POLICY COORDINATING COMMITTEE AGENDA

July 19, 2016 MEETING TIME: 12:00 p.m.
BOCC Board Room, (403), YC Courthouse
Billings, Montana 59101

1. Call to Order/Pledge to the American Flag: PCC Chairman

2. **PUBLIC COMMENT PERIOD** – As required (minute maximum per person. *Any member of the public may be heard on any subject that is not on the agenda. The Policy Coordinating Committee will not take any action on these items at this time, but could choose to add an item to the next meeting's agenda for discussion.*

   a. **Comments on items not on the agenda and requests to add items to future agendas.**
   Comments on items on the non-public agenda items.

3. Approval of the minutes of: **May 17, 2016. (The June 21, 2016 meeting was canceled).**

4. Old Business

   a. **Motion. West end Multi-Modal Modeling Study.** Scott Walker, Transportation Coordinator, presenting.

   b. **Motion. Rims to Valley Feasibility Study.** Scott Walker, Transportation Coordinator, presenting.

   c. **Update/Discussion. 5th Avenue Corridor Feasibility Study.** Scott Walker, Transportation Coordinator presenting.

5. New Business

6. Other Business and Future Agenda Items

7. Adjournment

PCC Agenda

Meeting Date: 07/19/2016

Information

Subject

Approval of the minutes of: **May 17, 2016. (The June 21, 2016 meeting was canceled).**

Attachments

PCC_16_05_17_DRAFT

POLICY COORDINATING COMMITTEE

MINUTES –MAY 17, 2016
DRAFT TO APPROVED BY A MOTION JULY 19, 2016

Members Present: Councilman Larry Brewster, Ward 2; Commissioner Bill Kennedy, Board of County Commissioners; Darell Tunnicliff, President, City/County Planning Board; Stefan Streeter, MDT District Office.

Staff Present: Commissioner John Ostlund; Candi Millar, Director, Planning & Community Services Department; Scott Walker, Transportation Planner, Planning & Community Services Department; Wyeth Friday, Lora Mattox, Transportation Planner; Planning Division Manager, Tammy Deines, Planning Clerk; Vern Heisler, Deputy Public Works Director; Tim Miller, Director, Yellowstone County Public Works Department.; Mike Black, Yellowstone County, Public Works Department

Conference Call Participants: Kenn Winegar, MDT Planning; Alan Woodmansey, FHWA

Others Present: Gary Neville, MDT; Tom Zurbuchen; Dennis Ulvestad, Evelyn Pyburn, Yellowstone County News; Mike Ferguson, Billings Gazette; Tonya Modershzki, KULR 8; Oscar Heinrich; Patrick Klugman; Andy Daleiden, Kittleson and Associates

1. Call to Order: Commissioner Reno called the meeting to order at 12:00 p.m., Board of County Commissioners Board Room, Yellowstone County Courthouse

Commissioner Kennedy called the meeting to order in the Board of County Commissioners Board Room, welcomed everyone in attendance, and led the pledge to the American Flag.

2. Communication from the Audience

Commissioner Kennedy asked for communication from the audience. There was none.

3. Minutes of April 19, 2016- Councilman Brewster made a motion and Darryl Tunnicliff seconded the motion to approve the April 19, 2016 meeting minutes as submitted. The motion carried with a unanimous voice vote.

4. Old Business:

a. Motion/Approval 2015-2019 TIP Amendment III. Scott Walker, Transportation Coordinator Presenting.

INTRODUCTION

Federal regulations require that Metropolitan Planning Organizations (MPOs) review and update their Transportation Improvement Programs (TIP) periodically. Due to additional projects being added to the current 2015- 2019 TIP, the Billings MPO requires an amendment. This amendment will be called the 2015- 2019 TIP Amendment III. The

projects that have been amended include a number of safety and overlay projects throughout our MPO area and the 1st Avenue North project. These projects are programmed into the MDT project funding and are not funded through local allocations.

Highlights of 2015-2019 TIP Amendment III

Listed below is an overview of the minor changes for the following projects:

- 4199 Billings Bypass – Five Mile Road
  - CN costs increased
- 6040: Zimmerman Trail
  - o RW moved from 2016 to 2017
  - o CN moved from 2017 to 2018
- 7972: I-90 Yellowstone River Billings
  - o PE increase
- 8036: Downtown State Signals
  - o RW added in 2016
  - o IC added in 2016
  - o CN decrease
- 8052: Roundabout King & 56th
  - o IC increase
- 8611: SF 129 – Roundabout Central & 56th
  - o PE increase
  - o IC moved from 2016 to 2017
  - o CN increase

New Projects:

- 9082: 1st Ave South – ADA (BLGS)
  - o All phase in 2016 for $1,830,700
  - o Funded with Statewide CMAQ
  - o ADA Compliance funding bucket was reduced in 2016 since a project was nominated

Discussion

Discussion was held regarding the Billings ByPass construction cost increases and time frames. Right-of-way acquisition and construction has been moved back a year. Stefan Streeter explained MDT is waiting for design and right-of-way acquisitions.

There was question on the 27th –Street Signalization Project. Stefan Streeter said there are no changes to this projects and the right-of way issues will be addressed.

MOTION

Darryl Tunnicliff made a motion and it was seconded by Councilman Brewster to approve the 2015-2019 Amendment III as presented by staff. The motion carried with a unanimous voice vote.

POLICY COORDINATING COMMITTEE

MINUTES –MAY 17, 2016
DRAFT TO APPROVED BY A MOTION JULY 19, 2016

5. New Business:

5a. Presentation. Discussion. Airport Road & Main Street Intersection Study. Wade Salyards, PE, MDT Project Manager; Andy Daleiden, PE, Consultant Project Manager, Kittelson & Associates, Inc.

Montana Department of Transportation (MDT) is kicking off a transportation study for the Airport Road and Main Street intersection. This study will investigate transportation alternatives to improve operations and safety for all users in the study area. This project consists of two phases: Phase 1 is the transportation study to identify the proposed project for design and construction. Phase 2 would include design and construction of the project.

The Airport Road and Main Street intersection is located roughly 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 recreation, residential neighborhoods (Heights West and East), low density commercial, and light industrial uses with downtown Billings and Interstate 90.

Alternatives:

Alternative 1-No Build

Alternative 3B-Signalized Southwest Quadrant

Alternative 5B-Partial Displaces Left Turn (Southwest Quadrant)

Website: http://www.mdt.mt.gov/pubinvolve/blgairportmain/

Public meetings will be held on May 18 and in June to gather feedback from the public and from the stakeholders. The final report will be developed in June and July. Staff will bring forward and update to this Committee in the early fall.

Discussion

Per request of Darryl Tunnicliff, Andy Daleiden explained the safety performance measures for double left and triple left turns. Darryl Tunnicliff asked about the impacts on this intersection when the Johnson Lane and new bridge is constructed. Andy Daleiden said the Billings Bypass Project traffic volumes and projected levels of service have been considered. Traffic volumes will be higher if the project is not moved forward. Stefan Streeter further clarified and said studies have shown this intersection will have issues with or without the Bypass projects. This study considers mitigation of this intersection in advance.

6. **OTHER BUSINESS-**There is no other business.

ADJOURNMENT: The meeting adjourned at 1:10 p.m.

To be approved by a motion on July 19, 2016.

PCC Agenda

Meeting Date: 07/19/2016

Information

Subject

Motion. West end Multi-Modal Modeling Study. Scott Walker, Transportation Coordinator, presenting.

Attachments

West End Multi-Modal Pln St_DRAFT

WEST END MULTI-MODAL PLANNING STUDY

DRAFT REPORT

APRIL 2016

SANDERSON STEWART

ACKNOWLEDGEMENTS

The West End Multi-Modal Planning Study was conducted under the direction of the Project Oversight Committee, which included the members listed below. Along with the input of numerous community members, the guidance of the Project Oversight Committee has been essential to the success of this process and is very much appreciated.

Project Oversight Committee

Candi Millar, City-County Planning Division

Wyeth Friday, City-County Planning Division

Scott Walker, City-County Planning Division

Lora Mattox, City-County Planning Division

Terry Smith, City Engineering

Mike Black, County Public Works

Stan Jonutis, MDT Billings District

Katie Potts, MDT Helena

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EXECUTIVE SUMMARY

The West End Multi-Model Planning Study is the result of a collaborative effort between the Billings-Yellowstone County Metropolitan Planning Organization (MPO), the City of Billings, Yellowstone County and the consultant Project Team (Sanderson Stewart and Fehr & Peers). The purpose statement for the study is as follows:

To evaluate the cumulative effect of ongoing and projected future land development and population growth on the multi-modal transportation system for the area of Billings west of Shiloh Road

This document provides guidance in terms of cost and prioritization for multi-modal transportation system projects in the study area based on a pair of land development projection scenarios for the 20-year period leading up to the study Horizon Year of 2035.

Study Area

The study area for the West End Multi-Modal Planning Study is depicted at right in **Figure ES1**. The areas shown in light blue are in the City of Billings, while all other areas have not yet been annexed. The areas shaded in red have been identified for potential annexation by 2018, while the areas in yellow-orange have been identified for potential longer-term annexation. The orange dotted line represents the MPO planning jurisdictional boundary.

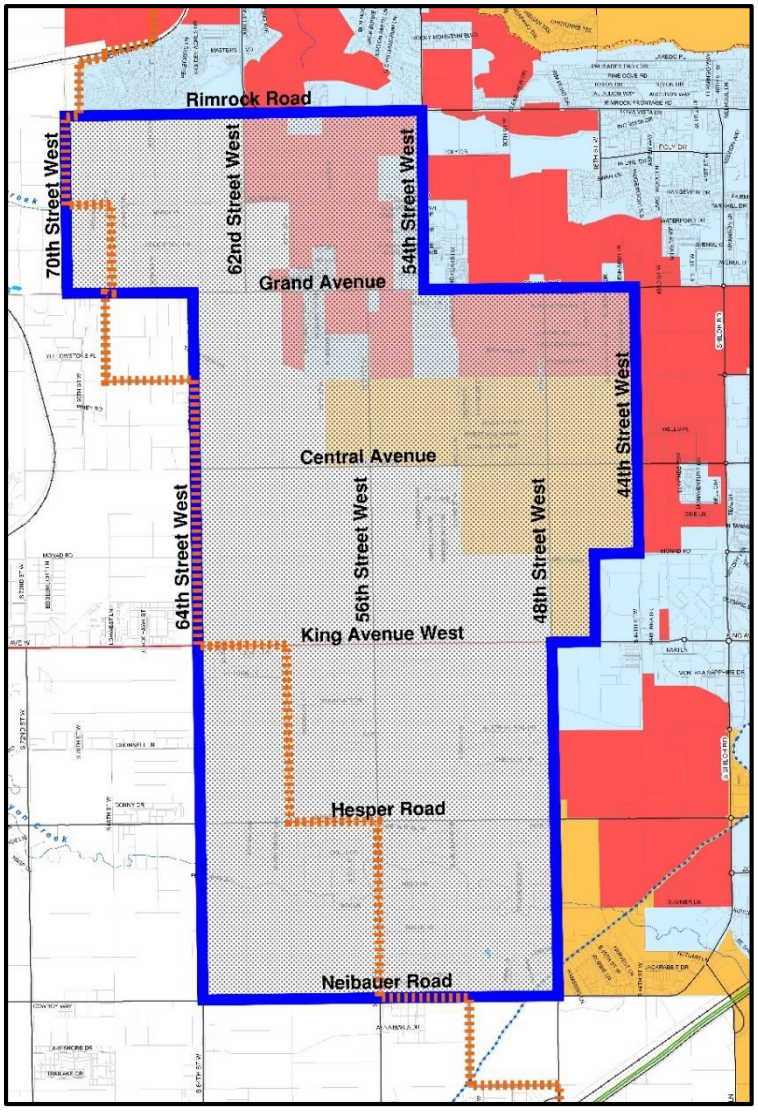


FIGURE ES1. STUDY AREA

Methodology

The Project Team inventoried existing multi-modal transportation system features within the study area, collected traffic counts and crash history data and performed a comprehensive analysis of existing conditions to utilize as a baseline for the study. In addition to evaluating operations and safety for vehicular travel, the team evaluated conditions for the bicycle and pedestrian environment using latent demand and level of traffic stress (LTS) metrics.

Two (2) Horizon Year (2035) land development projection scenarios were calculated; one that approximated a continuation of recent historical development in the area, including a mixture of City and County subdivisions; and a second scenario that projected more aggressive annexation of study area property, thereby resulting in denser development and growth.

The parameters for the two growth scenarios were provided to the Montana Department of Transportation (MDT) for analysis in the Transcad transportation model for Yellowstone County. MDT returned link-specific average daily traffic (ADT) volume projections for both scenarios to be utilized for the Horizon Year (2035) analyses.

The Project Team analyzed future multi-modal operations for both of the growth scenarios. Based on the results of those efforts and the crash history analysis for the study area, the team developed a series of prioritized short-term and long-term project recommendations with high-level approximate construction cost ranges estimates.

Analysis Results

Existing Conditions

For the Existing Conditions (2015) scenario, all of the study area intersections and street corridor segments were found to operate at acceptable levels of service (LOS) during all periods of a typical day. However, an evaluation of crash history for study area intersections for the 5-year period from 2010-2014 revealed that there are seven (7) intersections with crash rates higher than 1.0 crashes/million vehicles entering (MVE), which is a threshold number that MDT uses to determine when an intersection may be of concern. The following three (3) of those intersections exhibited crash rates greater than 1.50 crashes/MVE:

- Rimrock Road & 62nd Street West
- Neibauer Road & 48th Street West
- Neibauer Road & 56th Street West

There were no fatalities reported as a result of any of the crashes during the 5-year analysis period. However, crash severity, which takes into account how many injuries and/or fatalities have occurred as a result of a sample of crashes, was found to be elevated for six (6) intersections. The two Neibauer Road intersections listed above had the highest crash severity rates.

From an active transportation (bicycle/pedestrian) standpoint, the availability of sidewalks, side paths, trails, or bike lanes in the study area is very limited with the exception of sidewalks internal to masterplanned communities. In general, the study area lacks connectivity to low stress bike/pedestrian facilities. A level of traffic stress (LTS) analysis showed that all of the major streets in the study area exhibit the highest LTS scores, thereby making them uninviting to typical bicyclists and pedestrians. This is generally due to the high speeds and narrow or non-existent shoulders in the study area.

Future Conditions (2035)

Under land use growth Scenario 1 (typical growth), most roadways in the study area continue to experience a LOS D or better. However, three of the primary east-west arterials (Rimrock Road, Grand Avenue, King Avenue West) are not projected to meet that standard. Of the north-south arterials, only 62nd Street West, north of Rimrock Road, is projected to operate below LOS D. **Figure ES2** on the following page provides a graphical illustration of the corridor LOS conditions for Scenario 1. Figure ES2 also shows the intersections that are projected to operate below an acceptable LOS C during one or both peak hour periods for Scenario 1.

Under the higher-growth Scenario 2 (aggressive growth), Central Avenue joins Rimrock Road, Grand Avenue and King Avenue West in having one or more segments exhibiting LOS E or worse conditions. For the north-south corridors, 62nd Street West, north of Rimrock Road degrades to LOS F, while 54th Street West is projected at LOS D north of Rimrock Road and LOS E south of Rimrock Road. **Figure ES3**, also on the following page, illustrates the corridor LOS analysis results for Scenario 2 and also shows graphically which intersections are projected to fail under that scenario.

