BILLINGS AIRPORT ROAD & MAIN STREET Concept

TECHNICAL MEMORANDUM #2

Date: September 30, 2015

Project #: 18460

To: Wade Salyards, PE (Montana Department of Transportation)

From: Andy Daleiden, PE and Brett Korporaal

Project: Airport Rd/Main St – Billings, CM 1099(102), UPN 8718000

Subject: Evaluation Criteria and Initial Alternatives

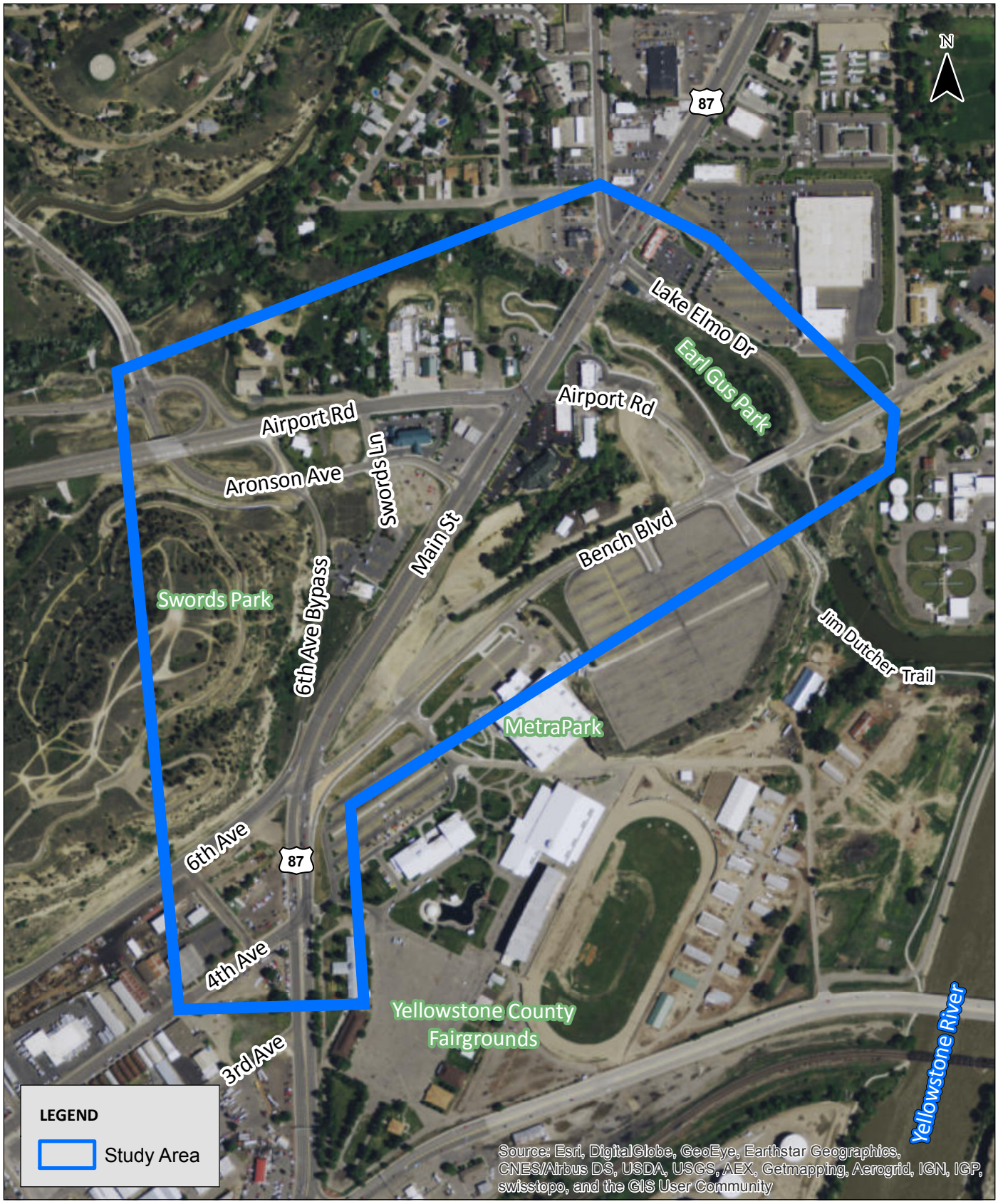
Introduction

This memorandum summarizes the evaluation criteria and initial alternatives for consideration associated with the Airport Road and Main Street transportation study in Billings, MT. This memorandum documents the background information used to develop a purpose and need statement for the transportation study, as well as the goals, objectives, evaluation criteria, performance measures, and tools to evaluate and screen the alternatives. This information was presented at the August 27 Project Advisory Committee (PAC) meeting. Comments were received and incorporated into this final memorandum.

