MONTANA 3 BILLINGS
CORRIDOR STUDY

JUNE 2025

EXISTING & PROJECTED CONDITIONS

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1.0 INTRODUCTION

The Montana Department of Transportation (MDT) initiated a corridor study of Montana Highway 3 (MT 3) in Billings, between the highway's intersection with Apache Trail and the East (E.) Airport Road/North (N.) 27th Street intersection. The study's purpose is to develop a comprehensive long-range plan for managing the corridor and determine what could be done to improve the corridor based on needs, public and agency input, and financial feasibility. This is a collaborative process with local jurisdictions, resource agencies, MDT, Federal Highway Administration (FHWA), and the public to identify transportation needs and potential solutions given environmental constraints, financial feasibility, constructability, and corridor context.

This *Existing and Projected Conditions* report provides a planning-level overview of environmental and transportation system conditions along the planning study portions of MT 3. Information in this report was obtained from publicly available reports, websites, documentation, and on-site field review. Additional environmental information is contained in the *Environmental Scan* report.

If specific improvement options are advanced from this study, a feasibility study and an analysis for compliance with the National Environmental Policy Act (NEPA), Montana Environmental Policy Act (MEPA), and other applicable regulations will be completed as part of the MDT project development process. Information provided in this report may be incorporated into the NEPA and/or MEPA process.

1.1 Study Corridor Area

The MT 3 Billings study corridor is in the northwest part of Billings, within Yellowstone County, Montana. The study corridor includes 5.1 miles of MT 3 beginning at the intersection with Apache Road (Reference Post [RP] 8.1) and continues east to the intersection with E. Airport Road and N. 27th Street (RP 3.0). For the purposes of the planning study, the study corridor area limits include a 0.25-mile buffer from the centerline of the roadway, except in portions south of the road where the Rimrocks mark the boundary. Figure 1 shows the study corridor area and the highway system designation for roads in the area.

Highway system designation is established based on the functional classification of the route; the system designation is important as it affects the roadway's ability to receive different types of funding. MT 3 is designated as a national highway system (NHS) non-interstate route and connects Billings to Great Falls. Zimmerman Trail and E. Airport Road are designated as urban highway routes.

Roundabout at Intersection of MT 3, E. Airport Road, and N. 27th Street

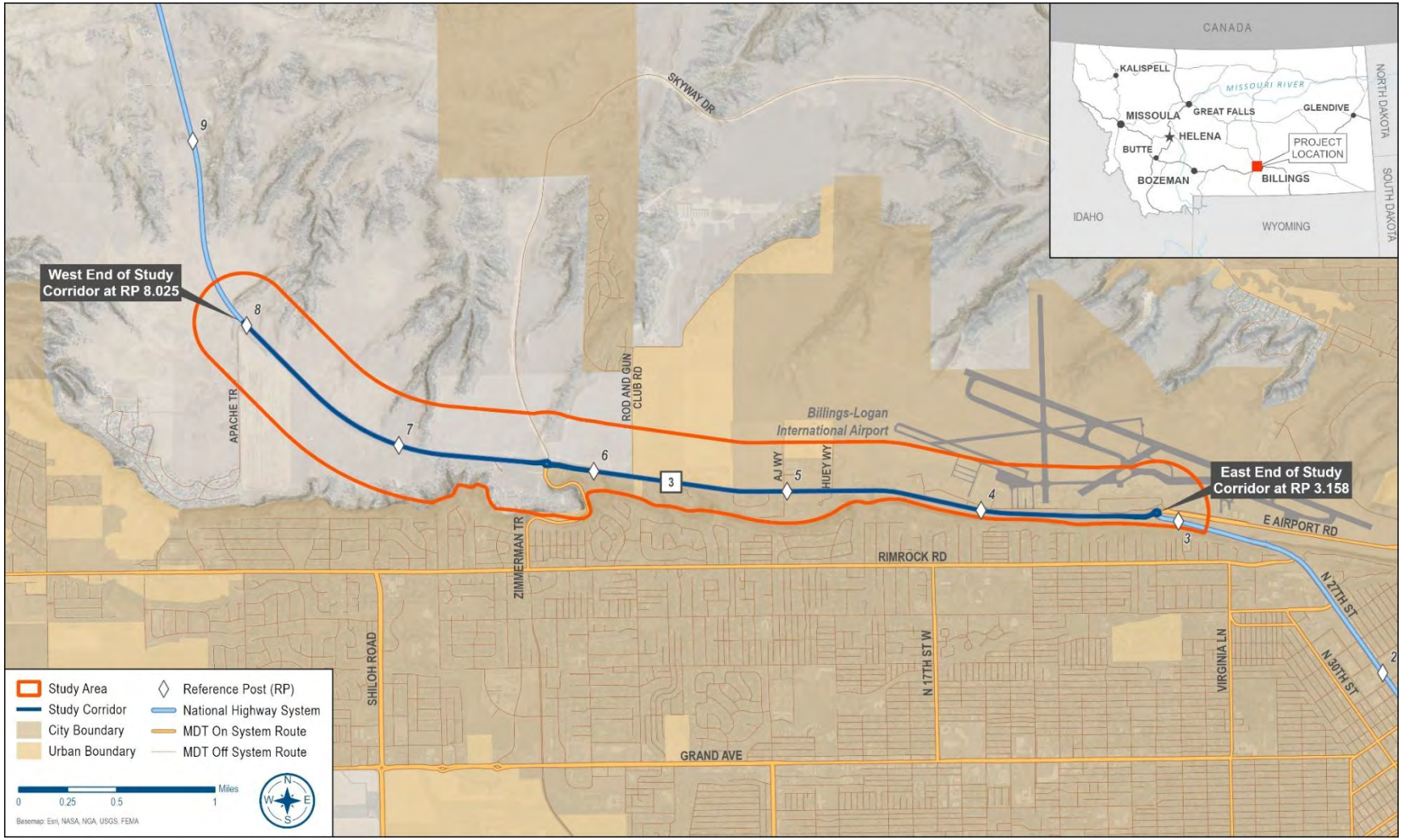

Figure 1: Study Corridor Area and System Designation

1.2 Study Background

MT 3 is the northwestern gateway to Billings. Within the project extent, the study corridor transitions from rural highway on the west end to urban arterial on the east end. The corridor has several residential housing subdivisions with trails and open spaces along the Rimrocks providing scenic overlooks of Billings. MT 3 is a high-volume corridor and traffic volumes are expected to rise with increases in employment and population growth expected north of the corridor. The land use along the corridor varies and includes agricultural, residential, and commercial aviation land uses. The area south of the corridor is constrained by the Rimrocks. Connecting Great Falls to Billings, the corridor is part of the National Highway System and Strategic Highway Network, highlighting the importance of the route for defense mobility and truck traffic.

1.3 Related Plans and Studies

Several local transportation and land use plans exist that include the study corridor area. The following is a summary of local plans and regulations that include land use policy and transportation guidance.

- The **City of Billings Growth Policy**[1] was updated in 2016 and provides guidance for land use and development through defined goals and policies. The document also compares growth scenarios for the north and west parts of Billings to demonstrate the benefits and costs of alternative growth patterns.
- The **Billings Urban Area Long Range Transportation Plan**[2] (LRTP) was updated in 2023. The transportation plan establishes existing and projected conditions for the Billings area and identifies improvements needed to meet projected traffic demand. The 2023 update also includes an update to the travel demand model built for the Billings-Yellowstone County Metropolitan Planning Organization (MPO).
- The **Billings Land Use Plan and Future Land Use Map** is currently underway with expected completion in 2026. This plan will provide guidance on future land use and will review population growth, housing, local services, facilities, economic development, and natural resources within Billings. A separate **Skyway Drive Land Use Plan** is also anticipated, with plan development beginning in 2025.
- The **Billings Area Bikeway and Trails Master Plan**[3] was updated in 2017; the plan summarizes existing non-motorized facilities and identifies/prioritizes recommended non-motorized improvements in the Billings area.
- The **Highway 3 Corridor Planning Study**[4] was completed by the City of Billings in 2015. The study analyzed existing and future 2035 traffic conditions and provides recommended roadway, intersection, parking, and pedestrian improvements.
- The **Billings Logan International Airport Master Plan**[5] was completed in 2010. An update is underway, with anticipated completion in 2025 or 2026. The plan summarizes existing and future airport demand as well as planned airport expansions.
- The **Inner Belt Loop Corridor Study**[6] was completed in 2020, providing a vision for the recently completed Skyway Drive which connects the west end of Billings at the Zimmerman Trail roundabout to the Heights through a seven-mile corridor.
- The **Molt Road/Highway 3 Collector Road Planning Feasibility Study**[7] was completed in 2004 to evaluate the development of a connector road between Molt Road and MT 3. The *Billings LRTP* recommends an update to the 2004 feasibility study.

1.4 Related Projects and Planned Developments

There is one committed and one proposed pedestrian/bicycle project in the study corridor area:

- The **Stagecoach Trail** project is active/committed and will provide an 8-foot-wide pedestrian and bicycle path on the east side of Zimmerman Trail, from Rimrock Road to MT 3. This project is currently in design and construction is planned for 2028. This connection is part of the Marathon Loop, a 26-mile multi-use paved path around Billings.
- The **Yellowjacket Trail** proposed project will provide a pedestrian and bicycle path along N. 27th Street, from the E. Airport Road roundabout to Rimrock Road. Billings TrailNet is conducting a high-level feasibility study to identify the recommended configuration for this non-motorized connection.[8]

The two developments listed below are planned in the study corridor area on AJ Way and Huey Way. Additionally, new eastbound left-turn lanes and westbound right-turn lanes are anticipated on MT 3 at the AJ Way and Huey Way intersections to accommodate development traffic.

- The **Billings Readiness and Innovation Campus**[9] (BRIC) is a planned development located on the north side of MT 3 off AJ Way. The campus will consist of training and aviation support facilities for the Montana Army National Guard. The campus will be built-out in several phases, with opening year in 2026 and full build expected in 2040. The BRIC will accommodate drill weekend trainings, which will occur seven to 12 weekends per year. At full build in 2040, up to 880 personnel are anticipated at the BRIC during drill weekends. The traffic impact analysis for the BRIC recommends a roundabout at the MT 3 and AJ Way intersection to accommodate full build development traffic volumes.
- The **Yellowstone Landing Commercial Park**[10] (YLCP) development is planned on the north side of MT 3 with access provided via the AJ Way and Huey Way intersections. The development will consist of nine lots with commercial and light industrial land uses; full build-out is expected by 2029.

2.0 DEMOGRAPHICS

This section provides an overview of demographic and socioeconomic characteristics in the study corridor area. Demographic and socioeconomic information was reviewed to help determine recent trends in population, age, employment, economic status, and commuting characteristics for area residents. Historical and recent population trends in the area help define existing conditions and aid in forecasting techniques, as there is a direct correlation between motor vehicle travel and socioeconomic indicators. This section presents the most available recent data and indicates recent and potential changes in the area.

2.1 Population

Demographics were reviewed within the nine census tracts near the study corridor area, hereinafter referred to as the study area tracts. Figure 2 depicts the location of the study area tracts. This review is appropriate to gain an understanding of historical trends in population and population characteristics relevant to transportation planning. 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.

2.1.1 Historical and Recent Population Trends

Table 1 provides historical and current population estimates. Between 1980 and 2020, Billings and Yellowstone County have outpaced the growth rate of both Montana and the United States (US). Over this 40-year period, Billings and Yellowstone County saw compound annual growth rates of approximately 1.41% and 1.06%, respectively. In contrast, Montana and the US grew at compound annual growth rates of 0.81% and 0.96%, respectively.

Table 1: Population Change Since 1980

Geographic Area	1980	1990	2000	2010	2020	Compound Annual Growth (1980-2020)
Billings	66,798	81,469	89,847	104,170	117,116	1.41%
Yellowstone County	108,035	113,157	129,352	147,972	164,731	1.06%
Montana	786,690	799,065	902,195	989,415	1,084,225	0.81%
United States	226.5M	248.7M	281.4M	308.7M	331.4M	0.96%

M = Million. Source: U.S. Census Bureau, American Fact Finder

2.1.2 Study Area Population Characteristics

NEPA/MEPA direct federal, state, and local agencies to assess potential social and economic impacts anticipated from proposed actions. Guidelines recommend consideration of impacts to neighborhoods and community cohesion, social groups including those with differing demographics, and local and/or regional economies, as well as growth and development that may be induced by transportation improvements.

Table 2 summarizes recent population and demographic data. Billings and Yellowstone County are slightly more racially diverse than the state, most notably with a higher proportion of those of Hispanic descent. However, the study area tracts are a less diverse area than Billings and Yellowstone County as a whole. For more specific information regarding demographics, refer to the Socioeconomics and Community Demographics section of the *Environmental Scan* report.

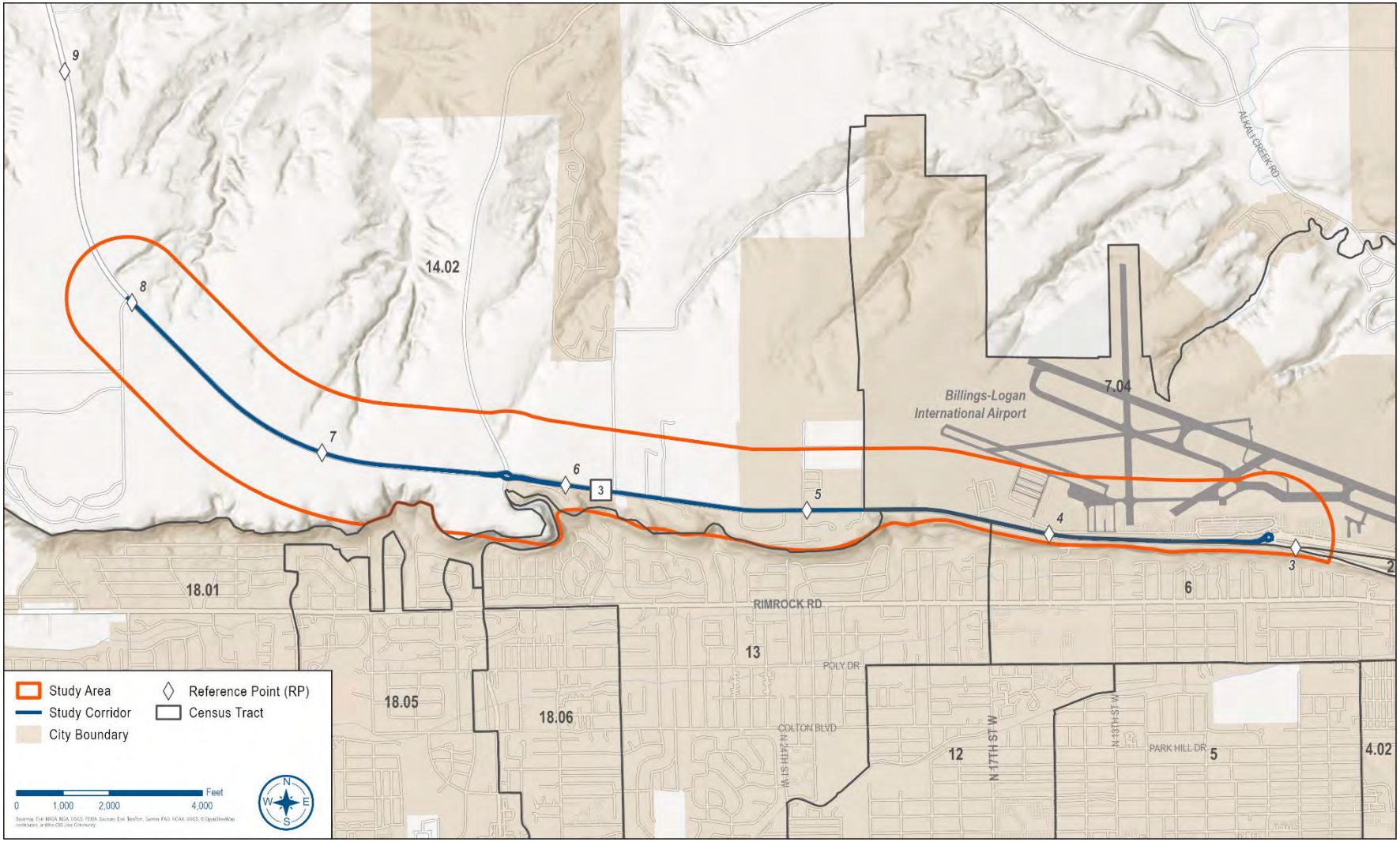

Figure 2: Study Area Census Tracts

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

		Study Area Tracts	Billings	Yellowstone County	Montana
Race	White	89.6%	83.2%	83.9%	84.1%
	African American	0.3%	0.5%	0.5%	0.5%
	American Indian	1.0%	4.2%	3.8%	5.5%
	Asian	0.7%	0.8%	0.8%	0.8%
	Hispanic or Latino	4.8%	7.2%	6.4%	4.4%
	Other	3.7%	4.1%	4.6%	4.7%
Age	Under 18	22.6%	22.5%	23.2%	21.3%
	18-64	54.5%	59.1%	59.0%	59.0%
	65 and over	22.9%	18.4%	17.8%	19.7%
Sex	Male	47.8%	49.5%	49.5%	50.7%
	Female	52.2%	50.5%	50.5%	49.3%
Disability Status	% With Disability	12.6%	14.5%	13.9%	14.3%
	% Disabled (<18 years)	4.1%	6.2%	6.2%	6.7%
	% Disabled (≥65 years)	70.6%	76.6%	75.9%	70.6%

Source: U.S. Census Bureau 2019-2023 American Community Survey (ACS) 5-Year Estimates[11]

Table 3 shows population trends by age group. The study area tracts have a higher elderly population, which includes individuals 65 and over, in relation to Billings, Yellowstone County, and Montana averages. Based on data from 2013 to 2023, the elderly population increased steadily within the study area tracts and decreased in number of individuals under 65 during the same period.

Table 3: Trend in Population Distribution by Age Groups

Age Group	Year	Study Area Tracts	Billings	Yellowstone County	Montana
% Under 18	2013	22.3%	22.6%	23.7%	22.4%
	2018	22.8%	23.0%	23.6%	21.8%
	2023	22.6%	22.5%	23.2%	21.3%
% 18-64	2013	60.4%	62.4%	61.9%	62.3%
	2018	56.6%	60.6%	60.3%	60.5%
	2023	54.5%	59.1%	59.0%	59.0%
% 65 and over	2013	17.3%	15.0%	14.4%	15.3%
	2018	20.6%	16.4%	16.1%	17.6%
	2023	22.9%	18.4%	17.8%	19.7%

Source: U.S. Census Bureau 2009-2013 ACS 5-Year Estimates, 2014-2018 ACS 5-Year Estimates, 2019-2023 ACS 5-Year Estimates

2.1.3 Population Projections

Table 4 lists population growth rates in Montana by decade. Between 2010 and 2023, Montana's population grew faster (14.5%) than the national average (8.5%). Notably, since 2020, Montana's population has grown at a substantially greater rate than in the previous decade (the 2010s) and currently ranks near the top among other states.

Table 4: Statewide Population Growth Rates and Ranks by Decade

Time Frame	Montana Yearly Growth Rate	Rank Among Other States
2010-2019	0.9%	16th
2020-2023	1.5%	3rd

Source: U.S. Census Bureau – 2010 Census, 2020 Census, and ACS 1-Year Estimates (2011-2019, 2021-2023)

Table 5 lists population growth from 2013 to 2023. Yellowstone County is Montana's most populated county with a population of 167,340 as of 2023 and makes up 15% of the state's total population. From 2013 to 2023, Yellowstone County's population grew faster than the state average at a rate of 11.4% versus 10.7%. Within Yellowstone County, Billings is the largest city with a population of 118,321 in 2023; Billings is also the most populated city in Montana with 10.7% of the state's population residing there. In the study area tracts, the population has grown by 10.5% since 2013, nearly the same rate as the state's growth. However, from 2018 to 2023, the study area tracts' population grew by 9.4%, while Billings grew by 8.1%, Yellowstone County grew by 6.0%, and the state grew by 6.1%.

Table 5: Population Growth

Time Frames	Study Area Tracts	Billings	Yellowstone County	Montana
2013 to 2023	**10.5%**	**11.8%**	**11.4%**	**10.7%**
2013 to 2018	1.1%	3.4%	5.1%	4.3%
2018 to 2023	9.4%	8.1%	6.0%	6.1%

Source: U.S. Census Bureau – ACS 5-Year Estimates (2009-2013, 2014-2018, 2019-2023)

Figure 3 depicts the actual percent change in population from 2010 to 2023 and the anticipated growth to 2040. Since 2010, the population growth rate of Yellowstone County and Billings has slightly exceeded the state's growth rate. This trend is expected to continue through 2040. Of note, the population of Billings experienced minor declines in 2017 and 2018 (0.3% average decrease) followed by a minor increase in 2019 (0.3%). Since 2020, Billings' population growth has rebounded and now slightly outpaces the state's growth rate, mirroring Yellowstone County's growth rate. On average, Yellowstone County's population is expected to grow at a rate of 1.2% per year from 2024 to 2040. This aligns with the 1.2% annual average population growth rate forecasted in the Billings-Yellowstone County MPO travel demand model.

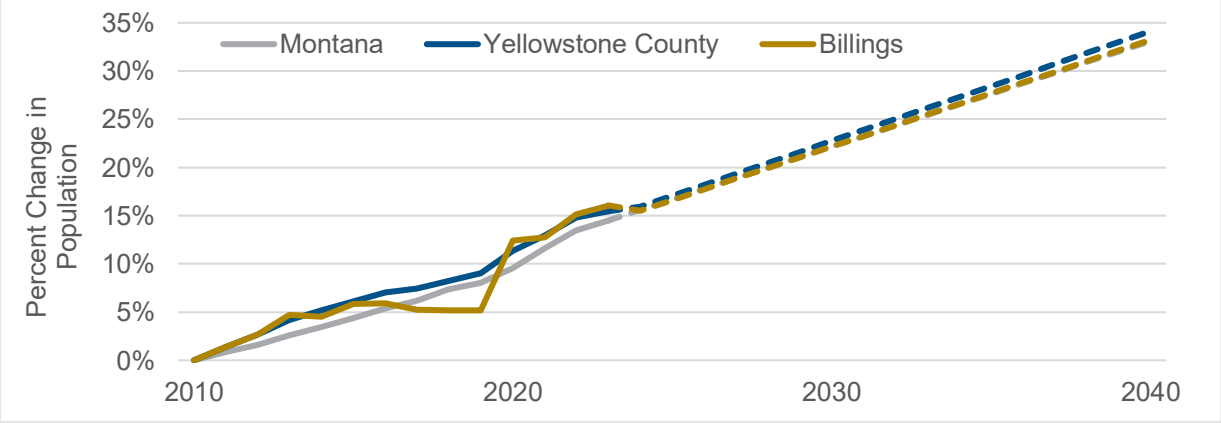

Figure 3: Population Growth From 2010 to 2040

Source: MDT, U.S. Census Bureau – ACS 1-Year and 5-year Estimates, Decennial Census

Of note, U.S. Census Bureau National Population Projections indicate that total US population growth is expected to slow and turn negative around 2080.[12]

2.1.4 Housing Characteristics

In 2023, Yellowstone County had the greatest number of housing units of all counties in Montana. Likewise, Billings has the most housing units (comprising about 15%) of all cities and towns in Montana. Notably, Billings has more housing units than all but three counties in Montana (Yellowstone, Missoula, and Gallatin County). The study area tracts contain approximately 24% of all housing units in Billings. Over the 10-year period 2013 to 2023, there has been higher growth in the number of housing units in study area tracts (14.6% increase), in Billings (15.7% increase), and in Yellowstone County (14.2% increase) than the state average (8.2% increase).

Table 6 lists the share of occupied and vacant housing units. From 2013 to 2023, the share of occupied housing units in the study area tracts has slightly decreased but is considerably higher than the state average.

Table 6: Share of Occupied and Vacant Housing Units in 2013 and 2023

	Study Area Tracts		Billings		Yellowstone County		Montana	
	2013	2023	2013	2023	2013	2023	2013	2023
% Occupied	98%	96%	95%	94%	95%	94%	84%	87%
% Vacant	2%	4%	5%	6%	5%	6%	16%	13%

Source: U.S. Census Bureau – ACS 5-Year Estimates (2018-2023)

2.1.5 Personal Travel and Commuting Characteristics

The U.S. Census Bureau provides estimates of the total share of workers aged 16 and older who commute or work at home, transportation modes used by commuters, and mean travel times for commuters. Table 7 presents commuting characteristics for workers in the study area tracts, Billings, and Yellowstone County. Statistics for Montana are also provided for comparison.

Table 7: Mode of Transportation to Work

Subject	Study Area Tracts	Billings	Yellowstone County	Montana
Percent of workers 16 years and older with access to a vehicle	99.4%	98.4%	98.5%	97.8%
Number of workers 16 years and older	20,242	93,219	83,606	532,519
Percent who commuted to work	91.3%	91.8%	92.0%	88.4%
Percent who work at home	8.7%	8.2%	8.0%	11.6%
Drove alone (car/truck/van)	72.4%	76.5%	77.9%	72.0%
Carpool	6.2%	10.5%	9.7%	9.6%
Public transportation (excluding taxi)	0.1%	1.0%	0.9%	0.6%
Walk to work	0.5%	2.3%	2.0%	4.0%
Bicycle to work	0.4%	0.5%	0.5%	1.0%
Other means of commuting	0.1%	1.0%	0.9%	1.2%
Mean travel time to work (minutes)	14.6	19.6	18.6	19.2

Source: U.S. Census Bureau – ACS 5-Year Estimates (2018-2023)

Based on data from 2018 to 2023, most commuting workers in the study area tracts had access to a personal vehicle and drove alone to work destinations. Workers in the study area tracts had a substantially shorter commute time compared to the other geographic areas presented, taking an average of 14.6 minutes.

2.2 Economic Conditions and Income Characteristics

2.2.1 Income and Poverty Rate

The median household income is significantly higher in Yellowstone County ($74,400), Billings ($71,855), and the study area tracts ($101,575) than the state ($69,922) as of 2023. The poverty rate is lower in Yellowstone County (10.2%), Billings (10.6%), and the study area tracts (6.7%) than the state (12%) as of 2023.

2.2.2 Employment Status

Table 8 lists the change in labor force between 2013 and 2023 and unemployment statistics. As of 2023, Billings and Yellowstone County have a higher percentage of its eligible workforce (defined as the population age 16 and over) in the labor force (66.2% and 66.1%, respectively) than the state (62.8%). However, the study area tracts have a lower percentage of labor force participants (62.0%). This is consistent with the study area tracts having a higher elderly population (individuals 65 and over) in relation to Billings, Yellowstone County, and Montana.

Despite the lower percentage in the labor force, the study area tracts have a slightly higher share of their labor force employed (97.2%) than the state (95.6%). Likewise, Billings and Yellowstone County have slightly higher shares of their labor force employed (96.5% in both areas) than the state. Additionally, the unemployment rate in the study area tracts (2.8%), Billings (3.5%), and Yellowstone County (3.4%) are lower than the state average (3.8%). These employment characteristics have changed over the period 2013 to 2023. Notably, in all areas, unemployment rates have significantly decreased as well as the labor force percentage, and the percent of labor force employed has increased.

Table 8: Change in Labor Force and Unemployment Statistics

Year	Study Area Tracts	Billings	Yellowstone County	Montana
	Percent in Labor Force			
2013	65.8%	68.4%	68.9%	64.7%
2023	62.0%	66.2%	66.1%	62.8%
Percent of Labor Force that is Employed				
2013	96.1%	94.6%	94.5%	92.0%
2023	97.2%	96.5%	96.5%	95.6%
Unemployment Rate				
2013	3.9%	5.3%	5.3%	7.3%
2023	2.8%	3.5%	3.4%	3.8%

Source: U.S. Census Bureau 2009-2013 & 2019-2023 ACS 5-Year Estimates

2.2.3 Employment Industries

Table 9 displays the percentage of the population employed by industry area for the study area tracts, Billings, Yellowstone County, and the state as of 2023. Bolded numbers indicate the top three employment industries in each area. There are mostly similar employment shares in each area, but the most noticeable difference is the study area tracts having a higher percentage of

employees in the Educational Services, Health Care, and Social Assistance industries compared to Billings as a whole.

Table 9: Percent of Employed Population by Industry and by Area for 2023

Industry	Study Area Tracts	Billings	Yellowstone County	Montana
Agriculture, forestry, fishing, hunting, and mining	2.1%	1.9%	2.8%	6.1%
Construction	7.4%	7.5%	8.5%	9.0%
Manufacturing	5.0%	3.7%	4.7%	4.8%
Wholesale trade	1.8%	2.6%	2.8%	2.2%
Retail trade	**9.7%**	**12.1%**	**12.4%**	**11.9%**
Transportation, warehousing, and utilities	5.8%	6.2%	6.2%	5.0%
Information	1.4%	1.7%	1.4%	1.5%
Finance, insurance, real estate, rental and leasing	7.6%	6.8%	6.2%	5.5%
Professional, scientific, management, and administrative	**11.6%**	10.6%	9.9%	9.6%
Educational services, health care and social assistance	**29.5%**	**26.2%**	**24.7%**	**23.3%**
Arts, entertainment, recreation, and accommodation	7.6%	**10.9%**	**10.3%**	**10.3%**
Other services, except public administration	5.9%	5.5%	5.7%	5.1%
Public administration	5.7%	3.9%	8.5%	6.5%

Source: U.S. Census Bureau 2019-2023 ACS 5-Year Estimates

Table 10 displays the shift in employment in study area tracts from 2013 to 2023. Most notably, employment in the Educational Services, Health Care, and Social Assistance Industry and the Construction Industry had the greatest growth (increases of 4% and 2%, respectively). Conversely, Wholesale Trade Industry and Retail Trade Industry had the greatest decline in employment share (1.4% decrease and 3% decrease, respectively).

Table 10: Share of Civilian Employees in Study Area Tract Industries from 2013 to 2023

Industry	2013	2023
Agriculture, forestry, fishing, hunting, and mining	2.5%	2.1% (↓)
Construction	5.4%	7.4% (↑)
Manufacturing	4.7%	5.0% (↑)
Wholesale trade	3.2%	1.8% (↓)
Retail trade	12.7%	9.7% (↓)
Transportation, warehousing, and utilities	5.7%	5.8% (↑)
Information	2.1%	1.4% (↓)
Finance, insurance, real estate, rental and leasing	8.8%	7.6% (↓)
Professional, scientific, management, and administrative	11.4%	11.6% (↑)
Educational services, health care and social assistance	25.5%	29.5% (↑)
Arts, entertainment, recreation, and accommodation	8.6%	7.6% (↓)
Other services, except public administration	5.3%	5.9% (↑)
Public administration	4.0%	5.7% (↑)

Source: U.S. Census Bureau 2009-2013 & 2019-2023 ACS 5-Year Estimates

3.0 PHYSICAL FEATURES AND CHARACTERISTICS

This section describes existing physical features in the study corridor including land use, roadway characteristics, utilities, geotechnical conditions, drainage conditions, and alternative transportation modes.

3.1 Land Use and Right-of-Way

Land within the study corridor is predominantly privately owned; however, a considerable portion is managed by the State of Montana, City of Billings, and MDT. One small parcel within the confines of the Billings Logan International Airport (BIL) is under federal jurisdiction. No conservation easements were found within the area.

