Montana Department of Transportation
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Helena, MT 59620-1001

Memorandum

To: Ryan Dahlke, PE
Consultant Design Engineer

From: Bryan Miller, PE
Consultant Plans Engineer

Date: May 25, 2017

Subject: NH 16-1(57)2
Airport Rd & Main St - Billings
UPN 8718001
Work Type 130 - Reconstruction – with added capacity

Please approve the attached Preliminary Field Review Report, which also serves as the project's scoping meeting minutes.

Approved _____ Date _____
Ryan Dahlke
Consultant Design Engineer

We are requesting comments from those on the distribution list. We will assume their concurrence if we receive no comments within two weeks of the approval date.

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cc:
Wade Salyards, PE EPS Project Manager,
Consultant Design Master file
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Introduction

The scoping meeting for the subject project was held on March 21st, 2017 at the DOWL office in Billings. The purpose of the meeting was to gather information necessary to move forward with defining the scope of the project. The formal meeting began at approximately 1:00 p.m. and concluded at approximately 4:30 p.m. with the following personnel in attendance:

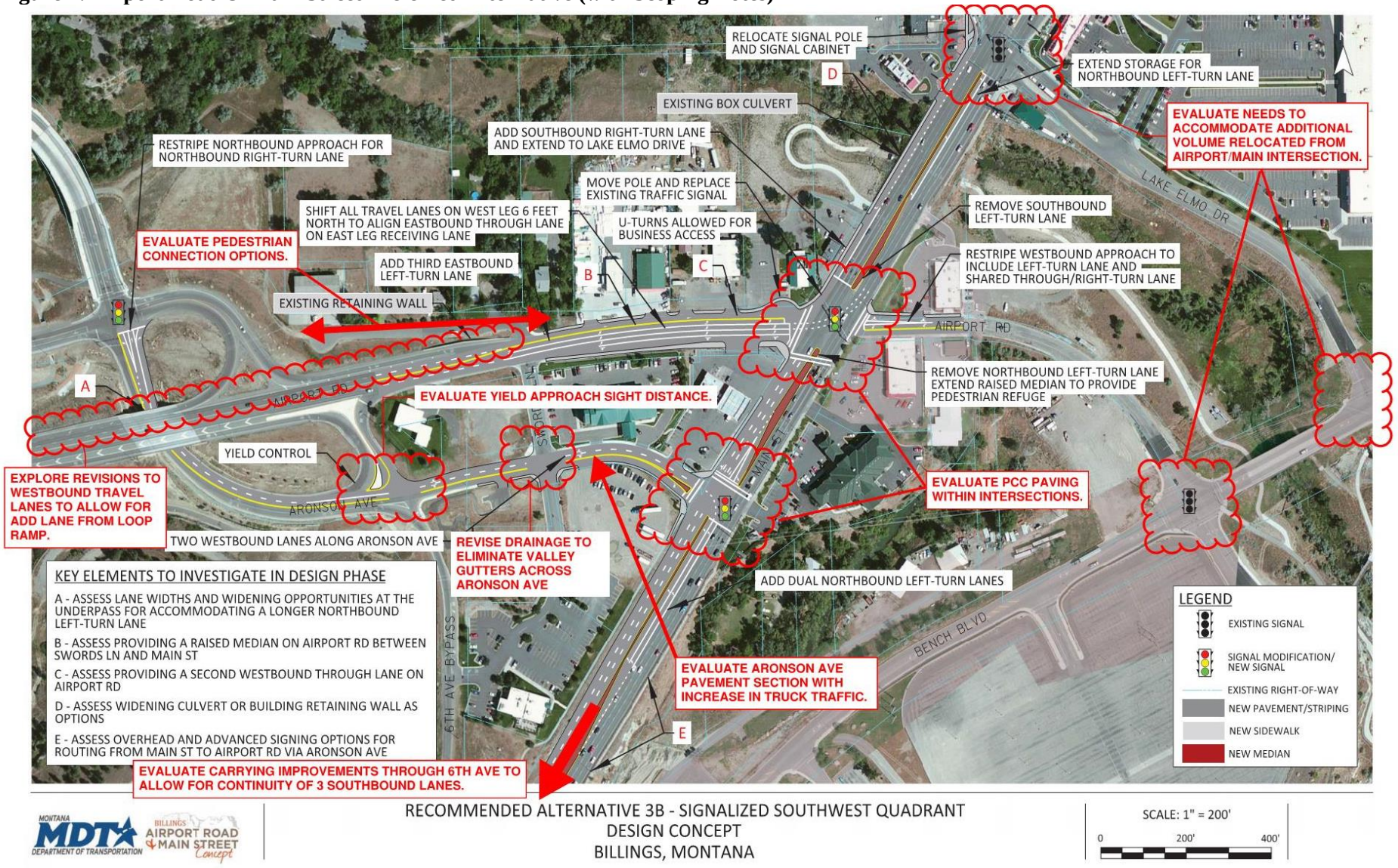
Participants in Attendance at DOWL Billings Office:	
Wade Salyards	MDT Helena - Consultant Design
Tammy Saldivar	MDT Billings District – Utilities
Gary Neville	MDT Billings District – Engineering Supervisor
Stefan Streeter	MDT Billings District – District Administrator
Matt King	MDT Helena – RW/Utilities
Kevin St. George	MDT Helena – Consultant Design
Matt Maze	MDT Helena – ADA Coordinator
Erin Claunch	City of Billings – Staff Engineer
Scott Walker	City/County Planning - Supervisor
Doug Enderson	DOWL – Transportation Engineering Manager (DOWL PM)
Todd Cormier	DOWL – Senior Transportation Manager
Greg Gabel	DOWL – Senior Water Resources Engineer
Adam Zwemke	DOWL – Project Staff
Andy Daleiden	Kittelson & Associates, Inc. – Associate Engineer (KAI PP)
Yuri Mereszczak	Kittelson & Associates, Inc. – Senior Engineer (KAI Deputy PM)
Participants in Attendance at MDT Helena Headquarters Office (via Phone):	
Danielle Bolan	MDT Helena – Traffic
Bryan Miller	MDT Helena – Consultant Design
Dave Leitheiser	MDT Helena – Hydraulics
Tom Gocksch	MDT Helena – Environmental
Cameron Kloberdanz	MDT Helena – Geotechnical
Participants in Attendance via Phone:	
Stan Jonutis	MDT Billings District – Traffic
C.B. Clearwood	MDT Billings District – R/W
Alan Woodmansey	FHWA

Proposed Scope of Work

Proposed improvements include lane modifications, signal upgrades, median work, and minor realignment of routes and approaches near the intersection of Airport Road and Main Street in Billings. **This project will be designed in MDT's enhanced workspace using Microstation SS4 and OpenRoads 3D technology as agreed through discussion with the MDT Project Manager.**

Figure 1 on the following page illustrates the recommended alternative from the Concept Study as well as key comments from the scoping kickoff meeting.

Figure 1: Airport Road & Main Street Preferred Alternative (with Scoping Notes)



History

During the Concept Study, an extensive evaluation of the existing and future no-build conditions was performed. Project goals and objectives were identified, detailed stakeholder and public involvement was conducted, the alternative selection process was vetted and alternatives were developed, and the preferred alternative shown in Figure 1 was identified.

Needs and Objectives

The Concept Study identified the following needs for this project:

- The subject intersection, Airport Road and Main Street, currently operates at a level of service (LOS) C and near capacity (intersection volume-to-capacity ratio of 0.92) during the weekday a.m. peak hour, and LOS D and near capacity (intersection volume-to-capacity ratio of 0.92) during the weekday p.m. peak hour. Future year 2040 traffic conditions project the intersection operations to be at LOS F and over capacity (intersection volume-to-capacity ratio of greater than 1.0) during the weekday a.m. and p.m. peak hours. With the substandard operations at the intersection, vehicle queues frequently spill back and impact adjacent intersection operations during the weekday a.m. and p.m. peak hours.
- The subject intersection had 111 reported crashes from 2010 to 2014, of which 61% were rear-end crashes and 40% were injury related. The crash rate is 1.33 crashes per million entering vehicles.
- The existing pedestrian facilities (e.g., sidewalks, ramps, and crossings) generally do not provide a comfortable experience for pedestrians.
- The intersection is located on the Camino Real International Trade Corridor and experiences high truck traffic ranging between 3% and 12% of all vehicles throughout the day.
- The intersection is located in close proximity to the MetraPark, a major activity and event center for the Billings area and the Yellowstone County fairgrounds. During events, heavy traffic volumes travel through the subject intersection to access and depart from MetraPark.

Generally, the objective of this project is to address the capacity and queuing issues, safety and mobility needs, signal upgrade needs, and other operational issues for all users within the project area.

Project Location and Limits

Located in Yellowstone County, within the Billings city limits, the Airport Road and Main Street intersection is located two miles northeast of downtown Billings, just north of MetraPark. The intersection resides on the Camino Real International Trade Corridor that connects Canada, United States, and Mexico, and is a critical junction for commuter, regional, and freight trips along the Airport Road and Main Street corridors. The two corridors connect recreational, residential neighborhoods (Heights West and East), low density commercial, and light industrial land uses with downtown Billings and Interstate 90. Figure 2 illustrates the project limits.

Figure 2: Airport Road & Main Street Project Area

The proposed project limits include the following:

Roadway Segments:

- Airport Road (U-1014), classified by MDT as an Urban Minor Arterial, from the Aronson Avenue overpass to Main Street (approximately 1,500 feet).
    - The most recent as-built stationing increases from west to east (MT-CM-STPU (009)).
- Airport Road (L-56-4978), classified by MDT as a Local Road, between Main Street and Bench Boulevard (approximately 1,000 feet).
    - No as-builts were provided for this segment of Airport Road as of the PFR submittal so the as-built stationing is unknown.
- Main Street (N-16), classified by MDT as an Urban Principal Arterial, from 6th Avenue North to Lake Elmo Drive (approximately 3,000 feet). Main Street is also designated as a National Highway System (NHS) Non-Interstate route.
    - The most recent as-built stationing increases from south to north (MT-CM 1099(32)), in the same direction as the reference posts along N-16.
- Aronson Avenue (L-56-4819), classified by MDT as a Local Road, between Alkali Creek Road and Main Street (approximately 1,800 feet).
    - No as-builts were provided for this segment of Aronson Avenue as of the PFR submittal so the as-built stationing is unknown.