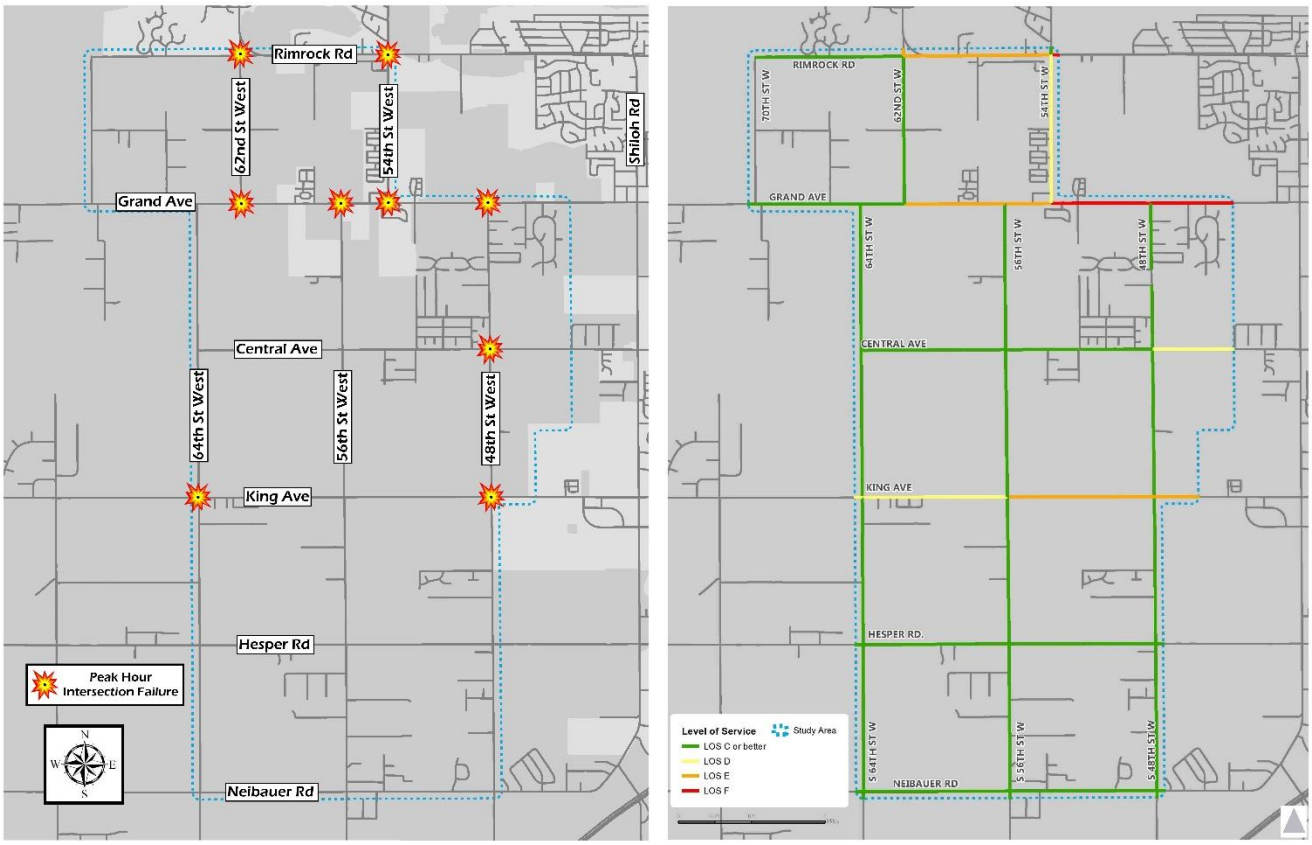


FIGURE ES2. SCENARIO 1 (2035) INTERSECTION AND CORRIDOR LOS ANALYSIS RESULTS

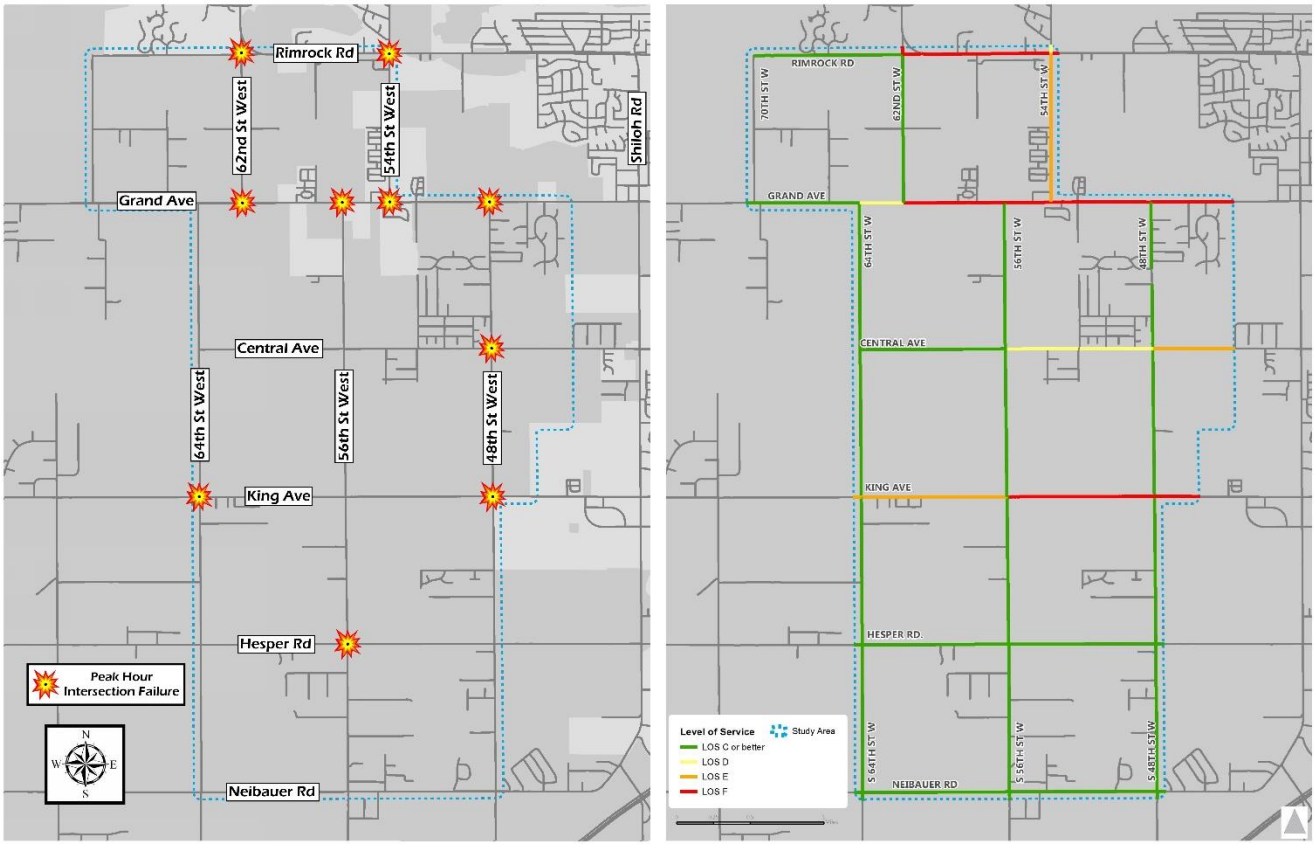


FIGURE ES3. SCENARIO 2 (2035) INTERSECTION AND CORRIDOR LOS ANALYSIS RESULTS

A Latent Demand Model was used to provide a logical analysis framework to prioritize attention and investment for active transportation. Based on the growth projections, demand for active transportation is expected to increase significantly. Most of the study area north of King Avenue and east of 56th Street will generate demand, with the highest concentrations along 54th Street and Grand Avenue. **Figure ES4** below illustrates the projected change in active transportation demand from Existing Conditions (2015) to Scenario 2 (2035)

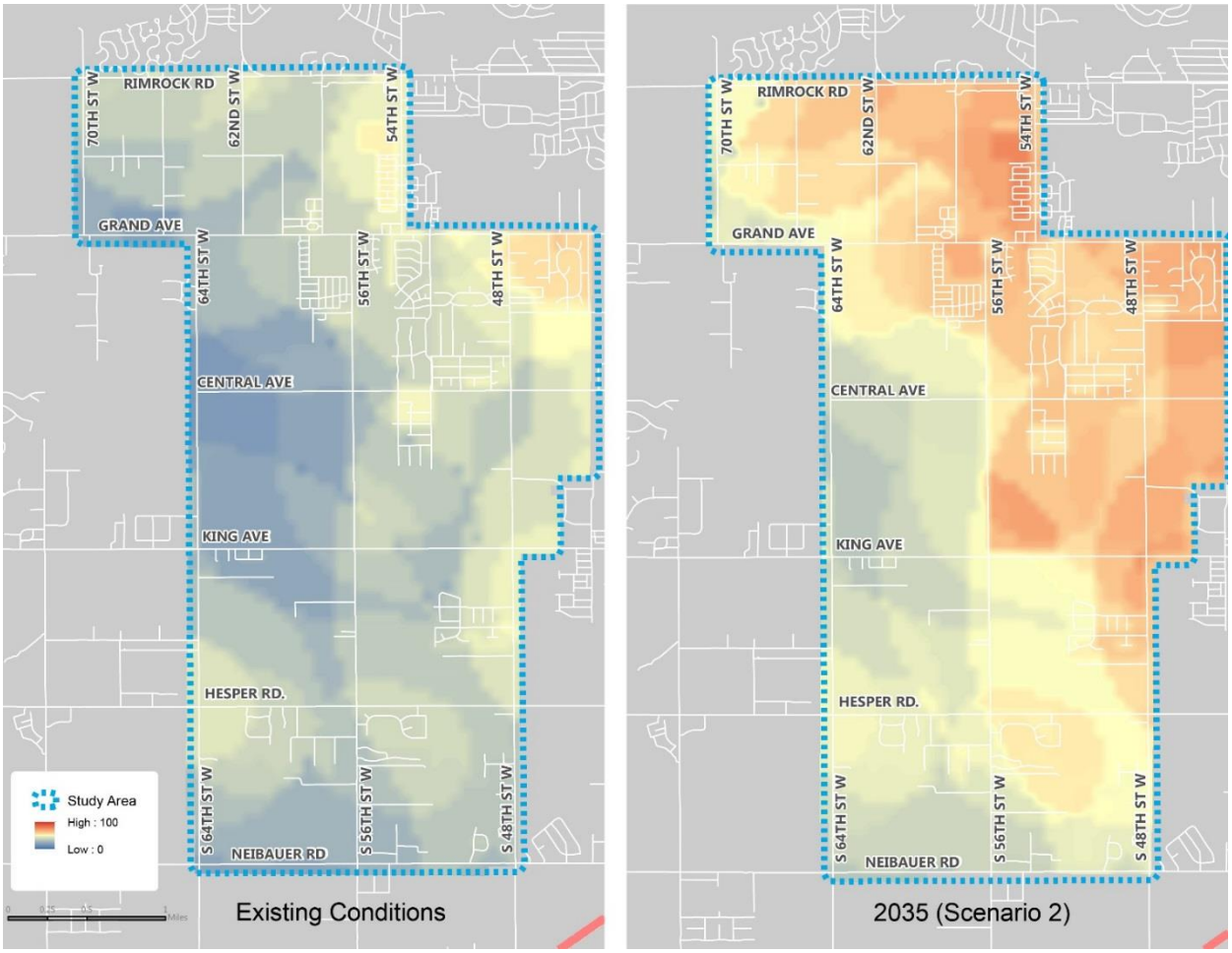


FIGURE ES4. LATENT DEMAND MODEL ANALYSIS RESULTS

Study Recommendations

Streets & Intersections

The priority project recommendations for this study were broken down into short-term and long-term categories. Short-term priority projects are those that could be necessary in order to maintain safe and efficient operations during the first half of the 20-year study period. Long-term priority projects are more likely to be needed during the second half of that period. However, it should be noted that there are many factors related to land development that could change the priority, location and cost considerations that are summarized in these recommendations. As such, the recommendations are to be utilized as a guideline for planning and not as a hard and fast committed projects list.

Tables ES1-ES4 and **Figure ES5-ES6** on the following pages list and illustrate the short term and long-term priority project recommendations for street and intersection improvements. In addition to details about each recommended project, the tables provide estimated construction cost ranges. The estimated costs do not consider right-of-way, irrigation systems modifications or street lighting other than as associated directly with traffic signals or roundabouts.

TABLE ES1. SHORT-TERM INTERSECTION PROJECT RECOMMENDATIONS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Neibauer Rd. & 56th St. West	All-Way Stop Control/OH Flashing Beacons/Transverse Rumble Strips	$120,000-$200,000
2	Neibauer Rd. & 48th St. West	OH Flashing Beacons/Transverse Rumble Strips	$120,000-$200,000
3	Rimrock Rd. & 54th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
4	King Ave. West & 64th St. West	Auxiliary Turn Lanes	$400,000-$600,000
5	Grand Ave. & 48th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
6	Molt Rd./Rimrock Rd./62nd St. West	Design Study	$20,000-$30,000
7	Grand Ave. & 56th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000

TABLE ES2. SHORT-TERM CORRIDOR PROJECT RECOMMENDATIONS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Grand Ave. - Shiloh Rd. to 52nd St. West	Widening/Reconstruction (3-lane section)	$2,800,000-$4,500,000
2	Rimrock Rd. - 50th St. West to 54th St. West	Widening/Reconstruction (3-lane section)	$1,000,000-$1,600,000
3	King Ave. West - MT Sapphire Dr. to 48th St. West	Widening/Reconstruction (3-lane section)	$1,300,000-$2,000,000
4	Grand Ave. - Wilderness Dr. to 62nd St. West	Widening/Reconstruction (3-lane section)	$900,000-$1,400,000

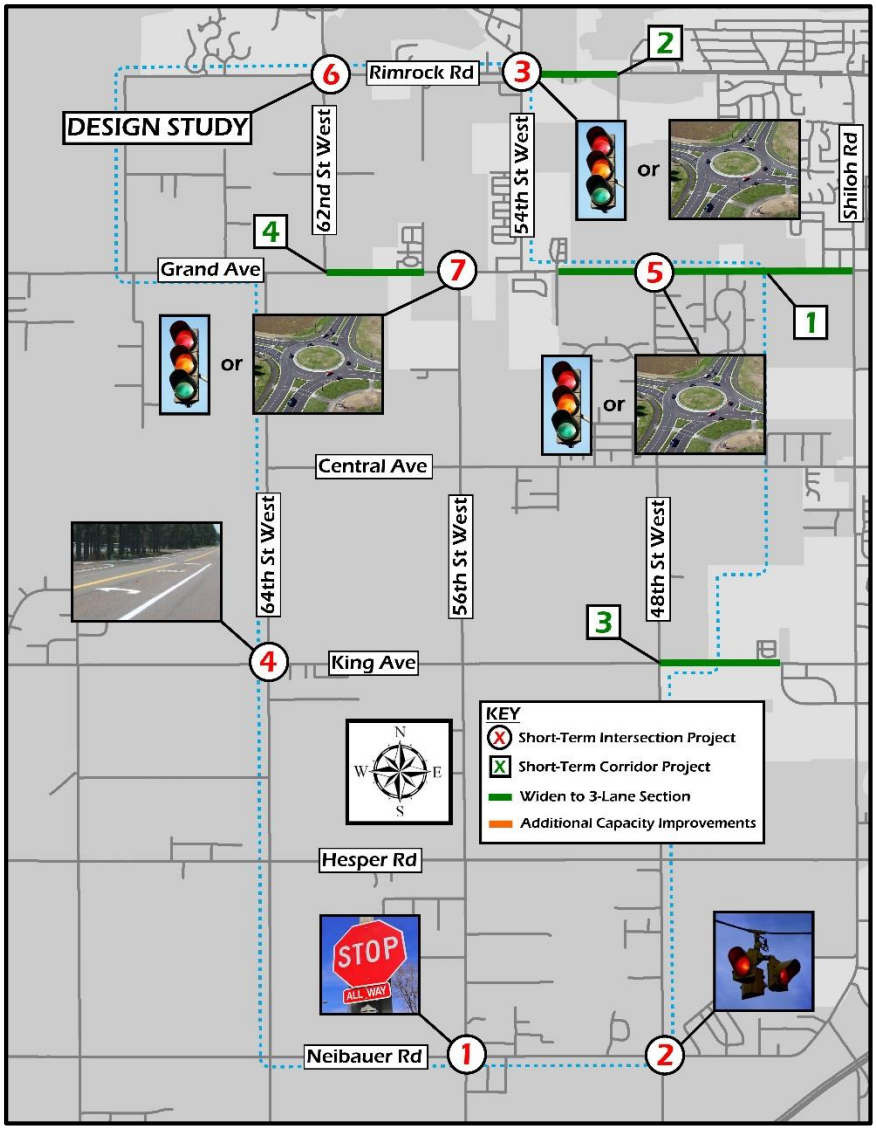


FIGURE ES5. SHORT-TERM INTERSECTION & CORRIDOR PROJECT RECOMMENDATIONS

TABLE ES3. LONG-TERM INTERSECTION PROJECT RECOMMENDATIONS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Molt Rd./Rimrock Rd./62nd St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
2	King Ave. West & 48th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
3	Central Ave. & 48th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
4	King Ave. West & 64th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
5	Grand Ave. & 62nd St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
6	Hesper Rd. & 56th St. West	All-Way Stop	$4,000-$200,000

TABLE ES4. LONG-TERM CORRIDOR PROJECT RECOMMENDATIONS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Grand Ave. - Shiloh Rd. to 62nd St. West	Widening/Reconstruction (5-lane section)	$7,500,000-$11,000,000
2	Rimrock Rd. - Shiloh Rd. to 62nd St. West	Widening/Reconstruction (5-lane section/3-lane section)	$6,900,000-$10,300,000
3	King Ave. West - MT Sapphire Dr. to 64th St. West	Widening/Reconstruction (5-lane section/3-lane section)	$6,100,000-$9,300,000
4	54th St. West - Grand Ave. to Rimrock Rd.	Widening/Reconstruction (3-lane section)	$2,100,000-$3,300,000
5	Central Ave. - Shiloh Rd. to 48th St. West	Widening/Reconstruction (3-lane section)	$2,000,000-$3,100,000
6	62nd St. West - Rimrock Rd. to Western Bluffs Dr.	Widening/Reconstruction (3-lane section)	$700,000-$1,100,000

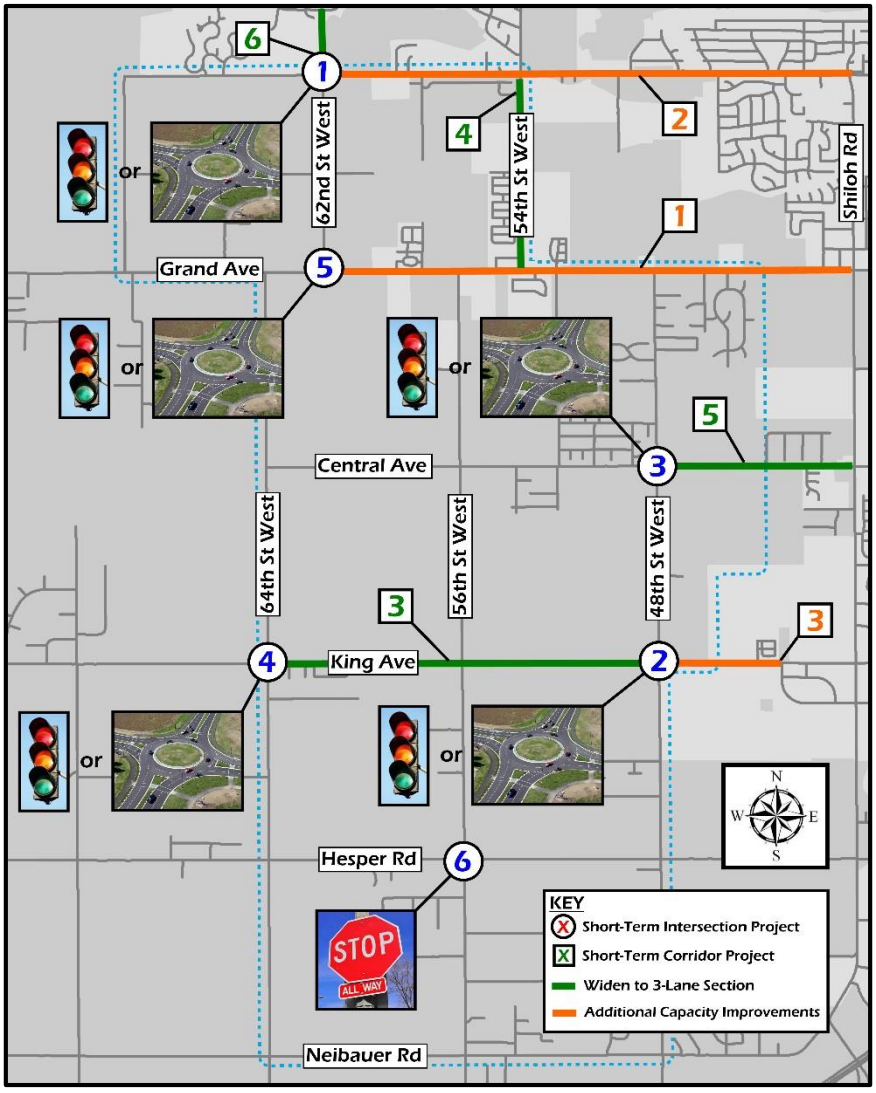


FIGURE ES6. LONG-TERM INTERSECTION & CORRIDOR PROJECT RECOMMENDATIONS

The City and County should also strongly consider the implementation of access control as a tool for extending the life (in terms of capacity) for roadway corridors in this area. Closely spaced driveways with no restrictions on turning movements can greatly degrade the throughput capacity for an arterial. A well-conceived access control plan can improve arterial capacity and also provide safety benefits by reducing conflict points in high-mobility corridors.