The western half of the study corridor is primarily developed for residential and crop production, and the eastern half is developed mainly for commercial purposes. The Billings Logan International Airport is the largest parcel. Zoning districts within the study corridor are demarcated by the Billings city limits at Zimmerman Trail (RP 6.25). Districts east of Zimmerman Trail fall within Billings city limits, while those west of Zimmerman Trail are designated by Yellowstone County. The existing zoning designations and land uses are shown in Figure 4 and outlined below.

- **Yellowstone County Zoning** encompasses the western third of the study corridor from Zimmerman Trail to the west. The majority of zoning in this area is agriculture, with Zimmerman Park designated as open space, parks, and recreation.
- **City of Billings Zoning** encompasses the eastern extent of the study corridor from Zimmerman Trail to the east. The Billings Logan International Airport and associated facilities are zoned primarily public-civic and institutional. The remainder of City-designated zoning north of MT 3 is predominantly agriculture, heavy commercial, and public campus. The southern side of MT 3 is mostly a mix of open space, parks, recreation and suburban neighborhood.

Proposed improvements carried forward from this study would need to consider potential impacts to adjacent private landowners, as well as potential impacts to adjacent land use, should new right-of-way or easements on adjacent lands, new access points, or changes in access be required. Based on historical right-of-way plans, existing MDT right-of-way along MT 3 varies from 100 to 140 feet wide within the study corridor area.[13]

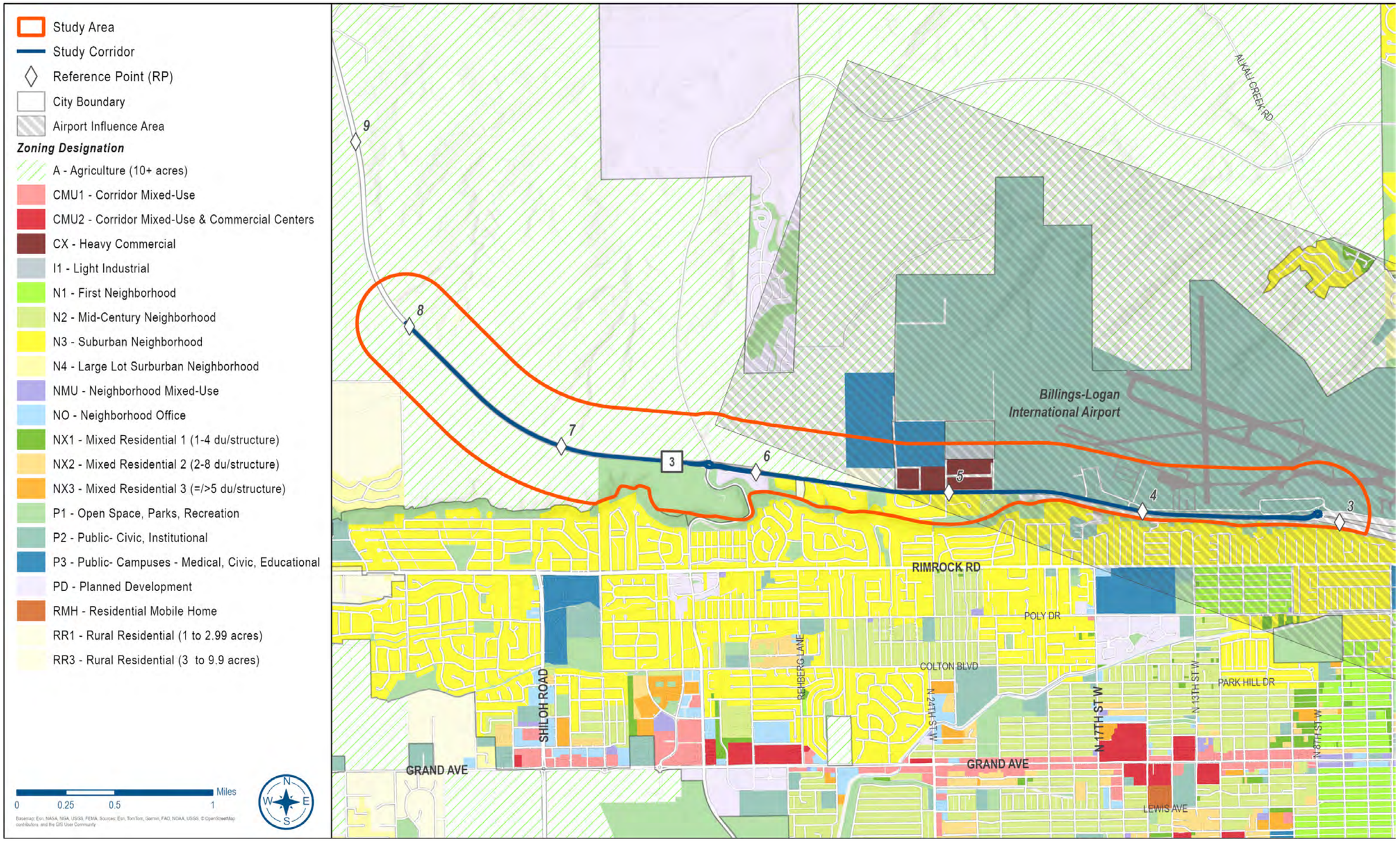

Figure 4: Zoning Designations

3.2 Functional Classification

Functional classification is a hierarchical system used to classify each road based on its relative emphasis on mobility versus land access. Arterials provide the greatest mobility but are intended to have limited access (i.e., higher travel speeds and volumes primarily serving long-distance travel). Local roads focus on land access and have limited mobility (i.e., lower travel speeds and volumes primarily serving adjacent land uses). Collector roads are an intermediate classification and provide a more balanced blend between mobility and access. Figure 5 shows the FHWA functional classification hierarchy.[14] Figure 6 depicts the functional classification for roads within the study corridor area. MT 3 is classified as a principal arterial, while Zimmerman Trail and E. Airport Road are classified as minor arterials.

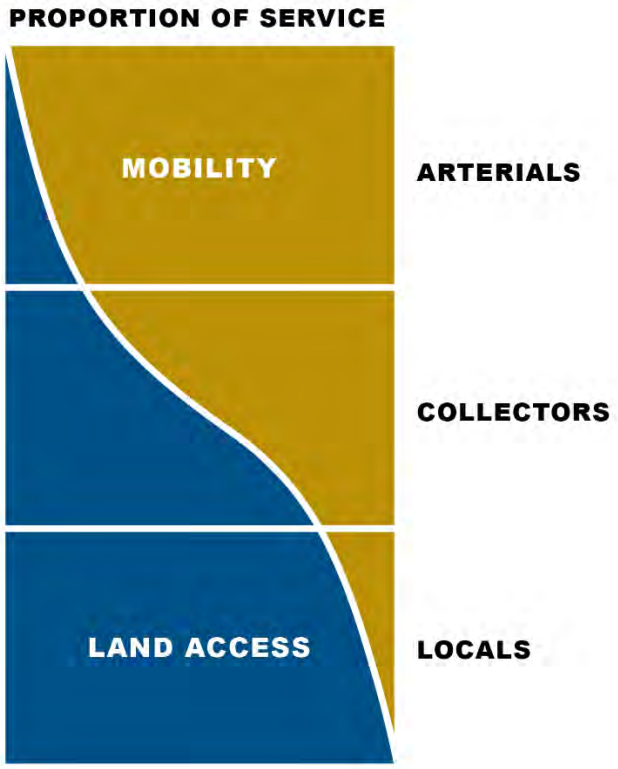

Figure 5: Mobility and Access Relative to Functional Classification

Figure 6: Functional Classification

3.3 Posted Speed Limits

Figure 7 depicts the posted speed limits in the study corridor area. The speed limit is 70 miles per hour (mph) on the west end of the corridor but decreases to 50 mph just west of Zimmerman Trail, then decreases to 45 mph just west of the E. Airport Road/N. 27th Street roundabout. The speed limit on Zimmerman Trail is 25 mph, while the speed limit on Skyway Drive is 45 mph.

Figure 7: Posted Speed Limits

3.4 Access Density and Access Control

Figure 8 depicts the access density along the study corridor. Access density is the number of driveways and minor intersections along a corridor; more access points can increase potential crashes and conflicts. For this study, the corridor was divided into quarter-mile segments and the number of approaches and intersections were counted on each segment. Access density is relatively low on the west end of the corridor. However, the nature of the corridor changes east of Zimmerman Trail, where there are more residential developments with direct access onto MT 3. MDT implemented access control on MT 3 in 1990.[15] The access control begins 0.3 miles east of Zimmerman Trail and extends west past the study corridor area at Apache Trail. An access management plan is being prepared for the MT 3 study corridor as part of the overall corridor planning study to guide future access along the corridor.

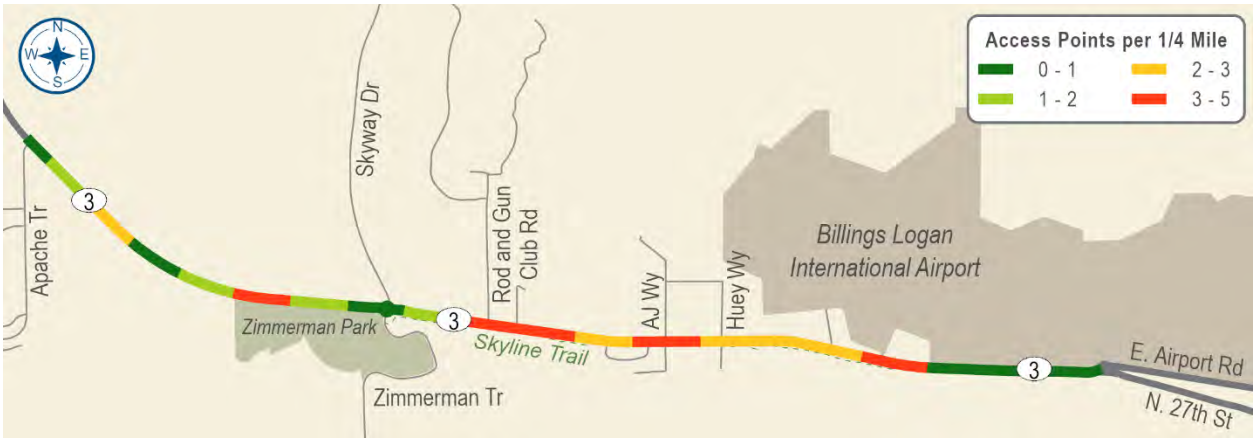

Figure 8: Access Density

Improvements Recommended in Related Plans and Studies

The 2015 *MT 3 Corridor Planning Study* recommended access control on MT 3, with a raised or depressed median extending from Zimmerman Trail to E. Airport Road. With the median recommended in the 2015 study, several intersections would be limited to three-quarter access where left and right-turn movements would be allowed onto the side street, but access to MT 3 from the side street would be limited to right-turns only.

3.5 Roadway Surfacing

The MDT Road Log contains data on roadway surfacing including widths and thicknesses along state routes. The typical section on MT 3 consists of two 12-foot-wide travel lanes with one travel lane in each direction, variable shoulder widths, and roadside ditches (no curb or gutter).

MDT conducts annual pavement monitoring. A variety of conditional assessments are conducted by MDT, consisting primarily of Ride, Rut, and Cracking. Specifically, these attributes are tracked as follows:

- **Ride Index (IRI)**: Roughness index measurement in inches per mile and converted to a 0 to 100 scale
- **Rut Index (RI)**: Rut depth measurement taken every foot and converted to a 0 to 100 scale
- **Alligator Cracking Index (ACI)**: Fatigue cracking measurement for all load-related cracks converted to a 0 to 100 scale
- **Miscellaneous Cracking Index (MCI)**: Fatigue cracking measurement for non-load-rated cracks converted to a 0 to 100 scale
- **Overall Performance Index (OPI)**: Factored overall performance score derived empirically from the previously noted indices and converted to a 0 to 100 scale

Table 11 summarizes pavement condition data collected by MDT. The OPI is a summary of the pavement's general condition. OPI scores of 80 to 100 are good, 60 to 80 fair, and less than 60 is considered poor. Based on the specified scaling to determine OPI, this section of the MT 3 corridor is generally rated on the low end of fair. The MT 3 corridor pavement was milled and overlaid in 2017 from RP 3.2 to 6.1 (Zimmerman Trail to E. Airport Road).

Table 11: Pavement Condition on MT 3

Begin RP	End RP	IRI	RI	ACI	MCI	OPI
3.0	4.0	78.45 Fair	100.00 Good	98.98 Good	94.41 Good	70.10 Fair
4.0	5.0	85.99 Good	100.00 Good	99.54 Good	86.40 Good	68.29 Fair
5.0	6.0	85.92 Good	100.00 Good	97.63 Good	84.79 Good	67.15 Fair
6.0	7.0	76.97 Fair	100.00 Good	97.57 Good	86.13 Good	63.91 Fair
7.0	8.1	87.90 Good	100.00 Good	99.91 Good	92.79 Good	72.69 Fair

3.6 Maintenance and Operations

MDT is responsible for maintenance of MT 3 throughout the study corridor area. Responsibilities include repairs and preventative maintenance of the roadway, structures, and signs within the highway right-of-way.

3.6.1 Winter Operations

MDT maintenance personnel are responsible for winter snowplowing and sanding of MT 3. The MDT Maintenance Operations and Procedures Manual[16] provides classification of winter maintenance areas. MT 3, east of Zimmerman Trail, qualifies as a Level I facility. Level I facilities include roadways within or adjacent to a three-mile radius of towns or cities with an average daily traffic (ADT) greater than 5,000 vehicles per day (vpd). These routes may receive continuous snowplowing and anti-icing/de-icing operations throughout a storm event.

MT 3, west of Zimmerman Trail, qualifies as a Level I-A facility. This facility type includes interstate and other MDT-maintained roadways with an ADT greater than 3,000 vpd but less than 5,000 vpd. These routes may receive coverage up to 19 hours per day during a storm event, typically between the hours of 5:00 AM and 12:00 AM. Coverage of these facilities is at the discretion of the Area Maintenance Chief. 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.

3.6.2 Emergency Services

Coordination of public safety agencies is the responsibility of Yellowstone County Disaster and Emergency Services. These services include law enforcement, fire, ambulance, public works, volunteers, and other groups that may be associated with an emergency response.

Fire Station 1 of the City of Billings Fire Department responds to downtown Billings and north of the Rimrocks for fire, emergency medical services, and rescue calls. Station 1 is on the north side of downtown Billings.

Law enforcement is provided by the City of Billings Police Department and Yellowstone County Sheriff Department within the study corridor area. As a state route, the MT 3 corridor is patrolled by local law enforcement and Montana Highway Patrol.

Emergency response is provided by the local fire department and medical services are provided by Billings Clinic Hospital and St. Vincent Regional Health. Both medical facilities are on the north side of downtown Billings, within two miles of the MT 3 corridor.

MT 3 is part of the Strategic Highway Network and National Highway System, indicating the route may be used for emergency defense mobilization or evacuation.

3.7 Geotechnical Conditions

The study corridor area is north of the Rimrocks overlooking southeast Billings. The Rimrocks form the bluffs along the eastern margin of the Yellowstone River. They are the remnants of an offshore sandbar or barrier island environment formed by the Cretaceous Seaway that connected the Gulf of Mexico and the Arctic Ocean.[17] The Rimrocks are composed of Upper Cretaceous Eagle Sandstone that generally dips to the northeast at approximately 3 to 5 degrees. The Eagle Sandstone, a light brownish-gray to yellowish-brown massive sandstone, is very fine-grained to fine-grained, well-cemented, cross-bedded, contains some sandy shale beds up to 50 feet thick, and overall this geologic unit is 250 to 350 feet thick in the region.[18] It typically contains marine fossils and evidence of bioturbation (the process by which organisms rework soil and sediments). Underlying the Eagle Sandstone is the Upper Cretaceous Telegraph Creek Formation, a brownish to dark-gray shale to sandy shale with thin, interbedded sandstone beds that become thicker as it grades into the Eagle Sandstone. This unit is about 150 feet thick and outcrops locally at the base of the cliffs southwest of the study corridor area.[19]

Surficial soil deposits in this area are residual soils from the weathering Rimrocks and have been described as clayey and silty sands. Competent bedrock has been encountered as shallow as 10 feet below the existing ground surface. The depth to competent bedrock beneath soil deposits may vary within a few feet based on the degree of decomposition of the bedrock at any particular location.

The fine-grained silty/sandy soils along the study corridor area are likely frost-susceptible when moisture is present. These soil types often require additional subgrade preparation, and compaction may be more difficult during wet seasons when the subgrade soil exceeds its optimum moisture.

Rockfall from the Rimrocks has been a significant issue in Billings and has caused damage to public and private property. Stabilization techniques, such as rock dowels or bolts, have been locally used to reduce rockfall risk. The MT 3 corridor is not expected to be at risk of rockfall incidents as the project location is north of the rim of the cliffs. However, care should be taken to make sure construction activities along the MT 3 corridor do not disturb possibly loose or weak rock. Geotechnical investigations would be required for reconstruction or significant improvements to MT 3 to determine potential stability, erosion, subgrade support, and settlement concerns posed by surface geology and soil conditions.

Montana is a seismically active state; however, most seismic activity is concentrated in the mountainous western third of the state. Seismic activity in the Billings area is relatively low. According to data from the Montana Bureau of Mines and Geology, no active faults are mapped within the study corridor area. Only one magnitude 2.2 earthquake has been documented within the Yellowstone Valley, and this 2014 event was located over seven miles east of the study corridor area. In addition, the study corridor area is within a Seismic Hazard Zone that is less likely to experience significant ground-shaking.[20]

3.8 Drainage Conditions

The study corridor area is a section of highway with limited stormwater and drainage facilities. The area lies directly north of the Rimrocks, which are identified as a high-risk area for flooding and erosion-related issues. The area directly below the Rimrocks is residential and increasing the volume or peak flow of runoff over the Rimrocks should be avoided.

For the majority of the study corridor area, runoff is conveyed and discharged through a series of open ditches and culverts ranging from 18 to 30 inches in diameter. West of the MT 3 and Zimmerman Trail intersection, the topography generally slopes from south to north toward Alkali Creek. Five culverts cross under MT 3 in this section to drain the areas south of the road into intermittent drainages to the north; all lie within the Alkali Creek drainage. Seven culverts convey drainage from the roadside ditches through the approaches and driveways in this area. Drainage features in the western portion of the study corridor area are depicted in Figure 9.

East of the MT 3 and Zimmerman Trail intersection, nine culverts discharge into drainages that outfall over the Rimrocks into the City/County Drain and Yegen Drain basins. The majority of runoff discharges to the City/County Drain; only the area east of RP 3.7 discharges to Yegen Drain. Crossing culverts in this area discharge into, or directly above, residential areas. Increasing runoff volume or peak flow at these outfalls would increase flood and erosion risk for the properties south of the Rimrocks. A rock check dam was installed in 2023 with the construction of Skyline Trail that runs parallel to MT 3 to the south. This dam attenuates stormwater flows and reduces sediment transport before discharging to the City/County Drain basin. East of RP 3.9, the roadside ditch includes energy dissipators that slow runoff and reduce erosion. One crossing culvert near RP 3.4 conveys water from the south roadside ditch to the north. A ditch block immediately downstream of this culvert causes water to stack up to 1.5 feet higher than the culvert inlet. There are three paved parking lots in this area that include curb and gutter systems that outfall to the roadside ditches. Drainage features in the eastern portion of the study corridor area are depicted on Figure 10.

There are subsurface stormwater systems near the MT 3 and E. Airport Road / N. 27th Street roundabout and the MT 3 and Zimmerman Trail roundabout. In the immediate area of the roundabouts, curb and gutter conveys water to inlets before discharging to open ditches. The MT 3 and Zimmerman Trail area includes a stormwater detention pond northeast of the roundabout. Due to proximity of the study corridor area to Billings Logan International Airport, detention and retention ponds are regulated by the Federal Aviation Administration (FAA) as they have the potential to attract birds and create a hazard for aircraft. Overflow from the pond flows to the east before discharging over the Rimrocks through a 30-inch diameter crossing culvert to the City/County Drain basin. Historically, there have been drainage issues in the subdivision at this outfall and volume or peak flow of runoff should not be increased in this area. There are small subsurface systems near the east Masterson Circle approach and the Skyranch Drive approach. These systems consist of curb and gutter, inlets, manholes, and 12- to 24-inch diameter storm drainpipe that discharge into drainages that outfall over the Rimrocks to the City/County Drain basin.

The majority of the study area is within the Billings Municipal Separate Storm Sewer System (MS4). MS4s are regulated by the Montana Pollutant Discharge Elimination System. Requirements for the Billings MS4 are described in the City of Billings Storm Water Management Program.

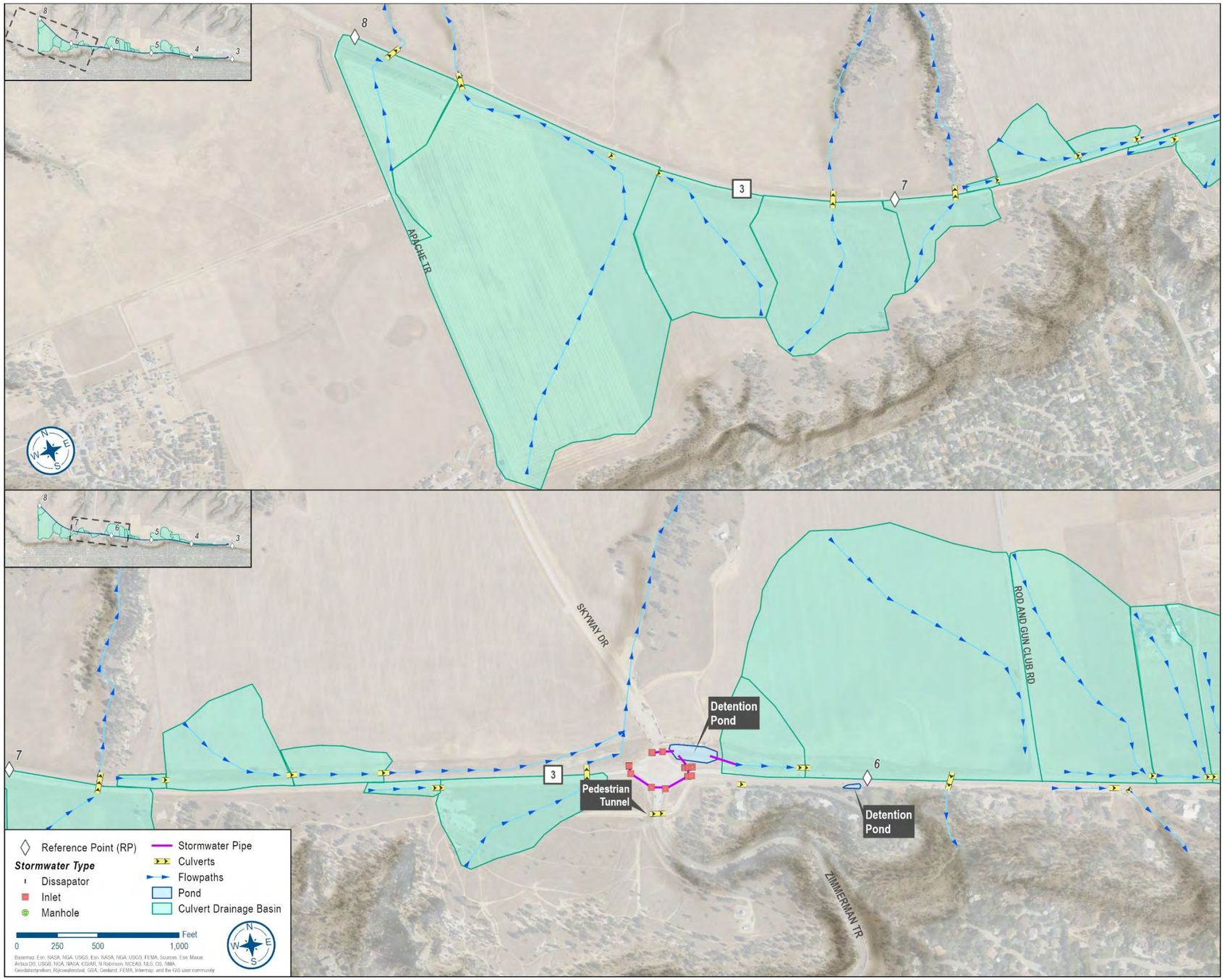

Figure 9: Existing Drainage Features (Western Half of Study Corridor Area)

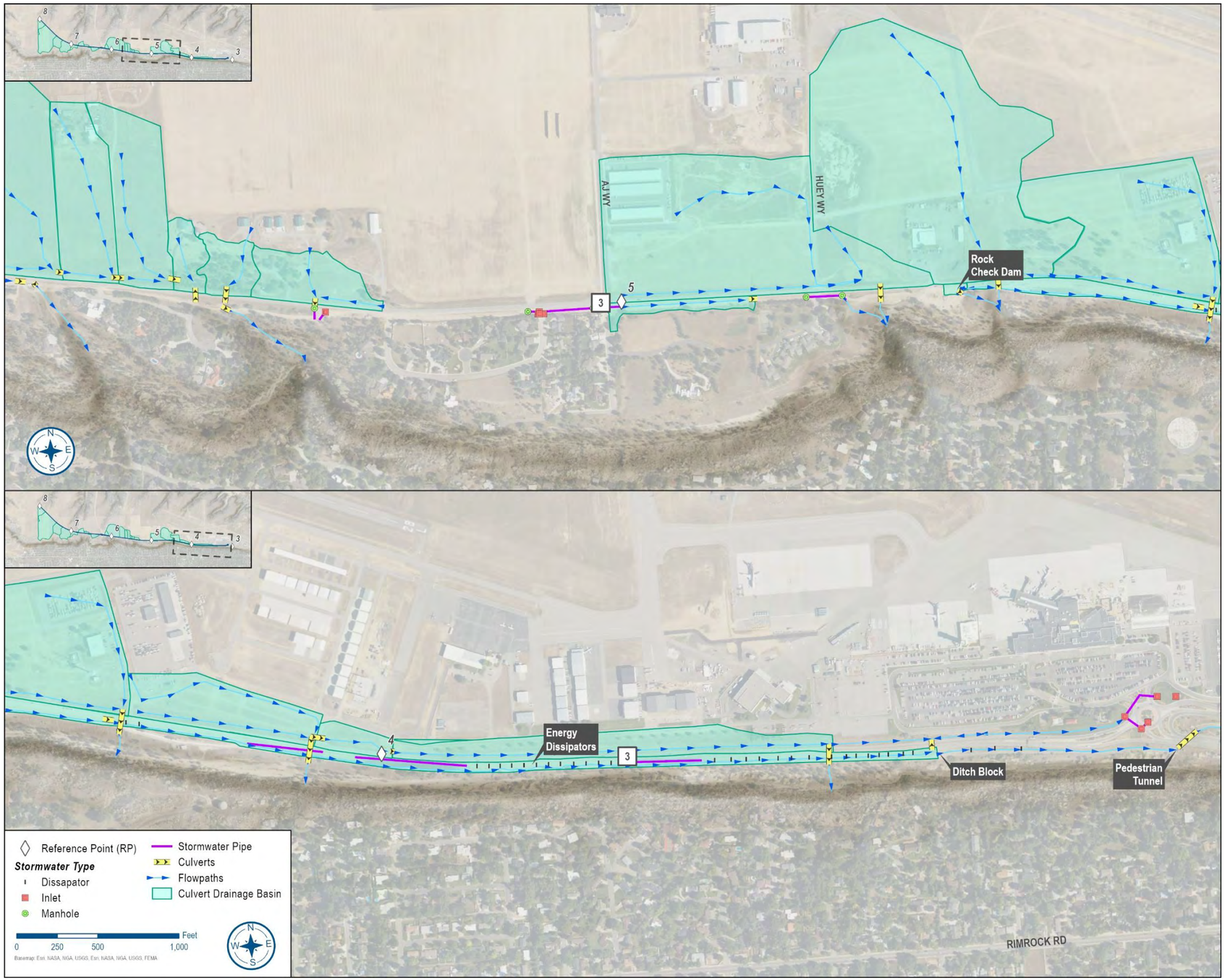

Figure 10: Existing Drainage Features (Eastern Half of Study Corridor Area)

3.9 Utilities

Three sources of data were used to identify the utilities present in the study corridor area.

- City of Billings Geographical Information System (GIS) data
- MDT utility permit database records
- Montana 811 one-call utility locate system

The level of information provided by each of these sources varies. The Billings GIS information includes detailed mapping of water, sanitary sewer, and storm drain facilities. Specific attributes of these facilities are available, such as pipeline sizes and material types. The MDT utility permit information consists of a tabular list of utility occupancy and encroachment permits only within the highway right-of-way, identified by RP location(s). The Montana 811 one-call system is typically used to identify precise utility locations for excavation safety, but in this instance, an information-only request was made to simply identify the utility companies and utility types within the study corridor area.

3.9.1 Public Utilities

Figure 11 shows the existing water, sanitary sewer, and storm drain facilities in the study corridor area, along with the existing water tanks and pump stations. Of note, most of the existing storm drain and water pipelines in the airport parking and terminal areas are not shown for clarity.

Figure 11: Existing Water, Sanitary Sewer, and Storm Drain Facilities

Water

The City of Billings operates the municipal water system that services the corridor segment from E. Airport Road to Zimmerman Trail. A 12-inch-diameter ductile iron water transmission main is installed from Waldo Pump Station, 120 feet south of MT 3 near the west edge of the airport, to Rod and Gun Club Road. At Rod and Gun Club Road, the water main transitions to 16-inch diameter and continues both north to serve the Rehberg Ranch subdivision and west to Zimmerman Trail. This transmission main crosses MT 3 three times, so it is both south and north of the roadway at various locations along the corridor. This area of the water system has a finite capacity until the City of Billings Zone 6 reservoir and transmission line is constructed, anticipated in fiscal year 2029, pending available funding.

Smaller-diameter water distribution mains serve the residential developments south of MT 3 and the various airport facilities to the north. These distribution mains contribute another three pipeline crossings of MT 3. The water system also contains numerous appurtenant facilities

along the pipeline routes, such as isolation valves, fire hydrants, and building service lines. A 100,000-gallon elevated steel water tank and the Christensen Pump Station are present approximately 200 feet north of MT 3 near the west edge of the airport.

There are limited rural residential and commercial buildings north of MT 3 between AJ Way and Zimmerman Trail outside Billings city limits and served by individual groundwater wells. West of Zimmerman Trail, there are no potable water facilities due to the lack of building development.

Sanitary Sewer

The sanitary sewer facilities within the study corridor area consist primarily of a low-pressure sewer system serving the residential developments south of MT 3 between Masterson Circle and Zimmerman Trail, as well as the private airport hangars north of MT 3 adjacent to AJ Way. The low-pressure sewer system consists of 2-inch- and 3-inch-diameter pipelines paralleling the highway along the south shoulder. Between Masterson Circle and Stoney Ridge Road, the sewer is collected in an 8-inch-diameter gravity sewer main. This sewer main crosses MT 3 once at Stoney Ridge Road. The sewer system also contains numerous manholes and individual building service lines. This sewer has limited capacity for future growth.