Public Street Intersections:

- Airport Road (U-1014)/Main Street (N-16) (signalized)
- Airport Road (U-1014)/Swords Lane (L-56-4673) (unsignalized)
- Airport Road (U-1014)/Airport Road Westbound Ramps (L-56-4823 & L-56-4862) (unsignalized)
- Airport Road (U-1014)/Airport Road Eastbound Ramps (L-56-4822 & L-56-4867) (unsignalized)
- Main Street (N-16)/6th Avenue North (U-1029) (signalized)
- Main Street (N-16)/Aronson Avenue (L-56-4819) (to be signalized with project)
- Main Street (N-16)/Lake Elmo Drive (L-56-2413 & L-56-2389) (signalized)
- Aronson Avenue (L-56-4819)/Swords Lane (L-56-4673) (unsignalized)
- Aronson Avenue (L-56-4819)/6th Avenue Bypass (officially named the Swords Avenue Bypass) (L-56-4868) (unsignalized)
- Aronson Avenue (L-56-4819)/Alkali Creek Road (L-56-726) (signalized)

The following additional project limits will be analyzed as part of the traffic analysis and evaluated for potential improvements:

- Evaluate the following improvements at the Main Street and Lake Elmo Drive intersection:
  - Extend the storage length for the right-turn lane or add a second right-turn lane from Lake Elmo Drive to southbound Main Street.
  - Extend the northbound left-turn lane.
  - Install a pedestrian refuge area in the median on the north approach.
- Explore revisions to the westbound travel lanes on Airport Road to allow the Westbound Airport Road On Ramp (loop ramp) to join Airport Road as an add lane.
- Evaluate carrying improvements on Main Street through the intersection with 6th Avenue North to allow for the continuity of three southbound through lanes.
- Evaluate the need for improvements due to re-routed Airport Road and Main Street intersection traffic at the following intersections:
  - Airport Road and Bench Boulevard
  - Lake Elmo Drive and Bench Boulevard

As-built plans were found dating back to 1973 and up to 2014. As-built plans include the following:

- STPE 1099(84), UPN 7934000 – Aronson Bypass Trail at Swords Park, 2014
- MT-STPU 1036(1) – Grade, Gravel, Pl. Mix Surf. & C&G (Bench Boulevard – Billings), 2013
- W.O. 03-07, TCSP 007-Q69, CTEP UPN 6396, STPE 1009(57) – Alkali Creek Multi-Use Path Segment 1B (City of Billings), 2011
- MT-CM 1099(32) – Bridge, Grade, Gravel, and Plant Mix Surface (6th Ave N to Bench Blvd. – Blgs), 2010
- W.O.08-21 – Main Street to Wicks Lane (Billings), 2010
- MT-CM-STPU (009) – Grade, Gravel, PL. Mix, Surf. & Structures (Billings – Airport Road), 2008
- NH-IM-STPU 0002(644), Signing and Electrical Truck Route Signs (Billings), 2006
- NH 16-1(45)1 – Mill, Fill, & ADA Ramps (Main Street – Billings Heights), 2005
- W.O. 99-07 – Lake Elmo Road, Main Street to Hansen Lane (Billings), 2005
- CM 16-1(43)1 – Traffic Signal Upgrade (Main Street – Billings Heights), 2003
- W.O. 94-04 – Main Street Sidewalk Project (Billings), 1998
- W.O. 94-04 – Main Street Sidewalk Project (Billings), 1995
- NH 16-1{31}2 – Right Turn Lane & GVW Signing at Main Street and 6th Ave N (Billings), 1991
- RTF 16-1(29)2 – Surface Rehabilitation Main Street, 6th Ave N to Milton Rd (Billings), 1990
- M-1099 [2] Unit 2 – Intersections of 4th Ave N, 6th Ave N, at Exposition Drive (Billings), 1973

Adjacent/related projects include the following:

- NH 16-1(55)1 - Main St-Billings, UPN 8717000
- NH 16-1(53)0 – Exposition Drive & 1st Avenue North – Billings, UPN 7908000
- NH 53-1(29)0 – 27th Street (1st Ave S to Airport) – Billings, UPN 7910000
- NH 115-1(1)0 – 1st Avenue North – Billings, UPN9022000
- W.O. 16-21 – Exposition Drive Pedestrian Crossing Feasibility Study (City of Billings, Billings Industrial Revitalization District)
- Town Pump Development – A new Town Pump casino/convenience store is being constructed on the west side of Main Street approximately 600 feet north of Lake Elmo Drive.

The only reference post marker within the project area is RP 2 at 3.3201 on Main Street (N-16) just south of the crossing of Alkali Creek.

Work Zone Safety and Mobility

At this time, Level 1 construction zone impacts are anticipated for this project as defined in the Work Zone Safety and Mobility (WZSM) guidance. The plans package will include a Transportation Management Plan (TMP) consisting mainly of a Traffic Control Plan (TCP). A Transportation Operations (TO) component and a Public Information (PI) component will be necessary given the complexity of the project and to better coordinate with nearby projects, as well as to address business access, detour routes, and heavy truck traffic including wide and oversized loads. These issues are discussed in more detail under the Traffic Control and Public Involvement sections.

Physical Characteristics

The physical characteristics of the roadway segments and project intersections are generally described below:

Airport Road (U-1014)

Airport Road (U-1014) provides connections to the Billings Heights' neighborhoods, Billings Logan International Airport and MetraPark between State Highway 3 (N-53) to the west and Main Street (N-16) to the east. Airport Road also serves as a regional connection for State Highway 3 and US 87. According to the MDT Road Log, the roadway was last reconstructed and rehabilitated in 2011 (MT-CM-STPU (009)). This reconstruction project included the resurfacing of Airport Road as well as the ramp terminals at Alkali Creek Road and the 6th Avenue Bypass.

From east to west, Airport Road from Bench Boulevard to Main Street is classified as a Local Road with a three-lane cross section and a sidewalk on the south side of the roadway. Sidewalks are provided on the north side of the roadway near the Main Street intersection. A speed limit is not posted on this portion of Airport Road.

The posted speed limit along Airport Road is 45 mph between Main Street (N-16) and State Highway 3 (N-53), with a roadway cross section consisting of four lanes, each 12 feet wide, and eight foot shoulders on both sides of the roadway. Sidewalks are present on the north and south side of the roadway from Main Street to Swords Lane. Heading west along Airport Road, the grade of the roadway is less than 2% between the Main Street intersection and the Aronson Avenue overpass. The grade gradually increases to over 4.5% west of the Aronson Avenue overpass. The overpass is approximately 140 feet in length and 100 feet wide. Luminaires are staggered along each side of the roadway approximately 200 feet apart from the Main Street intersection to approximately 900 feet west of the Aronson Avenue overpass. A cantilever sign structure exists on the south side of the roadway, approximately 300 feet west of Main Street, at about 3 feet behind the back of sidewalk. West of the Aronson Avenue overpass, Airport Road continues as a four-lane cross section with eight-foot shoulders to State Highway 3 (N-53). The roadway generally follows the existing ground grade and all grades appear to be less than design maximums.

Airport Road (U-1014)/Main Street (N-16) Intersection
The Airport Road (U-1014)/Main Street (N-16) intersection (shown in the image) is the junction of two arterial routes serving both regional and local traffic. The intersection functions as a gateway intersection into both downtown Billings and the Billings Heights area. Maintaining adequate flow through the intersection is critical to accessing these areas of Billings, including the East Billings Urban Renewal District (EBURD) and MetraPark, as well as providing reliable transportation through the greater Yellowstone County region. According to the MDT Road Log, the intersection was last reconstructed in 1965, with the last rehabilitation work occurring in 2005 (NH 16-1(45)1).


Exhibit 1. Airport Rd & Main St Intersection

All vehicular movements at the intersection operate as protected movements (the north-south left-turn movements are protected-permissive) controlled by an overhead traffic signal on a truss structure spanning from the northwest quadrant to the southeast quadrant of the intersection. The traffic signal cabinet is located on the northwest corner of the intersection. Marked crosswalks and pedestrian signals are provided on the south, east and west legs of the intersection. Luminaires are provided on the southwest and northeast corners of the intersection. The Cenex gas station, Golden Phoenix Chinese Cuisine and Subway each have a large business sign on the southwest, northwest, and southeast corners of the intersection, respectively. Each sign is approximately six to nine feet from the back of sidewalk at its closest point. Overhead power lines run parallel to the southbound lanes (approximately 20 feet behind the back of sidewalk) before following the northwest corner curvature to run parallel with the westbound lanes on the west leg of the intersection (approximately three to five feet behind the back of sidewalk). There are no powerlines crossing Airport Road or Main Street in the immediate vicinity of the intersection.

The lane configurations for each leg of the intersection are as follows:

- The north and south legs have four entry lanes and three departure lanes. The entry lanes include one left-turn only lane and two through lanes and one shared through/right-turn lane with a center median approximately four feet in width.
- The east leg has two approach lanes and one departure lane. The entry lanes include one shared through/left-turn lane and one dedicated right-turn lane.
- The west leg has three approach lanes and two departure lanes. The entry lanes consist of one dedicated left-turn lane, one shared through/left-turn lane, and one dedicated right-turn lane.

Airport Road (U-1014)/Swords Lane Intersection
Swords Lane is located approximately 700 feet west of the Airport Road/Main Street intersection and is owned and maintained by the City of Billings. The Swords Lane intersection (shown in the image) connects businesses to the south of Airport Road and a small number of residential units north of Airport Road. Swords Lane has one approach lane and one receiving lane on the north and south legs of the intersection, which are both stop controlled. Airport Road has two lanes in each direction separated by a double yellow line and is uncontrolled.


Exhibit 2. Airport Rd & Swords Ln Intersection

Airport Road (U-1014)/Airport Road Westbound Ramps Intersection
As mentioned previously, the Airport Road/Airport Road Westbound Ramps intersection (shown in the image) was rehabilitated in 2011 (MT-CM-STPU (009)). The westbound ramp includes one exit lane for vehicles coming off Airport Road to access either Alkali Creek Road or Aronson Avenue. The exit lane is developed approximately 550 feet in advance of the intersection and is separated from the through lanes by a four-foot striped buffer. The westbound on-ramp is a loop ramp developed at the Aronson Avenue/Alkali Creek Road intersection described in greater detail later in this section. The single-lane loop ramp meets the established Airport Road grade and cross section at the Aronson Avenue overpass. Vehicles have a 750-foot acceleration lane in the westbound direction on Airport Road before having to merge with the outer through lane. As the grade of Airport Road increases to greater than 4.5% west of the overpass, a typical heavy truck with a 200 lb/hp ratio can accelerate to roughly 25 mph before being forced to merge with westbound traffic. While extending the existing acceleration lane is a feasible option, the acceleration lane would need to be an additional 2,000 feet in length for a heavy truck to accelerate to a maximum speed of 30 mph on a 4% grade.

Exhibit 3. Airport Rd WB & EB Ramps & Aronson/6th Avenue Bypass

Airport Road (U-1014)/Airport Road Eastbound Ramps & Aronson Avenue/6th Avenue North Bypass Intersections
As mentioned previously, the Airport Road Eastbound Ramps (shown in the image above) were rehabilitated in 2011 (MT-CM-STPU (009)). The eastbound ramp is located across from the westbound ramp on the south side of Airport Road. The eastbound ramp includes one exit lane for vehicles leaving Airport Road to access Aronson Avenue. The exit lane is developed approximately 950 feet in advance of the intersection and is separated from the through lanes by a 15-foot striped buffer. The exit ramp is a loop ramp that continues as its own uncontrolled lane when it joins Aronson Avenue to the south and crosses underneath Airport Road. The eastbound on-ramp is a single-lane, stop controlled movement for right-turns onto Airport Road. There is no acceleration lane provided for vehicles making the right turn onto Airport Road. Vehicles can access the eastbound ramp via Aronson Avenue from the west and east and the 6th Avenue North Bypass to the south. Vehicles heading eastbound on Aronson Avenue must use the ramp to go north on Main Street (N-16). The westbound approach on Aronson Avenue is a single-lane, stop-controlled approach, while the eastbound approach is uncontrolled with a dedicated right-turn lane and a through/left-turn lane.