Background

The Airport Road and Main Street intersection is located two miles northeast of downtown Billings, just north of MetraPark. The intersection's location is a critical junction for commuter, regional, and freight trips along the Airport Road and Main Street corridors. Designated as principal arterials, the two corridors connect recreational, residential neighborhoods (Heights West and East), low density commercial, and light industrial uses with downtown Billings and Interstate 90. The intersection is located on the Camino Real International Trade Corridor that connects Canada, United States, and Mexico. Figure 1 highlights the study area. However, the focus of this transportation study is at the Airport Road and Main Street intersection.

The Airport Road and Main Street intersection is a four-legged, signalized intersection with a bypass connection via Aronson Avenue to the south of the intersection. In the southwest quadrant, the bypass connection (Aronson Avenue) functions as a partial unsignalized quadrant intersection, providing turning movements with a connection to the local businesses and Heights neighborhood via Aronson Avenue. Additionally, a grade-separated interchange is located approximately 1,500 feet to the west of the Airport Road/Main Street intersection. The interchange has Aronson Avenue routing under Airport Road, providing access to Airport Road via two loop ramps.



MONTANA MDT DEPARTMENT OF TRANSPORTATION

BILLINGS AIRPORT ROAD & MAIN STREET Concept

STUDY AREA
BILLINGS, MONTANA

SCALE: 1" = 600'

0 300 600 Feet

FIGURE
1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Coordinate System: NAD 1983 StatePlane Montana FIPS 2500 Feet

H:\profile\18460 - Airport Road & Main Street - Billings\gis\base\tech memo 1\StudyArea8.5x11.mxd - bkorporaal - 9:16 AM 10/27/2015

Technical Memorandum #1: Existing and Future Conditions (TM#1) includes key findings regarding the existing and projected future conditions of the intersection, such as:

- **Major freight route** - The Airport Road and Main Street corridors are located on a major freight route, El Camino Real Trade Corridor. The Main Street corridor has several traffic signals along with an uphill grade on Main Street just to the south of Airport Road, which result in stops, delay, and longer travel times for freight vehicles.
- **Safety** – The intersection has had 111 reported intersection crashes over the last five years and a crash rate of greater than 1.0. 63% of the crashes are rear-end type crashes. Additionally, there are limited bicycle connections between the trail system and the intersection.
- **Traffic volumes** - The Airport Road/Main Street intersection has a total entering volume of 4,570 vehicles during the weekday p.m. peak hour, which is approaching the threshold of a large signalized intersection and an alternative intersection form (e.g., displaced left-turns, quadrants, median U-turns). In the year 2040, Main Street is projected to carry approximately 56,000 to 81,000 daily traffic volumes with the Billings Bypass Arterial. Airport Road is projected to carry approximately 22,000 to 35,000 daily traffic volumes with the Billings Bypass Arterial in place.
- **Traffic operations** - The Airport Road/Main Street intersection is currently operating at a LOS D with a v/c ratio of 0.93 during the weekday p.m. peak hour. In the year 2040 with the Billings Bypass Arterial in place, the intersection's operations are projected to be LOS F with a v/c ratio of greater than 1.0 during the weekday a.m. and p.m. peak hours.
- **Land use** – Land development is fairly built out adjacent to the intersection, including a gas station, hotel, casino, restaurants, retail shops, and other commercial uses. The majority of accesses are in the vicinity of the Airport Road/Main Street intersection and the Lake Elmo Drive/Main Street intersection and do not meet the MDT Access Spacing guidelines.
- **Environmental** – The study areas includes three Section 4(f) properties: Swords Park, Earl Gus Park, and MetraPark; three historical properties: Black Otter Trail, Boothill Cemetery, and Larry's Overlook; two inactive and three active hazardous materials sites; three listed endangered species and two candidate species; and a classified surface water with Alkali Creek.

Additionally, we have kicked off an outreach effort to engage the public and stakeholders with this study. To date, two public comments were provided, which included:

- **Comment #1**: There should be no left turn from northbound Main Street onto Airport Road. All such traffic should use Bench and East Airport Road to cross Main Street instead of making the extreme left turn.

- **Comment #2**: Please focus more on the non-motorized aspects of this intersection than motorized. Refuge islands for pedestrian crossing, longer walk signal times, wider sidewalks that allow people be more than 2 feet from 45 MPH traffic, etc.

We will continue to monitor the project comments from the public and stakeholders, and update the background information as needed through the duration of this study. This information is critical in informing the project team about the community needs and vision for this major intersection.