The east edge of the corridor has 8-inch-diameter gravity sewer mains that collect wastewater from the primary airport buildings. These sewer mains continue east along E. Airport Road outside the study corridor area. There are limited rural residential and commercial buildings north of MT 3 between AJ Way and Zimmerman Trail outside the Billings city limits that are served by individual septic tanks and drain fields. West of Zimmerman Trail, there are no sanitary sewer facilities due to lack of building development, other than a vault at Zimmerman Park approximately 220 feet south of MT 3.

Storm Drain

Underground storm drain facilities in the study corridor area are limited to the system of storm inlets, pipelines, and manholes throughout the developed areas of the airport north of MT 3. Drainage improvements that convey stormwater runoff along the highway itself consist of roadside ditches and culvert crossings throughout the entire corridor.

3.9.2 Private Utilities

Several private utilities exist in the study area including overhead power lines, buried power lines, communications, and natural gas.

Power

NorthWestern Energy and Yellowstone Valley Electric Co-operative both have electrical power facilities in the study corridor area. Overhead power lines and power poles are located along the north edge of the MT 3 right-of-way from Apache Trail to Rod and Gun Club Road and start again at Southview Drive for 1,900 feet east. Overhead power lines and power poles are located along the south edge of the MT 3 right-of-way from the Zimmerman Park entrance to Stoney Ridge Road and start again at Skyranch Drive for 700 feet east. Overhead power line crossings of MT 3 occur at the following locations:

- 3,200 feet southeast of the Apache Trail intersection
- 2,000 feet west of the Zimmerman Trail roundabout
- 1,400 feet east of the Rod and Gun Club Road intersection
- 200 feet and 700 feet east of the Skyranch Drive intersection
- 300 feet east of the Southview Drive intersection
- 700 feet west of the E. Airport Road roundabout

Buried power lines are also located parallel to and crossing MT 3 within the study corridor area. Determination of exact locations would require identification by a qualified utility location service. Subsurface power lines typically have a buried depth ranging from one to four feet below ground surface.

Communications

Entities owning communication utilities in the study corridor area include Lumen (formerly, or doing business as, CenturyLink, Qwest, US West, and others), AT&T, and Charter Communications. The communication facilities are primarily underground fiber optic and copper cables. Some communication cables may share overhead utility poles. Determination of exact locations of buried cables would require identification by a qualified utility location service. Subsurface communication lines typically have a buried depth ranging from one to four feet below ground surface.

Natural Gas

Montana Dakota Utilities owns natural gas facilities parallel to and crossing MT 3 within the study corridor area. These facilities are known to include 2-inch- to 4-inch-diameter gas main pipelines and smaller-diameter services. Determination of exact locations of buried gas pipelines would require identification by a qualified utility location service. Subsurface gas lines typically have a buried depth ranging from one to four feet below ground surface.

3.10 Other Transportation Modes

3.10.1 Transit

Figure 12 depicts existing transit routes within the study corridor area. The City of Billings MET Transit operates the Downtown Circulator bus route, which passes through the east end of the study corridor area. The Downtown Circulator provides a connection between downtown Billings and the airport terminal. The route extends to the Skyline Trail bus stop seasonally, from May 1 to September 30. The Downtown Circulator typically operates on weekdays with 15-minutes between buses from 5:45 a.m. to 8:00 p.m.

There are additional Billings transportation service providers, including MET Plus, Community Option Resource Enterprises, and Residential Support Services, which provide paratransit services to people with disabilities.

Figure 12: Transit Routes

3.10.2 Pedestrian and Bicycle Facilities

Figure 13 depicts the existing pedestrian and bicycle facilities within the study corridor area. Skyline Trail exists on the south side of MT 3 from Zimmerman Park east to Swords Park, east of the airport. A shared-use path also exists along the east side of Skyway Drive and connects to the Heights Neighborhood. A Rectangular Rapid Flashing Beacon (RRFB) exists on the east leg of the Zimmerman Trail roundabout to facilitate north-south pedestrian crossings. Two pedestrian/bicycle underpasses exist in the study corridor area, on the south leg of the Zimmerman Trail roundabout and the south leg of the E. Airport Road roundabout. A sidewalk exists on the north and south legs of the AJ Way intersection. Four paved parking areas exist south of MT 3 between Huey Way and E. Airport Road for visitors and trail users.

Figure 13: Pedestrian and Bicycle Facilities

The City of Billings collected trail counts on Skyline Trail (one mile west of Airport Road) from September 25 to October 14, 2024. An average of 179 pedestrians/bicyclists were observed per day on Skyline Trail during the 20-day period (ranging from 90 to 400 users per day). A trail count on the Skyway Drive path, just north of Zimmerman Trail, estimated an average of 53 non-motorized users per day from September 11 to 18, 2024 (ranging from 10 to 160 users per day).

The 2017 *Billings Area Bikeway and Trails Master Plan* evaluated the Bicycle Level of Traffic Stress (BLTS) on MT 3. For cyclists using the roadway, MT 3 has a BLTS of four, indicating cycling on the roadway is only acceptable by highly confident bicyclists. MT 3 has a Pedestrian Level of Traffic Stress (PLTS) of one east of Zimmerman Trail, indicating that the existing Skyline trail accommodates pedestrians of all abilities.

Pedestrian and Bicycle Connectivity

National Cooperative Highway Research Program (NCHRP) *Report 562*[21] and *Report 992*[22] provide tools to identify appropriate pedestrian and bicycle crossing treatments. Four main criteria are used to identify appropriate crossing treatment: peak hour pedestrian volumes, conflicting vehicle volumes, conflicting vehicle speed, and crossing distance. Based on the existing crossing characteristics, an RRFB or Pedestrian Hybrid Beacon are considered appropriate crossing treatments on the east leg of the Zimmerman Trail roundabout, along with marked crosswalks and signing.

Providing safe crossings for non-motorized users is key, given the number of regional trails which intersect in the study corridor area. Skyline Trail crosses several driveways providing

access to residential developments along MT 3. City of Billings staff have noted that nonmotorized safety is a concern at these access points along Skyline Trail and at the RRFB on the east leg of the Zimmerman Trail roundabout.

Committed or Proposed Improvements

There is one committed and one proposed pedestrian/bicycle project in the study corridor area:

- Stagecoach Trail: This project is active/committed and will provide an 8-foot-wide pedestrian and bicycle path on the east side of Zimmerman Trail, from Rimrock Road to MT 3. This project is currently in design and construction is planned for 2028. This connection is part of the Marathon Loop, a 26-mile multi-use paved path around Billings.
- Yellowjacket Trail: The proposed project will provide a pedestrian and bicycle path along N. 27th Street, from the E. Airport Road roundabout to Rimrock Road. Billings TrailNet is conducting a high-level feasibility study to identify the recommended configuration for this non-motorized connection.

Improvements Recommended in Related Plans and Studies

Several additional non-motorized connections are recommended in the study corridor area, per the *Billings LRTP* and 2017 *Billings Area Bikeway and Trails Master Plan* as follows.

- MT 3: Buffered bike lanes are recommended on MT 3 from Alkali Creek Road (three miles west of Apache Trail) to Zimmerman Trail. Bike lanes are recommended on MT 3 from Zimmerman Trail to E. Airport Road.
- Rod and Gun Club Road: Bike lanes are recommended on Rod and Gun Club Road north of MT 3, connecting to the existing Rehberg Ranch Trail.
- MT 3 / Zimmerman Trail Intersection: A pedestrian and bicycle underpass is recommended on the east leg of the Zimmerman Trail roundabout to allow for uninterrupted north-south crossings, connecting the Skyline Trail to the multi-use path along Skyway Drive.

Existing RRFB on the East Leg of the Zimmerman Trail Roundabout

3.10.3 Aviation Facilities

Aviation facilities along the study corridor include Billings Flying Service and Billings Logan International Airport. Billings Flying Service is located on AJ Way and provides aerial firefighting and heavy lift services. The Billings Logan International Airport (BIL) is a busy commercial service airport located on MT 3 near the E. Airport Road roundabout. The existing and projected aviation demand at BIL has been characterized using actual reported activity levels from the past 20 years and the FAA Terminal Area Forecast (TAF). Overall, the number of passenger enplanements, aircraft operations, and based aircraft are anticipated to grow annually. The actual growth rates in each area may be more modest than the forecast in the 2010 Airport Master Plan, but the trends project growth in aviation activity at BIL. The airport has several capital improvement projects scheduled in the near term to expand facilities and increase capacity.

Table 12 lists actual reported activity levels in the past 20 years (2003 through 2023) for passenger enplanements, aircraft operations, and based aircraft. Passenger enplanements are the number of revenue-generating passengers that boarded an aircraft at BIL each year. Passenger enplanements have fluctuated over the last 20 years but overall have grown at an average annual rate of 0.87% per year. Aircraft operations include the total takeoffs and landings at BIL. Operations show fluctuation over the 20-year period, with a general trend toward growth since 2013. Based aircraft are aircraft that are usually housed at BIL, and this number has grown at an average annual rate of 1.14% per year.

Table 12: Twenty-Year Aviation Activity History at BIL

Year	Passenger Enplanements	Percent Change Enplanements	Aircraft Operations	Percent Change Operations	Based Aircraft
2003	360,505		101,789		145
2008	422,494	17%	90,125	-11%	173
2013	387,773	-8%	76,032	-16%	167
2018	440,263	14%	88,304	16%	170
2023	428,868	-3%	99,748	13%	197

Source: FAA [23, 24, 25]

Expected Growth in Aviation Demand

The FAA develops the TAF, an official forecast of aviation activity for US airports that is used for planning purposes. Table 13 shows the recent history and anticipated trends for BIL according to the fiscal year 2024 TAF. Of note, the total operations shown in Table 13 are for fiscal year, while the total operations shown in Table 12 are for calendar year. The TAF indicates BIL will continue to experience modest growth in enplanements, operations, and based aircraft.

Table 13: Forecasted Growth in Enplanements and Operations at BIL

Year	TAF Enplanements	Annual Passenger Enplanements Growth	TAF Aircraft Operations	Annual Operations Growth
2020*	292,264		86,266	
2021*	345,852	18%	101,799	18%
2022*	380,514	10%	91,333	-10%
2023*	424,566	12%	97,121	6%
2024	461,856	9%	101,564	5%
2025	506,731	10%	107,773	6%
2026	515,135	2%	108,473	1%
2027	524,083	2%	109,208	1%
2028	533,216	2%	109,953	1%
2029	541,677	2%	110,675	1%
2030	550,108	2%	111,396	1%
2031	558,667	2%	112,125	1%
2032	567,354	2%	112,862	1%
2033	576,323	2%	113,611	1%
2034	585,319	2%	114,363	1%
2035	594,279	2%	115,116	1%

Source: Fiscal Year 2024 FAA TAF
*Data for 2020-2023 are actual reported statistics; data for 2024-2035 are forecasts

The 2023 to 2027 Airport Capital Improvement Plan indicates near-term projects (within the next five years) planned to increase parking capacity on the airside (for aircraft) and landside (for vehicles). BIL is planning to expand the cargo ramp and northside public ramp for aircraft parking. Vehicle parking at BIL has reached capacity during periods of high travel demand (e.g., spring break, summer, and holidays), resulting in vehicles parking on grassy areas along Overlook Drive, when parking areas become full.[26] The Capital Improvement Plan indicates that BIL will be planning and designing a vehicle parking garage to expand parking capacity.

Overall, actual reported enplanements, operations, and based aircraft trends, as well as the TAF, indicate aviation activity at BIL will continue to grow at a modest rate. A more detailed aviation demand forecast will be developed as part of the updated Airport Master Plan, to be completed in 2025 or 2026.

4.0 GEOMETRIC CONDITIONS

Existing roadway geometrics were evaluated and compared to current MDT standards. The analysis was completed based on a review of public information, MDT as-built drawings, GIS data, and field observations.

4.1 Design Criteria

The MDT *Road Design Manual*[27] (RDM) and *Baseline Criteria Practitioner's Guide*[28] establish design controls and general design criteria that influence the overall roadway design approach. A balanced design incorporates the baseline design criteria, adjusted to context of the facility as appropriate, while meeting the desired outcome of a project and being mindful of impacts related to the project. MDT classifies MT 3 as a principal arterial which is designed to accommodate higher traffic volumes, longer trip lengths, and provide fewer access points compared to a minor arterial or collector road. Table 14 lists baseline design criteria for MT 3.

Table 14: Design Standards

Design Element			MT 3, West of Zimmerman Trail	MT 3, East of Zimmerman Trail
Basic Design Parameters	Roadway Designation		Rural Principal Arterial	Urban Principal Arterial
	Posted Speed		70 mph	50 mph
	Design Speed (1)		70 mph	55 mph
	Design Vehicle		WB-67	
Roadway Cross Section Elements	Travel Lane Width (1)		12 feet	
	Shoulder Width (1)	Outside	6-8 feet	6 feet
		Inside	N/A	
	Cross Slope (1)	Travel Lane	2% Typical	
		Shoulder	2% Typical	
Roadside Cut Sections	Ditch	Inslope	6:1 (10-foot width)	4:1
		Width	10 feet minimum	Traversable V-ditch
		Slope	20:1 towards backslope	Traversable V-ditch
	Backslope Cut Depth at Slope Stake	0-5 feet	5:1	Varies
		5-10 feet	4:1	
		10-15 feet	3:1	
		> 15 feet	2:1	
Roadway Fill Slopes	Fill Height at Slope Stake	0-10 feet	6:1	Varies
		10-20 feet	4:1	
		20-30 feet	3:1	
		> 30 feet	2:1	
Alignment Elements	Stopping Sight Distance (1)		See RDM 2.8.1 & Appendix F.2	
	Intersection Sight Distance		See RDM 2.8.2 & Appendix F.3	
	Minimum Radius (1)		See RDM 3.2.3	
	Superelevation Rate (1)		e_{max} = 8.0%	e_{max} = 4.0%
	Maximum Grade (Level) (1)		3%	5%
	Minimum Vertical Clearance		17 feet	17 feet

(1) Controlling design criteria.

4.2 Roadway Typical Section

For most of the corridor, the roadway has a two-lane typical section, with one travel lane in each direction, and no curb or gutter. West of the Zimmerman Trail roundabout, the existing typical section includes two 12-foot-wide travel lanes and 8-foot-wide shoulders, providing a roadway surface width of 40 feet. East of the Zimmerman Trail roundabout, the roadway surface width decreases to 31 feet, including two 12-foot-wide travel lanes and 3.5-foot-wide shoulders. The 3.5-foot shoulder width east of Zimmerman Trail does not meet design standards, as the minimum shoulder width for a rural and urban principal arterial is 6 feet. MDT's Road Design Manual requires at least 5 feet of separation between the edge of roadway and shared use path, while the City of Billings requires at least 10 feet of separation for a path along a principal arterial.[29] Ten feet of separation is generally met in the existing condition where Skyline Trail runs along the south side of MT 3.

Existing cut slopes range from 1.5H:1V to 3H:1V, with surface slumps observed where cut slopes are steeper than 2H:1V. Cut slopes should be adjusted to meet design standards based on the total cut depth. The existing fill slopes are relatively shallow throughout the corridor. However, there are sections with larger fill heights adjacent to the Skyline Trail and adjacent to existing drainages. The fill slopes for these sections are approximately 2H:1V. Fill slopes should be adjusted to meet design standards based on the total fill height.

Improvements Recommended in Related Plans and Studies

The *Billings LRTP* recommends that the cross-section on MT 3 be widened from Apache Trail to E. Airport Road to provide one through lane in each direction, bike lanes, and center turn lanes where needed for future development. A speed study is recommended after the roadway widening is complete.

4.3 Roadway Alignment

A roadway alignment consists of both a horizontal alignment and a vertical alignment. A horizontal alignment consists of a series of straight lines, known as tangents, and curves to change direction. Consideration is also given to the degree of curvature, the rate of superelevation, and curve type. A vertical alignment consists of a series of straight grades and vertical curves. Consideration is given to the elevation change, the vertical curve type (either a crest or sag), and the rate of curvature (K-value). The K-value is the horizontal distance needed to produce a one percent change in gradient. The functional classification of the roadway and design speed dictate the specific geometric design criteria.

The E. Airport Road / N. 27th Street intersection was upgraded to a roundabout in 2010, while the Zimmerman Trail intersection was upgraded to a roundabout in 2019. Skyway Drive opened in mid-2024. Available as-built information provided by MDT included the following projects within the study corridor area, with the project completion date in parentheses.

- MT 3 from Zimmerman Trail to E. Airport Road – Resurfacing (2017)
- MT 3 / Zimmerman Trail Intersection - Flasher (1978, 2004) and Roundabout (2019)
- MT 3 / N. 27th Street / E. Airport Road Intersection (1964, 1986) and Roundabout (2010)

The horizontal alignment of the roadway in the study corridor is relatively straight with four curves. The existing horizontal alignment complies with current geometric design standards. The vertical alignment is generally flat and complies with current geometric standards. Vertical curves generally meet or exceed current geometric design standards. Proposed improvements carried forward from the corridor study should make sure that current alignment standards are met and consider design speed and terrain type.

5.0 TRAFFIC CONDITIONS

This section documents traffic conditions on the study corridor, including a review of existing and historical traffic volumes, anticipated future growth, and intersection operations with existing and future 2045 traffic volumes.

5.1 Daily Traffic Volumes & Expected Growth

Figure 14 depicts the 2023 annual average daily traffic (AADT) on the corridor and on major crossroads. Estimated AADT was obtained from MDT's short-term count sites within the study corridor area. The corridor volumes are highest between Zimmerman Trail and E. Airport Road, with an AADT of 12,300 vehicles per day. The daily volumes reduce significantly west of Zimmerman Trail. For reference, the planning level capacity of a two-lane urban arterial is 18,300 vehicles per day.[30]

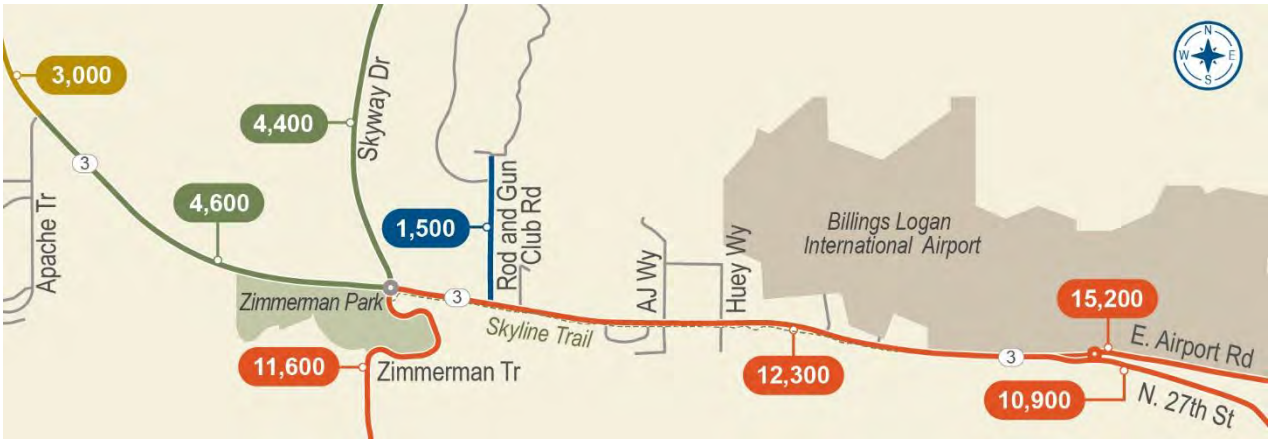

Figure 14: 2023 AADT (Vehicles per Day)

The historical growth rate was analyzed over the 20-year period from 2004 to 2023 to estimate future traffic volumes. Historical AADT was obtained for the short-term count sites on MT 3. Of note, the AADT reported at short-term count sites is based on a seasonally adjusted 48-hour traffic count. Therefore, the AADT reported is only an estimate and can vary widely from year to year, based on the conditions during the traffic count.

Table 15 lists the locations of the short-term count sites within the study corridor area and the compound annual growth rate at each site. Figure 15 graphically depicts the data. Traffic growth on MT 3 was highest from 2004 to 2013 (2.8% average growth); however, growth slightly decreased from 2014 to 2023 (2.1% average growth). When considered in aggregate, the average growth rate over the last 20 years was equal to 2.6%. The 20-year growth rate is less impacted by randomness in the data, which can occur when analyzing shorter periods.

Table 15: Historical AADT and Growth Rate

Count Site	2004 AADT	2023 AADT	Growth Rate		
			2004-2013	2014-2023	2004-2023
MT 3 west of Zimmerman Trail	3,570	4,602	1.5%	1.0%	1.3%
MT 3 east of Zimmerman Trail	6,340	12,292	3.7%	2.8%	3.4%
MT 3 west of Airport Rd / 27th St	6,750	12,249	3.3%	2.4%	3.0%
Average Growth Rate for MT 3 Count Sites			**2.8%**	**2.1%**	**2.6%**

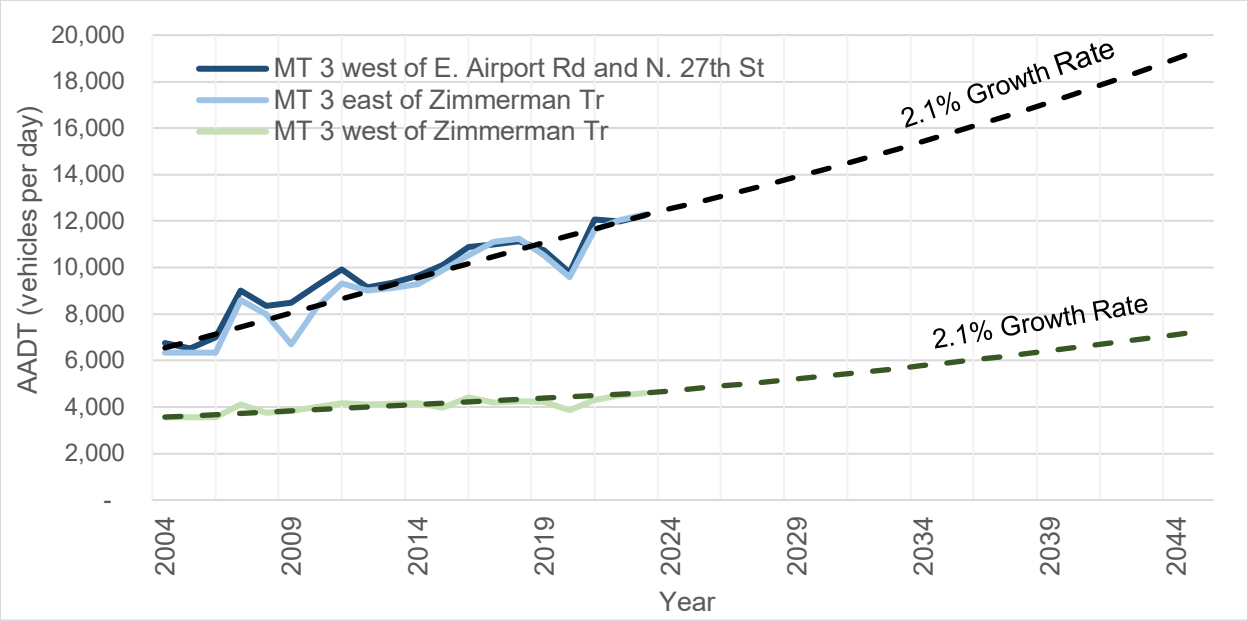

Figure 15: Historical and Projected AADT

The Billings-Yellowstone County MPO maintains a travel demand model which forecasts expected traffic growth in the Billings area. Table 16 lists the travel demand model's forecasted AADT and growth rate on MT 3. Averaged across all segments, the model projects 2.1% annual traffic growth on MT 3 within the study corridor area between 2021 and 2045. This 2.1% growth rate was used to estimate future 2045 traffic volumes.

Table 16: Forecasted Traffic Growth from MPO Travel Demand Model

Count Site	2021 AADT	2045 AADT	Growth Rate 2021-2045
MT 3 west of Zimmerman Trail	4,335	7,449	2.2%
MT 3 east of Zimmerman Trail	11,038	15,203	1.3%
MT 3 west of Airport Rd / 27th St	11,336	23,089	2.9%
Average Growth Rate for MT 3 Count Sites			**2.1%**

Figure 16 and Table 17 show the projected AADT in year 2045, assuming a compound annual growth rate of 2.1%. In 2045, the study corridor is expected to have 7,300 daily vehicles west of Zimmerman Trail and 19,400 daily vehicles east of Zimmerman Trail. Of note, the travel demand model does not include forecasted traffic associated with the BRIC and YLCP planned development north of MT 3 at AJ Way and Huey Way. These developments are expected to draw significant traffic to the study corridor area, particularly during drill weekends when the BRIC is fully built-out. The added traffic associated with these developments is discussed further in Section 5.7 (2045 Projected Intersection Operations).

Table 17: Forecasted 2045 AADT based on 2.1% Annual Growth Rate

Count Site	2023 AADT	2045 AADT
MT 3 west of Zimmerman Trail	4,602	7,270
MT 3 east of Zimmerman Trail	12,292	19,417
MT 3 west of Airport Rd / 27th St	12,249	19,349

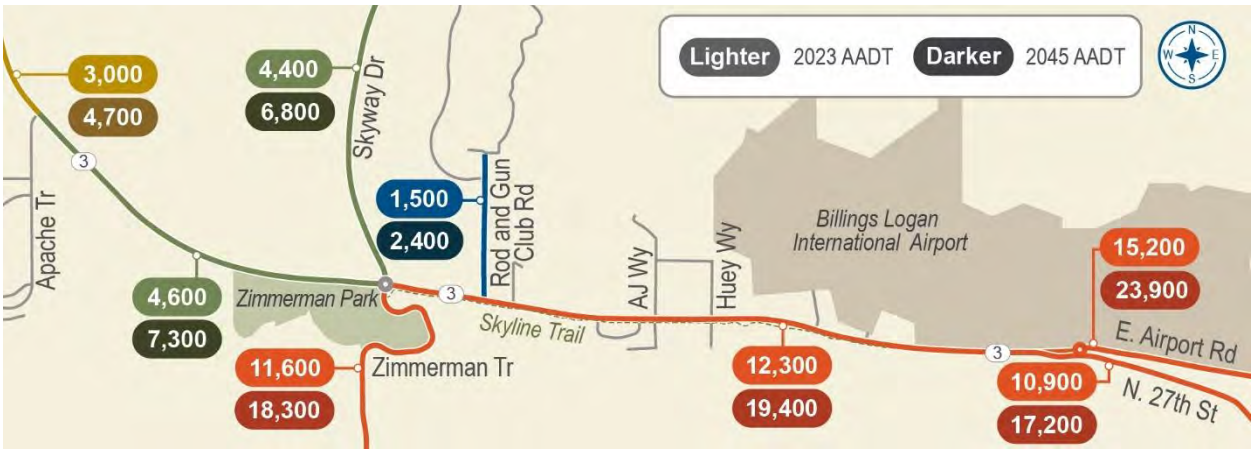

Figure 16: 2023 AADT and Projected 2045 AADT

5.2 Heavy Vehicle Traffic

Heavy vehicles generally include buses, delivery trucks, and semi-trailer trucks. Table 18 lists the two MDT short-term traffic count stations near the study corridor area with 24-hour vehicle classification data, including the percent and number of heavy vehicles. There are 13% heavy vehicles on MT 3 west of Apache Trail, while there are only 3% heavy vehicles on E. Airport Road east of the E. Airport Road / N. 27th Street roundabout. However, there are a higher number of heavy vehicles on the east end of the study corridor area compared to the west end.

Table 18: Percent and Number of Heavy Vehicles

Count Site	Count Date	% Heavy Vehicles	Number of Heavy Vehicles
MT 3 west of Apache Trail	July 16-17, 2024	13%	475
E. Airport Road east of MT 3	September 5-6, 2023	3%	575

5.3 Seasonal and Daily Variation

Figure 17 shows the seasonal variation in traffic volumes at the nearest MDT permanent count station (on Main Street north of Hilltop Road). The figure shows the monthly average daily traffic, along with the relative proportion of each month to the AADT. The spring and summer months (April to September) have the highest traffic volumes (e.g., August traffic volumes are 6% higher than annual average traffic volumes). Traffic volumes on MT 3 are expected to follow a similar trend, peaking during the summer months.

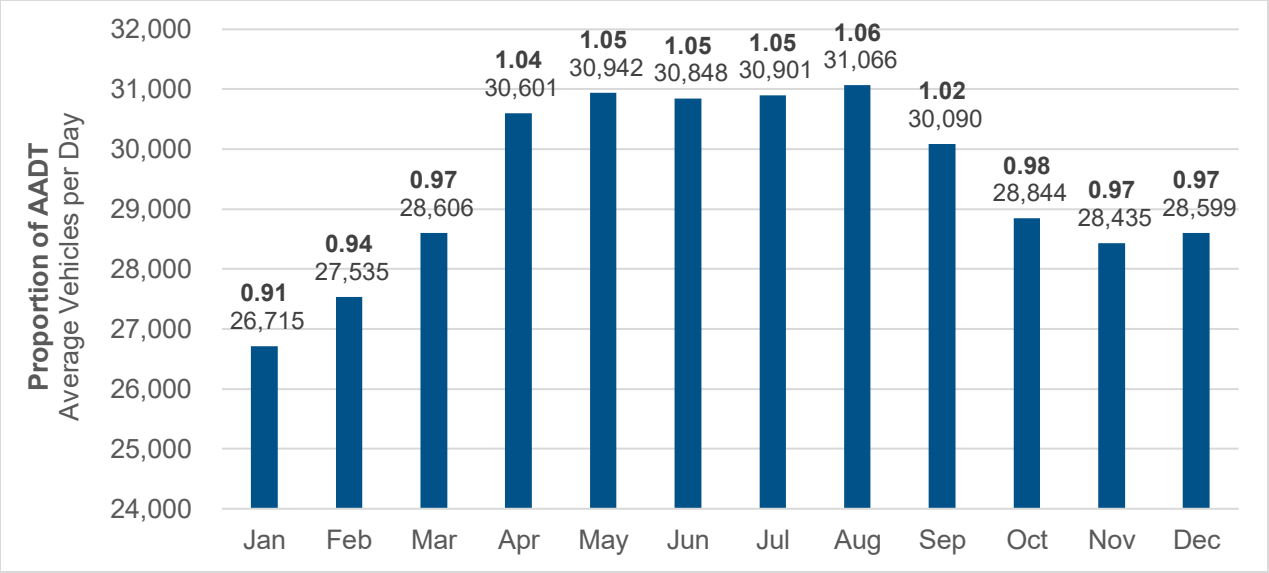

Figure 17: 2023 Average Daily Traffic on Main Street north of Hilltop Road

Figure 18 shows the traffic volume profiles for Thursday, Saturday, and Sunday, based on traffic counts collected at the MT 3 and AJ Way intersection between May 5 and 8, 2022. The AM peak hour occurred from 7:15 to 8:15 a.m. and the PM peak hour occurred from 4:30 to 5:30 p.m. Weekend traffic volumes peak in the middle of the day between 11:30 a.m. and 1:30 p.m.