Main Street (N-16)
Within the project limits, Main Street (N-16) runs roughly south to north from 6th Avenue North (U-1029) to Lake Elmo Drive. Main Street provides a local and regional connection within the City of Billings, Yellowstone County, and points north and south. According to the MDT Road Log, the roadway was last rehabilitated in 2005 (NH 16-1(45)1). The roadway consists of six 12-foot travel lanes with a center median of varying widths. Sidewalks exist on both sides of the roadway and luminaires are staggered along each side of the roadway approximately 300 feet apart. The posted speed limit is 35 mph through the project limits.

From the 6th Avenue North intersection, the roadway initially follows a horizontal curve with an uphill grade to approximately 300 feet south of the Aronson Avenue intersection. Visual observation indicates

that the grade generally follows the existing ground, and that all grades appear to be less than design maximums. Immediately to the east of Main Street, there is a drastic change in topography as the slope of the Rimrocks become more pronounced. Roadway expansion to the east was determined unfeasible during the Concept Study due to the natural landscape between 6th Avenue North and Aronson Avenue.

Sidewalk on the east side of Main Street is separated by a guardrail from 6th Avenue North to Aronson Avenue, while the sidewalk on the west side is separated from the roadway due to varying topography. North of Aronson Avenue, attached sidewalks are present through the Lake Elmo Drive intersection.

Just south of the Aronson Avenue intersection, high voltage power lines cross Main Street approximately 40 feet overhead. The nearest power pole is located on the east side of the roadway, and south of the access driveway, approximately 12 feet behind the back of sidewalk.

Two cantilever sign structures exist in this segment, one on the west side approximately 400 feet north of 6th Avenue North (approximately 2 feet behind the back of curb) and one on the east side approximately 575 feet north of 6th Avenue North (approximately 10 feet behind the back of curb).

Continuing on Main Street, approximately 450 feet north of the Aronson Avenue intersection is the Airport Road (U-1014)/Main Street intersection. The northbound section of Main Street includes three through lanes with the development a dedicated left-turn lane for the intersection. There is one driveway access for businesses on the east side of Main Street. The southbound section of Main Street includes three through lanes and the development of dedicated left-turn and right-turn lanes at the Aronson Avenue intersection. There is one driveway for the Cenex gas station on the west side of the roadway, near the Airport Road/Main Street intersection.

North of the Airport Road/Main Street intersection, the roadway includes a seven-lane cross section to Lake Elmo Drive, three through lanes and back-to-back left-turn lanes in each direction. This section of Main Street includes guardrails at the back of sidewalk on west side and four feet behind the back of curb on the east side of the roadway as the roadway spans approximately 250 feet across Alkali Creek.

Alkali Creek is channeled through a 15-foot wide SPPC structure approximately 185 feet in length underneath Main Street. In 2011, the City of Billings constructed a multiuse path and tunnel running underneath Main Street. The tunnel is an SPPC structure with entrances reinforced by concrete frames, which support a 10-foot wide multiuse path running adjacent to Alkali Creek. The multiuse path is accessible via the sidewalk on the west side of Main Street.

Overhead power lines run adjacent to Main Street on the west side of the roadway. The closest power poles are located near the Airport Road intersection and are approximately 20-25 feet behind the back of sidewalk. As the power poles approach Lake Elmo Drive, the poles are located more than 60 feet behind the back of sidewalk.

There are four driveways on the west side of the roadway. Two at the southwest corner of the Lake Elmo Drive intersection and two on the northwest corner of the Airport Road/Main Street intersection. There is one driveway on the east side of Main Street approximately 275 feet north of the Airport Road/Main Street intersection. Because of the four-foot raised median through this section, all driveways are limited to right-in/right-out movements only.

6th Avenue North (U-1029)/Main Street (N-16) Intersection

6th Avenue North/Main Street (shown in the image on the next page) is a signalized intersection that provides a critical connection to vehicles traveling between downtown Billings and the Billings Heights, as well as to and from MetraPark, directly to the south of the subject intersection. Southbound vehicles can access 6th Avenue North and downtown Billings via the 6th Avenue North Bypass from Aronson

Avenue or via the two dedicated southbound right-turn bypass lanes from Main Street. The intersection also serves as the beginning/end of Bench Boulevard (U-1036). According to the MDT Road Log, the roadway was last rehabilitated in 2005 (NH 16-1(45)1); however, the northbound right-turn bypass lane to Bench Boulevard was completed under project number MT-CM-1099(32) in 2011.

All vehicular movements at the intersection operate as protected movements controlled by a traffic signal with the exception of the northbound and southbound right-turn bypass lanes. Characteristics include:

- The north leg of the intersection includes five approach lanes and three departure lanes. The entry lanes include a right-turn bypass lane for the 6th Avenue Bypass. This lane is separated from the two southbound right-turn bypass lanes on Main Street by a median island. There are two through lanes at the traffic signal.
    - The southbound right-turn bypass lanes are developed from the outside lane on Main Street approximately 700 feet north of the intersection. This results in a lack of continuity through the intersection with two entry through lanes and three receiving lanes for the southbound through movement at the intersection.

Exhibit 4. 6th Avenue N & Main St Intersection

- The south leg of the intersection includes four approach lanes and three departure lanes. The entry lanes include one dedicated left-turn lane and three through lanes. The right-turn bypass lane onto Bench Boulevard is developed approximately 450 feet south of the intersection.
- The east leg of the intersection (Bench Boulevard) includes three approach lanes and one departure lane created from the northbound right-turn bypass. The three approach lanes include one dedicated left-turn lane, one shared through/left-turn lane and one shared through/right-turn lane. Vehicles traveling through the intersection proceed onto 6th Avenue North towards downtown Billings.
- The west leg of the intersection is 6th Avenue North which consists of five one-way, westbound departure lanes.
- Pedestrian crossings at the intersection occur at the south and east legs of the intersection.
- There are no overhead power lines or power poles in the immediate vicinity of the intersection.
- Overhead luminaires are provided approximately every 200 feet and 1 foot behind the back of sidewalk along each side of Main Street in the vicinity of the intersection.
- Traffic signal poles with mast arms are located on the northeast and southwest corners of the intersection. Post-mounted signals are located in the center median on the north approach and in the median separating the northbound right-turn bypass lane.
- The traffic signal cabinet is located on the southwest corner of the intersection.

Aronson Avenue/Main Street (N-16) Intersection

Aronson Avenue/Main Street intersection (shown in the image) is located approximately one-quarter mile north of 6th Avenue North and approximately 450 feet south of the Airport Road/Main Street intersection. Characteristics of the Aronson Avenue/Main Street intersection include:

Exhibit 5. Aronson Ave & Main St Intersection

- The west leg of the intersection is stop-controlled, with a landscaped median island. Lane configurations include one approach lane for right-turns only and one receiving lane.
- The north leg has five entry lanes and three departure lanes. The entry lanes include one dedicated right-turn lane, three through lanes and a dedicated left-turn lane for development on the east side of Main Street.
- The south leg has four approach lanes and three departure lanes. The entry lanes consist of one dedicated left-turn lane and three through lanes.
- There is a large overhead sign, approximately 30 feet high, for the Cenex gas station in the northwest corner of the intersection, located roughly one foot behind the back of sidewalk.

Lake Elmo Drive/Main Street (N-16) Intersection

Lake Elmo Drive, owned and maintained by the City of Billings, serves as an important roadway for vehicles accessing the Billings Heights. Observations noted a heavy southeast bound right-turn movement onto Main Street during the a.m. peak period and conversely a heavy northbound left turn movement onto Lake Elmo Drive during the p.m. peak period. The City of Billings last improved Lake Elmo Drive and its approach at the Main Street intersection during project number STPE 1099(41) in 2005.

Exhibit 6. Lake Elmo Dr & Main St Intersection

All vehicular movements at the intersection (shown in the image) are controlled by a traffic signal. Reconstruction of the northwest leg of the intersection included the addition of a dedicated right-turn lane by widening the existing roadway on Lake Elmo Drive from Main Street through Emerald Lane, approximately 250 feet north of the intersection. As-built plans show the slope of the road in this section of Lake Elmo Drive increasing from 0.5% to 1.5%. Because of the curvature of the southeast bound approach, the receiving lane width exceeds the typical 12 feet as seen within the majority of the corridor. Additionally, the northwest corner of the intersection was reconstructed in 2015 and 2016 for a drive-through coffee shop (Starbucks), which did not impact the roadway, but did improve the sidewalks within its vicinity. The lane configurations for each leg of the intersection are as follows:

- The north leg of the intersection has four approach lanes and three departure lanes. The four entry lanes include a southbound left-turn lane, two through lanes, and a shared through/right-turn lane.
    - The north leg departure lanes include a right-turn lane for development on the east side of Main Street. The right-turn lane is developed shortly after the intersection.
- The south leg of the intersection includes four approach lanes and three departure lanes. The entry lanes include one left-turn lane, two through lanes, and one shared through/right-turn lane.

- The east leg serves the retail developments to the east of Main Street. The approach consists of three entry lanes, and one receiving lane. The entry lanes include one dedicated left-turn lane, one through lane, and one right-turn lane.
- The northwest leg of the intersection includes two approach lanes and one departure lane. The entry lanes include one shared through/left-turn lane and one dedicated right-turn lane, roughly 90 feet in length. The receiving lane is approximately 20 to 22 feet wide near the intersection.

Other notable characteristics of the Lake Elmo Drive/Main Street intersection include:

- Pedestrian crossings are provided on all legs except the south leg of the intersection.
- Overhead luminaires are provided on the northeast and southwest corners of the intersection.
- Traffic signal poles with mast arms are located on the northeast, southeast and southwest corners of the intersection. A post-mounted signal pole is located on the northwest corner of the intersection.
- The traffic signal cabinet is located on the southwest corner of the intersection.

Aronson Avenue

Aronson Avenue, owned and maintained by the City of Billings, provides a connection to vehicles coming to/from the east side of the Billing Heights. From Main Street heading west, Aronson Avenue is a two-lane road with 12-foot lanes and no posted speed within the project limits (the posted speed is 30 mph just north of the intersection with Alkali Creek Road). Between Main Street and Swords Lane sidewalks are provided on both sides of the roadway and continue on the south side of the roadway to the 6th Avenue North Bypass. Visual observations indicate an uphill grade from Main Street to the 6th Avenue Bypass that appears to be less than the design maximum.

West of the 6th Avenue Bypass, Aronson Avenue was reconstructed and rehabilitated as part of project MT-CM-STPU(009) in 2011. The reconstruction included widening to a four-lane cross section to accommodate a dedicated eastbound right-turn lane onto the 6th Avenue Bypass and an add lane from the 6th Avenue Bypass off-ramp from Airport Road as previously described. The roadway's cross section narrows back down to three lanes before crossing under the Airport Road overpass. North of Alkali Creek Road, Aronson Avenue widens to a three-lane cross section with bike lanes and sidewalks as it continues onto a bridge over Alkali Creek roughly 250 feet north of the intersection.

Aronson Avenue/Swords Avenue

This intersection (shown in the image) serves as a local connection for businesses on the north and south side of Aronson Avenue as well as a cut through to/from Airport Road. The lane configurations for each leg of the intersection are as follows:

Exhibit 7. Aronson Ave & Swords Ln Intersection

- The east and west legs of the intersection are uncontrolled and have one approach lane and one receiving lane with the ability to make all movements at the intersection.
- The north and south legs consist of one approach lane and one receiving lane. The approaches are stop-controlled and allow all movements.
- There are no sidewalk connections on the north and south approaches; however, there are existing pedestrian ramps to cross between the sidewalks running on the north and south sides of Aronson Avenue.

