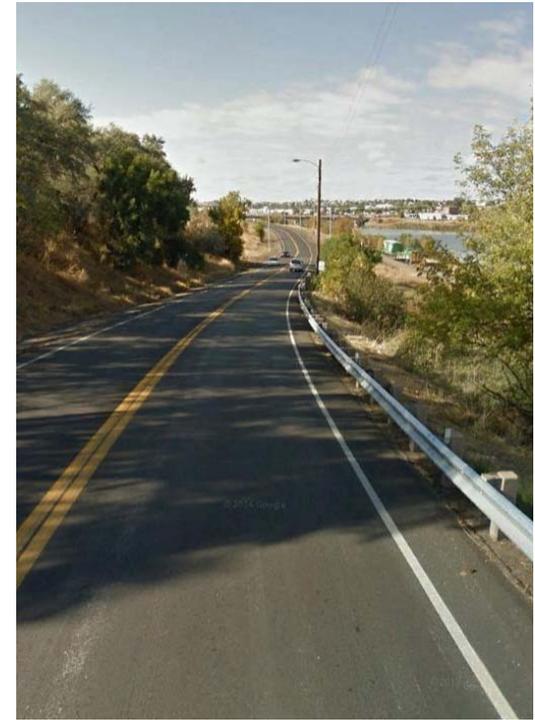


EXISTING AND PROJECTED CONDITIONS

Technical Memorandum



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Existing and Projected Conditions

1.0. INTRODUCTION

This report identifies existing and projected roadway conditions, as well as social, economic, and environmental factors that influence the River Drive North corridor in Great Falls. The analysis performed includes a planning-level examination of the corridor by applying technical and environmental considerations to determine known issues, constraints, and/or areas of concern.

The analysis contained in this report is based on existing and historic traffic data, field measurements and observations, roadway as-built plans, aerial imagery, Geographical Information Systems (GIS), and publically available environmental information and demographics.

1.1. STUDY AREA

The study area for the *River Drive Corridor Study* includes a two mile segment of River Drive North in northern Great Falls. The corridor begins at the intersection with 15th Street North (Reference Post [RP] 3.4) and ends at the intersection with 38th Street North (RP 5.4). A 200-foot buffer from centerline along both sides of the roadway was used to define the study area. **Figure 1** presents the location of the corridor and the study area.

The north side of the corridor is generally constrained by the Missouri River. In addition, the River's Edge Trail parallels the corridor between the river and the roadway. South of the roadway, the land consists of commercial and residential development between 15th Street North and 25th Street North. Recreational development exists on the south side of the road east of 25th Street North.

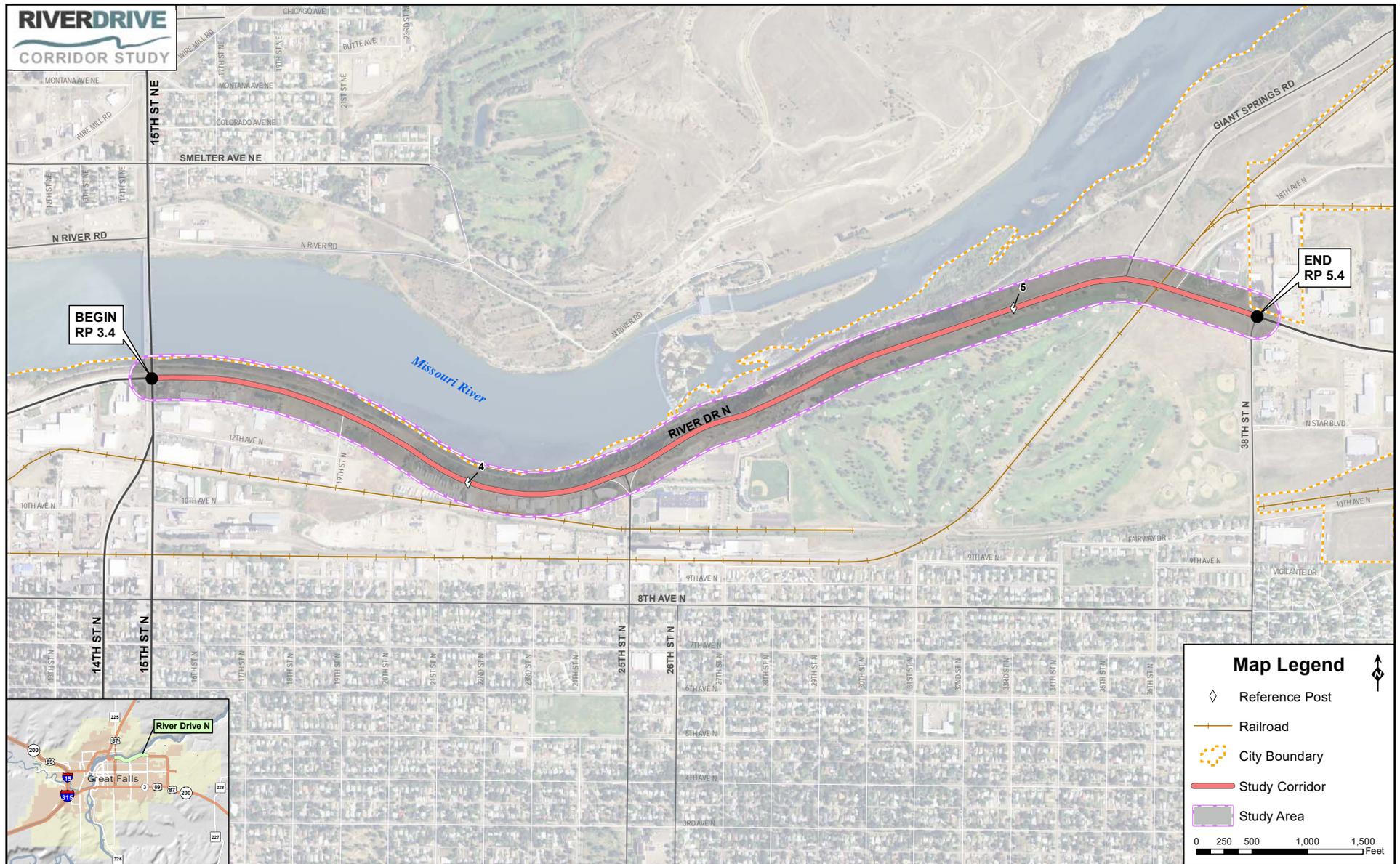


Figure 1: Study Area Boundary

1.2. PAST, CURRENT AND PLANNED PROJECTS

River Drive North was originally constructed in 1945. Since then, numerous projects have been constructed. A search of the Montana Department of Transportation (MDT) online summary of road and bridge construction projects was reviewed to identify notable projects within the study area. A list of recent projects, along with the letting date and a brief description, are shown in **Table 1**. The list is not an all-inclusive list of projects, rather, it is only a list of recent major projects completed along the corridor. The list does not include maintenance projects performed by MDT such as guardrail repair, pothole repair, striping, or other similar project. In addition, there have been multiple Community Transportation Enhancement Program (CTEP) projects within the study area. The CTEP projects include non-motorized improvements, such as the River's Edge Trail and the Caboose Trailhead.

Table 1: Recent Projects within the Study Area

Project Name	ID Number	UPN	Letting Date	Description
15th St. and River Drive – Great Falls – Cascade County	NH 10-1(15)3	1356	22-FEB-96	Improvements to the intersection at 15 th Street North and River Drive North.
Giant Springs Road – Great Falls	PLH-STPU 5221(3)	4694	26-JUL-01	Improvements to Giant Springs Road including the intersection of River Drive North.
Northeast Bypass – Great Falls	NH-STPE 5205(18)	4042	27-MAY-04	Reconstruction of the Northeast Bypass between 38 th Street North and 2 nd Avenue North. Included installation of a traffic signal at the intersection with 38 th Street North.
River Dr – 15th to 25th (GTFLS)	NH 102-1(4)3	6953	02-DEC-10	Pavement preservation of River Drive North between 15 th Street North and 25 th Street North. Included street lighting.
River Dr – 25th to 38th (GTF)	NH 102-1(8)4	7627	26-APR-12	Pavement preservation of River Drive North between 25 th Street North and 38 th Street North. Included digouts and a mechanically stabilized earth retaining wall.

Source: MDT Project List accessible at http://www3.mdt.mt.gov:7782/mttplc/mttplc.tplk0007.project_init

Two future projects are planned within the study area. Project UPN 8879 will result in construction of an overlook along River Drive North near the intersection of 25th Street North. Project UPN 5556 includes construction of a new bicycle/pedestrian bridge along 25th Street North just south of River Drive North. This project also includes sidewalk, curb, and landscaping.

1.3. LOCAL PLANNING

Local planning documents and regulations were reviewed for relevance to transportation within the study area. Improvement options identified as part of this study should be reviewed for continuity with existing local plans and regulations. In addition, a review for updated planning documents should take place during the project development process. The following provides a summary of relevant planning documents.

Great Falls Area Long Range Transportation Plan – 2014

The *Great Falls Area Long Range Transportation Plan (LRTP) – 2014*¹ is intended to offer guidance for the decision-makers in the Great Falls Area by responding to existing and future transportation system concerns through a menu of large and small improvements to the transportation network. The LRTP provides a blueprint for guiding transportation infrastructure investments based on system needs and associated decision-making principles. Several items were noted in the LRTP that should be taken into consideration during the corridor study. The following provides a summary of recommended improvement options identified along the study corridor.

MSN-1: River Drive North – 15th Street North to 38th Street North

The existing two-lane facility will be inadequate to handle future traffic volumes. An expansion of the existing facility will be needed by the year 2035, and probably sooner given current travel characteristics exhibited during peak travel hours. Due to a high level of public interest in this corridor and its close proximity to the Missouri River and River's Edge Trail, it is recommended that a detailed corridor study and environmental assessment be undertaken prior to any design or construction which would consider reconstruction scenarios for River Drive North (15th Street North to 38th Street North). A corridor planning study should be entertained before proceeding with any project(s), which would then help inform the level of environmental documentation required.

The reconstruction of the facility along its existing alignment should be to a minimum three-lane principal arterial standard. It is recommended that any roadway widening be to the south and away from the river. The entire reconstruction of the facility could be constructed in two phases. Phase 1 could include the segment between 15th Street North and 25th Street North, while phase 2 could occur later in the planning horizon and include the segment between 25th Street North and 38th Street North. Coincident to project development activities, an assessment to the viability of non-motorized amenities should be made as public sentiment and stakeholder feedback has identified this route as an important gap in the visionary bicycle network for the community.

Illustrative MSN-20: 25th Street North – River Drive to 2nd Avenue North

Reconstruct to a minor arterial street standard. The roadway currently exhibits a mixture of urban and rural road characteristics. It is desirable to reconstruct the road to an urban minor arterial to accommodate increasing traffic, provide better non-motorized facilities and connectivity, and plan for the varied uses in the area. The project would require a new bridge crossing of the railroad. The intersection of 25th Street North and River Drive North should be reconstructed with consideration for either traffic signalization or a modern roundabout.

Non-motorized Recommendations

- **River Drive North (15th Street North to 38th Street North):** If River Drive North is improved to a 3-lane arterial section, an assessment to the viability of on-street bike lanes should be made as public sentiment and stakeholder feedback has identified this route as an important gap in the visionary bicycle network for the community.

- **15th Street North Connector Trail (15th Street North to 19th Street North):** If deemed feasible, construct a shared-use path on the north side of River Drive between 15th Street North and 19th Street North. The path would connect the River's Edge Trail to the intersection of 15th Street North and River Drive.
- **15th Street North and River Drive North (Intersection Improvement – Buffered Bike Lanes):** Construct intersection improvements to facilitate connections from 15th Street North to the proposed 15th Street North Connector Trail.
- **25th Street North and River Drive North (Trail Connection – Shared Use Pathway):** If deemed feasible, provide a shared-use connection between 25th Street North and the River's Edge Trail. The connection could be considered by either a trail descending from River Drive down to the River's Edge Trail, or by a tunnel connecting to Veteran's Memorial Park. This connection would tie into the proposed 25th Street North bike lanes and the currently under development pedestrian bridge over the railroad tracks along 25th Street North.

Cascade County Growth Policy Update (2014)

The *Cascade County Growth Policy Update (2014)*² was drafted as a comprehensive plan to provide guidance on decisions regarding land development and public investments within Cascade County. The document outlines 13 goals, of which the transportation goal is most relevant to this study. The transportation goal is to, "promote and maintain a transportation system that provides safety, efficiency, and is cost effective". In addition, nine objectives are listed to help achieve this goal.

City of Great Falls Growth Policy Update (2013)

The *City of Great Falls Growth Policy Update (2013)*³ is intended to provide guidance to the local government with regard to establishing policy and a framework to guide the social, environmental, economic, and physical makeup of the city of Great Falls. The Growth Policy recognizes that transportation and growth go hand in hand. Specific to the study corridor, the Growth Policy notes that existing traffic volumes on River Drive North, between 15th Street North and 25th Street North, currently exceed optimal levels for the number of lanes present.