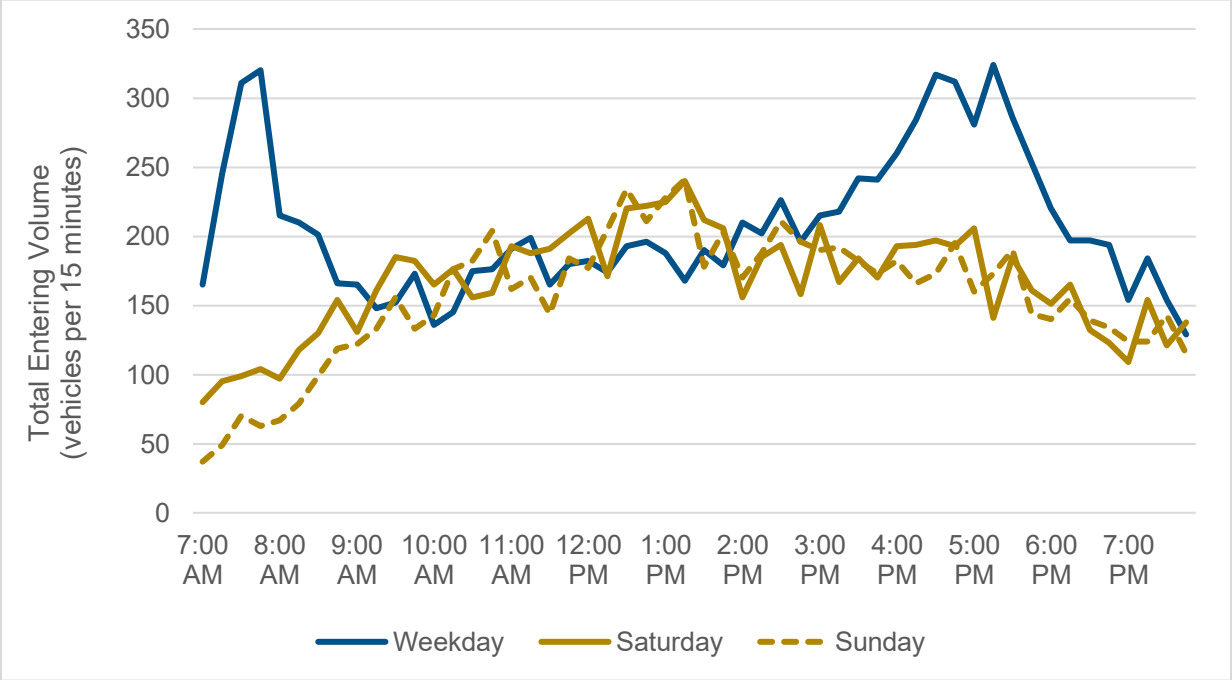

Figure 18: Weekday versus Weekend Total Entering Volume at MT 3 and AJ Way

5.4 Directional Traffic Patterns

Figure 19 and Figure 20 depict the directional distribution of traffic on the east and west ends of the MT 3 study corridor area, respectively. Traffic data on MT 3 east of Zimmerman Trail is from the 24-hour traffic counts collected in December 2024, while traffic data for MT 3 west of Apache Trail is from the MDT short-term traffic count station.

Volumes are relatively balanced on MT 3 east of Zimmerman Trail, with about 52% of traffic heading eastbound during the AM peak and 54% heading westbound during the PM peak. However, directional traffic volumes are less balanced during the peak hours on MT 3 west of Apache Trail where about 65% of traffic is heading eastbound during the AM peak and 62% of traffic is heading westbound during the PM peak.

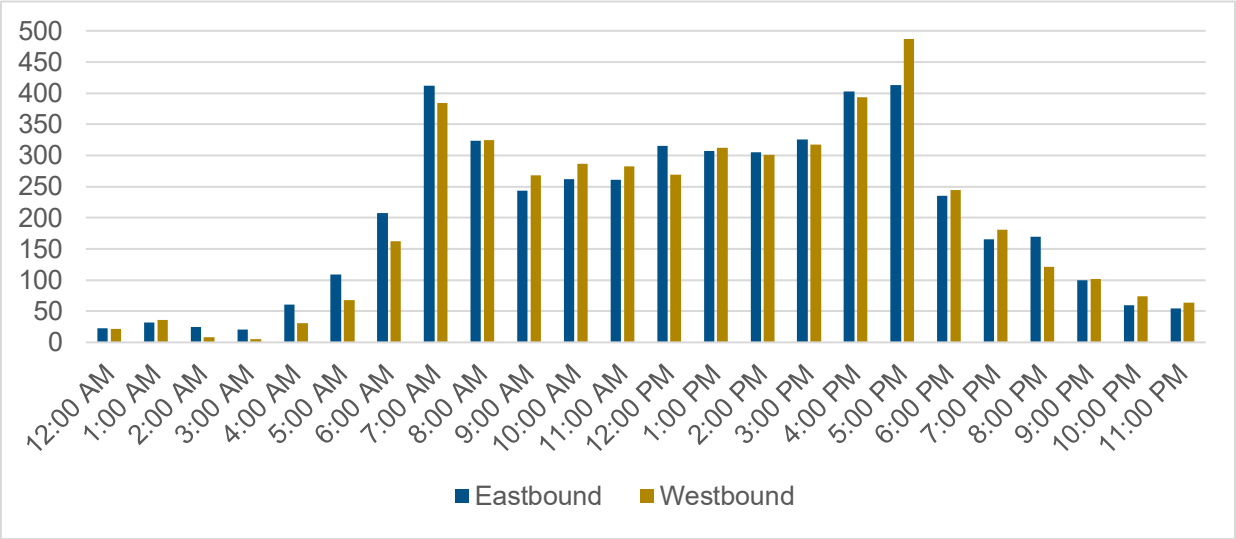

Figure 19: Directional Distribution of Traffic on MT 3 East of Zimmerman Trail

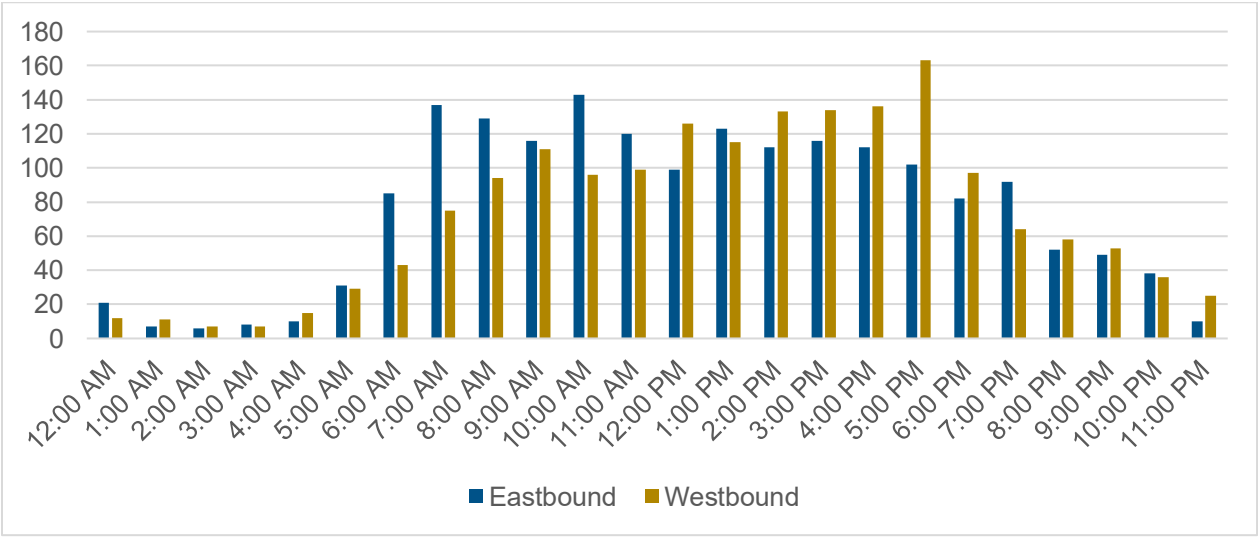

Figure 20: Directional Distribution of Traffic on MT 3 West of Apache Trail

5.5 Traffic Control and Intersection Configuration

Figure 21 shows the existing traffic control and intersection configuration at the study intersections.

Improvements Recommended in Related Plans and Studies

There are two planned lane improvements at AJ Way and Huey Way associated with the BRIC and YLCP developments. As part of the MDT Systems Impact Analysis Process (SIAP), the following two improvements are expected at AJ Way and Huey Way:

- MT 3 / AJ Way: Add new eastbound left-turn lane and westbound right-turn lane
- MT 3 / Huey Way: Add new eastbound left-turn lane and westbound right-turn lane

The BRIC traffic impact study recommended a roundabout at the AJ Way intersection to meet future traffic demand when the BRIC is fully built-out. The *Billings LRTP* recommends a roundabout at the Rod and Gun Club Road intersection to meet future traffic demand.

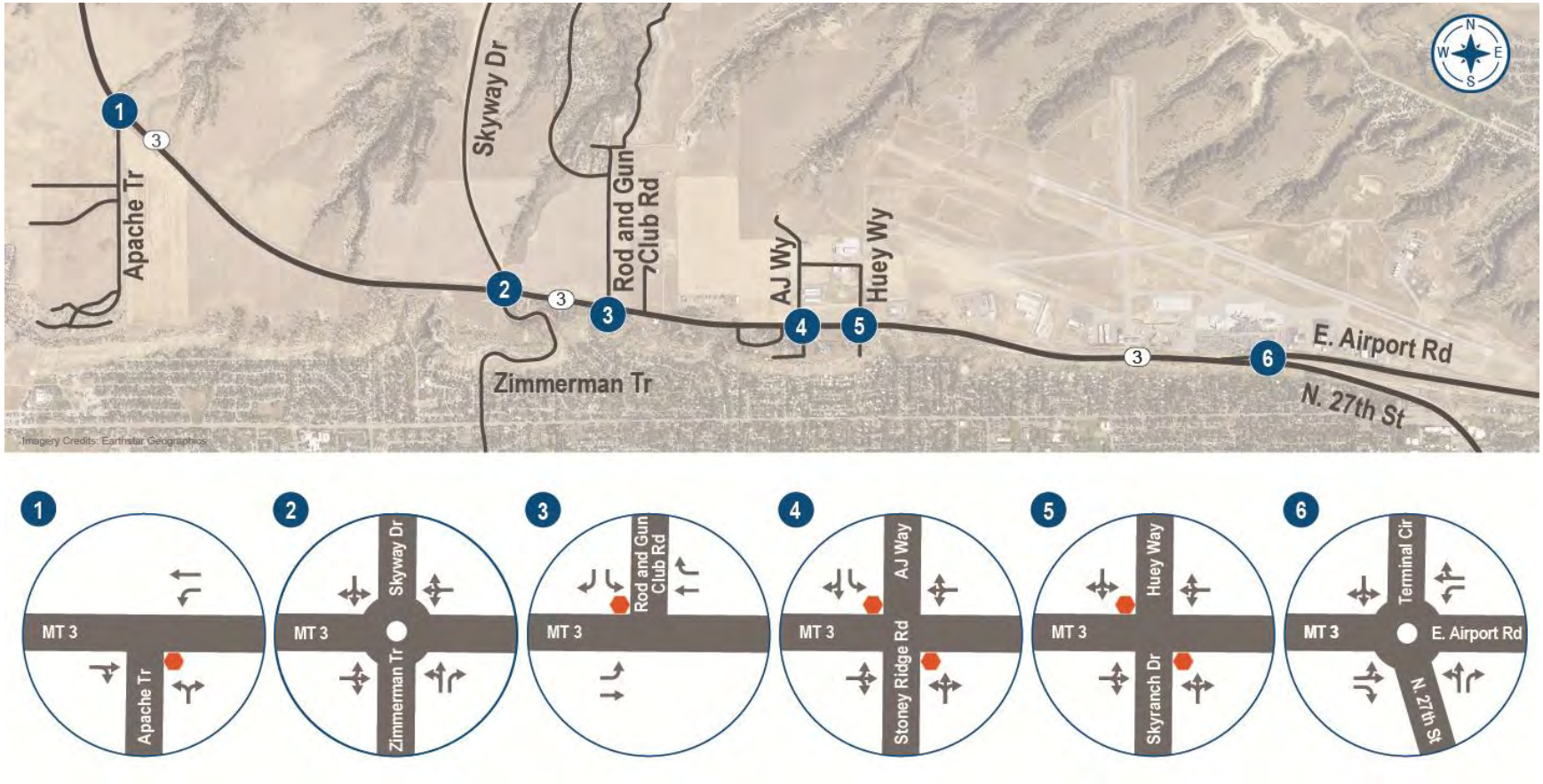

Figure 21: Traffic Control and Intersection Configuration

5.6 Existing Intersection Operations

Intersection level of service (LOS) was analyzed using SYNCHRO version 12 software. SIDRA version 9 was used to report the LOS and delay at roundabouts. LOS describes the quality of traffic operations and is a letter grade based on average control delay. LOS defines how well vehicle traffic flows along a street or road. LOS is graded from A to F, with LOS A representing free-flow conditions and LOS F representing severe congestion with stop-and-go flow conditions. Given the principal arterial classification and roadway context, the design year intersection LOS threshold is LOS D or better. Table 19 lists the LOS criteria for roundabout and two-way stop controlled (TWSC) intersections.

Table 19: LOS Criteria for Roundabouts and TWSC Intersections

LOS	Average Control Delay (Seconds / Vehicle)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Traffic counts were collected on Tuesday, December 10, 2024. **Attachment 1** provides the raw traffic count data. Given December traffic volumes are lower than the annual average, a seasonal adjustment factor of 1.12 was applied to the traffic count data collected, following the Oregon Department of Transportation analysis procedures manual.[31] Figure 22 shows the existing turning movement volumes and LOS at the study intersections. Table 20 lists the delay in seconds per vehicle. Results are reported based on the Highway Capacity Manual 7th Edition methodology. **Attachment 2** provides the operational analysis reports.

Table 20: Existing Peak Hour LOS and Delay (seconds/vehicle)

Intersection	Control	AM Peak	PM Peak
MT 3 / Apache Tr	TWSC	A/10	A/9
MT 3 / Zimmerman Tr	Roundabout	A/8	A/9
MT 3 / Rod and Gun Club Rd	TWSC	C/22	D/26
MT 3 / AJ Way	TWSC	D/27	C/24
MT 3 / Huey Way	TWSC	C/22	C/22
MT 3 / Airport Rd / 27th St	Roundabout	A/5	A/5

*Delay reported for overall intersection at roundabouts; Delay reported for critical movement at TWSC intersections (side street lane with the highest delay).

The Apache Trail intersection and the two roundabouts operate at LOS A in the AM and PM peak hours. The Rod and Gun Club Road and AJ Way intersections are currently operating at LOS D during either the AM or PM peak hour. At TWSC intersections, delay is reported for the side street approach lane with the highest delay. The overall intersection delay is reported at roundabouts. Of note, Overlook Drive and Southview Drive are TWSC intersections on MT 3 west of the E. Airport Road roundabout. These intersections provide access to the airport and also experience high side street approach delay during peak hours.

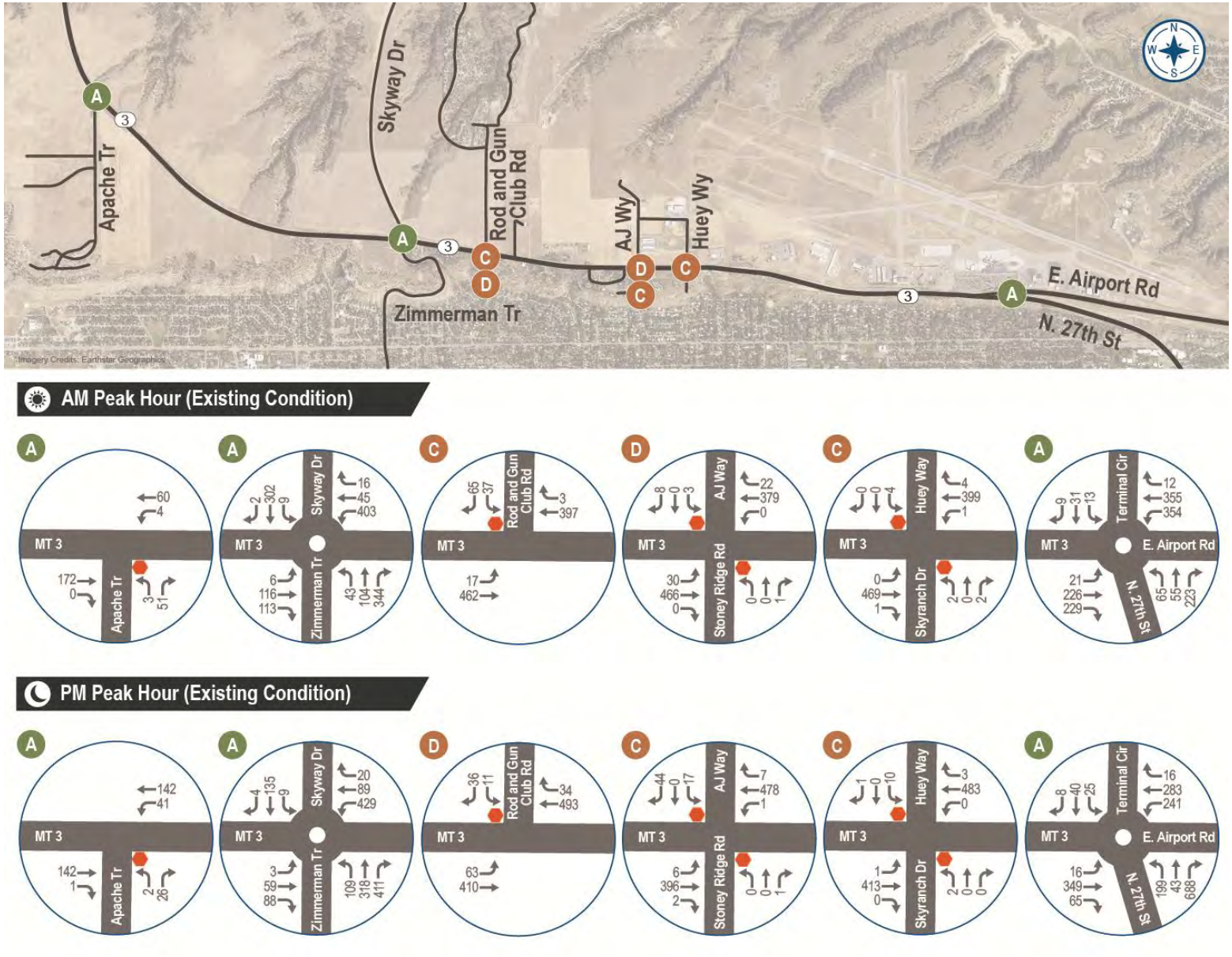

Figure 22: Existing AM and PM Peak Hour Traffic Volumes and LOS

5.7 2045 Projected Intersection Operations

Year 2045 traffic volumes were developed assuming a projected growth rate of 2.1% per year, while also including expected AM and PM peak hour traffic associated with the BRIC and YLCP developments. The BRIC and YLCP full-build development traffic volumes were obtained from the BRIC traffic impact study and add 267 new trips in the AM peak hour and 244 new trips in the PM peak hour. Origins and destinations for these new trips were assigned based on existing traffic patterns. Figure 23 shows the projected turning movements and LOS at study intersections in year 2045, with turning movements rounded to the nearest five. Traffic volumes less than seven vehicles per hour were not rounded, because a small increase in side street traffic can have a significant impact on delay results at TWSC intersections. Table 21 lists the forecasted LOS and delay at each intersection, with the existing traffic control and intersection configuration. **Attachment 2** provides year 2045 operational analysis reports.

Table 21: 2045 Peak Hour LOS and Delay (seconds/vehicle)

Intersection	Control	AM Peak	PM Peak
MT 3 / Apache Tr	TWSC	B/11	B/10
MT 3 / Zimmerman Tr	Roundabout	F/52	F/79
MT 3 / Rod and Gun Club Rd	TWSC	F/126	F/112
MT 3 / AJ Way	TWSC	F/>300	F/>300
MT 3 / Huey Way	TWSC	F/73	F/187
MT 3 / Airport Rd / 27th St	Roundabout	B/11	B/12

*Delay reported for overall intersection at signalized intersections; Delay reported for critical movement at TWSC intersections (side street lane with the highest delay). Red text indicates the intersection is operating over capacity.

With no capacity improvements, the Apache Trail intersection and E. Airport Road / N. 27th Street roundabout are expected to operate at LOS B in 2045. All other intersections are expected to degrade to a failing LOS during both the AM and PM peak hour in 2045. The critical movement at the TWSC intersections are the southbound left-turns. This movement competes with eastbound and westbound vehicles for an adequate gap in traffic to access MT 3.

The Zimmerman Trail single-lane roundabout is also expected to fail in 2045. The highest delay is expected on the eastbound and southbound approaches, where there is a high conflicting circulating volume. *NCHRP Report 672: Roundabouts: An Informational Guide*[32] cites that more than one entry lane may be required for an approach, if the sum of the entry volume and conflicting circulating volume exceeds 1,300 vehicles per hour. This threshold is met on all approaches of the roundabout.

Of note, the delay reported is reflective of a typical weekday peak hour and does not reflect delay anticipated during drill weekends planned at the BRIC, occurring seven to 12 weekends per year. The Readiness Center at the BRIC has an anticipated opening year of 2035 and will significantly increase the number of personnel on campus during drill weekends. At full build-out in 2040, up to 880 personnel are anticipated at the BRIC during drill weekends. Therefore, delay is expected to be higher at all study intersections during drill weekends.

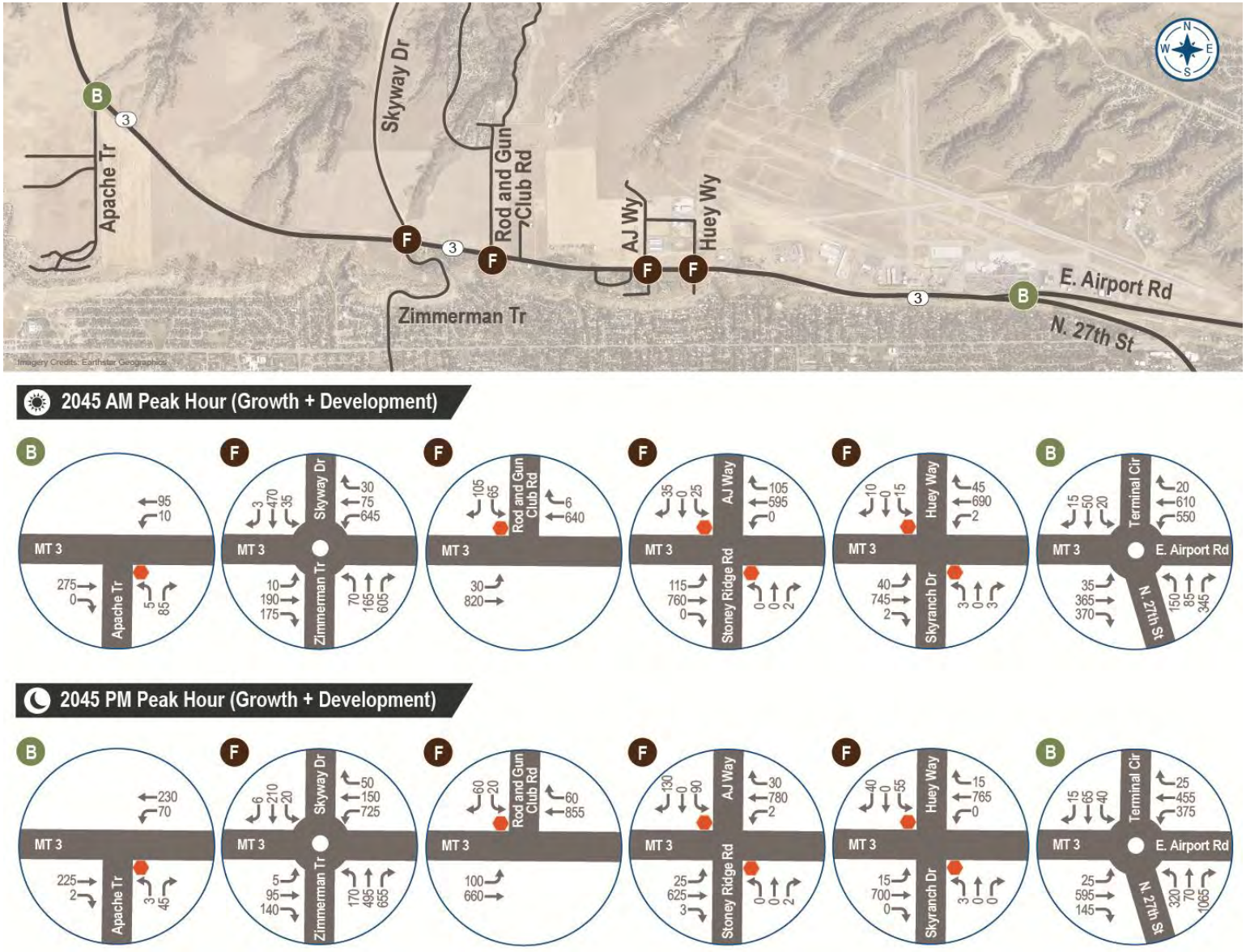

Figure 23: 2045 AM and PM Peak Hour Traffic Volumes and LOS

6.0 SAFETY

Five years of crash data along the study corridor were analyzed (January 1, 2019, to December 31, 2023). A total of 115 crashes were reported over the five years. It is important to note crash data is obtained from crash reports completed by police officers at the time of the crash. The data can be incomplete or inaccurate, as many crashes go unreported and the reporting of crash information can vary, depending on the reporting officer.

Disclaimer: 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.

6.1 Crash Trends

Figure 24 depicts the number of crashes per year on the corridor and the AADT on MT 3 (based on the average of the three count sites located on MT 3 within the study corridor limits). In the five-year period, crashes increased by 73% while AADT increased by about 14%. The increase in crashes can be partially attributed to increased traffic on MT 3. In addition, the Zimmerman Trail intersection was upgraded from a TWSC intersection to a roundabout in 2019. Roundabouts tend to have a higher crash frequency compared to stop controlled and signalized intersections. However, crashes at roundabouts tend to be lower speed and have a lower incident angle, which improves overall intersection safety by reducing crash severity.[33]

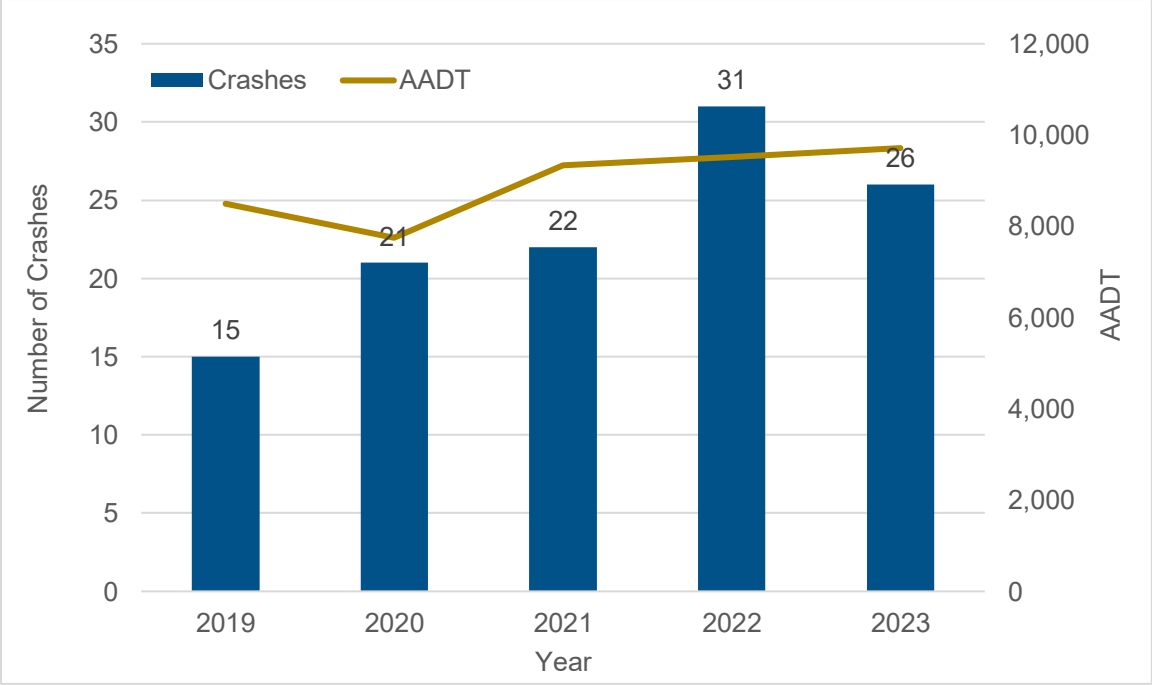

Figure 24: Crashes by Year

Figure 25 depicts crash data by time of day. Crashes occur most often during typical commuting hours in the morning and afternoon, with 18% of all crashes occurring from 7:00 to 10:00 a.m. and 21% occurring from 3:00 to 6:00 p.m. These periods coincide with heaviest weekday traffic volumes.

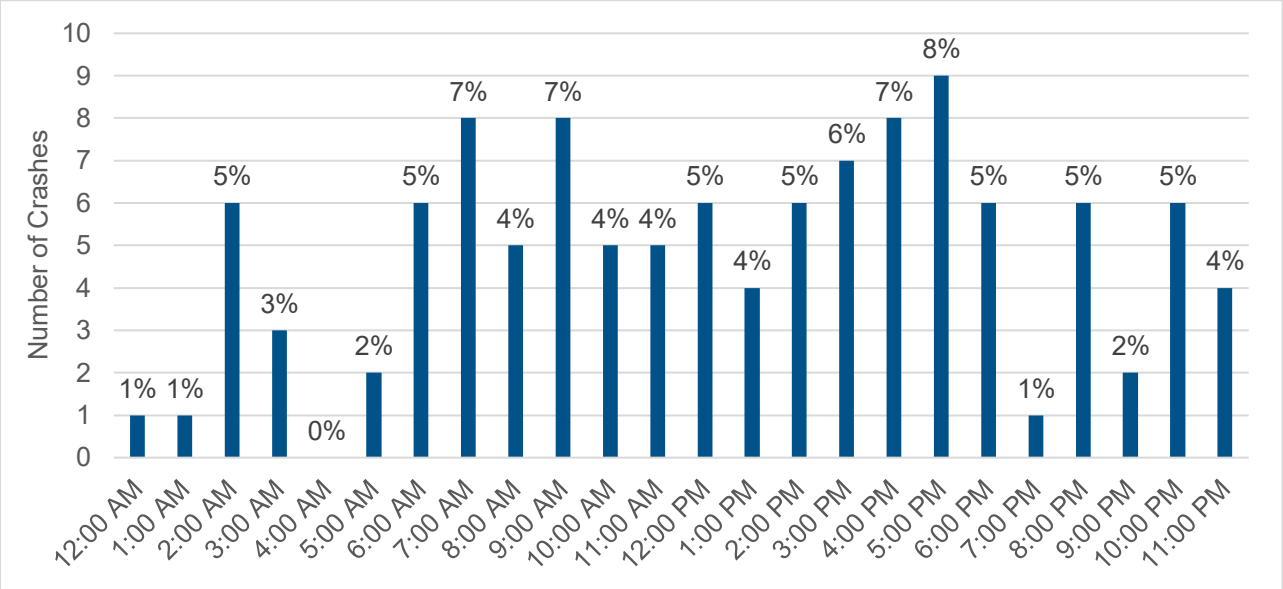

Figure 25: Crashes by Time of Day (2019 – 2023)

When analyzed by day of week, Fridays had the highest number of crashes. There was no clear trend in crash frequency when analyzed by month or season; overall, May and October had the highest number of crashes.

