Maintenance*** - In 2024, epoxy striping was applied along Old Havre Highway for its entire length (RP 0.0 to 1.3) to enhance road markings for improved visibility and safety.
- ***Black Eagle NHS Routes - Great Falls*** - This resurfacing project, anticipated for construction in 2027, will involve a mill and fill on US 87 from RP 2.7 to 4.3, overlay on Old Havre Highway from RP 0.5 to 1.3, and scrub seal on River Drive from RP 0.0 to 0.3.

2.0 DEMOGRAPHICS

This section provides an overview of the socioeconomic characteristics of the subarea. It includes data from Cascade County and Great Falls, along with comparative data for the State of Montana and the United States as a whole.

Demographic and socioeconomic data was analyzed to assess recent trends in population, age distribution, 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.

2.1 Population

A review of demographics within the subarea 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, an aging population may indicate a need for specific types of transportation improvements such as transit services and/or non-motorized infrastructure improvements. The presence of a disadvantaged population may warrant other considerations.

2.1.1 Historic and Recent Population Trends

From 1970 through 2020, Montana's population has grown at a compound annual growth rate (CAGR) of 0.90 percent. From 2010 through 2022, Montana experienced the 11th highest population growth in the nation, at 13.30 percent. Conversely, both Cascade County and Great Falls experienced population declines from 1970 through 1990, followed by moderate population increases from 2000 through 2020, with both the city and county returning to or surpassing the population numbers recorded in 1970. **Table 1** provides historical and current population estimates for the city, county, state, and country.

According to the *Central Montana Socioeconomic Report*,[8] Great Falls remains the third most populated city in Montana with 60,412 residents as of 2023. Cascade County ranks fifth among counties with 84,601 residents as of 2023.

Table 1: Population Change Since 1970

Area	1970	1980	1990	2000	2010	2020	Compound Annual Growth (1970 – 2020)
Cascade County	81,804	80,696	77,691	80,357	81,327	84,414	0.06%
Great Falls	60,091	56,725	55,097	56,690	58,505	60,442	0.01%
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: US Census Bureau & MT Census and Economic Information Center.

2.1.2 Subarea 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, social groups, local and/or regional economies, as well as potential growth and development resulting from transportation improvements. The demographic and economic information provided in this section aims to help identify populations that may be impacted by proposed improvements in the subarea. **Table 2** summarizes recent population and demographic data for Cascade County and Great Falls, along with data for the whole state and country for comparison. The data was obtained from the 2019 through 2023 *American Community Survey (ACS) 5-Year Estimates*,[9] which provide detailed demographic, social, economic, and housing information by combining five years of survey data to offer reliable insights for smaller geographic areas.

Great Falls and Cascade County share similar demographics with Montana, including predominantly white populations (84.8 and 84.7 percent, respectively), above the national average of 63.4 percent. American Indian residents make up 4.1 percent of Great Falls and 3.5 percent of the county, higher than the national 0.9 percent. City and county Hispanic or Latino populations are lower than the national average of 19.0 percent but align with Montana's 4.4 percent. Youth under 18 make up 21.1 percent of Great Falls, close to the national 22.2 percent. Seniors (65 and older) account for 20.0 percent of Great Fall's population, above the U.S. average of 16.8 percent. Disability rates in Great Falls (17.3 percent) also exceed the national rate of 13.0 percent. Sex distribution in Great Falls is similar to Montana and the country.

Table 2: Race, Age, Sex, and Disability Data

Population Characteristics	Cascade County	Great Falls	State of Montana	United States
White	84.7%	84.8%	85.7%	63.4%
African American	1.5%	1.2%	0.5%	12.4%
American Indian	3.5%	4.1%	5.7%	0.9%
Asian	1.2%	1.0%	0.8%	5.8%
Other Race/ Combination of Races	9.1%	9.0%	7.2%	17.5%
Hispanic or Latino (any race)	5.1%	4.9%	4.4%	19.0%
Age **Under 18**	22.5%	21.1%	21.3%	22.2%
Age **18-64**	58.2%	58.6%	59.0%	61.0%
Age **65 and over**	19.3%	20.0%	19.7%	16.8%
Male	51.0%	49.5%	50.7%	49.5%
Female	49.0%	50.5%	49.3%	50.5%
% Persons with Disability	15.7%	17.3%	14.3%	13.0%
% Disabled (<18 years)	6.0%	7.0%	4.7%	4.7%
% Disabled (≥65 years)	31.2%	33.8%	32.7%	32.9%
Total Population	**84,601**	**60,412**	**1,105,072**	**332,387,540**

Source: US Census Bureau. 2019-2023. ACS 5-Year Estimates.
**Disability status provided as a percentage of the noninstitutionalized population.*

2.1.3 Population Projections

Great Falls experienced population growth from the five-year ACS period ending in 2018 through the period ending in 2023, with an increase of 2.4 percent, compared to 3.5 percent growth in Cascade County and 6.1 percent growth in Montana. This increase aligns with the national average growth rate of 2.9 percent. Looking ahead, the populations in Great Falls and Cascade County are projected to decrease, with estimated declines of 1.6 percent from 2025 through 2035. In comparison, Montana is expected to grow by 4.9 percent, and the national population is projected to increase by 3.8 percent.

The overall growth trend of Great Falls and Cascade County could be temporarily influenced by planned developments, particularly in the Great Falls area. However, it remains uncertain whether this growth will be sustained long-term after these projects are completed. **Table 3** details the past and projected population trends in the region and country.

Table 3: Population Change

Parameter	Cascade County	Great Falls	State of Montana	United States
2014-2018 5-year estimate	81,746	58,990	1,041,732	322,903,030
2019-2023 5-year estimate	84,601	60,412	1,105,072	332,387,540
2025 Projection	82,916	59676	1,160,666	338,016,000
2030 Projection	82,060	59060	1,199,203	345,074,000
2035 Projection	81,560	58700	1,217,232	350,861,000
Population Change (2018-2023)	**3.5%**	**2.4%**	**6.1%**	**2.9%**
Projected Population Change (2025-2035)	**-1.6%**	**-1.6%**	**4.9%**	**3.8%**

Source: US Census Bureau. 2014-2018 and 2019-2023. ACS 5-Year Estimates.
Population Projection REMI. 2021 data vintage year.
US Census Bureau. 2023. National Population Projections Tables Main Series.
Note: Great Falls data is projected based on Cascade County and Fergus County projections.

2.1.4 Housing Characteristics

From the five-year ACS period ending in 2018 through the period ending in 2023, the number of housing units in Great Falls increased slightly by 1.7 percent, while Cascade County experienced a larger increase of 4.8 percent, as shown in **Table 4**. In Great Falls, the total number of occupied housing units increased by 1.1 percent, similar to Cascade County (3.6 percent), though both are lower than the increase experienced in Montana (seven percent). Notably, owner-occupied units increased substantially in both Great Falls (11.2 percent) and Cascade County (13.0 percent), aligning with the state's increase of 9.7 percent. While the number of housing units in Great Falls increased, the average number of bedrooms per home also rose by 2.1 percent, matching the growth in the state by allowing for more occupants per home.

Table 4: Housing Occupancy and Tenure Characteristics

Subject	Year Range	Cascade County	Great Falls	State of Montana	United States
Total Housing Units	2019-2023	39,248	28,333	522,939	142,332,876
Total Occupied Housing Units	2019-2023	34,909	26,010	452,683	127,482,865
Owner Occupied	2019-2023	24,490	17,784	314,266	82,892,037
Renter Occupied	2019-2023	10,419	8,226	138,417	44,590,828
Total Vacant	2019-2023	4,339	2,323	70,256	14,850,011
Share of Owner-Occupied Units	2019-2023	70.2%	68.4%	69.4%	65.0%
Average Number of Bedrooms	2019-2023	2.82	2.75	2.78	2.72
Total Housing Units	2014-2018	37,454	27,858	505,685	136,384,292
Total Occupied Housing Units	2014-2018	33,685	25,717	423,240	119,730,128
Owner Occupied	2014-2018	21,665	15,999	286,553	76,444,810
Renter Occupied	2014-2018	12,020	9,718	136,687	43,285,318
Total Vacant	2014-2018	3,769	2,141	82,445	16,654,164
Share of Owner-Occupied Units	2014-2018	64.3%	62.2%	67.7%	63.8%
Average Number of Bedrooms	2014-2018	2.75	2.70	2.72	2.70
Change in Total Housing Units		**4.8%**	**1.7%**	**3.4%**	**4.4%**
Change in Occupied Housing Units		**3.6%**	**1.1%**	**7.0%**	**6.5%**
Change in Owner Occupation Rate		**13.0%**	**11.2%**	**9.7%**	**8.4%**
Change in Number of Bedrooms		**2.3%**	**2.1%**	**2.1%**	**0.6%**

Source: US Census Bureau. 2014-2018 and 2019-2023. ACS 5-Year Estimates.

2.1.5 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 5** presents commuting characteristics for workers in Great Falls and Cascade County. Similar statistics for the State of Montana and the whole country are provided for comparison.

According to the 2019 through 2023 ACS data, most workers in Great Falls and Cascade County commute by car, with 79.5 and 77.9 percent driving alone, respectively. Carpooling is also common for 9.8 percent of workers in Great Falls and 10.3 percent in Cascade County. Walking to work is less prevalent in Great Falls (1.3 percent) compared to Cascade County (2.3 percent). Public transportation use is minimal in both Great Falls and Cascade County. The average commute time in Great Falls is 14.7 minutes, slightly lower than Cascade County's 16.6 minutes, and almost half of the national average of 26.6 minutes.

Table 5: Mode of Transportation to Work

Subject	Cascade County	Great Falls	State of Montana	United States
% Workers 16 Years and Older with Access to 1+ Vehicle	97.1%	96.5%	97.8%	95.7%
Number of Workers 16 Years and Older	40,658	29,150	532,519	157,645,183
% Who Commuted to Work	93.0%	93.4%	88.4%	86.5%
% Who Worked at Home	7.0%	6.6%	11.6%	13.5%
Drove alone (car, truck, van)	77.9%	79.5%	72.0%	70.2%
Carpooled	10.3%	9.8%	9.6%	8.5%
Public Transportation (excluding taxicabs)	0.7%	0.8%	0.6%	3.5%
Walked to Work	2.3%	1.3%	4.0%	2.4%
Bicycled to Work	0.7%	0.8%	1.0%	0.4%
Other means of commuting	1.1%	1.1%	1.2%	1.5%
Mean Travel Time to Work (minutes)	**16.6**	**14.7**	**19.2**	**26.6**

Source: US Census Bureau. 2019-2023. American Community Survey (ACS) 5-Year Estimates.

2.2 Economic Conditions and Income Characteristics

2.2.1 Employment Industries

Cascade County is a key player in Montana's economy. The county boasts a diverse economic landscape, with major sectors including healthcare, education, retail trade, and professional services. Healthcare and educational services are the largest industries, accounting for nearly 26.0 percent of the workforce, while the retail trade industry employs 13.6 percent. Great Falls follows a similar trend to the rest of the county, with 28.1 percent of the workforce employed in healthcare and educational services and 13.2 percent in the retail trade industry. Cascade County also benefits from a strong tourism sector, supported by nearby state parks, national forests, and attractions such as Giant Springs and the Lewis & Clark Heritage Greenway. In 2023, nonresident visitors spent an estimated $276 million in the county, placing it among the top five counties in the state for tourism spending.[10] This tourism influx helps bolster the region's economic stability and growth potential. **Table 6** presents the 2023 employment estimates by industry for the region, state, and country.

Table 6: Employment by Industry

Industry	Cascade County	Great Falls	State of Montana	United States
Agriculture, forestry, fishing, hunting, and mining	3.7%	2.6%	5.5%	1.6%
Construction	8.0%	7.0%	9.4%	6.9%
Manufacturing	5.2%	5.3%	5.0%	9.9%
Wholesale trade	3.0%	2.9%	2.0%	2.0%
Retail trade	13.6%	13.2%	10.8%	10.6%
Transportation, warehousing, and utilities	4.7%	4.8%	5.3%	6.0%
Information	0.7%	0.5%	1.3%	1.9%
Finance, insurance, real estate, rental and leasing	5.9%	6.3%	6.3%	6.6%
Professional, scientific, management, and administrative	7.5%	7.4%	9.8%	12.8%
Educational services, health care and social assistance	26.4%	28.1%	23.4%	23.5%
Arts, entertainment, recreation, and accommodation	10.0%	11.2%	10.3%	8.8%
Other services, except public administration	5.8%	5.4%	5.4%	4.8%
Public administration	5.6%	5.2%	5.6%	4.6%

Source: US Census Bureau. 2019-2023. American Community Survey (ACS) 5-Year Estimates.

2.2.2 Employment Status and Income Measures

Table 7 presents data on employment status and income levels for Great Falls, Cascade County, the State of Montana, and the United States for the 2019 through 2023 period. Great Falls reported a median household income of $63,934, which is lower than both the county median of $66,203 and the state median of $69,922. The mean household income in Great Falls was $80,952, below both the county average of $85,695 and the state average of $94,544. The unemployment rate in Great Falls was 3.2 percent, which is slightly higher than the county rate of 3.0 percent and lower than the state and national averages of 3.8 and 5.2 percent, respectively. The poverty rate in Great Falls was 14.0 percent, above the state rate of 12.0 percent and the national rate of 12.4 percent.

Table 7: Employment Status and Income Statistics

Characteristics of Population	Cascade County	Great Falls	State of Montana	United States
Civilian Labor Force (16 years and older)	39,865	29,821	560,181	168,567,852
Employed %	97.0%	96.8%	96.2%	94.8%
Unemployed %	3.0%	3.2%	3.8%	5.2%
Median Household Income	$66,203	$63,934	$69,922	$78,538
Mean Household Income	$85,695	$80,952	$94,544	$110,491
Per Capita Income	$36,562	$35,968	$39,842	$43,289
Poverty Rate	13.2%	14.0%	12.0%	12.4%

Source: US Census Bureau. 2019-2023. American Community Survey (ACS) 5-Year Estimates.
Note: Civilian labor force is defined as workers 16 years and over not in the Armed Forces. Unemployed percentage calculated based on total civilian labor force.

3.0 PHYSICAL FEATURES AND CHARACTERISTICS

The Old Havre Highway and US 87 subarea is located just north of the Missouri River in Great Falls, serving as a key access point to the city from the north. The Missouri River bisects Great Falls, with two bridges connecting the northern and southern parts of the city, and two others linking the eastern and western sides. Two of the four bridges crossing the Missouri River, located just south of the subarea, connect to 15th Street NE/US 87 and Old Havre Highway. US 87 is also a critical north-south transportation route in Central Montana, linking local, state, and national networks, stretching from New Mexico to Montana near the Canadian border.

The three roadways meet at a nonstandard intersection, with Old Havre Highway and 15th Street NE approaching from the south and US 87 from the north. The land surrounding the intersection is primarily privately owned, with a mix of agricultural, residential, commercial, and industrial land uses, and some parcels of undeveloped land.

US 87 is an important freight route into Great Falls. While the subarea corridors support freight and commercial vehicle traffic, they are predominantly used by passenger vehicles. Public transit is available through the Great Falls Transit District, with Route 6 running along 15th Street NE near the subarea. Pedestrian and bicycle infrastructure is limited, with no sidewalks or SUPs along the subarea corridors, though some areas feature wide shoulders that can accommodate cycling. Overall, the corridors serve as vital routes for both freight and local travel, contributing to the region's connectivity and mobility.

3.1 Land Use and Right-of-Way

The land surrounding the subarea is primarily owned by private landowners (90 percent), though some lands are held by the City of Great Falls, Cascade County, local agencies, and MDT. Human land use categories, such as agriculture, roads, residential/commercial/industrial developments, and developed open spaces, make up roughly 77 percent of the subarea, with the remaining land classified as undeveloped. The zoning map shown in **Figure 2** reflects these land uses, with residential and industrial zoning being the most common. There are no conservation easements near or adjacent to the subarea.[11] Right-of-way widths vary across the three intersecting roads within the subarea and are summarized in **Table 8**.

Table 8: Right-of-Way Widths

Road	East Side ROW	West Side ROW	Total ROW
Old Havre Highway	100 ft (narrows to 60 ft in some sections)	Generally 80 ft (with short 60 ft section)	120 ft to 180 ft
15th Street NE	90 ft (with short 80 ft section)	Generally 90 ft (with short 80 ft section)	160 ft to 180 ft
US 87	60 ft	70 ft	130 ft
Intersection of all 3 roads	45 ft	80 ft	125 ft

Source: MDT. 1942-2013. As-Builts.