A number of goals and policies were crafted around four primary focus areas: Social, Environmental, Economic and Physical. In all four focus areas there are transportation related policies interwoven throughout. There are multiple policies identified to improve transportation system form and function throughout the Growth Policy. Perhaps most specific to transportation in the community is information developed under the "transportation and mobility" goal found under the Physical focus area. The transportation and mobility goal is to, "increase mobility and the access of citizens to transportation alternatives throughout the City". Twelve policies are identified as part of this goal.

Great Falls Transit Development Plan (2010)

The *Great Falls Transit Development Plan (TDP)*⁴ was developed to analyze and recommend strategies that will affect the delivery of public transportation services for the Great Falls Transit District. The TDP states the following: "The mission of the Great Falls Transit District is to provide a safe, reliable, affordable and fiscally sound transportation system for the people of Great Falls and Black Eagle, Montana." Currently no fixed routes use the study corridor. Furthermore, no new alternative routes are recommended within the study area.

River Drive North Feasibility Study (2009)

The *River Drive North Feasibility Study*⁵ was developed as an academic exercise with students of the George Mason University, Transportation Policy, Operations and Logistics Program in cooperation with MDT and the City of Great Falls. The purpose of the study was to research and develop alternatives to improving River Drive North between 15th Street North and 38th Street North.

The study recommends that the River Drive North corridor be reconstructed to include two travel lanes (one in each direction), left-turn lanes where necessary, and improvements to roadway geometrics to improve safety and operations. The study notes that the recommended configuration does not fully meet capacity demands, but would result in less impacts to adjacent landowners and would have less constraints than a four-lane roadway.

The study recommends that a new bridge across the Missouri River be evaluated as a long-term improvement option to connect River Drive North near Giant Springs Road to Smelter Avenue on the north side of the river. Additional recommendations were made for further analysis of additional traffic control at the intersection with 25th Street North, and for a grade separated railroad crossing east of 38th Street North.

Great Falls Arterial Studies (2004 - 2009)

The 2004 *Great Falls Arterial Feasibility Study*⁶ evaluated the engineering and economic feasibility of two possible arterial routes connecting Interstate 15 west of Great Falls with US Highway 87/89 east of Great Falls. A northern corridor and a southern corridor were evaluated. The study concluded that a southern arterial would provide a more favorable benefit/cost ratio than a northern arterial. The report recommended the continued development of the southern corridor to include preparation of a route location study, preparation of an appropriate environmental document, and development of project design activities.

In response to the 2004 study, the *Great Falls South Arterial Alignment Study*⁷ was conducted in 2009. The *Great Falls South Arterial Alignment Study* built on analysis from the 2004 study by providing a more detailed analysis of the opportunities and constraints in the general study area. The study identified engineering, environmental, and funding challenges and provided preliminary cost estimates to aid in the identification of a recommended alignment for the south arterial. The study ultimately recommended a four-lane rural principal arterial alignment. However, on April 5, 2010, the Great Falls Policy Coordinating Committee, as the official decision making body for the Great Falls transportation planning process, took action to cease work on the development of a south arterial.

Missouri River Urban Corridor Plan (2004)

The *Missouri River Urban Corridor Plan*⁸ examined and planned for lands adjoining the Missouri River in the core of the Great Falls urban area. The plan was conceived as an ongoing vision, recognizing the challenge of transitioning historic and industrial land uses over time. The plan recognizes that some development patterns along the river corridor represented an opportunity for more desirable, sustainable development that would capitalize on the river as an amenity and a resource. The plan provided a heavy transportation focus for typical sections and gateway treatments, and included River Drive North between 15th Street North and 32nd Street North.

2.0. TRANSPORTATION SYSTEM

River Drive North serves as a key route in the Great Falls transportation system and supports both local access and regional travel demand. Within the study area, the roadway is classified as a principal arterial roadway on the Non-interstate National Highway System (NHS). The corridor is a designated truck route and provides access to several businesses, industrial areas, residential neighborhoods, community resources, and recreation areas. The corridor is part of the US Highway 87 bypass which connects 10th Avenue South to 15th Street North.

The following sections discuss the transportation-specific aspects of the study corridor. Information obtained from publically available sources, field observations, data collection efforts, GIS data, and as-built drawings were used to evaluate the transportation system.

2.1. PHYSICAL FEATURES AND CHARACTERISTICS

The roadway was constructed or improved at various times, beginning in 1945. The study corridor consists of two travel lanes, one in each direction, and serves as a key route, supporting both local access, and regional travel demand. The north side of the roadway is generally constrained by the Missouri River and River's Edge Trail. West of 25th Street North, there are commercial, light industrial, residential, and recreational developments on the south side of the roadway. The Veteran's Memorial Park and Eagle Falls Golf Club are located on the south side of the roadway to the west of 25th Street North.

2.1.1. Roadway Surfacing

The MDT *Road Log*⁹ contains information for roadway surface width, lane width, shoulder width, surfacing thickness, and base thickness. According to the *Road Log*, the study corridor consists of a 30-foot paved roadway. The paved surface includes two 12-foot travel lanes and 3-foot shoulders on each side of the roadway. The MDT *Road Design Manual* requires a minimum travel lane width of 12 feet. The MDT *NHS Route Segment Plan* suggests a width of 40 feet or greater for the corridor. However, the *NHS Route Segment Plan* no longer defines the standard roadway width. The MDT Roadway Width Committee is responsible for determining the appropriate width during future project development.

Pavement Condition

MDT annually tracks and measures pavement condition indices along the corridor. MDT's Pavement Management System (PvMS) is used to analyze the collected data to determine the relative performance of the pavement. Items of primary interest include the presence and degree of cracking and rutting, as well as overall ride quality. By understanding the condition of the pavement, MDT can identify the most appropriate treatments and resources needed to extend pavement life. Several pavement condition indices are monitored through MDT's PvMS. The performance measures and corresponding indices are such that the numerical value of 100 is assigned to a new pavement with no flaws, and zero is assigned to a highly degraded pavement. The following performance measures are routinely used to track pavement conditions:

- **Ride Index:** This is determined by using an internationally applied roughness index (IRI) in inches per mile and converting the number to a 0 to 100 scale.
- **Rut Index (RI):** This is calculated by converting rut depth to a 0 to 100 scale. Rut measurements are taken approximately every foot and averaged into one-tenth-mile reported depths.
- **Alligator Crack Index (ACI):** This is measured by combining all load-associated cracking and converting the index to a 0 to 100 scale.
- **Miscellaneous Cracking Index (MCI):** This is calculated by combining all non-load-associated cracking and converting the index into a 0 to 100 scale.
- **Overall Performance Index (OPI):** This is determined by combining and placing various weighting factors on the IRI, RI, ACI, and MCI figures and converting the index to a 0 to 100 scale. The OPI is calculated to provide a single index describing the current general health of a particular route or system.

The most important performance measure is the OPI, as this index includes all the aforementioned indices. An OPI of 80 to 100 is considered “good,” 60 to 79.9 is “fair,” and 0 to 59.9 is “poor.” As shown in **Table 2**, the various pavement condition performance measures generally indicate fair performance for the study corridor. The OPI indicates that the pavement is in fair condition. The roadway was last paved in 2012.

Table 2: Roadway Surfacing

Route	Surface Width	Last Surface	Flexible Thickness (feet)	IRI	RI	ACI	MCI	OPI
River Drive North (RP 3.4 to RP 5.4)	30	2012	0.15	67.32	77.18	97.10	99.57	67.56

2.1.2. Access and Right-of-way

The typical width of right-of-way for the study corridor is approximately 100 feet, measured 50 feet on each side of centerline. There are some spot locations with greater than 100 feet of available right-of-way.

Access along the study corridor is varied in type and density. There are multiple public and private approaches and drives. There are seven defined business approaches on the south side of the roadway between 15th Street North and 19th Street North. The approaches provide access to adjacent businesses and parking areas. Just east of 19th Street North, there is access for the Caboose Trailhead parking area on the north side of River Drive North.

The Big Stack Mobile Home Court is accessed on the south side of River Drive North between 15th Street North and 25th Street North near the top of the grade (see **Photo 1**). Also on the south side of River Drive North, and just west of 25th Street North, there is a business district with no defined access points (see **Photo 2**). The businesses front closely to the roadway which provides little room for

ingress/egress and for parking. During the field review it was noted that vehicles appear to be parking within the River Drive North right-of-way. There does not appear to be sufficient available parking near the business district outside the roadway right-of-way. There are no known easements or agreements for this de-facto parking use in place with MDT.



Photo 1: Big Stack Mobile Home Court Access



Photo 2: Business District Access

East of 25th Street North there is limited access. There are three scenic pull-outs on the north side of the roadway. There are no access points on the south side of the roadway due to the Eagle Falls Golf Club and Veteran's Memorial Park. There is one private business approach on the north side of the roadway, just west of 38th Street North.

The north gate for Malmstrom Air Force Base (AFB) is located approximately 1.5 miles east of 38th Street North at the intersection with 10th Avenue North. Traffic along River Drive North is influenced by commuter and other traffic associated with Malmstrom AFB.

There are six public roads which intersect River Drive North within the study area. These public roads range from local public roads, to principal arterials and have varying forms of intersection traffic control. **Table 3** provides a list of these intersections.

Table 3: Public Access Points

Intersection	RP	Classification	Jurisdiction	Traffic Control
15 th Street North	3.4	Principal Arterial	MDT	Signalized
19 th Street North	3.7	Local	City	Unsignalized
25 th Street North	4.3	Urban Minor Arterial	City	Unsignalized
Giant Springs Road	5.2	Urban Major Collector	City	Unsignalized
18 th Avenue North	5.3	Local	City	Unsignalized
38 th Street North	5.4	Urban Minor Arterial	City	Signalized

2.1.3. Drainage Conditions

There is limited information available for the location and type of drainage structures along the corridor. The existing as-built drawings did not include drainage information. There is currently curb and gutter on the west end of the corridor between 15th Street North and the Parks and Recreation approach (approximately 750 feet). The remaining portion of the corridor is uncurbed. A storm sewer pipe located under the roadway on the east side of the Caboose Trailhead was noted during the field review.

Problematic erosion is known to exist along the shoulder on the south side of River Drive North between 25th Street North and 19th Street North. The Missouri River floodplain is located on the north side of the corridor. The study area is located within the Great Falls Municipal Separate Storm Sewer System (MS4) area which may require additional drainage considerations (see **Section 3.1.3**). Further investigation and analysis of drainage conditions may be necessary during project development.

2.1.4. Operations

The study corridor is considered a Level I winter maintenance level according to the MDT *Maintenance Operations and Procedures Manual*.¹⁰ A Level I roadway receives the highest level of maintenance and attention during inclement weather events. Level I routes are eligible to receive up to 24-hour-per-day coverage during storms. The primary objective is to keep at least one travel lane in each direction open to traffic and to provide intermittently bare pavement as soon as possible.

2.1.5. Other Transportation Modes

Non-motorized

The River's Edge Trail is located within the study area. The trail is a shared use path for bicyclists and pedestrians and is part of the nationally published Lewis and Clark Bicycle Trail. The trail is located north of the study corridor between 15th Street North and Giant Springs Road. At Giant Spring Road, the trail continues northeast along the Missouri River.

An additional shared use path connects to the River's Edge Trail on the east side of Giant Springs Road. This trail is located on the north side of River Drive North and connects to 38th Street North. The trail travels south along 38th Street North towards the recreational baseball

fields. There are bike lanes on both sides of the roadway east of 38th Street North. There are no non-motorized accommodations along the south side of the study corridor, nor are there any sidewalks along the corridor.

The Caboose Trailhead is located on the north side of River Drive North, just east of 19th Street North (see **Photo 3**). The trailhead provides parking and access to the River's Edge Trail. There is a trail spur that terminates at 19th Street North (see **Photo 4**). There are currently no crossing treatments at this location.



Photo 3: Caboose Trailhead



Photo 4: Trail Crossing at 19th Street North

Transit

Great Falls Transit does not currently operate a route along the River Drive North corridor. The nearest route to the study corridor is the Yellow Route (Northeast Route), which passes through the intersection of 15th Street North and River Drive North. The closest stop is located at the intersection of 15th Street North and 8th Avenue North.

Rail

BNSF Railway operates rail line within the study area. There is an at-grade crossing between Giant Springs Road and 38th Street North (RP 5.25). The crossing (#098 910U) is a concrete crossing approximately 57 feet in length. The line is part of the Fort Benton branch line which runs from Fort Benton to Great Falls. The line serves the industrial and commercial areas south of River Drive North.

There are, on average, two trains per day at this crossing with a maximum train speed of 10 mph. Traffic control at the crossing currently consists of a post mounted flashing light signal with a crossbuck sign (see **Photo 5**).

Freight

The study corridor is a designated truck route and is part of the Northeast Bypass. The Northeast Bypass provides an alternate route to US Highway 87 between the intersection with 57th Street North in the southeast side of Great Falls, and the intersection with 15th Street North in the northwest. The corridor accommodates local and regional freight traffic. Within and adjacent to the study area are multiple industrial and commercial freight generators. A new industrial park is planned to be developed in the area of River Drive North and 18th Avenue North. Developments in the area are expected to serve firms reliant on goods movement by trucks and rail. The study corridor currently experiences approximately 7.2 percent heavy vehicle traffic (see **Section 2.2.1**).