Aronson Avenue/Alkali Creek Road (Airport Road Westbound Loop Ramp)

This signalized intersection (shown in the image) provides a connection to the Billings Heights, access to/from Airport Road via the ramps, and access to the residential areas along Alkali Creek Road and to State Highway 3 northwest of the airport. All of the left-turn movements operate under permissive signal control. Traffic signal poles and luminaires are located on all four corners of the intersection with the traffic signal cabinet located in the northwest corner. The traffic signal is owned and maintained by the City of Billings. The lane configurations for each leg of the intersection are as follows:

Exhibit 8. Aronson Ave & Alkali Creek Rd Intersection

- The east and west legs of the intersection have two approach lanes and one departure lane. The entry lanes include one shared through/left-turn lane and one dedicated right-turn lane.
- The south and north legs of the intersection have two approach lanes and one departure lane. The entry lanes include one dedicated left-turn lane and one shared through/right-turn lane. Additionally, the north leg has a crosswalk, pedestrian ramps on both corners, and connects with sidewalks on both sides of Aronson Avenue.

Traffic Data

As part of the Concept Study, MDT provided average annual daily traffic (AADT) volumes along Main Street for the past 20 years (1995 - 2014). The AADT along Main Street includes two-way traffic volumes between 1st Avenue and Lake Elmo Drive. In 2014, AADT along Main Street varied from 46,900 north of Lake Elmo Drive to 38,100 north of 1st Avenue North. The historical annual growth rate on Main Street is approximately 1%. The Airport Road/Main Street intersection experiences 5.6% and 3.5% heavy vehicles during the weekday a.m. and p.m. peak hours, respectively.

Additionally, there are ten MDT short-term counters (56-4A-264, 56-4A-350, 56-4A-265, 56-4A-292, 56-4A-299, 56-4A-013, 56-4A-012, 56-4A-247, 56-4A-011, 56-4A-337) located in the project area. Table 1 summarizes the daily traffic volumes (year 2015 and year 2040) on Airport Road, Main Street, and Aronson Avenue.

Table 1. Year 2015 and Year 2040 Daily Traffic Volumes

Airport Road (West of Main Street)		Main Street (1st Ave N to Lake Elmo Drive)		Aronson Avenue	
2015 AADT	11,800 to 13,000	2015 AADT	38,100 to 46,900	2015 AADT	3,100
2040 AADT	21,900 to 35,200	2040 AADT	56,200 to 81,300	2040 AADT	4,700[1]

Above data presented in the Concept Study
[1]With the proposed improvements at the Airport Road/Main Street intersection, the traffic volumes on Aronson Avenue are projected to increase to above 6,000 daily traffic volumes.

As part of the Activity 112 Preliminary Traffic Report (PTR), a request for traffic data will be made to MDT to obtain daily traffic volumes, design hour traffic volumes, ESALs, and other related data for the design of the project. This information will be included in the PTR documentation.

Crash Analysis

Crash data from the five year time period of 2010 – 2014 was obtained from MDT and used to evaluate crash trends at the project intersections. Crash data was summarized and a crash rate was provided for each of the project intersections.

Overall, there were 325 crashes, including 1 fatality over a 5-year period in the study area. Injury-related crashes accounted for 35% of all reported crashes. Table 2 presents the severity of the total reported crashes, as well as a crash rate for each intersection

Table 2. Project Intersection Crash Rates (2010 to 2014 Reported Crashes)

Project Intersection	Property Damage Only	Injury	Fatal	Total	Crashes per Million Entering Vehicles
Lake Elmo Drive/Main Street	96	51	0	147	**1.78**
Airport Road/Alkali Creek Road	1	1	0	2	**0.06**
Airport Road/Swords Lane	4	1	0	5	**0.22**
Airport Road/Main Street	67	44	0	111	**1.33**
Aronson Avenue/6th Avenue Bypass	2	0	0	2	**0.09**
Aronson Avenue/Swords Lane	0	0	0	0	**0.00**
Aronson Avenue/Main Street	5	3	0	8	**0.40**
6th Avenue/Main Street	34	15	1	50	**0.58**
Total	**209**	**115**	**1**	**325**	-

Both the Lake Elmo Drive/Main Street and Airport Road/Main Street intersections have crash rates greater than 1.0 crashes per million entering vehicles. Both intersections have the two highest totals of reported crashes. Rear-end crashes accounted for approximately two-thirds of the reported crashes at both intersections.

In addition to the intersection crashes, there were a total of 44 reported crashes that occurred on the individual segments on Main Street between 4th Street and Lake Elmo Drive. The highest crash types were rear-end and side-swipe.

Major Design Features

a. **Functional Classification & Ownership**. There are two functional classification references for roadways within the project limits, (1) the Billings-Yellowstone County Metropolitan Planning Organization (MPO) and (2) the MDT Functional Classification Map (GIS). Within the project area, roadway functional classifications and ownership are as follows:

- **Airport Road**
  - West of Main Street:
    - MDT Functional Classification Map: Urban Minor Arterial
    - Billings-Yellowstone County MPO: Principal Arterial
    - Ownership: MDT
  - East of Main Street
    - MDT Functional Classification Map: Urban Local Road
    - Billings-Yellowstone County MPO: N/A
    - Ownership: *Yellowstone County (to be confirmed by MDT)*
  - **Proposed Design Basis:** Kittelson & Associates, Inc. (KAI) proposes improvements on Airport Road to the west of Main Street be designed based on MDT standards for an **Urban Minor Arterial**, with design exceptions evaluated as appropriate to avoid substantial changes to the existing horizontal and vertical alignments of the roadway. KAI proposes improvements to Airport Road east of Main Street be designed based on Yellowstone County standards for a **Local Road**.

- **Main Street**
  - MDT Functional Classification Map: Principal Arterial

- Billings-Yellowstone County MPO: Principal Arterial
- Ownership: MDT
- **Proposed Design Basis:** KAI proposes improvements on Main Street be designed based on MDT standards for an **Urban Principal Arterial**, with design exceptions evaluated as appropriate to avoid substantial changes to the existing horizontal and vertical alignments of the roadway.

- **Aronson Avenue**
  - MDT Functional Classification Map: Urban Local Road
  - Billings-Yellowstone County MPO: Principal Arterial
  - Ownership: City of Billings. *MDT and the City will collaborate on future ownership of Aronson Avenue through the project process to determine if MDT acquires ownership of Aronson Avenue between Main Street and Alkali Creek Road.*
  - **Proposed Design Basis:** This project proposes a significant change to the current functionality of Aronson Avenue, as Aronson Avenue will serve as the only connection for northbound Main Street traffic to Airport Road. Therefore, KAI proposes improvements on Aronson Road be designed based on MDT standards for an **Urban Collector**, with design exceptions evaluated as appropriate to avoid substantial changes to the existing horizontal and vertical alignments of the roadway.

b. **Design Speed.** The design speeds are discussed on the basis of Exhibits 8, 9, and 10 of the MDT Geometric Design Standards (GDS), with consideration for the existing posted speeds of each of the roadways.

- **Airport Road West of Main Street (Urban Minor Arterial):** Airport Road west of Main Street has both curbed and shouldered sections with a posted speed of 45 mph. The MDT GDS (Exhibit 9) recommends a design speed of 35 mph for Urban Minor Arterials for a curbed or shouldered multilane facility.
  - **Proposed Design Basis**: KAI proposes a 45 mph design speed for Airport Road to the west of Main Street to match the existing posted speed.

- **Airport Road East of Main Street (Local Road):** Airport Road east of Main Street is a curbed facility with no posted speed limit. The MDT GDS does not provide a design speed recommendation for a Local Road.
  - **Proposed Design Basis**: KAI proposes a 30 mph design speed for Airport Road to the east of Main Street to match the existing characteristics and driver expectancy on this facility.

- **Main Street (Urban Principal Arterial):** Within the project limits, Main Street is a curbed multilane facility with a posted speed of 35 mph. The MDT GDS (Exhibit 8) recommends a design speed of 40 mph for Urban Principal Arterials (National Highway System – Non Interstate) for a curbed or shouldered multilane facility.
  - **Proposed Design Basis**: KAI proposes a 40 mph design speed on Main Street within the project limits to align with the MDT GDS recommendation.

- **Aronson Avenue (*Proposed* Urban Collector):** Aronson Avenue is a curbed facility with both multilane and single lane sections and no posted speed limit within the project limits (the posted speed is 30 mph just north of the intersection with Alkali Creek Road). The MDT GDS (Exhibit 10) recommends a design speed of 30 mph for an Urban Collector.
  - **Proposed Design Basis**: With the construction of this project, traffic volumes on this section of Aronson Avenue are expected to increase, which may merit an updated roadway functional classification. Therefore, KAI proposes a 30 mph design speed on Aronson Avenue within the project limits to align with the MDT GDS

recommendation and generally match the existing characteristics and driver expectancy on this facility.

c. **Horizontal Alignment**.

- **Airport Road:** On the west side of Main Street, Airport Road is relatively straight with a gentile curve to the south as it approaches the Main Street intersection. On the east side of Main Street, Airport Road curves to the south as it approaches Bench Boulevard. The current roadway alignment can be reasonably maintained, with a minor shift on the west leg (approximately 6 feet to the north) to align the eastbound through lane with the east leg receiving lane. No adverse horizontal conditions are anticipated that may present modifications to the design criteria for the roadway.

- **Main Street:** Within the project limits, Main Street curves to the east beginning from a point approximately 350 feet to the south of 6th Avenue North to a point approximately 350 feet north of 6th Avenue North, where Main Street is then on a tangent through Lake Elmo Drive. It is anticipated that the current alignment will be maintained and unmodified by the project improvements. South of Aronson Avenue, the side slopes on Main Street are significantly steep due to geological/geotechnical conditions (vertical, exposed rock) which could impact design criteria (i.e., maintaining 12-foot lane widths, meeting minimum median widths) to accommodate the widening for the addition of a second northbound left-turn lane at Aronson Avenue. If design exceptions are recommended to minimize excavation efforts (i.e., rock blasting), they will be discussed with MDT for further evaluation.

- **Aronson Avenue:** Within the project limits, Aronson Avenue has two horizontal curves and passes under the Airport Road Bridge. The current alignment may be able to be maintained by the project; however, it is unknown at this time whether the existing horizontal curve radii will meet the minimum radius criteria based on the proposed Urban Collector classification and associated 30 mph design speed. This will be explored further by KAI as part of the preliminary roadway design and discussed with MDT. The need for design exceptions will be assessed as part of the evaluation and discussions.

The minimum horizontal curve radii for each of the roadways are based on the design speed of the roadway and the superelevation rate for each specific curve. Significant changes to the existing horizontal curves are not anticipated at this time, but should horizontal curve changes be necessary, the design curve radii will be equal to or greater than that calculated according to Equation 3.2-1 of the MDT Road Design Manual.

d. **Vertical Alignment**. No significant modifications are anticipated to the roadway vertical alignments to accommodate the project improvements, with the possible exception of Aronson Avenue. The current vertical alignment on Aronson Avenue could pose sight distance issues with the change to yield control for the Airport Road Eastbound Off-Ramp intersection. Vertical design elements (including sight distances) at each of the project intersections will be evaluated during the design phase with the assumptions that Airport Road and Main Street are of level terrain type and Aronson Avenue is of rolling terrain type.