Active Transportation Systems

The Project Team recommends the implantation of short-term bicycle facility improvements in the following locations:

- 54th Street from Rimrock Road to Grand Avenue
- 48th Street from Central Avenue to Grand Avenue
- Grand Avenue from 58th Street to Shiloh Road
- Central Avenue from 56th Street to Shiloh Road

Specific improvements could include shoulder widening to provide ridable space (5-8 ft of pavement outside of the shoulder stripe), protected bike lanes ("cycletrack"), and sidewalks or sidepaths. The provision of parallel multi-use pathways designed to serve both pedestrians and bicycles should also be a focus to better accommodate the needs of multiple user groups.

Near-term improvements for pedestrian facilities should focus on improving sidewalk connectivity with neighborhoods and providing crosswalks and related signage to make drivers aware of crossing locations. The following locations should be considered in the short-term for crossing improvements:

- Grand Ave/54th St: crosswalk enhancements, possibly a traffic signal, to improve pedestrian safety near school zone
- Grand Avenue midway between 56th Street West and 58th Street West: pedestrian actuated mid-block beacon, possibly a pedestrian hybrid beacon ("HAWK signal") or rectangular rapid flashing beacon (RRFB)
- 54th Street West at terminus of multi-use path (north end of Cottonwood Park): pedestrian actuated mid-block beacon, possibly a pedestrian hybrid beacon ("HAWK signal") or rectangular rapid flashing beacon (RRFB)
- Rimrock Road/54th St: crosswalk enhancements, possibly a traffic signal, to connect multi-use paths

The following corridors should be considered in the short-term for sidewalk or multi-use path improvements:

- Multi-use path on Grand Ave from 52nd Street West to west boundary of Trails West Subdivision
- Sidewalk on Grand Ave from west boundary of Foxtail Subdivision to HAWK signal
- Multi-use path from Grand Avenue to north boundary of Cottonwood Park along west side of 54th Street West
- Sidewalk along east side of 54th Street West from Grand Avenue to north boundary of Grand Peaks Subdivision

Figure ES7 on the following page illustrates the recommended locations for short-term active transportation system improvements.

Longer-term, it is recommended that a "layered network" principle be implemented as a way as to provide comfortable and efficient bike and pedestrian connectivity via lower-stress streets instead of force-fitting all modes onto the arterial corridors. Since many of these future collector corridors are platted but not built, it is an ideal time to establish the roadway standards that incorporate bike lanes, sidewalks and modest speed limits. A key consideration regarding this concept is cooperation between the City of Billings and Yellowstone County in terms of developing and implanting development requirements that will require construction of well-planned and consistent facilities as property develops in the study area. In the event that some of the major arterials become more urbanized over time, with speed limit reductions and bike facilities they could also become useful low-stress bikeways.

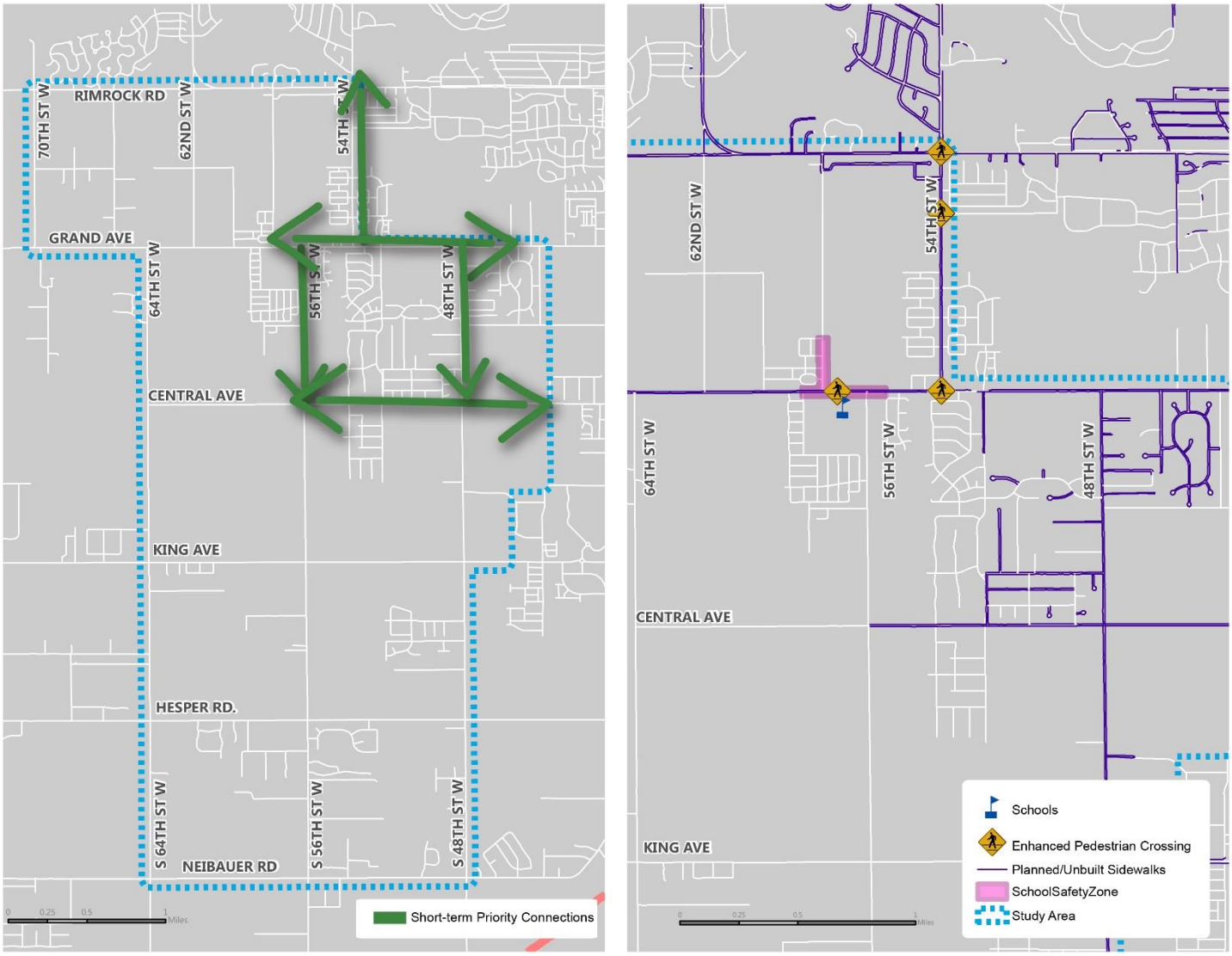


FIGURE ES7. SHORT-TERM IMPROVEMENTS FOR ON-STREET BICYCLE AND PEDESTRIAN FACILITIES

Recommended long-term low-stress corridors include:

- 58th Street West - Rimrock Road to Grand Avenue
- 66th Street West - Rimrock Road to Grand Avenue
- 60th Street West
- 52nd Street West
- Monad Road
- Broadwater Avenue
- Colton Boulevard

Future pathway segments should be prioritized based on the proximity to high demand areas and the ability of the segment to provide connectivity through barriers and gaps in the street system. **Figure ES8** on the following page illustrates the locations for recommended long-term active transportation projects. For more detail on all of the project conclusions and recommendations, please see the report body.

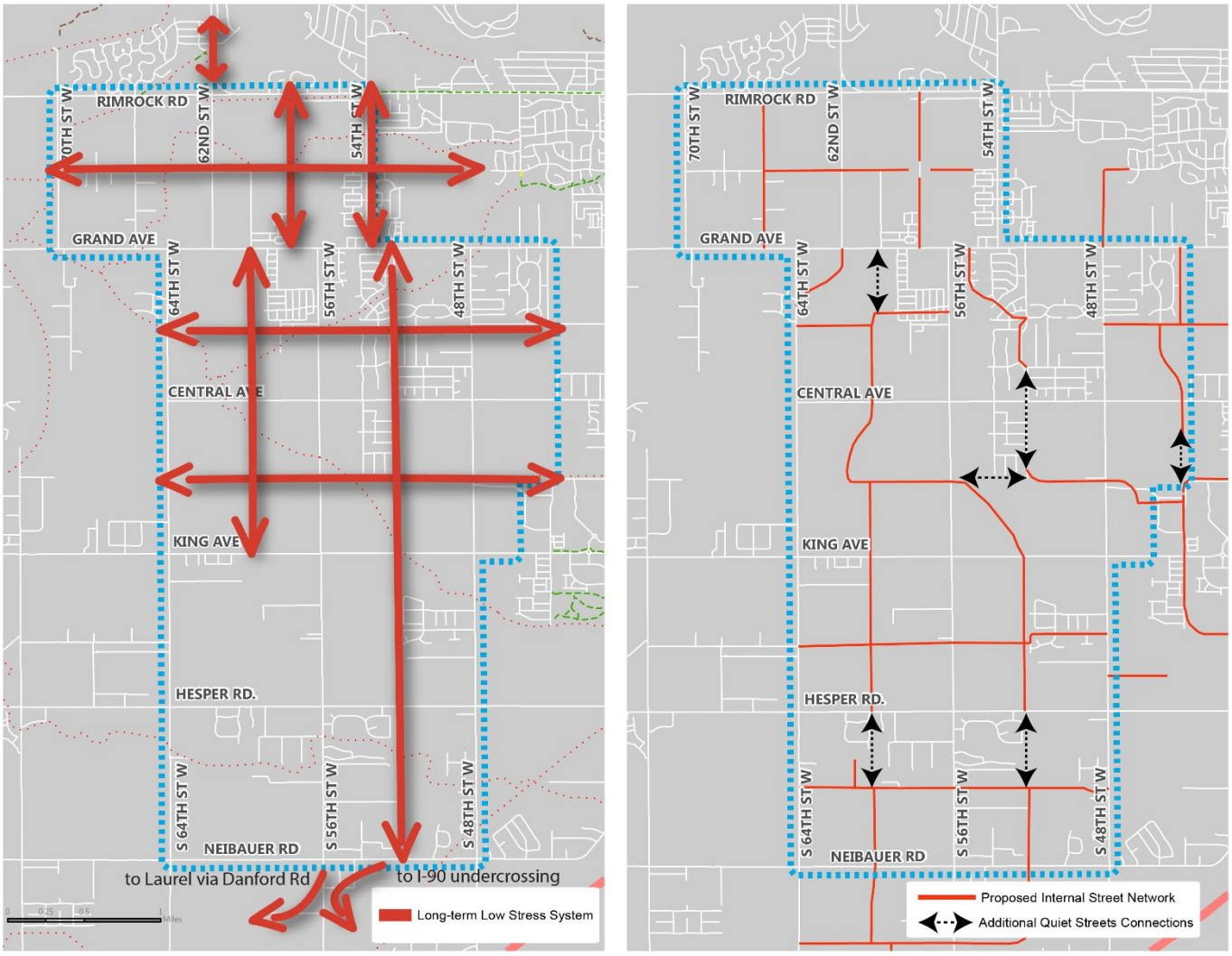


FIGURE ES8. LONG-TERM ACTIVE TRANSPORTATION STRATEGIES

INTRODUCTION

1

Billings is the largest municipality in the state of Montana with a population that was estimated at 108,869 by the US Census Bureau in 2014. Billings and Yellowstone County are governed by the City Council, County Commissioners and the Yellowstone County Board of Planning. The Metropolitan Planning Organization (MPO) administers the transportation planning program for the City and the County in the great Billings urban area.

In recent years, land development in the suburban/rural area west of Shiloh Road has brought about an increase in traffic volumes that directly impacts safety, operations and access. In addition to increased vehicular traffic, there is a growing demand for pedestrian and bicycle facilities in this area to provide connectivity amongst subdivisions and back to the more densely developed "West End" portion of Billings proper.

Study Objectives

The West End Multi-Modal Planning Study came about partially in response to complaints registered by residents west of Billings regarding increased traffic levels and the resulting impacts on traffic operations and safety. Through discussions between the MPO and the Technical Advisory Committee (TAC), it was determined that a study should be commissioned to look at the cumulative effect of subdivision development on the transportation system to help identify future gaps in infrastructure relative to all modes of transportation. To that end, the objectives of the West End Multi-Modal Planning Study are as follows:

1. Obtain Existing Conditions model data from the Montana Department of Transportation (MDT) and calibrate the study area based on recently collected traffic data and land usage information
2. Develop two (2) land development projection scenarios to be utilized as the basis for the future model runs; the "baseline" scenario represents a continuation of status quo growth and the "aggressive" scenario presumes more substantial annexation of the study area into the City
3. Develop preliminary improvement project recommendations based on model run results
4. Hold public meetings to present preliminary study results and solicit input from public
5. Revise model inputs as necessary based on public meeting and steering committee input; re-run models and revise improvement project recommendations accordingly

6. Summarize final results in a guiding document that provides recommendations on priority and approximate cost for improvement projects to mitigate projected impacts.

The Project Team also developed a purpose statement for the study that reads as follows:

To evaluate the cumulative effect of ongoing and projected future land development and population growth on the multi-modal transportation system for the area of Billings west of Shiloh Road.

Study Area Description

The study area for this project is depicted in **Figure 1** on the following page. The study area boundary was determined by the Planning Board and Planning Division. The intent was to include the areas generally outside of the City limits (though there are some annexed subdivisions that fall within the study area) that are most likely to develop with the 20-year horizon period for the study. It should be noted that there are some properties that were not included in the study area although they are currently still in the County. In general, those areas are already developed and/or are projected for annexation in the next few years.

Public Participation Process

A thorough public participation process was conducted for the West End Multi-Modal Planning Study in conformance with the 2009 Yellowstone County Board of Planning Participation Plan.

The following meetings were conducted as part of the plan development:

- **Project Steering Committee** meetings were held during most months to discuss the direction of the planning study.
- **Public Meeting No. 1** was held on February 2, 2016 to introduce the study to the public and request input on the type and prioritization of infrastructure improvement projects. Attendance was excellent (approximately 100 people). The primary themes of the question and comments received revolved around the anticipated Grand Avenue improvement project (City of Billings W.O. 16-09), roundabouts, and the high speeds within the study area. There was some discussion about active transportation (bike and pedestrian) modes and facilities.
- **Public Meeting No. 2** was held on April 14, 2016 in order to present preliminary recommendations and gather additional public input. Attendance was lower for this meeting, but we did receive some good input from the public.

The following dates were scheduled for review and approval of the West End Multi-Modal Planning Study:

- **Technical Advisory Committee** – Presentation and action on May 5, 2016
- **Yellowstone County Planning Board** – Presentation on May 10, 2016 and public hearing/action on May 24, 2016
- **Billings City Council** – Presentation on June 20, 2016 and action on June 27, 2016 (consent agenda, no public hearing)
- **Yellowstone County Commission** – Discussion on June 20, 2016 and presentation/action on June 28, 2016
- **Policy Coordinating Committee** – Final action on July 19, 2016

A project website was developed as a location to post draft documents for review and as a tool to request additional public input. The web address is www.sandersonstewart.com/projects/westend. The final document will be posted on the City of Billings website at http://ci.billings.mt.us/DocumentCenter/View/26772.

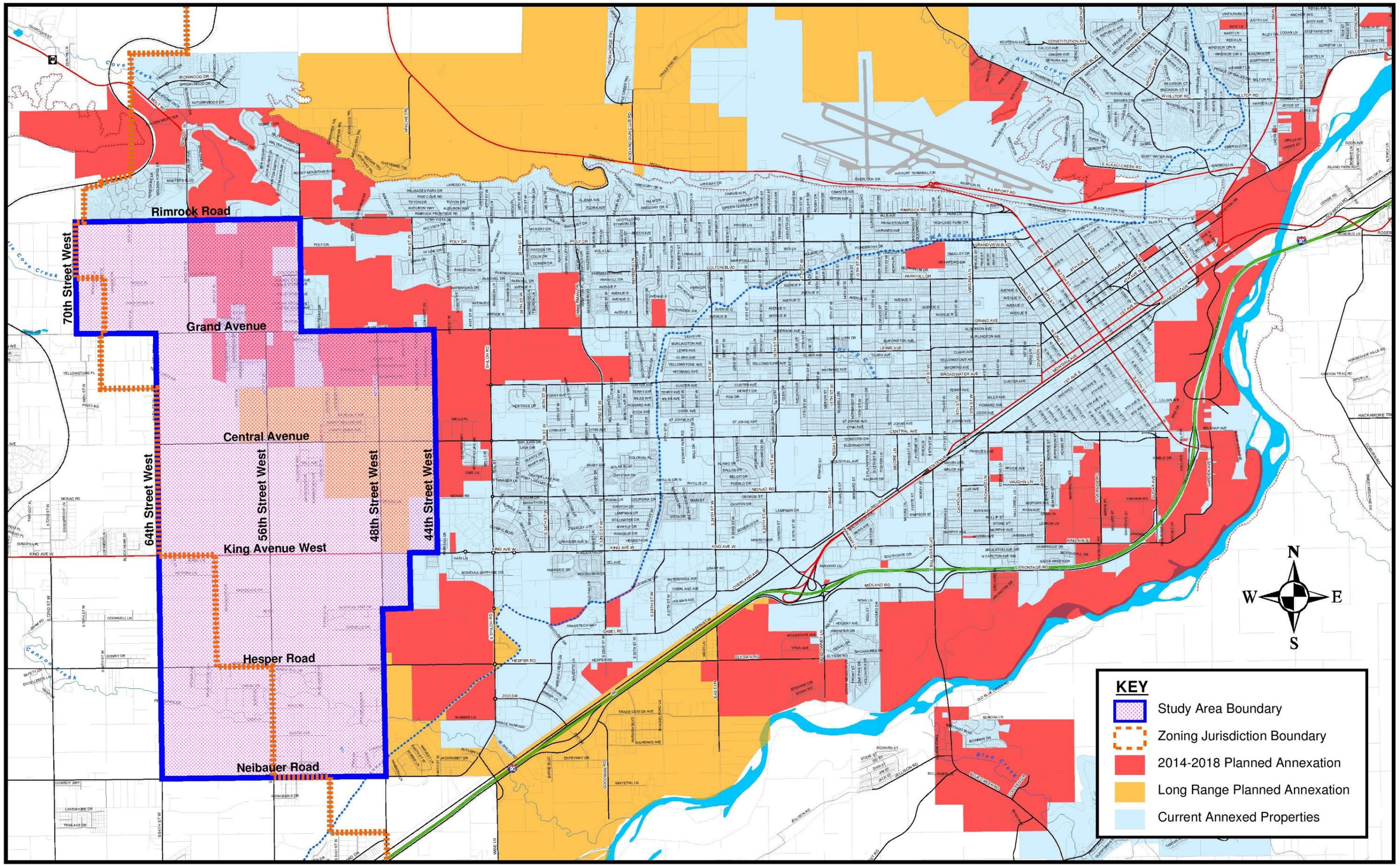


FIGURE 1 – STUDY AREA

EXISTING CONDITIONS

2

Although the primary intent of this study is to evaluate and prioritize potential project needs for a horizon year that is 20 years in the future, it was also important to evaluate existing conditions in order to provide a reasonable basis for comparison and expectations in terms of growth and demand. The following sections of this report summarize the Project Team's analysis of existing operational and safety conditions for all modes of travel.