6.2 Crash Locations

Figure 26 depicts the density of crashes along the corridor and the location of fatal and injury crashes. About 51% of crashes occurred at intersections or were intersection-related. The crash density was highest at the Zimmerman Trail and E. Airport Road / N. 27th Street roundabouts. One fatal crash occurred at the E. Airport Road / N. 27th Street roundabout in August 2022.

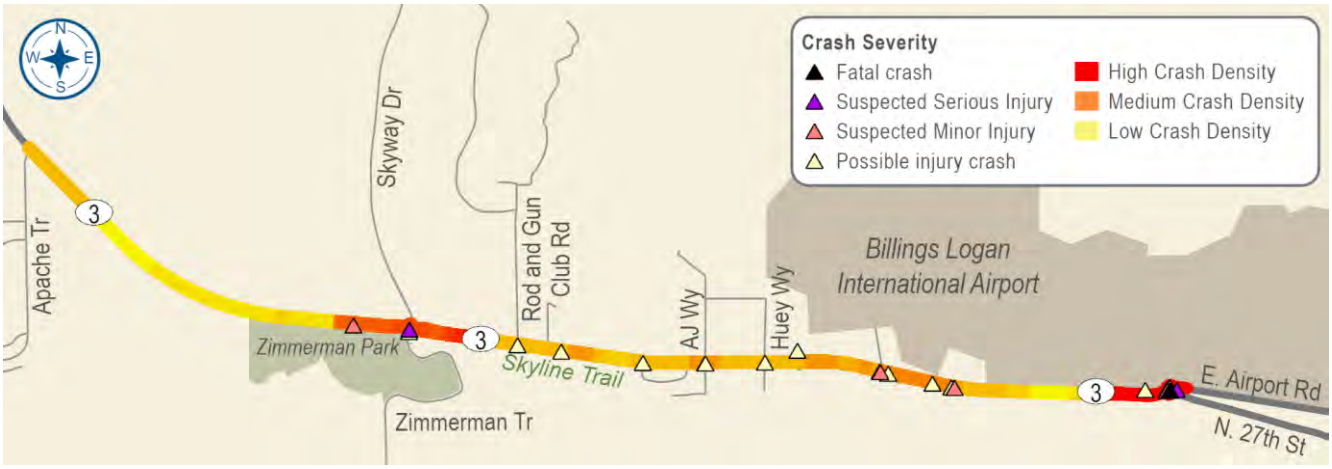

Figure 26: Crash Density (2019 – 2023)

6.3 Crash Severity

Crashes were categorized based on the severity of injuries reported. The most severe injury defines the severity of the crash. Figure 27 depicts the distribution of crash severity on the corridor. About 63% of crashes were property damage only (PDO) and 27% of crashes resulted in injury. Among the crashes that resulted in injury, 23 were categorized as possible injury crashes, six were categorized as minor injury crashes, and two were categorized as serious injury crashes.

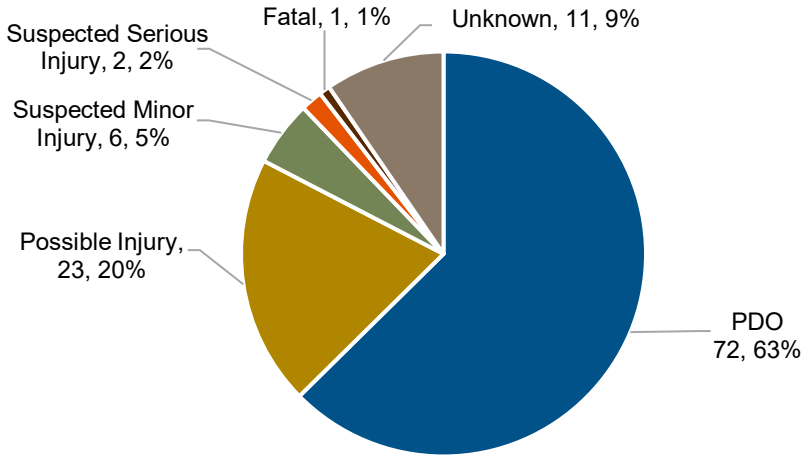

Figure 27: Crash Severity (2019 – 2023)

6.4 Crash Types

Figure 28 summarizes the types of crashes occurring on the corridor. Rear-end collisions account for about 25% of crashes. Fixed-object collisions were the second most common crash type, typically occurring at intersections. One bicycle crash was reported on the corridor over the five-year period, occurring at the MT 3 and E. Airport Road / N. 27th Street roundabout. The majority of the wildlife-vehicle collisions occurred on MT 3 west of Zimmerman Trail.

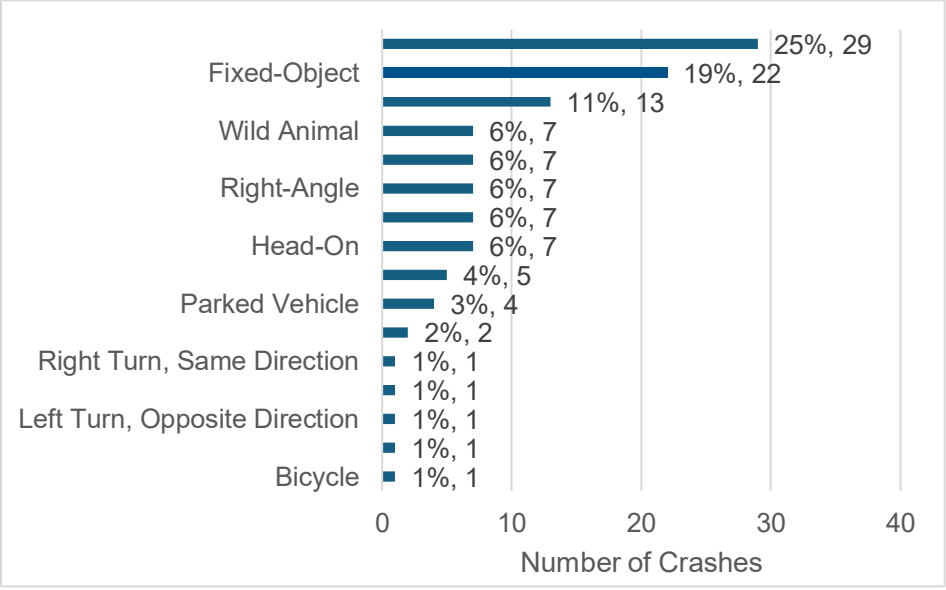

Figure 28: Crash Types (2019 – 2023)

6.5 Road and Lighting Condition

Figure 29 shows the road and lighting conditions during the crashes. About 29% of crashes occurred during wet, snowy, or icy road conditions. About 36% of crashes occurred during dawn, dusk, or dark conditions. Intersection lighting only exists at the Zimmerman Trail and E. Airport Road roundabouts.

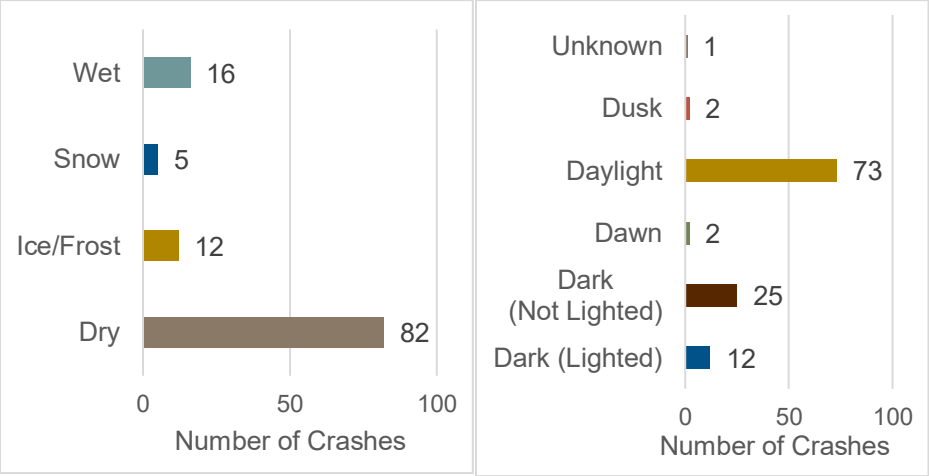

Figure 29: Road and Lighting Conditions (2019 – 2023)

6.6 Intersection Crash Severity

Table 22 lists the total number of crashes and the crash severity at each of the study corridor intersections. The E. Airport Road / N. 27th Street roundabout experienced the highest number of crashes, followed by the Zimmerman Trail roundabout. The Zimmerman Trail roundabout had one suspected serious injury crash, involving a sideswipe opposite direction collision. The E. Airport Road / N. 27th Street roundabout had one fatal crash involving a sideswipe opposite direction collision and one suspected serious injury crash involving driving too fast for conditions.

Table 22: Crash Severity at Study Corridor Intersections (2019 – 2023)

Intersection	PDO	Minor or Possible Injury	Suspected Serious Injury	Unknown	Fatal	Total
MT 3 / Apache Tr	4	0	0	0	0	**4**
MT 3 / Zimmerman Tr	18	3	1	3	0	**25**
MT 3 / Rod and Gun Club Rd	4	1	0	0	0	**5**
MT 3 / AJ Way	0	1	0	0	0	**1**
MT 3 / Huey Way	2	1	0	1	0	**4**
MT 3 / Airport Rd / 27th St	25	10	1	4	1	**41**

6.7 Intersection Crash Rates

Table 23 lists the crash rate at each study corridor intersection. The crash rate provides more information than crash frequency alone, as it factors in the number of vehicles entering an intersection. This makes the crash rate an effective tool for comparing the relative safety of one intersection to another. The crash rate equation is provided below. Intersection crash rate is the number of crashes occurring per million entering vehicles.

$$\text{Intersection Crash Rate} = \frac{Total\ Number\ of\ Crashes * 1{,}000{,}000\ Vehicles}{Vehicles\ per\ Day * Number\ of\ Years * 365\ Days\ per\ Year}$$

Table 23: Crash Rates at Study Corridor Intersections (2019 – 2023)

Intersection	Total Crashes	Vehicles per Day *	Crash Rate
MT 3 / Apache Tr	4	3,884	0.56
MT 3 / Zimmerman Tr	25	12,710	1.08
MT 3 / Rod and Gun Club Rd	5	10,623	0.26
MT 3 / AJ Way	1	10,217	0.05
MT 3 / Huey Way	4	9,972	0.22
MT 3 / Airport Rd / 27th St	41	18,508	1.21

* Vehicles per day estimated based on AADT estimates at MDT short term count stations. If not available, AADT was estimated based on recent traffic counts, assuming 10% of daily traffic occurs in the peak hour.

The intersection crash rate is significantly higher at the Zimmerman Trail and E. Airport Road / N. 27th Street roundabouts, compared to all other study corridor intersections.

6.8 Intersection Crash Types

Table 24 provides a breakdown of crash types at each study corridor intersection. Rear-end and fixed-object collisions were the most common intersection crash types. Right-angle and rear-end collisions were the most common crash types at the TWSC intersections. A high number of sideswipe same-direction crashes occurred at the E. Airport Road / N. 27th Street roundabout.

Table 24: Crash Types at Study Corridor Intersections (2019 – 2023)

Intersection	Rear End	Fixed Object	Side Swipe		Right Angle	Head On	Roll Over	Right Turn		Bicycle	Parked Vehicle	Other	Total
			Same Dir	Opp Dir				Opp Dir	Same Dir				
MT 3 / Apache Tr	-	1	-	1	1	-	1	-	-	-	-	-	**4**
MT 3 / Zimmerman Tr	8	8	2	2	2	2	1	-	-	-	-	-	**25**
MT 3 / Rod and Gun Club Rd	2	1	-	-	1	-	-	-	-	-	-	1	**5**
MT 3 / AJ Way	1	-	-	-	-	-	-	-	-	-	-	-	**1**
MT 3 / Huey Way	1	-	1	-	1	-	-	-	-	-	-	1	**4**
MT 3 / Airport Rd / 27th St	8	7	9	2	1	3	1	1	1	1	1	6	**41**
Total	**20**	**17**	**12**	**5**	**6**	**5**	**3**	**1**	**1**	**1**	**1**	**7**	**80**

7.0 AREAS OF CONCERN AND CONSIDERATION

This section summarizes key areas of concern and consideration for the corridor, which were identified based on a comprehensive review of existing corridor conditions.

7.1 Demographics

Key demographic findings include:

- Between 1980 and 2020, Billings and Yellowstone County saw compound annual growth rates of approximately 1.41% and 1.06%, respectively. In contrast, Montana and the US grew at compound annual growth rates of 0.81% and 0.96% respectively during the same 40-year period.
- Within the study area tracts, 89.6% of the population is white which exceeds the Billings, Yellowstone County, and Montana averages. The next largest population within the study area tracts is Hispanic and Latino which makes up approximately 4.8% of the population.
- The study area tracts have a higher elderly population, which includes individuals 65 and over, in relation to Billings, Yellowstone County, and Montana averages.
- Within the study area tracts, 99.4% of workers aged 16 and older have access to a vehicle, and 72.4% drive to work alone, which is on par with averages from Billings (76.5%), and Yellowstone County (77.9%).
- Educational Services, Healthcare, and Social Assistance are the most common employers within the study area tracts, consistent with Billings, Yellowstone County, and Montana.

7.2 Transportation System

This section summarizes key findings and areas of concern related to physical features, geometric conditions, traffic conditions, and traffic safety.

Physical Features and Characteristics

- The speed limit is 70 mph on the west end of the corridor but decreases to 50 mph just west of Zimmerman Trail, then decreases to 45 mph just west of the E. Airport Road/N. 27th Street roundabout.
- Access density is relatively low on the west end of the corridor. However, the nature of the corridor changes east of Zimmerman Trail, where there are more residential developments with direct access onto MT 3. An access management plan will be prepared for MT 3 as part of this corridor study to guide future access along the corridor.
- Geotechnical investigations would be required for reconstruction or significant improvements to MT 3 to determine potential stability, erosion, subgrade support, and settlement concerns posed by surface geology and soil conditions.
- The study corridor area has limited stormwater facilities and any increase in runoff volume or peak flow over the Rimrocks should be avoided to protect the residential area below.
- Multiple public and private utilities exist in the study corridor area. Public utilities include the municipal water system, sanitary sewer facilities, and underground storm drain facilities. Private utilities include overhead power lines, buried power lines, communications, and natural gas.

- Several bicycle and pedestrian facilities exist in the study corridor area, including Skyline Trail on the south side of MT 3 and the multi-use trail along the east side of Skyway Drive. There is one committed and one proposed pedestrian/bicycle project in the study corridor area, which would add new multi-use trails along Zimmerman Trail and N. 27th Street.
- Providing safe crossings for non-motorized users is key, given the number of regional trails which intersect in the study corridor area. Skyline Trail crosses several driveways providing access to residential developments along MT 3. City of Billings staff have noted that nonmotorized safety is a concern at these access points along Skyline Trail and at the RRFB on the east leg of the Zimmerman Trail roundabout.
- For cyclists using the roadway, MT 3 has BLTS of four, indicating cycling on the roadway is only acceptable by highly confident bicyclists.

Geometric Conditions

- East of the Zimmerman Trail roundabout, the typical roadway section on MT 3 consists of two 12-foot-wide travel lanes with one travel lane in each direction, 3.5-foot-wide shoulders, and roadside ditches (no curb or gutter). The typical section widens west of Zimmerman Trail, providing 8-foot-wide shoulders.
- The existing 3.5-foot shoulder width east of Zimmerman Trail does not meet design standards, as the minimum shoulder width for a rural and urban principal arterial is 6 feet.
- Existing horizontal and vertical curves generally meet or exceed current geometric design standards.

Traffic Conditions

- The corridor is currently operating under capacity with the highest volumes experienced between Zimmerman Trail and E. Airport Road, at an AADT of 12,300 vehicles per day. The Rod and Gun Club Road and AJ Way intersections are currently operating at LOS D during either the AM or PM peak hour. Both intersections are TWSC with the southbound left-turn movement experiencing the greatest delay while waiting for an adequate gap to enter MT 3.
- Over the last 20 years, traffic has grown at a rate of 2.6% per year on the corridor. The City of Billings-Yellowstone County MPO travel demand model forecasts 2.1% annual traffic growth on MT 3 over the next 20 years. This 2.1% growth rate was used, in addition to forecasted BRIC and YLCP development traffic, to estimate 2045 traffic volumes. In 2045, all study intersections are expected to fail during the AM and PM peak hour, except for the Apache Trail and E. Airport Road / N. 27th Street intersections.

Safety

- A total of 115 crashes were reported on MT 3 between 2019 and 2023. About 63% of crashes were property damage only and 27% of crashes resulted in injury. One fatal crash occurred over the five-year period at the E. Airport Road / N. 27th Street roundabout.
- When analyzed by intersection, the crash frequency and crash rate is significantly higher at the Zimmerman Trail and E. Airport Road / N. 27th Street roundabouts, compared to all other study corridor intersections.

7.3 Environmental Constraints

Environmental constraints are summarized based on information provided in the *Environmental Scan* report.

Physical Environment

- Some land adjacent to the MT 3 corridor is publicly held by the State of Montana or the federal government.
- The study corridor area contains some soils classified as farmland of statewide importance or prime farmland if irrigated that may be subject to protections under the Farmland Protection Policy Act.
- There are five underground storage tanks and one hazardous waste generator within or adjacent to the study corridor area.
- A carbon monoxide maintenance area has been designated within the Billings area. The study corridor area falls within the designated limits of the carbon monoxide maintenance area from RP 3.1 to approximately RP 6.8.

Biological Resources

- At least 14 species of noxious weeds have been documented within the vicinity of the study corridor area.
- The forested drainages surrounding the western extent of the study corridor area and the ponderosa pine studded sandstone outcroppings along the southern margins of the study corridor area provide suitable habitat for a range of mammals, birds, reptiles, and invertebrates.
- Between RP 6 and RP 8 on MT 3, there may be a correlation between wildlife-vehicle crashes and the segments with forested drainages to the north and agricultural lands to the south.
- Monarch butterfly and Suckley's cuckoo bumble bee, which are both proposed for listing under the Endangered Species Act, were identified as potentially occurring within the study corridor area. No designated critical habitat for either species was present in the corridor.

Social and Cultural Resources

- Of the nine census tracts evaluated for the study corridor area, all race-related demographics are consistent with those for Yellowstone County and Montana.
- Of the nine census tracts evaluated for the study corridor area, eight census tracts had notably lower percentages of people below the poverty level. One census tract, Census Tract 12, had 17.6% of persons within the block group earning below poverty level, which is relatively higher than the rest of the study corridor area. However, the study corridor area as a whole does not have a notably high concentration of low-income persons.
- Zimmerman Park, Skyline Trail, Rimrock Trail (primitive trail along N. 27th Street) and several public parcels along the Rimrocks are publicly owned recreational resources. All of these resources are south of MT 3 within the study corridor area and may be subject to Section 4(f) of the U.S. DOT Act of 1966.

- Within the study corridor area, 42 historic sites were identified with 17 determined eligible for listing on the National Register of Historic Places (NRHP), 9 ineligible for listing, and the remaining 16 are undetermined. Any impacts to NRHP eligible sites would be protected under the provisions of Section 4(f) of the U.S. DOT Act of 1966.
- Sensitive noise receptors were identified within the study corridor area and primarily include adjacent residential properties and parks. These receptors are found from approximately RP 3 to RP 7 on the south side of MT 3.

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ATTACHMENT 1: TRAFFIC COUNT DATA

Type of report: Tube Count - Volume Data

LOCATION: Skyway Drive North of SR 3 **QC JOB #:** 16784215

SPECIFIC LOCATION: **DIRECTION:** NB, SB

CITY/STATE: Billings, MT **DATE:** Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		11				11			11	
01:00 AM		9				9			9	
02:00 AM		6				6			6	
03:00 AM		4				4			4	
04:00 AM		14				14			14	
05:00 AM		44				44			44	
06:00 AM		152				152			152	
07:00 AM		**368**				**368**			**368**	
08:00 AM		325				325			325	
09:00 AM		213				213			213	
10:00 AM		217				217			217	
11:00 AM		261				261			261	
12:00 PM		223				223			223	
01:00 PM		235				235			235	
02:00 PM		310				310			310	
03:00 PM		386				386			386	
04:00 PM		**455**				**455**			**455**	
05:00 PM		382				382			382	
06:00 PM		273				273			273	
07:00 PM		142				142			142	
08:00 PM		149				149			149	
09:00 PM		87				87			87	
10:00 PM		46				46			46	
11:00 PM		18				18			18	
Day Total		4330				4330			4330	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 368				7:00 AM 368			7:00 AM 368	
PM Peak Volume		4:00 PM 455				4:00 PM 455			4:00 PM 455	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Skyway Drive North of SR 3 **QC JOB #:** 16784215

SPECIFIC LOCATION: **DIRECTION:** NB

CITY/STATE: Billings, MT **DATE:** Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		7				7			7	
01:00 AM		4				4			4	
02:00 AM		5				5			5	
03:00 AM		1				1			1	
04:00 AM		0				0			0	
05:00 AM		16				16			16	
06:00 AM		40				40			40	
07:00 AM		117				117			117	
08:00 AM		101				101			101	
09:00 AM		84				84			84	
10:00 AM		107				107			107	
11:00 AM		**121**				**121**			**121**	
12:00 PM		131				131			131	
01:00 PM		145				145			145	
02:00 PM		191				191			191	
03:00 PM		241				241			241	
04:00 PM		**304**				**304**			**304**	
05:00 PM		264				264			264	
06:00 PM		178				178			178	
07:00 PM		100				100			100	
08:00 PM		91				91			91	
09:00 PM		62				62			62	
10:00 PM		25				25			25	
11:00 PM		11				11			11	
Day Total		2346				2346			2346	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		11:00 AM 121				11:00 AM 121			11:00 AM 121	
PM Peak Volume		4:00 PM 304				4:00 PM 304			4:00 PM 304	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Skyway Drive North of SR 3 **QC JOB #:** 16784215

SPECIFIC LOCATION: **DIRECTION:** SB

CITY/STATE: Billings, MT **DATE:** Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		4				4			4	
01:00 AM		5				5			5	
02:00 AM		1				1			1	
03:00 AM		3				3			3	
04:00 AM		14				14			14	
05:00 AM		28				28			28	
06:00 AM		112				112			112	
07:00 AM		**251**				**251**			**251**	
08:00 AM		224				224			224	
09:00 AM		129				129			129	
10:00 AM		110				110			110	
11:00 AM		140				140			140	
12:00 PM		92				92			92	
01:00 PM		90				90			90	
02:00 PM		119				119			119	
03:00 PM		145				145			145	
04:00 PM		**151**				**151**			**151**	
05:00 PM		118				118			118	
06:00 PM		95				95			95	
07:00 PM		42				42			42	
08:00 PM		58				58			58	
09:00 PM		25				25			25	
10:00 PM		21				21			21	
11:00 PM		7				7			7	
Day Total		1984				1984			1984	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 251				7:00 AM 251			7:00 AM 251	
PM Peak Volume		4:00 PM 151				4:00 PM 151			4:00 PM 151	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Zimmerman Trail South of SR 3 **QC JOB #:** 16784216

SPECIFIC LOCATION: **DIRECTION:** NB, SB

CITY/STATE: Billings, MT **DATE:** Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		50				50			50	
01:00 AM		66				66			66	
02:00 AM		34				34			34	
03:00 AM		28				28			28	
04:00 AM		97				97			97	
05:00 AM		198				198			198	
06:00 AM		523				523			523	
07:00 AM		**1086**				**1086**			**1086**	
08:00 AM		957				957			957	
09:00 AM		710				710			710	
10:00 AM		764				764			764	
11:00 AM		806				806			806	
12:00 PM		770				770			770	
01:00 PM		867				867			867	
02:00 PM		877				877			877	
03:00 PM		1018				1018			1018	
04:00 PM		**1269**				**1269**			**1269**	
05:00 PM		1260				1260			1260	
06:00 PM		740				740			740	
07:00 PM		457				457			457	
08:00 PM		438				438			438	
09:00 PM		272				272			272	
10:00 PM		156				156			156	
11:00 PM		120				120			120	
Day Total		13563				13563			13563	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 1086				7:00 AM 1086			7:00 AM 1086	
PM Peak Volume		4:00 PM 1269				4:00 PM 1269			4:00 PM 1269	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Zimmerman Trail South of SR 3 **QC JOB #:** 16784216

SPECIFIC LOCATION: **DIRECTION:** NB

CITY/STATE: Billings, MT **DATE:** Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		28				28			28	
01:00 AM		34				34			34	
02:00 AM		27				27			27	
03:00 AM		20				20			20	
04:00 AM		49				49			49	
05:00 AM		102				102			102	
06:00 AM		223				223			223	
07:00 AM		**418**				**418**			**418**	
08:00 AM		401				401			401	
09:00 AM		300				300			300	
10:00 AM		347				347			347	
11:00 AM		365				365			365	
12:00 PM		412				412			412	
01:00 PM		459				459			459	
02:00 PM		485				485			485	
03:00 PM		588				588			588	
04:00 PM		**728**				**728**			**728**	
05:00 PM		708				708			708	
06:00 PM		412				412			412	
07:00 PM		272				272			272	
08:00 PM		280				280			280	
09:00 PM		171				171			171	
10:00 PM		80				80			80	
11:00 PM		61				61			61	
Day Total		6970				6970			6970	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 418				7:00 AM 418			7:00 AM 418	
PM Peak Volume		4:00 PM 728				4:00 PM 728			4:00 PM 728	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Zimmerman Trail South of SR 3 **QC JOB #:** 16784216

SPECIFIC LOCATION: **DIRECTION:** SB

CITY/STATE: Billings, MT **DATE:** Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		22				22			22	
01:00 AM		32				32			32	
02:00 AM		7				7			7	
03:00 AM		8				8			8	
04:00 AM		48				48			48	
05:00 AM		96				96			96	
06:00 AM		300				300			300	
07:00 AM		**668**				**668**			**668**	
08:00 AM		556				556			556	
09:00 AM		410				410			410	
10:00 AM		417				417			417	
11:00 AM		441				441			441	
12:00 PM		358				358			358	
01:00 PM		408				408			408	
02:00 PM		392				392			392	
03:00 PM		430				430			430	
04:00 PM		541				541			541	
05:00 PM		**552**				**552**			**552**	
06:00 PM		328				328			328	
07:00 PM		185				185			185	
08:00 PM		158				158			158	
09:00 PM		101				101			101	
10:00 PM		76				76			76	
11:00 PM		59				59			59	
Day Total		6593				6593			6593	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 668				7:00 AM 668			7:00 AM 668	
PM Peak Volume		5:00 PM 552				5:00 PM 552			5:00 PM 552	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: SR 3 West of Zimmerman Trail/Skyway Dr
QC JOB #: 16784217
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Billings, MT
DATE: Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		17				17			17	
01:00 AM		39				39			39	
02:00 AM		13				13			13	
03:00 AM		14				14			14	
04:00 AM		60				60			60	
05:00 AM		114				114			114	
06:00 AM		326				326			326	
07:00 AM		**490**				**490**			**490**	
08:00 AM		332				332			332	
09:00 AM		212				212			212	
10:00 AM		282				282			282	
11:00 AM		259				259			259	
12:00 PM		278				278			278	
01:00 PM		259				259			259	
02:00 PM		244				244			244	
03:00 PM		267				267			267	
04:00 PM		**324**				**324**			**324**	
05:00 PM		287				287			287	
06:00 PM		185				185			185	
07:00 PM		131				131			131	
08:00 PM		104				104			104	
09:00 PM		84				84			84	
10:00 PM		45				45			45	
11:00 PM		37				37			37	
Day Total		4403				4403			4403	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 490				7:00 AM 490			7:00 AM 490	
PM Peak Volume		4:00 PM 324				4:00 PM 324			4:00 PM 324	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: SR 3 West of Zimmerman Trail/Skyway Dr
QC JOB #: 16784217
SPECIFIC LOCATION:
DIRECTION: EB
CITY/STATE: Billings, MT
DATE: Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		3				3			3	
01:00 AM		5				5			5	
02:00 AM		5				5			5	
03:00 AM		5				5			5	
04:00 AM		20				20			20	
05:00 AM		36				36			36	
06:00 AM		95				95			95	
07:00 AM		**231**				**231**			**231**	
08:00 AM		137				137			137	
09:00 AM		95				95			95	
10:00 AM		137				137			137	
11:00 AM		127				127			127	
12:00 PM		**157**				**157**			**157**	
01:00 PM		129				129			129	
02:00 PM		115				115			115	
03:00 PM		107				107			107	
04:00 PM		150				150			150	
05:00 PM		104				104			104	
06:00 PM		88				88			88	
07:00 PM		44				44			44	
08:00 PM		34				34			34	
09:00 PM		27				27			27	
10:00 PM		17				17			17	
11:00 PM		15				15			15	
Day Total		1883				1883			1883	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 231				7:00 AM 231			7:00 AM 231	
PM Peak Volume		12:00 PM 157				12:00 PM 157			12:00 PM 157	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: SR 3 West of Zimmerman Trail/Skyway Dr
QC JOB #: 16784217
SPECIFIC LOCATION:
DIRECTION: WB
CITY/STATE: Billings, MT
DATE: Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		14				14			14	
01:00 AM		34				34			34	
02:00 AM		8				8			8	
03:00 AM		9				9			9	
04:00 AM		40				40			40	
05:00 AM		78				78			78	
06:00 AM		231				231			231	
07:00 AM		**259**				**259**			**259**	
08:00 AM		195				195			195	
09:00 AM		117				117			117	
10:00 AM		145				145			145	
11:00 AM		132				132			132	
12:00 PM		121				121			121	
01:00 PM		130				130			130	
02:00 PM		129				129			129	
03:00 PM		160				160			160	
04:00 PM		174				174			174	
05:00 PM		**183**				**183**			**183**	
06:00 PM		97				97			97	
07:00 PM		87				87			87	
08:00 PM		70				70			70	
09:00 PM		57				57			57	
10:00 PM		28				28			28	
11:00 PM		22				22			22	
Day Total		2520				2520			2520	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 259				7:00 AM 259			7:00 AM 259	
PM Peak Volume		5:00 PM 183				5:00 PM 183			5:00 PM 183	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: SR 3 East of Zimmerman Trail/Skyway Dr
QC JOB #: 16784218
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Billings, MT
DATE: Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		45				45			45	
01:00 AM		68				68			68	
02:00 AM		33				33			33	
03:00 AM		26				26			26	
04:00 AM		92				92			92	
05:00 AM		177				177			177	
06:00 AM		370				370			370	
07:00 AM		**796**				**796**			**796**	
08:00 AM		649				649			649	
09:00 AM		511				511			511	
10:00 AM		549				549			549	
11:00 AM		543				543			543	
12:00 PM		584				584			584	
01:00 PM		619				619			619	
02:00 PM		606				606			606	
03:00 PM		643				643			643	
04:00 PM		796				796			796	
05:00 PM		**900**				**900**			**900**	
06:00 PM		480				480			480	
07:00 PM		346				346			346	
08:00 PM		291				291			291	
09:00 PM		202				202			202	
10:00 PM		134				134			134	
11:00 PM		118				118			118	
Day Total		9578				9578			9578	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 796				7:00 AM 796			7:00 AM 796	
PM Peak Volume		5:00 PM 900				5:00 PM 900			5:00 PM 900	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: SR 3 East of Zimmerman Trail/Skyway Dr
QC JOB #: 16784218
SPECIFIC LOCATION:
DIRECTION: EB
CITY/STATE: Billings, MT
DATE: Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		23				23			23	
01:00 AM		32				32			32	
02:00 AM		25				25			25	
03:00 AM		21				21			21	
04:00 AM		61				61			61	
05:00 AM		109				109			109	
06:00 AM		208				208			208	
07:00 AM		**412**				**412**			**412**	
08:00 AM		324				324			324	
09:00 AM		243				243			243	
10:00 AM		262				262			262	
11:00 AM		261				261			261	
12:00 PM		315				315			315	
01:00 PM		307				307			307	
02:00 PM		305				305			305	
03:00 PM		326				326			326	
04:00 PM		403				403			403	
05:00 PM		**413**				**413**			**413**	
06:00 PM		235				235			235	
07:00 PM		165				165			165	
08:00 PM		170				170			170	
09:00 PM		100				100			100	
10:00 PM		60				60			60	
11:00 PM		54				54			54	
Day Total		4834				4834			4834	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 412				7:00 AM 412			7:00 AM 412	
PM Peak Volume		5:00 PM 413				5:00 PM 413			5:00 PM 413	