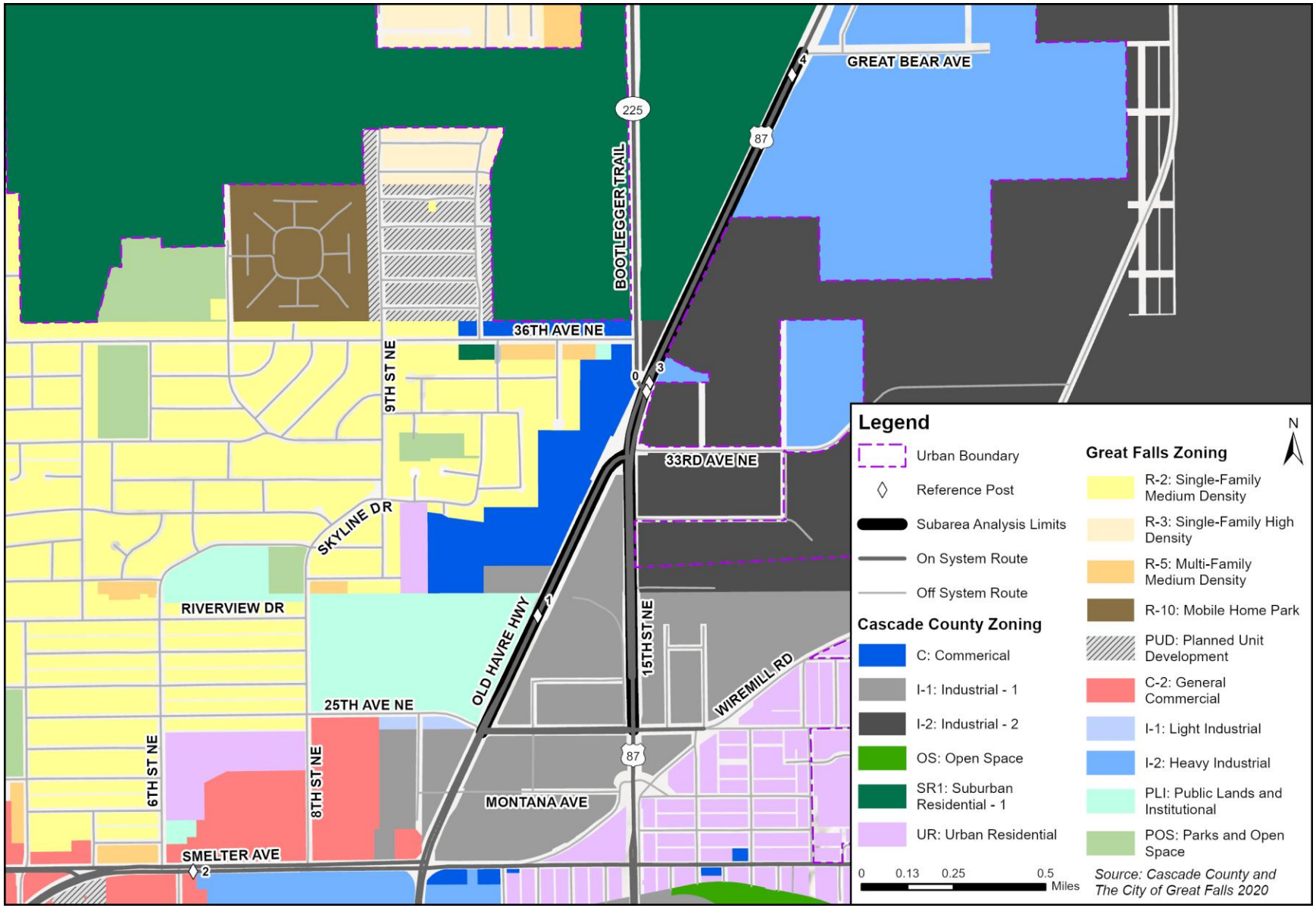


Figure 2: Zoning

3.2 Roadway Surfacing

Based on aerial imagery and as-built data, the existing roadway width along Old Havre Highway ranges from 28 to 85 feet. The typical width includes one travel lane in each direction and approximately two-foot-wide shoulders. A small section on the north side of the intersection with 25th Avenue NE features two lanes in each direction, a painted median, and 10-foot shoulders, resulting in a wider surface width. Along 15th Street NE, the 72-foot width includes two travel lanes in each direction, a two-way left-turn lane (TWLTL) or median, and six to eight-foot shoulders throughout its entire length. The width of US 87 varies from 27 to 120 feet, with the typical section consisting of one travel lane in each direction and minimal or no shoulder. Turn lanes and medians at intersections contribute to the wider surface. At the intersection of these three roads, US 87 expands to about 120 feet wide, with two travel lanes in each direction and a large grass median.

Pavement condition indices are measured and tracked annually in the subarea corridors. MDT's Pavement Management System (PvMS) is used to analyze the collected data to determine the relative performance of the pavement. Items of interest include the presence and degree of cracking and rutting. Several pavement condition indices are monitored through the PvMS. The performance measures and corresponding indices use a numerical scale from 100 (assigned to a new pavement with no flaws) to 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.

Pavement condition was assessed in segments along the subarea corridors as shown in **Table 9**. While most of the pavement is asphalt, a section of 15th Street NE is constructed with Portland Cement Concrete (PCC), as indicated in **Figure 3**. The OPI indicates that pavement is poor on the southern portion of 15th Street NE/US 87, and fair on the northern portion and on Old Havre Highway.

Table 9: Pavement Condition Indices

Roadway	Begin RP	End RP	Pavement Type	ACI	MCI	IRI	RI	OPI
Old Havre Highway	0.8	1.3	Asphalt	99.5 [Good]	92.3 [Good]	63.5 [Fair]	50.0 [Fair]	51.8 [Fair]
15th Street NE/US 87	2.3	2.7	PCC	N/A	44.6 [Poor]	50.3 [Poor]	100.0 [Good]	31.1 [Poor]
15th Street NE/US 87	2.7	3.0	Asphalt	86.1 [Good]	56.0 [Poor]	59.4 [Poor]	65.6 [Good]	39.4 [Poor]
15th Street NE/US 87	3.0	4.1	Asphalt	98.5 [Good]	84.0 [Good]	70.1 [Fair]	58.9 [Fair]	55.6 [Fair]

Source: MDT. 2024.

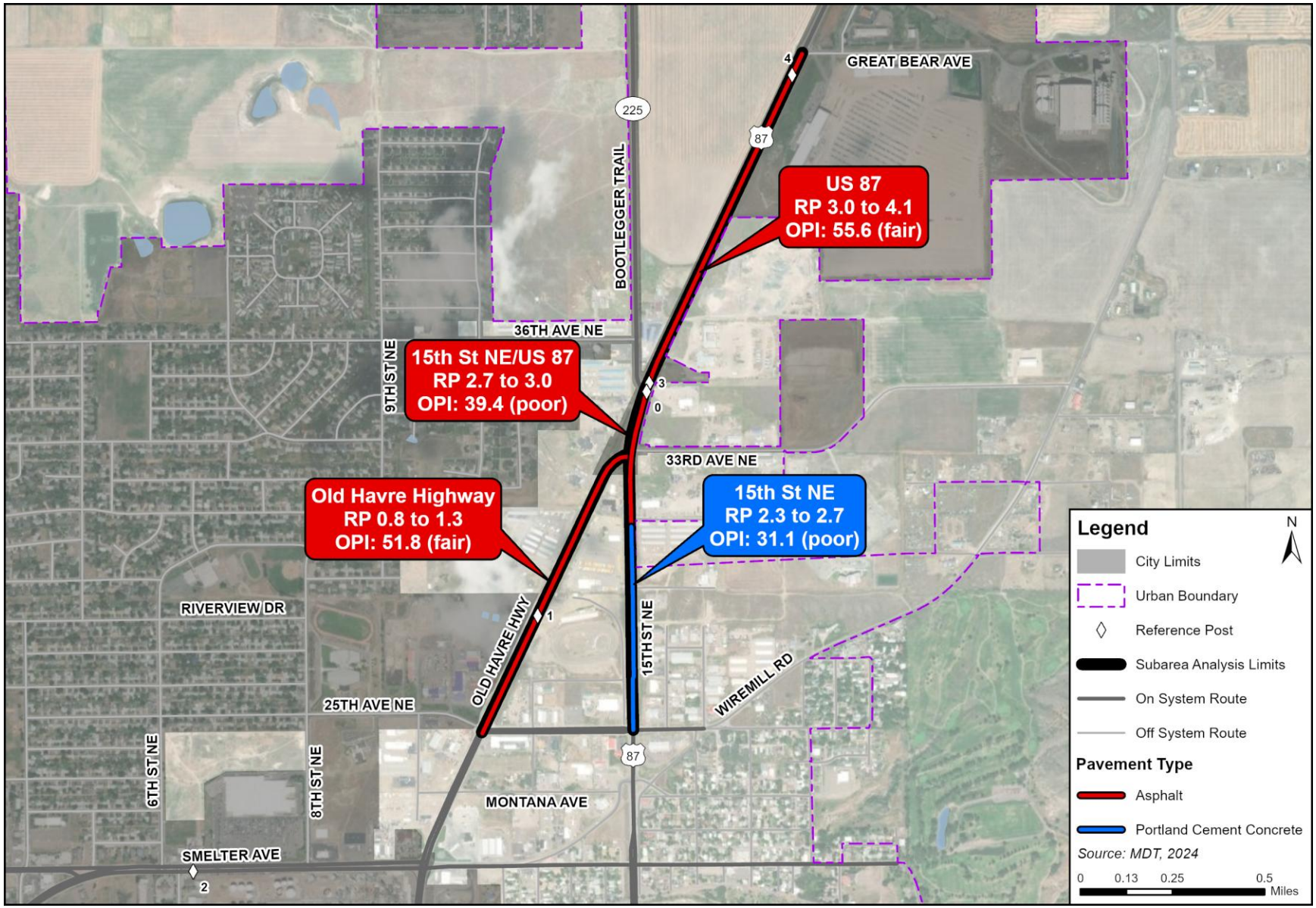


Figure 3: Pavement Conditions

3.3 Access Points and Turnouts

Numerous public and private access points occur along the subarea corridors. Access points were identified through a review of available GIS data and aerial imagery. Based on this review, 30 access points were identified along the subarea corridors, including 13 public roadways, 16 private approaches, and one turnout. Accesses were categorized according to their most typical use, as determined from aerial imagery.

The angle of an approach refers to the angle at which the approaching road intersects the major road. Desirably, roadways should intersect at or as close to 90° as practical. The approach angle is recommended to be between 60° and 120°, as skews greater than 30° from perpendicular restrict the driver's line of sight. Two skewed access points were noted on the subarea corridors, one being a public approach.

One existing access control plan is in place along one of the subarea corridors. *Junction Bootlegger Trail – NE*[12] spans from RP 3.39 to 4.05. The 2008 resolution designates this 0.65-mile-long segment of US 87 a controlled access highway and facility, stating that owners of abutting land shall have no easement of access or only a limited easement of access to this section of highway.[13]

Table 10 provides a summary of access points grouped by subarea corridor. The table shows the number and density of approaches for the various roadway segments. The density of approaches, expressed on a per mile basis, is also shown in **Figure 4**.

Table 10: Access Points Along Subarea Corridors

Segment	Begin RP	End RP	Length (mi)	Public Access Points	Private Access Points	Turnout Access Points	Density (per mi)	Skewed (<60°)
Old Havre Highway	0.8	1.3	0.6	3	7	0	16.7	0
15th Street NE	2.4	2.9	0.5	5	4	0	18.0	0
US 87	2.9	4.0	0.8	5	5	1	13.8	2
Total			**1.9**	**13**	**16**	**1**	**15.8**	**2**

Developed via review of available aerial and Google Streetview imagery in 2025.

3.4 Posted Speeds

The subarea corridors have varying speed limits and intermittent speed zones. On the northern end of the subarea, US 87 is signed as a standard two-lane highway with a 70-mph daytime limit and 65-mph limit at night per MDT speed limit guidance.[14] At RP 3.2, US 87/15th Street NE transitions to a lower speed limit of 45 mph as the roadway enters city limits. The entirety of Old Havre Highway within the subarea is also posted at 45 mph. The existing posted speed limits are shown in **Figure 5**.

While speeds limits are typically statutory, based on guidance in Montana Code Annotated (MCA) 61-8-303,[15] they 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, representing the speed at or below which 85 percent of drivers travel under ideal conditions. This is typically used to establish a safe and rational speed limit. There are no current speed studies available for the subarea.

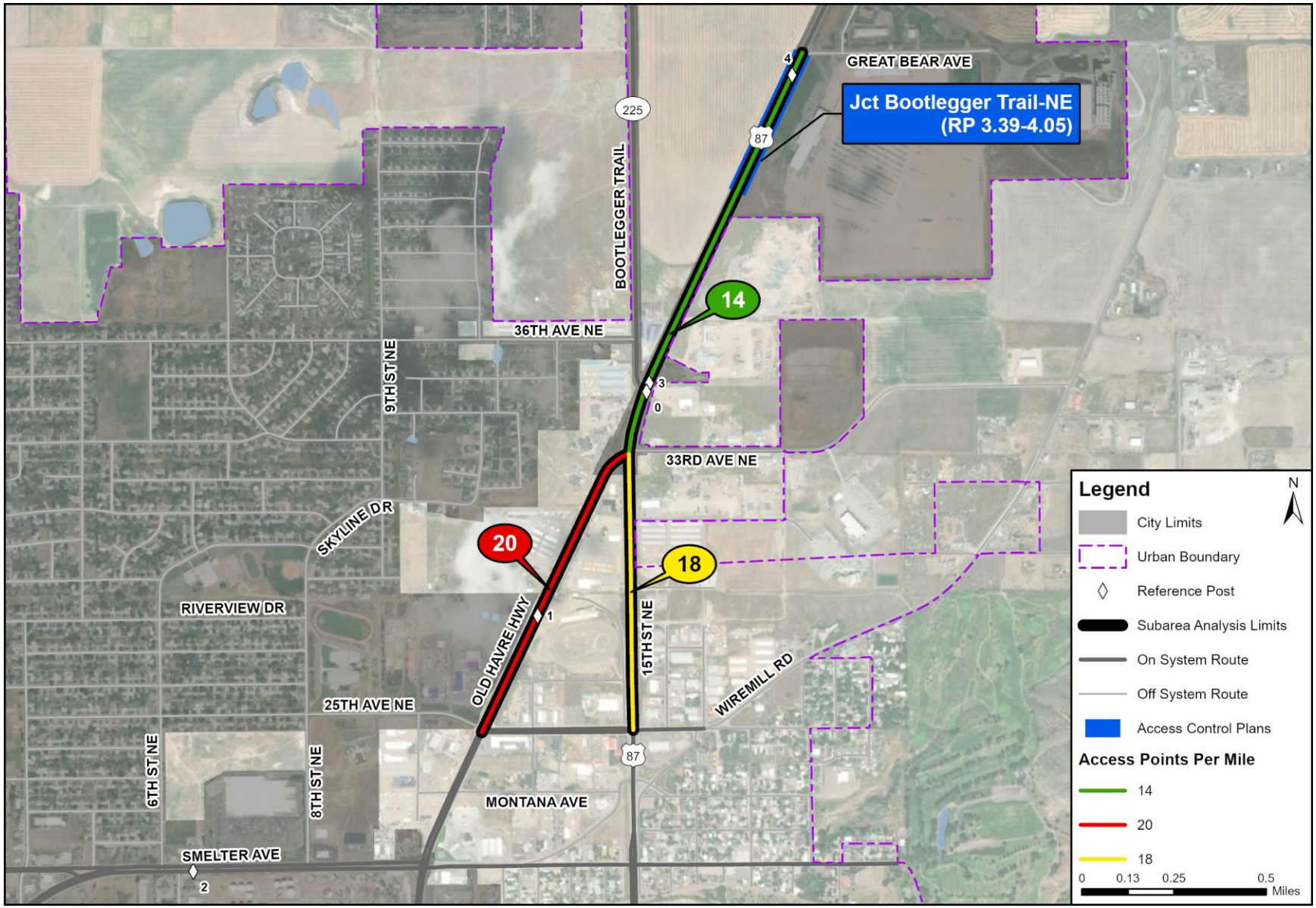


Figure 4: Access Point Density

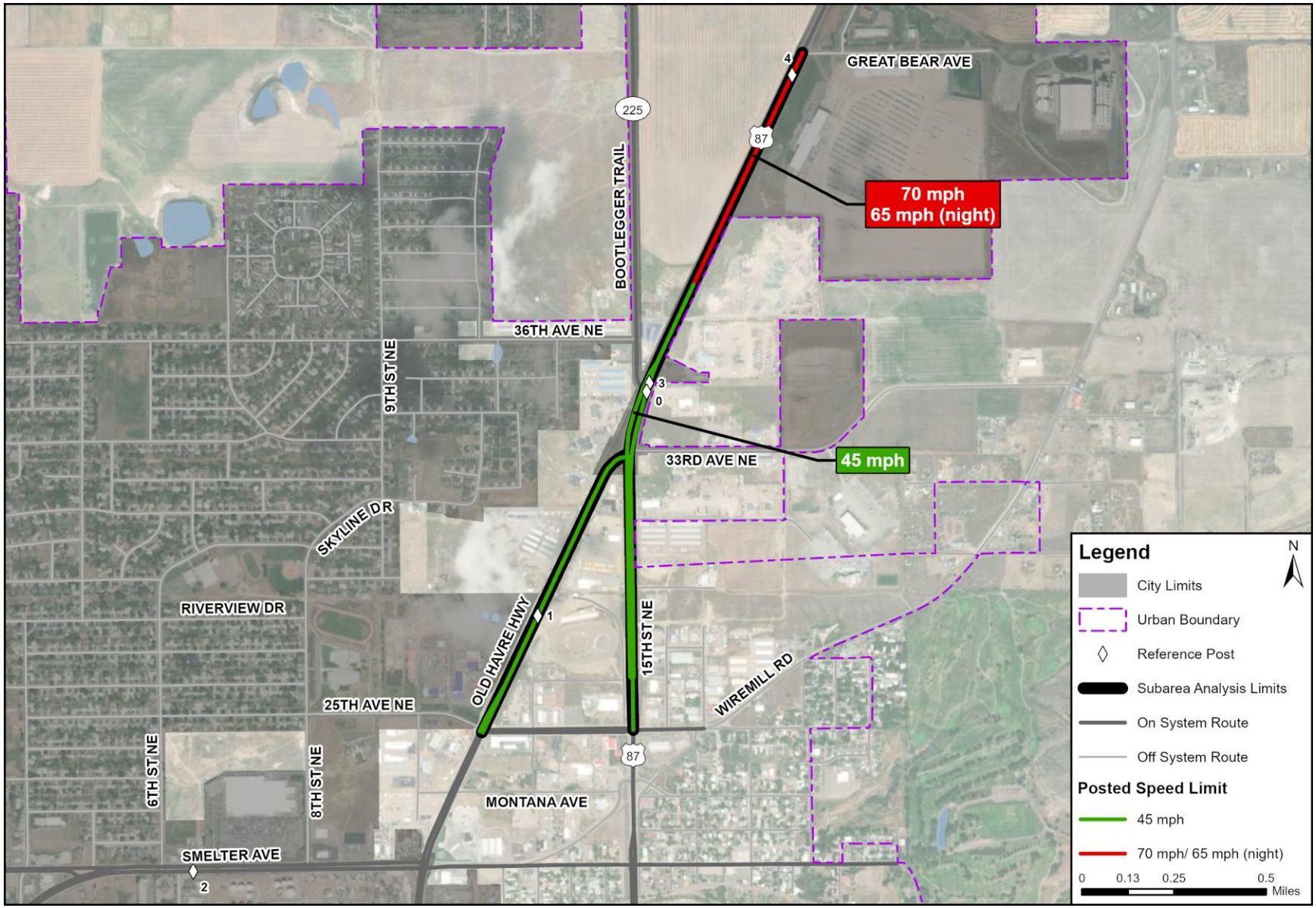


Figure 5: Posted Speed Limits

3.5 Maintenance and Operations

MDT is responsible for the maintenance of all subarea corridors, including repairs and preventative maintenance of the roadway as well as maintenance of signs and structures within the highway right-of-way. The entire subarea falls within the Great Falls Maintenance Division and is managed by the Great Falls Maintenance Section.