Air Service

The Great Falls International Airport serves the greater community. The airport is located approximately seven miles from the study corridor at the Gore Hill Interchange off Interstate 15. Due to the location of the airport, the study corridor is likely not directly influenced by the airport.

2.1.6. Utilities

Electric power and natural gas utilities are provided by Northwestern Energy. CenturyLink provides telecommunication services to the study area. Overhead power is located along the south side of the roadway beginning just east of 25th Street North. The overhead power crosses the roadway at two locations, both near the Veteran's Memorial Park. Street lights are present between 15th Street North and the Big Stack



Photo 5: Existing Traffic Control at the Railroad Crossing

Mobile Home Court. Street lighting is also in place at the intersection with 25th Street North, at the scenic pullout, and at the intersection with 38th Street North.

2.2. TRAFFIC OPERATIONS

An evaluation of traffic operations for the study corridor was completed using available data provided by MDT, as well as field-collected data. Turning-movement counts were conducted at the three major intersections within the study area over a 24-hour period. Mainline traffic volume data for existing and historic conditions were available at multiple locations within the study area. Visual observations were made for driver behavior, vehicle queuing and general traffic characteristics. The following sections provide details about the existing and projected traffic characteristics for the study corridor. Detailed data is included in the appendix.

2.2.1. Traffic Volumes

Traffic volumes along the roadways within the study area are collected annually as part of MDT's traffic data collection program. A total of 10 data collection sites are located within the study area. Of these 10 sites, three are located directly along the study corridor. The remaining seven sites are located adjacent to the study corridor.

The data collected at these sites is used to determine an average annual daily traffic (AADT) volume. AADT represents the average number of vehicles that pass a given point on a typical day of the year. Existing AADT volumes on the study corridor ranged from a low of 10,770 vehicle per day (vpd) east of Giant Springs Road, to a high of 14,400 vpd west of 25th Street North.

Projected Conditions

Projected transportation conditions were analyzed to estimate how traffic volumes and characteristics may change compared to existing conditions. The analysis was based on known existing conditions projected out 20 years, to the year 2035. Future projections were made using estimated growth for the study area. The location, type, and design of land use developments ultimately impacts the existing and future transportation system.

The future growth rate was estimated by comparing three different projection methods: historic traffic growth, transportation demand model (TDM) of a "no action" scenario, and TDM of an "expanded capacity" model. Each method resulted in a different growth rate for both the study area and the study corridor. These values were then compared and a final growth rate was determined.

The historic traffic growth method utilized the historic AADT data available from MDT. AADT data from the past 20 years (1995 through 2014) were used to determine an average annual growth rate (AGR) for the count sites within the study area. It was found that for the study area, the AAGR is 1.48 percent over the past 20 years. For the study corridor itself, the AAGR is 1.88 percent.

The second projection method used the TDM under a "no action" scenario. This scenario assumes that the transportation network will remain the same for the next 20 years. The existing traffic volumes, along with housing and employment projections, were entered into the

TDM and future traffic volumes were output. One consideration for this model is that the study corridor is shown to be at, or exceeding, assigned capacity values for a two-lane roadway. As such, future traffic demand is more likely to use alternate routes to the study corridor due to capacity constraints. This rerouting of traffic results in a lower growth rate than future demand might project. The AAGR for this method is 1.06 percent for the study area, and 0.93 percent for the study corridor.

The third method also utilized the TDM. Unlike the second method, however, the capacity along the study corridor was increased to remove the capacity constraints. This method is the method most likely to predict the true demand for the corridor, given no constraints for roadway capacity. This method resulted in an AAGR of 1.40 percent for the study area, and 1.48 percent for the study corridor.

Given the three traffic projection methods, an AAGR of 1.50 percent was selected for the study corridor. This growth rate was applied to the existing traffic volume data discussed previously. The existing AADT and resulting projected AADT values for the year 2035 are shown in **Table 4**.

Table 4: Existing and Projected AADT

Location		2014 AADT	2035 AADT ⁽ⁱ⁾
ALONG STUDY CORRIDOR			
River Drive North	West of 25 th Street North	14,400	19,690
River Drive North	West of Giant Springs Road	12,583	17,200
River Drive North	East of Giant Springs Road	10,770	14,720
ADJACENT TO STUDY CORRIDOR			
River Drive North	East of 10 th Street North	12,336	16,860
River Drive North	East of 38 th Street North	8,941	12,220
25 th Street North	South of River Drive North	5,339	7,300
38 th Street North	South of River Drive North	5,603	7,660
Giant Springs Road	North of River Drive North	1,170	1,600
15 th Street North	South of River Drive North	11,470	15,680
15 th Street North	North of River Drive North	15,650	21,390

⁽ⁱ⁾ Projected AADT based on an assumed growth rate of 1.50% per year.

Heavy Vehicle Traffic

An analysis of heavy vehicle traffic along the study corridor was made using the 24-hour turning movement count data. The turning movement count data includes breakouts for vehicle types. For this analysis, vehicles classified as single-unit trucks and articulated trucks

were considered heavy vehicles. Based on the turning movement counts, heavy vehicles account for approximately 7.2 percent of all vehicles along the study corridor.

2.2.2. Major Intersections

Traffic volume data was supplied by MDT for the intersections of River Drive North with 15th Street North, 25th Street North, and 38th Street North. The turning movement counts were performed on August 17th, 2015 at 15th Street North and on September 21st, 2015 at 25th Street North and at 38th Street North. Each turning movement count was adjusted based on seasonal traffic adjustment factors published by MDT¹¹. The following sections discuss the traffic operations at the three major intersections. **Figures 2 and 3** provides graphical summaries of the existing and projected traffic conditions for the study area. The results of the intersection operational analysis are shown in **Table 5**.

15th Street North

The intersection of River Drive North and 15th Street North is currently signalized. The eastbound and westbound approaches consist of dedicated right-turn, through, and left-turn lanes. The northbound approach consists of a dedicated left-turn bay, one dedicated through lane, and a shared through/right-turn lane. The southbound approach consists of a shared through/right-turn and a shared through/left-turn lane.

During field observations it was noted that large trucks had difficulty making turns at this intersection, particularly right-turns from the westbound approach. The southbound approach is constrained by the limited width of the bridge directly to the north of the intersection. This results in sharp corners that force large trucks to turn into the outside lane.

The signal is operated using split phasing for the northbound and southbound directions (i.e. southbound and northbound movements receive green time separately from each other) due to the current lane configurations. A left-turn phase study was completed by MDT on January 13, 2011. The purpose of the study was to explore the implementation of an east/west protected-permissive left-turn phase. The study determined that modifying the traffic signal to include protected-permissive left-turn phasing was not warranted at the time.

Under existing traffic conditions, this intersection operates at a Level of Service (LOS) of D, C and C during the AM, noon, and PM peak hours, respectively. Under projected conditions, the intersection is shown to operate at a LOS of E, C and E during the respective peak hours.

25th Street North

The intersection of River Drive North and 25th Street North is a three-legged intersection. The northbound approach consists of a right-turn slip lane with yield control and a dedicated left-turn lane with stop control. The eastbound approach consists of a free-flowing through lane and a yield controlled right-turn slip lane. The westbound approach consists of a dedicated left-turn bay and a free flowing through lane.

An intersection signal warrant analysis was completed on January 13, 2015. The purpose of the analysis was to evaluate installation of a traffic signal or roundabout to accommodate existing traffic. The analysis noted that a higher form of traffic control could be necessary to

accommodate northbound left-turning vehicles. Existing issues, such as steep roadway grades, construction constraints, and the desire to maintain the bypass characteristics of River Drive North, were noted as challenges which may inhibit installation of a traffic signal or roundabout. The analysis recommended that the entire River Drive North corridor be evaluated for a long-term solution.

Under existing traffic conditions, the intersection operates at a LOS of D, C and F during the AM, noon, and PM peak hours, respectively. Under projected traffic conditions, the intersection operates at a LOS of F during all peak hours.

38th Street North

The intersection of River Drive North and 38th Street North is a four-legged signalized intersection. The northbound, eastbound, and westbound approaches each consist of a dedicated left-turn bay and a shared through/right-turn lane. The southbound leg of the intersection is an access to a local business.

The intersection is shown to operate at a LOS of A during the existing peak hours. Under projected conditions, the intersection operates at a LOS of B, A and B during the AM, noon, and PM peak hours, respectively.

Table 5: Intersection Operations Analysis

Intersection	Existing Conditions (2015)						Projected Conditions (2035)					
	AM		Noon		PM		AM		Noon		PM	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
15th Street North	37.5	D	21.2	C	31.3	C	58.7	E	34.1	C	58.3	E
<i>Eastbound</i>	22.4	C	20.5	C	24.2	C	35.4	D	25.3	C	33.8	C
<i>Westbound</i>	12.9	B	14.4	B	17.6	B	15.3	B	17.0	B	24.0	C
<i>Northbound</i>	30.5	C	24.6	C	36.5	D	48.9	D	39.3	D	66.5	E
<i>Southbound</i>	68.4	E	24.8	C	49.1	D	109.1	F	52.3	D	113.2	F
25th Street North	31.4	D	23.5	C	92.7	F	73.8	F	65.9	F	517.9	F
<i>Eastbound</i>	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
<i>Westbound</i>	0.6	A	1.1	A	0.7	A	0.6	A	1.1	A	0.8	A
<i>Northbound</i>	25.9	D	20.1	C	75.1	F	56.4	F	51.0	F	407.8	F
38th Street North	8.6	A	6.7	A	8.3	A	11.3	B	7.5	A	11.7	B
<i>Eastbound</i>	8.0	A	6.4	A	7.6	A	11.3	B	6.8	A	11.0	B
<i>Westbound</i>	5.2	A	5.5	A	7.1	A	5.6	A	5.6	A	9.5	A
<i>Northbound</i>	13.4	B	9.7	A	13.5	B	16.7	B	13.1	B	19.2	B
<i>Southbound</i>	0.0	A	8.8	A	11.3	B	0.0	A	11.5	B	15.3	B