Study Purpose and Need

The purpose of the Airport Road and Main Street transportation study is to identify the need, type, location, and feasibility of a transportation project at the Airport Road and Main Street intersection in the City of Billings, Montana. Key elements of the study include:

- Identify the existing and future deficiencies
- Identify a list of intersection alternatives
- Evaluate and screen the intersection alternatives
- Identify a preferred alternative for the intersection

The study will serve as an analysis/pre-design study to aid in future decision-making at this intersection for both the Montana Department of Transportation and the City of Billings. The study will provide screening data regarding the feasibility of the alternatives under consideration, but is not an assessment to comply with the National Environmental Policy Act (NEPA) requirements. Any formal environmental documentation would be addressed in the next phase of the project development process.

The need for this transportation study is based on the following findings from past studies in the area and TM #1:

- Recent studies identified this intersection and the Main Street corridor as needing improvements to address the future over-capacity conditions.
- Airport Road and Main Street are major freight routes through Billings and need to maintain their functional integrity.
- The intersection has experienced a high number of reported crashes over the last five years, has a crash rate of greater than 1.0, and a majority of the crashes are rear-end type crashes.
- Existing operations are approaching capacity at this intersection. The intersection is projected to be over capacity in the year 2040 with the Billings Bypass Arterial in place.

- The intersection has a significant number of private driveways in the vicinity of the intersection that increase the number of conflict points and friction between vehicles on Main Street and vehicles at the driveways.

Study Goals, Objectives, and Evaluation Criteria

The goals, objectives, and evaluation criteria for the project were developed based on a review of transportation-related goals in applicable transportation and land use policies and studies. Plans and documents reviewed include:

- MetraPark Egress Improvements Study (Reference 1)
- Traffic Report 6th Ave N/Bench-Blgs, Phase 2 (Reference 2)
- Hospitality Corridor Planning Study (Reference 3)
- 2014 Billings Urban Area Long Range Transportation Plan (Reference 4)
- East Billings Urban Renewal District (EBURD) Master Plan (Reference 5)

The goals, objectives, evaluation criteria, and performance measures are presented in Table 1 (on the next page). This information was refined based on feedback from the PAC meeting on August 27, 2015. The final goals, evaluation criteria, and performance measures will be used in the next stage of the project to evaluate and screen the alternatives. The evaluation criteria will ensure that each alternative is evaluated for consistency with the overall intent of the study purpose, need, and goals. The evaluation criteria include categories supported by specific performance measures and analysis tools that will be used to evaluate the alternatives.

Table 1. Proposed Goals, Objectives, and Evaluation Criteria for Screening of Alternatives

Goal	Objective	Evaluation Criteria	Performance Measure	Analysis Tool
Mobility	▪ Accommodate critical traffic patterns at the intersection. ▪ Decrease travel time for vehicles and freight. ▪ Improve vehicle operations in the future.	▪ Does the project accommodate the critical traffic patterns? ▪ Does the project reduce expected travel time for vehicles and freight? ▪ Does the project improve future intersection operations?	▪ Critical movements (EBLT, NBLT, NBTH, SBR, and SBTH) ▪ Vehicle and freight movement travel time ▪ Indirect or direct freight routes ▪ Intersection volume-to-capacity ratio and delay (LOS)	▪ Critical movement analysis ▪ Synchro ▪ HCM 2000 and 2010 ▪ CAP-X ▪ Comparison of freight routes
Safety	▪ Minimize conflicts at the intersection for vehicles. ▪ Provide improved access and response times for emergency vehicles. ▪ Provide improved connectivity and crossing opportunities for pedestrians and bicyclists	▪ Does the project reduce conflict points for vehicles? ▪ Does the project reduce the highest crash trends (in this case, rear-end crashes)? ▪ Does the project improve accessibility and response time for emergency vehicles? ▪ Does the project improve or worsen pedestrian connectivity and crossing opportunities? ▪ Does the project improve or worsen bicycle connectivity and crossing opportunities? ▪ Does the project include reasonable driver comprehension and signing element?	▪ Conflict points ▪ Travel time, intersection delay, and routing ▪ Countermeasure to reduce rear end crashes (Qualitative) ▪ Pedestrian crossing locations and distance ▪ Bicycle crossing locations and distance ▪ Signage (simple or complex)	▪ Conflict point diagram ▪ Synchro ▪ HCM 2000 and 2010 ▪ CAP-X ▪ Comparison of emergency vehicle routes ▪ Comparison of pedestrian and bicycle crossing locations and distance
Land Use	▪ Connect existing neighborhoods and businesses. ▪ Provide appropriate access to businesses and land uses. ▪ Minimize right-of-way needs. ▪ Minimize to the extent possible geographic constraints. ▪ Minimize to the extent possible impacts to environmental resources.	▪ Does the project connect key destinations? ▪ Does the project negatively impact access into and out of MetraPark? ▪ Does the project provide reasonable access to businesses and land uses? ▪ Does the project impact the environment negatively? ▪	▪ Access to neighborhoods and businesses ▪ Access to MetraPark ▪ Special event routes ▪ ROW requirements ▪ Impacts to geographic, 4f, 6f, and other resource elements	▪ Quadrant assessment of impacts to each business ▪ Comparison of routes for special events ▪ ROW impacts based on concept layouts ▪ Assess impacts to environmental elements
Implementation	▪ Coordinate with existing land use and transportation plans. ▪ Identify relative magnitude of project costs. ▪ Consider staged construction. ▪ Gather support from stakeholders and the public.	▪ Is the project consistent with adopted plans and policies? ▪ Is the overall cost of the project restrictive? ▪ Can the project be constructed in multiple phases? ▪ Does the project add significant maintenance lane miles? ▪ Is there community support for the project?	▪ Compatibility with adopted plans and policies ▪ Planning level ROW costs ▪ Planning level construction costs ▪ Phasing opportunities ▪ Additional lane miles or areas ▪ Input from stakeholders and public	▪ Check consistency with adopted plans and policies ▪ Planning level costs based on concept layouts ▪ Construction staging assessment ▪ Lane miles or area assessment ▪ Online commenting tool and meeting forums (PAC meetings and open houses, if held)