Streets & Intersections

The following paragraphs provide background information about major streets and intersections that fall within the study area boundary for this project. The descriptions include physical measurements, speed limits, traffic control configurations and classification designations that help to determine the traffic demand and traffic stream makeup for the streets and intersections.

Streets

This region of Billings and Yellowstone County is transected by a series of streets that are generally laid out on a standard north-south-east-west grid. Those streets have a variety of roles, generally defined by Functional Classification, in the transportation of people and goods throughout the area. Functional Classification is the process by which streets and highways are grouped into classes according to the character of the traffic service that they are intended to provide. The basic system generally includes three categories: 1.) Arterials; 2.) Collectors; and 3.) Local Streets. Arterials are intended to provide a high level of mobility with limited local access. At the other end of the spectrum, Local Streets are designed to focus on providing access with limited function in terms of regional mobility. Collectors typically fall in between with an intended balance between mobility and access. Most jurisdictions further expand upon this system by adding Major (Principal) and Minor designations to the Arterial and sometimes Collector categories. Interstate is also often a separate classification category. The MPO utilizes the designations of Interstate, Principal Arterial, Minor Arterial, Collector and Local Street to define the streets and highways in Yellowstone County. MDT utilizes the categories of Interstate Principal Arterial, Other Principal Arterial, Minor Arterial, Major Collector, Minor Collector, Local and Alley to classify roadways. **Table 1** on the following page provides a listing of all non-Local streets within the study area, with functional classifications provided based on both systems where applicable.

TABLE 1. STUDY AREA STREET CHARACTERISTICS

Street	Functional Classification		Truck Traffic Restriction	Typical Street Widths (ft)		Speed Limit (mph)
	MPO	MDT		Travel Lanes	Shoulders	
Rimrock Road	Principal Arterial	Minor Arterial/Local Street[1]	No Restriction	11.0	0.5	55/(n/a)[5]
Grand Avenue	Principal Arterial	Major Collector/Minor Collector[2]	No Restriction	11.0	0.5-1.5	45/50/55[6]
Central Avenue	Principal Arterial	Major Collector/Minor Collector[3]	RESTRICTED	10.0	0.5-1.5	45/55/60[7]
King Avenue West	Principal Arterial	Major Collector	No Restriction	12.0	1.0	60
Hesper Road	Principal Arterial	Local Street	RESTRICTED	10.0-11.0	0.5-1.0	60
Neibauer Road	Principal Arterial	Minor Collector	RESTRICTED	11.5	1.0	60
64th Street West	Principal Arterial	Minor Collector/Local Street[4]	RESTRICTED	10.5-11.0	0.5-1.5	35/45/50/60[8]
62nd Street West	Principal Arterial	Minor Collector	RESTRICTED	11.0	1.0	(n/a)[9]
56th Street West	Principal Arterial	Minor Collector	No Restriction	11.0	0.5-1.0	45/50[10]
54th Street West	Minor Arterial	Local Street	No Restriction	12.0	0.5	45
48th Street West	Principal Arterial	Local Street	RESTRICTED	11.0	0.5-1.5	45/50[11]

[1] Minor Arterial - 54th Street West to Molt Road/Local Street - Molt Road to 70th Street West

[2] Major Collector - 48th Street West to 52nd Street West/Minor Collector - 52nd Street West to 64th Street West

[3] Major Collector - 48th Street West to 52nd Street West/Minor Collector - 52nd Street West to 64th Street West

[4] Minor Collector - Grand Avenue to King Avenue West/Local Street - King Avenue West to Neibauer Road

[5] 55 mph - 54th Street West to Molt Road/No speed limit posted - Molt Road to 70th Street West

[6] 45 mph - 44th Street West to 48th Street West/50 mph - 48th Street West to Molt Road/No speed limit posted - Molt Road to 70th Street West

[7] 45 mph - 44th Street West to 48th Street West/55 mph - 48th Street West to 56th Street West/60 mph - 56th Street West to 64th Street West

[8] 60 mph - Neibauer Road to School Zone area just south of Hesper Road/45 mph and 35 mph - School Zone area /55 mph - School Zone area to Grand Avenue

[9] No posted speed limit

[10] 50 mph - Neibauer Road to Central Avenue/45 mph - Central Avenue to Grand Avenue

[11] 50 mph - Neibauer Road to Central Avenue/45 mph - Central Avenue to Grand Avenue

Yellowstone County has an ordinance (07-107) in place that defines restrictions for the allowance of truck traffic on County roads. The ordinance states that "no truck traffic except for local deliveries" will be allowed on County roads designated as "restricted." For the purposes of the ordinance, a truck is defined as a vehicle with a combined gross vehicle weight of 16,000 pounds of more. Entities (businesses) located on roads that are designated as restricted are required to direct trucks via the shortest route possible to an unrestricted route. Within the study area for the West End Multi-Modal Planning Study, the majority of arterial streets are designated as restricted with the exception of Rimrock Road, Grand Avenue, King Avenue West and 56th Street West. **Table 1** includes a column that notes the restrictions accordingly.

In terms of the physical environment, the two biggest factors that impact multi-modal mobility in the study are roadway widths (lane and shoulder widths) and speeds. The Project Team performed an inventory of all of the above and the resulting data is included in **Table 1**. As indicated, all of the street segments within the study area boundaries have posted speed limits of 45 mph or higher. Combined with narrow travel lanes and shoulder widths, the travel speed conditions make for an uninviting setting for pedestrian and bicycle travel.

Intersections

Nineteen (19) existing intersections were identified as being prominent within the study area in terms of existing or future anticipated traffic demand. Those intersections are depicted in **Figure 2** on page 7. All 19 intersections are currently two-way stop-controlled. However, single-lane roundabouts are planned for the intersections of Central Avenue/56th Street West and King Avenue West/56th Street West and a traffic signal or roundabout is planned for construction at the Grand Avenue/54th Street West intersection as well. More detail is provided on these projects in a later section of the report. Several study area intersections also have overhead flashing beacons in place to warn high-speed drivers of approaching stop signs (red beacons) or stop-controlled side street approaches (amber beacons). It should also be noted that intersection sight distance is limited at various study area intersections during certain periods of the year as a result of agricultural crop production.

Traffic & Safety

A thorough evaluation of existing conditions relative to traffic and safety was conducted to establish a baseline future scenario operations analyses. That effort included a review of available historic traffic data from MDT, collection of new peak hour turning movement counts at major intersections, and review and analysis of historical crash data provided by MDT.

Traffic Volumes

The Project Team conducted AM and PM peak hour turning movement counts at eighteen (18) major intersections in May of 2105 and/or January of 2016 to utilize as the basis for existing conditions traffic analyses and model calibration. The AM and PM peak hours were generally found to occur from 7:15 to 8:15 AM and 4:45 to 5:45 PM. Raw count data was adjusted for seasonal variation utilizing MDT's published Seasonal Day of the Week For Axle Counts adjustment factors. **Figure 2** on the following page summarizes the Existing Conditions peak hour turning movement volume data. Detailed traffic count data is included in **Appendix A.**

Average Daily Traffic (ADT) volume count data for various key locations in the study area was provided by the MPO. The Project Team utilized that data and a K-factor approach (relating peak hour turning movement volumes to 24-hour ADT volumes) to estimate annual average daily traffic (AADT) volumes for study area corridor segments. **Figure 2** also illustrates the AADT estimates for the Existing Conditions scenario. The raw data counts from the MPO are included in Appendix A.

Crash History

Historical crash data was obtained from MDT for the 5-year period from January 1, 2010 through December 31, 2014 for the eighteen (18) study area intersections referenced previously. The data was analyzed for the purpose of calculating intersection crash and severity rates and evaluating collision type trends. **Table 2** on the page 8 illustrates the results of that analysis organized by intersection.

Intersection crash rates were calculated on the standard basis of crashes per million vehicle entering (MVE) each intersection. The MVE metric was estimated from the 2015 traffic counts. As a general rule, MDT considers that intersections with a crash rate greater than 1.0 crashes per million vehicles entering (MVE) should be examined further to determine if an inherent safety concern exists. The following seven (7) study area intersections exhibited intersection crash rates greater than 1.0 crashes/MVE per this analysis.

- Rimrock Road & 62nd Street West (crashes on Molt Road curve not included in this analysis)
- Central Avenue & 48th Street West
- Central Avenue & 56th Street West
- King Avenue & 56th Street West
- Hesper Road & 56th Street West
- Neibauer Road & 48th Street West
- Neibauer Road & 56th Street West

Of those seven (7) intersection, Rimrock Road & 62nd Street West, Neibauer Road & 48th Street West and Neibauer Road & 56th Street West exhibited crash rates higher than 1.50 with Neibauer Road having the highest rate at 2.87 crashes/MVE. The average intersection crash rate for the study area was 1.03 crashes/MVE.

Severity indexes and rates were also calculated for each of the study area intersections. The severity index is defined as the weighted average by crash severity, including fatal, injury, and property damage only crashes. Severity rate is defined as the crash rate multiplied by the severity index. There were no fatal crashes reported at any of the study area intersections, but

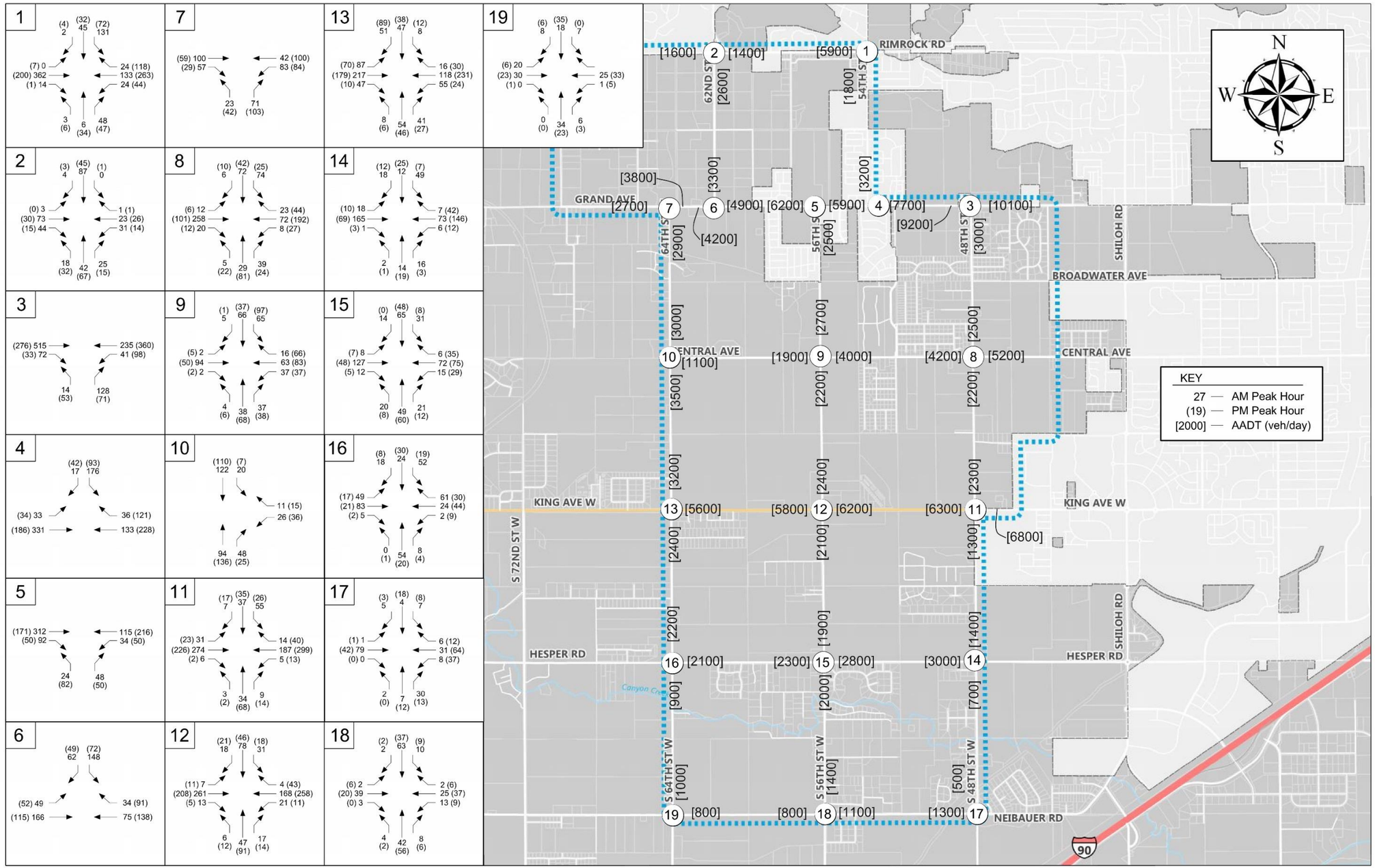


FIGURE 2 – EXISTING CONDITIONS (2015) TRAFFIC VOLUMES

TABLE 2. STUDY AREA INTERSECTION CRASH HISTORY

Intersection	2015 DEV[1]	Reported Crashes[2]	Crash Type			Rates (per MVE[3])		Collision Type						
			PDO	Injury	Fatality	Crash	Severity	Rear End	Right Angle	Fixed Object	Right Turn SD	Left Turn OD	Head On	Other[4]
Rimrock Road & 54th Street West	9526	13	9	4	0	0.75	1.21	3	8	2	0	0	0	0
Rimrock Road & 62nd Street West	3528	11	8	3	0	1.71	2.64	1	6	2	0	1	0	1
Grand Avenue & 48th Street West	11148	9	7	2	0	0.44	0.64	6	2	1	0	0	0	0
Grand Avenue & 54th Street West	8408	13	9	4	0	0.85	1.37	3	3	6	0	0	0	1
Grand Avenue & 56th Street West	7315	3	1	2	0	0.22	0.51	0	1	1	0	0	0	1
Grand Avenue & 62nd Street West	6180	7	5	2	0	0.62	0.97	2	2	1	0	1	0	1
Central Avenue & 48th Street West	3822	9	3	6	0	1.29	3.01	1	6	1	1	0	0	0
Central Avenue & 56th Street West	6292	13	5	8	0	1.13	2.52	2	8	2	0	0	0	1
Central Avenue & 64th Street West	7080	No Reported Crashes												
King Avenue & 48th Street West	8391	7	2	5	0	0.46	1.12	2	2	1	0	2	0	0
King Avenue & 56th Street West	8285	20	12	8	0	1.32	2.38	3	12	2	0	0	0	3
King Avenue & 64th Street West	8885	15	9	6	0	0.93	1.67	3	5	4	0	1	0	2
Hesper Road & 48th Street West	4292	7	4	3	0	0.89	1.65	1	3	1	0	0	0	2
Hesper Road & 56th Street West	4557	12	7	5	0	1.44	2.64	0	6	3	0	0	1	2
Hesper Road & 64th Street West	3440	1	1	0	0	0.16	0.16	0	0	0	0	0	0	1
Neibauer Road & 48th Street West	2293	12	5	7	0	2.87	6.22	2	9	1	0	0	0	0
Neibauer Road & 56th Street West	2370	8	4	4	0	1.85	3.70	0	4	4	0	0	0	0
Neibauer Road & 64th Street West	1723	No Reported Crashes												
TOTALS/AVERAGES	**6171**	**160**	**91**	**69**	**0**	**1.06**	**2.03**	**29**	**77**	**32**	**1**	**5**	**1**	**15**

[1] Daily Entering Volume (DEV) estimated from 2015 hourly counts

[2] Crashes reported from January 1, 2010 to December 31, 2014

[3] Crash and severity rates expressed as crashes per million vehicles entering (MVE) based on MDT severity factors

[4] "Other" crash types include sideswipes, backing vehicles, rollovers, animal-vehicle collisons and other

there were a substantial number of injury crashes reported (approximately 43.1 percent of crashes). There is not a rule-of-thumb threshold for severity rate that MDT utilizes to gauge concern for intersections. However, six (6) of the study area intersections exhibited severity rates above 2.50. Again it was the intersection of Neibauer Road & 56th Street West that had the highest severity rate at 6.22. The average severity rate for the study area was 2.03.