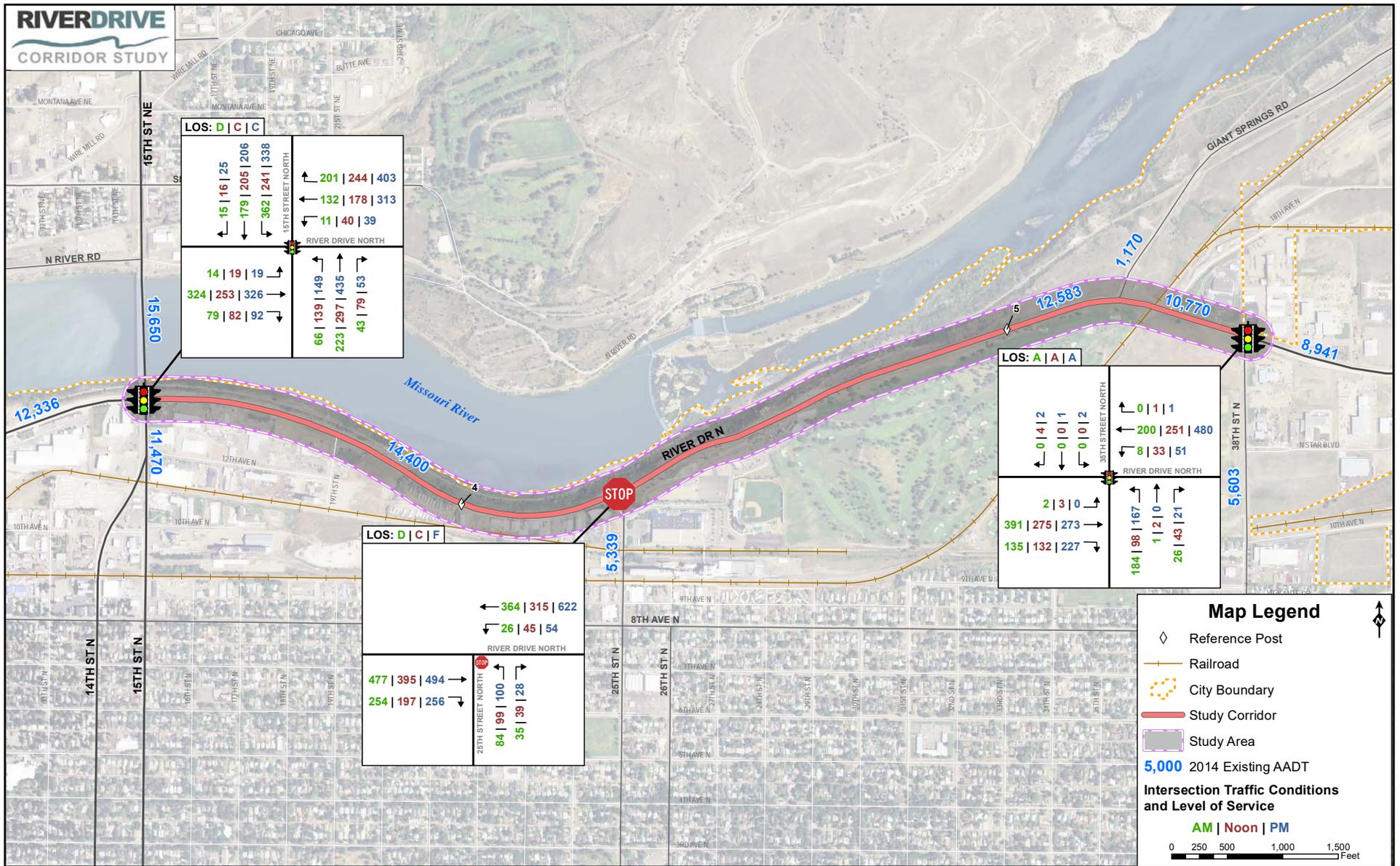


Figure 2: Existing Traffic Conditions

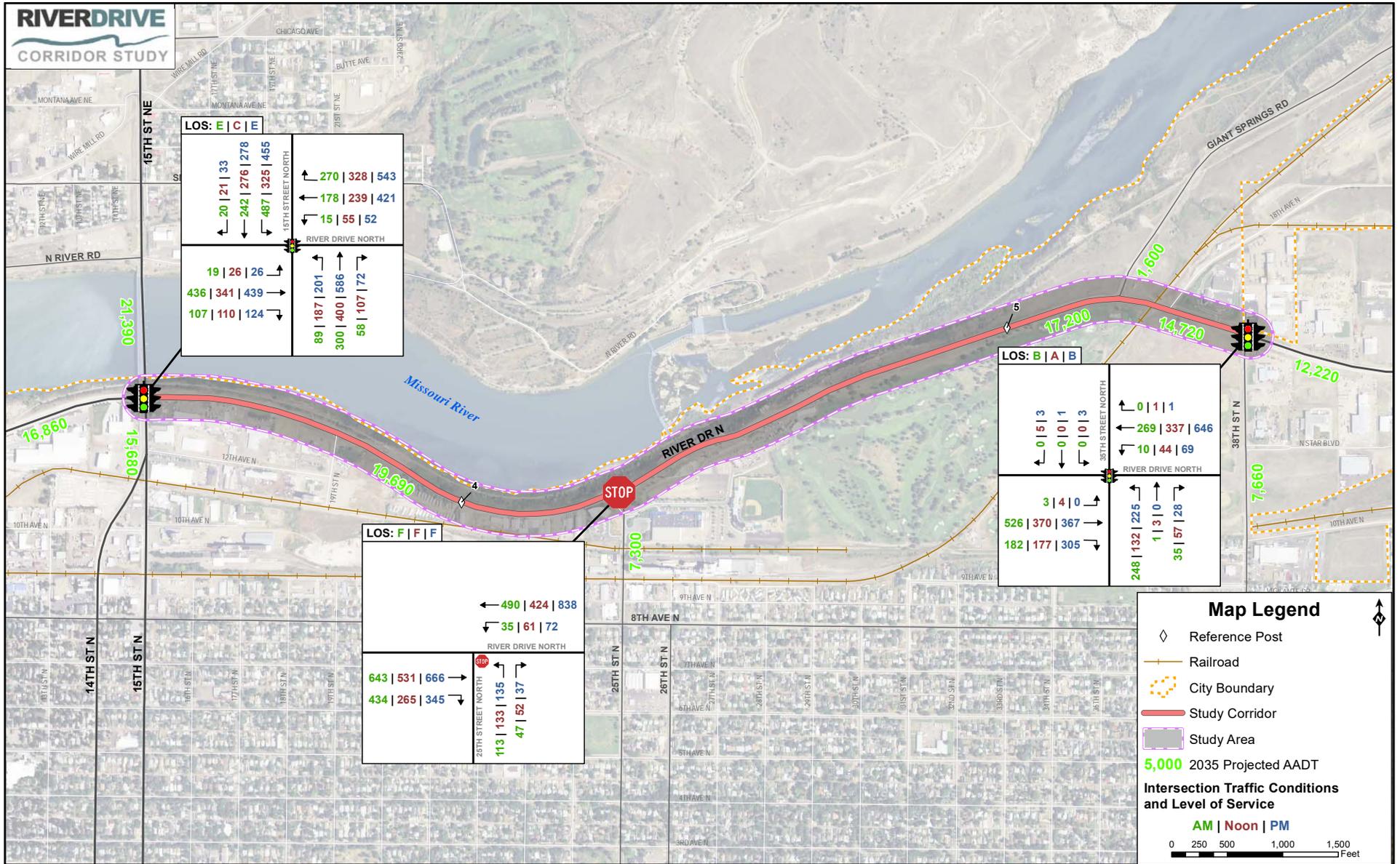


Figure 3: Projected Traffic Conditions

2.3. GEOMETRIC CONDITIONS

Existing roadway geometrics were evaluated and compared to current MDT standards. The analysis was conducted based on a review of public information, MDT as-built drawings, GIS data, and field observations. As-built drawings containing horizontal geometrics were reviewed for the study corridor. Vertical profiles were not available as part of the as-built drawings. Planning level mapping was completed for the *River Drive North Feasibility Study* and was used to approximate vertical profile information.

2.3.1. Design Criteria

The MDT *Road Design Manual*¹² specifies general design principles and controls that determine the overall operational characteristics of the roadway and enhance its aesthetic appearance. The geometric design criteria for the study corridor are based on the current MDT design criteria for an “Urban Principal Arterial (NHS Non-Interstate)” roadway.

The NHS is a system of highways determined to have the greatest national importance to transportation, commerce and defense. Arterial roadways are characterized by a capacity to move relatively large volumes of traffic quickly and a restricted-access-point function to serve adjoining properties. In both rural and urban areas, the principal arterials provide the highest traffic volumes and the greatest trip lengths.

Table 6 lists the current design standards for the study corridor according to MDT design criteria.

The design speed for an urban principal arterial roadway ranges between 40 and 45 mph where curbing is present, and 40 to 50 mph for an uncurbed roadway. Note that a facility’s design speed and its operating speed differ. The design speed is a selected speed used to determine the various geometric design features of the roadway. The operating speed is the highest overall speed at which a driver can travel on a given section of roadway under favorable weather conditions and under prevailing traffic conditions without at any time exceeding the safe speed as determined by the design speed.

Some design standards vary based on terrain. MDT’s *Road Design Manual* contains the following definitions for each terrain type:

- **Level Terrain** – The available stopping sight distances are generally long or can be made to be so without construction difficulty or major expense.
- **Rolling Terrain** – The natural slopes consistently fall below and rise above the roadway and occasional steep slopes offer some restriction to horizontal and vertical alignment.
- **Mountainous Terrain** – Longitudinal and traverse changes in elevation are abrupt and extensive grading is frequently needed to obtain acceptable alignments.

Based on these definitions, most of the study area appears to be level terrain with some areas of rolling terrain. A determination of design speed and terrain type for the corridor was not made as part of this evaluation. Rather, those areas that do not meet standards for the minimum design speed (40 mph) and criteria for level terrain as listed in **Table 6** were considered areas of concern. Further evaluation of design speed and terrain type may be necessary during the project development process.

Table 6: Geometric Design Criteria (Urban Principal Arterial)

Design Element		Manual Section	2-lane			
			Curbed		Uncurbed	
Design Controls	Design Forecast Year (Geometrics)	8.4	20 years			
	Design Speed ⁽ⁱ⁾	8.3	40 – 45 mph	40 – 50 mph		
	Level of Service	8.4	Desirable: B Minimum: C			
Roadway Elements	Travel Lane Width ⁽ⁱ⁾	11.2	12'			
	Shoulder Width ⁽ⁱ⁾	Outside	Varies			
		Inside	N/A			
	Cross Slope	Travel Lane ⁽ⁱ⁾	2% Typical	2%		
		Shoulder	2% Typical	2%		
Median Width	11.3	N/A				
TWLTl Width	11.2	16'				
Earth Cut Section	Ditch	Inslope	N/A	6:1 Desirable; 4:1 Minimum		
		Width	N/A	10' Min.		
		Slope	N/A	20:1 towards back slope		
	Back Slope; Cut Depth at Slope Stake	0' – 5'	11.4	5:1		
		5' – 10'		Level/rolling: 4:1; Mountainous: 3:1		
		10' – 15'		Level/rolling: 3:1; Mountainous: 2:1		
		15' – 20'		Level/rolling: 2:1; Mountainous: 1.5:1		
> 20'	1.5:1					
Earth Fill Slopes	Fill Height at Slope Stake	0' – 10'	6:1	6:1		
		10' – 20'	4:1	4:1		
		20' – 30'	3:1	3:1		
		> 30'	2:1	2:1		
Alignment Elements	DESIGN SPEED		40 mph	45 mph	50 mph	
	Stopping Sight Distance ⁽ⁱ⁾	8.6	305'	360'	425'	
	Minimum Radius ⁽ⁱ⁾	9.2	533'	711'	760'	
	Superelevation Rate ⁽ⁱ⁾	9.3 & 9.4	e _{max} = 4.0%		e _{max} = 8.0%	
	Vertical Curvature ⁽ⁱ⁾	Crest	10.5	44	61	84
		Sag		64	79	96
	Maximum Grade ⁽ⁱ⁾	Level	10.3	6%	6%	6%
		Rolling		7%	7%	7%
Mountainous		9%		9%	9%	
Minimum Vertical Clearance ⁽ⁱ⁾	10.6	17'				

⁽ⁱ⁾ Controlling design criteria

Source: MDT Road Design Manual, Figure 12-7, Geometric Design Criteria for Urban Principal Arterials

2.3.2. Horizontal Alignment

Elements comprising horizontal alignment include curvature, superelevation, and sight distance. These horizontal alignment elements influence traffic operation and safety and are directly related to the design speed of the corridor. MDT's standards for horizontal curves are defined in terms of curve radius, stopping sight distance, and superelevation rate. For a 40 mph design speed, the minimum standards for curve radius, stopping sight distance, and superelevation rate are 533 feet, 305 feet, and 4.0 percent, respectively. **Table 6** provides the recommended standards contained in the MDT *Road Design Manual*.

Horizontal curve radius was determined based on as-built drawings provided by MDT. According to the as-built drawings, eight horizontal curves exist along the study corridor. All eight horizontal curves appear to meet current 40 mph design standards based on curve radius and sight distance. Superelevation rates were unavailable, so it is unknown at this time whether the curves meet standards for maximum superelevation rates. **Table 7** provides a summary of the horizontal curves found along the study corridor.

Table 7: Horizontal Curve Design Information

Location (RP)	Radius (ft)	Length (ft)	Superelevation	Min. Sight Obstruction (ft) ⁽ⁱ⁾	Design Speed Met (mph)	Meets Standards	Comments
3.53	1,910	471.9	UNKNOWN	8.5	45	YES	Curbed segment
3.74	4,000	1,329.7	UNKNOWN	5.6	50	YES	
4.07	1,640	1,561.5	UNKNOWN	13.7	50	YES	
4.27	600	108.9	UNKNOWN	19.3	40	YES	
4.41	1,100	307.5	UNKNOWN	20.5	50	YES	
4.48	1,200	234.2	UNKNOWN	18.8	50	YES	
4.69	4,500	581.9	UNKNOWN	5.0	50	YES	
5.16	1,433	947.8	UNKNOWN	15.7	50	YES	

⁽ⁱ⁾ Minimum sight obstruction distance calculated based on design speed met.

2.3.3. Vertical Alignment

Vertical alignment is a measure of elevation change of a roadway. The length and steepness of grades directly affect the operational characteristics of the roadway. The MDT *Road Design Manual* lists recommendations for vertical alignment elements such as grade, rate of vertical curvature (K-value), and stopping sight distance. Recommendations are made based on roadway design speed and terrain type. These recommendations are shown in **Table 6**.

According to the *Road Design Manual*, the maximum allowable grades are six percent for level terrain, seven percent for rolling terrain, and nine percent for mountainous terrain. For vertical curves, stopping sight distance, and K-values are controlling design criteria. K-values are

defined as a function of the length of the curve compared to the algebraic change in grade, which comprises either a sag or a crest vertical curve. For a 40 mph design speed, minimum k-values of 44 and 64 are recommended for crest and sag vertical curves, respectively.

As-built vertical profile information was unavailable for the study corridor. Instead, planning level mapping completed for the *River Drive North Feasibility Study* was used to approximate vertical profile information. According to the planning level mapping, there are 14 vertical curves along the study corridor. Of the 14 vertical curves, two do not appear to meet standards based on rate of curvature (K-value). In addition, the grade between approximately RP 3.87 and RP 4.01 exceeds standards for level terrain. **Table 8** provides a list of vertical curve information as obtained from the planning level mapping.