Additionally, concerns have been expressed that the grade of the westbound loop ramp from Aronson Avenue to Airport Road prevents heavy vehicles from getting up to speed for their merge with Airport Road traffic. As no re-grading of the loop ramp is anticipated for this project, KAI will evaluate the possibility of carrying only a single westbound lane on Airport Road from Main Street to the westbound Airport Road loop ramp. The loop ramp entry onto Airport Road would then come into its own lane (second westbound lane) and eliminate the merge area that currently exists to the west of the loop ramp.

The maximum grades for each of the roadways are based on the functional classifications presented earlier in this section of the report. Significant changes to grades are not anticipated at this time, but should grade changes be necessary, they will not exceed the maximums outlined in Exhibits 8, 9 and 10 of the MDT GDS or a design exception will be obtained. The maximum grades for the Airport Road, Main Street and Aronson Avenue roadway segments are as follows:

- Airport Road West of Main Street - Urban Minor Arterial (MDT GDS Exhibit 9): 6%
- Main Street – Urban Principal Arterial (NHS – Non-Interstate) (MDT GDS Exhibit 8): 6%
- Aronson Avenue – Urban Collector (MDT GDS Exhibit 10): 9%

e. **Typical Sections and Surfacing**. Typical sections for each of the roadways are based on the functional classifications presented earlier in this section of the report, and will be designed to the criteria presented in Exhibits 8, 9 and 10 of the MDT GDS unless design exceptions are granted by MDT. Design minimums and maximums are outlined for each roadway, but in general, all cross sectional elements (i.e. lane widths, shoulder widths) will be consistent with existing conditions unless they do not meet the minimum or maximum thresholds, are functionally deficient, or other constraints exist that require change. The following summarizes key minimum design criteria for the Airport Road, Main Street and Aronson Avenue roadway segments:

- **Airport Road West of Main Street - Urban Minor Arterial (MDT GDS Exhibit 9):**
  - 11-foot minimum travel lane widths (not including gutter pan width) and two-way left-turn (TWLTL) lane widths
  - Minimum shoulder widths: Curbed = Varies; Uncurbed = 4 feet
  - 1% - 4% cross slopes (2% desirable)
  - 4-foot minimum raised median width
  - Maximum superelevation rate of 4%
  - 4:1 side slopes

- **Main Street – Urban Principal Arterial (MDT GDS Exhibit 8):**
  - 12-foot exterior (abutting curb) travel lane widths (not including gutter pan width) & TWLTL lane widths
  - 11-foot interior travel lane widths
  - Minimum shoulder widths: Curbed = 0 feet; Uncurbed = 6 feet
  - 1% - 4% cross slopes (2% desirable)
  - 4-foot minimum raised median width
  - Maximum superelevation of 4%
  - 4:1 side slopes

- **Aronson Avenue – Urban Collector (MDT GDS Exhibit 10):**
  - 10-foot minimum travel lane widths are shown in Exhibit 10 of the GDS; however, due to the new traffic patterns and anticipated increase in truck traffic we recommend 11-foot minimum travel lane widths (not including gutter pan width) on Aronson Avenue.
  - 11-foot minimum TWLTL lane widths
  - Minimum shoulder widths: Curbed = 0 feet; Uncurbed = 4 feet
  - 1% - 4% cross slopes (2% desirable)
  - 4-foot minimum raised median width
  - Maximum superelevation of 4%
  - 4:1 side slopes

Any sidewalks on the above roadway segments should be buffered or separated from the roadway where possible and sidewalk widths should be a minimum of 5 feet, with 6 feet or wider desired when

possible.

The Main St–Billings project, currently under design and scheduled for construction in 2018, will rehabilitate the pavement on Main Street within the project limits, but will not rehabilitate the existing median caps. Extensive median changes are planned as part of the Airport Road/Main Street project, and therefore, the medians on Main Street will either be reconstructed or resurfaced as part of this project.

During the scoping meeting, the use of portland cement concrete (PCC) pavement within either or both the Airport Road/Main Street and Aronson Avenue/Main Street intersections (and possibly between the two intersections on Main Street) was discussed and it was agreed to be further evaluated as part of the design of the project. The statement was made that if PCC pavement is used there is a need to ensure that any utilities underneath the concrete are in good condition prior to paving.

The existing pavement on Airport Road east of the Main Street intersection is in poor shape (actual PCI is unknown). This segment of roadway is believed to be under ownership of Yellowstone County (to be confirmed by MDT). If Yellowstone County is the owner, MDT will collaborate with the county to determine if there is a desire to rehabilitate or reconstruct Airport Road east of Main Street and, if so, the specific limits and extent of rehabilitation or reconstruction. MDT will coordinate with the Consultant Team in regard to the decisions made with Yellowstone County. The Consultant Team can prepare scope to assist with the geotechnical investigation, pavement condition assessment and rehabilitation or reconstruction of the roadway if desired by Yellowstone County and MDT.

Lastly, the Consultant Team will investigate the ability for the existing pavement on Aronson Avenue to handle the increase in traffic volume and truck traffic that will occur on Aronson Avenue with the recommended alternative. Recommendations will be made in regard to the need for any changes to the pavement section based on the geotechnical investigation and the anticipated increase in ESALs.

f. **Geotechnical Considerations**. In addition to geotechnical investigations for surfacing recommendations along Main Street, Airport Road, and Aronson Avenue, slope stability investigations and analysis are anticipated along the west side of Main Street along the western fill slope over Alkali Creek and the sandstone rock cut slope near the Applebee's restaurant on the southern end of the project limits. Slope stability will be considered along both sides of Aronson Avenue between the 6th Avenue Bypass and Alkali Creek Road intersections. Roadway widening is anticipated at the three locations mentioned above. DOWL will perform all geotechnical investigations and analysis for the project. Limited geotechnical investigation work (hand dig outs) was performed as part of the Main St-Billings project. DOWL will coordinate with the Main St-Billings project team to obtain any useful geotechnical information.

g. **Hydraulics**. Given the urban nature of this project and the addition of impervious pavement, DOWL will investigate and document existing hydraulic related issues. These may include intersection flooding at less than preferred runoff events by discovering known problems through discussions with MDT Maintenance and local business owners. DOWL will calculate the new spread widths and ensure compliance with spread criteria. DOWL will also model the existing storm drain system and determine adequacy. If the existing storm drain system is not adequate, recommendations for upgrades will be presented in the Hydraulics Report. The preliminary storm drain analysis will also specifically look at the drainage at the Aronson Avenue/Swords Lane intersection and opportunities for removing the valley gutters currently crossing Aronson Avenue. Once the preliminary storm drain analysis and recommendations are presented, MDT will determine the feasibility of upgrading the system with this project.

DOWL will investigate and document the condition of the Alkali Creek culvert and the suitability to

extend the culvert as needed by the roadway widening. The existing 180" x 210' SPPC was constructed in 1965 with F 230(9), Billings-East. The culvert is about 52-years old. The Hydraulics Report will discuss the need for an Alkali Creek floodplain permit if a culvert extension is necessary. If the extension is necessary, DOWL will evaluate the water surface elevation impact to Alkali Creek. A rise in the floodway or floodplain surface elevation will require a CLOMR and LOMR. MDT prefers to avoid CLOMR and LOMR. DOWL will evaluate potential no-rise improvement options that will accommodate roadway widening as needed. Traditional survey will be used to properly model the floodplain and floodway for obtaining the floodplain permit if extension of the Alkali Creek culvert is needed.

h. **Bridges.** According the MDT's SMS bridge management system, there are three bridges within the project limits:
   - MDT Structure ID 04990, Name M56010000+09001 – Structure on Aronson Avenue over Alkali Creek
   - MDT Structure ID: 06950, Name: U01014002+05171 – Structure on Airport Road over Aronson Avenue
   - MDT Structure ID: 06960, Name: U01036002+09701 – Structure on Bench Boulevard over Alkali Creek

   Modifications to existing bridges within the project limits are not anticipated for this project. However, the design team will consider the widening of Aronson Avenue below the Airport Road Bridge structure. Kittelson and Associates, Inc. will evaluate the need for roadway widening through the Preliminary Traffic Report and, if deemed necessary, DOWL will verify that the existing three-span structure can accommodate roadway widening between the piers. If the Aronson Avenue widening can be accommodated between the bridge piers, modifications to the concrete fill apron and the addition of concrete traffic barrier are anticipated.

i. **Traffic.** This project will make substantial modifications and improvements to traffic-related features within the project limits. Specific, traffic-related modifications listed below are the geometric modifications, intersection improvements, electrical and signing and pavement markings improvements known at this time:

   <u>Roadway Segment Geometric Modifications</u>:
   - **Airport Road**
     - <u>Potential Traffic Improvements:</u>
       - Kittelson & Associates, Inc. (KAI), in collaboration with MDT and adjacent business owners, will assess the traffic operational and safety impacts of providing a raised median on Airport Road between Swords Lane and Main Street to restrict access.
       - KAI, in collaboration with MDT, will assess the impacts of providing a second westbound through lane on Airport Road departing the Main Street intersection (the recommended concept only shows a single westbound lane). This assessment will include quantitative and qualitative analysis of traffic operations and safety, physical/property impacts, and emergency vehicle accommodation for the following scenarios:
         - Two westbound lanes
         - A single westbound lane that is wider than standard (16 feet to 18 feet)
         - A single westbound lane with shoulder area (4 feet to 6 feet)

   - **Main Street**
     - No improvements are specifically identified for the Main Street roadway segment;

however, widening will occur on Main Street between 6th Avenue N and Lake Elmo Drive due to several intersection improvements discussed in detail later in this section.

- **Aronson Avenue**
  - Planned Traffic Improvement: Widening on Aronson Avenue will be necessary to accommodate the additional westbound travel lane between Main Street and the 6th Avenue Bypass. This widening will generally occur on the south side of the road between Main Street and Swords Lane and then transition generally to the north side of the road between Swords Lane and the 6th Avenue Bypass.
  - Potential Traffic Improvement: Lane widths and widening opportunities will be explored under the Airport Road Bridge to accommodate a longer northbound left-turn lane at the intersection with Alkali Creek Road. A design exception will likely be necessary if it is determined to be infeasible to accommodate the additional left-turn lane length.

Intersection Improvements

Many of the intersections within the project limits will be redesigned as part of the project. Intersection redesigns will be based upon the guidelines and design criteria in the MDT Traffic Engineering Manual (primarily Chapter 28 – Intersections At-Grade). Exclusive vehicular turn lanes will be added and or modified at many of the intersections within the project limits and the design of these turn lanes will also be based upon the guidelines and design criteria in the MDT Traffic Engineering Manual. Design exceptions are likely to be necessary for one or more of the turn lane lengths or tapers due to various constraints.

As MDT and the city have different traffic signal design standards, ownership of each new or modified signal needs to be clearly identified during the design process. Ownership of the traffic signals within the project limits is indicated below within the discussion of improvements for each intersection. Specific, traffic-related improvements at each of the public street intersections within the project limits are discussed below:

- **Airport Road/Bench Boulevard**
  - Intersection Control: Signalized
  - Ownership: City of Billings
  - Potential Traffic Improvements: Evaluate whether or not any improvements are needed to accommodate the re-routed southbound left-turn traffic from the Airport Road/Main Street intersection to the Lake Elmo Drive/Main Street intersection.