Initial Alternatives

The initial alternatives were developed based on the need at the Airport Road and Main Street intersection. The alternatives seek to address the future traffic patterns and operational deficiency, safety performance, movement of freight on the two corridors, and maintain a level of connectivity to businesses and land uses adjacent to the intersection. Through this assessment, the project team identified 20 initial alternatives for the Airport Road and Main Street intersection. The initial alternatives fall within the following operational and improvement strategies.

No Build

The no-build alternative is a "do nothing" strategy. The no build alternative is included in the alternative list and will be used to compare against the other alternatives through the duration of the study. A no build alternative would be required if this study moves into the NEPA process.

Conventional Intersection Strategy

The conventional intersection strategy includes optimizing traffic signal coordination, implementing advanced signal timing treatments, adding a right or left-turn lane, modifying the left-turn phasing, and reconfiguring the existing lane geometry. These strategies are typical intersection capacity type improvements that build upon the existing intersection geometry and footprint. This group includes five alternatives. Alternative 2B includes adding a southbound right-turn lane. At this time, the other alternatives do not include this additional turn lane, but it could be added, if found to be beneficial to the intersection operations.

Quadrant Intersection Strategy

The quadrant strategy utilizes the existing quadrant form southwest of the Airport Road/Main Street intersection by utilizing Aronson Avenue. The quadrant intersection strategy utilizes the existing roadway connections with Aronson Avenue and Swords Lane and removes a left-turn signal phase from the Airport Road/Main Street intersection, which provides additional capacity at the intersection.

Typically, the northbound left-turns at the Airport Road/Main Street intersection are rerouted to the Aronson Avenue/Main Street intersection connection via an unsignalized or signalized traffic control. The southbound left-turns at the Airport Road/Main Street intersection are rerouted to the Lake Elmo Drive/Main Street intersection. There are four quadrant alternatives. Each alternative builds upon the previous alternative with increased connectivity and traffic control for turning movements being rerouted from Main Street and Airport Road.

One-Way Intersection or Couplet Strategy

The one-way intersection or couplet strategy utilizes the existing roadway network and converts the east approach at the Airport Road/Main Street intersection to a one-way in the eastbound direction of travel and/or converts the Airport Road and Aronson Avenue segments to one-way streets between Main Street and 6th Avenue Bypass. These one-way conversions create additional capacity via removal of left-turn signal phases at the Main Street/Airport Road intersection. There are four one-way and couplet alternatives.

Alternative Intersection Strategy

The alternative intersection strategy includes a median U-turn (MUT) intersection, displaced left-turn (DLT) intersection, and a roundabout intersection. These alternatives are reflected in the FHWA *Alternative Intersection Informational Guides* (References 6, 7) for the MUT and DLT and the NCHRP Report 672, *Roundabouts: An Informational Guide* (Reference 8) for the roundabout.

The MUT provides an alternate approach to rerouting the northbound and southbound left-turns, while the DLT provides an alternate approach to routing the northbound left-turns through a partial DLT. Both of these alternatives provide additional capacity at the Airport Road/Main Street intersection by removing a left-turn signal phase from the intersection. The roundabout alternative includes a multilane roundabout with three circulatory lanes and multilane entries and exits on the four approaches of the Airport Road/Main Street intersection.