Table 8: Vertical Curve Design Information

Location (RP)	Curve Type	Length (ft)	Grade Back	Grade Ahead	K-value	Design Speed Met (mph)	Meets Standards	Comments
3.49	SAG	200.0	1.1%	0.6%	399.2	45	YES	Curbed segment
3.59	CREST	100.0	0.6%	-1.4%	51.5	40	YES	
3.62	SAG	100.0	-1.4%	0.6%	50.5	35	NO	Does not meet current standards based on rate of curvature.
3.67	CREST	500.0	0.6%	-2.0%	188.5	50	YES	
3.87	SAG	700.0	-2.0%	6.8%	78.8	40	NO	Does not meet current standards for level terrain based on grade.
4.01	CREST	400.0	6.8%	1.9%	81.0	45	NO	Does not meet current standards for level terrain based on grade.
4.10	SAG	550.0	1.9%	3.5%	336.6	50	YES	
4.26	CREST	400.0	3.5%	-1.4%	80.7	45	YES	
4.45	SAG	800.0	-1.4%	2.0%	237.7	50	YES	
4.60	CREST	490.0	2.0%	-1.2%	154.8	50	YES	
4.70	SAG	200.0	-1.2%	-0.1%	185.0	50	YES	
4.87	CREST	380.0	-0.1%	-1.5%	283.8	50	YES	
5.25	SAG	297.0	-1.5%	3.5%	59.3	35	NO	Does not meet current standards based on rate of curvature.
5.34	CREST	480.0	3.5%	1.7%	263.6	50	YES	

2.3.4. Roadside Clear Zone

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a recovery area. The desired clear zone width varies depending on traffic volumes, speeds and roadside geometry. Clear zones are evaluated individually based on the roadside cross section. According to MDT, clear zone should be attained by removing or shielding obstacles, if costs are reasonable.

In certain instances within the study area, it may be impractical to protect or remove certain obstacles within the clear zone. As improvement options develop, roadside clear zones should be designated, to a practical extent, to meet current MDT design standards.

2.4. SAFETY

Historic crash data was provided by the MDT Traffic and Safety Bureau for the study area for the five year period from January 1st, 2010 to December 31st, 2014. A total of 113 crashes were reported to have occurred within the study area during the crash analysis period. The following subsections provide detailed analyses of the crash data.

2.4.1. Crash Location

Crash data for the period of record were evaluated based on location. The crashes were plotted based on GPS coordinates contained in the crash records. **Figure 4** shows the locations and clusters of reported crashes over the analysis period. The following were noted as crash cluster locations:

- **15th Street North Intersection:** A total of 41 crashes occurred at the intersection with 15th Street North. Of these crashes, 39 involved multiple vehicles. There were 16 rear-end crashes and 11 right angle crashes. The remaining crash types at this intersection include fixed object, head on, left turn, right turn, backing vehicle, and sideswipe crashes. There were three crashes which resulted in a non-incapacitating injury and eight resulting in a possible injury. The remaining crashes at this intersection resulted in property damage only.
- **East of 15th Street North:** A total of six crashes were reported near the entrances to the businesses east of 15th Street North. Four crashes were rear-ends, one was a fixed object, and the sixth crash was reported as other. Two of the rear-end crashes resulted in possible injuries, while the remaining crashes were property damage only.
- **Big Stack Mobile Home Court:** There were 19 reported crashes at the entrance to the Big Stack Mobile Home Court, 17 of which involved multiple vehicles. Of the 19 crashes, 12 were rear-ends, three were left turn crashes, one was a fixed object collision, one involved a wild animal, one was a right angle crash, and one was listed as "other". Eighteen of the reported crashes occurred during daylight conditions, while the 19th occurred during dusk. Four of the reported crashes resulted in possible injuries and one crash was reported as a non-incapacitating injury.

- **25th Street North Intersection**: Eleven crashes were reported at the intersection with 25th Street North. Nine of the crashes involved multiple vehicles. The crash types included five rear-ends, three right angles, one left turn, one roll over, and one pedestrian related crash. All 11 crashes occurred on dry surface condition.
- **Scenic Pullout**: Seven crashes were reported near the scenic pullout overlooking Black Eagle Falls. Two of the crashes were rear-end crashes, three were fixed object collisions, and two were wild animal related. One rear-end resulted in an incapacitating injury, while the remaining six crashes resulted in property damage only. Two crashes occurred under daylight, three under dark-lighted, one under dark-not lighted, and one under dusk lighting conditions. The weather was reported as clear for all but one crash which was listed as cloudy.
- **Giant Springs Road Intersection**: Seven crashes were reported at the intersection of Giant Springs Road. Two of the crashes involved multiple vehicles and were reported as left turn crashes. The remaining include two wild animal related and three fixed object crashes. One left turn crash resulted in an incapacitating injury and one of the fixed object crashes resulted in a non-incapacitating injury. The remaining five crashes were reported as property damage only crashes.
- **Railroad Crossing**: Four crashes were reported in the vicinity of the railroad crossing between Giant Springs Road and 18th Avenue North. All of the crashes resulted in property damage only. Two crashes were rear-end and the other two were wild animal related.
- **38th Street North Intersection**: Five crashes were reported at the 38th Street North intersection. All five crashes were rear-end crashes. Three resulted in property damage only and the other two were reported as a possible injury and a non-incapacitating injury. All of the crashes occurred during the daylight. The roadway conditions were reported as one wet, one dry, one snow covered, and three unknown.

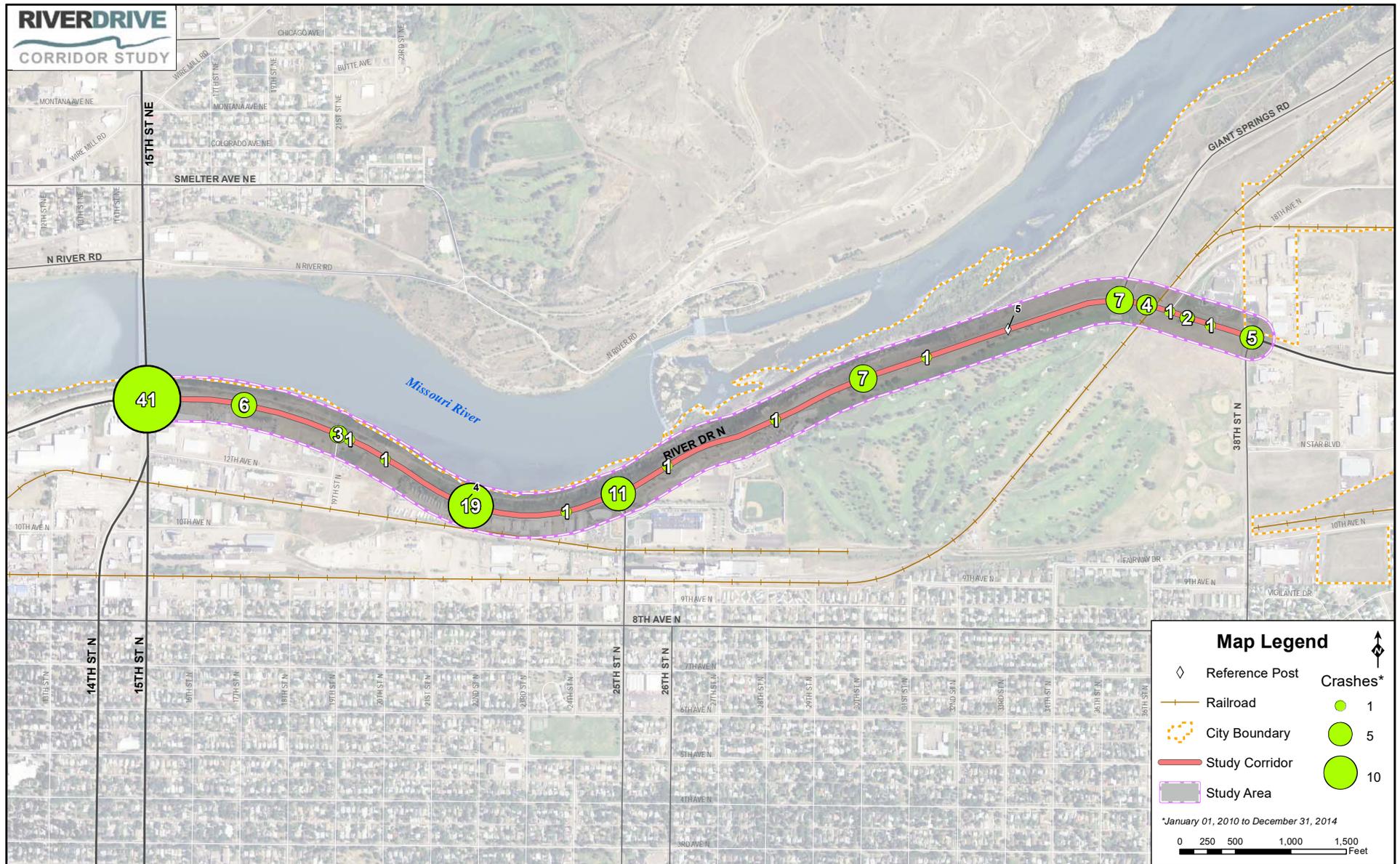


Figure 4: Crash Locations

2.4.1. Crash Type

The crash type, or manner of crash, was reported for each crash. Crash types can be grouped into two categories, multi- and single vehicle crashes. Multi-vehicle crashes are crashes that involve two or more vehicles, single vehicle crashes involve only one vehicle. Multi-vehicle crashes accounted for 79 percent of all crashes. Single vehicle crashes accounted for the remaining 21 percent. The most common crash type was rear-end crashes, accounting for 48 percent of all reported crashes. The most commonly single vehicle crash was fixed object crashes, accounting for 10 percent of total crashes. **Figure 5** presents the distribution of crashes based on crash type.

2.4.2. Temporal Analysis

Each crash record contains the date and time of the crash. The data was inspected to determine if any temporal patterns could be identified. With respect to the time-of-day in which crashes occurred, crashes occurring between 4:00 and 5:00 PM accounted for 12 percent of all crashes. **Figure 6** depicts the distribution of crashes based on time-of-day.