Comments:

Report generated on 12/19/2024 5:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: SR 3 East of Zimmerman Trail/Skyway Dr
QC JOB #: 16784218
SPECIFIC LOCATION:
DIRECTION: WB
CITY/STATE: Billings, MT
DATE: Dec 10 2024 - Dec 10 2024

Start Time	Mon	Tue 10 Dec 24	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		22				22			22	
01:00 AM		36				36			36	
02:00 AM		8				8			8	
03:00 AM		5				5			5	
04:00 AM		31				31			31	
05:00 AM		68				68			68	
06:00 AM		162				162			162	
07:00 AM		**384**				**384**			**384**	
08:00 AM		325				325			325	
09:00 AM		268				268			268	
10:00 AM		287				287			287	
11:00 AM		282				282			282	
12:00 PM		269				269			269	
01:00 PM		312				312			312	
02:00 PM		301				301			301	
03:00 PM		317				317			317	
04:00 PM		393				393			393	
05:00 PM		**487**				**487**			**487**	
06:00 PM		245				245			245	
07:00 PM		181				181			181	
08:00 PM		121				121			121	
09:00 PM		102				102			102	
10:00 PM		74				74			74	
11:00 PM		64				64			64	
Day Total		4744				4744			4744	
% Weekday Average		100%								
% Week Average		100%				100%				
AM Peak Volume		7:00 AM 384				7:00 AM 384			7:00 AM 384	
PM Peak Volume		5:00 PM 487				5:00 PM 487			5:00 PM 487	

Comments:

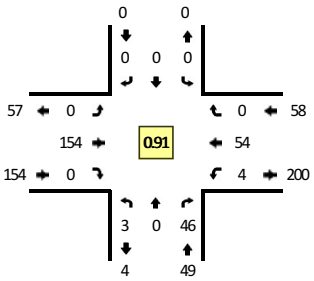
Report generated on 12/19/2024 5:00 PM

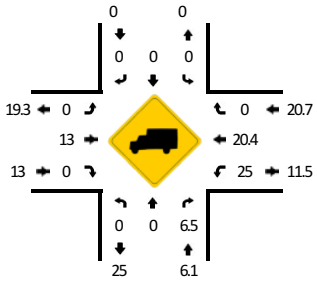
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

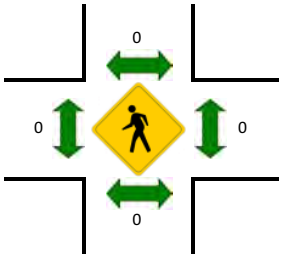
LOCATION: Apache Trl -- SR 3 | **QC JOB #:** 16784201
CITY/STATE: Billings, MT | **DATE:** Tue, Dec 10 2024

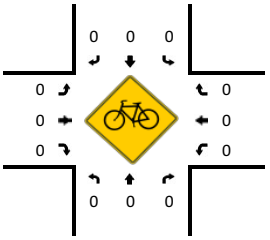
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

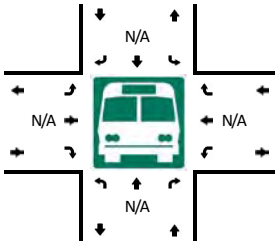


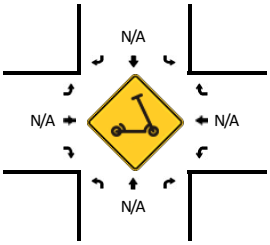


TRUE DATA TO IMPROVE MOBILITY









15-Min Count Period Beginning At	Apache Trl (Northbound)				Apache Trl (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	5	0	0	0	0	0	0	23	0	0	0	11	0	0	39	
7:15 AM	1	0	10	0	0	0	0	0	0	44	0	0	1	14	0	0	70	
7:30 AM	1	0	13	0	0	0	0	0	0	48	0	0	0	10	0	0	72	
7:45 AM	1	0	9	0	0	0	0	0	0	38	0	0	1	13	0	0	62	243
8:00 AM	0	0	14	0	0	0	0	0	0	24	0	0	2	17	0	0	57	261
8:15 AM	0	0	3	0	0	0	0	0	0	23	1	0	3	12	0	0	42	233
8:30 AM	0	0	10	0	0	0	0	0	0	23	1	0	3	20	0	0	57	218
8:45 AM	1	0	6	0	0	0	0	0	0	30	0	0	6	20	0	0	63	219

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	0	52	0	0	0	0	0	0	192	0	0	0	40	0	0	288
Heavy Trucks	0	0	8		0	0	0		0	8	0		0	8	0		24
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

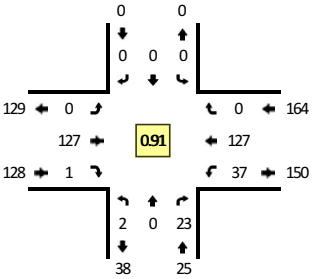
Type of peak hour being reported: Intersection Peak

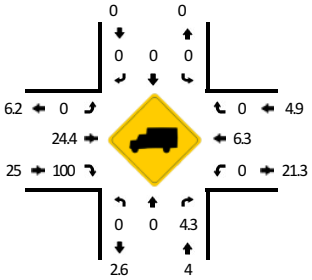
Method for determining peak hour: Total Entering Volume

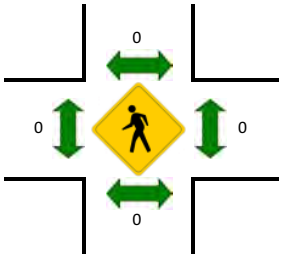
LOCATION: Apache Trl -- SR 3
CITY/STATE: Billings, MT

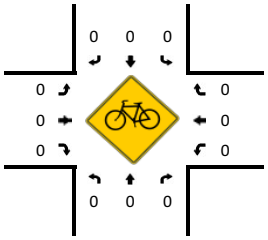
QC JOB #: 16784202
DATE: Tue, Dec 10 2024

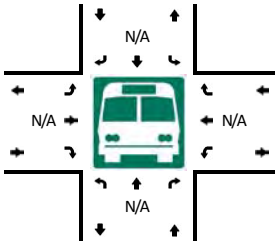
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

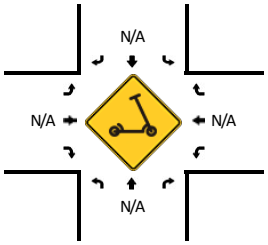












15-Min Count Period Beginning At	Apache Trl (Northbound)				Apache Trl (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	0	5	0	0	0	0	0	0	15	0	0	13	30	0	0	64	
4:15 PM	1	0	6	0	0	0	0	0	0	32	0	0	8	33	0	0	80	
4:30 PM	0	0	3	0	0	0	0	0	0	36	0	0	10	38	0	0	87	
4:45 PM	1	0	6	0	0	0	0	0	0	30	0	0	10	28	0	0	75	306
5:00 PM	0	0	8	0	0	0	0	0	0	29	1	0	9	28	0	0	75	317
5:15 PM	0	0	7	0	0	0	0	0	0	15	0	0	5	35	0	0	62	299
5:30 PM	0	0	4	0	0	0	0	0	0	19	1	0	6	32	0	0	62	274
5:45 PM	0	0	5	0	0	0	0	0	0	15	0	0	4	26	0	0	50	249

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	12	0	0	0	0	0	0	144	0	0	40	152	0	0	348
Heavy Trucks	0	0	0		0	0	0		0	44	0		0	8	0		52
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

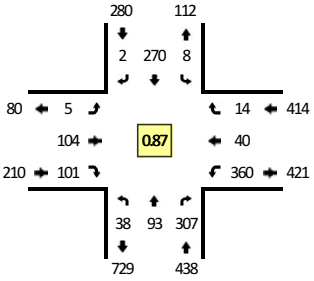
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

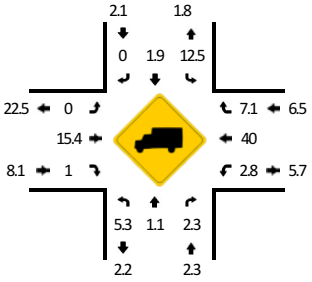
LOCATION: Skyway Dr/Zimmerman Trl -- SR 3
CITY/STATE: Billings, MT

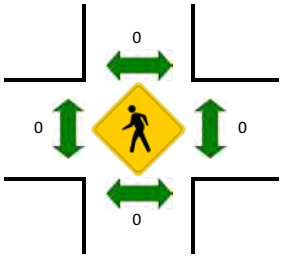
QC JOB #: 16784203
DATE: Tue, Dec 10 2024

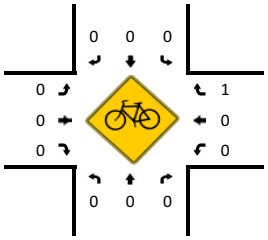
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

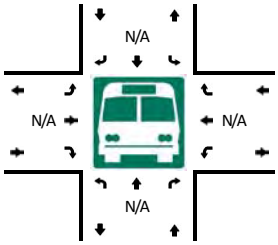


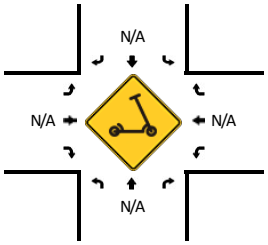
TRUE DATA TO IMPROVE MOBILITY











15-Min Count Period Beginning At	Skyway Dr/Zimmerman Trl (Northbound)				Skyway Dr/Zimmerman Trl (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	3	27	54	0	1	30	0	0	1	27	14	0	47	12	2	0	218	
7:15 AM	10	27	58	0	1	66	0	0	2	27	26	0	83	7	5	0	312	
7:30 AM	9	25	81	0	1	84	0	0	2	28	32	0	109	9	4	0	384	
7:45 AM	8	18	98	0	3	63	1	0	1	30	28	0	89	12	2	0	353	1267
8:00 AM	11	23	70	0	3	57	1	0	0	19	15	0	77	12	3	2	293	1342
8:15 AM	15	32	72	0	0	43	1	0	1	10	18	0	66	17	0	0	275	1305
8:30 AM	13	15	57	0	2	58	1	0	1	18	25	0	59	7	2	0	258	1179
8:45 AM	16	21	54	0	3	55	0	1	1	18	16	0	68	13	0	0	266	1092

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	100	324	0	4	336	0	0	8	112	128	0	436	36	16	0	1536
Heavy Trucks	4	0	4		0	8	0		0	16	0		12	24	0		68
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

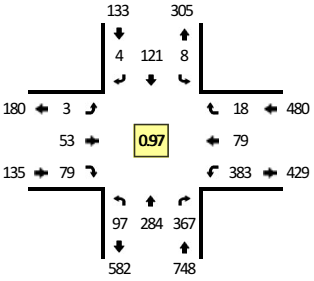
Type of peak hour being reported: Intersection Peak

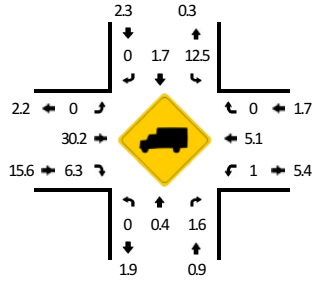
Method for determining peak hour: Total Entering Volume

LOCATION: Skyway Dr/Zimmerman Trl -- SR 3
CITY/STATE: Billings, MT

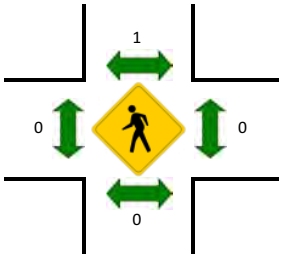
QC JOB #: 16784204
DATE: Tue, Dec 10 2024

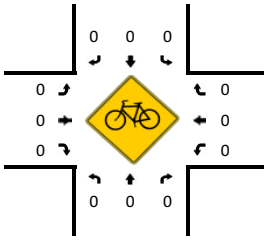
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

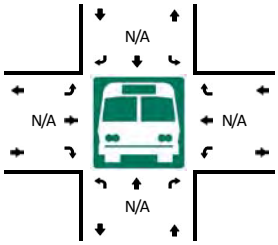


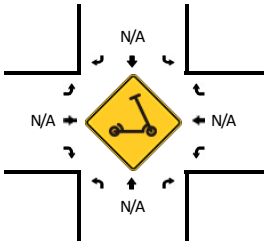


TRUE DATA TO IMPROVE MOBILITY









15-Min Count Period Beginning At	Skyway Dr/Zimmerman Trl (Northbound)				Skyway Dr/Zimmerman Trl (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	26	58	81	1	3	29	3	0	1	9	25	0	69	14	2	0	321	
4:15 PM	21	79	81	0	6	35	2	0	1	15	20	0	85	17	3	0	365	
4:30 PM	25	72	91	0	2	33	1	0	0	21	25	0	89	14	3	0	376	
4:45 PM	35	77	79	0	1	37	0	0	2	10	18	0	79	14	5	1	358	1420
5:00 PM	16	66	104	0	3	30	1	0	0	10	19	0	107	25	4	0	385	1484
5:15 PM	21	69	93	0	2	21	2	0	1	12	17	0	107	26	6	0	377	1496
5:30 PM	35	61	89	0	0	25	0	0	0	8	15	0	92	20	4	0	349	1469
5:45 PM	24	55	76	0	2	33	1	0	0	10	9	0	86	14	0	0	310	1421

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	64	264	416	0	12	120	4	0	0	40	76	0	428	100	16	0	1540
Heavy Trucks	0	0	0		4	0	0		0	4	0		0	4	0		12
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

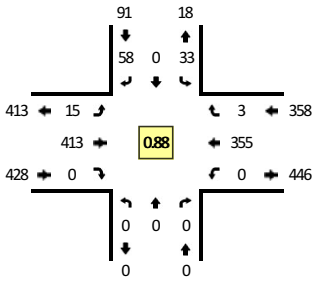
Type of peak hour being reported: Intersection Peak

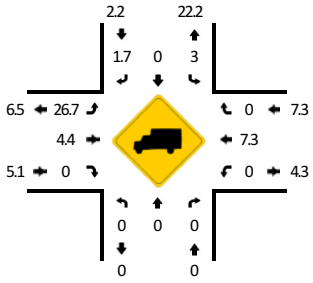
Method for determining peak hour: Total Entering Volume

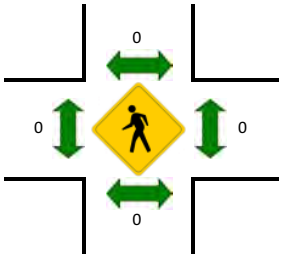
LOCATION: Rod and Gun Club Rd -- SR 3
CITY/STATE: Billings, MT

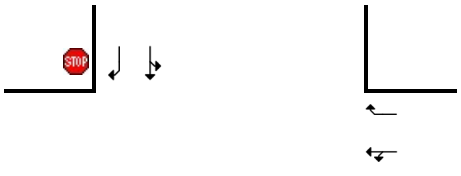
QC JOB #: 16784205
DATE: Tue, Dec 10 2024

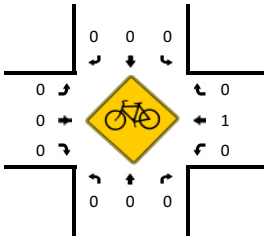
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

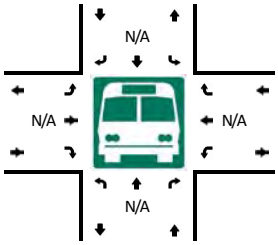


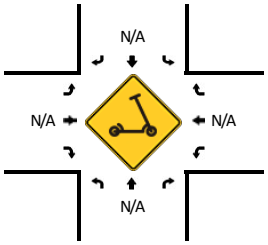












15-Min Count Period Beginning At	Rod and Gun Club Rd (Northbound)				Rod and Gun Club Rd (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	5	0	11	0	0	80	0	0	0	56	2	0	154	
7:15 AM	0	0	0	0	7	0	17	0	3	79	0	0	0	83	0	0	189	
7:30 AM	0	0	0	0	10	0	10	0	3	116	0	0	0	110	1	0	250	
7:45 AM	0	0	0	0	11	0	14	0	3	126	0	0	0	85	1	0	240	833
8:00 AM	0	0	0	0	5	0	17	0	6	92	0	0	0	77	1	0	198	877
8:15 AM	0	0	0	0	2	0	9	0	3	75	0	0	0	69	1	0	159	847
8:30 AM	0	0	0	0	4	0	7	0	5	72	0	0	0	69	3	0	160	757
8:45 AM	0	0	0	0	3	0	8	0	5	66	0	0	0	68	0	0	150	667

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	40	0	40	0	12	464	0	0	0	440	4	0	1000
Heavy Trucks	0	0	0		0	0	0		4	20	0		0	32	0		56
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

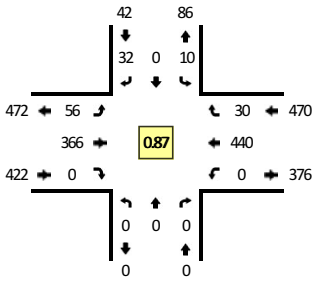
Type of peak hour being reported: Intersection Peak

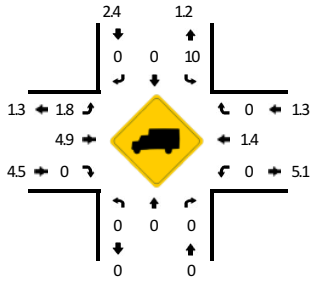
Method for determining peak hour: Total Entering Volume

LOCATION: Rod and Gun Club Rd -- SR 3
CITY/STATE: Billings, MT

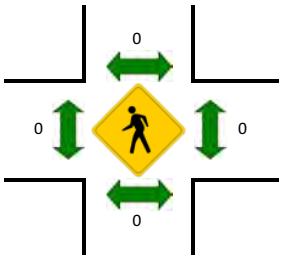
QC JOB #: 16784206
DATE: Tue, Dec 10 2024

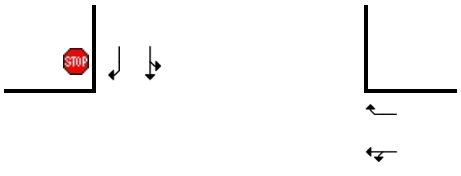
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

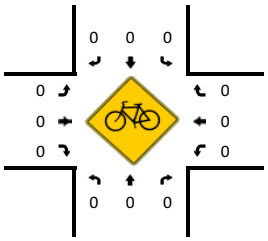


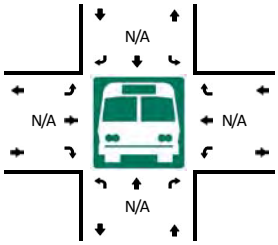


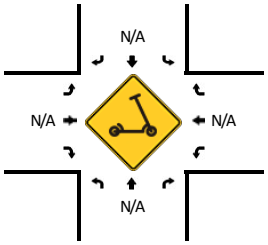
TRUE DATA TO IMPROVE MOBILITY











15-Min Count Period Beginning At	Rod and Gun Club Rd (Northbound)				Rod and Gun Club Rd (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	2	0	1	0	10	79	0	0	0	88	8	0	188	
4:15 PM	0	0	0	0	1	0	5	0	10	95	0	0	0	100	6	0	217	
4:30 PM	0	0	0	0	2	0	6	0	9	99	0	0	0	100	1	0	217	
4:45 PM	0	0	0	0	3	0	5	0	17	75	0	0	0	90	10	0	200	822
5:00 PM	0	0	0	0	2	0	11	0	17	95	0	0	0	129	13	0	267	901
5:15 PM	0	0	0	0	3	0	10	0	13	97	0	0	0	121	6	0	250	934
5:30 PM	0	0	0	0	0	0	9	0	15	72	0	0	0	105	2	0	203	920
5:45 PM	0	0	0	0	3	0	6	0	14	79	0	0	0	92	8	0	202	922

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	8	0	44	0	68	380	0	0	0	516	52	0	1068
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	4	0		8
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

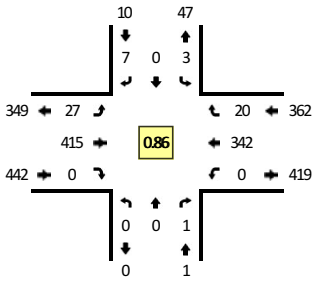
Type of peak hour being reported: Intersection Peak

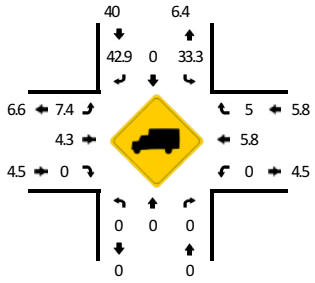
Method for determining peak hour: Total Entering Volume

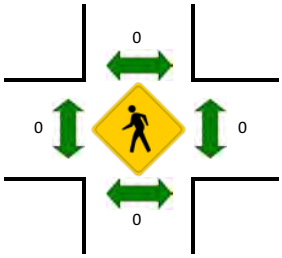
LOCATION: AJ Wy/Stoney Ridge Cir -- SR 3
CITY/STATE: Billings, MT

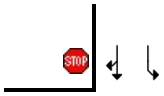
QC JOB #: 16784207
DATE: Tue, Dec 10 2024

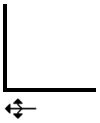
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

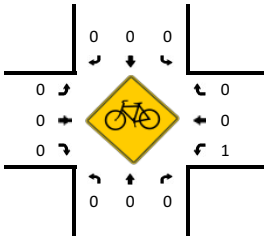


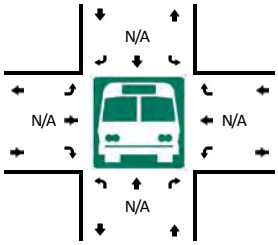


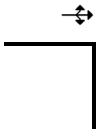


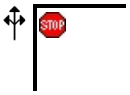


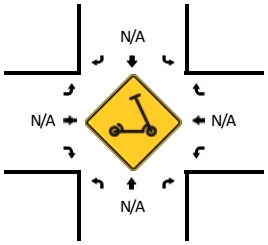












15-Min Count Period Beginning At	AJ Wy/Stoney Ridge Cir (Northbound)				AJ Wy/Stoney Ridge Cir (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	0	0	0	0	0	1	0	5	70	0	0	0	50	8	0	136	
7:15 AM	0	0	0	0	0	0	3	0	7	89	0	0	0	82	2	0	183	
7:30 AM	0	0	1	0	2	0	2	0	2	120	0	0	0	102	3	0	232	
7:45 AM	0	0	0	0	0	0	1	0	8	130	0	0	0	89	10	0	238	789
8:00 AM	0	0	0	0	1	0	1	0	10	76	0	0	0	69	5	0	162	815
8:15 AM	0	0	1	0	3	0	1	0	4	78	1	0	0	63	7	0	158	790
8:30 AM	1	0	1	0	1	0	2	0	4	69	0	0	0	74	2	0	154	712
8:45 AM	0	0	0	0	0	0	1	0	4	58	0	0	1	63	0	0	127	601

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	0	4	0	32	520	0	0	0	356	40	0	952
Heavy Trucks	0	0	0		0	0	0		0	20	0		0	36	4		60
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		4	0	0		4
Scooters																	

Comments:

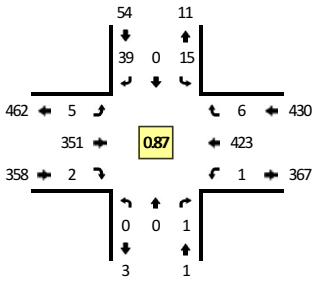
Report generated on 12/18/2024 12:05 PM

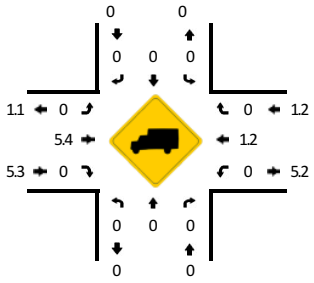
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

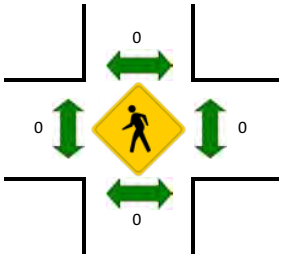
LOCATION: AJ Wy/Stoney Ridge Cir -- SR 3 | **QC JOB #:** 16784208
CITY/STATE: Billings, MT | **DATE:** Tue, Dec 10 2024

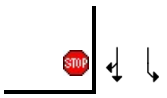
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

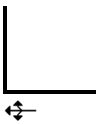


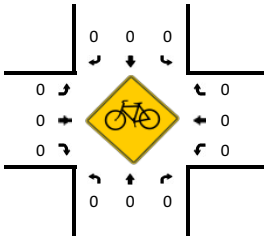


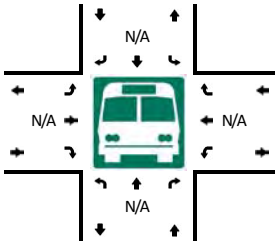
TRUE DATA TO IMPROVE MOBILITY

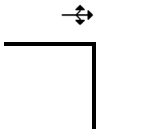


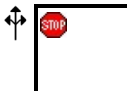


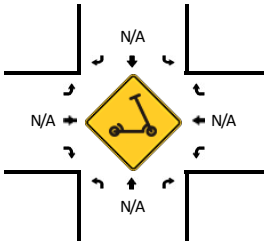












15-Min Count Period Beginning At	AJ Wy/Stoney Ridge Cir (Northbound)				AJ Wy/Stoney Ridge Cir (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	1	0	1	1	1	0	2	74	0	0	0	100	0	0	180	
4:15 PM	0	0	0	0	7	0	5	0	3	90	0	0	0	99	0	0	204	
4:30 PM	0	0	0	0	7	0	7	0	5	89	0	0	0	88	2	0	198	
4:45 PM	0	0	0	0	1	0	8	0	0	79	0	0	0	95	1	0	184	766
5:00 PM	0	0	0	0	2	0	15	0	0	95	1	0	0	128	2	0	243	829
5:15 PM	0	0	1	0	5	0	9	0	0	88	1	0	1	112	1	0	218	843
5:30 PM	0	0	0	0	2	0	7	0	0	81	1	0	4	94	0	0	189	834
5:45 PM	0	0	0	0	1	0	4	0	1	77	0	0	0	95	0	0	178	828

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	8	0	60	0	0	380	4	0	0	512	8	0	972
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	8	0		12
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

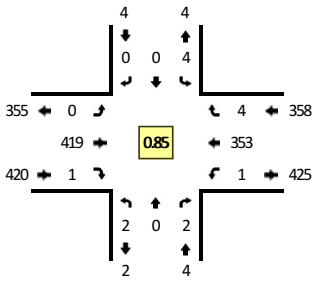
Type of peak hour being reported: Intersection Peak

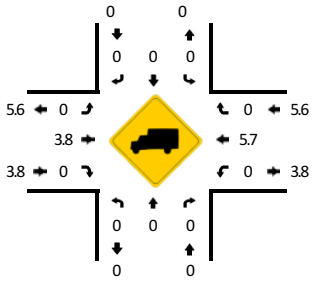
Method for determining peak hour: Total Entering Volume

LOCATION: Huey Way -- SR 3
CITY/STATE: Billings, MT

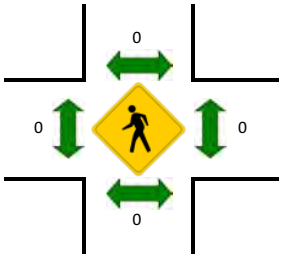
QC JOB #: 16784211
DATE: Tue, Dec 10 2024

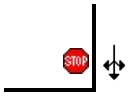
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

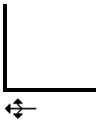


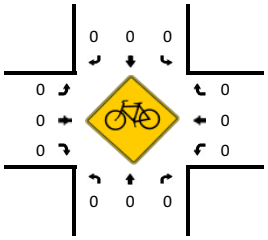


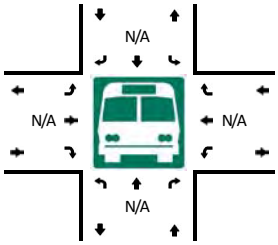
TRUE DATA TO IMPROVE MOBILITY

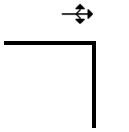


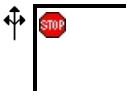


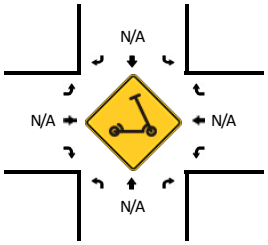












15-Min Count Period Beginning At	Huey Way (Northbound)				Huey Way (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	1	0	0	0	0	70	0	0	0	61	2	0	134	
7:15 AM	0	0	1	0	1	0	0	0	0	89	0	0	0	86	0	0	177	
7:30 AM	1	0	0	0	1	0	0	0	0	118	1	0	0	100	1	0	222	
7:45 AM	0	0	1	0	1	0	0	0	0	133	0	0	1	94	2	0	232	765
8:00 AM	1	0	0	0	1	0	0	0	0	79	0	0	0	73	1	0	155	786
8:15 AM	1	0	0	0	0	0	0	0	0	82	0	1	0	76	3	0	163	772
8:30 AM	0	0	0	0	1	0	0	0	0	72	0	0	0	74	0	0	147	697
8:45 AM	0	0	1	0	0	0	0	0	0	58	0	0	0	64	0	0	123	588

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	4	0	4	0	0	0	0	532	0	0	4	376	8	0	928
Heavy Trucks	0	0	0		0	0	0		0	12	0		0	36	0		48
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

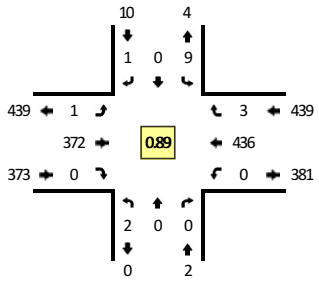
Report generated on 12/18/2024 12:05 PM

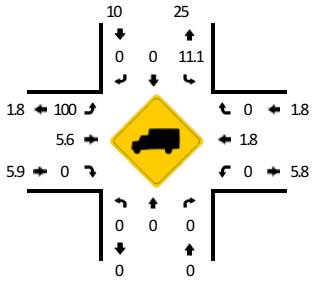
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