Grade Separated Strategy

The grade separated strategy includes grade separation of the eastbound left-turn lane, Airport Road with a loop ramp in the southeast quadrant, or Airport Road with a larger intersection at Airport Road/Bench Boulevard. These alternatives increase the capacity of the Main Street/Airport Road intersection by removing left-turn phases from the intersection. In the case of the loop ramp or connection with Bench Boulevard, the traffic signal is removed from the Main Street/Airport Road intersection resulting in free-flow movements on the two facilities. However, any grade separated alternatives will have their own challenges related to structure design, vertical clearance, and access to businesses and public streets on Main Street, Airport Road, and Bench Boulevard.

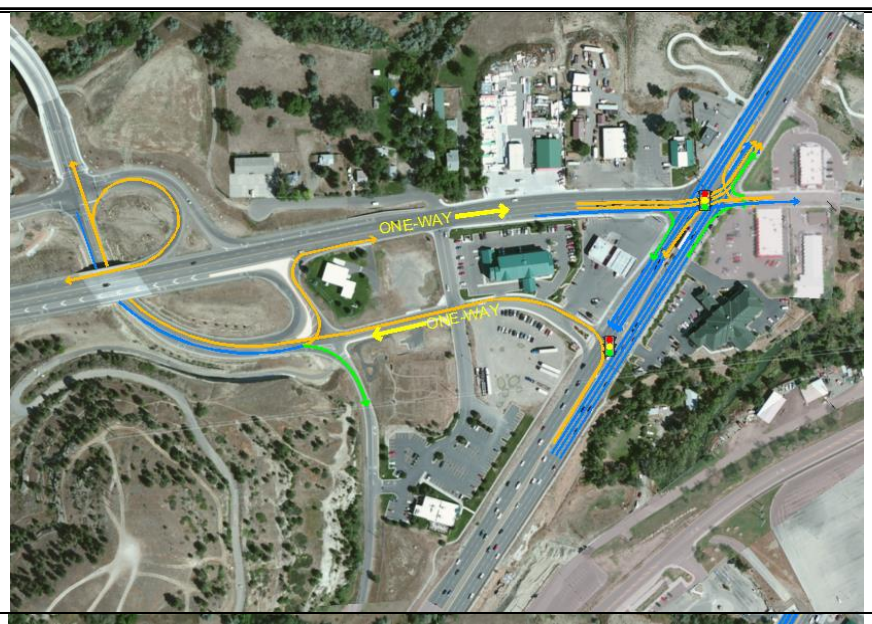
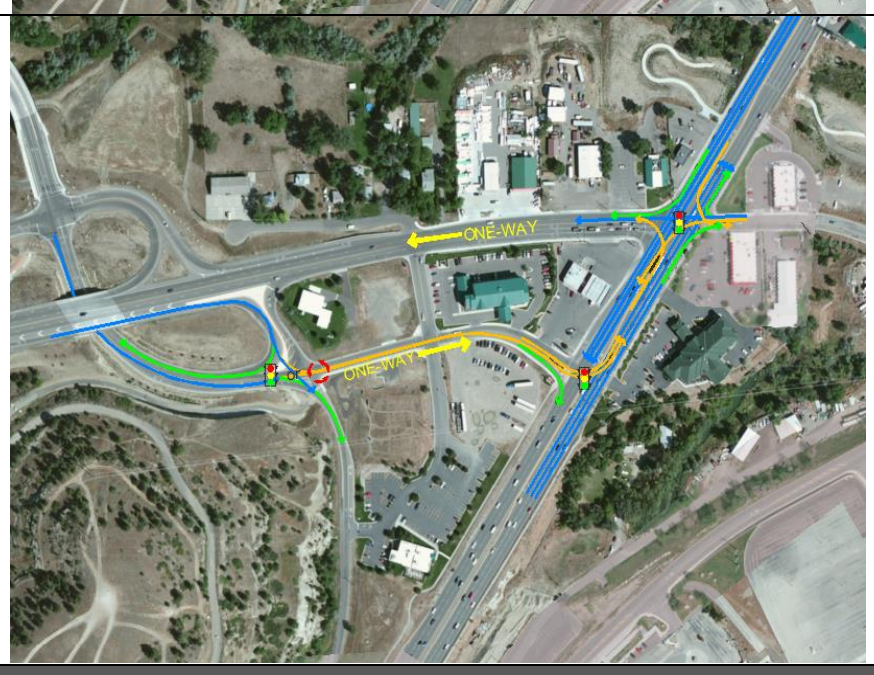
Table 2 summarizes the initial list of alternatives with supporting illustration and description of each alternative.