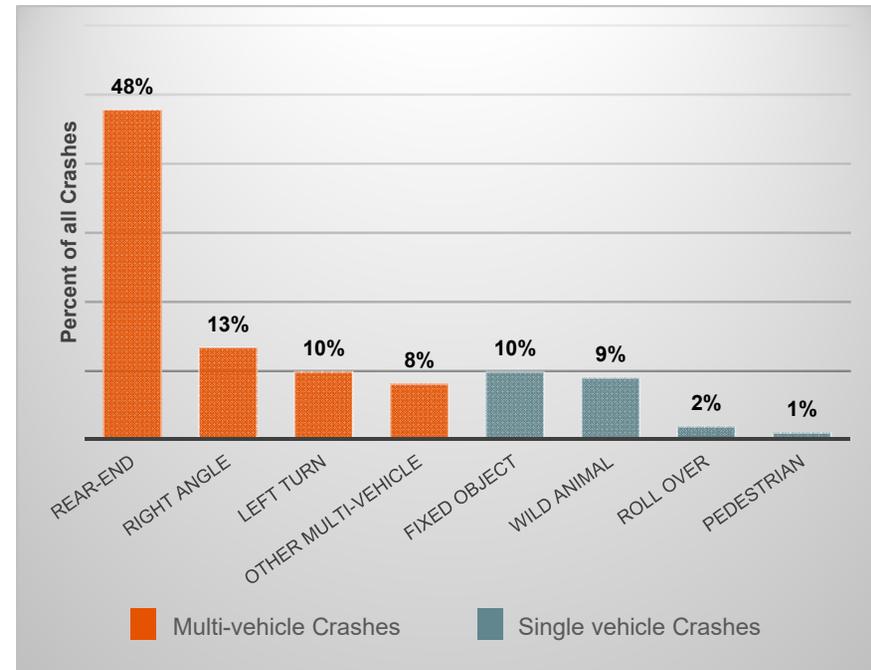


Figure 5: Crash Type Statistics

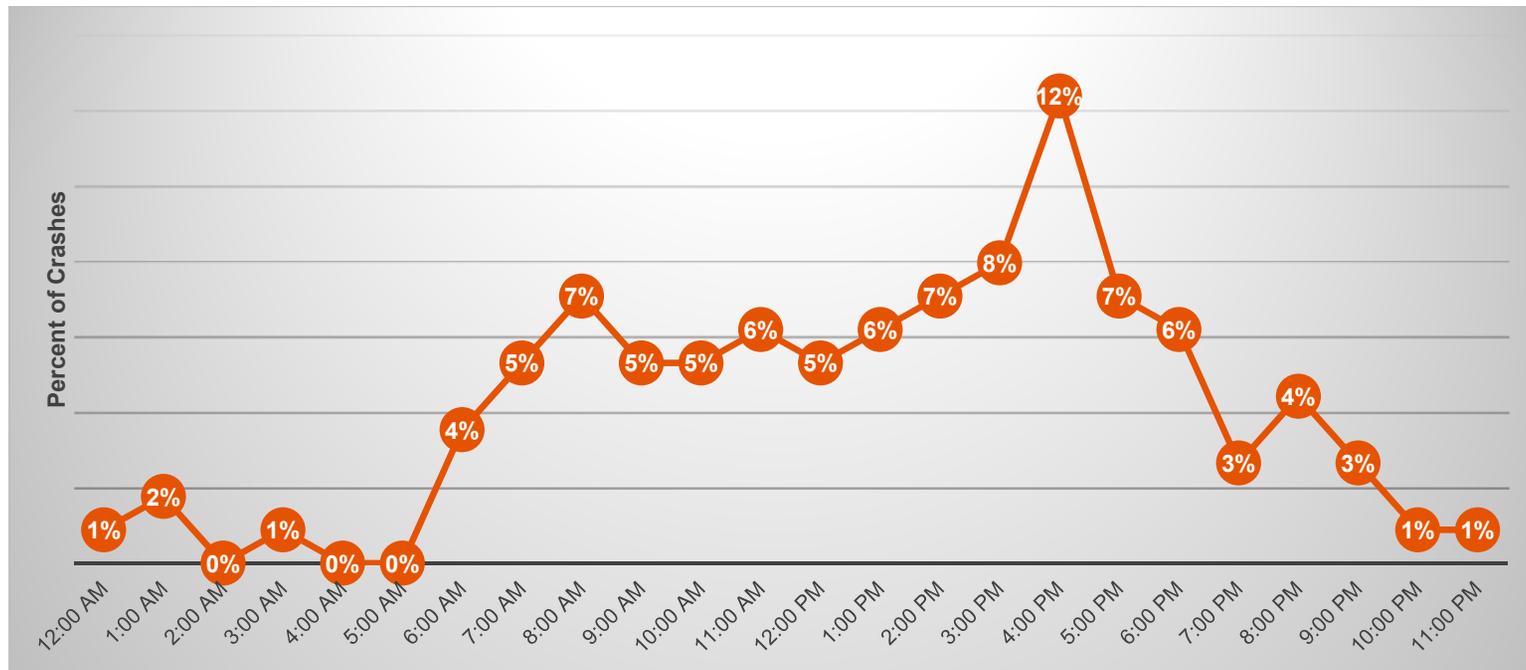


Figure 6: Time-of-day Crash Statistics

Both the day of the week and the month of the year in which crashes occurred were analyzed. Analysis of the day of the week data showed that the most common day for crashes was Monday, accounting for 22 percent of total crashes. Crashes occurring on Saturday and Sunday accounted for 12 and 4 percent of crashes, respectively. Data regarding the month of the year in which crashes occurred showed that October had the most crashes, accounting for 14 percent of total crashes. April had the fewest crashes, accounting for 3 percent of all crashes. The winter months, November through February, accounted for a combined 34 percent of all crashes. **Figure 7** shows the distribution of crashes with respect to the day of the week and the month of the year in which the crashes occurred.

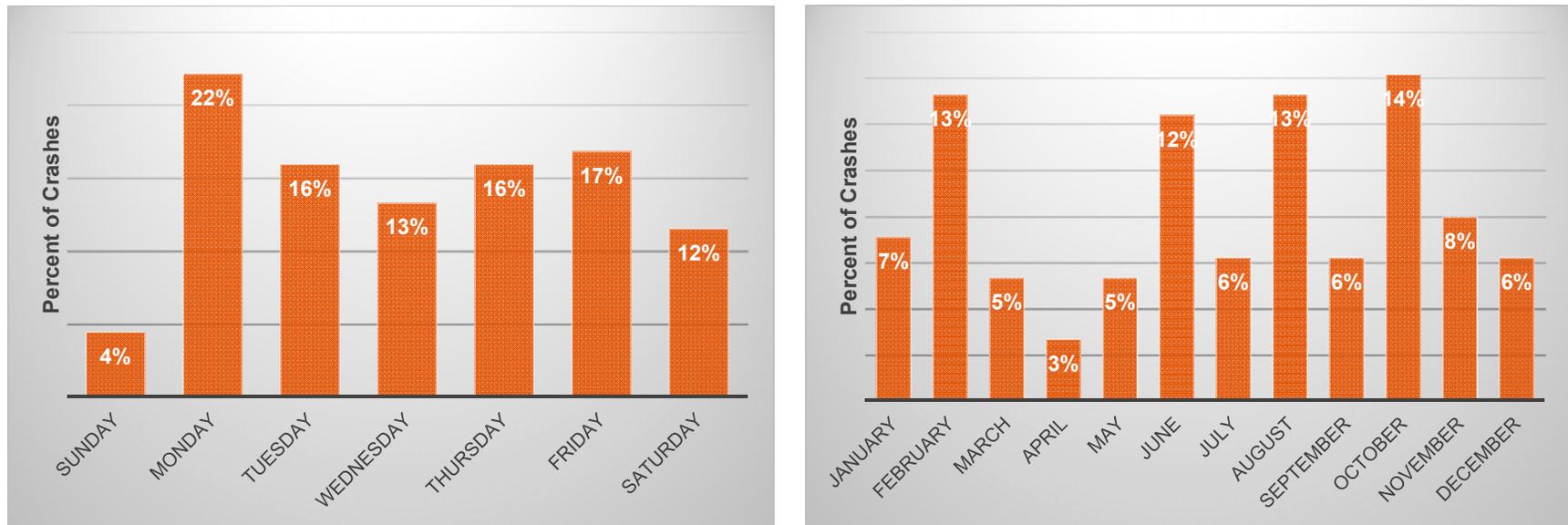


Figure 7: Day of Week and Month of Year Crash Statistics

2.4.3. Crash Severity

Crash severity is reported based on the worst injury that occurred during the crash. For example, if there are three individuals involved in a crash and two are uninjured and the third has a non-incapacitating evident injury, the crash would be reported as a non-incapacitating injury crash. Crash severity can be defined as non-injury, property damage only (PDO); possible injury; non-incapacitating, evident injury, incapacitating injury; or fatal injury. An incapacitating injury is defined as an injury, other than a fatality, which prevents the injured person from walking, driving, or normally continuing the activities the person was capable of performing before injury. During the analysis period, there no reported fatal injury crashes, two incapacitating injury crashes, and six non-incapacitating injury crashes.

2.4.4. Driver's Age and Gender

Reported with each crash is the age and gender of each individual involved in the crash. Additionally, drivers and passengers are identified separately. A total of 216 drivers were involved in crashes within the study area during the crash analysis time period. Males accounted for 65 percent of all drivers, females accounted for 32 percent of drivers, and the gender of the remaining three percent was not listed. With respect to the driver's age, the 21 to 25 years of age group accounted for 18 percent of drivers. The 16 to 20 years of age group had the second most drivers with 10 percent of drivers.

2.4.5. Environmental Conditions

Three environmental conditions are reported on each crash record: weather, road, and lighting conditions. It was found that 65 percent of crashes occurred under clear weather conditions, 65 percent occurred on dry roads, and 80 percent occurred during daylight conditions. **Table 9** shows the relationship between the three environmental conditions.

2.4.6. Crash Rates

Table 10 provides a comparison of the crash rate, crash severity index, and crash severity rate within the study area. Crash rates are defined as the number of crashes per million vehicle miles of travel (for intersections, the crash rate is the number of crashes per million vehicles entering the intersection per year). The crash severity index is the ratio of the sum of the level of crash degree to the total number of crashes. Crash severity rate is determined by multiplying the crash rate and the crash severity index.

Table 9: Environmental Crash Statistics

Road Condition <i>Lighting Condition</i>	Number of Crashes					Total
	Weather Condition					
	Clear	Cloudy	Snow	Rain	Other	
Dry	60	14				74
<i>Daylight</i>	50	9				59
<i>Dark-Lighted</i>	6	2				8
<i>Dusk/Dawn</i>	3	3				6
<i>Dark-Not Lighted</i>	1					1
Wet	1	4	1	3		9
<i>Daylight</i>	1	4	1	2		8
<i>Dark-Lighted</i>				1		1
Snow		2	5			7
<i>Daylight</i>		2	3			5
<i>Dark-Lighted</i>			1			1
<i>Dusk/Dawn</i>			1			1
Ice/Frost	1		1		3	5
<i>Daylight</i>	1		1		2	4
<i>Dark-Lighted</i>					1	1
Unknown	11	5	1		1	18
<i>Daylight</i>	9	3	1		1	14
<i>Dark-Lighted</i>	2	2				4
Grand Total	73	25	8	3	4	113

Table 10: Crash Rate and Severity Statistics

Location	# Fatal/Incap	# Injury	#PDO	AADT 3-year Average	Crash Rate	Severity Index	Severity Rate
SEGMENTS							
15th Street North – 25th Street North	0	9	22	15,503	1.25	1.58	1.97
25th Street North – 38th Street North	2	3	20	11,991	0.99	1.80	1.78
MAJOR INTERSECTIONS							
15th Street North	0	11	30	27,266	0.81	1.54	1.24
25th Street North	0	4	7	16,311	0.36	1.73	0.63
38th Street North	0	2	3	12,276	0.22	1.80	0.39

3.0. ENVIRONMENTAL SETTING

This section provides a summary of the *Environmental Scan*¹³ developed by MDT. The primary objective of the *Environmental Scan* is to provide a planning-level overview of resources and to determine potential constraints and opportunities within the study area. As a planning-level scan, the information was obtained from various publicly available reports, websites, and other documentation, as well as a “windshield survey” conducted by MDT staff. This scan is not a detailed environmental investigation. Refer to the MDT *Environmental Scan* for more detailed information.

If improvement options are forwarded from this study into project development, an analysis for compliance with the National and Montana Environmental Policy Acts (NEPA and MEPA) will be completed as part of the project development process. Information provided in the *Environmental Scan* may be included in the NEPA/MEPA process at that time.

3.1. PHYSICAL ENVIRONMENT

The following subsections present an overview of items related to the physical environment.

3.1.1. Soil Resources and Prime Farmland

Information obtained on soils is used to determine the presence of prime and unique farmland in the study area to demonstrate compliance with the Farmland Protection Policy Act (FPPA). Farmland includes prime farmland, some prime if irrigated farmland, unique farmland, and farmland (other than prime or unique farmland) that is of statewide or local importance. Prime farmland soils are those that have the best combination of physical and chemical characteristics for producing food, feed, and forage; the area must also be available for these uses. Prime farmland can be either non-irrigated or lands that would be considered prime if irrigated. Farmland of statewide importance is defined as follows: land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

Soil surveys of the study area are available from the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). NRCS indicates that farmland of statewide importance is present within the study area. There is land designated as having statewide importance on the south side of the study area between approximately RP 3.4 to RP 4.25, as well as along the last quarter mile of the corridor. The majority of this land has already been developed and is no longer subject to the FPPA.

If a federally funded improvement option forwarded from the study will require acquisition of lands from these areas, MDT will have to complete a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects and coordinate with NRCS. NRCS will use information from that form to keep an inventory of the prime and important farmlands within the state.

3.1.2. Geologic Resources

Information on the geology and seismicity in the study area was obtained from several published sources. Geologic mapping was reviewed for rock types, the presence of unconsolidated material, and fault lines. The seismicity and potential seismic hazards were also reviewed. This geologic information can help determine potential design and construction issues related to embankments and road design.

It is common in this area to encounter deposits of silt interbedded with very fine-grained sand and clay from glacial lake deposits. The majority of soils are silts, fine silty sands, and clays which can be moisture sensitive. The design of future projects forwarded from the study should consider including permanent erosion and sediment control measures to the extent practicable to facilitate stabilization and revegetation of disturbed areas.

Improvements brought forward from the study will be subject to a more detailed analysis of the above-mentioned geotechnical risk factors. Part of this detailed analysis may involve taking advance borings to evaluate soil characteristics at exact project locations. This is standard procedure for most MDT road projects. The design of any improvements should consider specific requirements that come from the detailed analysis.

3.1.3. Surface Waters

Topographic maps and GIS data were reviewed to identify the location of surface water bodies within the study area. The Missouri River is the only surface water located within the study area. Although not within or immediately adjacent to the study area, an intermittent stream flows into the Missouri River on the opposite side of the river from the corridor study area. This intermittent stream has the potential to transport sediment or pollutants that could affect water quality of the Missouri River.

Effects on water bodies near the study area will have to be identified and coordinated with applicable agencies during any future project design. Permitting may be required for improvement options involving construction in or near the Missouri River. Coordination with federal, state, and local agencies would be necessary to determine the appropriate permits based on choice of improvement options forwarded from this study. Impacts should be avoided and minimized to the maximum extent practicable.

Total Maximum Daily Loads

Section 303 subsection "d" of the Clean Water Act requires the state of Montana to develop a list, subject to U. S. Environmental Protection Agency (USEPA) approval, of water bodies that do not meet water quality standards. When water quality fails to meet state water quality standards, the Department of Environmental Quality (DEQ) determines the causes and sources of pollutants in a sub-basin assessment and sets maximum pollutant levels, called total maximum daily loads (TMDL). TMDLs set by DEQ become the basis for implementation plans to restore water quality to a level that supports state designated beneficial water uses. The implementation plans identify and describe pollutant controls and management measures to be undertaken (such as best management practices), the mechanisms by which the selected measures would be put into action, and the individuals and entities responsible for implementation projects.

DEQ lists the section of the Missouri River that is adjacent to the study area as having impairments. The Missouri River is classified as category 5. Category 5 water bodies are waters where one or more applicable beneficial uses are impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat, but has not been completed. DEQ is currently working on completing the TMDL for this watershed. Coordination with DEQ on TMDL status will occur at the development stage of potential improvements. For the Missouri River within the study area, major probable sources of impairment are industrial/commercial site stormwater discharge, and industrial point source discharges. The probable sources of impairments are not currently listed as being associated with road construction activities. That said, if improvement options are advanced, it will be necessary to reevaluate the 303(d)/305(b) integrated report for changes to listed impairments along with possible changes to TMDLs on a project level at that future time.