- **Airport Road/Main Street**
  - Intersection Control: Signalized
  - Ownership: MDT
  - Planned Traffic Improvements:
    - Reconstruct the existing traffic signal. Evaluate the tradeoffs of extending/modifying the existing truss structure versus converting to signal poles with mast arms.
    - Remove the northbound left-turn lane and associated signal phase and widen the raised median and extend it into the intersection further to provide a pedestrian refuge for the crosswalk on the south side of the intersection. Re-route northbound left-turns through the Aronson Avenue/Main Street intersection.
    - Remove the southbound left-turn lane and associated signal phase. Re-route southbound left-turns through the Main Street/Lake Elmo Drive

intersection.
- Shift all travel lanes on the west leg 6 feet north to align the eastbound through lane with the receiving lane on east leg.
- Add a third eastbound left-turn lane.
- Add a southbound right-turn lane.
- Restripe the westbound approach and modify the signal phasing to provide an exclusive left-turn lane and a shared through-right lane.
- Allow for eastbound to westbound u-turns on the west leg of Airport Road. Provide a loon (widened area for truck u-turns) on the north side of the west leg of Airport Road.

- **Airport Road/Swords Lane**
  - Intersection Control: Stop-control – north & south legs; Uncontrolled – east & west legs
  - Ownership: MDT
  - Planned Traffic Improvements: None.

- **Airport Road/Airport Road Westbound Ramps**
  - Intersection Control: Uncontrolled – all legs (acceleration lane for north leg to east leg movement & deceleration lane for east leg to north leg movement)
  - Ownership: MDT
  - Potential Traffic Improvement: Explore revisions to the westbound travel lanes on Airport Road to allow the Westbound Airport Road On-Ramp (loop ramp) to join Airport Road as an add lane.

- **Airport Road/Airport Road Eastbound Ramps**
  - Intersection Control: Stop-control: south leg (deceleration lane for west leg to south leg ingress); Uncontrolled – east & west legs
  - Ownership: MDT
  - Planned Traffic Improvements: None.

- **Main Street/6th Avenue North**
  - Intersection Control: Signalized (with the exception of the northbound & southbound uncontrolled right-turn bypass lanes)
  - Ownership: MDT
  - Potential Traffic Improvement: Evaluate carrying three southbound lanes through the intersection from the north leg for continuity with the three south leg departure lanes. Specifically evaluate whether or not the 95th percentile queues associated with the Main Street southbound through movement are anticipated to spill back and block the free right turn lane onto 6th Avenue North.

- **Main Street/Aronson Avenue**
  - Intersection Control: Current: Stop-control - east (private) & west legs; Uncontrolled – north & south legs; Future: To be signalized with the project
  - Ownership: MDT
  - Planned Traffic Improvements:
    - Construct a new traffic signal at the intersection (signal poles with mast arms).
    - Add dual northbound left-turn lanes.
    - Remove the southbound right-turn lane.

- **Main Street/Lake Elmo Drive**
  - Intersection Control: Signalized
  - Ownership: MDT
  - Planned Traffic Improvements:
    - Extend the storage length for the northbound left-turn lane.
    - Relocate the existing traffic signal poles on the southwest quadrant of the intersection due to widening for the southbound right-turn lane at the Airport Road/Main Street intersection.
  - Potential Traffic Improvements:
    - Evaluate the traffic operational and physical/property impacts of extending the existing southeast bound right-turn lane on Lake Elmo Drive or adding a second southeast bound right-turn lane.
    - Consider widening and extending the median on the north leg of the intersection to allow for installation of a pedestrian refuge area.

- **Lake Elmo Drive/Bench Boulevard**
  - Intersection Control: Stop-control - northwest leg; Uncontrolled – southwest & northeast legs
  - Ownership: City of Billings
  - Potential Traffic Improvements: Evaluate whether or not any improvements are needed to accommodate the re-routed southbound left-turn traffic from the Airport Road/Main Street intersection to the Lake Elmo Drive/Main Street intersection.

- **Aronson Avenue/Swords Lane**
  - Intersection Control: Stop-control – north & south legs; Uncontrolled – east & west legs
  - Ownership: City of Billings (may be transferred to MDT if Aronson Avenue ownership is transferred from the city to MDT)
  - Planned Traffic Improvements: None.

- **Aronson Avenue/6th Avenue Bypass (officially named Swords Avenue Bypass)**
  - Intersection Control: Stop-control – east leg; Uncontrolled – all other legs
  - Ownership: City of Billings (may be transferred to MDT if Aronson Avenue ownership is transferred from the city to MDT)
  - Planned Traffic Improvements:
    - Convert the westbound approach from a stop-controlled to uncontrolled movement.
    - Convert the southbound approach from an uncontrolled, free right-turn movement to a yield-controlled movement due the additional westbound through lane.

- **Aronson Avenue /Alkali Creek Road**
  - Intersection Control: Signalized
  - Ownership: City of Billings (may be transferred to MDT if Aronson Avenue ownership is transferred from the city to MDT)
  - Planned Traffic Improvement: Restripe northbound approach to provide an exclusive northbound right lane
  - Potential Traffic Improvement: As mentioned above in the Aronson Avenue roadway segment discussion, providing a longer northbound left-turn lane will be explored. The city is exploring the implementation of protected-permissive left-turn phasing at this intersection (all left-turn movements are currently permissive only). At the scoping meeting the city indicated they have identified the need for

protected-permissive phasing for the northbound left-turn movement. Kittelson & Associates, Inc. will coordinate with the city to evaluate the impacts of protected-permissive phasing for this movement (and potentially other left-turn movements at the intersection).

Traffic Signal Designs

Kittelson & Associates, Inc. (KAI) will implement the new MDT design standards for traffic signals based on the latest AASHTO signal design standards as documented in the MDT Draft Traffic Signal Operations Manual. Vehicular detection will be provided on all approaches regardless of the specific actuation scheme of the traffic signal. Stop bar detection will be via radar detectors and advanced detection will be by either video or radar (to be determined by MDT policy decision later in 2017). Additionally, an inventory of currently deficient traffic equipment (signal heads, pedestrian countdown timers, signs, backplates, etc.) will be provided by MDT and the city to identify necessary equipment replacements and upgrades.

Signing/Pavement Markings & Overhead Sign Structures

Careful attention will be given to roadway signing and pavement markings throughout the project area, especially in relation to wayfinding for left-turn traffic currently turning northbound and southbound from Main Street onto Airport Road, as this traffic will be re-routed through other nearby traffic signals. Careful attention will also be given to both existing and new overhead (cantilever) signing within the project vicinity. Several existing overhead sign structures will likely need to be relocated or removed due to roadway widening. Additional overhead sign structures may be necessary to help guide the re-routed traffic described above.

Illumination Design

At the scoping meeting, MDT identified the intent of replacing all existing high pressure sodium (HPS) luminaires within the project limits with light emitting diode (LED) luminaires. Kittelson & Associates, Inc. (KAI) will be responsible for conducting photometric analysis to determine the light pole layout for the new LED luminaires and to assess how many of the existing light poles can be retained versus new light poles to be installed.

j. **Pedestrian/Bicycle/ADA**. Within the study area, Earl Gus Park and Swords Park provide multi-use paths for both pedestrians and bicyclists. These paths are separated and protected from nearby roadways. Earl Gus Park is bordered by Lake Elmo Drive, Airport Road, Main Street and Bench Boulevard. The park includes grade separated facilities to access the Jim Dutcher Trail, which runs parallel to Bench Boulevard and the Yellowstone River. Swords Park is located west of the 6th Avenue Bypass and includes several trails for hiking and biking with views overlooking the Rimrocks and the City of Billings.

As part of the Concept Study, pedestrian and bicyclist counts were collected at each study intersection and showed minimal pedestrian activity occurring at the intersections. The majority of pedestrian and bicyclist activity occurred at the Airport Road/Main Street intersection and along Bench Boulevard in the vicinity of Earl Gus Park. Overall, there was relatively minimal bicycle activity throughout the study area as the majority of bicyclists utilize the nearby multi-use trails.

Pedestrian Facilities: Currently, there are sidewalks (in various conditions) on both sides, or at least one side, of the roadways throughout the project limits, with two exceptions: there are no sidewalks on Airport Road west of Swords Lane or on Aronson Avenue west of the 6th Avenue Bypass. Any impacts to existing pedestrian facilities related to the development of this project will be replaced and reconstructed to the latest ADA standards as outlined in the Draft PROWAG Guidelines.

As the project includes widening of Main Street between Lake Elmo Drive and Airport Road to

provide an additional southbound right-turn lane, the existing Jim Dutcher Trail pedestrian underpass may be impacted. Specific impacts will be evaluated during the project design. The need to adjust the grade of the pathway connecting Main Street and the pedestrian underpass to meet Draft PROWAG ADA guidance will also be investigated.

Currently there is a lack of connectivity from the terminus of the Aronson Trail at the Swords Lane cul-de-sac (north of Airport Road) to the existing sidewalk on the north side of Airport Road east of Swords Lane. This project will explore the possibility of providing a minimum 7-foot wide sidewalk (wider sidewalk is desired to provide multi-use functionality) along Swords Lane (north of Airport Road) to connect the Aronson Trail with the sidewalk on Airport Road east of Swords Lane.

Timing at the traffic signals within the project area should be done as such to allow for pedestrians to cross the entire roadway approach at one time (even if a median refuge area is provided). Countdown pedestrian signal heads will be provided at all signalized pedestrian crossings.

Bicycle Facilities: There are currently no dedicated bicycle lanes/facilities on the roadways within the project limits. According to staff from the Billings-Yellowstone County MPO, no new bicycle connections or dedicated bicycle facilities are planned in this area and, therefore, none will be included in the project.

ADA Improvements: ADA improvements will occur with the Main St-Billings project at the Main Street/Lake Elmo Road and Main Street/6th Avenue North intersections. The Airport Road/Main Street project will be responsible for the design and construction of the ADA improvements at the Airport Road/Main Street and Airport Road/Aronson Avenue intersections and all other public street intersections within the project limits. Pedestrian ramps throughout the project limits will be made ADA compliant in accordance with the Draft PROWAG Guidelines.

k. **Miscellaneous Features**. Improvements planned for the westbound Airport Road lanes should be as such to minimize, or preferably avoid, modifications to the existing retaining wall on the north side of Airport Road immediately west of Swords Lane. Additionally, a high pressure water line that serves the Billings Heights area crosses Airport Road just to the west of this retaining wall and impacts to this water line should be avoided if possible.

l. **Context Sensitive Design Issues**. There are exposed sections of Eagle Sandstone rock within the project area, and it's anticipated that this very hard rock may be encountered during excavation activities. Special considerations or excavation methods (e.g., blasting, ripping) will be evaluated during the design phase. Borings/test pits at specific locations where significant excavation is anticipated will also be considered prior to construction.

m. **Permanent Erosion and Sediment Control (PESC) Features**. The widening of the various roadways within the project limits may require additional on-site stormwater detention, retention, or treatment facilities, or the expansion of existing facilities. The project limits fall within the City of Billings MS4 co-permit with MDT and the extent of improvements is greater than one acre. Therefore, City of Billings and/or MDT approved BMPs will be required to treat the stormwater runoff occurring due to the project improvements. Additionally, the MDT LID Analysis form will need to be completed as part of the design to assess the viability of applying LID stormwater practices on the project.