Winter Maintenance

Winter snowplowing and sanding are the responsibility of MDT maintenance personnel. The subarea corridors are considered Level I and Level II winter maintenance areas according to the MDT *Maintenance Operations and Procedures Manual.*[16] Within the subarea, Old Havre Highway is a Level I maintenance area, while 15th Street NE and US 87 are Level II maintenance areas. Implementation of maintenance coverage is at the discretion of MDT's Great Falls Area Maintenance Chief.

A Level I winter maintenance area includes roadways within or adjacent to a three-mile radius to towns or cities with an average daily traffic (ADT) greater than 5,000 vehicles per day (vpd). Level I routes are eligible to receive up to 24 hours-per-day coverage during a winter storm event. The primary objective is to keep the roadway open to traffic and provide an intermittent bare pavement surface in the main driving lane as soon as possible. The remaining lanes and shoulders should be cleared as soon as conditions and available manpower and equipment allows. Anti-icing and sand/de-icing operations are typically conducted during the storm.

The Level II category applies to MDT-maintained roadways with ADT of 1,000 to 3,000 vpd. Level II routes are eligible to receive up to 17 hours of coverage per day during a winter storm event, typically from 5:00 a.m. to 10:00 p.m.. The primary objective is to keep one lane in each direction open to traffic. Snow-packed and/or icy surfaces are acceptable, but they may be treated with abrasives or abrasive/chemical combination. Plowing/removal of any snowpack or icy surface, widening of the traveled way, and clearing of shoulders should be accomplished only during regularly scheduled work hours. Anti-icing strategies and techniques will not be implemented unless documented to be cost-effective.

Heavy Vehicle Operations

There are no scale sites along the subarea corridors, though one is located on US 87 near RP 11, north of the subarea.

Emergency Services

Cascade 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 in the county. They work closely with Montana Disaster and Emergency Services as well as the county rural emergency medical services, rural volunteer fire districts, and the Community Emergency Response Team in the surrounding towns.

The subarea is served by the Black Eagle Fire Department and the Great Falls Municipal Fire Department.[17]

The subarea corridors are patrolled by the Great Falls Police Department, Cascade County Sheriff's Office, and Montana Highway Patrol (MHP).

Medical services for emergency situations are primarily served by Benefis Health System in Great Falls, a Level II Trauma Hospital, or the Great Falls Hospital, also located in Great Falls. Benefis Hospital has an on-site helipad for air ambulance transport.

Mutual Aid Agreements

The *Agreement for Mutual Aid in Fire Protection with Cascade County Rural Fire Services and Great Falls Fire Rescue*[18] allows the 16 rural fire departments in Cascade County and the Great Falls Fire Rescue to 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.

3.6 Structures and Hydraulic Conditions

There are no bridges located within the subarea corridors. However, a total of 19 drainage features were identified beneath the subarea corridors, based on as-built drawings from 1963, 1947, and 1942. All of these features are small culverts or conduits, ranging in size from 10 to 30 inches, although their sizes may have changed since their initial installation due to modifications or replacements over time.

3.7 Utilities

Multiple utilities are present within the subarea corridors providing electrical, gas, communications, sewer, and water services. Electrical services are supplied by several private providers including Energy West, Central Montana Electric Power Cooperative and NorthWestern Energy. Electrical connections are primarily provided through overhead power lines that occasionally cross over or under the roadway. Gas services in the subarea corridors are provided by NorthWestern Energy, Intermountain Gas Company, and Energy West via underground gas lines. Communications services, including telephone, internet, and cable, are provided by CenturyLink, TDS Telecom, Spectrum, Hughes Net, and T-Mobile. Most of these utilities are underground, though a few overhead telephone lines are also present within the subarea corridors. Underground water and sewer lines are primarily provided and maintained by the City of Great Falls.

As part of the Sentinel project, existing utility corridors are expected to be upgraded, and new utility corridors are planned. These corridors are designed to provide essential utilities to the main bases, MAFs, LFs, and communication towers. No existing or proposed utility corridors exist within the subarea, however, MDT and the DOD have discussed the potential for a new east-west northern fiber optic connector starting

approximately at US 87 and Great Bear Avenue, connecting to I-15 and extending north and south along the Interstate. No plans for this utility corridor have been formalized.

Utility providers must obtain appropriate occupancy and/or encroachment permits prior to utility installation within MDT right-of-way. 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 study, coordination with utility owners may be required to address potential impacts on utility infrastructure and associated mitigation.

3.8 Multimodal Transportation Facilities

Freight Facilities

US 87 is one of two primary routes into and out of Great Falls, connecting the city to markets across the state and the country. The other main route, I-15, carries the highest volume of trucks in the area. While I-15 provides access to the west side of the city, trucks also enter the city via US 87 from the northeast, with connections to Smelter Avenue and River Drive. From the southeast, trucks can access the city along US 87/10th Avenue S. Although neither of the subarea corridors are officially designated as a truck route by the City of Great Falls,[19] both are considered typical truck routes according to the *Great Falls Area LRTP*. These routes, which are generally located outside the municipal boundary, connect to official truck routes, helping form a comprehensive goods movement network.

Transit Facilities

The Great Falls Transit District was established in 1978 to provide an alternative transportation option for residents of Great Falls and the surrounding county. Covering a service area of 20 square miles, primarily within the City of Great Falls, the GFTD currently operates seven regular fixed routes. One such route, Route 6, begins at the downtown transfer station, travels up 15th Street NE, and turns east onto 25th Avenue NE at the south end of the subarea.

Pedestrian and Bicycle Facilities

There are no sidewalks or SUPs along the subarea corridors, though the shoulders are wide enough in certain areas to provide space for bicycles to safely ride outside the travel lane. A sidewalk is present along 25th Avenue NE, with crosswalks at its intersections with both Old Havre Highway and 15th Street NE, but it does not connect to either of these roads. As a result, pedestrian and bike traffic within the subarea is minimal.

4.0 GEOMETRIC CONDITIONS

The subarea corridors were generally constructed in the late 1920s and throughout the 1930s. In the 1940s, the corridors were realigned to their current configuration. Several improvement projects have taken place since then. Those projects consist of a variety of work, including intersection realignment, resurfacing, widening, signalization, and other safety improvements.

Existing roadway geometrics were evaluated and compared to current MDT baseline criteria. The analysis was conducted based on MDT as-built drawings, GIS data, aerial imagery, and supplemental field observations. Available as-built drawings for the base construction were used to establish preliminary horizontal and vertical alignments. Newer as-built drawings for spot improvement projects were used to supplement the original plans to account for changes in roadway alignment. In general, alignment data was provided for the entire subarea. Left turn lanes were also evaluated using aerial imagery to ensure that they meet current design standards. The following sections summarize the existing geometric conditions of the highway.

4.1 Design Criteria

The MDT *Baseline Criteria Practitioner's Guide*[20] specifies quantitative design criteria to be used as uniform baseline design dimensions or values. Baseline criteria are intended to be used as a starting point. For any projects advanced from this study, the MDT project team and engineer of record will consider the context of the facility and scope of the project to determine final criteria.

The criteria for the subarea corridors are based on the current MDT baseline design criteria for urban principal arterials, as presented in **Table 11**.

For this classification, the design speed ranges from 25 mph to 55 mph for both curbed and shouldered roads, though posted speeds may differ from the design speed. The *Baseline Criteria Practitioner's Guide* indicates design speed for urban principal arterials should match the urban context classification and driver expectancy while also considering needs of multimodal users. In transitional areas between rural and urban sections of roadway, the determination of the design speed should be based on consideration of roadside development, number and type of approaches, lane configuration, and traffic control devices. The posted speed should also be considered as the design speed for urban facilities.

The maximum grade for this classification varies depending on the terrain. According to the definitions in the Road Design Manual,[21] the corridors are considered level to rolling terrain. The *Baseline Criteria Practitioner's Guide* provides critical design criteria depending on design speed and roadway classification. Design speed and terrain type will ultimately be determined as necessary during the project development process for any improvement options forwarded from this subarea analysis.

Table 11: Baseline Criteria for Urban Principal Arterials

Design Element			Curbed Design Criteria	Uncurbed Design Criteria
Design Control	Design Speed		25 mph - 55 mph (used 40 mph)	
Roadway Elements	Travel Lane Width		12 ft*	
	Shoulder Width	Outside	0 ft	6 ft
		Inside	N/A	
	Cross Slope	Travel Lane	1% - 4% (2% Typical)	2%
		Shoulder	1% - 4% (2% Typical)	2%
Roadside Elements	Ditch	Inslope	4:1	
		Width	Traversable V-ditch**	
		Slope		
	Median Width		4 ft***	
	Clear Zone		See RDM Section 9.2	
Alignment Elements	Design Speed Used		40 mph	
	Stopping Sight Distance		Varies (calculated 305 ft for 40 mph design speed)	
	Intersection Sight Distance		Varies (calculated 195 ft for 40 mph design speed)	
	Horizontal Alignment	Minimum Radius	Varies (calculated 533 ft for 40 mph design speed)	
		Superelevation Rate (maximum)	4.0%	
	Vertical Alignment	Maximum Grade Level	5% - 7%	
		Maximum Grade Rolling	6% - 10%	
		Maximum Grade Mountainous	8% - 12%	
	Minimum Vertical Clearance		17 ft	

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

**For multilane facilities, the interior lane width is 11' and the exterior lane width is 12'. This is also applicable for an exclusive left-turn lane with a flush median, as well as for a TWLTL. The lane width does not include the gutter section on curbed facilities. Add 3' where a curb lane is provided for bicycles.*

**A ditch with a bottom width of 10' at 20:1 is preferred, however site constraints may necessitate narrowing this width or require the use of a v-ditch. The v-ditch may be non-traversable if the ditch bottom is located outside of the clear zone.

***The raised median width needs to be added to the exclusive left-turn lane width.

4.2 Roadway Width

The subarea corridors generally feature 12-foot travel lanes, with shoulder widths ranging from two to 10 feet. Along Old Havre Highway, the typical section includes two travel lanes and two-foot shoulders on each side, resulting in a total width of 28 feet. Near the intersection with 25th Avenue NE, Old Havre Highway expands to four lanes with a painted median and 10-foot shoulders, increasing the total width to 85 feet. On 15th Street NE, there are four lanes, six to eight-foot shoulders, and a 10-foot left-turn lane that transitions into a median, giving a total width of 72 feet. US 87 typically has two lanes with varying shoulder widths, with the total width ranging from 27 to 34 feet. Near the intersection with Great Bear Avenue, the addition of a left-turn lane and two painted medians increases the total width to 60 feet. At the junction of these three roads, US 87 widens to about 120 feet, with two travel lanes in each direction and a spacious grass median.

The MDT *Baseline Criteria Practitioner's Guide* recommends a travel lane width of 12 feet and a shoulder width of six feet on uncurbed urban principal arterial routes. While the corridors satisfy the 12-foot travel lane width, parts of Old Havre Highway and US 87 have shoulder widths less than the recommended six feet, as shown in **Figure 6**.

4.3 Horizontal Alignment

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 the subarea corridors. MDT's design standards for horizontal curves are defined in terms of curve radius, which varies based on design speed. For a 40-mph design speed used for this subarea, the minimum recommended radius is 533 feet with a minimum stopping sight distance (SSD) of 305 feet.

Appendix A provides a list of horizontal curves along the subarea corridors through the review of available as-builts. A determination of whether the curve meets standards was decided based on the design criteria 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 the 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 12 summarizes the locations of the horizontal curves and the design speed that each of the curves meets. There are four existing horizontal curves along the subarea corridors. Only one curve does not meet the minimum standards for horizontal curvature based on a 40-mph design speed. This is the curve located along Old Havre Highway at RP 1.32, as shown in **Figure 6**. This curve connects Old Havre Highway to 15th Street NE.

Table 12: Horizontal Alignment Summary

Corridor	Location (RP)	Design Speed Met (mph)	Meets Criteria
Old Havre Highway	1.32	35	No
15th Street NE/US 87	2.86	75	Yes
15th Street NE/US 87	2.96	60	Yes
15th Street NE/US 87	3.02	80	Yes

Source: MDT. 1963 & 2016. As-Built Drawings.
Note: Data based on available as-builts.

4.4 Vertical Alignment

Vertical alignment is a measure of the elevation change of a roadway. The length and steepness of grades directly affect the operational characteristics of the roadway. The controlling design limits for vertical curves are 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.

Appendix A lists the location and controlling design features for the vertical curves along the subarea corridors. According to the MDT *Baseline Criteria Practitioner's Guide*, the maximum allowable grades for an urban principal arterial are five to seven percent for level terrain, six to 10 percent for rolling terrain, and eight to 12 percent for mountainous terrain.

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 recommended sight distance on crest curves and to headlight beam distance on sag vertical curves. Minimum K-values are provided in the MDT *Road Design Manual* and vary based on design speed, and roadway grade. For a 40-mph design speed with a level grade, minimum K-values of 52 and 71 are recommended for crest and sag vertical curves, respectively. For a 40-mph design speed in mountainous terrain, minimum K-values of 59 and 77 are recommended for crest and sag vertical curves, respectively.

A review of the vertical alignment within the subarea revealed one notable concern along 15th Street NE, where a segment exceeds the maximum allowable grade of seven percent for level terrain, as shown in **Figure 6**. **Table 13** summarizes the vertical curves on the subarea corridors and the design speed that each of the curves meets. Within the subarea, there are four vertical curves. All of the curves meet minimum design criteria associated with level terrain for the 40-mph design speed used for this subarea, however, the grade on 15th Street NE does not meet current criteria.

Table 13: Vertical Alignment Summary

Corridor	Location (RP)	Type	Grade Back	Grade Ahead	Design Speed Met (mph)	Meets Criteria Vertical Curve	Meets Criteria Grade*
Old Havre Highway	1.26	Crest	4.60%	1.41%	70	Yes	Yes
15th Street NE/US 87	2.38	Sag	6.15%	**7.19%**	70	Yes	**No**
15th Street NE/US 87	2.70	Crest	**7.19%**	-0.71%	55	Yes	**No**
15th Street NE/US 87	3.38	Crest	-0.97%	-2.03%	75	Yes	Yes

Source: MDT. 1963. As-Built Drawings.
Note: Data based on available as-builts.
**Based on level terrain (maximum grade: 7%)*

4.5 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, the driver of a vehicle should have an unobstructed view and enough distance to perceive, react, and safely stop for or avoid approaching vehicles and other hazards.

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 subarea corridors ranges from 10 to 18 feet, depending on traffic volumes, speeds, and roadside geometry. Clear zones are evaluated individually based on the roadside cross section. It is generally desirable to attain adequate clear zones by removing or shielding obstacles if costs are reasonable.

Portions of the subarea corridors are narrow with limited room for road expansion. The proximity of buildings in certain locations may limit sight distances and restrict the ability to provide recommended clear zone widths as outlined by MDT design standards. During field review, steep side slopes were noted along Old Havre Highway from RP 0.8 to 1.0.

In certain locations within the subarea, it may be impractical to protect or remove certain obstacles within the clear zone. As improvement options are developed in the future, roadside clear zones should be designated, to a practical extent, to meet current MDT design standards. This may include slope flattening, clearing trees along the roadside, and/or widening shoulders.

4.6 Intersections

The placement of intersections along the road can affect the operation of the subarea corridors and the crossing roadways. If the intersections are placed too close to each other, they could generate queuing issues that could cause backups. Queuing can also affect the operation of the crossroad by creating unnecessary delay. The geometric design of an intersection can also cause unnecessary delay if large vehicles cannot make left or right-hand turns without interfering with following traffic. As such, intersection locations should be carefully considered to allow enough space for the necessary auxiliary turn lanes needed to alleviate possible queuing issues. Intersections should be designed to accommodate a standard semi-truck with a 67-foot wheelbase (WB-67).

Chapter 28 of MDT's *Traffic Engineering Manual*[22] discusses guidelines for auxiliary turn lanes, including conditions under which they should be considered, traffic volume thresholds, and recommended design standards. The length of auxiliary lanes should provide adequate space for both vehicle deceleration and storage. In urban areas, however, it is often impractical to include full deceleration lengths due to space constraints. As a result, turn lanes in urban environments may be designed to provide storage space only. Additionally, taper lengths should be included at the entrance of each turn lane. These lengths, based on the design speed, are recommended in addition to the storage and deceleration lengths, where applicable. Storage lengths should be calculated to accommodate the number of vehicles anticipated to queue during peak conditions. The Traffic Engineering Manual includes specific methodologies for determining appropriate storage lengths, varying based on whether an intersection is signalized or unsignalized.