Stormwater

The study area is located within the Great Falls MS4 area. Under the current Small MS4 General Permit, new development or redevelopment projects greater than or equal to one acre in size must implement, when practicable, low impact development (LID) practices that infiltrate, evapo-transpire, or capture for reuse the runoff generated from the first half-inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation. MS4 issues, including potential applicability of LID requirements, will have to be further evaluated during any future project design. In addition, there may be a need to obtain coverage under the Montana Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity during project development.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act Congress created in 1968 provided for the protection of certain selected rivers, as well as their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Based on a review of the United States National Park Service website, the Missouri River does not carry the wild and scenic designation within the study area.

3.1.4. Groundwater

There are 6,208 wells on record in Cascade County. Within the study area, there are two private domestic wells and one public water supply well. Wells can be a costly item to mitigate if they are not avoided. Mitigation of a well usually involves drilling a new well for the owner in a new location that will not be impacted by the potential project. In addition, there is a 100-foot setback requirement for public water supply wells in which no source of pollutant can be located. Public water supply wells can also be deeper and require a higher volume of water to be discharged. This can translate into a more expensive well to replace, along with affecting larger number of users compared to a private well if impacted. Impacts on existing wells should be considered if a project is forwarded from this study.

3.1.5. Wetlands

The U.S. Army Corps of Engineers defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Based on review of available information and on a windshield survey of the corridor, no known wetland areas are currently identified within the study area. The potential does exist for a wetland to occur within the riparian corridor of the Missouri River. Given the steepness of the terrain along the riverbanks, however, it likely would not facilitate generation of a wetland area. Future wetland investigation and potential delineation would be required if improvement options are forwarded from the study.

3.1.6. Floodplains and Floodways

Executive Order 11988, Floodplain Management, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Federal Emergency Management Agency-issued flood maps for Cascade County indicate that flood plain zones existing within or adjacent to the study area.

Some areas of Zone A, Zone AE, and Zone X (0.2% chance flood) are adjacent to, or intersect, the study area on the north side of the corridor. However, the elevation difference between the Missouri River and the corridor places the road outside these areas. The majority of the study area is located within Zone X (determined to be outside the 500-year flood).

A flood plain permit is required if improvement options involve placement of fill within the regulatory flood plain. As Zone X (outside the 500-year flood) is the main flood zone within the study area, there is likely to be minimal impacts to possible improvements by flood zones. However, this should be reevaluated at the time of project development.

3.1.7. Irrigation

There is no irrigated agriculture land within the study area. If a project results in impacts to irrigation structures, there could be additional costs above typical project costs associated with the redesign, or moving of the irrigation structure(s). The available Water Resources Survey maps indicate that there is only one water right close to the study area. As such, irrigation structures should not be a concern for this corridor study. A more in-depth review for irrigation structures should occur at the project development stage to identify if new possible impacts are present.

3.1.8. Air Quality

The USEPA designates communities that do not meet National Ambient Air Quality Standards (NAAQS) as “non-attainment areas.” States are then required to develop plans to control source emissions and ensure future attainment of NAAQS. The study area is not located in a

non-attainment area for any of the criteria pollutants. Additionally, there are currently no non-attainment areas nearby. As a result, special design considerations are likely not required in future project design to accommodate NAAQS non-attainment issues.

Depending on the scope of the project under consideration along this corridor, an evaluation of mobile source air toxics (MSATs) may be required. MSATs are compounds emitted from highway vehicles and off-road equipment that are known or suspected to cause cancer or other serious health and environmental effects.

3.1.9. Hazardous Substances

The NRIS and Montana Board of Oil and Gas databases were searched for information on underground storage tank sites, leaking underground storage tank sites, abandoned mine sites, remediation response sites, landfills, National Priority List sites, hazardous waste, crude oil pipelines, and toxic release inventory sites. There were no oil and gas production wells, crude oil pipelines, open-cut mining sites, or toxic release inventory sites identified within the study area. At this time, none of the identified hazardous substances sites are expected to substantially impact improvements to the corridor. However, if a project were to overlap a hazardous substance site, a soil investigation would likely be needed. If contaminated soils are present, a special provision regarding handling contaminated soils is recommended to be included in project documentation. In addition, the contaminated soils could result in the need for remediation.

3.2. BIOLOGICAL ENVIRONMENT

The following information applies to natural resources within the study area and reflects a baseline natural resource condition. Depending on the level of detail available through the high-level baseline scan, some of the information is presented at the county level, some at the study-area level, and some at the corridor level.

3.2.1. Vegetation

According to the Montana Natural Heritage Program Landcover Report, the dominate landcover type in the study area is developed land consisting of open space (golf course, park), commercial/industrial, railroad, and roads. There are also small sections of grassland consisting of Great Plains mixed prairie. This landcover is a reflection of the study area being located in an urban setting.

If improvement options are forwarded from the study, practices outlined in MDT standard specifications should be followed to minimize adverse impacts to vegetation and facilitate establishment of final stabilization of disturbed areas. Removal of mature trees and shrubs should be limited to the extent practicable.

3.2.2. Noxious Weeds

Noxious weeds can degrade native vegetative communities, damage riparian areas, compete with native plants, create fire hazards, degrade agricultural and recreational lands, pose threats to the viability of livestock, humans, and wildlife, and are expensive to manage. Areas with a history of disturbance, like highway rights-of-way, are at particular risk of weed encroachment.

The Invaders Database System lists 28 exotic plant species and 10 Montana noxious weed species in Cascade County, some of which may be present in the study area. Reseeding of disturbed areas with desirable native plant species will help to reduce the spread and establishment of noxious weeds and to re-establish permanent vegetation. If improvements are forwarded from the study, field surveys for noxious weeds should take place prior to any ground disturbance and coordination with Cascade County Weed Board should occur. Proposed projects should incorporate the practices outlined in MDT standard specifications to minimize adverse impacts.

3.2.3. General Wildlife Species

Mammals

Wildlife species inhabiting or traversing the study area are typical of those that occur in developed and disturbed areas of Montana. Since many species in this area are habituated to somewhat disturbed areas and are tolerant of moderate levels of development, species present in this area are predominately, though not exclusively, generalists. Some of the generalist wildlife species present in the study area are white-tail and mule deer, coyote, red fox, porcupine, raccoon, striped skunk, muskrat, Richardson's ground squirrel, deer mouse, and meadow vole. Due to the lack of suitable habitat resulting from the level of development in the study area, density of roads, it is not anticipated that any of the listed species occurring in Cascade County would normally occur in the study area.

There were three reported occurrences of carcasses collected within the study area. One mule deer and two white-tail deer carcasses were collected in the eastern half of the corridor near the golf course.

Fisheries

The only waterbody in the study area is the Missouri River and it is listed as providing suitable habitat for an array of cold-water species. If impacts to the Missouri River will occur from future improvements, potential impacts to aquatic species will be need to be considered.

Birds

The MNHP Natural Heritage Tracker database indicates a variety of birds have been documented with the potential to occur and nest in the Study Area. These species include representative songbirds, birds of prey, waterfowl, owls, and shorebirds. The study area provides marginal habitat for migratory birds which may nest in the mature trees or move through the area as seasonal migrants.

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA). Under this strict liability law, it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Direct disturbance of a nest occupied with birds or eggs is prohibited under the law. The destruction of unoccupied nests of eagles; colonial nesters such as cormorants, herons, and pelicans; and some ground/cavity nesters such as burrowing owls or bank or cliff swallows may also be prohibited under the MBTA.

There are two bald eagle nests which occur within the general proximity of the corridor, with one of the half-mile buffer areas crossing into the study area. The study area is not typical golden eagle habitat, so presence of golden eagle nests is unlikely.

Any improvements forwarded from this study should consider potential constraints that may result from nesting/breeding periods of migratory birds and presence of unknown or future bald and golden eagles nests. Future projects that involve tree and shrub removal and/or structure replacement or rehabilitation must be conducted in compliance with MBTA, which may entail a timing restriction between April 15 and August 15.

Amphibians and Reptiles

The presence of amphibians and reptiles in the study area is likely limited by lack of suitable habitat and level of development. Common species may occur in low numbers along irrigation facilities, drainages, and within wetland areas. The Plains Spadefoot has a record of collection from 1992 the area near the railroad tracks south of River Drive North. Any improvements forwarded from the study should take into consideration and minimize impacts to amphibian and reptile habitat where practicable.

Crucial Areas Planning System

The Montana Fish, Wildlife and Parks (FWP) Crucial Areas Planning System (CAPS) is a resource intended to provide non-regulatory information during early planning stages of projects, conservation opportunities, and environmental review. The finest data resolution within CAPS is at the square-mile section scale or water body. Use of these data layers at a more localized scale is not appropriate and may lead to inaccurate interpretations since the classification may or may not apply to the entire square-mile section.

CAPS provides general recommendations and recommendations specific to transportation projects for both terrestrial and aquatic species and habitat. These recommendations of the CAPS system can have a generic application to possible project locations moving forward from the study. Coordination with the FWP wildlife biologist should occur during project development.

3.2.4. Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) maintains the federal list of threatened and endangered species. Species on this list receive protection under the Endangered Species Act. An “endangered” species is in danger of extinction throughout all or a significant portion of its range. A “threatened” species is likely to become endangered in the near future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list. According to the USFWS, four threatened, endangered, proposed, or candidate species are listed as occurring in Cascade County:

- Sprague’s Pipit (Candidate)
- Whitebark Pine (Candidate)
- Red Knot (Threatened)
- Canada Lynx (Threatened, and Critical Habitat)

The Montana Natural Heritage Program - Natural Heritage Map Viewer database records and maps documents observations of species in a known location. According to the database, there are no records of any threatened, endangered, proposed, or candidate species within

the boundaries of the corridor study. Due to the lack of suitable habitat resulting from the level of development in the study area, density of roads, it is not anticipated that any of the listed species occurring in Cascade County would normally occur in the study area. It is anticipated that any project forwarded from this study would result in a “no effect” determination for listed species in Cascade County.

As the federal status of protected species changes over time, reevaluation of the listing status and a review for the potential occurrence of these species in the project area should take place before issuing a determination of effect relative to potential project impacts. If a project moves forward from this study, completion of an evaluation of potential effects on any of the species listed above has to occur during the project development process.

3.2.5. Species of Concern

Montana Species of Concern (SOCs) are native animals breeding in the state that are considered to be at risk due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as an SOC is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and to address conservation needs proactively.

A search of the MNHP species of special concern database, revealed three SOC in Cascade County that have the potential to occur and breed in the study area based on presence of suitable habitat. These species include the following:

- **Bald Eagle:** There is a nest site located approximately 0.05 miles north of the roadway across the Missouri River.
- **Plains Spadefoot:** A record from 1992 was collected from the area near the railroad tracks south of the roadway.
- **Many-headed Sedge:** There is one historic record within the boundaries of the corridor study. This record is from 1891; this species is not expected to occur in the project area due to development of Great Falls since 1891.

A thorough field investigation for the presence and extent of these species should be conducted if improvement options are forwarded from this study. If present, special conditions that apply to the project design and/or during construction such as timing restrictions should be considered to avoid or minimize impacts to these species.

3.3. SOCIAL AND CULTURAL ENVIRONMENT

The following subsections present an overview of the social and cultural environment within the study area.

3.3.1. Population Demographics and Economic Conditions

Under NEPA/MEPA and associated implementing regulations, state and federal agencies are required to assess potential social and economic impacts resulting from proposed actions. FHWA guidelines recommend consideration of impacts to neighborhoods and community cohesion, social groups including minority populations, and local and/or regional economies, as well as growth and

development that may be induced by transportation improvements. Demographic and economic information presented in this section is intended to assist in identifying human populations that might be affected by improvements within the study area.

Title VI of the U. S. Civil Rights Act of 1964, as amended (USC 2000(d)) and Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, require that no minority, or, by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. For transportation projects, this means that no particular minority or low-income person may be disproportionately isolated, displaced, or otherwise subjected to adverse effects. If a project is forwarded from the improvement option(s), environmental justice will need to be further evaluated during the project development process.

According to the U. S. Census Bureau’s estimate, Cascade County had a population of 82,384 people in 2013, and was the 5th most populous county in Montana. Great Falls, the 3rd largest city in the state, had a population of 59,351. Over the last 15 years, Cascade County has seen slight increases and decreases in population. The population is projected to grow over the next fifteen years, but at rate less than Montana as a whole (see **Figure 8**).