Other Projects

At this time, there are four other MDT projects, and one known development project, that are currently under construction or design and may affect this project.

- NH 53-1(29)0 – 27th Street (1st Ave S to Airport) – Billings, UPN 7910000. This project is being completed by HDR. Sanderson Stewart performed the survey control, engineering topo survey,

and cadastral survey for this project.

- NH 16-1(53)0 – Exposition Drive & 1st Avenue North – Billings, UPN 7908000. This intersection improvement project lies directly adjacent to the 1st Avenue North–Billings project. This project and the Airport Road/Main Street project may be coordinated for construction purposes depending on construction timeframe. A scoping meeting for the Exposition Drive & 1st Avenue North-Billings project was held between Kittelson & Associates, Inc., DOWL, and MDT in February 2017; however, the project is on-hold at the time of this report.
- NH 115-1(1)0 – 1st Avenue North–Billings, UPN9022000 This project is to rehabilitate/reconstruct 1st Avenue North (N-115) from Division Street to North 9th Street. This is a combined rehabilitation and reconstruction project that is intended to address poor pavement condition (rutting, cracking, etc.) and substandard curb, gutter, and sidewalk. The majority of traffic signals and associated intersection curb ramps are being replaced in 2017 as part of the Downtown State Signals – Billings (UPN 8036006) project. Sanderson Stewart is the consultant for this project.
- NH 16-1(55)1 - Main St-Billings, UPN 8717000 – This pavement preservation project includes pavement, median, and pedestrian ramp improvements along Main Street. MDT is completing this project in-house.
- Town Pump Development – A new Town Pump casino/convenience store is being constructed on the west side of Main Street approximately 600 feet north of Lake Elmo Drive. This development, and the associated roadway construction plans, is being evaluated by Kittelson & Associates, Inc. (KAI) concurrently with the PFR for potential impacts to the Airport Road/Main Street project. KAI summarized the findings of this analysis in a separate memorandum titled "Operational Analysis at Lake Elmo Drive/Main Street Intersection."

Location Hydraulics Study Report

No Location Hydraulics Study Report was provided for this project. All preliminary hydraulics matters are addressed in the Major Design Features earlier in this report.

Design Exceptions

At this time, there are no known design exceptions for the project. However, exceptions are anticipated for shorter turn lanes and taper lengths at locations where physical or right-of-way (ROW) constraints exist (i.e., Aronson Avenue underpass, Airport Road retaining wall, business impacts, etc.). Design exceptions may also be necessary for one or both of the existing horizontal curve radii on Aronson Avenue if the 30 mph design speed for the proposed Urban Collector classification is carried forward. Any required design exceptions will be evaluated during the design phase and communicated with and approved through MDT.

Right-of-Way

The existing ROW on the major roadway segments is generally as follows:

- Airport Road has approximately 110 to 160 feet of ROW between Main Street and Swords Lane. The ROW increases significantly around the Airport Road/Aronson Avenue Loop Ramps. Between Main Street and Bench Boulevard, the Airport Road ROW is approximately 50 feet.
- Main Street has approximately 130 feet to 180 feet of ROW between Airport Road and 6th Avenue and approximately 130 feet to 160 feet of ROW between Airport Road and Lake Elmo Drive.
- Aronson Avenue has approximately 50 to 70 feet of ROW between Main Street and Swords Lane. The ROW increases significantly around the Airport Road/Aronson Avenue Loop Ramps.

From the Concept Study, it is anticipated that approximately 3,080 square-feet of ROW acquisition will be necessary to accommodate the proposed improvements. This ROW acquisition estimate will be refined as part of the design phase. The major areas of anticipated ROW needs are as follows:

- NW and SW quadrants of the Aronson Avenue/Main Street intersection

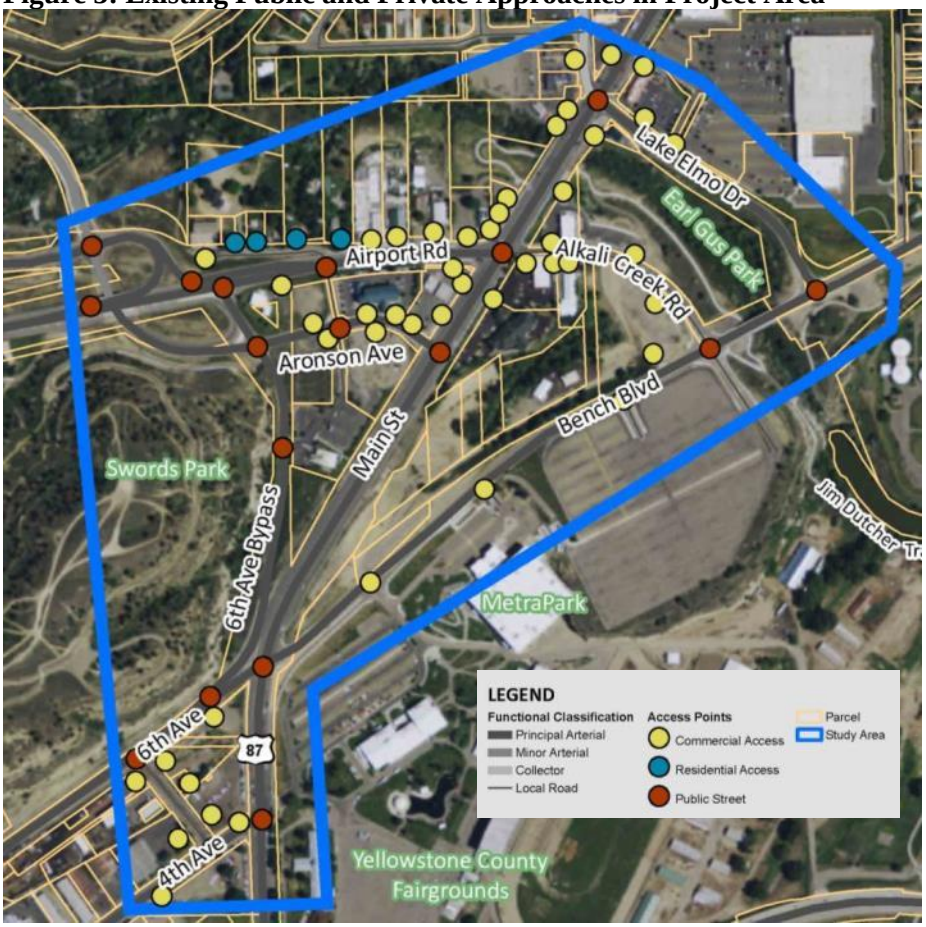
- South side of Aronson Avenue between Main Street and Swords Lane
- NW and NE quadrants of the Airport Road/Main Street intersection
- West side of Main Street between Airport Road and Lake Elmo Drive
- NW quadrant of the Lake Elmo Drive/Main Street intersection.

Kittelson & Associates, Inc. (KAI) will prepare the ROW plans and MDT will lead the ROW acquisition process. No full property acquisitions are anticipated as of the PFR. Full acquisitions should be avoided if at all possible.

Access Control

Within the project limits, Main Street between 6th Avenue North and Lake Elmo Drive is an access controlled facility through a resolution (Designation of Limited Access Highway as part of Project No. BRF 16-1(27)1, East Bridge-Billings) completed in 1989. The access control limits extend beyond the project limits, south of 6th Avenue North and north of Lake Elmo Drive. It is unclear from the most recent Airport Road right-of-way plans (MT-CM-STPU (009)) whether Airport Road is a designated access controlled facility. Airport Road is not designated as an access controlled facility on MDT's Access Control GIS database website. The limited access designation of Main Street will not be modified on this project.

Figure 3: Existing Public and Private Approaches in Project Area



From the scoping meeting, the following items are anticipated to be addressed in the design phase:

- Business accesses on Airport Road – follow-up one-on-one meetings with business owners are critical coming out of the Concept Study.
- Refer to the background information on deeded approaches from the Concept Study.

- MDT would like to consolidate access as much as possible with this project.
- Access for the casino/liquor store on the SE corner of the Airport Road/Main Street intersection: if no southbound left-turn is allowed at the Airport Road/Main Street intersection, the property will still have access through the hotel access at the Aronson Avenue/Main Street intersection and/or via a u-turn at the Aronson Avenue/Main Street intersection (future signal).

Utilities/Railroads

A significant amount of underground and overhead utilities exist within the project area, including overhead power distribution and transmission lines, gas, phone, fiber, water, sewer, storm drain, cable and other communications. Therefore, utility mapping and coordination will be established during the design phase. Any utility conflicts will be coordinated with the utility owner and MDT and will be shown on the design plans. Steam tunnels and underground vaults may also be present within the roadway corridor. Utility poles and light poles are located within the sidewalk in many cases and will be relocated to provide an unobstructed sidewalk where possible. Utility companies will be given the opportunity to upgrade their facilities before the project construction is complete. The City of Billings has programmed upgrades for 2019 to the existing water line in the area.

During the scoping meeting, MDT staff asked the Consultant Team to explore implementation of 1-foot to 5-foot wide buffer areas between the curb and sidewalk (boulevard treatments) where feasible. These buffer areas can often be used for accommodation of various utilities.

The known utilities and owners who operate in the project area include:

- 360 Networks
- Charter Communications
- City of Billings
- Heights Water District
- Montana Dakota Utilities
- Mid-Rivers Telephone Coop
- MDT
- Northwestern Energy
- Yellowstone Valley Electric
- Project Telephone Company
- Century
- Triangle Communications
- AT&T Communications

There are no railroad crossings within the project limits.

Maintenance Items

This project will be designed for anticipation of low maintenance aesthetics due to MDT's limited maintenance resources. Two areas of specific attention include:

- The routing and accessibility of oversized loads
- The need for dedicated snow storage areas (further emphasis on exploring buffer areas between the curb and sidewalk as discussed in the previous section of this report)

These maintenance items will be emphasized during the design phase and be coordinated with MDT maintenance staff. No specific maintenance items have been identified for completion prior to construction of the proposed improvements.

Intelligent Transportation Systems (ITS) Features

There is an existing signal interconnect system on Main Street (ethernet over copper) connecting the

existing Main Street signals. It is anticipated that this project will expand this existing interconnect system to ensure interconnect of all new and modified signal infrastructure, including the new signal at Aronson Avenue. No other ITS features are anticipated for this project.

Experimental Features

No experimental features are anticipated for this project.

Survey

In addition to the scoping meeting, a separate meeting was held with MDT Survey on April 5, 2017 to discuss the need and methodology for the survey activities for this project. Aerial photogrammetry was the selected method for the engineering survey. MDT will set ground targets and fly the project corridor. The Consultant team will be responsible for processing the photogrammetric data as needed for design. A subconsultant, such as Quantum Spatial or Fugro, will likely process the photogrammetric data. The aerial survey limits will include this project and the Exposition Dr & 1st Ave N–Blgs project limits.

DOWL will perform traditional survey as needed to supplement the aerial photogrammetry. The project team anticipates traditional survey along Alkali Creek for the analysis of the Alkali Creek culvert crossing underneath Main Street.

DOWL will complete a full cadastral survey as right-of-way acquisition is anticipated for this project. MDT will check the control set for the Main Street pavement preservation project and devise a plan to establish additional control for this project if needed. If additional control is needed, DOWL will expand the control network.