Table 14 presents the analysis of the left-turn lanes, when present, at the intersections within the subarea. While right-turn lanes are also present, they were not evaluated against design standards, as they function as dropped lanes rather than auxiliary lanes. The table includes recommended storage lengths based on MDT standards, 95th percentile queue lengths derived from peak hour traffic analysis in **Section 5.4**, and existing turn bay storage lengths determined using aerial imagery. Deceleration lengths were not calculated due to the urban nature of the subarea intersections, and it was assumed that taper lengths meet MDT standards. The 95th percentile queue represents the maximum queue length that is exceeded only five percent of the time. For example, if the 95th percentile queue is 100 feet, queue lengths will be shorter than 100 feet during 95 percent of the time and exceed 100 feet five percent of the time. Left-turn lanes that do not appear to meet MDT minimum storage standards or the 95th percentile queue are shown in **Figure 6**.

Table 14: Left-Turn Bay Lengths

Intersection	Existing Length (feet)	Recommended Storage Length (feet)	Peak Hour Turning Volume (vph)	95th Percentile Queue (feet)	Meets Standards	Comments
15th St NE/ 25th Ave NE (NB)	73	100	118	11.92	No	Does not meet turn-bay length standards.
15th St NE/ 25th Ave NE (SB)	415	50	11	1.07	Yes	
15th St NE/ 25th Ave NE (EB)*	52	50	7	5.29	Yes	
15th St NE/ Old Havre Highway (NB)	57	50	14	1.16	Yes	
15th St NE/ Old Havre Highway (SB)	70	50	4	0.29	Yes	
US 87 / Bootlegger Trail (NB)	243	369**	443	75.17	No	Does not meet turn-bay length standards.
US 87 / Bootlegger Trail (SB)	66	50	0	0.00	Yes	
US 87 / Great Bear Ave (SB)	611	50	4	0.23	Yes	
Old Havre Hwy / 25th Ave NE (NB)*	102	50	54	3.85	Yes	
Old Havre Hwy / 25th Ave NE (WB)*	100	50	50	25.37	Yes	

Source: MDT. 2007. Montana Traffic Engineering Manual, Chapter 28, Figure 28.4J. mdt.mt.gov/other/webdata/external/traffic/manual/chapter_28.pdf.
**Two-Way Left-Turn Lane*
***Values from Equation 28.4-1*

15th Street NE and 25th Avenue NE Intersection

The intersection of 15th Street NE and 25th Avenue NE is a four-legged intersection with stop control on the minor leg (25th Avenue NE). Both the northbound and southbound approaches on 15th Street NE are configured with dedicated left-turn bays.

The northbound left-turn bay is approximately 73 feet in length, while MDT standards recommend a storage length of 100 feet. The 95th percentile queue length for this movement is about 12 feet. The southbound left-turn bay measures approximately 415 feet, compared to an MDT-recommended storage length of 50 feet. The 95th percentile queue for this movement is approximately one foot. The eastbound approach includes a TWLTL measuring approximately 52 feet in length, which meets the MDT standard of 50 feet. The 95th percentile queue length for the eastbound movement is about five feet.

15th Street NE and Old Havre Highway Intersection

This four-legged intersection is located at RP 3.0 along 15th Street NE, which serves as the northbound and southbound legs. The eastbound leg is Old Havre Highway, and the westbound leg is 33rd Avenue NE. Stop control is present on the eastbound and westbound approaches. The southbound approach includes a dedicated left-turn lane and a channelized right-turn lane. The northbound approach also includes a left-turn lane.

The northbound left-turn bay measures approximately 57 feet in length, and the southbound left-turn bay measures approximately 70 feet. According to MDT guidelines, a minimum storage length of 50 feet is recommended for these types of movements. Based on the intersection operations analysis presented in **Section 5.4**, the 95th percentile queue length is estimated at about one foot for the northbound left-turn movement and less than one foot for the southbound left-turn movement.

US 87 and Bootlegger Trail Intersection

The intersection of US 87 and Bootlegger Trail is located approximately 700 feet north of the 15th Street NE and Old Havre Highway intersection. While it functions as a four-legged intersection, the westbound leg serves as the entrance to a truck repair shop parking lot. Stop control is present on the eastbound approach. The northbound and southbound approaches each include a left-turn lane, with the southbound approach also featuring a channelized right-turn lane.

The northbound left-turn bay is approximately 243 feet in length. MDT guidelines recommend a minimum storage length of 369 feet for this movement based on peak hour turning volumes. The southbound left-turn bay measures approximately 66 feet, compared to an MDT-recommended length of 50 feet. The 95th percentile queue for the northbound left-turn movement is estimated at around 75 feet. For the southbound left-turn movement, the 95th percentile queue is zero feet.

US 87 and Great Bear Avenue Intersection

The intersection of US 87 and Great Bear Avenue is located at the northern end of the subarea. This is a three-legged intersection, with stop control on the minor leg (Great Bear Avenue). The southbound approach includes a left-turn lane, which appears to be in alignment with MDT standards. Both the northbound and westbound approaches feature channelized right-turn lanes.

The southbound left-turn bay measures 611 feet in length. MDT standards suggest a minimum storage length of 50 feet for this type of turn bay. According to the intersection operations analysis, the 95th percentile queue for the southbound left-turn movement is less than one foot.

Old Havre Highway and 25th Avenue NE Intersection

This four-legged intersection is located along a vertical curve and has stop control on the minor leg (25th Avenue NE). Both the northbound and westbound approaches include left-turn lanes. The westbound leg also includes a channelized right-turn lane.

The northbound left-turn bay, which also functions as a TWLTL, is approximately 102 feet in length. MDT standards suggest a minimum storage length of 50 feet for this type of turn bay. Similarly, the westbound left-turn bay, also a TWLTL, is 100 feet long, which is longer than the suggested minimum of 50 feet. The 95th percentile queue length for the northbound left-turn movement is estimated to be about four feet, while the 95th percentile queue for the westbound left-turn movement is approximately 25 feet.

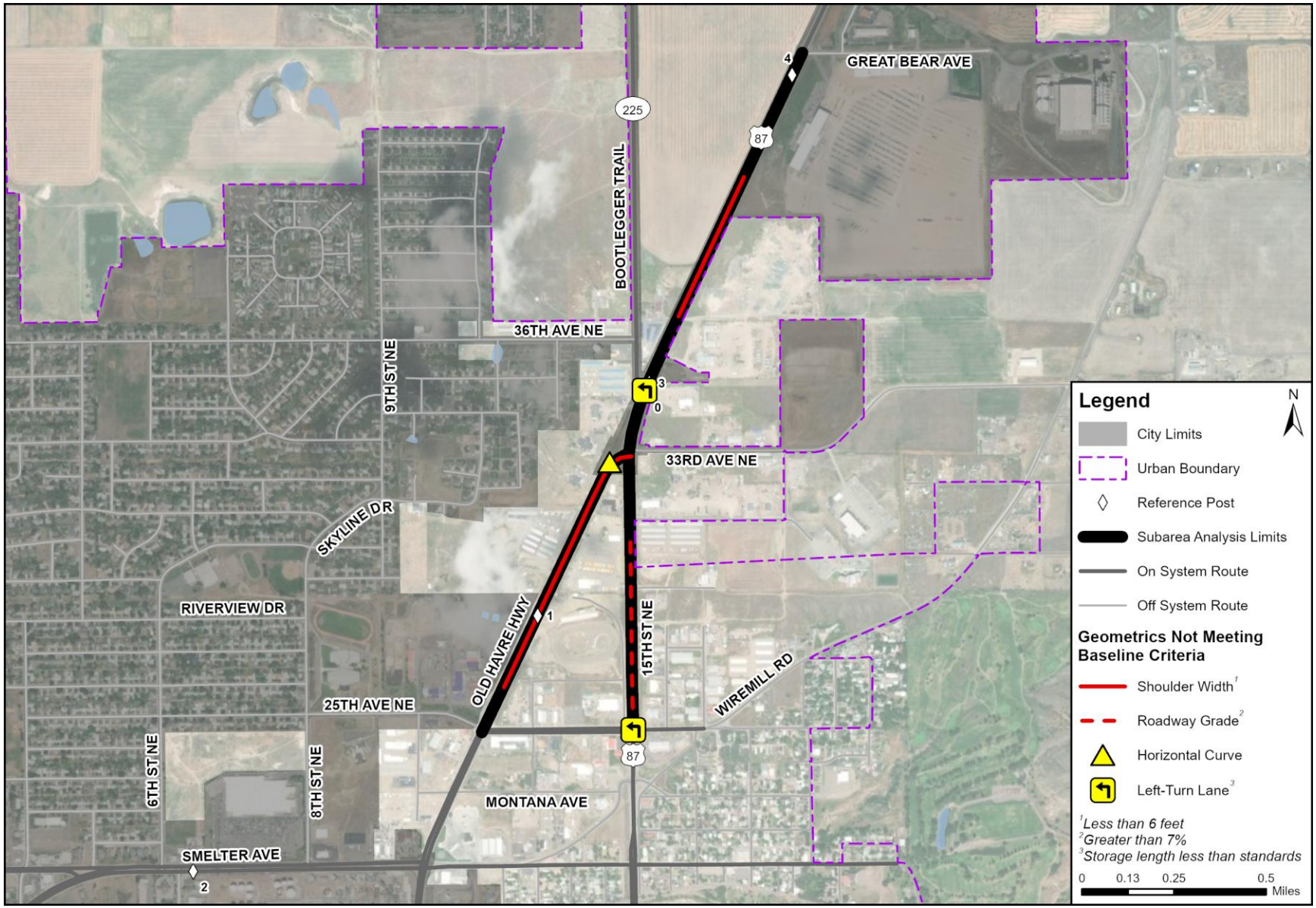


Figure 6: Existing Geometric Conditions

5.0 TRAFFIC CONDITIONS

An evaluation of traffic operations within the subarea was conducted using data provided by MDT, along with supplemental field-collected data. Turning movement counts (TMCs) were performed at six primary intersections within the subarea, and additional counts were taken at three intersections just south of the subarea to provide a more comprehensive understanding of traffic operations. The counts were conducted over a 24-hour period in March 2025. Additionally, MDT provided mainline traffic volume data for both existing and historical conditions at various locations within and near the subarea. The following sections present details on both the existing and projected traffic characteristics for the area. Comprehensive data can be found in **Appendix B**.

5.1 Average Daily Traffic Volumes

Traffic volumes on major roadways are typically collected on an annual basis as part of MDT's traffic data collection program. Several data collection sites are located within the subarea, with additional sites located immediately adjacent to it. For this analysis, seven short-term count sites within the general subarea were considered to understand traffic conditions affecting the area. There are no weigh-in-motion or other continuous count sites within or near the subarea. Data from the short-term count sites, typically collected annually, is used to determine annual average daily traffic (AADT) volumes. **Figure 7** shows the average growth rates for each count site over the past 20 years, while **Table 15** presents the average growth rates for all count sites over the past 20-, 15-, 10-, and 5-year timeframes.

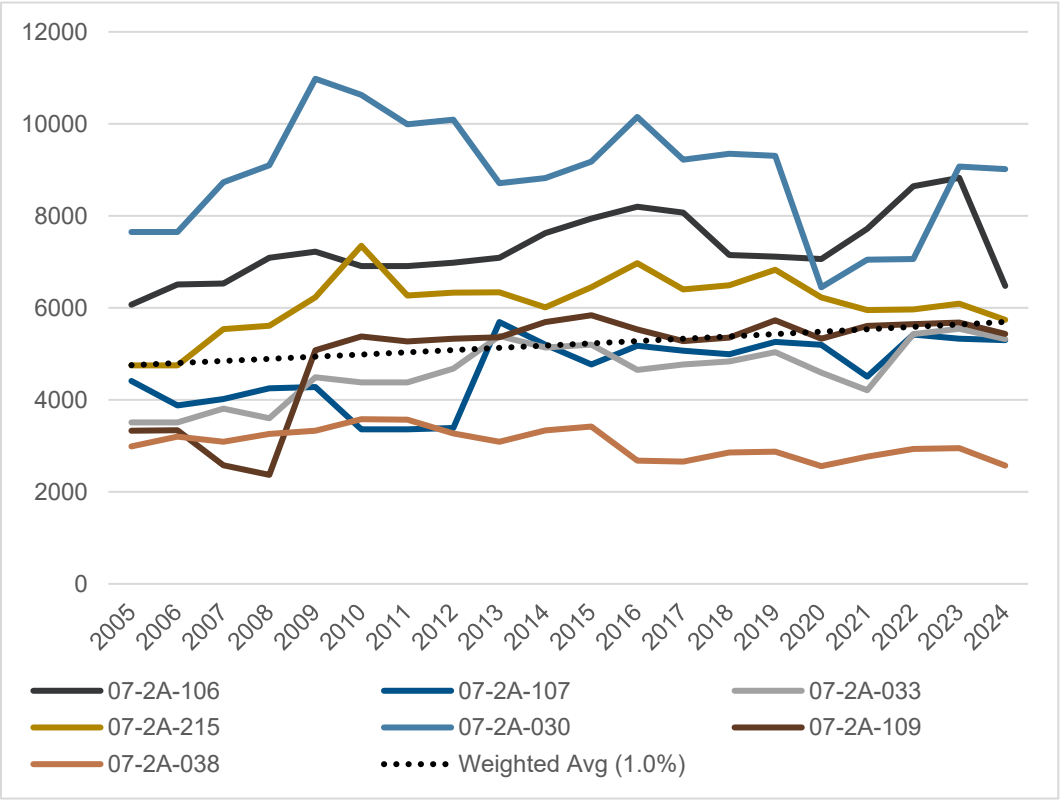


Figure 7: Historic Traffic Volumes

Table 15: Historic Traffic Growth

Site ID	Location	RP	2005 AADT	2024 AADT	20-Year Annual Growth (2005 – 2024)	15-Year Annual Growth (2010 – 2024)	10-Year Annual Growth (2015 – 2024)	5-Year Annual Growth (2020 – 2024)
07-2A-106	Old Havre Hwy, N of Smelter Ave	0.5	6,070	6,477	0.9%	0.6%	-0.4%	-0.3%
07-2A-107	Old Havre Hwy, SW of US 87	1.3	4,410	5,299	1.8%	2.5%	0.6%	1.7%
07-2A-033	US 87, NE of Bootlegger Trail	3.2	3,510	5,322	1.8%	0.7%	0.9%	4.7%
07-2A-215	15th St NE, N of 25th Ave NE	2.5	4,750	5,739	0.7%	-0.8%	-1.5%	-1.1%
07-2A-030	15th St NE, S of 25th Ave NE	2.3	7,650	9,017	-0.6%	-1.8%	-1.9%	7.7%
07-2A-109	Bootlegger Trail, S of 36th Ave NE	0.1	3,330	5,433	3.1%	0.2%	0.0%	0.4%
07-2A-038	25th Ave NE, btwn Old Havre Hwy & 15th St NE	0.2	2,990	2,572	-1.1%	-1.8%	-0.9%	0.6%
All Sites	**Weighted Average**				**1.0%**	**-0.1%**	**-0.6%**	**2.5%**

Source: MDT. 2024. Traffic Count Database System. https://mdt.public.ms2soft.com/tcds/tsearch.asp?loc=Mdt&mod=. Calculations by RPA. 2025.

Traffic volumes show variability by location and timeframe, which could reflect a range of unknown factors. The weighted average growth rate over the past 20 years was approximately one percent, while the 15- and 10-year periods saw negative growth rates of -0.1 and -0.6 percent, respectively. However, the five-year growth rate showed a positive increase of 2.5 percent. The rapid growth seen over the past five years (2020 through 2024) could be attributed to the sharp decline in traffic in 2020 during the COVID-19 pandemic, followed by a strong rebound to pre-pandemic levels in 2021 and 2022.

5.2 Projected Traffic Growth

Given the high variability in growth rates at each count site within the subarea, applying a single growth rate to the entire subarea was deemed inaccurate for projecting future traffic conditions. As a result, the transportation demand model (TDM) developed for the 2024 *Great Falls Area LRTP*[4] was used to determine specific growth rates for each leg of the intersections within the subarea.

The TDM employed industry-standard methodologies and data to reflect 2019 baseline traffic conditions. A future model year, 2045, was then developed, incorporating projected housing and employment growth as well as expected roadway infrastructure improvements within Great Falls from 2019 through 2045. To determine appropriate growth rates, a CAGR was calculated for each intersection leg by comparing the modeled traffic volumes from the 2019 baseline year through the projected 2045 volumes.

Table 16 summarizes the resulting TDM CAGRs for each AADT count site as well as the projected 2045 AADTs calculated by applying the CAGRs to 2024 AADTs. **Figure 8** illustrates the resulting TDM CAGRs for each intersection leg, which range from 0.3 percent to 2.7 percent

per year. These growth rates were then applied to TMC data collected in 2025 to evaluate intersection and corridor operations, as discussed in the following sections.

Table 16: Projected 2045 Traffic Volumes

Site ID	Location	RP	CAGR	2024 AADT	2045 AADT
07-2A-106	Old Havre Hwy, N of Smelter Ave	0.5	1.4%	6,477	8,670
07-2A-107	Old Havre Hwy, SW of US 87	1.3	0.7%	5,299	6,130
07-2A-033	US 87, NE of Bootlegger Trail	3.2	1.1%	5,322	6,700
07-2A-215	15th St NE, N of 25th Ave NE	2.5	1.3%	5,739	7,530
07-2A-030	15th St NE, S of 25th Ave NE	2.3	1.4%	9,017	12,070
07-2A-109	Bootlegger Trail, S of 36th Ave NE	0.1	1.3%	5,433	7,130
07-2A-038	25th Ave NE, btwn Old Havre Hwy & 15th St NE	0.2	1.4%	2,572	3,440

Source: MDT. 2024. Traffic Count Database System. https://mdt.public.ms2soft.com/tcds/tsearch.asp?loc=Mdt&mod=. Calculations by RPA. 2025.

5.3 Heavy Vehicle Volumes

An evaluation of heavy vehicle traffic within the subarea was conducted using data from the MDT count sites. The percentage of heavy vehicles in the traffic stream ranges from three to eight percent. Typically, the counts show between 240 and 490 heavy vehicles per day on subarea corridors. **Table 17** presents the percentage of heavy vehicles reported in 2024 by MDT.