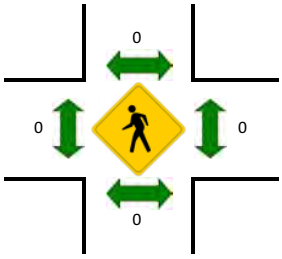
LOCATION: Huey Way -- SR 3 | **QC JOB #:** 16784212
CITY/STATE: Billings, MT | **DATE:** Tue, Dec 10 2024

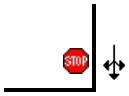
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

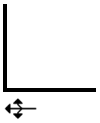


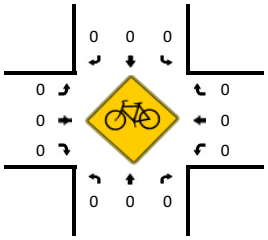


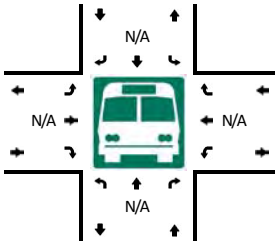
TRUE DATA TO IMPROVE MOBILITY

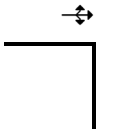


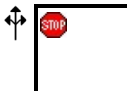


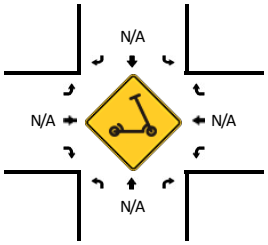












15-Min Count Period Beginning At	Huey Way (Northbound)				Huey Way (Southbound)				SR 3 (Eastbound)				SR 3 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	1	0	0	0	0	74	0	0	0	101	1	0	177	
4:15 PM	0	0	0	0	0	0	0	0	0	102	0	0	0	100	0	0	202	
4:30 PM	2	0	0	0	0	0	0	0	0	100	0	0	0	90	2	0	194	
4:45 PM	0	0	0	0	2	0	0	0	1	80	0	0	0	99	0	0	182	755
5:00 PM	0	0	0	0	4	0	1	0	0	93	0	0	0	133	0	0	231	809
5:15 PM	0	0	0	0	3	0	0	0	0	99	0	0	0	114	1	0	217	824
5:30 PM	0	0	0	0	2	0	0	0	0	80	1	0	0	97	2	0	182	812
5:45 PM	0	0	0	0	3	0	0	0	0	77	2	0	0	95	2	0	179	809

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	16	0	4	0	0	372	0	0	0	532	0	0	924
Heavy Trucks	0	0	0		4	0	0		0	4	0		0	4	0		12
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

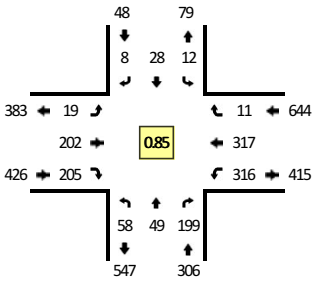
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

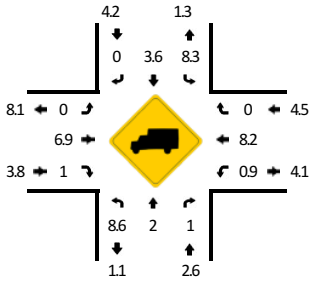
LOCATION: Terminal Cir -- SR 3/E Airport Rd
CITY/STATE: Billings, MT

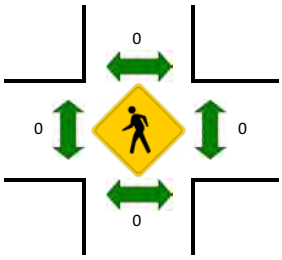
QC JOB #: 16784209
DATE: Tue, Dec 10 2024

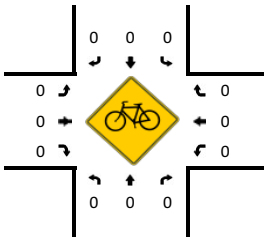
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

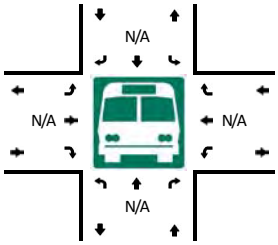


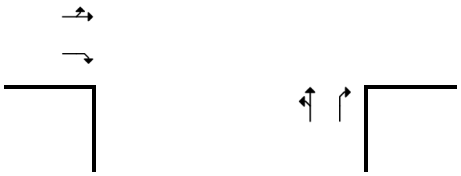
TRUE DATA TO IMPROVE MOBILITY

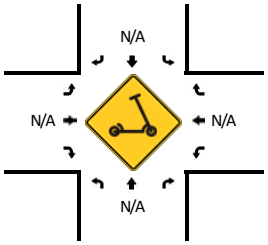












15-Min Count Period Beginning At	Terminal Cir (Northbound)				Terminal Cir (Southbound)				SR 3/E Airport Rd (Eastbound)				SR 3/E Airport Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	15	7	42	0	5	4	3	0	1	37	22	0	38	48	2	0	224	
7:15 AM	9	7	47	0	0	6	3	0	5	39	37	0	65	79	2	1	300	
7:30 AM	14	13	50	0	1	9	1	0	3	60	60	0	79	92	2	1	385	
7:45 AM	24	19	57	0	6	5	2	0	9	61	62	0	94	77	4	0	420	1329
8:00 AM	11	10	45	0	5	8	2	0	2	42	46	0	76	69	3	0	319	1424
8:15 AM	20	10	31	0	2	4	2	0	4	62	16	0	69	55	1	0	276	1400
8:30 AM	13	11	39	0	5	5	2	0	6	51	15	0	59	64	3	0	273	1288
8:45 AM	10	19	43	0	3	15	6	1	14	34	14	0	48	50	7	0	264	1132

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	96	76	228	0	24	20	8	0	36	244	248	0	376	308	16	0	1680
Heavy Trucks	12	4	4		4	0	0		0	12	0		0	36	0		72
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

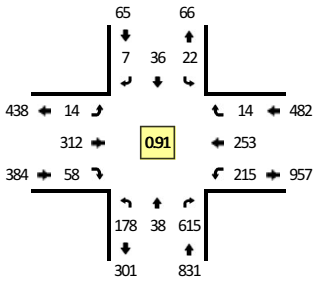
Type of peak hour being reported: Intersection Peak

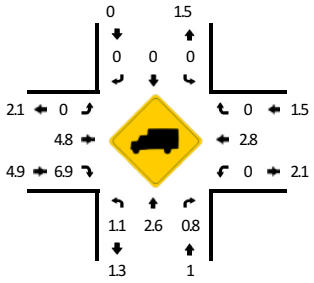
Method for determining peak hour: Total Entering Volume

LOCATION: Terminal Cir -- SR 3/E Airport Rd
CITY/STATE: Billings, MT

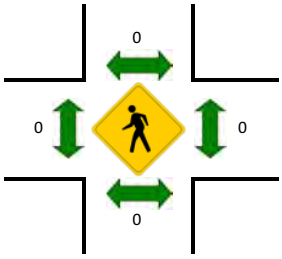
QC JOB #: 16784210
DATE: Tue, Dec 10 2024

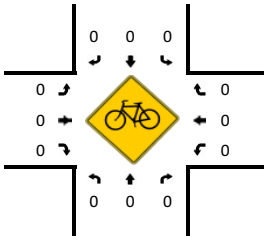
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

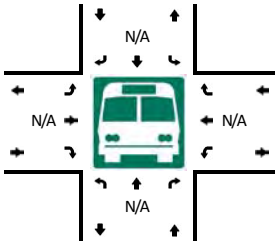


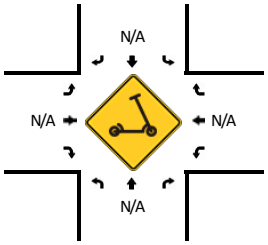


TRUE DATA TO IMPROVE MOBILITY









15-Min Count Period Beginning At	Terminal Cir (Northbound)				Terminal Cir (Southbound)				SR 3/E Airport Rd (Eastbound)				SR 3/E Airport Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	30	12	155	0	5	18	9	0	3	60	10	0	48	52	5	0	407	
4:15 PM	27	12	132	0	15	27	6	0	5	85	18	1	54	69	4	5	460	
4:30 PM	24	7	157	0	4	17	3	0	4	80	19	0	49	66	7	6	443	
4:45 PM	38	9	106	0	4	7	2	0	2	70	11	0	49	62	2	1	363	1673
5:00 PM	56	13	175	0	7	6	1	0	1	83	15	0	59	64	3	0	483	1749
5:15 PM	60	9	177	0	7	6	1	0	7	79	13	0	50	61	2	1	473	1762
5:30 PM	33	21	128	0	7	16	5	0	4	77	12	0	50	59	5	2	419	1738
5:45 PM	23	12	101	1	7	17	6	0	6	60	16	0	40	65	6	0	360	1735

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	224	52	700	0	28	24	4	0	4	332	60	0	236	256	12	0	1932
Heavy Trucks	0	0	12		0	0	0		0	12	4		0	12	0		40
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/18/2024 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

ATTACHMENT 2: OPERATIONAL ANALYSIS REPORTS

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	172	0	4	60	3	51
Future Vol, veh/h	172	0	4	60	3	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	350	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	13	0	25	20	0	7
Mvmt Flow	189	0	4	66	3	56

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	189	0	264	189
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	75	-
Critical Hdwy	-	-	4.35	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.425	-	3.5	3.363
Pot Cap-1 Maneuver	-	-	1258	-	730	840
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	953	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1258	-	727	840
Mov Cap-2 Maneuver	-	-	-	-	727	-
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	950	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.49	9.65
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	833	-	-	1258	-
HCM Lane V/C Ratio	0.071	-	-	0.003	-
HCM Ctrl Dly (s/v)	9.7	-	-	7.9	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	270	533	564	359
Demand Flow Rate, veh/h	291	569	575	367
Vehicles Circulating, veh/h	842	179	171	601
Vehicles Exiting, veh/h	126	164	962	147
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	15.5	9.0	5.9	12.0
Approach LOS	C	A	A	B

Lane	Left	Left	Left	Bypass	Left
Designated Moves	LTR	LTR	LT	R	LTR
Assumed Moves	LTR	LTR	LT		LTR
RT Channelized				Yield	
Lane Util	1.000	1.000	1.000		1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	291	569	172	403	367
Cap Entry Lane, veh/h	585	1150	1159	1167	748
Entry HV Adj Factor	0.928	0.937	0.981	0.980	0.978
Flow Entry, veh/h	270	533	169	395	359
Cap Entry, veh/h	543	1077	1137	1144	731
V/C Ratio	0.498	0.495	0.148	0.345	0.491
Control Delay, s/veh	15.5	9.0	4.5	6.5	12.0
LOS	C	A	A	A	B
95th %tile Queue, veh	3	3	1	2	3

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	462	397	3	37	65
Future Vol, veh/h	17	462	397	3	37	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	570	-	-	100	225	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	27	4	7	0	3	2
Mvmt Flow	19	525	451	3	42	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	451	0	-	0	1015	451
Stage 1	-	-	-	-	451	-
Stage 2	-	-	-	-	564	-
Critical Hdwy	4.37	-	-	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.443	-	-	-	3.527	3.318
Pot Cap-1 Maneuver	989	-	-	0	263	608
Stage 1	-	-	-	0	639	-
Stage 2	-	-	-	0	568	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	989	-	-	-	258	608
Mov Cap-2 Maneuver	-	-	-	-	258	-
Stage 1	-	-	-	-	627	-
Stage 2	-	-	-	-	568	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.31	0	15.34
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	989	-	-	258	608
HCM Lane V/C Ratio	0.02	-	-	0.163	0.121
HCM Ctrl Dly (s/v)	8.7	-	-	21.7	11.7
HCM Lane LOS	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.4

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	466	0	0	379	22	0	0	1	3	0	8
Future Vol, veh/h	30	466	0	0	379	22	0	0	1	3	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	340	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	7	4	0	0	6	5	0	0	0	33	0	43
Mvmt Flow	35	542	0	0	441	26	0	0	1	3	0	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	466	0	0	542	0	0	1052	1078	542	1065	1065	453
Stage 1	-	-	-	-	-	-	612	612	-	453	453	-
Stage 2	-	-	-	-	-	-	441	466	-	612	612	-
Critical Hdwy	4.17	-	-	4.1	-	-	7.1	6.5	6.2	7.43	6.5	6.63
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.43	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.43	5.5	-
Follow-up Hdwy	2.263	-	-	2.2	-	-	3.5	4	3.3	3.797	4	3.687
Pot Cap-1 Maneuver	1069	-	-	1037	-	-	206	221	544	175	224	530
Stage 1	-	-	-	-	-	-	484	487	-	531	573	-
Stage 2	-	-	-	-	-	-	599	566	-	432	487	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1069	-	-	1037	-	-	193	210	544	167	214	530
Mov Cap-2 Maneuver	-	-	-	-	-	-	193	210	-	167	214	-
Stage 1	-	-	-	-	-	-	461	464	-	531	573	-
Stage 2	-	-	-	-	-	-	589	566	-	411	464	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.51	0	11.63	16.05
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	544	109	-	-	1037	-	-	167	530
HCM Lane V/C Ratio	0.002	0.033	-	-	-	-	-	0.021	0.018
HCM Ctrl Dly (s/v)	11.6	8.5	0	-	0	-	-	27.1	11.9
HCM Lane LOS	B	A	A	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	469	1	1	399	4	2	0	2	4	0	0
Future Vol, veh/h	0	469	1	1	399	4	2	0	2	4	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	4	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	0	552	1	1	469	5	2	0	2	5	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	474	0	0	553	0	0	1024	1029	552	1026	1027	472
Stage 1	-	-	-	-	-	-	552	552	-	474	474	-
Stage 2	-	-	-	-	-	-	472	476	-	552	553	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1098	-	-	1027	-	-	216	236	537	215	236	596
Stage 1	-	-	-	-	-	-	521	518	-	575	561	-
Stage 2	-	-	-	-	-	-	577	560	-	522	518	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1098	-	-	1027	-	-	215	235	537	214	236	596
Mov Cap-2 Maneuver	-	-	-	-	-	-	215	235	-	214	236	-
Stage 1	-	-	-	-	-	-	521	518	-	574	560	-
Stage 2	-	-	-	-	-	-	576	559	-	519	518	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.02	16.9	22.23
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	307	1098	-	-	4	-	-	214
HCM Lane V/C Ratio	0.015	-	-	-	0.001	-	-	0.022
HCM Ctrl Dly (s/v)	16.9	0	-	-	8.5	0	-	22.2
HCM Lane LOS	C	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1

Intersection	
Intersection Delay, s/veh	4.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	560	848	403	62
Demand Flow Rate, veh/h	582	885	414	64
Vehicles Circulating, veh/h	473	174	326	954
Vehicles Exiting, veh/h	545	301	457	105
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.0	6.9	1.7	7.1
Approach LOS	A	A	A	A

Lane	Left	Bypass	Left	Right	Left	Bypass	Left
Designated Moves	LT	R	L	TR	LT	R	LTR
Assumed Moves	LT		L	TR	LT		LTR
RT Channelized		Free				Free	
Lane Util	1.000		0.475	0.525	1.000		1.000
Follow-Up Headway, s	2.535		2.667	2.535	2.535		2.535
Critical Headway, s	4.328		4.645	4.328	4.328		4.328
A (Intercept)	1420		1350	1420	1420		1420
B (Slope)	8.501e-4		9.199e-4	8.501e-4	8.501e-4		8.501e-4
Entry Flow, veh/h	310	272	420	465	149	265	64
Cap Entry Lane, veh/h	950	1768	1150	1225	1076	1768	631
Entry HV Adj Factor	0.940	0.990	0.990	0.928	0.944	0.990	0.962
Flow Entry, veh/h	291	269	416	432	141	262	62
Cap Entry, veh/h	893	1750	1139	1137	1016	1750	607
V/C Ratio	0.326	0.154	0.365	0.380	0.138	0.150	0.101
Control Delay, s/veh	7.6	0.0	6.8	7.0	4.8	0.0	7.1
LOS	A	A	A	A	A	A	A
95th %tile Queue, veh	1	1	2	2	0	1	0

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	142	1	41	142	2	26
Future Vol, veh/h	142	1	41	142	2	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	350	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	100	0	6	0	4
Mvmt Flow	156	1	45	156	2	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	157	0	403	157
Stage 1	-	-	-	-	157	-
Stage 2	-	-	-	-	246	-
Critical Hdwy	-	-	4.1	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	1435	-	607	884
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	799	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1435	-	588	884
Mov Cap-2 Maneuver	-	-	-	-	588	-
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	774	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.7	9.38
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	853	-	-	1435	-
HCM Lane V/C Ratio	0.036	-	-	0.031	-
HCM Ctrl Dly (s/v)	9.4	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	155	554	864	152
Demand Flow Rate, veh/h	178	563	872	156
Vehicles Circulating, veh/h	598	443	92	654
Vehicles Exiting, veh/h	212	89	684	352
Ped Vol Crossing Leg, #/h	0	0	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.4	14.5	6.2	7.8
Approach LOS	A	B	A	A

Lane	Left	Left	Left	Bypass	Left
Designated Moves	LTR	LTR	LT	R	LTR
Assumed Moves	LTR	LTR	LT		LTR
RT Channelized				Yield	
Lane Util	1.000	1.000	1.000		1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	178	563	440	432	156
Cap Entry Lane, veh/h	750	878	1256	1260	708
Entry HV Adj Factor	0.869	0.985	1.000	0.980	0.976
Flow Entry, veh/h	155	554	440	424	152
Cap Entry, veh/h	652	865	1256	1235	691
V/C Ratio	0.237	0.641	0.350	0.343	0.220
Control Delay, s/veh	8.4	14.5	6.2	6.1	7.8
LOS	A	B	A	A	A
95th %tile Queue, veh	1	5	2	2	1

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	63	410	493	34	11	36
Future Vol, veh/h	63	410	493	34	11	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	570	-	-	100	225	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	5	1	0	10	0
Mvmt Flow	72	471	567	39	13	41

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	567	0	-	0	1183	567
Stage 1	-	-	-	-	567	-
Stage 2	-	-	-	-	616	-
Critical Hdwy	4.12	-	-	-	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.218	-	-	-	3.59	3.3
Pot Cap-1 Maneuver	1005	-	-	0	202	527
Stage 1	-	-	-	0	552	-
Stage 2	-	-	-	0	524	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1005	-	-	-	187	527
Mov Cap-2 Maneuver	-	-	-	-	187	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	524	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.18	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	1005	-	-	187	527
HCM Lane V/C Ratio	0.072	-	-	0.068	0.079
HCM Ctrl Dly (s/v)	8.9	-	-	25.6	12.4
HCM Lane LOS	A	-	-	D	B
HCM 95th %tile Q(veh)	0.2	-	-	0.2	0.3

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	396	2	1	478	7	0	0	1	17	0	44
Future Vol, veh/h	6	396	2	1	478	7	0	0	1	17	0	44
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	340	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	7	455	2	1	549	8	0	0	1	20	0	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	557	0	0	457	0	0	1022	1030	456	1025	1027	553
Stage 1	-	-	-	-	-	-	470	470	-	556	556	-
Stage 2	-	-	-	-	-	-	552	560	-	469	471	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1023	-	-	1114	-	-	216	235	608	215	236	536
Stage 1	-	-	-	-	-	-	578	563	-	519	516	-
Stage 2	-	-	-	-	-	-	522	514	-	579	563	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1023	-	-	1114	-	-	194	233	608	213	234	536
Mov Cap-2 Maneuver	-	-	-	-	-	-	194	233	-	213	234	-
Stage 1	-	-	-	-	-	-	573	558	-	518	515	-
Stage 2	-	-	-	-	-	-	472	513	-	572	558	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.13	0.02	10.93	15.54
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	608	27	-	-	4	-	-	213	536
HCM Lane V/C Ratio	0.002	0.007	-	-	0.001	-	-	0.092	0.094
HCM Ctrl Dly (s/v)	10.9	8.5	0	-	8.2	0	-	23.6	12.4
HCM Lane LOS	B	A	A	-	A	A	-	C	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.3	0.3

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	413	0	0	483	3	2	0	0	10	0	1
Future Vol, veh/h	1	413	0	0	483	3	2	0	0	10	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	100	6	0	0	2	0	0	0	0	11	0	0
Mvmt Flow	1	464	0	0	543	3	2	0	0	11	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	546	0	0	464	0	0	1009	1012	464	1011	1011	544
Stage 1	-	-	-	-	-	-	466	466	-	544	544	-
Stage 2	-	-	-	-	-	-	543	546	-	466	466	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.21	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.21	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.21	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.599	4	3.3
Pot Cap-1 Maneuver	672	-	-	1108	-	-	221	241	602	210	242	543
Stage 1	-	-	-	-	-	-	581	566	-	507	522	-
Stage 2	-	-	-	-	-	-	528	521	-	560	566	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	672	-	-	1108	-	-	220	240	602	209	241	543
Mov Cap-2 Maneuver	-	-	-	-	-	-	220	240	-	209	241	-
Stage 1	-	-	-	-	-	-	579	564	-	507	522	-
Stage 2	-	-	-	-	-	-	527	521	-	559	564	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.03	0	21.55	22.18
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	220	4	-	-	1108	-	-	222
HCM Lane V/C Ratio	0.01	0.002	-	-	-	-	-	0.056
HCM Ctrl Dly (s/v)	21.6	10.4	0	-	0	-	-	22.2
HCM Lane LOS	C	B	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.2

Intersection	
Intersection Delay, s/veh	4.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	473	594	1022	80
Demand Flow Rate, veh/h	497	603	1033	80
Vehicles Circulating, veh/h	336	287	448	806
Vehicles Exiting, veh/h	550	430	309	84
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.6	6.1	1.7	6.2
Approach LOS	A	A	A	A

Lane	Left	Bypass	Left	Right	Left	Bypass	Left
Designated Moves	LT	R	L	TR	LT	R	LTR
Assumed Moves	LT		L	TR	LT		LTR
RT Channelized		Free				Free	
Lane Util	1.000		0.439	0.561	1.000		1.000
Follow-Up Headway, s	2.535		2.667	2.535	2.535		2.535
Critical Headway, s	4.328		4.645	4.328	4.328		4.328
A (Intercept)	1420		1350	1420	1420		1420
B (Slope)	8.501e-4		9.199e-4	8.501e-4	8.501e-4		8.501e-4
Entry Flow, veh/h	421	76	265	338	269	764	80
Cap Entry Lane, veh/h	1067	1873	1037	1113	970	1768	716
Entry HV Adj Factor	0.954	0.935	1.000	0.972	0.987	0.990	1.000
Flow Entry, veh/h	402	71	265	329	266	756	80
Cap Entry, veh/h	1019	1750	1037	1082	958	1750	716
V/C Ratio	0.394	0.041	0.256	0.304	0.277	0.432	0.112
Control Delay, s/veh	7.8	0.0	5.9	6.3	6.6	0.0	6.2
LOS	A	A	A	A	A	A	A
95th %tile Queue, veh	2	0	1	1	1	2	0

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	142	1	41	142	2	26
Future Vol, veh/h	142	1	41	142	2	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	350	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	100	0	6	0	4
Mvmt Flow	156	1	45	156	2	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	157	0	403	157
Stage 1	-	-	-	-	157	-
Stage 2	-	-	-	-	246	-
Critical Hdwy	-	-	4.1	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	1435	-	607	884
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	799	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1435	-	588	884
Mov Cap-2 Maneuver	-	-	-	-	588	-
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	774	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.7	9.38
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	853	-	-	1435	-
HCM Lane V/C Ratio	0.036	-	-	0.031	-
HCM Ctrl Dly (s/v)	9.4	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	155	554	864	152
Demand Flow Rate, veh/h	178	563	872	156
Vehicles Circulating, veh/h	598	443	92	654
Vehicles Exiting, veh/h	212	89	684	352
Ped Vol Crossing Leg, #/h	0	0	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.4	14.5	6.2	7.8
Approach LOS	A	B	A	A

Lane	Left	Left	Left	Bypass	Left
Designated Moves	LTR	LTR	LT	R	LTR
Assumed Moves	LTR	LTR	LT		LTR
RT Channelized				Yield	
Lane Util	1.000	1.000	1.000		1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	178	563	440	432	156
Cap Entry Lane, veh/h	750	878	1256	1260	708
Entry HV Adj Factor	0.869	0.985	1.000	0.980	0.976
Flow Entry, veh/h	155	554	440	424	152
Cap Entry, veh/h	652	865	1256	1235	691
V/C Ratio	0.237	0.641	0.350	0.343	0.220
Control Delay, s/veh	8.4	14.5	6.2	6.1	7.8
LOS	A	B	A	A	A
95th %tile Queue, veh	1	5	2	2	1

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	63	410	493	34	11	36
Future Vol, veh/h	63	410	493	34	11	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	570	-	-	100	225	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	5	1	0	10	0
Mvmt Flow	72	471	567	39	13	41

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	567	0	-	0	1183	567
Stage 1	-	-	-	-	567	-
Stage 2	-	-	-	-	616	-
Critical Hdwy	4.12	-	-	-	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.218	-	-	-	3.59	3.3
Pot Cap-1 Maneuver	1005	-	-	0	202	527
Stage 1	-	-	-	0	552	-
Stage 2	-	-	-	0	524	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1005	-	-	-	187	527
Mov Cap-2 Maneuver	-	-	-	-	187	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	524	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.18	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	1005	-	-	187	527
HCM Lane V/C Ratio	0.072	-	-	0.068	0.079
HCM Ctrl Dly (s/v)	8.9	-	-	25.6	12.4
HCM Lane LOS	A	-	-	D	B
HCM 95th %tile Q(veh)	0.2	-	-	0.2	0.3

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	396	2	1	478	7	0	0	1	17	0	44
Future Vol, veh/h	6	396	2	1	478	7	0	0	1	17	0	44
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	340	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	7	455	2	1	549	8	0	0	1	20	0	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	557	0	0	457	0	0	1022	1030	456	1025	1027	553
Stage 1	-	-	-	-	-	-	470	470	-	556	556	-
Stage 2	-	-	-	-	-	-	552	560	-	469	471	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1023	-	-	1114	-	-	216	235	608	215	236	536
Stage 1	-	-	-	-	-	-	578	563	-	519	516	-
Stage 2	-	-	-	-	-	-	522	514	-	579	563	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1023	-	-	1114	-	-	194	233	608	213	234	536
Mov Cap-2 Maneuver	-	-	-	-	-	-	194	233	-	213	234	-
Stage 1	-	-	-	-	-	-	573	558	-	518	515	-
Stage 2	-	-	-	-	-	-	472	513	-	572	558	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.13	0.02	10.93	15.54
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	608	27	-	-	4	-	-	213	536
HCM Lane V/C Ratio	0.002	0.007	-	-	0.001	-	-	0.092	0.094
HCM Ctrl Dly (s/v)	10.9	8.5	0	-	8.2	0	-	23.6	12.4
HCM Lane LOS	B	A	A	-	A	A	-	C	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.3	0.3

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	413	0	0	483	3	2	0	0	10	0	1
Future Vol, veh/h	1	413	0	0	483	3	2	0	0	10	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	100	6	0	0	2	0	0	0	0	11	0	0
Mvmt Flow	1	464	0	0	543	3	2	0	0	11	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	546	0	0	464	0	0	1009	1012	464	1011	1011	544
Stage 1	-	-	-	-	-	-	466	466	-	544	544	-
Stage 2	-	-	-	-	-	-	543	546	-	466	466	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.21	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.21	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.21	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.599	4	3.3
Pot Cap-1 Maneuver	672	-	-	1108	-	-	221	241	602	210	242	543
Stage 1	-	-	-	-	-	-	581	566	-	507	522	-
Stage 2	-	-	-	-	-	-	528	521	-	560	566	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	672	-	-	1108	-	-	220	240	602	209	241	543
Mov Cap-2 Maneuver	-	-	-	-	-	-	220	240	-	209	241	-
Stage 1	-	-	-	-	-	-	579	564	-	507	522	-
Stage 2	-	-	-	-	-	-	527	521	-	559	564	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.03	0	21.55	22.18
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	220	4	-	-	1108	-	-	222
HCM Lane V/C Ratio	0.01	0.002	-	-	-	-	-	0.056
HCM Ctrl Dly (s/v)	21.6	10.4	0	-	0	-	-	22.2
HCM Lane LOS	C	B	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.2

Intersection	
Intersection Delay, s/veh	4.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	473	594	1022	80
Demand Flow Rate, veh/h	497	603	1033	80
Vehicles Circulating, veh/h	336	287	448	806
Vehicles Exiting, veh/h	550	430	309	84
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.6	6.1	1.7	6.2
Approach LOS	A	A	A	A

Lane	Left	Bypass	Left	Right	Left	Bypass	Left
Designated Moves	LT	R	L	TR	LT	R	LTR
Assumed Moves	LT		L	TR	LT		LTR
RT Channelized		Free				Free	
Lane Util	1.000		0.439	0.561	1.000		1.000
Follow-Up Headway, s	2.535		2.667	2.535	2.535		2.535
Critical Headway, s	4.328		4.645	4.328	4.328		4.328
A (Intercept)	1420		1350	1420	1420		1420
B (Slope)	8.501e-4		9.199e-4	8.501e-4	8.501e-4		8.501e-4
Entry Flow, veh/h	421	76	265	338	269	764	80
Cap Entry Lane, veh/h	1067	1873	1037	1113	970	1768	716
Entry HV Adj Factor	0.954	0.935	1.000	0.972	0.987	0.990	1.000
Flow Entry, veh/h	402	71	265	329	266	756	80
Cap Entry, veh/h	1019	1750	1037	1082	958	1750	716
V/C Ratio	0.394	0.041	0.256	0.304	0.277	0.432	0.112
Control Delay, s/veh	7.8	0.0	5.9	6.3	6.6	0.0	6.2
LOS	A	A	A	A	A	A	A
95th %tile Queue, veh	2	0	1	1	1	2	0