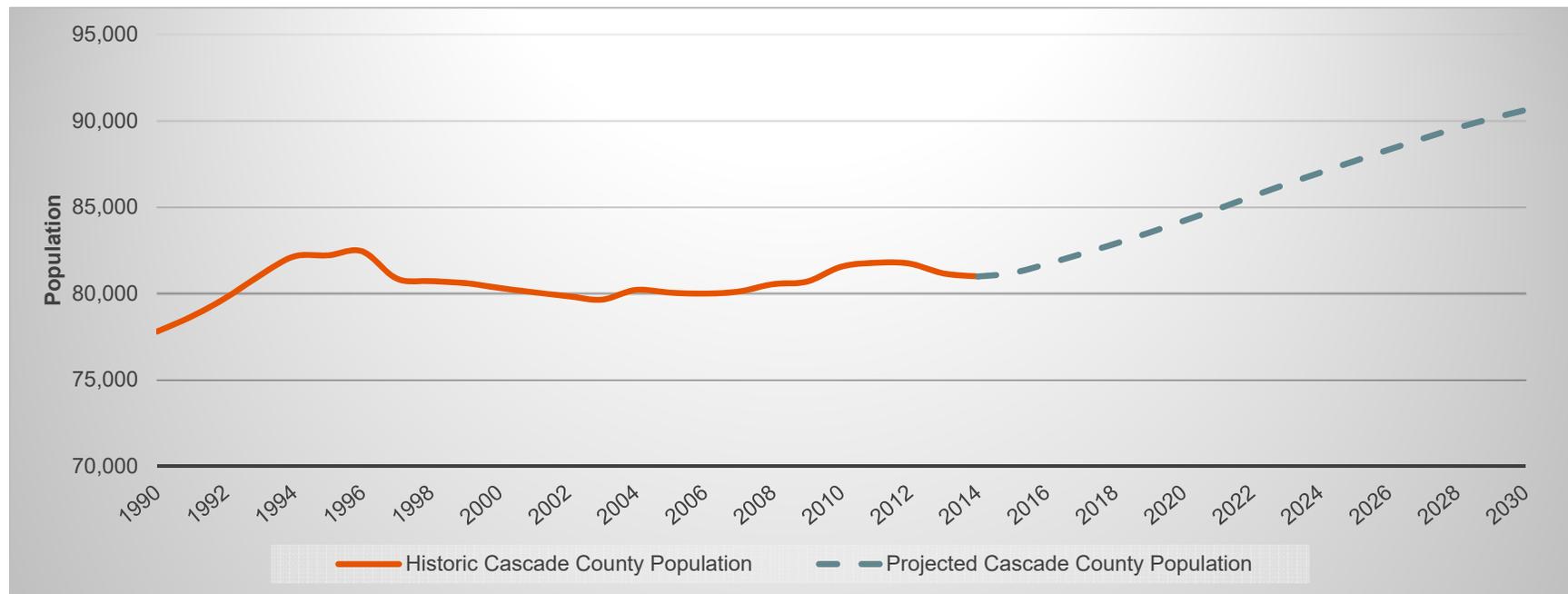


Figure 8: Historic and Projected Population for Cascade County

Source: Montana Department of Commerce, eREMI data.

Past trends in growth for the City of Great Falls indicate that this projected growth may be high. A large part of the City of Great Falls economy relies on Malmstrom AFB which does not have the potential for growth seen in other industries such as energy, tech, or tourism. These other industries have not shown tremendous growth in the City of Great Falls, which is reflected in the city's population having smaller growth than other major cities of Montana.

The population ethnicity in Cascade County is primarily White/Caucasian (89.1 percent). Hispanic or Latino individuals comprise just over three percent of the population. Great Falls has a slightly more diverse ethnic population compared to the Montana average. Malmstrom Air Force Base (in Great Falls) and the two Native American Reservations (Blackfeet Reservation and Rocky Boy Reservation) located within 100 miles of Great Falls could be contributors to the higher than Montana average population diversity seen in Great Falls.

Cascade County and Great Falls residents have a slightly higher percentage of people under the age of 18 and people over the age of 65, with a smaller proportion in the 18 to 64 age range. The median age of 39.2 in Great Falls is still slightly younger than the state median of 39.9 years.

Cascade County's labor market has shown strong performance as evidenced by its 3.7 percent unemployment rate. The county is one of many in Montana showing strong labor market conditions and low unemployment, especially as compared to the rest of the United States. Educational Services, health care and social assistance industries account for 23.8 percent of employment in Cascade County, which is slightly above the Montana average of 22.8 percent. Great Falls and Cascade County employment mirrors that of the State of Montana, and as mentioned earlier, lacks the growth in technology, tourism, and energy industries other Montana cities are seeing.

Median household income for Cascade County is \$44,963 and the City of Great Falls is \$43,822, both of which are lower than the state average of \$46,230. The poverty levels for the City of Great Falls and Cascade County are 16.5 percent, and 14.9 percent, respectively. The state average poverty level is 15.2 percent.

Three census tracts overlap the corridor study area. The overlap incorporates information from locations surrounding the corridor study area, but does not include all census data for the City of Great Falls. The data from the three census tracts around the study area indicates a poverty level of 19.37 percent and minority population of 16.43 percent, both of which are higher than City of Great Falls average.

Cascade County's economy has only moderate growth projected in the near future. The median income within the study area is likely below statewide averages, while the minority population is likely higher than statewide averages. As such, further investigation may be necessary during project development to determine the possibility of low-income and/or minority person(s) being disproportionately isolated, displaced, or otherwise subjected to adverse effects.

3.3.2. Land Ownership

Ownership of land in the study area is predominantly local government, with some interspersed private, commercial, and federal owners. The specific public landowners include the City of Great Falls, FWP, and MDT. The City of Great Falls land includes the Eagle Falls Golf

Club and Parks and Recreation land. The FWP land encompasses a majority of the land on the north side of the study area along the bank of the Missouri River. The majority of private land use within the study area is either industrial or commercial. Some properties are physically close to the River Drive North roadway, which may inhibit future project development. If improvements are forwarded from this study, land use at and adjacent to possible projects will need to be considered during design for determining overall project costs.

3.3.3. Recreational Resources

Cascade County and the Great Falls area offer a variety of year round outdoor activities. Some of the local activities available either in or adjacent to the study area include walking, running, biking, site seeing, and golfing. Adjacent to the study area are the Veteran's Memorial Park, Eagle Falls Golf Club, the Centene Stadium, and the road that leads to the Giant Springs State Park which contains the Lewis and Clark Interpretive Center and the Giant Springs Fish Hatchery.

Recreational resource information was gathered through review of FWP resource lists, the City of Great Falls website, and websites for the specific venues. Recreational areas may be protected under Section 4(f) of the US Department of Transportation Act of 1966, which was enacted to protect publically owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Federally funded transportation projects cannot impact Section 4(f)-protected properties unless there are no feasible and prudent avoidance alternatives and all possible planning to minimize harm has occurred.

From a high level evaluation, there appears to be recreational-related potential 4(f) resources within the study area that could potentially be impacted from future improvements. These are the Eagle Falls Golf Club and Veteran's Memorial Park both located on City of Great Falls property. The Eagle Falls Golf Club is owned by the City of Great Falls and open to the public. Acquiring right-of-way from these potential 4(f) lands would need to go through the evaluation process described above which could add time and costs to a project.

According to the FWP National Land and Water Conservation Fund Act (LWCFA) Sites by County, there is one Section 6(f) resource within the study area. This 6(f) resource is Giant Springs State Park. LWCFA funds were utilized in both the acquisition and development of the state park lands. FWP has indicated that the entire property has LWCFA 6(f) protection. This 6(f) resource should be taken into consideration for any potential forwarded projects, as converting to a non-recreational resource will be both difficult and time-consuming.

Reevaluation of 4(f) and 6(f) resources is likely needed during project development. If future resources are discovered, efforts should be made to avoid adverse impacts to, or right of way acquisitions from, these community recreational resources.

3.3.4. Cultural Resources

A file search of the study area through the Montana State Historic Preservation Office revealed four historic properties sites located within sections 4, 5, and 6, T20N, R4E. These four properties have been previously recorded and National Register of Historic Places status established. All four properties are near, but not within, the study area.

Other potentially historic resources exist within the study area. An examination of the Montana Cadastral Survey information for the designated corridor indicates that at least 10 historic-age properties are adjacent to the study corridor. These resources are “unrecorded historic sites” and include nine commercial properties that were constructed between 1950 and 1962.

Direct and indirect impacts (such as visual, noise, and access impacts) to eligible or listed properties would need to be considered during project development. A cultural resource survey for unrecorded historic and archaeological properties within the Area of Potential Effect will need to be completed during the project development process.

3.3.5. Noise

Traffic noise may have to be evaluated for planned improvements to the study corridor. Noise analysis is necessary for “Type I” projects. If the roadway improvements are limited (e.g., the horizontal and vertical alignments are not changed, and the highway remains a two-lane facility), then the project would not be considered a Type I project.

If the improvements planned for the road would include a substantial shift in the horizontal or vertical alignments, increasing the number of through-lanes, passing lanes, or turning lanes, or increasing the traffic speed and volume, then the project would be considered a Type I project, which would require a detailed noise analysis. The analysis would include measuring ambient noise levels at selected receivers and modeling design-year noise levels using projected traffic volumes.

Noise abatement measures would be considered for the project if noise levels would approach or substantially exceed the noise abatement criteria. The noise abatement measures must be considered reasonable and feasible before implementation. If noise abatement measures were deemed necessary, they could increase costs of proposed future Type I roadway improvements. Construction activities in the study area may cause localized, short-duration noise impacts. These impacts can be minimized by using standard MDT specifications for the control of noise sources during construction.

There are sensitive noise receptors within the study area which may need evaluation during project development. These receptors include the River’s Edge Trail, Veteran’s Memorial Park, Eagle Falls Golf Club, Bob Speck Municipal Golf Course, Centene Stadium, and Giant Springs State Park. Due to these receptors, the majority of the corridor will qualify as an Active Category C for the Noise Abatement Criteria.

3.3.6. Visual Resources

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness in landscape character), and landscape visibility (relative distance of seen areas) of a geographically defined view shed.

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness in landscape character), and landscape visibility (relative distance of seen areas) of a geographically defined view shed.

The River's Edge Trail allows the public to walk and bike along the edge of the Missouri River. An historic marker at approximately RP 4.6 describes the history of Black Eagle. Pullouts exist along the corridor allowing views of Black Eagle Falls. Along with a view of Black Eagle Falls, sandstone outcroppings are visible along the cliffs. One of the pullouts is the Caboose trailhead which has two railroad cars and several picnic tables for public use. Another visually appealing aspect is the Veteran's Memorial Park, which has a wall of tiles dedicated to those that have served in any branch of the US military.

These features lead to a visually appealing setting which considered during the development of improvement options. An evaluation of the potential effects on visual resources may be necessary, depending on the improvement options forwarded from this study.

4.0. AREAS OF CONCERN AND CONSIDERATION SUMMARY

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

4.1. TRANSPORTATION SYSTEM

Access and Right-of-way

- West of 25th Street North, businesses closely front the roadway which provides little room for ingress/egress and for parking.

Non-motorized

- The River's Edge Trail is located on the north side of the roadway.
- The Caboose Trailhead is located just east of 19th Street North and provides parking and access to the River's Edge Trail.
- There is a trail spur that terminates at the intersection with 19th Street North. There are no crossing treatments at this location.

Rail

- There is an at-grade crossing between Giant Springs Road and 38th Street North.

Freight

- The study corridor is a designated truck route and is part of the Northeast Bypass.
- The route currently experiences approximately 7.2 percent heavy vehicle traffic.

Traffic Operations

- The intersection with 15th Street North is projected to experience a LOS of E during the AM and PM peak hours.
- The intersection with 25th Street North currently experiences a LOS of F during the PM peak hour. The intersection is projected to experience a LOS of F during the AM, noon, and PM peak hours.

Geometrics

- Two vertical curves do not meet current standards for rate of curvature.
- The grade between RP 3.8 and RP 4.0 exceeds current standards.

Safety

- Crash clusters were noted at the following locations:
 - 15th Street North intersection
 - East of 15th Street North
 - Big Stack Mobile Home Court approach
 - 12th Street North intersection
 - Black Eagle Falls scenic pullout
 - Giant Springs Road intersection
 - Railroad crossing
 - 38th Street North intersection
- A trend of rear-end crashes was noted along the study corridor.

4.2. ENVIRONMENTAL CONSIDERATIONS

Physical Environment

- The roadway is constrained to the north by the Missouri River.
- The study area is located within the Great Falls MS4 area.
- There is a public water supply well located within the study area.

Biological Environment

- Noxious and exotic plant species may be located within the study area.
- Two bald eagle nests are located within the general proximity of the study corridor.
- Three species of concern have the potential to occur and breed within the study area.

Social and Cultural Environment

- The median income within the study area is likely below the statewide average.
- The minority population within the study area is likely higher than the statewide average.
- There are likely 4(f) and 6(f) resources within the study area.
- There are historic-age properties adjacent to the study corridor.
- There are sensitive noise receptors within the study area.
- Visual resources include multiple scenic pull-outs, the Black Eagle Falls, the Veteran's Memorial Park, and the sandstone outcroppings along the cliffs.

5.0. REFERENCES

- ¹ *Great Falls Long Range Transportation Plan – 2014*, Robert Peccia and Associates, March 17, 2014, http://www.greatfallsmt.net/sites/default/files/fileattachments/greatfalls_lrtpl_final_adopted_low_res.pdf
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