In terms of collision type, right-angle collisions were easily the most common, comprising almost 42 percent of the overall sample for the 5-year analysis period. This trend is not surprising given that the majority of the study area intersections are stop-controlled, right-angle intersections of high-speed rural facilities. Fixed-object (18.1 percent) and rear-end (15.6 percent) collisions were the next most prevalent. A couple of specific intersections contributed the majority of the fixed-object collision crashes. The fixed objects were most often utility poles or pedestals or in the case of the Grand Avenue & 54th Street West intersection, the masonry wall for Vintage Estates Subdivision. Again here, higher speeds are likely a contributing factor, as they are for the rear-end collisions which were generally clustered at higher-demand intersections that do not have auxiliary turn bays.

Intersection Traffic Operations

The Project Team performed Existing Conditions (2015) AM and PM peak hour intersection capacity calculations for all of the major study area intersections using Synchro, Version 8.0, the analysis methods for which are based on the HCM2010. The HCM2010 defines level of service (LOS) as "a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience." LOS is a qualitative measure of the performance of an intersection with values ranging from LOS A, indicating good operation and low vehicle delays, to LOS F, which indicates congestion and longer vehicle delays. The purpose of this exercise was to establish a baseline for intersection operations and to identify any intersections that are currently at or approaching failure during peak traffic periods. **Table 3** on the following page illustrates the results of the Existing Conditions (2015) intersection capacity analysis.

The City of Billings and the Montana Department of Transportation generally consider Level of Service (LOS) C to be the minimum threshold for acceptable intersection operations. For the Existing Conditions (2015) scenario, all of the study area intersections were calculated to operate at LOS C or better (for the intersection as a whole) during both peaks. Overall, there were four individual intersection approaches that exhibited sub-standard LOS conditions (LOS D or E), all during the AM peak hour. Projected maximum queue lengths were generally manageable for all study area intersection approaches, even those with substandard LOS results. **Appendix B** contains Existing Conditions (2015) intersection capacity calculation worksheets.

Corridor Traffic Operations

In addition to peak hour intersections analysis, the Project Team performed an evaluation of daily corridor LOS to evaluate corridor capacity concerns and the potential need for road widening or other measures to improve capacity. The analysis was based on the Existing Conditions (2015) AADT volumes that are illustrated in **Figure 2**.

Planning-level corridor LOS values were estimated by comparing Existing Conditions (2015) AADT volumes to assumed capacity levels to calculate a volume-to-capacity (V/C) ratio. **Table 4** (page 11) displays the LOS categories and a description of the associated traffic conditions. It was determined collectively with the City that Level of Service D would be the desired minimum threshold for corridor traffic operations for this study. **Table 5** (page 11) contains typical LOS thresholds based on V/C ratio and categorized by the functional classifications of the streets. **Figure 3** (page 12) illustrates the results of this analysis for the Existing Conditions (2015) scenario. All corridors in the study area were projected to operate at LOS C or better. Note that the color-coding scheme in **Figure 3** matches those in **Tables 4 and 5**.

TABLE 3. EXISTING CONDITIONS (2015) INTERSECTION CAPACITY CALCULATION RESULTS

Intersection	Approach	Existing (2015) AM Peak Avg Delay (s/veh)	AM Peak LOS	AM Peak 95th % Queue (veh)	PM Peak Avg Delay (s/veh)	PM Peak LOS	PM Peak 95th % Queue (veh)
Intersection Control		*Stop Controlled (EB & WB)*					
62nd Street West & Rimrock Road	EB	11.5	B	1	10.2	B	1
	WB	12.9	B	1	10.9	B	1
	NB	1.6	A	1	2.1	A	1
	SB	0.0	A	0	0.2	A	0
	Intersection	6.3	A	--	4.9	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
54th Street West & Rimrock Road	EB	0.0	A	0	0.3	A	0
	WB	1.2	A	1	0.8	A	1
	NB	14.4	B	1	14.0	B	1
	SB	*42.6*	*E*	*5*	23.7	C	2
	Intersection	9.1	A	--	5.1	A	--
Intersection Control		*Stop Controlled (SB)*					
62nd Street West & Grand Avenue	EB	1.7	A	1	2.5	A	1
	WB	0.0	A	0	0.0	A	0
	SB	14.5	B	2	12.8	B	1
	Intersection	6.5	A	--	4.1	A	--
Intersection Control		*Stop Controlled (NB)*					
64th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	5.2	A	1	3.5	A	1
	NB	10.5	B	1	11.0	B	1
	Intersection	4.6	A	--	5.5	A	--
Intersection Control		*Stop Controlled (SB)*					
56th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	1.9	A	1	1.5	A	1
	NB	13.8	B	1	15.7	C	2
	SB	15.1	C	1	0.0	A	0
	Intersection	2.4	A	--	4.4	A	--
Intersection Control		*Stop Controlled (SB)*					
54th Street West & Grand Avenue	EB	0.7	A	1	1.3	A	1
	WB	0.0	A	0	0.0	A	0
	SB	19.1	C	3	15.4	C	2
	Intersection	5.2	A	--	3.3	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	1.4	A	1	1.7	A	1
	NB	19.0	C	2	19.6	C	2
	SB	0.0	A	0	21.9	C	1
	Intersection	3.1	A	--	3.9	A	--
Intersection Control		*Stop Controlled (WB)*					
64th Street West & Central Avenue	WB	10.9	B	1	10.7	B	1
	NB	0.0	A	0	0.0	A	0
	SB	1.1	A	1	0.5	A	0
	Intersection	2.0	A	--	2.0	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
56th Street West & Central Avenue	EB	0.2	A	0	0.7	A	0
	WB	2.4	A	1	1.5	A	1
	NB	11.7	B	1	11.8	B	1
	SB	15.2	C	2	14.6	B	2
	Intersection	7.3	A	--	7.4	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Central Avenue	EB	0.3	A	0	0.4	A	0
	WB	0.6	A	0	0.8	A	1
	NB	12.7	B	1	14.5	B	2
	SB	20.4	C	3	14.4	B	1
	Intersection	7.4	A	--	5.5	A	--

Intersection	Approach	Existing (2015) AM Peak Avg Delay (s/veh)	AM Peak LOS	AM Peak 96th % Queue (veh)	PM Peak Avg Delay (s/veh)	PM Peak LOS	PM Peak 96th % Queue (veh)
Intersection Control		*Stop Controlled (NB & SB)*					
64th Street West & King Avenue West	EB	1.9	A	1	2.2	A	1
	WB	2.3	A	1	0.7	A	1
	NB	*32.3*	*D*	*4*	19.8	C	2
	SB	*25.7*	*D*	*3*	18.7	C	3
	Intersection	11.0	B	--	6.8	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
56th Street West & King Avenue West	EB	0.2	A	0	0.4	A	0
	WB	0.9	A	1	0.3	A	0
	NB	16.4	C	1	21.8	C	3
	SB	21.2	C	3	19.2	C	2
	Intersection	6.5	A	--	6.8	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & King Avenue West	EB	0.8	A	1	0.7	A	1
	WB	0.2	A	0	0.3	A	0
	NB	15.8	C	1	18.8	C	2
	SB	21.4	C	2	19.8	C	2
	Intersection	5.1	A	--	4.7	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
64th Street West & Hesper Road	EB	17.8	C	3	10.4	B	1
	WB	11.0	B	1	10.1	B	1
	NB	0.0	A	0	0.3	A	0
	SB	4.2	A	1	2.4	A	1
	Intersection	9.6	A	--	6.5	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
56th Street West & Hesper Road	EB	15.5	C	2	11.1	B	1
	WB	14.8	B	2	11.7	B	1
	NB	1.7	A	1	0.7	A	0
	SB	2.1	A	1	1.1	A	0
	Intersection	9.3	A	--	6.9	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Hesper Road	EB	0.7	A	0	0.9	A	0
	WB	0.5	A	0	0.4	A	0
	NB	10.7	B	1	11.7	B	1
	SB	12.5	B	1	11.4	B	1
	Intersection	4.8	A	--	2.8	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
64th Street West & Neibauer Road	EB	10.5	B	1	9.7	A	1
	WB	9.9	A	1	9.7	A	1
	NB	0.0	A	0	0.0	A	0
	SB	1.6	A	0	0.0	A	0
	Intersection	6.4	A	--	4.6	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
56th Street West & Neibauer Road	EB	10.6	B	1	10.3	B	1
	WB	10.8	B	1	10.3	B	1
	NB	0.5	A	0	0.2	A	0
	SB	1.0	A	0	1.4	A	0
	Intersection	4.5	A	--	4.7	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Neibauer Road	EB	0.1	A	0	0.2	A	0
	WB	1.3	A	0	2.4	A	1
	NB	9.3	A	1	10.1	B	1
	SB	9.8	A	1	11.1	B	1
	Intersection	3.4	A	--	4.3	A	--

TABLE 4. LEVEL OF SERVICE (LOS) CAPACITY ANALYSIS DESCRIPTIONS

	Level of Service	Traffic Flow	Description
Uncongested	A		• Light traffic • Free flow speeds
	B		• Slightly increased traffic levels • Still free flow speeds
	C		• Approaching moderate congestion levels • Speeds near free flow
Congesting	D		• Speeds reduced • Lane changes restricted due to traffic
Congested	E		• Congestion • Irregular traffic flow
	F		• Road at capacity • Gridlock with frequent stops

TABLE 5. LEVEL OF SERVICE (LOS) THRESHOLDS BY FUNCTIONAL CLASSIFICATION

LOS Threshold	A-C	D	E	F
Arterials/Collectors	*Upper Limit V/C Cutpoints*			
	0.58	0.75	0.92	>0.92
Principal Arterial	*(Daily Capacity Per Lane - 9000)*			
2 Lane	10,440	13,500	16,560	≥18,000
3 Lane	11,480	14,850	18,220	≥19,800
4 Lane	20,880	27,000	33,120	≥36,000
Minor Arterial	*(Daily Capacity Per Lane - 7000)*			
2 Lane	8120	10,500	12,880	≥14,000
3 Lane	8930	11,550	14,170	≥15,400
4 Lane	16,240	21,000	25,760	≥28,000
Collector	*(Daily Capacity Per Lane - 6000)*			
2 Lane	6960	9000	11,040	≥12,000
3 Lane	7660	9,900	12,140	≥13,200
4 Lane	13,920	18,000	22,080	≥24,000

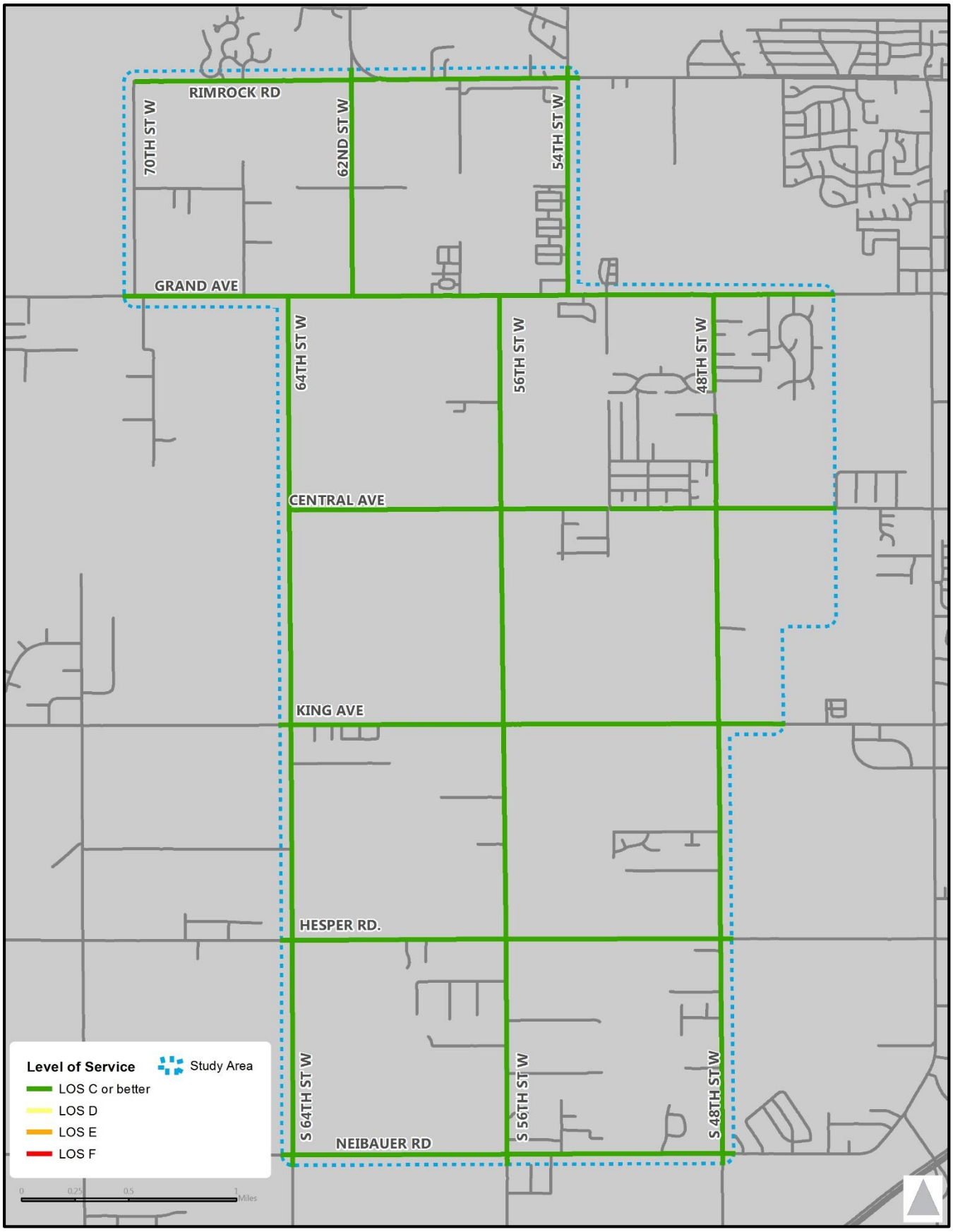


FIGURE 3. EXISTING CONDITIONS (2015) CORRIDOR LEVEL OF SERVICE (LOS)

Active Transportation Facilities

The term "active transportation" usually refers to walking and bicycle trips, but can include many forms of transportation powered by human energy, such as skateboards, kick scooters, or rollerblades. Active transportation trips offer an affordable and healthy way to access employment, schools, retail centers, or simply a way to recreate. Similar to the roadway networks that connect destinations for automobiles, active transportation networks get people from point A to point B on trails, quiet neighborhood streets, side paths, and bike lanes.

Figure 4 on the following page illustrates the existing network of active transportation facilities in the study area. Except for sidewalks internal to master-planned communities, the availability of sidewalks, side paths, trails, or bike lanes in the study area is very limited. This is primarily due to the undeveloped and agricultural nature of the study area, which is typical of rural areas. Towards the east side of the study area, development becomes denser approaching the urban core of the City of Billings. In these established urban areas (many of which are just outside the study area boundary), active transportation facilities are more prevalent. High quality paths on the eastern edge of the study area include the Rimrock Road Trail, Big Ditch Trail, Shiloh Road Trail, King Avenue West Trail, Zimmerman Trail, Gabel Road Trail, and the Olympic & Heritage Sub Trails. Additionally, there are striped bike lanes on Monad Road, and sidewalks are typical.

While there are nearby low-stress facilities, the study area generally lacks connectivity to these facilities. The existing roads that connect are arterials with very narrow shoulders and speeds limits between 45 to 60 MPH. The sidewalk and trail facilities that exist in and around subdivisions are isolated from connection to the Billings network.

What Type of Bike Rider Are You?

To be effective, Active Transportation systems should be designed to provide a network of facilities that accommodate a diversity of equipment and skill levels. For instance, it is not unusual to have side paths in a corridor with bike lanes; experienced adult riders may choose to ride at higher speeds adjacent to vehicle travel lanes, whereas a child riding to school may feel more comfortable on a path or sidewalk separated from traffic.

A commonly-cited study from the Portland Bureau of Transportation[1] developed four basic categories of cyclists: The Strong and the Fearless, The Enthused and Confident, The Interested but Concerned, and No Way No How. **Figure 5** on page 15 depicts the typical population split for these four categories and gives a description for reach. The categories are particularly useful when characterizing how different types of bikeways influence a rider's level of comfort. The percent of population breakdown for the four typologies indicates that the majority of cyclists (67 percent) fall into the Enthused and Confident and Interested but Concerned, suggesting that there is potential to increase cycling by investing in a low-stress bikeway system that is more comfortable to a wide range of people. While the percentage breakdown of four types of cyclists in Billings may not be exactly the same, the concept is a useful one for understanding aspects of a bike network that would increase cycling.

Level of Traffic Stress

Level of Traffic Stress (LTS) is a modern methodology developed by Mekuria, Furth and Nixon (2012) that examines the characteristics of city streets and how various aspects can cause stress on bicyclists and affect where they are likely to ride. LTS methodology classifies roadway segments into one of four levels of traffic stress, which are termed as LTS1 through LTS4. Groups of cyclists are categorized by how much stress they will tolerate in different environments:

[1] Geller, R. "Four Types of Cyclists," Portland Bureau of Transportation, Portland, OR, 2006. http://www.portlandoregon.gov/transportation/article/264746, Accessed March 2016.