Heavy truck volumes from select MDT count sites, along with heavy vehicle traffic volumes collected from the TMCs at each intersection, are shown in **Figure 9**. The data indicates that Old Havre Highway carries a higher volume of heavy truck traffic compared to 15th Street NE and US 87. It was also noted that heavy truck volumes are lower during the p.m. peak hour than those seen in the a.m. peak hour.

Table 17: Commercial Truck Traffic

Site ID	Location	RP	2024 AADT	2024 Trucks	Heavy Vehicle Percentage
07-2A-106	Old Havre Hwy, N of Smelter Ave	0.5	6,477	488	8%
07-2A-107	Old Havre Hwy, SW of US 87	1.3	5,299	290	5%
07-2A-033	US 87, NE of Bootlegger Trail	3.2	5,322	361	7%
07-2A-215	15th St NE, N of 25th Ave NE	2.5	5,739	243	4%
07-2A-030	15th St NE, S of 25th Ave NE	2.3	9,017	243	3%
07-2A-109	Bootlegger Trail, S of 36th Ave NE	0.1	5,433	139	3%
07-2A-038	25th Ave NE, btwn Old Havre Hwy & 15th St NE	0.2	2,572	214	8%

Source: MDT. 2024. Traffic Count Database System. https://mdt.public.ms2soft.com/tcds/tsearch.asp?loc=Mdt&mod=. Calculations by RPA. 2025.

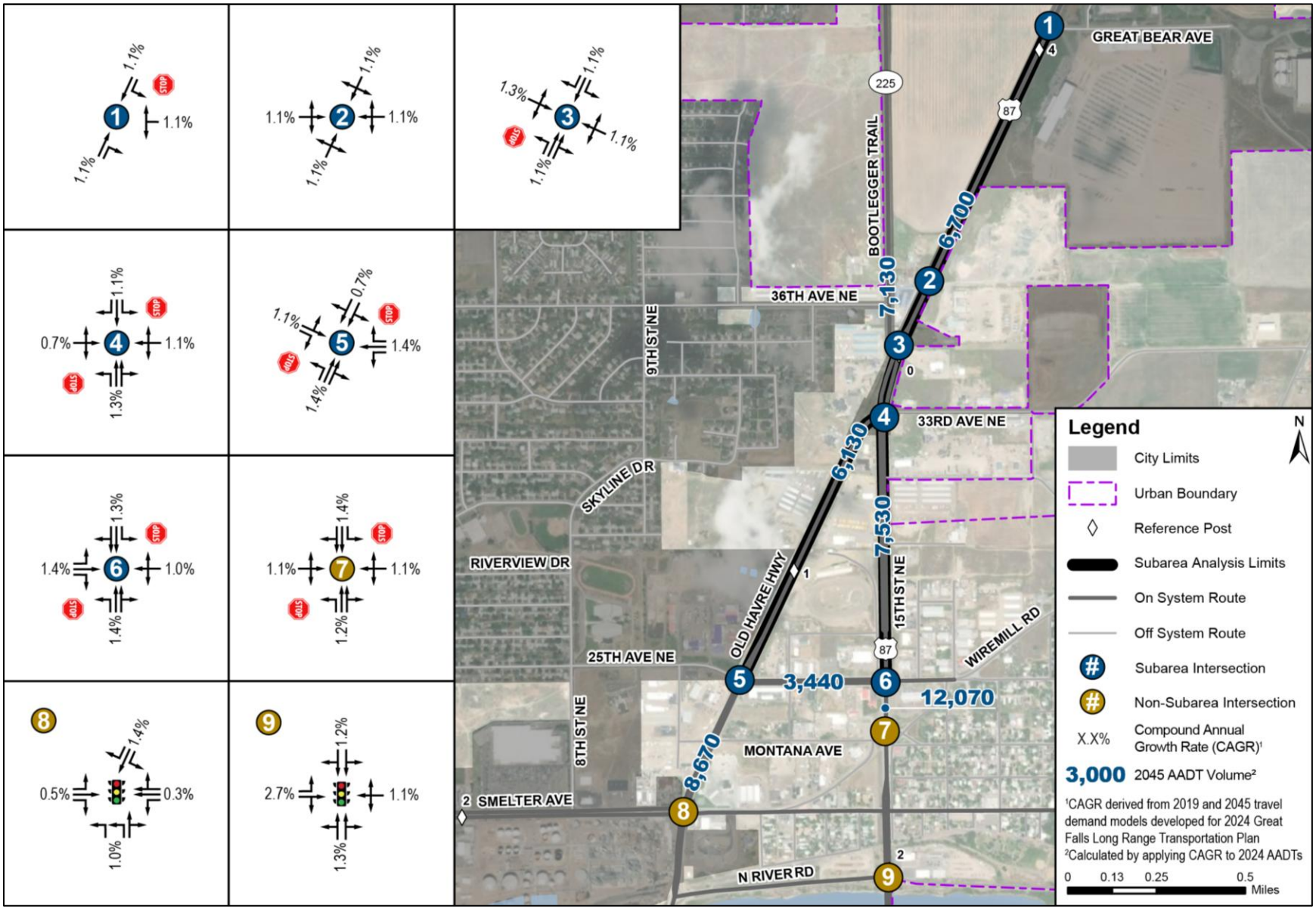


Figure 8: Historic and Projected Traffic Growth

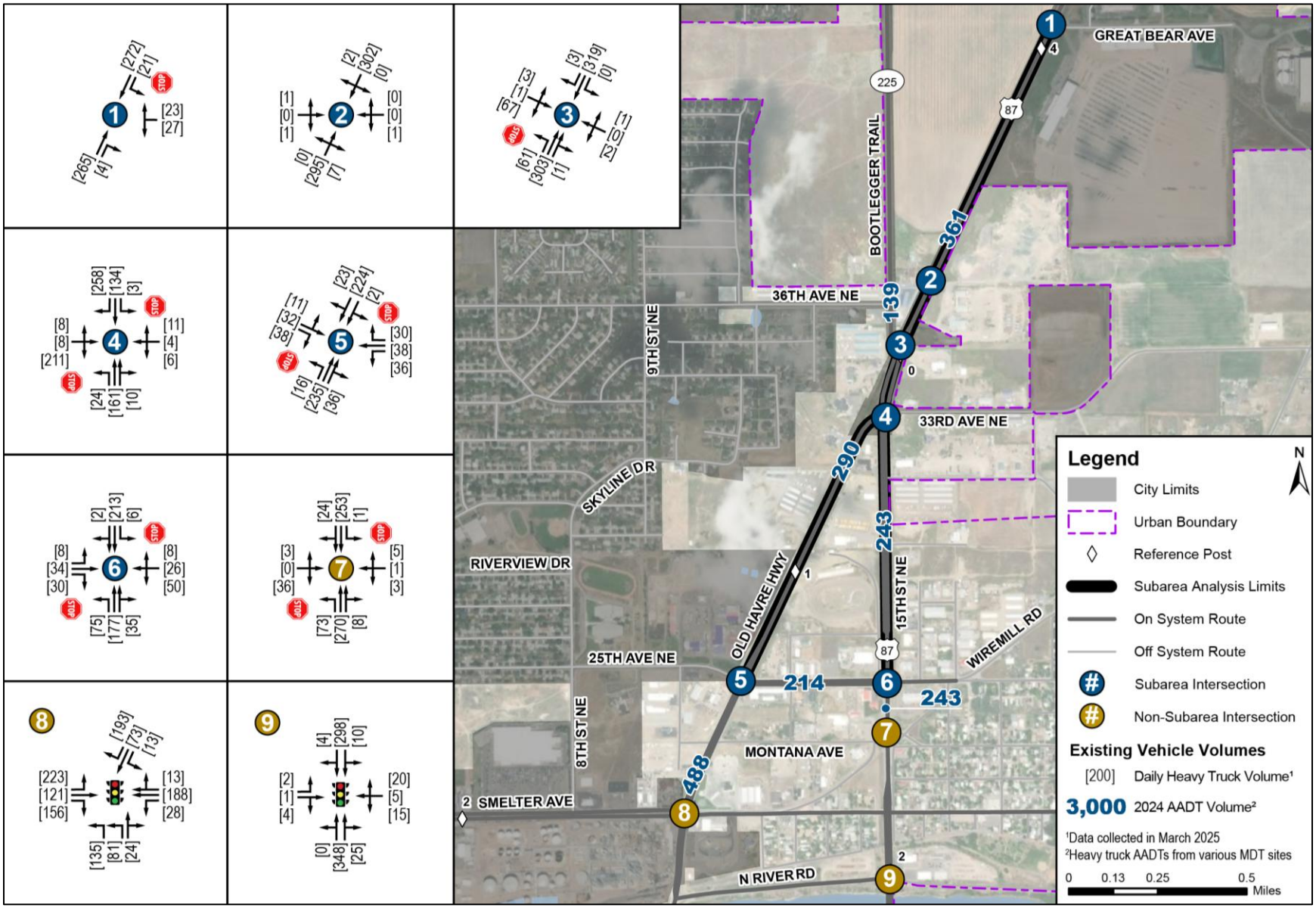


Figure 9: Existing Heavy Truck Volumes

5.4 Intersection Operations

To supplement the existing AADT counts within the subarea, TMCs were collected at nine intersections. Six of these intersections are located within the subarea, while the three additional intersections, situated south of the subarea, were included to better characterize traffic operations within the subarea. TMC data was collected over a 24-hour period during the week of March 10, 2025. Seasonal adjustment factors were applied to the TMC data based on the day of data collection.[23]

The operational conditions of the intersections are characterized by their level of service (LOS). LOS is based on an alphabetic scale which represents the full range of operating conditions defined based on the vehicle delay experienced at the intersection. The scale ranges from A, which indicates little, if any, vehicle delay, to F, which indicates substantial delay and traffic congestion.

5.4.1 Existing Intersection Operations

An analysis was performed on each of the nine intersections for two existing peak periods, a.m. and p.m., using *PTV Vistro 2025* software. Seven of the nine intersections are stop-controlled on the minor approach. For stop-controlled intersections, the LOS is determined based on the turning movement with the highest delay. The remaining two intersections are controlled by traffic signals, with the LOS determined by the average delay across all legs. **Table 18** and **Figure 10** present the analysis results for the existing 2025 traffic conditions. Additional detailed operational analysis results are provided in **Appendix C**.

Four of the six intersections within the subarea and six of the nine total intersections were found to be operating at a LOS of D or worse during at least one peak hour. For the stop-controlled intersections, the worst-performing turning movement on the minor leg was identified. In all cases, except for the intersection of US 87 and 34th Avenue NE, the worst-performing movement was a left turn.

Table 18: Existing Conditions (2025) Intersection Operations

ID	Intersection	Peak Hour Period	NB Delay (s)	NB LOS	SB Delay (s)	SB LOS	EB Delay (s)	EB LOS	WB Delay (s)	WB LOS	Int. Total Worst Mvmt	Int. Total Delay (s)	Int. Total LOS
1	US 87 & Great Bear Ave	a.m.	0.0	A	0.2	A	-	-	11.0	B	WBL	11.1	B
2	US 87 & 34th Ave NE	a.m.	0.0	A	0.0	A	9.7	A	0.0	A	EBL	11.1	B
3	US 87 & Bootlegger Tr	a.m.	3.3	A	0.0	A	18.0	C	0.0	A	EBL	24.1	C
4	15th St NE/US 87 & Old Havre Hwy	a.m.	0.5	A	0.1	A	32.9	D	10.1	B	EBL	33.0	D
5	Old Havre Hwy & 25th Ave NE	a.m.	1.6	A	0.1	A	15.5	C	16.2	C	EBL	24.1	C
6	15th St NE & 25th Ave NE	a.m.	2.9	A	0.2	A	14.5	B	52.4	F	WBL	55.8	F
7	15th St NE & Wire Mill Rd	a.m.	3.9	A	0.1	A	20.1	C	39.2	E	WBL	64.2	F
8	Old Havre Hwy/10th St NE & Smelter Ave*	a.m.	45.2	D	34.2	C	14.1	B	47.1	D	-	36.6	D
9	15th St NE & N River Rd*	a.m.	19.5	B	18.8	B	0.0	A	13.0	B	-	19.0	B
1	US 87 & Great Bear Ave	p.m.	0.0	A	0.0	A	-	-	18.8	C	WBL	18.8	C
2	US 87 & 34th Ave NE	p.m.	0.1	A	0.0	A	11.5	B	0.0	A	EBR	11.5	B
3	US 87 & Bootlegger Tr	p.m.	8.7	A	0.0	A	16.8	C	163.7	F	WBL	194.4	F
4	15th St NE/US 87 & Old Havre Hwy	p.m.	0.3	A	0.1	A	37.5	E	18.2	C	EBT	40.0	E
5	Old Havre Hwy & 25th Ave NE	p.m.	1.6	A	0.1	A	21.1	C	23.0	C	EBL	33.0	D
6	15th St NE & 25th Ave NE	p.m.	1.8	A	0.3	A	17.8	C	185.3	F	WBL	191.1	F
7	15th St NE & Wire Mill Rd	p.m.	3.3	A	0.2	A	28.8	D	115.9	F	WBL	149.2	F
8	Old Havre Hwy/10th St NE & Smelter Ave*	p.m.	51.3	D	42.2	D	13.8	B	54.2	D	-	44.3	D
9	15th St NE & N River Rd*	p.m.	23.4	C	17.9	B	12.7	B	14.0	B	-	20.8	C

*Signal controlled intersection

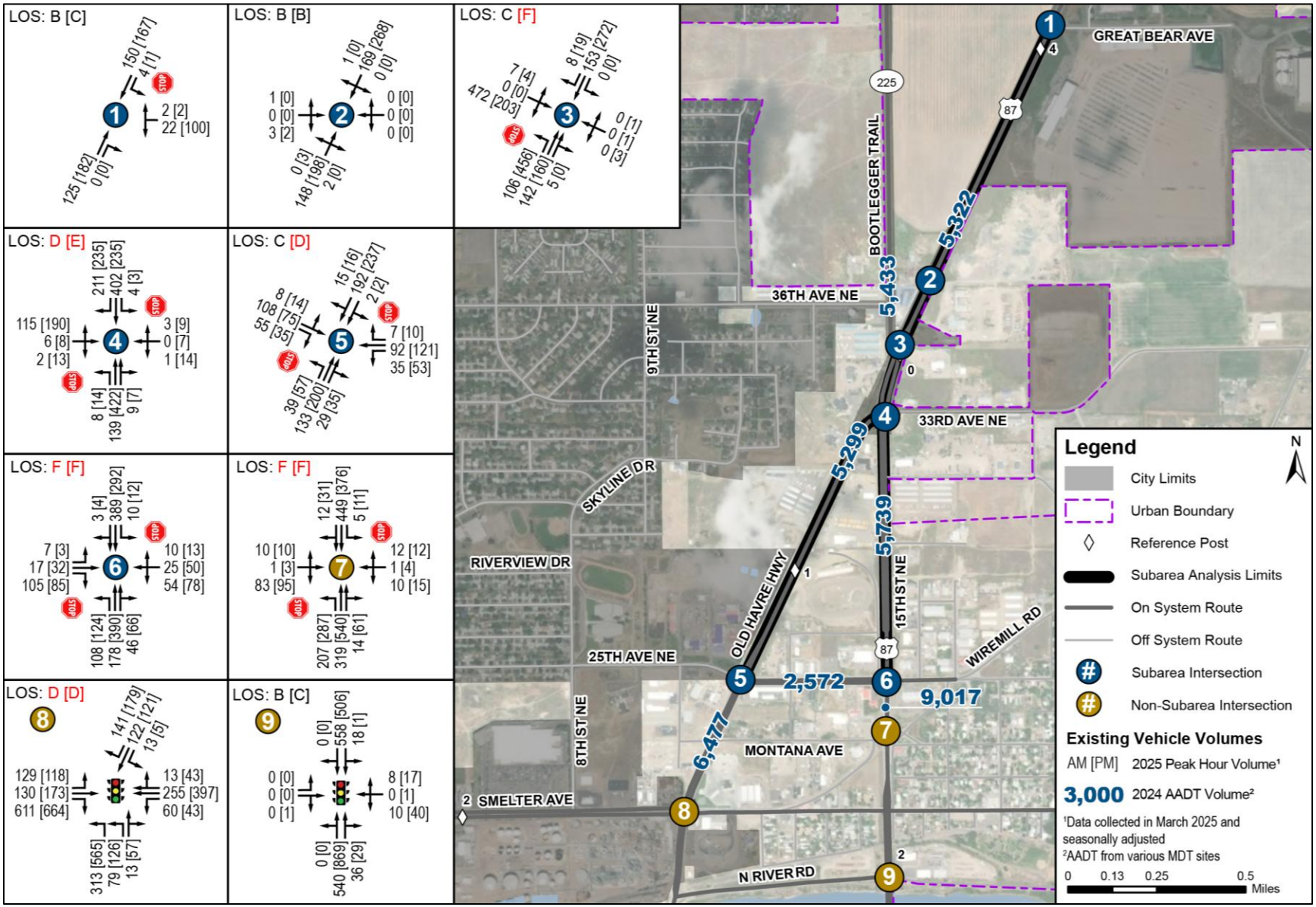


Figure 10: Existing Traffic Conditions (2025)

5.4.2 Projected Intersection Operations

Table 19 and **Figure 11** present the analysis results for the projected 2045 traffic conditions. All of the 2025 traffic volumes were increased using the CAGR values derived from the TDM developed for the 2024 LRTP as discussed previously. All intersection control and turn lane configurations remained the same as under existing conditions. Detailed projected operational analysis results are provided in **Appendix D**.

Under the projected 2045 traffic conditions, the delay at each intersection increased. Five of the six intersections within the subarea, and seven of the nine total intersections, were projected to operate at a LOS of D or worse during at least one peak hour under future conditions.