MOVEMENT SUMMARY

Site: 101 [2024 AM Peak Zimmerman Tr/MT 3 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Zimmerman Trail														
3	L2	43	5.0	49	5.0	0.141	4.3	LOS A	0.6	15.1	0.30	0.17	0.30	26.2
8	T1	104	1.0	120	1.0	0.141	4.2	LOS A	0.6	15.1	0.30	0.17	0.30	23.6
18	R2	344	2.0	395	2.0	0.241	4.1	LOS A	0.0	0.0	0.00	0.00	0.00	24.9
Approach		491	2.1	564	2.1	0.241	4.2	LOS A	0.6	15.1	0.09	0.05	0.09	24.7
East: MT 3														
1	L2	403	3.0	438	3.0	0.468	8.5	LOS A	2.8	74.4	0.48	0.33	0.48	34.1
6	T1	45	40.0	49	40.0	0.468	9.6	LOS A	2.8	74.4	0.48	0.33	0.48	33.5
16	R2	16	7.0	17	7.0	0.468	8.6	LOS A	2.8	74.4	0.48	0.33	0.48	32.2
Approach		464	6.7	504	6.7	0.468	8.6	LOS A	2.8	74.4	0.48	0.33	0.48	33.9
North: Skyway Drive														
7	L2	9	13.0	10	13.0	0.452	11.4	LOS B	2.8	70.2	0.70	0.78	0.91	33.9
4	T1	302	2.0	328	2.0	0.452	10.9	LOS B	2.8	70.2	0.70	0.78	0.91	33.7
14	R2	2	0.0	2	0.0	0.452	10.8	LOS B	2.8	70.2	0.70	0.78	0.91	32.4
Approach		313	2.3	340	2.3	0.452	10.9	LOS B	2.8	70.2	0.70	0.78	0.91	33.7
West: MT 3														
5	L2	6	0.0	7	0.0	0.450	13.2	LOS B	2.3	62.3	0.73	0.82	1.04	36.5
2	T1	116	15.0	126	15.0	0.450	14.1	LOS B	2.3	62.3	0.73	0.82	1.04	34.5
12	R2	113	1.0	123	1.0	0.450	13.3	LOS B	2.3	62.3	0.73	0.82	1.04	34.8
Approach		235	7.9	255	7.9	0.450	13.7	LOS B	2.3	62.3	0.73	0.82	1.04	34.7
All Vehicles		1503	4.5	1664	4.4	0.468	8.3	LOS A	2.8	74.4	0.43	0.40	0.52	30.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024 PM Peak Zimmerman Tr/MT 3 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Zimmerman Trail														
3	L2	109	0.0	112	0.0	0.339	5.9	LOS A	1.9	46.8	0.28	0.15	0.28	25.8
8	T1	318	0.0	328	0.0	0.339	5.9	LOS A	1.9	46.8	0.28	0.15	0.28	23.3
18	R2	411	2.0	424	2.0	0.258	4.0	LOS A	0.0	0.0	0.00	0.00	0.00	24.9
Approach		838	1.0	864	1.0	0.339	5.0	LOS A	1.9	46.8	0.14	0.08	0.14	24.4
East: MT 3														
1	L2	429	1.0	466	1.0	0.676	15.7	LOS C	8.1	205.8	0.82	1.02	1.44	32.7
6	T1	88	5.0	96	5.0	0.676	15.9	LOS C	8.1	205.8	0.82	1.02	1.44	32.2
16	R2	20	0.0	22	0.0	0.676	15.7	LOS C	8.1	205.8	0.82	1.02	1.44	31.6
Approach		537	1.6	584	1.6	0.676	15.8	LOS C	8.1	205.8	0.82	1.02	1.44	32.6
North: Skyway Drive														
7	L2	9	13.0	10	13.0	0.240	8.8	LOS A	1.0	25.5	0.64	0.64	0.64	35.9
4	T1	135	2.0	147	2.0	0.240	8.2	LOS A	1.0	25.5	0.64	0.64	0.64	37.4
14	R2	4	0.0	4	0.0	0.240	8.1	LOS A	1.0	25.5	0.64	0.64	0.64	36.0
Approach		148	2.6	161	2.6	0.240	8.3	LOS A	1.0	25.5	0.64	0.64	0.64	37.3
West: MT 3														
5	L2	3	0.0	3	0.0	0.260	8.3	LOS A	1.0	27.2	0.62	0.62	0.62	39.4
2	T1	59	30.0	64	30.0	0.260	9.8	LOS A	1.0	27.2	0.62	0.62	0.62	35.3
12	R2	88	6.0	96	6.0	0.260	8.6	LOS A	1.0	27.2	0.62	0.62	0.62	36.8
Approach		150	15.3	163	15.3	0.260	9.0	LOS A	1.0	27.2	0.62	0.62	0.62	36.2
All Vehicles		1673	2.6	1772	2.7	0.676	9.2	LOS A	8.1	205.8	0.46	0.49	0.66	28.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024 AM Peak 27th St/Airport Rd/MT3 (Site Folder: General)]

Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: 27th St														
3	L2	65	9.0	76	9.0	0.141	5.0	LOS A	0.6	14.4	0.42	0.31	0.42	34.8
8	T1	55	2.0	65	2.0	0.141	4.8	LOS A	0.6	14.4	0.42	0.31	0.42	36.1
18	R2	223	1.0	262	1.0	0.158	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.3
Approach		343	2.7	404	2.7	0.158	1.7	LOS A	0.6	14.4	0.15	0.11	0.15	38.3
East: Airport Road														
1	L2	354	1.0	416	1.0	0.347	6.3	LOS A	1.8	46.3	0.38	0.25	0.38	33.8
6	T1	355	8.0	418	8.0	0.384	7.1	LOS A	1.9	51.4	0.39	0.26	0.39	35.3
16	R2	12	0.0	14	0.0	0.384	6.9	LOS A	1.9	51.4	0.39	0.26	0.39	35.4
Approach		721	4.4	848	4.4	0.384	6.7	LOS A	1.9	51.4	0.39	0.25	0.39	34.5
North: Terminal Circle														
7	L2	13	8.0	15	8.0	0.103	7.4	LOS A	0.3	8.8	0.60	0.60	0.60	27.4
4	T1	31	4.0	36	4.0	0.103	7.1	LOS A	0.3	8.8	0.60	0.60	0.60	27.8
14	R2	9	0.0	11	0.0	0.103	6.9	LOS A	0.3	8.8	0.60	0.60	0.60	27.6
Approach		53	4.3	62	4.3	0.103	7.2	LOS A	0.3	8.8	0.60	0.60	0.60	27.7
West: MT3														
5	L2	21	0.0	25	0.0	0.326	7.4	LOS A	1.3	35.0	0.54	0.50	0.54	35.8
2	T1	226	7.0	266	7.0	0.326	7.6	LOS A	1.3	35.0	0.54	0.50	0.54	34.9
12	R2	229	1.0	269	1.0	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	39.9
Approach		476	3.8	560	3.8	0.326	4.0	LOS A	1.3	35.0	0.28	0.26	0.28	37.2
All Vehicles		1593	3.9	1874	3.9	0.384	4.8	LOS A	1.9	51.4	0.31	0.24	0.31	35.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
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Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024 PM Peak (27th St/Airport Rd/MT3) (Site Folder: General)]

Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: 27th St														
3	L2	199	1.0	234	1.0	0.314	7.3	LOS A	1.4	35.8	0.57	0.53	0.57	33.8
8	T1	43	3.0	51	3.0	0.314	7.4	LOS A	1.4	35.8	0.57	0.53	0.57	33.7
18	R2	688	1.0	809	1.0	0.488	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.1
Approach		930	1.1	1094	1.1	0.488	2.0	LOS A	1.4	35.8	0.15	0.14	0.15	38.2
East: Airport Road														
1	L2	241	0.0	284	0.0	0.264	5.9	LOS A	1.2	30.7	0.46	0.36	0.46	34.1
6	T1	283	3.0	333	3.0	0.337	6.9	LOS A	1.6	41.5	0.49	0.39	0.49	36.1
16	R2	16	0.0	19	0.0	0.337	6.8	LOS A	1.6	41.5	0.49	0.39	0.49	35.5
Approach		540	1.6	635	1.6	0.337	6.4	LOS A	1.6	41.5	0.47	0.38	0.47	35.2
North: Terminal Circle														
7	L2	25	0.0	29	0.0	0.126	6.7	LOS A	0.4	11.1	0.59	0.59	0.59	28.2
4	T1	40	0.0	47	0.0	0.126	6.7	LOS A	0.4	11.1	0.59	0.59	0.59	28.2
14	R2	8	0.0	9	0.0	0.126	6.7	LOS A	0.4	11.1	0.59	0.59	0.59	27.6
Approach		73	0.0	86	0.0	0.126	6.7	LOS A	0.4	11.1	0.59	0.59	0.59	28.1
West: MT3														
5	L2	16	0.0	19	0.0	0.430	8.3	LOS A	2.1	53.4	0.54	0.47	0.54	35.5
2	T1	349	5.0	411	5.0	0.430	8.5	LOS A	2.1	53.4	0.54	0.47	0.54	34.8
12	R2	65	7.0	76	7.0	0.049	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	38.9
Approach		430	5.1	506	5.1	0.430	7.2	LOS A	2.1	53.4	0.45	0.40	0.45	35.4
All Vehicles		1973	2.1	2321	2.1	0.488	4.5	LOS A	2.1	53.4	0.32	0.28	0.32	36.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
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Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	275	0	10	95	5	85
Future Vol, veh/h	275	0	10	95	5	85
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	350	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	13	0	25	20	0	7
Mvmt Flow	302	0	11	104	5	93

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	302	0	429	302
Stage 1	-	-	-	-	302	-
Stage 2	-	-	-	-	126	-
Critical Hdwy	-	-	4.35	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.425	-	3.5	3.363
Pot Cap-1 Maneuver	-	-	1139	-	587	726
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	904	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1139	-	581	726
Mov Cap-2 Maneuver	-	-	-	-	581	-
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	896	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.78	10.83
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	716	-	-	1139	-
HCM Lane V/C Ratio	0.138	-	-	0.01	-
HCM Ctrl Dly (s/v)	10.8	-	-	8.2	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Intersection Delay, s/veh	69.6
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	430	861	965	583
Demand Flow Rate, veh/h	465	919	985	599
Vehicles Circulating, veh/h	1359	287	307	967
Vehicles Exiting, veh/h	207	296	1517	239
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	208.3	29.7	12.5	120.6
Approach LOS	F	D	B	F

Lane	Left	Left	Left	Bypass	Left
Designated Moves	LTR	LTR	LT	R	LTR
Assumed Moves	LTR	LTR	LT		LTR
RT Channelized				Yield	
Lane Util	1.000	1.000	1.000		1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	465	919	276	709	599
Cap Entry Lane, veh/h	345	1030	1009	1020	515
Entry HV Adj Factor	0.925	0.937	0.979	0.980	0.974
Flow Entry, veh/h	430	861	270	695	583
Cap Entry, veh/h	319	964	987	1000	501
V/C Ratio	1.348	0.892	0.274	0.695	1.164
Control Delay, s/veh	208.3	29.7	6.4	14.8	120.6
LOS	F	D	A	B	F
95th %tile Queue, veh	21	13	1	6	21

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	820	640	6	65	105
Future Vol, veh/h	30	820	640	6	65	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	570	-	-	100	225	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	27	4	7	0	3	2
Mvmt Flow	34	932	727	7	74	119

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	727	0	-	0	1727	727
Stage 1	-	-	-	-	727	-
Stage 2	-	-	-	-	1000	-
Critical Hdwy	4.37	-	-	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.443	-	-	-	3.527	3.318
Pot Cap-1 Maneuver	772	-	-	0	97	424
Stage 1	-	-	-	0	477	-
Stage 2	-	-	-	0	354	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	772	-	-	-	93	424
Mov Cap-2 Maneuver	-	-	-	-	93	-
Stage 1	-	-	-	-	455	-
Stage 2	-	-	-	-	354	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.35	0	58.22
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	772	-	-	93	424
HCM Lane V/C Ratio	0.044	-	-	0.798	0.282
HCM Ctrl Dly (s/v)	9.9	-	-	125.2	16.8
HCM Lane LOS	A	-	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	4.2	1.1

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	115	760	0	0	595	105	0	0	2	25	0	35
Future Vol, veh/h	115	760	0	0	595	105	0	0	2	25	0	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	340	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	7	4	0	0	6	5	0	0	0	33	0	43
Mvmt Flow	134	884	0	0	692	122	0	0	2	29	0	41

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	814	0	0	884	0	0	1843	1965	884	1904	1904	753
Stage 1	-	-	-	-	-	-	1151	1151	-	753	753	-
Stage 2	-	-	-	-	-	-	692	814	-	1151	1151	-
Critical Hdwy	4.17	-	-	4.1	-	-	7.1	6.5	6.2	7.43	6.5	6.63
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.43	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.43	5.5	-
Follow-up Hdwy	2.263	-	-	2.2	-	-	3.5	4	3.3	3.797	4	3.687
Pot Cap-1 Maneuver	792	-	-	774	-	-	58	64	347	43	70	350
Stage 1	-	-	-	-	-	-	243	275	-	358	420	-
Stage 2	-	-	-	-	-	-	438	394	-	210	275	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	792	-	-	774	-	-	34	43	347	~ 29	46	350
Mov Cap-2 Maneuver	-	-	-	-	-	-	34	43	-	~ 29	46	-
Stage 1	-	-	-	-	-	-	162	184	-	358	420	-
Stage 2	-	-	-	-	-	-	387	394	-	139	184	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	1.38	0	15.43	165.08
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	347	237	-	-	774	-	-	29	350
HCM Lane V/C Ratio	0.007	0.169	-	-	-	-	-	1.014	0.116
HCM Ctrl Dly (s/v)	15.4	10.5	0	-	0	-	-	$ 372.9	16.6
HCM Lane LOS	C	B	A	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0	0.6	-	-	0	-	-	3.3	0.4

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	745	2	2	690	45	3	0	3	15	0	10
Future Vol, veh/h	40	745	2	2	690	45	3	0	3	15	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	4	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	47	876	2	2	812	53	4	0	4	18	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	865	0	0	879	0	0	1788	1841	878	1814	1816	838
Stage 1	-	-	-	-	-	-	972	972	-	843	843	-
Stage 2	-	-	-	-	-	-	816	869	-	971	973	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	787	-	-	777	-	-	64	76	350	61	79	369
Stage 1	-	-	-	-	-	-	306	333	-	361	382	-
Stage 2	-	-	-	-	-	-	374	372	-	307	333	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	787	-	-	777	-	-	54	67	350	53	69	369
Mov Cap-2 Maneuver	-	-	-	-	-	-	54	67	-	53	69	-
Stage 1	-	-	-	-	-	-	271	294	-	359	380	-
Stage 2	-	-	-	-	-	-	360	370	-	268	294	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.5	0.03	46.44	73
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	94	91	-	-	5	-	-	81
HCM Lane V/C Ratio	0.075	0.06	-	-	0.003	-	-	0.364
HCM Ctrl Dly (s/v)	46.4	9.9	0	-	9.6	0	-	73
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0	-	-	1.4

Intersection	
Intersection Delay, s/veh	11.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	905	1389	682	101
Demand Flow Rate, veh/h	939	1452	704	105
Vehicles Circulating, veh/h	740	335	526	1620
Vehicles Exiting, veh/h	985	485	714	167
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.2	15.6	3.2	16.2
Approach LOS	A	C	A	C

Lane	Left	Bypass	Left	Right	Left	Bypass	Left
Designated Moves	LT	R	L	TR	LT	R	LTR
Assumed Moves	LT		L	TR	LT		LTR
RT Channelized		Free				Free	
Lane Util	1.000		0.450	0.550	1.000		1.000
Follow-Up Headway, s	2.535		2.667	2.535	2.535		2.535
Critical Headway, s	4.328		4.645	4.328	4.328		4.328
A (Intercept)	1420		1350	1420	1420		1420
B (Slope)	8.501e-4		9.199e-4	8.501e-4	8.501e-4		8.501e-4
Entry Flow, veh/h	500	439	653	799	294	410	105
Cap Entry Lane, veh/h	757	1768	992	1068	908	1768	358
Entry HV Adj Factor	0.940	0.990	0.991	0.928	0.939	0.990	0.959
Flow Entry, veh/h	470	435	647	742	276	406	101
Cap Entry, veh/h	712	1750	983	991	852	1750	343
V/C Ratio	0.660	0.249	0.658	0.748	0.324	0.232	0.293
Control Delay, s/veh	17.6	0.0	13.7	17.3	7.9	0.0	16.2
LOS	C	A	B	C	A	A	C
95th %tile Queue, veh	5	1	5	7	1	1	1

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	225	2	70	230	3	45
Future Vol, veh/h	225	2	70	230	3	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	350	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	100	0	6	0	4
Mvmt Flow	247	2	77	253	3	49

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	249	0	655	248
Stage 1	-	-	-	-	248	-
Stage 2	-	-	-	-	407	-
Critical Hdwy	-	-	4.1	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	1328	-	434	785
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	677	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1328	-	409	785
Mov Cap-2 Maneuver	-	-	-	-	409	-
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	637	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.84	10.22
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	743	-	-	1328	-
HCM Lane V/C Ratio	0.071	-	-	0.058	-
HCM Ctrl Dly (s/v)	10.2	-	-	7.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-

Intersection	
Intersection Delay, s/veh	82.1
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	247	954	1360	243
Demand Flow Rate, veh/h	285	969	1374	250
Vehicles Circulating, veh/h	998	690	156	1092
Vehicles Exiting, veh/h	344	151	1127	567
Ped Vol Crossing Leg, #/h	0	0	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	21.7	215.7	10.2	20.6
Approach LOS	C	F	B	C

Lane	Left	Left	Left	Bypass	Left
Designated Moves	LTR	LTR	LT	R	LTR
Assumed Moves	LTR	LTR	LT		LTR
RT Channelized				Yield	
Lane Util	1.000	1.000	1.000		1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	285	969	685	689	250
Cap Entry Lane, veh/h	499	683	1177	1183	453
Entry HV Adj Factor	0.866	0.985	1.000	0.980	0.971
Flow Entry, veh/h	247	954	685	675	243
Cap Entry, veh/h	432	672	1177	1160	440
V/C Ratio	0.572	1.419	0.582	0.582	0.552
Control Delay, s/veh	21.7	215.7	10.1	10.2	20.6
LOS	C	F	B	B	C
95th %tile Queue, veh	3	43	4	4	3

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	100	660	855	60	20	60
Future Vol, veh/h	100	660	855	60	20	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	570	-	-	100	225	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	5	1	0	10	0
Mvmt Flow	115	759	983	69	23	69

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	983	0	-	0	1971	983
Stage 1	-	-	-	-	983	-
Stage 2	-	-	-	-	989	-
Critical Hdwy	4.12	-	-	-	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.218	-	-	-	3.59	3.3
Pot Cap-1 Maneuver	703	-	-	0	65	305
Stage 1	-	-	-	0	351	-
Stage 2	-	-	-	0	348	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	703	-	-	-	55	305
Mov Cap-2 Maneuver	-	-	-	-	55	-
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	348	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.46	0	43.28
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	703	-	-	55	305
HCM Lane V/C Ratio	0.164	-	-	0.421	0.226
HCM Ctrl Dly (s/v)	11.1	-	-	112.4	20.2
HCM Lane LOS	B	-	-	F	C
HCM 95th %tile Q(veh)	0.6	-	-	1.6	0.9

Intersection	
Int Delay, s/veh	22.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	625	3	2	780	30	0	0	2	90	0	130
Future Vol, veh/h	25	625	3	2	780	30	0	0	2	90	0	130
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	340	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	29	718	3	2	897	34	0	0	2	103	0	149

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	931	0	0	722	0	0	1679	1713	720	1694	1698	914
Stage 1	-	-	-	-	-	-	778	778	-	918	918	-
Stage 2	-	-	-	-	-	-	901	936	-	776	779	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	743	-	-	889	-	-	76	91	431	~ 74	93	334
Stage 1	-	-	-	-	-	-	393	410	-	328	353	-
Stage 2	-	-	-	-	-	-	335	347	-	393	409	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	743	-	-	889	-	-	39	85	431	~ 69	87	334
Mov Cap-2 Maneuver	-	-	-	-	-	-	39	85	-	~ 69	87	-
Stage 1	-	-	-	-	-	-	367	383	-	326	351	-
Stage 2	-	-	-	-	-	-	184	345	-	366	383	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.38	0.02	13.39	174.35
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	431	69	-	-	4	-	-	69	334
HCM Lane V/C Ratio	0.005	0.039	-	-	0.003	-	-	1.506	0.448
HCM Ctrl Dly (s/v)	13.4	10	0	-	9.1	0	-	$ 391.2	24.2
HCM Lane LOS	B	B	A	-	A	A	-	F	C
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	8.8	2.2

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	11.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	700	0	0	765	15	3	0	0	55	0	40
Future Vol, veh/h	15	700	0	0	765	15	3	0	0	55	0	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	100	6	0	0	2	0	0	0	0	11	0	0
Mvmt Flow	17	787	0	0	860	17	3	0	0	62	0	45

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	876	0	0	787	0	0	1680	1697	787	1688	1688	868
Stage 1	-	-	-	-	-	-	820	820	-	868	868	-
Stage 2	-	-	-	-	-	-	860	876	-	820	820	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.21	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.21	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.21	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.599	4	3.3
Pot Cap-1 Maneuver	478	-	-	842	-	-	76	93	395	70	95	355
Stage 1	-	-	-	-	-	-	372	392	-	335	372	-
Stage 2	-	-	-	-	-	-	354	369	-	356	392	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	478	-	-	842	-	-	62	88	395	66	89	355
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	88	-	66	89	-
Stage 1	-	-	-	-	-	-	349	367	-	335	372	-
Stage 2	-	-	-	-	-	-	309	369	-	334	367	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.27	0	66.15	186.57
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	62	38	-	-	842	-	-	100
HCM Lane V/C Ratio	0.054	0.035	-	-	-	-	-	1.063
HCM Ctrl Dly (s/v)	66.1	12.8	0	-	0	-	-	186.6
HCM Lane LOS	F	B	A	-	A	-	-	F
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	6.7

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	840	939	1599	131
Demand Flow Rate, veh/h	884	954	1617	131
Vehicles Circulating, veh/h	527	462	758	1283
Vehicles Exiting, veh/h	887	731	483	133
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.5	10.9	3.9	11.7
Approach LOS	C	B	A	B

Lane	Left	Bypass	Left	Right	Left	Bypass	Left
Designated Moves	LT	R	L	TR	LT	R	LTR
Assumed Moves	LT		L	TR	LT		LTR
RT Channelized		Free				Free	
Lane Util	1.000		0.432	0.568	1.000		1.000
Follow-Up Headway, s	2.535		2.667	2.535	2.535		2.535
Critical Headway, s	4.328		4.645	4.328	4.328		4.328
A (Intercept)	1420		1350	1420	1420		1420
B (Slope)	8.501e-4		9.199e-4	8.501e-4	8.501e-4		8.501e-4
Entry Flow, veh/h	714	170	412	542	435	1182	131
Cap Entry Lane, veh/h	907	1873	883	959	746	1768	477
Entry HV Adj Factor	0.954	0.935	1.000	0.972	0.986	0.990	1.000
Flow Entry, veh/h	681	159	412	527	429	1170	131
Cap Entry, veh/h	866	1750	883	932	735	1750	477
V/C Ratio	0.787	0.091	0.467	0.565	0.583	0.669	0.275
Control Delay, s/veh	21.6	0.0	9.9	11.6	14.4	0.0	11.7
LOS	C	A	A	B	B	A	B
95th %tile Queue, veh	8	0	3	4	4	6	1

MOVEMENT SUMMARY

Site: 101 [2045 AM Peak Zimmerman Trail/MT 3 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Zimmerman Trail														
3	L2	70	5.0	80	5.0	0.244	5.6	LOS A	1.1	28.1	0.40	0.29	0.40	25.8
8	T1	165	1.0	190	1.0	0.244	5.5	LOS A	1.1	28.1	0.40	0.29	0.40	23.3
18	R2	608	2.0	699	2.0	0.426	6.3	LOS A	0.0	0.0	0.00	0.00	0.00	24.9
Approach		843	2.1	969	2.1	0.426	6.3	LOS A	1.1	28.1	0.11	0.08	0.11	24.6
East: MT 3														
1	L2	645	3.0	741	3.0	0.893	29.6	LOS D	28.8	760.6	1.00	1.47	2.52	27.2
6	T1	75	40.0	86	40.0	0.893	30.9	LOS D	28.8	760.6	1.00	1.47	2.52	24.9
16	R2	30	7.0	34	7.0	0.893	29.7	LOS D	28.8	760.6	1.00	1.47	2.52	26.1
Approach		750	6.9	862	6.9	0.893	29.7	LOS D	28.8	760.6	1.00	1.47	2.52	26.9
North: Skyway Drive														
7	L2	35	13.0	38	13.0	1.104	100.7	LOS F	31.3	799.8	1.00	2.41	6.17	14.9
4	T1	470	2.0	511	2.0	1.104	99.9	LOS F	31.3	799.8	1.00	2.41	6.17	15.2
14	R2	3	0.0	3	0.0	1.104	99.8	LOS F	31.3	799.8	1.00	2.41	6.17	14.9
Approach		508	2.7	552	2.7	1.104	99.9	LOS F	31.3	799.8	1.00	2.41	6.17	15.1
West: MT 3														
5	L2	10	0.0	11	0.0	1.179	139.3	LOS F	29.2	776.5	1.00	2.42	7.05	12.1
2	T1	190	15.0	207	15.0	1.179	140.8	LOS F	29.2	776.5	1.00	2.42	7.05	11.9
12	R2	175	1.0	190	1.0	1.179	139.4	LOS F	29.2	776.5	1.00	2.42	7.05	11.9
Approach		375	8.1	408	8.1	1.179	140.1	LOS F	29.2	776.5	1.00	2.42	7.05	11.9
All Vehicles		2476	4.6	2791	4.6	1.179	51.5	LOS F	31.3	799.8	0.69	1.31	3.07	19.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2045 PM Peak Zimmerman Trail/MT 3 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Zimmerman Trail														
3	L2	170	0.0	175	0.0	0.561	9.4	LOS A	4.1	102.6	0.51	0.34	0.51	24.8
8	T1	495	0.0	510	0.0	0.561	9.4	LOS A	4.1	102.6	0.51	0.34	0.51	22.5
18	R2	655	2.0	675	2.0	0.411	5.7	LOS A	0.0	0.0	0.00	0.00	0.00	24.9
Approach		1320	1.0	1361	1.0	0.561	7.7	LOS A	4.1	102.6	0.26	0.17	0.26	23.9
East: MT 3														
1	L2	725	1.0	747	1.0	1.421	216.2	LOS F	105.6	2674.2	1.00	4.06	11.91	8.8
6	T1	150	5.0	155	5.0	1.421	216.4	LOS F	105.6	2674.2	1.00	4.06	11.91	8.7
16	R2	50	0.0	52	0.0	1.421	216.2	LOS F	105.6	2674.2	1.00	4.06	11.91	8.7
Approach		925	1.6	954	1.6	1.421	216.3	LOS F	105.6	2674.2	1.00	4.06	11.91	8.8
North: Skyway Drive														
7	L2	20	13.0	22	13.0	0.445	14.0	LOS B	2.4	60.6	0.74	0.83	1.04	33.2
4	T1	210	2.0	228	2.0	0.445	13.3	LOS B	2.4	60.6	0.74	0.83	1.04	34.5
14	R2	6	0.0	7	0.0	0.445	13.2	LOS B	2.4	60.6	0.74	0.83	1.04	33.3
Approach		236	2.9	257	2.9	0.445	13.3	LOS B	2.4	60.6	0.74	0.83	1.04	34.4
West: MT 3														
5	L2	5	0.0	5	0.0	0.491	14.6	LOS B	2.5	71.4	0.74	0.85	1.14	35.4
2	T1	95	30.0	103	30.0	0.491	16.4	LOS C	2.5	71.4	0.74	0.85	1.14	32.0
12	R2	140	6.0	152	6.0	0.491	15.0	LOS B	2.5	71.4	0.74	0.85	1.14	33.3
Approach		240	15.4	261	15.4	0.491	15.5	LOS C	2.5	71.4	0.74	0.85	1.14	32.8
All Vehicles		2721	2.6	2832	2.7	1.421	79.1	LOS F	105.6	2674.2	0.59	1.60	4.33	15.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2045 AM Peak 27th St/Airport Rd/MT3 (Site Folder: General)]

Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: 27th St														
3	L2	150	9.0	176	9.0	0.335	8.3	LOS A	1.4	37.2	0.59	0.57	0.59	32.9
8	T1	85	2.0	100	2.0	0.335	8.0	LOS A	1.4	37.2	0.59	0.57	0.59	34.0
18	R2	345	1.0	406	1.0	0.245	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.2
Approach		580	3.2	682	3.2	0.335	3.4	LOS A	1.4	37.2	0.24	0.23	0.24	37.0
East: Airport Road														
1	L2	550	1.0	647	1.0	0.625	12.2	LOS B	7.0	176.5	0.70	0.76	1.06	31.1
6	T1	610	8.0	718	8.0	0.763	18.4	LOS C	13.4	354.7	0.80	1.06	1.64	30.0
16	R2	20	0.0	24	0.0	0.763	18.1	LOS C	13.4	354.7	0.80	1.06	1.64	30.1
Approach		1180	4.6	1388	4.6	0.763	15.5	LOS C	13.4	354.7	0.75	0.92	1.37	30.5
North: Terminal Circle														
7	L2	20	8.0	24	8.0	0.291	16.6	LOS C	1.0	25.3	0.80	0.86	0.96	24.7
4	T1	50	4.0	59	4.0	0.291	16.2	LOS C	1.0	25.3	0.80	0.86	0.96	25.1
14	R2	15	0.0	18	0.0	0.291	15.8	LOS C	1.0	25.3	0.80	0.86	0.96	24.9
Approach		85	4.2	100	4.2	0.291	16.2	LOS C	1.0	25.3	0.80	0.86	0.96	25.0
West: MT3														
5	L2	35	0.0	41	0.0	0.661	17.4	LOS C	5.4	141.3	0.78	1.00	1.52	30.9
2	T1	365	7.0	429	7.0	0.661	17.7	LOS C	5.4	141.3	0.78	1.00	1.52	30.2
12	R2	370	1.0	435	1.0	0.263	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	39.9
Approach		770	3.8	906	3.8	0.661	9.2	LOS A	5.4	141.3	0.40	0.52	0.79	34.2
All Vehicles		2615	4.0	3076	4.0	0.763	11.0	LOS B	13.4	354.7	0.54	0.65	0.93	32.6

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Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2045 PM Peak (27th St/Airport Rd/MT3) (Site Folder: General)]

Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: 27th St														
3	L2	320	1.0	376	1.0	0.685	19.7	LOS C	5.9	148.4	0.83	1.06	1.63	28.7
8	T1	70	3.0	82	3.0	0.685	19.8	LOS C	5.9	148.4	0.83	1.06	1.63	28.6
18	R2	1065	1.0	1253	1.0	0.756	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	39.7
Approach		1455	1.1	1712	1.1	0.756	5.7	LOS A	5.9	148.4	0.22	0.29	0.44	35.9
East: Airport Road														
1	L2	375	0.0	441	0.0	0.487	10.1	LOS B	3.3	83.3	0.67	0.73	0.88	32.1
6	T1	455	3.0	535	3.0	0.641	14.3	LOS B	6.5	166.6	0.76	0.96	1.32	32.3
16	R2	25	0.0	29	0.0	0.641	14.2	LOS B	6.5	166.6	0.76	0.96	1.32	31.8
Approach		855	1.6	1006	1.6	0.641	12.5	LOS B	6.5	166.6	0.72	0.86	1.13	32.2
North: Terminal Circle														
7	L2	40	0.0	47	0.0	0.319	13.5	LOS B	1.2	30.2	0.76	0.83	0.93	26.0
4	T1	65	0.0	76	0.0	0.319	13.5	LOS B	1.2	30.2	0.76	0.83	0.93	26.0
14	R2	15	0.0	18	0.0	0.319	13.5	LOS B	1.2	30.2	0.76	0.83	0.93	25.5
Approach		120	0.0	141	0.0	0.319	13.5	LOS B	1.2	30.2	0.76	0.83	0.93	25.9
West: MT3														
5	L2	25	0.0	29	0.0	0.870	29.6	LOS D	16.7	433.2	0.95	1.53	2.68	26.6
2	T1	595	5.0	700	5.0	0.870	29.8	LOS D	16.7	433.2	0.95	1.53	2.68	26.3
12	R2	145	7.0	171	7.0	0.109	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	38.9
Approach		765	5.2	900	5.2	0.870	24.1	LOS C	16.7	433.2	0.77	1.24	2.17	28.0
All Vehicles		3195	2.2	3759	2.2	0.870	12.0	LOS B	16.7	433.2	0.51	0.69	1.06	32.2

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