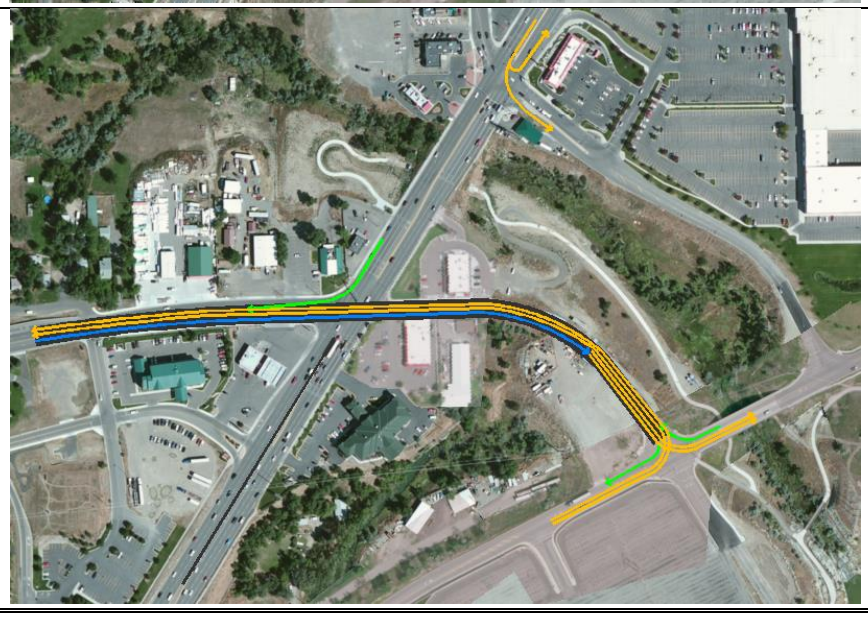
Table 2. List of Initial Alternatives

No.	Alternative	Illustration	Description
1	No-Build		The no-build alternative maintains the existing intersection form.
Conventional Intersection Strategy			
2A	Operational Strategies		Alternative 2A includes the following operational strategies: ▪ Retime signal coordination along Main Street ▪ Include an adaptive signal system ▪ Incorporate truck priority critical freight movements ▪ No geometric improvements are planned for this alternative
2B	Add Southbound Right-Turn Lane		The existing lane configuration includes a shared through-right lane in the southbound direction. Alternative 2B provides an exclusive southbound right-turn lane. Options to channelize the right-turn lane will be analyzed.
2C	Eastbound Approach Lane Reconfiguration		Alternative 2C maintains east-west split phasing and converts the eastbound approach to dual left-turn lanes with the third lane becoming a shared left/through/right lane.

2D	Eastbound and Westbound Approach Signal Phasing and Lane Configuration Modification		Alternative 2D modifies the east-west split phasing to a protected left-turn phase. Geometric changes at the intersection would be made to accommodate dual eastbound left-turn lanes and a through-right turn lane. Changes to the westbound approach would include a single left-turn lane and shared through-right turn lane.
2E	Triple Eastbound Left-Turn Lanes		Alternative 2E includes adding a third left turn lane by utilizing one westbound through lane on the west approach. The west approach would include a single westbound through lane, three eastbound left-turn lanes, and a shared eastbound through/right-turn lane. This alternative removes the east-west split phasing and modifies the westbound approach to a single left-turn lane and through-right with protected left-turn phasing for eastbound and westbound directions.
Quadrant Intersection Strategy			
3A	Unsignalized Southwest Quadrant – Removal of Northbound and Southbound Left-Turns		Alternative 3A removes the northbound and southbound left-turns at the Airport Rd/Main St intersection; signal phasing would be adjusted accordingly. Northbound left-turns accessing Airport Rd would be routed to the unsignalized intersection of Aronson Ave/Main St and continue to the Alkali Creek Road loop ramp. Southbound left-turns would be routed via the Lake Elmo Dr/Main St intersection. Trucks would be routed to use Bench Blvd to Airport Road.
3B	Signalized Southwest Quadrant – Removal of Northbound and Southbound Left-Turns		Alternative 3B removes the northbound and southbound left-turns at the Airport Rd/Main St intersection. Northbound left-turns accessing Airport Rd would be routed to the signalized intersection of Aronson Ave/Main St and continue to the Alkali Creek Road loop ramp. Southbound left-turns would be routed via the Lake Elmo Dr/Main St intersection. Trucks would be routed through the Aronson Avenue signal or via Bench Blvd to Airport Road.