Table 19: Projected Conditions (2045) Intersection Operations

ID	Intersection	Peak Hour Period	NB Delay (s)	NB LOS	SB Delay (s)	SB LOS	EB Delay (s)	EB LOS	WB Delay (s)	WB LOS	Int. Total Worst Mvmt	Int. Total Delay (s)	Int. Total LOS
1	US 87 & Great Bear Ave	a.m.	0.0	A	0.2	A	-	-	11.9	B	WBL	12.0	B
2	US 87 & 34th Ave NE	a.m.	0.0	A	0.0	A	10.1	B	0.0	A	EBL	12.0	B
3	US 87 & Bootlegger Tr	a.m.	3.4	A	0.0	A	44.7	E	0.0	A	EBL	53.7	F
4	15th St NE/US 87 & Old Havre Hwy	a.m.	0.5	A	0.1	A	92.9	F	10.5	B	EBL	93.1	F
5	Old Havre Hwy & 25th Ave NE	a.m.	1.6	A	0.1	A	21.6	C	23.2	C	EBL	39.2	E
6	15th St NE & 25th Ave NE	a.m.	3.2	A	0.2	A	22.5	C	381.6	F	WBL	392.8	F
7	15th St NE & Wire Mill Rd	a.m.	4.9	A	0.1	A	93.4	F	153.8	F	WBL	223.0	F
8	Old Havre Hwy/10th St NE & Smelter Ave*	a.m.	47.8	D	38.8	D	14.1	B	45.7	D	-	36.6	F
9	15th St NE & N River Rd*	a.m.	23.9	C	24.3	C	0.0	A	13.1	B	-	23.9	C
1	US 87 & Great Bear Ave	p.m.	0.0	A	0.0	A	-	-	34.1	D	WBL	34.1	D
2	US 87 & 34th Ave NE	p.m.	0.1	A	0.0	A	12.8	B	0.0	A	EBR	12.8	B
3	US 87 & Bootlegger Tr	p.m.	12.6	B	0.0	A	100.7	F	1,260.8	F	WBL	1,3372.3	F
4	15th St NE/US 87 & Old Havre Hwy	p.m.	0.3	A	0.1	A	148.1	F	27.9	D	EBT	151.6	F
5	Old Havre Hwy & 25th Ave NE	p.m.	1.6	A	0.1	A	65.7	F	52.2	F	EBL	121.7	F
6	15th St NE & 25th Ave NE	p.m.	2.0	A	0.4	A	41.1	E	1,800.0	F	WBL	1,841.5	F
7	15th St NE & Wire Mill Rd	p.m.	4.1	A	0.3	A	278.6	F	1,023.8	F	WBL	1,143.7	F
8	Old Havre Hwy/10th St NE & Smelter Ave*	p.m.	74.8	E	65.7	E	13.4	B	50.5	D	-	58.6	E
9	15th St NE & N River Rd*	p.m.	36.8	D	20.6	C	12.8	B	14.4	B	-	29.5	C

*Signal controlled intersection

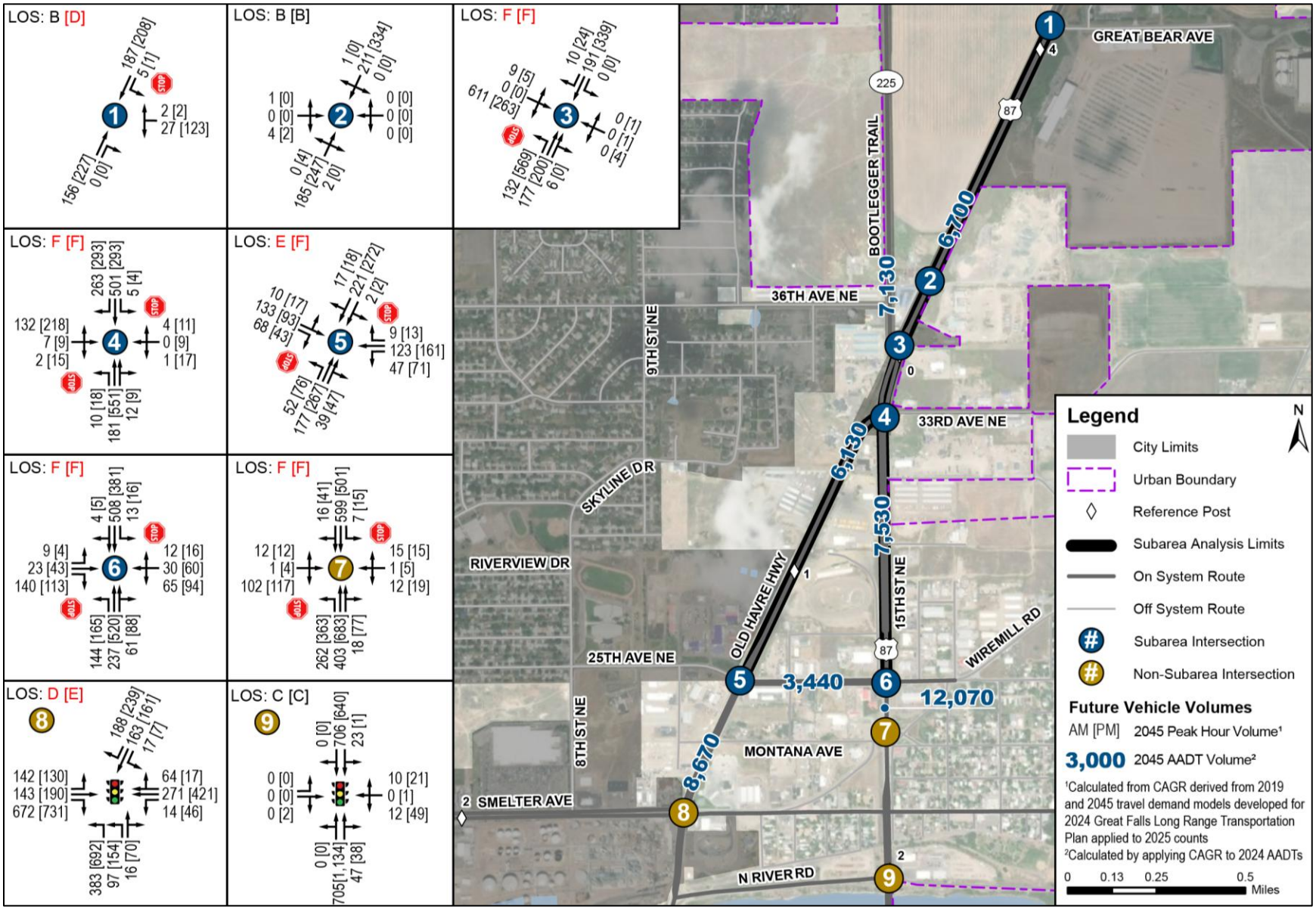


Figure 11: Projected Traffic Conditions (2045)

5.5 Corridor Operations

To evaluate corridor operations, a microsimulation model was developed to quantify traffic performance across the entire subarea. Traditional deterministic methods, like those outlined in the *Highway Capacity Manual 7th Edition,*[24] are not able to capture the complex relationships between intersections, as they do not account for network-wide effects. In contrast, microsimulation provides a more comprehensive analysis, offering not only intersection delay but also metrics such as travel time between key points, average network delay, and average speed across the corridor. These outputs enable a clearer comparison of existing and projected conditions, providing a more relatable way to assess the impacts of different design options.

5.5.1 Existing Corridor Operations

To assess travel times, specific locations were selected along each of the subarea corridors: Old Havre Highway, south of 25th Avenue NE; 15th Street NE, south of 25th Avenue NE; Bootlegger Trail, northwest of US 87; and US 87, north of Great Bear Avenue. These locations were then paired to create origin-destination pairs for analysis. **Table 20** summarizes the travel time results for both the a.m. and p.m. peak hours under the existing 2025 conditions.

Table 20: Existing Conditions (2025) Simulated Travel Time Results

Road	Begin Point	Road	End Point	Direction	Travel Time A.M. Peak Hour	Travel Time P.M. Peak Hour
Old Havre Hwy	S of 25th Ave NE	Bootlegger Trail	NW of US 87	NB	115.4	120.6
Old Havre Hwy	S of 25th Ave NE	US 87	N of Great Bear Ave	NB	145.8	152.1
15th St NE	S of 25th Ave NE	Bootlegger Trail	NW of US 87	NB	78.5	83.7
15th St NE	S of 25th Ave NE	US 87	N of Great Bear Ave	NB	108.7	106.8
Bootlegger Trail	NW of US 87	Old Havre Hwy	S of 25th Ave NE	SB	95.8	89.6
US 87	N of Great Bear Ave	Old Havre Hwy	S of 25th Ave NE	SB	125.2	125.3
Bootlegger Trail	NW of US 87	15th St NE	S of 25th Ave NE	SB	88.1	81.6
US 87	N of Great Bear Ave	15th St NE	S of 25th Ave NE	SB	116.7	117.3

In the northbound direction, travel times along 15th Street NE to either Bootlegger Trail or US 87 north of Great Bear Avenue (78 to 108 seconds) are lower than those along Old Havre Highway (115 to 152 seconds). This difference is likely due to the eastbound left turn from Old Havre Highway onto US 87. In the southbound direction, the travel time difference between Old Havre Highway and 15th Street NE is similar, with 15th Street NE offering shorter travel times (81 to 117 seconds, compared to 89 to 125 seconds on Old Havre Highway). Both routes experience relatively free-flow traffic through the intersection of 15th Street NE/US 87 and Old Havre Highway. The southbound right-turn bypass from US 87 onto Old Havre Highway is yield-controlled, so some delay can occur when there is a conflicting southbound vehicle on Old Havre Highway.

Regarding peak hours, northbound travel times are generally shorter in the a.m. than in the p.m., by approximately five seconds. In contrast, southbound travel times ending on Old Havre Highway are slightly longer during the a.m. peak than the p.m. peak (95 to 125 in the a.m. and 89 to 125 in the p.m.). These variations are largely attributed to daily traffic patterns, particularly the influence of commuters entering Great Falls in the morning and leaving Great Falls in the evening.

To evaluate overall network operations, three key metrics were analyzed: average network delay, average number of stops per vehicle, and average vehicle speed. Average network delay is calculated by dividing the total delay incurred by all vehicles by the total number of vehicles. Lower delay values indicate better performance. Average stops per vehicle is determined by dividing the total number of stops made by all vehicles in the network by the total number of vehicles that travel through the network. Again, lower values are preferable. Average speed represents the average speed of all vehicles traveling through the network, including periods when vehicles are stopped. Higher speeds are better for network efficiency.

Simulated network operation metrics are summarized in **Table 21**. For each of the three metrics, the network shows slightly lower performance during the p.m. peak hour, which is expected given the higher traffic volumes at that time.

Table 21: Existing Conditions (2025) Simulated Network Operation Results

Peak Hour	Average Network Delay (s/veh)	Average Stops per Vehicle	Average Speed (mph)
A.M.	35.6	1.15	26.7
P.M.	38.8	1.22	25.7

5.5.2 Projected Corridor Operations

The same travel time origin-destination pairs were also evaluated under projected 2045 traffic conditions, as shown in **Table 22**. The general travel time trends observed under the existing 2025 conditions were consistent under projected conditions, though all travel times increased. Northbound travel times originating on Old Havre Highway rose by approximately 40 to 50 seconds, while those originating on 15th Street NE increased by 10 seconds or less. Southbound travel times saw smaller increases compared to the northbound direction. Specifically, travel times from Bootlegger Trail increased by about 10 to 20 seconds, regardless of the destination. These results highlight two movements experiencing increased congestion: the eastbound left turn from Old Havre Highway onto US 87, and the eastbound right turn from Bootlegger Trail onto US 87 due to the high volumes of southbound traffic on US 87.

Table 22: Projected Conditions (2045) Simulated Travel Time Results

Road	Begin Point	Road	End Point	Direction	A.M. Peak Hour	P.M. Peak Hour
Old Havre Hwy	S of 25th Ave NE	Bootlegger Trail	NW of US 87	NB	165.3	167.8
Old Havre Hwy	S of 25th Ave NE	US 87	N of Great Bear Ave	NB	194.8	192.5
15th St NE	S of 25th Ave NE	Bootlegger Trail	NW of US 87	NB	85.0	93.9
15th St NE	S of 25th Ave NE	US 87	N of Great Bear Ave	NB	112.8	111.3
Bootlegger Trail	NW of US 87	Old Havre Hwy	S of 25th Ave NE	SB	107.9	112.6
US 87	N of Great Bear Ave	Old Havre Hwy	S of 25th Ave NE	SB	125.8	126.1
Bootlegger Trail	NW of US 87	15th St NE	S of 25th Ave NE	SB	99.6	101.6
US 87	N of Great Bear Ave	15th St NE	S of 25th Ave NE	SB	117.2	117.2

The projected 2045 network operations are summarized in **Table 23**. Each metric showed a decline under the projected traffic conditions. Average network delay increased by approximately 35 to 40 seconds per vehicle while the number of average stops per vehicle nearly doubled during both peak periods. Average speed decreased by about six mph in each peak period.

Table 23: Projected Conditions (2045) Simulated Network Operation Results

Peak Hour	Average Network Delay (s/veh)	Average Stops per Vehicle	Average Speed (mph)
A.M.	73.9	2.74	20.9
P.M.	74.6	2.34	20.0

5.6 Traffic Condition Conclusions

Based on the intersection analysis, most of the study intersections are currently operating at an undesirable LOS. Since all of the intersections within the subarea are two-way stop-controlled, the minor legs are the main source of intersection delay. While many of the minor legs have low volumes, the intersection of Old Havre Highway and 15th Street NE/US 87 sees heavy eastbound traffic, specifically left turns. Similarly, the intersections of 25th Avenue NE with both Old Havre Highway and 15th Street NE have high minor leg volume.

Comparing existing 2025 operations to projected 2045 conditions, network performance is anticipated to deteriorate. Travel time results highlight the intersections of Old Havre Highway and 15th Street NE/US 87, as well as US 87 and Bootlegger Trail, as locations of increased congestion and delay. These two intersections are closely spaced, which means their operations are likely interdependent. Any future improvements at these locations should be considered together. The intersections on 25th Avenue NE also contribute to network delays and may need upgrades. Additionally, the grades on Old Havre Highway and 15th Street NE should be accounted for when evaluating possible improvement options, especially considering the number of heavy trucks that travel through the area.

6.0 SAFETY CONDITIONS

The MDT Traffic and Safety Bureau provided crash data for the subarea corridors for the five-year period from January 1, 2019, through December 31, 2023.[i]

This information includes data from crash reports submitted to the MHP from their patrol officers and from local city law enforcement. While vehicle and crash characteristics were provided, the absence of person-level data made it difficult to conduct analysis from an individual perspective. The crash reports are a summation of information from the scene of the crash provided by the responding officer. Some of the information contained in the crash reports may be subjective. Any crash records from other law enforcement agencies that were not reported to or by the 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 subarea corridors, there are some limitations to the data. A primary limitation is unreported and unknown data. Many crash records include various fields left blank. Occasionally, a report will have “unknown” listed rather than a blank field. Without this information, it may be difficult to capture the complete picture of what happened in crashes. Similarly, many crashes, especially those where individuals and vehicles are unharmed, do not get 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. Often, the available crash data does not present the full picture. 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.

6.2 Crash Location

The crash locations were plotted using the latitude and longitude assigned to each record. According to the records, a total of 85 crashes were reported along the subarea corridors during the five-year analysis period. The crash records were reviewed to identify trends, contributing factors, and characteristics as discussed in the following sections. The crashes are primarily concentrated at intersections within the subarea, including Old Havre Highway/25th Avenue NE, 15th Street NE/25th Avenue NE, and Old Havre Highway/15th Street NE/US 87. The density of crashes along the subarea corridors is shown in **Figure 12.**

[i] *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.*

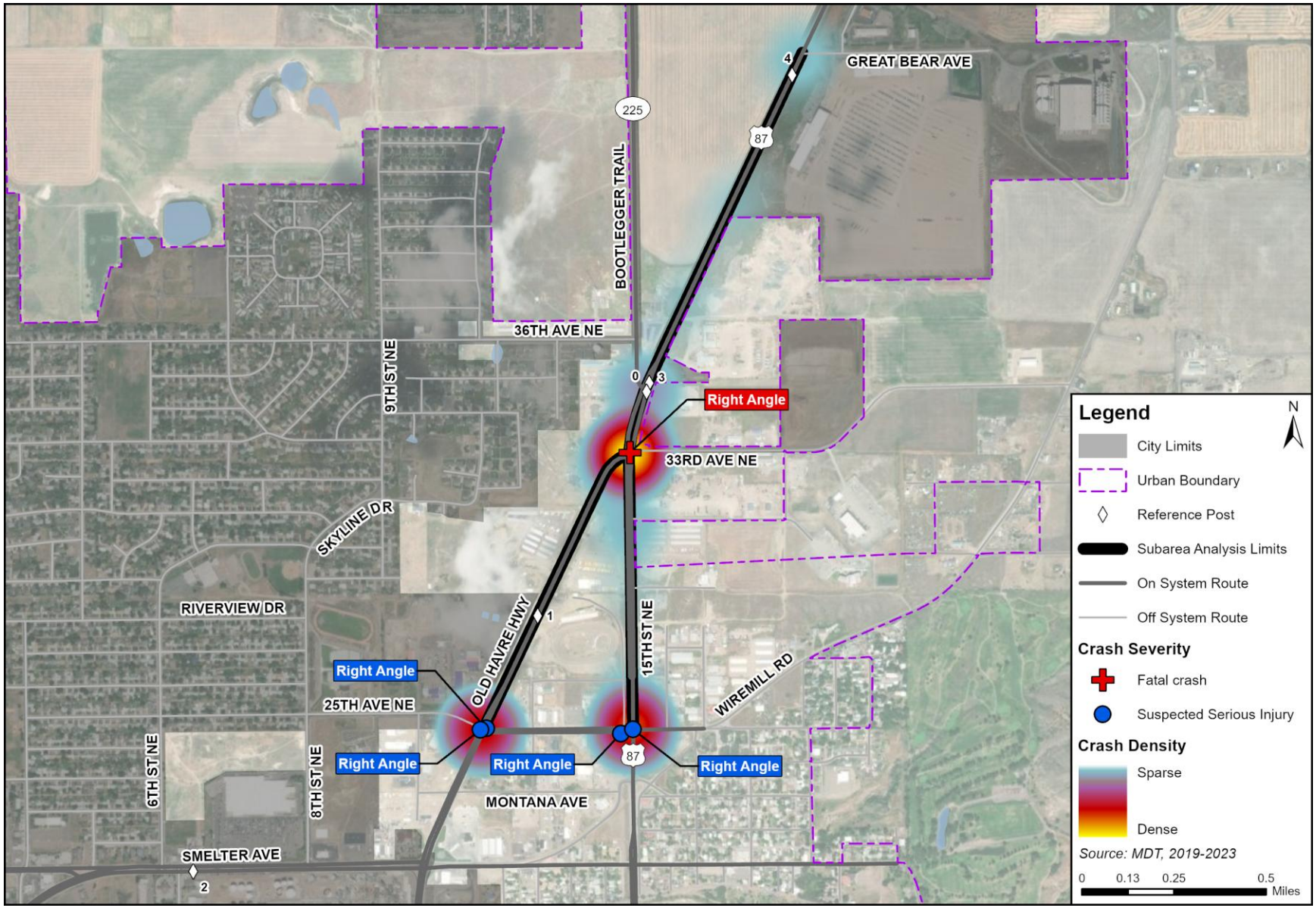


Figure 12: Crash Density and Severe Crashes

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 single 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.