Soil surveys and a Phase I SUE are needed for this project.

The project schedule will determine the survey schedule for this project. The survey limits are not heavily vegetated, so conducting the aerial mapping flight in the spring or fall is not critical. MDT plans to collect the aerial photogrammetry this spring or summer, which will meet the typical project workflow.

Public Involvement

As part of the Concept Study, an extensive public involvement plan was implemented that incorporated the following elements:

- A project advisory committee (MDT, City of Billings, Yellowstone County, & Billings-Yellowstone County MPO)
- A project website (http://www.mdt.mt.gov/pubinvolve/blgairportmain/pub-involve.shtml)
- An online interactive map survey
- Outreach to businesses and property owners via newsletters and public informational meeting (PIM) invitations
- News releases
- A PIM with local media coverage of the PIM
- Project updates to the County's Technical Advisory Committee (TAC) and Policy Coordinating Committee (PCC).

Building upon the outreach effort from the Concept Study, Level C is the appropriate level of public involvement and may include some or all of the following:

- Letter of intent and media releases explaining the project and including MDT's point of contact. Contact with newspapers, television and radio stations serving the area to develop stories and graphics that explain and illustrate the project, including content for social media.
- Outreach to adjacent landowners and stakeholders.
- Develop and maintain an electronic notification list that includes local government and organizations and associations for both business and recreational users of the highway.

- Informational meetings at major milestones to present basic concepts and information and seek input.
- Placing and maintaining information regarding the status of the project on MDTs website.
- Project updates and coordination with the following organizations:
    a. Yellowstone County's PCC and TAC
    b. BIRD and EBURD
    c. MetraPark

A public involvement component that includes property and business owners, local government, and roadway users is needed. One to two public informational meetings will be held as part of the project. MDT will host project information on their website with content provided by Kittelson & Associates, Inc. There will be various meetings with City of Billings, Yellowstone County, and other local agencies and stakeholders throughout the project, as well as adjacent or nearby property owners and businesses.

Environmental Considerations

This project is not anticipated to have significant environmental impacts or involve unusual circumstances, and a Categorical Exclusion is the appropriate level of National Environmental Policy Act (NEPA) documentation, to be completed by DOWL.

While significant impacts and unusual circumstances are not anticipated, primary environmental concerns on the project include the following:

- Alkali Creek and associated wetlands - may require Clean Water Act 404 and Stream Protection Act 124 permitting if work is proposed within the creek or wetlands. Design exceptions (such as retaining walls) should be considered to reduce or eliminate any impacts to wetlands. A field delineation will be required to identify wetland boundaries and the ordinary high water mark of the creek.
- Four recreational Section 4(f) resources have been identified within the project vicinity, Swords Park, Earl Guss Park, MetraPark, and a public multi-use path along Alkali Creek, which crosses under Main Street and connects to Jim Dutcher Trail. Potential "use" of these properties should be avoided. Potential use will be reviewed as part of this project.
- Several cultural resources, including Black Otter Trail, Boothill Cemetery, Skeleton Cliff, and several historic aged buildings are found in the project vicinity. A cultural survey will need to be conducted to document cultural resources within the project area and determine eligibility of identified resources. Sites eligible for listing are also considered historic Section 4(f) Resources.
- Alkali Creek has a designated floodplain and floodway. Encroachment into the floodplain and/or floodway will need to be considered. See the earlier Hydraulics section of this report for additional discussion on work within the Alkali Creek floodplain and/or floodway.
- This project is considered a Type 1 project and there are sensitive noise receptors in the project vicinity. An analysis of potential noise impacts will need to be conducted.
- Three underground storage tanks and a registered petroleum fund claim are located at the Cenex gas station on the southwest corner of Airport Road and Main Street.

Energy Savings/Eco-Friendly Considerations

Any salvageable/recyclable equipment such as asphalt, signs, mast arms, poles, luminaires, etc. will be inventoried and considered for re-use on this project or returned to the owner (MDT, City of Billings, or utility company) for future use. Exiting luminaires within the project limits will be upgraded to LED.

Traffic Control

This project will follow the Level 1 Work Zone Template and is anticipated to use a combination of detours, lane closures, shifting traffic, and flaggers during construction. Full roadway closures may be necessary at times to complete the work. Full roadway closures will be avoided if at all possible and minimized in duration if determined necessary. Should full roadway closures be necessary, MDT and the

Consultant Team will provide extensive outreach to local businesses, residents and the community and will work to maintain business and/or residence access within the full closure areas.

A Transportation Management Plan (TMP) consisting of a Traffic Control Plan (TCP), a Transportation Operations (TO) component and a Public Information (PI) component is appropriate for this project. The TO and PI components are included in order to develop a strategy for how to best minimize and mitigate impacts to the traveling public.

Traffic control will be challenging due to the presence of many commercial businesses and high-volume traffic conditions within the project area. Nighttime and/or off-peak work will be considered and discussed with MDT, the city, and primary stakeholders, as it offers a desirable opportunity to complete work outside of business hours, especially if extensive lane closures or full roadway closures are necessary.

Additionally, coordination with the 1st Avenue North and Exposition Drive/1st Avenue North projects will be considered for potential integration into an overall TMP for the area (dependent on construction timeframes).

Preliminary Construction Cost Estimate

Cost estimates were developed for the proposed improvements along Main Street, Airport Road, and Aronson Avenue using MDT's Preliminary Cost Estimating Tool. PCCP was assumed within the intersections of Airport Road/Main Street and Aronson Avenue/Main Street and approximately 100 feet back from the intersections on each of the entry legs. PMS was assumed for remainder of the project improvements.

	Estimated cost	Inflation (INF) (from PPMS)	TOTAL costs w/INF + IDC (from PPMS)
(IM, NH STPP, etc.) CN	**$**	**$**	**$**
G-Match CN	**$**	**$**	**$**
HSIP CN	**$**	**$**	**$**
(list all other) CN	**$**	**$**	**$**
TOTAL CN	**$5,170,000**	**$453,000**	**$5,623,000**
CE (10%)	**$517,000**	**$45,000**	**$562,000**
Contingency (10%)	**$517,000**	**$45,000**	**$562,000**

Project TOTAL from all of the funding types above:

Project TOTAL	**$6,204,000**	**$543,000**	**$6,747,000**

The estimate above includes $224,000 for traffic control, 10% allowance for contingency, and 10% for mobilization.

Note: Inflation is calculated in PPMS to the letting date. If there is no letting date, the project is assumed to be inside the current TCP and is given a maximum of 5 years until letting (year 2023 was assumed). IDC is calculated at 10.97% for FY 2017.

Preliminary Engineering

The specific amount of PE required will be determined after scoping and executing the contract with the Consultant Team.

Project and Risk Management

The Consultant Team will be responsible for the plans, specifications and estimate development under the oversight of Wade Salyards as the MDT project manager. The Consultant Team is comprised of Kittelson & Associates, Inc. (KAI) as the prime consultant with DOWL as a major subconsultant. Other, minor subconsultants may be necessary to execute the project and will be determined through the project scoping process. KAI will provide MDT with a Consultant Team contact list toward the end of the scoping process.

The Consultant Team project manager is:

Yuri Mereszczak, PE
Kittelson & Associates, Inc.
101 S Capitol Blvd, Suite 301
Boise, ID 83702
208-338-2683
ymereszczak@kittelson.com

This project is considered a Project of Division Interest (PoDI) by FHWA.

According to MDT's Risk Management Guidelines, this project is a High Risk project and will require a formal, in-person, risk analysis workshop using the Risk Management Process (RMP) worksheet. Risk management milestones include:

- Project scope, schedule, and estimate are complete (appropriate for the level of development)
- Review of areas of concern and determine level of concert (qualitative or quantitative)
- Risk meetings where risks are identified and characterized
- Risk response actions developed
- Risk response actions implemented

The RMP workshop will occur prior to completing the Scope of Work Report for the project and will identify project risks and develop an appropriate risk management strategy to be incorporated into all project activities. This project will include a risk management agenda item for regularly schedule project meetings to establish the expectation that risk will be managed, documented and reported.

Ready Date

A ready date has not been established for the project. A ready date will be determined once the project schedule has been determined through the project scoping process and entered into the MDT EPS scheduling system. This project is not currently in the Tentative Construction Program. The current PE End Date is December 31, 2026.

Site Map

See Figure 1 for the recommended concept illustration from the Concept Study, which serves as the project site map. See Figure 2 for the project limits.

e-copies:

Dustin Rouse, Preconstruction Engineer
James Combs, Highways Design Engineer
Dave Hedstrom, Hydraulics Engineer
Bryce Larsen, Supervisor, Photogrammetry & Survey
Danielle Bolan, Traffic Operations Engineer
Ivan Ulberg, Traffic Design Engineer
Patricia Burke, Acting Safety Engineer
Chad Richards, Engineering Cost Analyst
John Pirre, Engineering Information Services
Jan Nesset, Public Involvement Officer
Sue Sillick, Research Section Supervisor
Suzy Price, Contract Plans Bureau Chief
Alyce Fisher, Fiscal Programming Section
Kurtis Miros, Engineering Division
Jeff Nehring, Engineering Division
Wayne Noem, Secondary Roads Engineer
Sheila Ludlow, Bicycle/Pedestrian Coordinator
Michelle Erb, Bicycle/Pedestrian Coordinator
Tom Martin, Environmental Services Bureau Chief
Joe Radonich, Remediation and Assessment
Steve Platt, Archeologist

Jake Goettle, Construction Bureau – VA Engineer
Gabe Priebe, Utilities Engineering Manager
David Hoerning, Lands Section Supervisor
Greg Pizzini, Acquisition Section Supervisor
Joe Zody, R/W Access Management Section Manager
Jim Davies, Pavement Analysis Engineer
Darin Reynolds, Surfacing Design Supervisor
Jeff Jackson, Geotechnical Engineer
Paul Johnson, Project Analysis Bureau
Jean Riley, Planner
Tom Gocksch, ESB, Acting Engineering Section Supervisor
Dawn Stratton, Fiscal Programming Section
Amanda Jackson, Eng. Manager, Bridge Management System
Damian Krings, Road Design Engineer (if involved)
Becky Duke, Traffic Data Collection Section Supervisor (WIM)
Doug McBroom, Maintenance Division Operations Mgr (RWIS)
Matt Maze, ADA Coordinator
Bill Semmens, Environmental Resources Section Supervisor
Jon Axline, Historian
Phil Johnson, Reclamation Specialist

Gary Neville, Preconstruction Engineer
Steven Helms, Materials Lab
Celia Clearwood, Right of Way Supervisor
Michael Taylor, Construction Engineer
Dave Leitheiser, Hydraulics Engineer
LeRoy Wosoba, Traffic Project Engineer
Susan Lenard, Biologist
Rod Nelson, Projects Engineer
Tammy Saldivar, District Utility Agent

Randy Roth; Ron “Bud” Pederson, Maintenance Chief
Aaron Eschler, Right of Way Design Supervisor
Ted Thronson, Construction Ops Engineer
Jeff Olsen, Bridge Area Engineer
Cameron Kloberdanz, Geotechnical Manager
Tom Gocksch, Project Development Engineer
Russell Christoferson, District MCS Captain
Darin Reynolds, Surfacing Design