3C	Signalize Southwest Quadrant – Removal of Northbound and Southbound Left-Turns, Signal at Aronson Avenue and Swords Lane		Alternative 3C removes the northbound, southbound and eastbound left-turns at the Airport Rd/Main St intersection. Northbound and eastbound left-turns to/from Airport Rd would be routed to the signalized intersection of Aronson Ave/Main St with access to Airport Road via the signalized intersection at Swords Lane. Southbound left-turns would be routed via the Lake Elmo Dr/Main St intersection.
3D	Signalized Southwest and Southeast Quadrants		Alternative 3D removes all turning movements from the Airport Rd/Main St intersection. Vehicles making a northbound left- or right-turn, as well as eastbound left-turning vehicles would utilize the roadway extension east of the intersection to complete their turning movements. Vehicles making a southbound left- or right-turn, as well as eastbound right-turning vehicles will be routed to Aronson Avenue up to the Swords Lane signalized intersection.
One-Way Intersection or Couplet Strategy			
4A	Airport Road One-Way Eastbound		Alternative 4A modifies the east leg to one-way in the eastbound direction. Vehicles currently using Airport Road to head westbound would be rerouted to use Bench Blvd and connect to Main Street via Lake Elmo Drive or 6th Avenue. During events, Airport Road could be converted to two-way flow to help provide optimal traffic flow into and out of MetraPark.
4B	Signalize Southwest Quadrant – Removal of Northbound and Southbound Left-Turns and One-Way Eastbound Airport Road		Alternative 4B removes the northbound and southbound left-turns at Airport Rd/Main St intersection and converts Airport Road to one-way in the eastbound direction; signal phasing at the intersection would be adjusted accordingly. Northbound left-turns accessing Airport Road would be routed to the new signalized intersection of Aronson Ave/Main St. Southbound left-turns would be routed via the Lake Elmo Dr/Main St intersection.

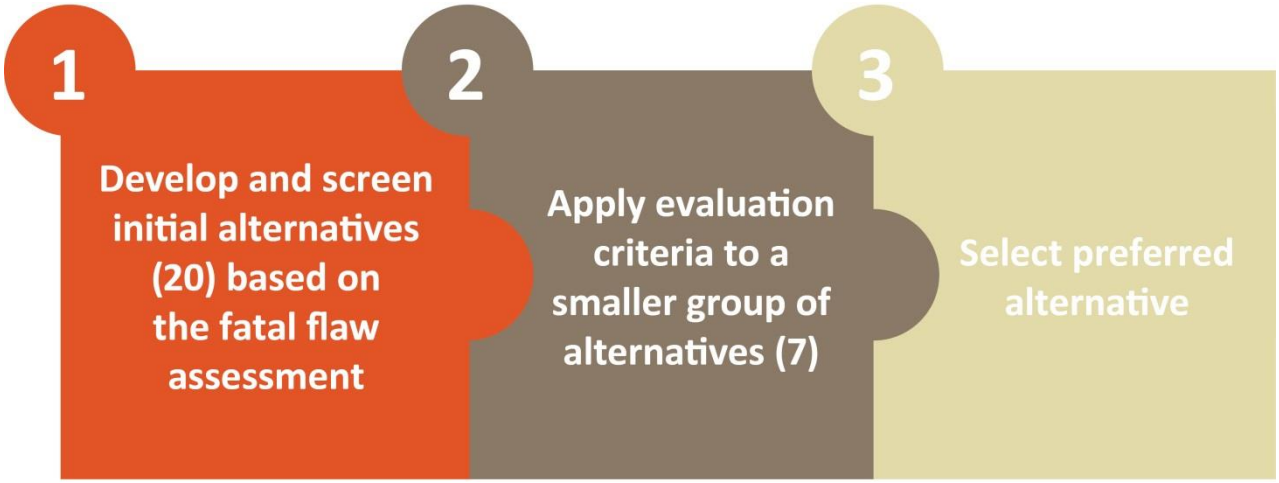
4C	One-Way Couplet (Westbound – Aronson Avenue)		Alternative 4C converts Aronson Avenue to one-way in the westbound direction and Airport Road to one-way in the eastbound direction between Main Street and 6th Avenue Bypass. Northbound left-turns would be removed from the Airport Rd/Main St intersection and would make the left hand turn at the signalized intersection of Aronson Avenue. Access to westbound Airport Road would be available using the Alkali Creek Road loop ramp.
4D	One-Way Couplet (Eastbound – Aronson Avenue)		Alternative 4D converts Aronson Avenue to one-way in the eastbound direction and Airport Road to one-way in the westbound direction between Main Street and 6th Avenue Bypass. All eastbound movements would be removed from the Airport Rd/Main St intersection and would use the 6th Avenue Bypass off-ramp to access Aronson Avenue. A new signal would be installed at Aronson Ave/Main St and either a signal or roundabout would be installed at Aronson Ave/6th Ave Bypass.
Alternative Intersection Strategy			
5A	Median U-Turn – North/South		Alternative 5A includes a median U-turn (MUT) intersection in the northbound and southbound directions. The MUT removes northbound and southbound left-turns at the Airport Rd/Main St intersection and reroutes these movements to occur as U-turns at Lake Elmo Dr/Main St and Aronson Ave/Main St signalized intersections. Trucks routing westbound on Airport Road will be routed via Aronson Avenue signalized intersection to the Alkali Creek Road loop ramp or Bench Blvd to Airport Road.
5B	Partial Displaced Left-Turn (DLT) – North/South		Alternative 5B includes a partial displaced left-turn (DLT) intersection, for the northbound left-turn movement at Airport Rd/Main St. The concept includes signalizing Aronson Ave/Main St to allow the crossover of the northbound left-turn and for vehicles to access Aronson Avenue via a signalized intersection. The signal at Airport Rd/Main St would be modified to permissive phasing for the southbound left-turn.