The distribution of reported crash severity is presented in **Figure 13**. There was one fatal crash and four suspected serious injury crashes, with almost six percent of all crashes classified as severe. The locations of severe crashes were shown previously in **Figure 12**. There were 19 suspected minor injury crashes (22 percent) and nine possible injury crashes (11 percent). Two crashes had unknown severity. The remaining 50 crashes (60 percent) resulted in PDO.

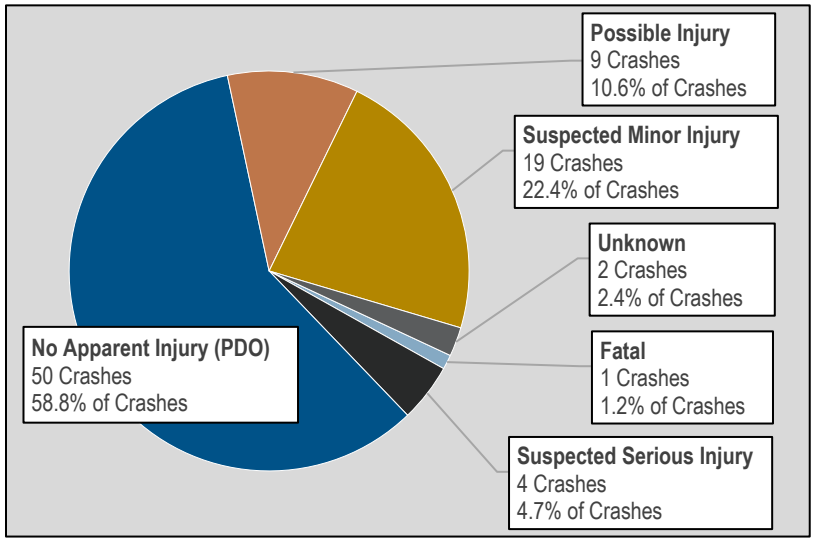


Figure 13: Crash Severity

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. Single-vehicle crashes accounted for 14 percent of all reported crashes. Of the single-vehicle crashes, fixed object crashes (seven percent) were the most common type, followed by wild animal crashes (five percent).

Multiple-vehicle crashes involve two or more vehicles. Multiple-vehicle crashes accounted for 86 percent of all crashes. The most common multiple vehicle crash types were right-angle crashes (56 percent), followed by rear-end crashes (19 percent), left turn crashes (four percent), and sideswipe collisions (two percent). **Figure 14** presents the distribution of crash types along the subarea corridors.

Crash types tend to be associated with their relation to a junction (i.e. intersection or driveway). For example, multiple-vehicle crashes are more common in locations near junctions. As such, analysis of relation to junction information can help to identify systemic issues within the subarea. Of the 85 total reported crashes, 80 percent of crashes were, in some way, related to a junction (intersection, driveway, or other access point). The remaining 20 percent of crashes were non-junction related.

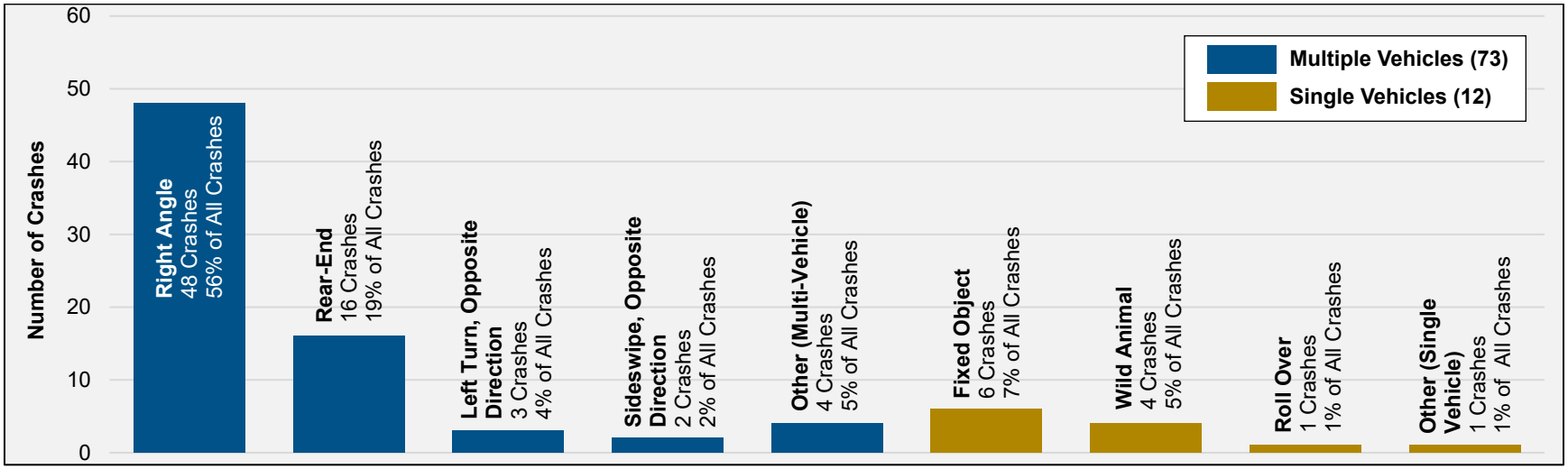


Figure 14: Crash Type

6.5 Crash Period

Each crash record includes the date and time when the crash occurred. This information can be used to determine seasonal and other time dependent trends. Time of day data was analyzed to determine if any specific trends were present. The data was plotted based on the hour the crash occurred and whether the crash occurred on a weekday or weekend.

For weekday crashes (75 percent of all crashes), two peaks are apparent. One peak occurs at noon, which accounted for 16 percent of weekday crashes. The other peak is more prolonged and generally occurs from about 3:00 to 5:00 p.m. relating to school release times and evening commuting hours, accounting for 33 percent of weekday crashes. For the weekend crashes (25 percent of all crashes), a peak period was identified from about 3:00 to 5:00 p.m., accounting for 48 percent of weekend crashes. Generally, the weekday and weekend crashes followed the same time pattern. **Figure 15** presents the distribution of crashes with respect to the time of day that the crashes occurred.

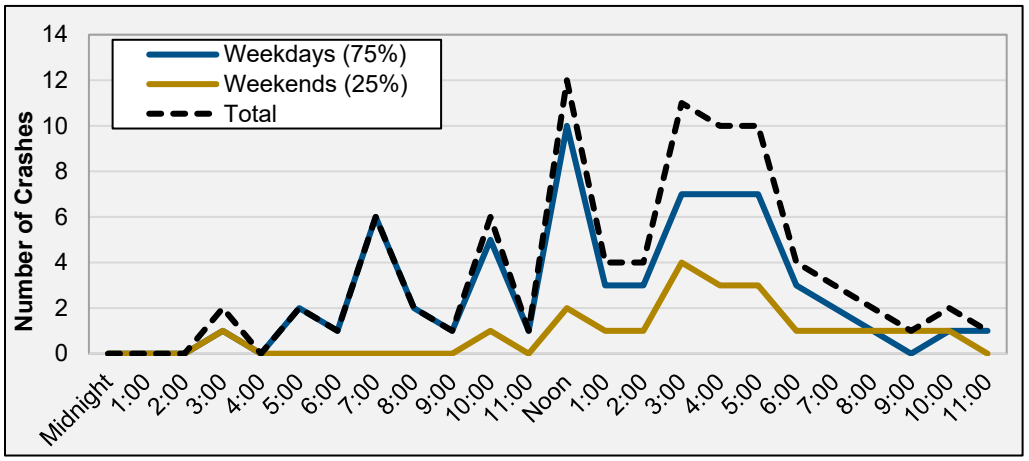


Figure 15: Crash Occurrence by Time of Day

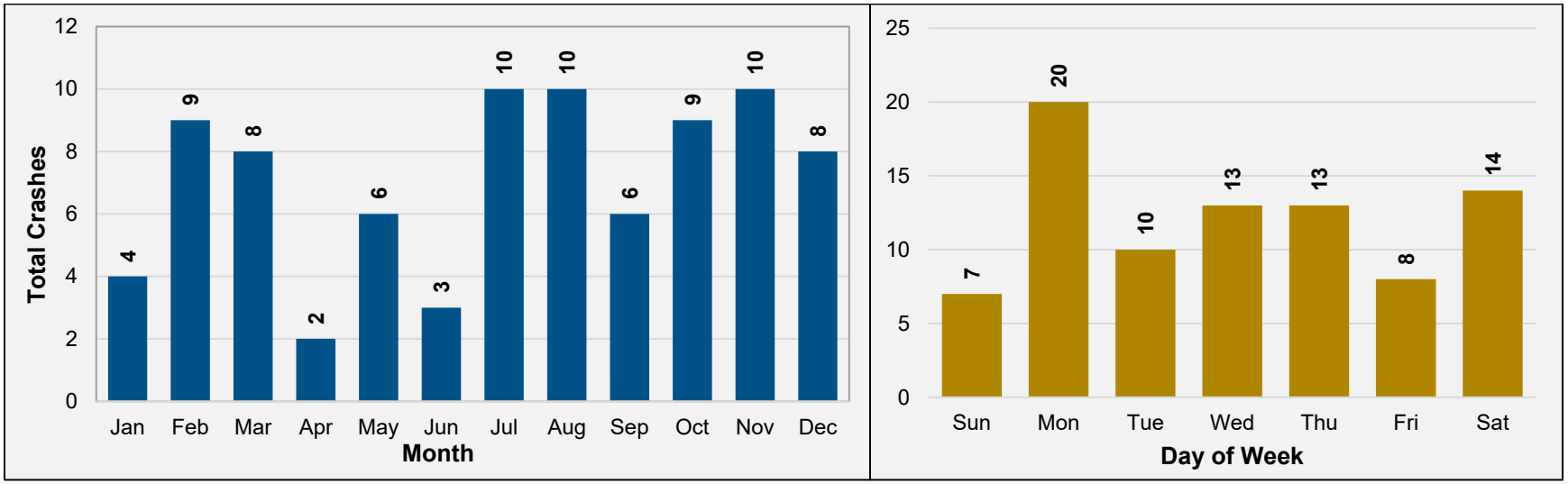


Figure 16: Crash Occurrence by Month and Day of the Week

The frequency of crashes occurring during each month and on a given day were plotted in **Figure 16**. The greatest number of crashes occurred on Mondays (24 percent) and the fewest crashes occurred on Sundays (eight percent). Of the severe crashes, two occurred on Saturday, two on Wednesday, and the remaining crash occurred on Monday. In general, the highest number of crashes were observed during the fall months (September through November), when almost 30 percent of crashes occurred, while crashes were the lowest during the spring months (March through May). The greatest number of crashes, however, occurred in July, August, and November (12 percent each).

Figure 17 shows the frequency of crashes occurring per year. As shown in the figure, the number of crashes per year has remained relatively constant throughout the five years, with a peak in 2021 accounting for 27 percent of the crashes over the analysis period. During the same period, the number of severe crashes resulting in a fatality or suspected serious injury followed the same trend, peaking in 2021 and 2022 with two severe crashes in both years

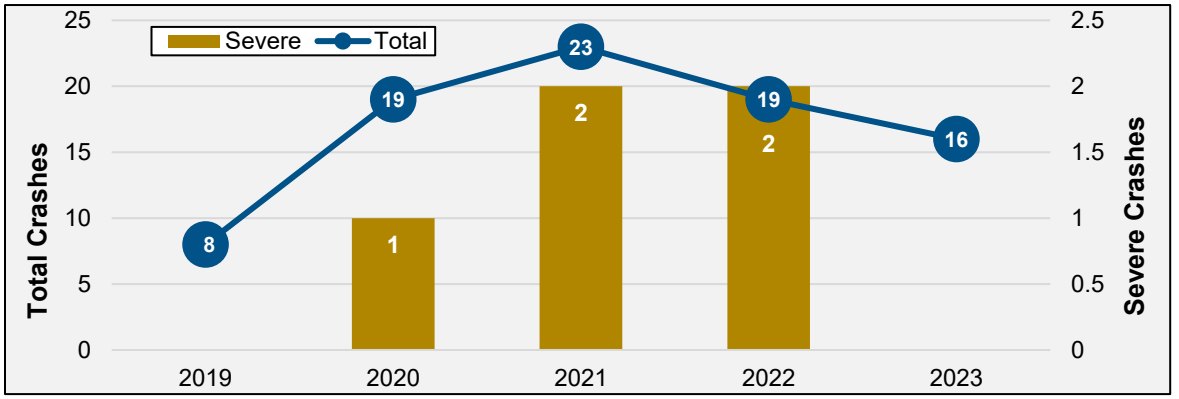


Figure 17: Crashes per Year

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. The weather condition was reported as clear or cloudy in 88 percent of all crashes and 100 percent of severe crashes. Adverse weather conditions, including snow and rain, were reported in approximately 12 percent of crashes. **Figure 18** presents the distribution of crashes based on weather conditions.

The reported road surface condition for crashes within the subarea is also presented in **Figure 18**. Approximately 76 percent of all crashes were reported as having occurred on dry roads, while 20 percent of crashes were reported as having occurred on wet, snowy, or icy/frost-covered roads. Of the severe crashes, two occurred on dry roads, while one occurred on wet roads, one on icy or frost-covered roads, and one under unknown road conditions. The "other" category includes slush; mud, dirt, and gravel; and unknown.

About 78 percent of all crashes were reported as having occurred under daylight conditions. An additional 19 percent of crashes were reported as occurring at dark, and 50 percent of those occurred where street lighting was not present. Within the subarea, street lighting is only present at the main intersections (Old Havre Highway/25th Avenue NE, 15th Street NE/25th Avenue NE, Old Havre Highway/15th Street NE/US 87, and US 87/Great Bear Avenue). Similarly, severe crashes occurred during daylight hours 60 percent of the time, and at dark with street lighting 40 percent of the time. The distribution of crashes occurring under the different lighting conditions is presented in **Figure 18**. The "other" category includes dusk and dawn.

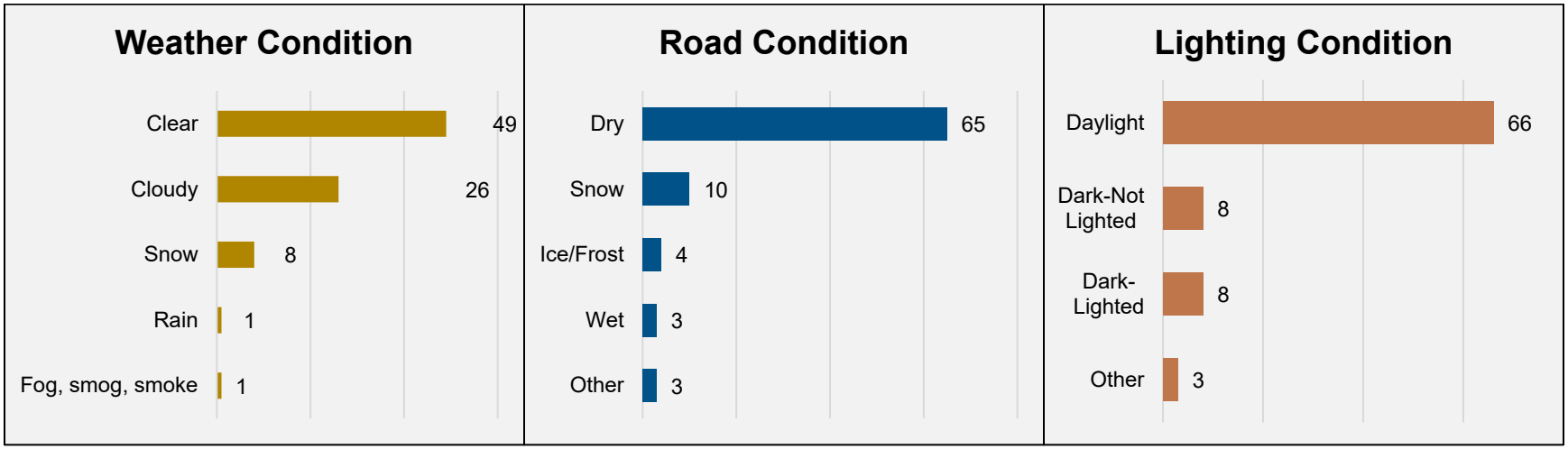


Figure 18: Crash Environmental Factors

6.7 Other Factors

Although data about the driver and people involved was not provided for the subarea, other factors can be identified from the crash and vehicle data. These include non-motorist involvement, impaired driving, and vehicle maneuvers. No pedestrians or cyclists were involved in any crashes within the subarea over the five-year data period.