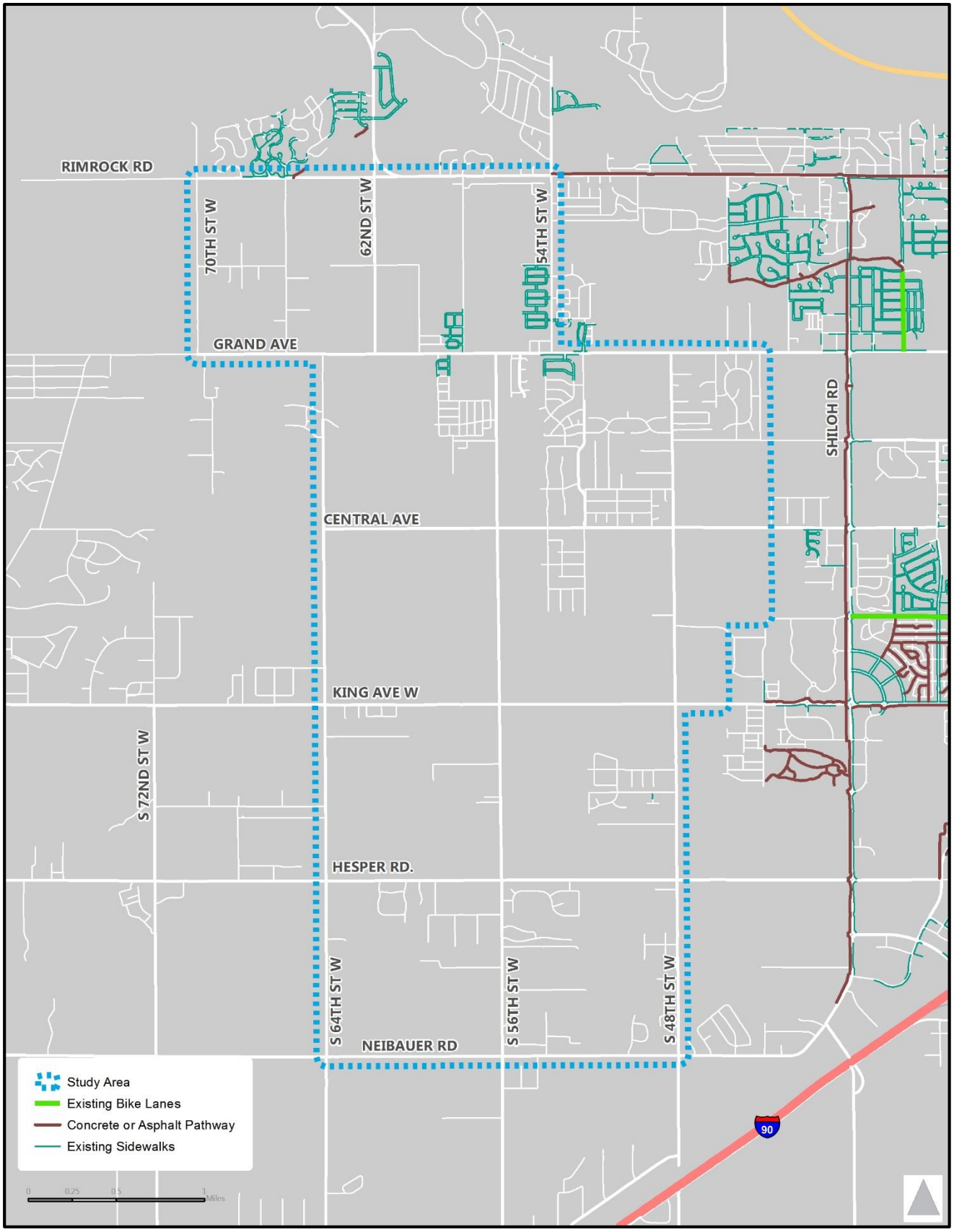


FIGURE 4. EXISTING STUDY AREA ACTIVE TRANSPORTATION FACILITIES

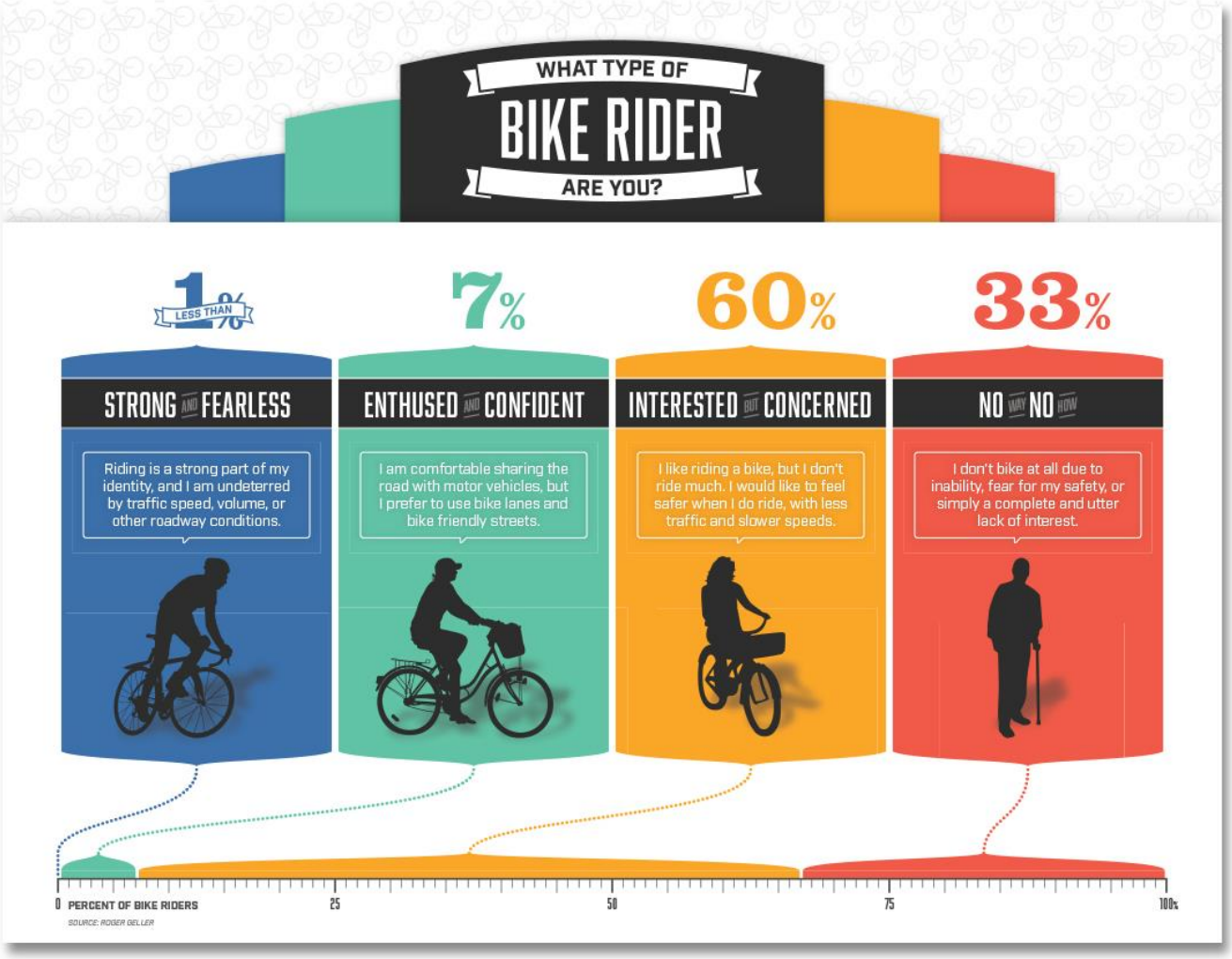


FIGURE 5 – TYPES OF BICYCLE RIDERS

- LTS1: most children can tolerate and feel safe while bicycling.
- LTS2: the mainstream adult population will tolerate and feel safe while bicycling
- LTS3: cyclists who are considered "enthused and confident," but still prefer having their own dedicated space for riding, will tolerate and feel safe while bicycling.
- LTS4: a level tolerated only by those characterized as "strong and fearless", which comprises just 0.5 percent of the population. The high-stress streets that LTS4 groups will ride are those with high speed limits, multiple travel lanes, limited or non-existent bike lanes and signage, and large distances to cross at intersections.

Table 6 on the following page presents the variables used to develop LTS scores for the roadway network in the study area. LTS works on the "weakest link" principle, where the traffic stress for a given corridor, intersection approach or crossing is dictated by the most stressful portion. This means a full segment receives the score of its lowest-scored portion. For example, a cross-town ride could have large portions of LTS1 and LTS2, but just one section of LTS3 would present a barrier. Only cyclists that could tolerate LTS3 would ride the entire route. So, LTS3 becomes the score for that route. LTS analysis was conducted only for minor arterials and arterials in the study area because there is limited connectivity for local/collector streets, requiring most trips to use the arterial system. **Figure 6** on page 17 illustrates the LTS rank for roads in the study area.

TABLE 6. LEVEL OF TRAFFIC STRESS (LTS) VARIABLES

Level of Traffic Stress (LTS) Variable	Data Source
Direction	Derived
Mode separation (mixed flow or bicycle lane)	Bike trails, field review
Is this a residential street?	Calculate based on land use
Adjacent parking	Field review
Lanes in analysis direction	Have from centerline file
Is there a median?	Field review
Is there a center line?	Field review
What is the prevailing speed? (Use speed limit if prevailing speed not available)	Speed limit from centerline file
Bike Lane + Parking Width (if bike lane present)	Field review
How often do bike lane blockages occur?	Estimate

This analysis suggests that virtually all the arterials in the study area are categorized as LTS4. The most significant elements of the physical roadway cross section contributing to the stressful cycling environment are vehicle speeds above 35 MPH and a lack of bike lanes or rideable shoulders.

Committed/Planned Projects

A variety of projects that are intended to improve multi-modal operations and/or safety are committed via the capital improvement plans for the City, County or MDT or are being tentatively planned for the near future. The following paragraphs provide descriptions of committed or planned projects as they are known at this time.

Street & Intersection Projects

Two projects are currently being designed under MDT administration that are specifically intended to improve safety conditions for the intersections of Central Avenue & 56th Street West and King Avenue West & 56th Street West. Both of those intersections will be reconstructed as single-lane roundabouts, and in both cases the projects were programmed in response to concerns about safety and the crash histories at those intersections. The current schedules for those projects would have the King Avenue-56th Street West roundabout starting construction in 2016 and the Central Avenue-56th Street West roundabout starting construction in 2017. Although both projects were initiated for safety reasons, the proposed improvements will also greatly increase traffic volume capacities for those intersections. The design years for the projects are 2035 (King) and 2036 (Central). It should be noted that crosswalks and sidewalk connections are not currently planned for construction at either the King Avenue West/56th Street West or Central Avenue/56th Street West roundabouts due to right-of-way constraints at the intersections. The roundabouts will be constructed with a removable sections of raised median so as to facilitate a retrofitting of crosswalks without complete reconstruction of the medians.

The City of Billings is in contract negotiations with Sanderson Stewart for design and construction services on the W.O. 16-09 Grand Avenue – 48th to 58th project, which is programmed for construction in 2017. That project will widen Grand Avenue to a 3-lane section from approximately 52nd Street West to 58th Street West. It will also construct eastbound and westbound auxiliary left-turn bays at the Grand Avenue-48th Street West intersection and a traffic signal or roundabout at the Grand Avenue-54th Street West intersection.

In addition to the committed street and intersection projects referenced above, it is tentatively planned that a traffic signal will be installed at the intersection of Rimrock Road and 54th Street West within the next couple years (per the City of Billings).

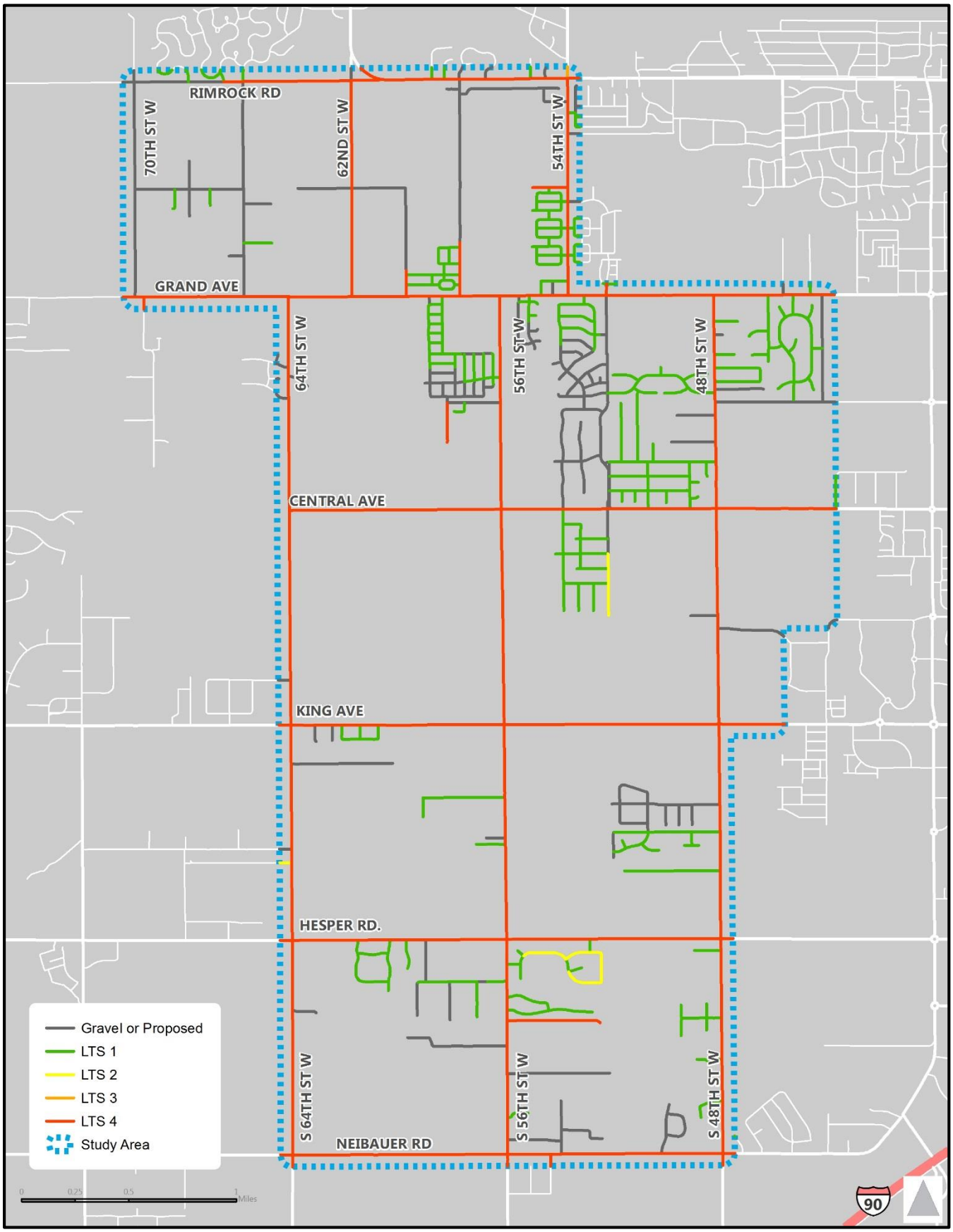


FIGURE 6. EXISTING CONDITIONS (2015) LEVEL OF TRAFFIC STRESS (LTS)

The Project Team is not aware of any other additional street or intersection improvement projects within or directly adjacent to the study area that are currently committed or even planned at this point in time.

Bicycle & Pedestrian Facility Projects

The above-referenced City of Billings W.O. 16-09 project is planned to construct a network of sidewalks and multi-use paths that will, at a minimum, provide pedestrian and bicycle connectivity along Grand Avenue from 52nd Street West to the west boundary of Trails West Subdivision and along 54th Street West from Grand Avenue to Rimrock Road. The ultimate configuration (and mixture of narrower sidewalk versus wider multi-use path) is yet to be finally determined and will depend somewhat on the availability of right-of-way or easement across a few key privately-held properties. The general intent of this network of bicycle and pedestrian facilities is to provide active transportation interconnectivity amongst area residential developments, Ben Steele Middle School and other neighborhood facilities.

Depending upon the final configuration of the system along 54th Street West, a mid-block pedestrian crossing with rectangular rapid flashing beacons (RRFBs) may be constructed at the boundary between Cottonwood Grove Subdivision and Cottonwood Park. Also, the City of Billings W.O. 16-09 project will install a High-Intensity Activated Crosswalk (HAWK) signal on Grand Avenue mid-block between 56th Street West and 58th Street West expressly for the purpose of getting pedestrians across Grand Avenue at the main entrance to Ben Steele Middle School. At this time, the Project Team is not aware of any other active transportation improvement projects that are committed or planned within the boundaries of the study area.

LAND DEVELOPMENT FORECASTING

3

The planned approach for analyzing the horizon year scenarios for this study was to work cooperatively with the MDT Statewide and Urban Planning Department to develop horizon year (2035) Transcad transportation model runs to projected future land development scenarios within the study area. MDT owns and maintains the transportation model for the Billings area, so its personnel were charged with creating the model runs for our study and it was the consultant team's responsibility to determine the input parameters that would most accurately represent the land development scenarios that were agreed upon by the Project Oversight Committee for analysis. The following paragraphs describe how those scenarios were planned and how the model input parameters were calculated.

Land Development Scenarios

Through discussions at the initial meetings of the project Steering Committee it was determined that two (2) land develop scenarios would be modeled and analyzed for the purposes of this study. Scenario 1 would represent an assumed progression of land development in the study area that was more conservatively consistent with recent historical trends in this area. Annexation (and thereby land development at densities consistent with City of Billings lot size requirements) would be presumed to occur only in the areas shown as "in the red" on the current version of the City's annexation planning map (see **Figure 1**). The areas not in the red (approximately 900 acres) would be presumed to develop with densities consistent with Montana Department of Environmental Quality (DEQ) requirements for lot size based on private water well and septic systems. Scenario 2 was more aggressively planned to represent an expansion of annexation that included the areas identified in yellow-orange on the City's annexation planning map (See **Figure 1**) in addition to the areas that are shown "in the red." That distinction increased the raw land area projected for City-based development densities by approximately 950 acres (total area of approximately 1850 acres).

In addition to the distinctions between the two scenarios that are based on presumed annexations, it was agreed that Scenario 1 would be based on a more conservative assumption of overall raw land development density, and that the assumptions for Scenario 2 would be more aggressive in terms of density of development. Since the undeveloped properties in the study area are owned by a multitude of different individuals, families and corporations, the Project Team relied heavily on the expertise of Mr. Bob Sanderson to project the raw land development densities for both scenarios. Mr. Sanderson is one of the founders of Sanderson Stewart and has more than 40 years of experience with land development in Billings area, but he has also resided

at a rural residence located just outside the study area boundary for a similar timeframe. Mr. Sanderson knows this area very well and he also has relationships with several of the property owners. The Project Team worked with Mr. Sanderson to evaluate each and every parcel of land in the study area to project land development probabilities (percentages) for both scenarios. Those projections were then converted to residential dwelling units, retail employees and non-retail employees so that the projections could be utilized as inputs for the Transcad models for each scenario. The determination of where residential vs. commercial development would occur was based on the current adopted zoning scheme and discussions between the Project Team and the Steering Committee about where commercial nodes might be most likely to develop in the future.