5C	Multilane Roundabout		Alternative 5C modifies the signalized intersection to a multilane roundabout with three entry lanes on the northbound and southbound approaches. Additionally, right-turn bypass lanes would be considered with this alternative.
Grade Separated Strategy			
6A	Eastbound Left Flyover at Airport Rd/Main St		Alternative 6A includes a grade-separated flyover for the eastbound left-turn onto Main St northbound. The east-west movements would be modified to permissive phasing.
6B	Loop Ramp in Southeast Quadrant		Alternative 6B includes a full grade separation of Airport Road to Bench Bolevard with a loop ramp located in the southeast quadrant of the intersection. The loop ramp would accommodate all eastbound and westbound movements as well as the northbound left-turn at the intersection. A southbound right-turn on-ramp would be provided to connect with westbound Airport Road. Southbound left-turns would be removed and routed to Lake Elmo Drive.
6C	Airport Road Overpass to Bench Boulevard		Alternative 6C includes a full grade separation of Airport Rd with a tie in at Bench Boulevard. The grade separation would accommodate all eastbound and westbound movements via Bench Boulevard. A southbound right-turn on-ramp would be provided to connect with westbound Airport Road. Southbound left-turns would be removed and routed to Lake Elmo Drive. Northbound left turns and right turns would be removed and routed to Bench Boulevard.

Application of the Evaluation Criteria

In the next stage of the transportation study, the initial alternatives will undergo a tiered-evaluation approach. Figure 2 illustrates this tiered-approach to the alternatives evaluation.

Figure 2: Tiered-Approach to Alternatives Evaluation



Tier 1 will identify if there is a fatal flaw with any of the twenty (20) alternatives, such as:

- Alternative does not serve the critical traffic volumes at the intersection.
- Alternative has a significant impact to an environmental element.
- Alternative is dismissed based on input from the PAC.

Based on the Tier 1 screening, we would evaluate a smaller number of alternatives (approximately 7) at a more refined level of development in Tier 2.

Tier 2 consists of evaluating this smaller group of alternatives (approximately 7) based on the evaluation criteria presented in Table 1. Each alternative will be assigned a score of -1 (poor), -0.5, 0 (fair), 0.5, or 1 (good) depending on how the alternative does or does not meet each of the specific evaluation criteria. At this time, a weighting factor is not proposed for any of the evaluation criteria, but that could be incorporated in the evaluation based on direction from the PAC. This evaluation will be performed through independent analyses to assess each alternative individually and relative to other alternatives to determine its effectiveness in meeting the various project goals, objectives, and evaluation criteria. The scores in each category would be summed to provide a total score for each alternative and presented to the PAC with initial recommendations for selection of the preferred alternative.

At this time, all of the operational analysis will be performed using CAP-X, Synchro, and the Highway Capacity Manual. However, after the Tier 2 discussion, a microscopic operational analysis (e.g. VISSIM) and animation videos could be used to support the operational analysis and visual aid for illustrating the alternatives. As identified in the scope of work, this item would be addressed with MDT at this time to determine whether a microscopic operational analysis is needed.

Tier 3 will involve refining the preferred alternative for use in the design stage of the project.

If you have any questions, please contact Andy Daleiden via email at adaleiden@kittelson.com or by phone at 208.338.2683.

References

1. Marvin & Associates. *Final Report for MetraPark Egress Improvements,* Yellowstone County Commissioners, April 2013.
2. Sanderson Stewart. *Traffic Report: 6th Ave N/Bench-Blgs, Phase 2,* Montana Department of Transportation, November 2012.
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6. Federal Highway Administration. *Median U-Turn Intersection Informational Guide.* August 2014.
7. Federal Highway Administration. *Displaced Left Turn Intersection Informational Guide.* August 2014.
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