Impaired driving is defined as operating a vehicle while under the influence of drugs or alcohol.[25] 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 per milliliter threshold for tetrahydrocannabinol (THC) in blood for anyone operating a motor vehicle. Of the 85 crashes, three involved impaired drivers, none of which were severe.

Vehicle maneuvers at the time of the crash can provide insight into how the crash occurred. Most vehicles were traveling straight ahead (69 percent) or stopped in traffic (12 percent) when the crash took place. Vehicles attempting to turn left at the time of the collision make up 10 percent. Other maneuvers recorded include parked vehicles, turning right, backing, slowing, negotiating a curve, and passing.

6.8 Vehicle Details

Over the analysis period, 172 vehicles were involved in crashes within the subarea. Of these vehicles, 39 percent were passenger cars/vans, 35 percent were pickups, and 20 percent were sport utility vehicles. Large trucks were involved in about two percent of crashes while motorcycles and ATVs were involved in slightly less than two percent of crashes. Other vehicles involved in crashes include light trucks/cargo vans (one percent) and school buses. The most common vehicle involved in severe crashes was passenger vehicles (45 percent) while about 36 percent involved pickups, and 18 percent involved SUVs. Commercial vehicles were involved in about two percent of crashes.

6.9 Citation Data

Citation data was obtained from the MDT Traffic and Safety Bureau for the same five-year analysis period (2019 through 2023). This data includes citations issued primarily by MHP for violations reflecting state and federal traffic codes. City codes are typically not reflected in this dataset. The citation locations were plotted using the latitude and longitude assigned to each record. **Figure 19** shows the locations of citations issued within the subarea. As shown in the figure, citations were mainly issued along 15th Street NE, including the intersections with 25th Avenue NE and Old Havre Highway.

A total of 159 citations were issued, with the greatest number being related to seatbelt violations, speed, registration/insurance violations, right-of-way violations, and license infractions. The dataset indicates that 16 percent of the citations were issued as a result of a crash and about six percent were issued as a result of a crash causing injury. The most citations were issued in 2022 (36) with declining numbers of citations in 2023 (27). Citations were higher in July (16 percent) compared to other months. Citations issued from 4:00 p.m. to 8:00 p.m. make up 34 percent of all citations. The lowest number of citations (one percent) were issued in the morning (10:00 a.m. to noon).

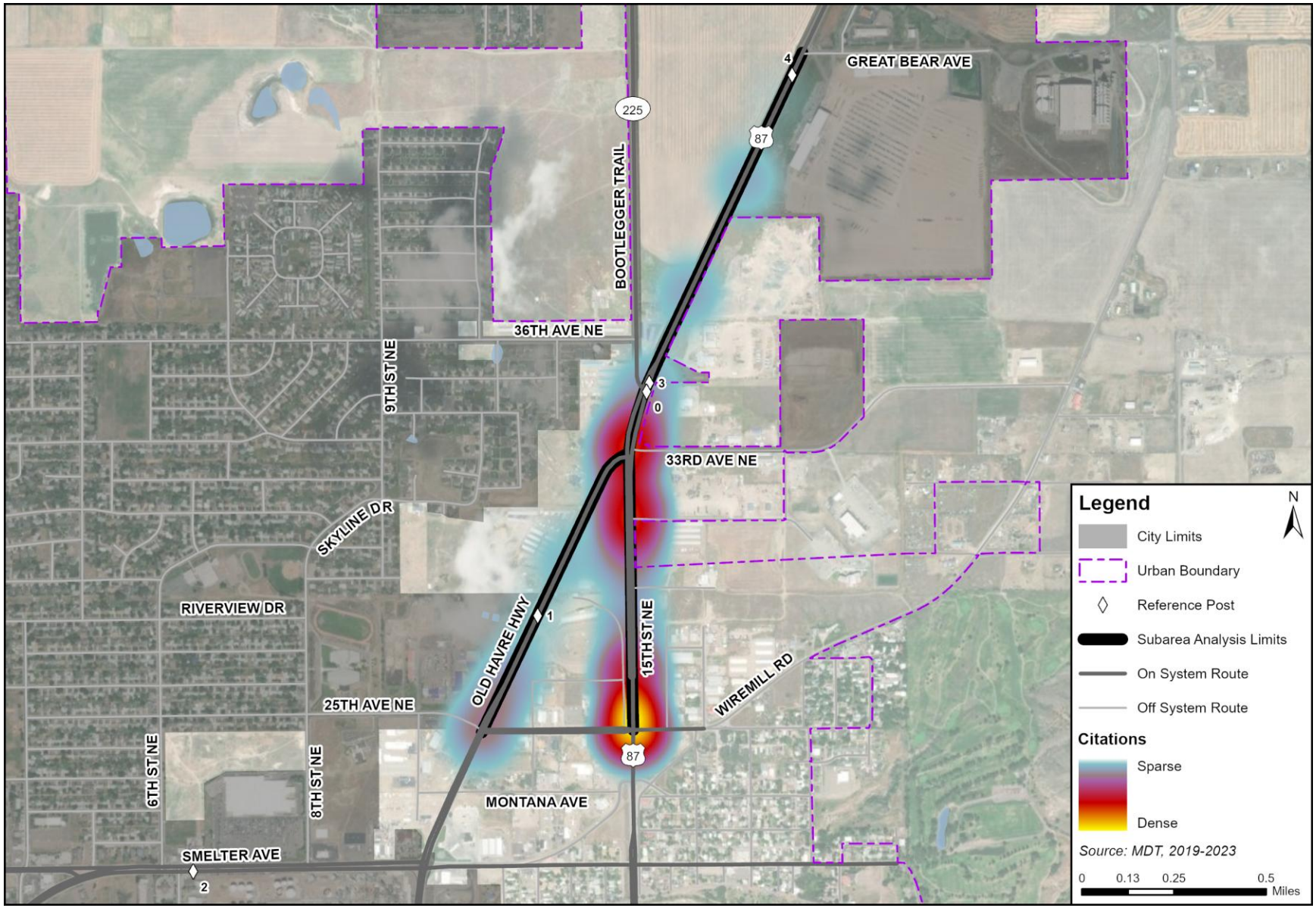


Figure 19: Citation Locations

7.0 AREAS OF CONCERN AND CONSIDERATION

This section provides a list and description of areas of concern and consideration along the subarea corridors. These areas 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

- From 1970 through 2020, Cascade County and Great Falls saw CAGRs of approximately 0.04 percent and 0.06 percent, respectively. In contrast, Montana and the nation had CAGRs of 0.87 and one percent, respectively, during the same 50-year period.
- From 1990 through 2020, Cascade County experienced substantial population growth, with a collective increase of over eight percent, bringing the combined estimated population to almost 85,000 residents. Approximately 72.0 percent of this population resides in Great Falls, which experienced a similar trend during the same period, growing by 9.7 percent.
- Great Falls and Cascade County have a higher percentage of white residents at 84.8 and 84.7 percent, respectively, compared to the state at 85.7 percent and the country at 63.4 percent.
- The populations of Cascade County and Great Falls are projected to decrease by 1.6 percent over the next 10 years, while the populations of the state and country are expected to grow by 4.9 and 3.8 percent, respectively.
- Cascade County residents have a higher percentage of population carpooling to work at 10.3 percent than Great Falls (9.8 percent) and the state (9.6 percent). Mean travel time to work is shorter in Great Falls at 14.7 minutes compared to Cascade County at 16.6 minutes and the state at 19.2 minutes.
- The educational services, healthcare, and social assistance industry along with the agriculture, forestry, fishing, hunting, and mining industry play a very important economic role in the region.
- The median household income and income per capita are lower in Great Falls compared to the state, Cascade County, and the country.
- The poverty rate in Great Falls is 14.0 percent, above Cascade County (13.2 percent) and the statewide average of 12.0 percent. The unemployment rate in Great Falls is also higher than that of the county, but lower than the state and country.

7.2 Transportation Conditions

Physical Features

- Right-of-way widths vary considerably within the subarea. For much of the Old Havre Highway corridor, widths are approximately 180 feet but narrow to 120 feet in sections. On 15th Street NE, the right-of-way ranges between 160 feet and 180 feet. For the entire length of US 87 within the subarea, the right-of-way totals 130 feet.
- Roadway pavement is in poor condition on all of the subarea corridors.
- The subarea corridors have varying access density with an average of 15.8 access points per mile. One existing access control plan is in place along US 87.
- Most of the subarea corridors have a posted speed limit of 45 mph. The last section of US 87 is signed as a standard highway with a 70-mph daytime limit for passenger vehicles and a 65-mph limit for heavy trucks and nighttime.
- There are no bridges along the subarea corridors. There are 19 drainage features, none of which are considered major features.
- Utilities existing along the subarea corridors include electrical, gas, communications, sewer, and water services.
- There are no sidewalks or SUPs along the subarea corridors, though the shoulders are wide enough in certain areas to provide space for bicycles to ride outside the travel lane.

Geometric Conditions

- The subarea corridors are considered urban principal arterials and were generally constructed on their current alignment in the 1940s. Several improvement projects have taken place since then. Those projects consist of a variety of work including intersection realignment, resurfacing, widening, signalization, and other safety improvements.
- There are locations with shoulder widths less than six feet, which are recommended for the corridors. In general, shoulder widths range from two to 10 feet.
- One horizontal curve does not meet the baseline criteria for an urban principal arterial with a design speed of 40-mph.
- All vertical curves meet the baseline criteria for urban principal arterial with a 40-mph design speed, although one section of 15th Street NE has a grade greater than seven percent.
- Of the intersections along the corridors, two have left turn lanes that do not meet design guidelines.

Traffic Conditions

- Traffic volumes are increasing throughout the subarea corridors at an average annual rate between 0.7 and 1.4 percent per year.
- Heavy vehicle traffic fluctuates between five and eight percent on Old Havre Highway, seven percent on US 87, and between three and four percent on 15th Street NE.
- Existing intersection LOS generally decreases traveling south on the subarea corridors. This coincides with the increased traffic at the south end of the subarea corridors.

- Under current traffic conditions, the following subarea intersections operate at LOS D or worse during at least one peak hour: US 87 and Bootlegger Trail, 15th Street NE/US 87 and Old Havre Highway, Old Havre Highway and 25th Avenue NE, and 15th Street NE and 25th Avenue NE.
- Under projected traffic conditions, all subarea intersections except for US 87 and 34th Avenue NE operate at LOS D or worse during at least one peak time period, with several intersections operating at LOS D or worse during all peak time periods.
- Under existing traffic conditions, travel times along 15th Street NE to either Bootlegger Trail or US 87 north of Great Bear Avenue are lower than those along Old Havre Highway.
- Under projected traffic conditions, average network delay increased by about 35 to 40 seconds per vehicle while the number of average stops per vehicle nearly doubled during both peak periods. Average speed decreased by about six mph in each peak period.

Safety[ii]

- A total of 85 crashes were reported during the five-year period from January 2019 through December 2023.
- Multiple-vehicle crashes accounted for 86 percent of all reported crashes. The most common crash types were right angle (56 percent), rear-end (19 percent), and fixed object (seven percent).
- Of the 85 total reported crashes, 80 percent (68) of crashes were junction related.
- There was one fatal crash and four suspected serious injury crashes.
- The most common day for crashes was Monday, while July, August, and November were the most common months for crashes to occur.
- About 20 percent of all crashes and 40 percent of severe crashes were reported as having occurred on wet, snowy, or icy/frost-covered roads.
- About 19 percent of all crashes were reported as occurring at dark, with 50 percent of those occurring where street lighting was not present. Similarly, severe crashes occurred at dark with street lighting approximately 40 percent of the time.
- Within the subarea, three crashes were determined to have involved an impaired driver, none of which were severe.
- A total of 159 citations were issued over the five-year period, with the greatest number being related to seatbelt violations, speed, registration/insurance violations, right-of-way violations, and license infractions.

[ii] *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.*

7.3 Environmental Constraints

Environmental constraints are summarized based on information provided in the *Central Montana Transportation Study Environmental Scan.*[26]

Physical Environment

- Almost 90 percent of land in the subarea vicinity is privately owned, while the remaining 10 percent is in public ownership.
- The subarea is within one mile of soils classified as prime farmland if irrigated and farmland of statewide importance that may be subject to protections under Farmland Policy Protection Act.
- The subarea is in a moderate to high seismic risk zone.
- The Missouri River is the only impaired water in the Old Havre Highway/US 87 subarea. Causes of impairment include sedimentation/siltation, selenium, chromium, turbidity, and Polychlorinated Biphenyls.
- There are 146 wells in the subarea, although none are public water supply wells.
- The subarea has a minimal risk of flooding.
- A total of 42 wetlands have been mapped within the subarea.
- There are six superfund sites, seven unresolved petroleum tank releases, seven hazardous waste generators, one solid waste site, and one sewage disposal location within the subarea.
- Residences in the subarea are sensitive noise receptors, which could be affected by future roadway improvements.

Biological Resources

- Nearly 40 species of invasive and noxious weeds are present within the subarea.
- Lands surrounding the subarea provide prairie habitats for a variety of wildlife species including mammals, birds, aquatic species, reptiles, and invertebrates.
- In addition to migratory birds and aquatic species, three species of concern have been documented in the subarea.
- Two endangered species have been documented near the subarea.

Social and Cultural Resources

- There are no federal, state, county, city, or other publicly owned recreation sites within a quarter mile of the subarea corridors.
- The Montana State Historic Preservation Office online database does not list any historic properties or districts in the subarea.

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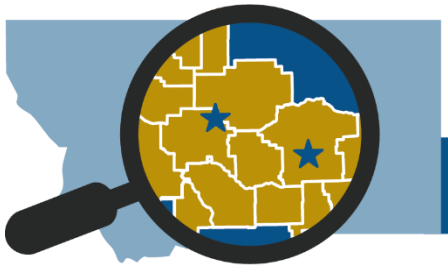
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Appendix A

As Built Geometrics Review



Central Montana
Transportation Study

Old Havre Highway & US 87
Analysis

Horizontal Alignment – As Built Review

Design Speed (mph): 40
SSD (ft): 305
Radius (ft): 533
Superelevation Rate: 4%

RADIUS (FT)	80	140	220	320	450	590	760	960	1200	1480	1810	2210	2670
SPEED (MPH)	20	25	30	35	40	45	50	55	60	65	70	75	80

ID	PLANS	CORRIDOR	STATION	RP	RADIUS (FT)	LENGTH (FT)	MIN SIGHT OBST. (FT)	DESIGN SPEED MET (MPH)	MEETS STANDARDS
D	1963, U 149(15)	Old Havre	53+02.10	1.32	358	314.00	31.99	35	No
D	1963, U 149(15)	15th St/US 87	54+51.00	2.86	2292	564.00	5.07	75	Yes
B	2016, STPS-CM-STUP 225-1(3)0	15th St/US 87	8+14.93	2.96	1435	652.81	8.10	60	Yes
D	1963, U 149(15)	15th St/US 87	63+24.70	3.02	5730	1196.70	2.03	80	Yes

Vertical Alignment – As Built Review

Design Speed (mph):	40
K-Value Crest:	51
K-Value Sag:	71
Maximum Grade Level:	5-7%
Maximum Grade Rolling:	6-10%
Maximum Grade Mountainous:	8-12%

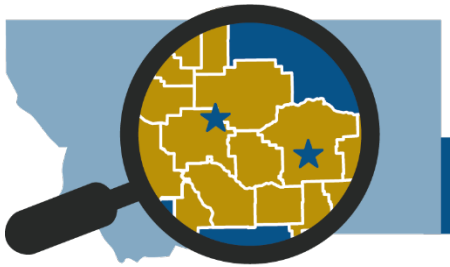
DESIGN SPEED (V)	15	20	25	30	35	40	45	50	55	60	65	70	75	80
CREST K	3	7	12	19	29	44	61	84	114	151	193	247	312	384
SAG K	10	17	26	37	50	64	79	96	115	136	157	181	206	231

ID	PLANS	CORRIDOR	STATION	RP	TYPE	LENGTH	GRADE BACK	GRADE AHEAD	K-VALUE	DESIGN SPEED MET (MPH)	MEETS STANDARDS
D	1963, U 149(15)	Old Havre	4980	1.26	crest	900	4.60%	1.41%	282.1	70	Yes
C	1963, U-FG 395(6)	15th St/US 87	5327.71	2.38	sag	200	6.15%	7.19%	192.3	70	Yes
C	1963, U-FG 395(6)	15th St/US 87	6992.9	2.70	crest	1000	7.19%	-0.71%	126.6	55	Yes
E	F_149-D (3)	15th St/US 87	8150	3.38	crest	400	-0.97%	-2.03%	377.4	75	Yes

Appendix B

Traffic Data Collection

Available from MDT upon request



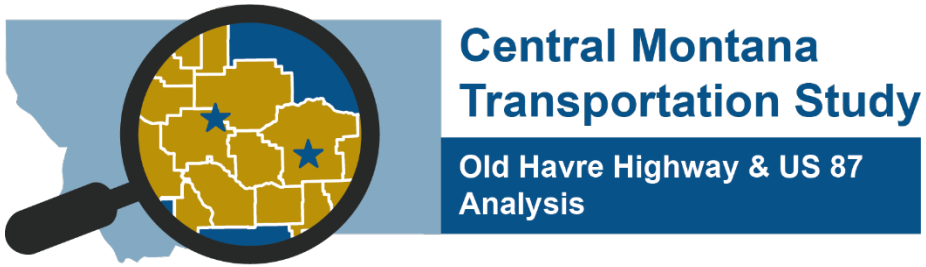
Central Montana Transportation Study

Old Havre Highway & US 87 Analysis

Appendix C

Existing Conditions Operations Analysis

Available from MDT upon request



Appendix D

Projected Conditions Operations Analysis

Available from MDT upon request