The residential dwelling unit conversions were made using absorption rates for housing derived from data for recent (past 10 years) residential subdivisions developed in and around the study area. Separate rates were derived for subdivisions developed in the County vs. within City Limits, since lot sizes and subdivision covenants are generally very different for County and City subdivisions. The commercial employee projections were calculated using Institute of Transportation Engineers (ITE) *Trip Generation* rates for retail and industrial employees and actual employee projection numbers for Ben Steele Middle School and future potential elementary and high schools based on discussions with School District #2.

To differentiate between Scenarios 1 and 2 from a land development sprawl standpoint, the projected percentage of developable area for Scenario 1 (as calculated by Mr. Sanderson) was doubled for Scenario 2. If the Scenario 1 percentage was 50 percent or greater, the Scenario 2 percentage was capped at 100 percent. As an additional differentiation, it was presumed through discussions with School District #2 that the only likely school opening within the study area for Scenario 1 would be Ben Steele Middle School. For Scenario 2, it as additionally assumed that new elementary and high schools would also be in operation.

Growth Projections

Based on the detailed forecasting of land development densities, types and locations, the Project Team performed some simple exponential growth projections and presented that data to the Steering Committee for the purpose of building consensus on the anticipated levels of growth for the land development scenarios. **Table 7** (below) and **Table 8** (next page) present the results of the residential and commercial growth projections along with census-based projections for population growth.

TABLE 7. SUMMARY OF RESIDENTIAL GROWTH PROJECTIONS

Scenario	2014		2035		Delta (Horizon Year)		Population Growth
	Homes[1]	Population[2]	Homes	Population	Homes	Population	
Existing Conditions	1,093	2,459	-	-	-	-	-
Scenario 1	-	-	9,269	20,855	8,176	18,396	10.7%
Scenario 2	-	-	19,334	43,502	18,241	41,043	14.7%
Delta (Scenario)	**-**	**-**	***10,065***	***22,647***	***10,065***	***22,647***	***3.9%***

[1] Calculated using 4.5% total growth from 2010 to 2014 (from US census data)

[2] Calculated using rate of 2.25 persons/household (from 2010 US census data)

TABLE 8. SUMMARY OF COMMERCIAL GROWTH PROJECTIONS

Scenario	Employees						Annualized Growth	
	2010		2035		Delta (Horizon Year)			
	Retail[1]	Non-Retail[1]	Retail	Non-Retail	Retail	Non-Retail	Retail	Non-Retail
Existing Conditions	66	469	-	-	-	-	-	-
Scenario 1	-	-	187	757	121	288	4.09%	1.86%
Scenario 2	-	-	248	1,146	182	677	5.22%	3.50%
Delta (Scenario)	**-**	**-**	***61***	***389***	***61***	***389***	***1.14%***	***1.64%***

[1] From 2010 MDT Transcad model for Billings

The Project Team presented the preliminary growth projections to the Steering Committee at a meeting in November of 2015. The group reviewed the information, particularly as it related to ongoing efforts by the MPO to update the Billings/Yellowstone County Growth Policy (separate project). The MPO reported a Growth Policy target range for City-wide population growth of 40,000-70,000 people with a mid-range estimate of 55,000 new residents by 2035. The expectation is that the overall growth will be spread out into a handful of areas around Billings, but that the West End region that is largely included in our study area is likely to account for a significant percentage of the total growth. After reviewing the initial projections, the Steering Committee agreed that the targeted growth for the West End Multi-Modal Planning Study was consistent with the range of overall growth (in terms of population and employees) from the Growth Policy project. The Project Team was given the go-ahead to provide model inputs to MDT based on the growth projections and proceed with the travel demand modeling effort on that basis.

TRAVEL DEMAND MODELING

4

Travel Demand Model Background

At the inception of this planning study, the original intent was to utilize the Yellowstone County travel demand model to develop future year traffic volume forecasts. The regional model is maintained by the Montana Department of Transportation (MDT), and includes traffic analysis zones (TAZs) and roadways in the study area. MDT does not allow consultants to run the model directly, and model documentation was not available; as such, the Project Team has limited knowledge of the assumptions, equations, and overall validation of the model. This chapter summarizes efforts made to use the travel model and describes assumptions ultimately used for the calculation of the traffic projections for this study.

Model Scenarios & Process

Initial Reasonability Checks - Base Year Validation

Model validation is the term used to describe model performance in terms of how closely the model's output matches existing travel data in the base year. Traditionally, most model validation guidelines have focused on the performance of the trip assignment step in accurately assigning trips to the street network. To determine the reasonableness of the Yellowstone County travel model in the project study area, daily volume results from the 2010 base year model runs were examined. Thirty daily traffic counts from 2014-2015 were compared to the base year model estimates; key validation measures are summarized below:

- At least 75 percent of the roadway links for which counts are available should be within the maximum desirable deviation, which ranges from approximately 15 to 60 percent depending on total volume (the larger the volume, the less deviation is permitted).

  Result: Model volumes were compared to existing traffic counts at thirty individual count sites for daily validation. Of those, 25 were within allowable deviation which meets the 75 percent requirement.

- The two-way sum of the volumes on all roadway links for which counts are available should be within 10 percent of the counts. Also called model-to-count ratio.

Result: The default model estimated 72 percent of volume indicated by counts, which is outside the allowable threshold.

Roadway Network Modifications - Calibration

Model calibration is the term used to describe the process by which the coefficients and inputs of the model may be adjusted to better replicate travel behavior and traffic volumes. Since the Project Team had limited access to the model to review key parameters such as trip generation rates, modifications to the roadway network were the primary calibration mechanism after verifying the base year land use was reasonable relative to Census population data. In an attempt to improve model validation, roadway characteristics were reviewed to ensure that the link attributes reflected local operating conditions. During this review, link characteristics such as speed, functional class, and capacity were modified to better reflect conditions on the ground. TAZ connectors were also modified to produce more realistic neighborhood access locations.

Future Land Use Scenarios

Land use data is one of the primary inputs to the Yellowstone County model, and this data is instrumental in estimating trip generation. The model's primary source of land use data is household and employment information. Households are categorized in terms of total dwelling units. The employment data is aggregated into two categories: retail employment, and non-retail employment. The future land use scenarios discussed in the previous chapter were summarized in terms of model-compatible inputs at the TAZ geography.

Model Run Results

Table 9 below summarizes the final model results in terms of annualized growth rates on key roadways in the study area. The annualized growth rates in excess of 6.0 percent were considered to be too high even for the more aggressive land development projection scenario. The application of the rates at that level or higher resulted in traffic volume projections that the Project Team and ultimately the Steering Committee found to be unrealistic for this market under any reasonable growth scenario. In general however, the geographic dispersion of growth as portrayed by the model was found to be relatively consistent with expected growth patterns. As such, the decision was made to manually override the model run results in terms of magnitude of traffic volume projections, but to utilize the model results as a basis for development of traffic growth projections (summarized in the following section).

Street	2035 Scenario 1 Annualized Growth Rate	2035 Scenario 2 Annualized Growth Rate
Rimrock Road	5.33%	7.31%
Grand Avenue	5.60%	6.94%
Central Avenue	8.14%	10.49%
King Avenue West	2.62%	3.59%
Hesper Road	2.58%	4.02%
Neibauer Road	3.51%	5.35%
48th Street West	2.83%	3.89%
54th Street West	6.29%	6.91%
56th Street West	7.47%	8.77%
62nd Street West	4.24%	4.35%
64th Street West	4.42%	6.80%

TABLE 9. TRAVEL DEMAND MODEL RESULTS – AVERAGE ANNUALIZED CORRIDOR GROWTH

Horizon Year (2035) Traffic Projections

In order to temper the overall magnitude of the Horizon Year (2035) traffic projections relative to the output volumes from the travel demand model, the Project Team evaluated a series of annualized growth rates for each scenario that were blended across the study area so as to project a higher intensity of growth in the northeast portion of the study area and lesser growth as you move south and west. The blended approach was found to generally be consistent with how the travel demand model was distributing traffic for the Horizon Year (2035) model runs. An iterative process was utilized to test different growth rate schemes using design year projections from the MDT Central Avenue & 56th Street West and King Avenue & 56th Street West intersection reconstruction projects to calibrate the projections.

Ultimately, the Project Team settled on a pair of blended schemes whereby the annualized growth rate percentages for Scenario 1 ranged from 2.7 percent to 4.5 percent (average of 3.5 percent) and the growth percentages for Scenario 2 ranged from 3.5 percent to 5.9 percent (average of 4.6 percent). This approach and the resulting peak hour turning movement and annual average daily traffic (AADT) volume projections were presented to the Steering Committee for review and approval in March of 2016. After a thorough discussion of the pros and cons, the approach was approved and the Project Team moved forward with final adjustments to the projections. Since the simplified application of growth rates directly to existing turning movement volumes does not take into account individual movement capacity thresholds or other factors that could limit growth for specific movements, manual adjustments were made in certain cases based on the professional judgement of the Project Team. **Figure 7** and **Figure 8** on (pages 25 to 26) illustrate the projected AM and PM peak hour turning movement and AADT volumes for Scenarios 1 and 2, respectively.

The resulting increases in traffic volumes were substantial across the board. The average corridor AADTs for Scenario 1 (2035) increased when compared to Existing Conditions (2015) by approximately 122.9 percent. The average AADTs for Scenario two represented an increase over existing of approximately 177.2 percent. The projected magnitude of increase for peak hour turning movement volumes was similar.

Active Transportation Modeling

Although there is a growing interest in modeling active transportation, most travel demand models are sensitive only to automobile and transit trips. Forecasting tools have traditionally excluded pedestrian and bicycle activity. One key complication to modeling non-auto modes is the scale at which bicycle and pedestrian trip are made. Since most walk trips are less than three miles, most travel model networks and traffic analysis zone (TAZ) structures simply lack adequate resolution to develop reasonable trip distribution and assignment estimates.

Rather than try to forecast the magnitude of bicycle and pedestrian activity, the Project Team implemented a methodology that determines the relative level of demand for walking and biking in the study area. The Latent Demand Model uses economic, demographic, land use, and built environment factors to identify "hot spots" for active transportation, and provides a logical analysis framework to prioritize attention and investment.

Latent Demand Variables

Active transportation – bicycling and walking – are dependent on a variety of factors. This analysis uses a combination of existing and newly developed GIS data correlated with active transportation. The weighting of these variables is, in part, based on results of previous research, but is also tailored to this project based on planning and engineering judgment. The variables, as well as the corresponding scoring criteria are provided in **Table 10** and **Table 11** on page 27.

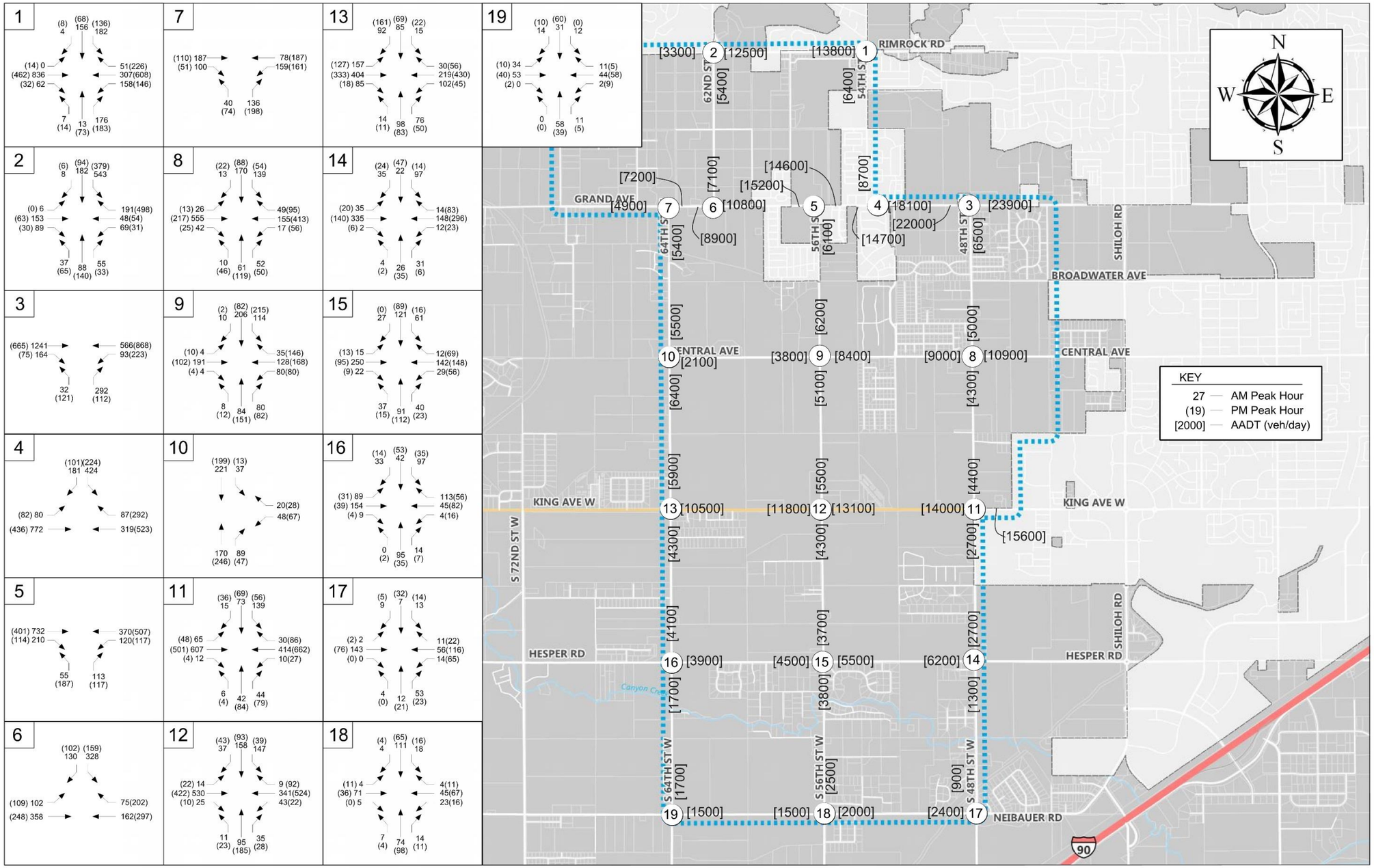


FIGURE 7 – SCENARIO 1 (2035) TRAFFIC VOLUME PROJECTIONS

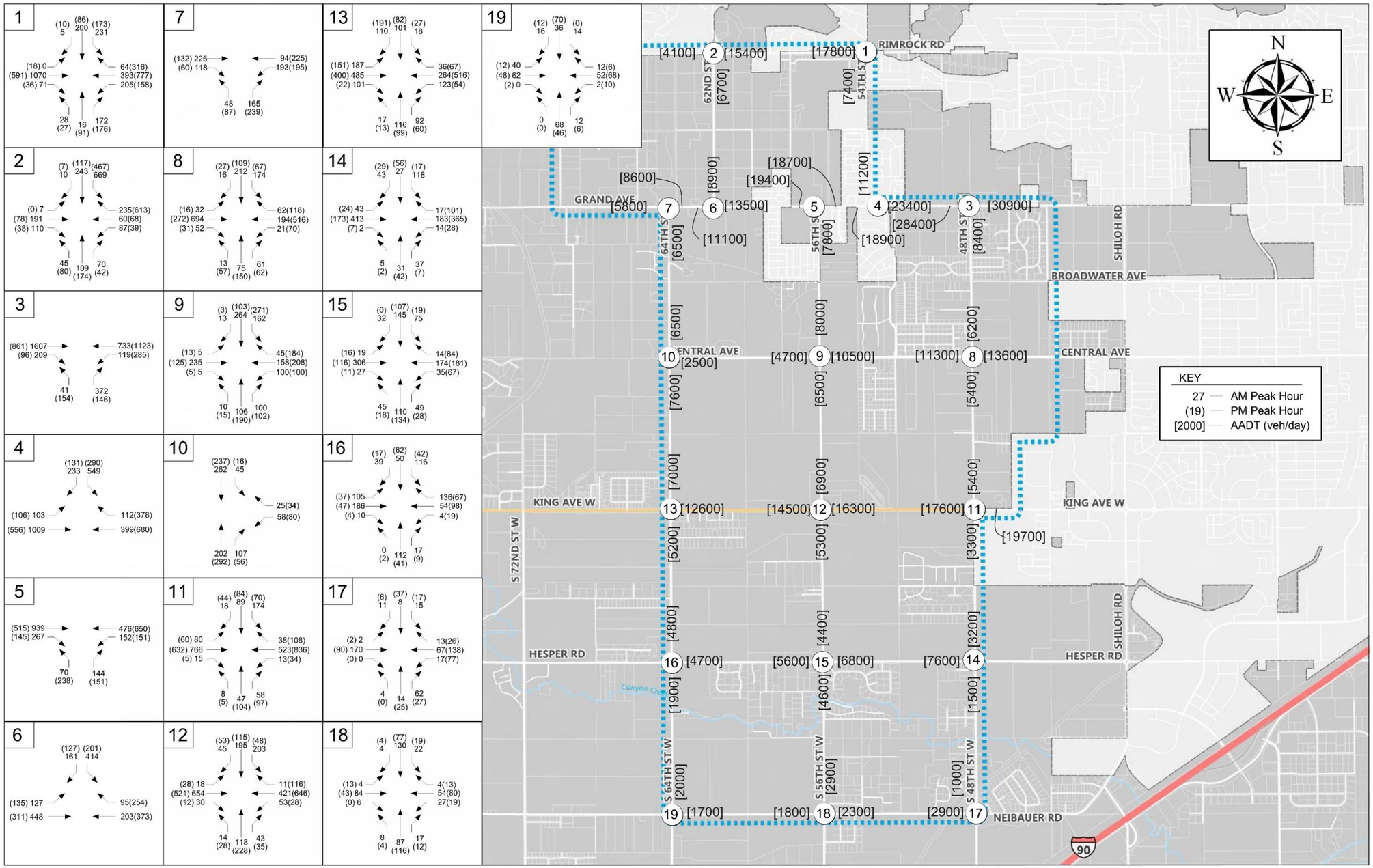


FIGURE 8 – SCENARIO 2 (2035) TRAFFIC VOLUME PROJECTIONS

TABLES 10 & 11. LATENT ACTIVE TRANSPORTATION DEMAND VARIABLES & SCORING

Built Environment Factors	
Dwelling Unity Density (Dwelling Units/Acre)	*Score (12 Maximum)*
0.0 - 0.4	0.0
0.5 - 1.3	2.4
1.4 - 2.3	4.8
2.4 - 4.1	7.2
4.2 - 6.7	9.6
> 6.7	12.0
Employment Density (Jobs/Acre)	*Score (12 Maximum)*
0.0 - 0.1	0.0
0.2 - 0.3	2.4
0.4 - 0.6	4.8
0.7 - 1.0	7.2
1.1 - 1.9	9.6
> 1.9	12.0
Land Use Mix (Jobs/Dwelling Units)	*Score (12 Maximum)*
0.0 - 0.2	0.0
0.3 - 0.6	1.5
0.7 - 1.5	3.0
1.6 - 2.5	4.5
> 2.5	6.0

Proximity Factors	
Schools (Proximity in Feet)	*Score (25 Maximum)*
0 - 660	25
661 - 1320	23.75
1231 - 2640	21.25
2641 - 3960	12.5
3961 - 5280	2.5
> 5280	0
Parks (Proximity in Feet)	*Score (20 Maximum)*
0 - 660	20
661 - 1320	15
1231 - 2640	10
2641 - 3960	5
> 3960	0
Retail (Proximity in Feet)	*Score (10 Maximum)*
0	10
1 - 2640	5
> 2640	0
Trails (Proximity in Feet)	*Score (15 Maximum)*
0 - 1320	15
1321 - 2640	7.5
> 2640	0

HORIZON YEAR (2035) OPERATIONS ANALYSIS

5

Once the Horizon Year (2035) traffic projections were approved by the Steering Committee for both scenarios, the Project Team was able to proceed with analyses to determine where in the study area that deficiencies would be most likely to occur in terms of both operations and safety. The following paragraphs describe how those considerations were evaluated for the vehicular environment, as well as for the existing system of bicycle and pedestrian facilities.

Intersection Traffic Operations

The Project Team performed Horizon Year (2035) AM and PM peak hour intersection capacity calculations for all of the major study area intersection using Synchro, Version 8.0, for stop-controlled and signalized intersections and Rodel, Version 1.88, for roundabouts. Capacity calculations were performed for Scenarios 1 and 2. Each volume scenario was first analyzed for a "no-build" scenario using existing intersection traffic control and lane configurations, except in the cases of the Central Avenue and King Avenue intersections with 56th Street West, where single-lane roundabouts are being designed and planned for construction in the near future (committed projects). The purpose of this exercise was to establish future intersection operation conditions without improvements in order to identify deficiencies. **Table 12** and **Table 13** (pages 29 to 30) illustrate the results of the Scenario 1 and Scenario 2 Horizon Year (2035) intersection capacity analyses for the "no-build" condition. Detailed intersection capacity calculation worksheets for the Horizon Year (2035) scenarios can be found in **Appendix C**.

For the purposes of this study, a LOS C metric for an intersection (not individual approaches) was considered to be the minimum acceptable threshold for requiring improvements. For the Scenario 1 (2035) no build condition, nine (9) intersections were projected to fall below LOS C during the AM peak hour and eight (8) intersections were projected to fall below LOS C during the PM peak hour. Of the intersections that sustained acceptable metrics, there were two (64th Street West/Hesper Road and 56th Street West/Hesper Road) that exhibited LOS D conditions on one or more individual approaches during the AM peak only. However, projected maximum queue lengths for these approaches were projected to be relative minor. The following intersections were projected to fall below LOS C during one or both peak hours as noted:

- 62nd Street West & Rimrock Road (AM Peak and PM Peak)
- 54th Street West & Rimrock Road (AM Peak and PM Peak)
- 62nd Street West & Grand Avenue (AM Peak)

TABLE 12. SCENARIO 1 (2035) NO BUILD CAPACITY CALCULATION RESULTS

Intersection	Approach	Scenario 1 (2035) - No Build					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Stop Controlled (EB & WB)*					
62nd Street West & Rimrock Road	EB	--	*F*	--	*71.1*	*F*	*4*
	WB	--	*F*	--	*459.7*	*F*	*45*
	NB	1.6	A	1	2.1	A	1
	SB	6.9	A	3	6.9	A	2
	Intersection	--	*F*	--	*199.9*	*F*	--
Intersection Control		*Stop Controlled (NB & SB)*					
54th Street West & Rimrock Road	EB	0.0	A	0	0.3	A	1
	WB	3.9	A	2	1.4	A	1
	NB	--	*F*	--	--	*F*	--
	SB	*7661.1*	*F*	*48*	--	*F*	--
	Intersection	--	*F*	--	--	*F*	--
Intersection Control		*Stop Controlled (SB)*					
62nd Street West & Grand Avenue	EB	1.8	A	1	2.8	A	1
	WB	0.0	A	0	0.0	A	0
	SB	*228.9*	*F*	*26*	*66.8*	*F*	*9*
	Intersection	*91.5*	*F*	--	16.5	C	--
Intersection Control		*Stop Controlled (NB)*					
64th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	5.6	A	1	3.7	A	1
	NB	13.9	B	2	16.1	C	3
	Intersection	5.4	A	--	7.3	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
56th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	3.0	A	1	1.8	A	1
	NB	*263.7*	*F*	*12*	*555.0*	*F*	*27*
	Intersection	*28.6*	*D*	--	*117.7*	*F*	--
Intersection Control		*Stop Controlled (SB)*					
54th Street West & Grand Avenue	EB	0.9	A	1	1.7	A	1
	WB	0.0	A	0	0.0	A	0
	SB	*1497.1*	*F*	*68*	*624.5*	*F*	*30*
	Intersection	*486.6*	*F*	--	*122.9*	*F*	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	2.3	A	1	2.3	A	2
	NB	*1467.5*	*F*	*38*	*4322.7*	*F*	*33*
	Intersection	*199.7*	*F*	--	*489.2*	*F*	--
Intersection Control		*Stop Controlled (WB)*					
64th Street West & Central Avenue	WB	12.8	B	1	13.1	B	1
	NB	0.0	A	0	0.0	A	0
	SB	1.1	A	1	0.5	A	0
	Intersection	2.0	A	--	2.3	A	--
Intersection Control		*Roundabout*					
56th Street West & Central Avenue	EB	4.7	A	1	4.1	A	1
	WB	4.1	A	1	4.9	A	2
	NB	4.7	A	1	4.8	A	2
	SB	4.9	A	2	4.6	A	2
	Intersection	4.6	A	--	4.7	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Central Avenue	EB	0.3	A	1	0.4	A	0
	WB	0.7	A	1	0.8	A	1
	NB	*37.9*	*E*	*4*	*102.3*	*F*	*10*
	SB	*440.4*	*F*	*26*	*127.2*	*F*	*9*
	Intersection	*113.9*	*F*	--	*36.2*	*E*	--

Intersection	Approach	Scenario 1 (2035) - No Build					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Stop Controlled (NB & SB)*					
64th Street West & King Avenue West	EB	2.0	A	1	2.4	A	1
	WB	2.6	A	1	0.7	A	1
	NB	*678.9*	*F*	*19*	*182.3*	*F*	*10*
	SB	--	*F*	--	*266.4*	*F*	*18*
	Intersection	--	*F*	--	*73.5*	*F*	--
Intersection Control		*Roundabout*					
56th Street West & King Avenue West	EB	8.9	A	5	7.4	A	3
	WB	5.1	A	2	20.1	C	15
	NB	5.5	A	1	5.5	A	2
	SB	5.9	A	2	6.5	A	1
	Intersection	6.8	A	--	13.5	B	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & King Avenue West	EB	0.8	A	1	0.8	A	1
	WB	0.2	A	0	0.3	A	1
	NB	*52.7*	*F*	*4*	*231.7*	*F*	*12*
	SB	*885.2*	*F*	*24*	*3381.6*	*F*	*23*
	Intersection	*141.7*	*F*	--	*352.5*	*F*	--
Intersection Control		*Stop Controlled (EB & WB)*					
64th Street West & Hesper Road	EB	*25.4*	*D*	*5*	11.5	B	1
	WB	11.7	B	1	10.9	B	1
	NB	0.0	A	0	0.3	A	0
	SB	4.3	A	1	2.5	A	1
	Intersection	13.0	B	--	7.5	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
56th Street West & Hesper Road	EB	*33.6*	*D*	*6*	13.2	B	1
	WB	*29.7*	*D*	*4*	16.0	C	3
	NB	1.7	A	1	0.7	A	0
	SB	2.2	A	1	1.1	A	0
	Intersection	18.7	C	--	9.5	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Hesper Road	EB	0.7	A	1	1.0	A	1
	WB	0.6	A	0	0.4	A	1
	NB	13.9	B	1	15.5	C	1
	SB	22.1	C	3	16.0	C	1
	Intersection	6.1	A	--	3.4	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
64th Street West & Neibauer Road	EB	10.7	B	1	10.1	B	1
	WB	10.2	B	1	10.2	B	1
	NB	0.0	A	0	0.0	A	0
	SB	1.6	A	0	0.0	A	0
	Intersection	5.9	A	--	5.3	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
56th Street West & Neibauer Road	EB	11.7	B	1	11.2	B	1
	WB	11.9	B	1	11.3	B	1
	NB	0.5	A	0	0.3	A	0
	SB	1.0	A	0	1.4	A	0
	Intersection	5.2	A	--	5.1	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Neibauer Road	EB	0.1	A	0	0.2	A	0
	WB	1.3	A	0	2.4	A	1
	NB	9.9	A	1	10.6	B	1
	SB	10.7	B	1	12.6	B	1
	Intersection	3.4	A	--	4.3	A	--

TABLE 13. SCENARIO 2 (2035) NO BUILD INTERSECTION CAPACITY CALCULATION RESULTS

Intersection	Approach	Scenario 1 (2035) - No Build					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Stop Controlled (EB & WB)*					
62nd Street West & Rimrock Road	EB	--	F	--	--	F	--
	WB	--	F	--	--	F	--
	NB	1.6	A	1	2.1	A	1
	SB	7.8	A	4	7.4	A	2
	Intersection	--	F	--	--	F	--
Intersection Control		*Stop Controlled (NB & SB)*					
54th Street West & Rimrock Road	EB	0.0	A	0	0.3	A	1
	WB	2.6	A	3	1.3	A	1
	NB	--	F	--	--	F	--
	SB	12806.0	F	62	--	F	--
	Intersection	--	F	--	--	F	--
Intersection Control		*Stop Controlled (SB)*					
62nd Street West & Grand Avenue	EB	1.9	A	1	3.0	A	1
	WB	0.0	A	0	0.0	A	0
	SB	684.3	F	52	353.5	F	24
	Intersection	272.5	F	--	83.7	F	--
Intersection Control		*Stop Controlled (NB)*					
64th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	5.9	A	1	3.8	A	1
	NB	17.7	C	3	23.9	C	5
	Intersection	6.5	A	--	10.0	B	--
Intersection Control		*Stop Controlled (NB & SB)*					
56th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	4.0	A	2	2.0	A	1
	NB	1506.4	F	26	2116.9	F	48
	Intersection	158.6	F	--	446.0	F	--
Intersection Control		*Stop Controlled (SB)*					
54th Street West & Grand Avenue	EB	0.9	A	1	2.0	A	1
	WB	0.0	A	0	0.0	A	0
	SB	5167.4	F	103	2284.2	F	52
	Intersection	1680.6	F	--	449.8	F	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0
	WB	4.0	A	3	3.1	A	3
	NB	12129.7	F	59	7835.0	F	43
	Intersection	1627.1	F	--	883.6	F	--
Intersection Control		*Stop Controlled (WB)*					
64th Street West & Central Avenue	WB	14.6	B	1	15.1	C	1
	NB	0.0	A	0	0.0	A	0
	SB	1.2	A	1	0.5	A	0
	Intersection	2.3	A	--	2.6	A	--
Intersection Control		*Roundabout*					
56th Street West & Central Avenue	EB	8.3	A	2	4.5	A	1
	WB	4.5	A	2	5.9	A	3
	NB	6.5	A	2	5.6	A	2
	SB	18.3	C	17	5.4	A	2
	Intersection	12.6	B	--	5.5	B	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Central Avenue	EB	0.3	A	1	0.5	A	1
	WB	0.7	A	1	0.8	A	1
	NB	--	F	--	638.5	F	26
	SB	1492.1	F	46	--	F	--
	Intersection	--	F	--	--	F	--

Intersection	Approach	Scenario 1 (2035) - No Build					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Stop Controlled (NB & SB)*					
64th Street West & King Avenue West	EB	2.1	A	1	2.5	A	1
	WB	2.7	A	1	0.7	A	1
	NB	--	F	--	--	F	--
	SB	--	F	--	--	F	--
	Intersection	--	F	--	--	F	--
Intersection Control		*Roundabout*					
56th Street West & King Avenue West	EB	17.1	C	14	7.2	A	4
	WB	6.0	A	3	16.8	C	15
	NB	7.0	A	2	6.5	A	2
	SB	7.9	A	4	6.3	A	2
	Intersection	10.9	B	--	11.1	B	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & King Avenue West	EB	0.8	A	1	0.9	A	1
	WB	0.2	A	1	0.3	A	1
	NB	--	F	--	--	F	--
	SB	4487.2	F	39	--	F	--
	Intersection	--	F	--	--	F	--
Intersection Control		*Stop Controlled (EB & WB)*					
64th Street West & Hesper Road	EB	53.5	F	9	12.4	B	1
	WB	13.0	B	2	11.7	B	2
	NB	0.0	A	0	0.3	A	0
	SB	4.4	A	1	2.6	A	1
	Intersection	23.6	C	--	8.0	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
56th Street West & Hesper Road	EB	109.2	F	15	15.3	C	2
	WB	313.8	F	17	22.3	C	5
	NB	1.7	A	1	0.7	A	0
	SB	2.3	A	1	1.1	A	0
	Intersection	106.1	F	--	12.6	B	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Hesper Road	EB	0.7	A	1	1.0	A	1
	WB	0.5	A	0	0.4	A	1
	NB	16.6	C	1	19.0	C	1
	SB	43.8	E	6	20.7	C	2
	Intersection	10.6	B	--	4.1	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
64th Street West & Neibauer Road	EB	11.1	B	1	10.4	B	1
	WB	10.4	B	1	10.4	B	1
	NB	0.0	A	0	0.0	A	0
	SB	1.6	A	0	0.0	A	0
	Intersection	6.1	A	--	5.4	A	--
Intersection Control		*Stop Controlled (EB & WB)*					
56th Street West & Neibauer Road	EB	12.5	B	1	11.8	B	1
	WB	12.9	B	1	12.1	B	1
	NB	0.5	A	0	0.2	A	0
	SB	1.1	A	1	1.5	A	0
	Intersection	5.6	A	--	5.5	A	--
Intersection Control		*Stop Controlled (NB & SB)*					
48th Street West & Neibauer Road	EB	0.1	A	0	0.2	A	0
	WB	1.3	A	0	2.4	A	1
	NB	10.2	B	1	11.5	B	1
	SB	11.2	B	1	13.8	B	1
	Intersection	3.5	A	--	4.5	A	--

- 56th Street West & Grand Avenue (AM Peak and PM Peak)
- 54th Street West & Grand Avenue (AM Peak and PM Peak)
- 48th Street West & Grand Avenue (AM Peak and PM Peak)
- 48th Street West & Central Avenue (AM Peak and PM Peak)
- 64th Street West & King Avenue West (AM Peak and PM Peak)
- 48th Street West & King Avenue West (AM Peak and PM Peak)

For the Scenario 2 (2035) "no build" condition, ten (10) intersections were projected to fall below LOS C during the AM peak hour and nine (9) intersections were projected to fall below LOS C during the PM peak hour. The intersections of Hesper Road with 64th Street West and 48th Street West were projected to have individual approaches operate at LOS F and E during the AM peak hour. Projected maximum queue lengths for these approaches were still projected to be relatively manageable regardless of the poor LOS projections. Mitigation strategies for the substandard intersections are discussed in the next chapter of the report. The following intersections were projected to fall below LOS during one or both peak hours as noted:

- 62nd Street West & Rimrock Road (AM Peak and PM Peak)
- 54th Street West & Rimrock Road (AM Peak and PM Peak)
- 62nd Street West & Grand Avenue (AM Peak and PM Peak)
- 56th Street West & Grand Avenue (AM Peak and PM Peak)
- 54th Street West & Grand Avenue (AM Peak and PM Peak)
- 48th Street West & Grand Avenue (AM Peak and PM Peak)
- 48th Street West & Central Avenue (AM Peak and PM Peak)
- 64th Street West & King Avenue West (AM Peak and PM Peak)
- 48th Street West & King Avenue West (AM Peak and PM Peak)
- 56th Street West & Hesper Road (AM Peak)

Corridor Traffic Operations

The Project Team re-evaluated corridor LOS for all arterial streets within the study area boundary. As was previously discussed, the minimum required corridor LOS is D for the purposes of this planning study. The following paragraphs discuss the results of the analysis for the two Horizon Year (2035) land development scenarios.

Scenario 1 (2035)

As shown in **Figure 9** (next page), most roadways in the study area continue to experience a LOS D or better. However, three of the primary east-west arterials (Rimrock Road, Grand Avenue, King Avenue West) are not projected to meet that standard. In the worse instance, Grand Avenue and Rimrock Road are projected to operate at LOS F to the east of 54th Street West. Segments of Rimrock Road, Grand Avenue and King Avenue West are also projected to operate at LOS E. In general, the predominant traffic patterns show higher traffic volumes to the east, closer to existing urban development; these volumes decline substantially in the western portion of the study area, except in certain cases (King Avenue West, Grand Avenue). Of the north-south arterials, only 62nd Street West, north of Rimrock Road, is projected to operate below LOS D for Scenario 1, while 54th Street West is the only other north-south corridor that is projected to operate below LOS C.

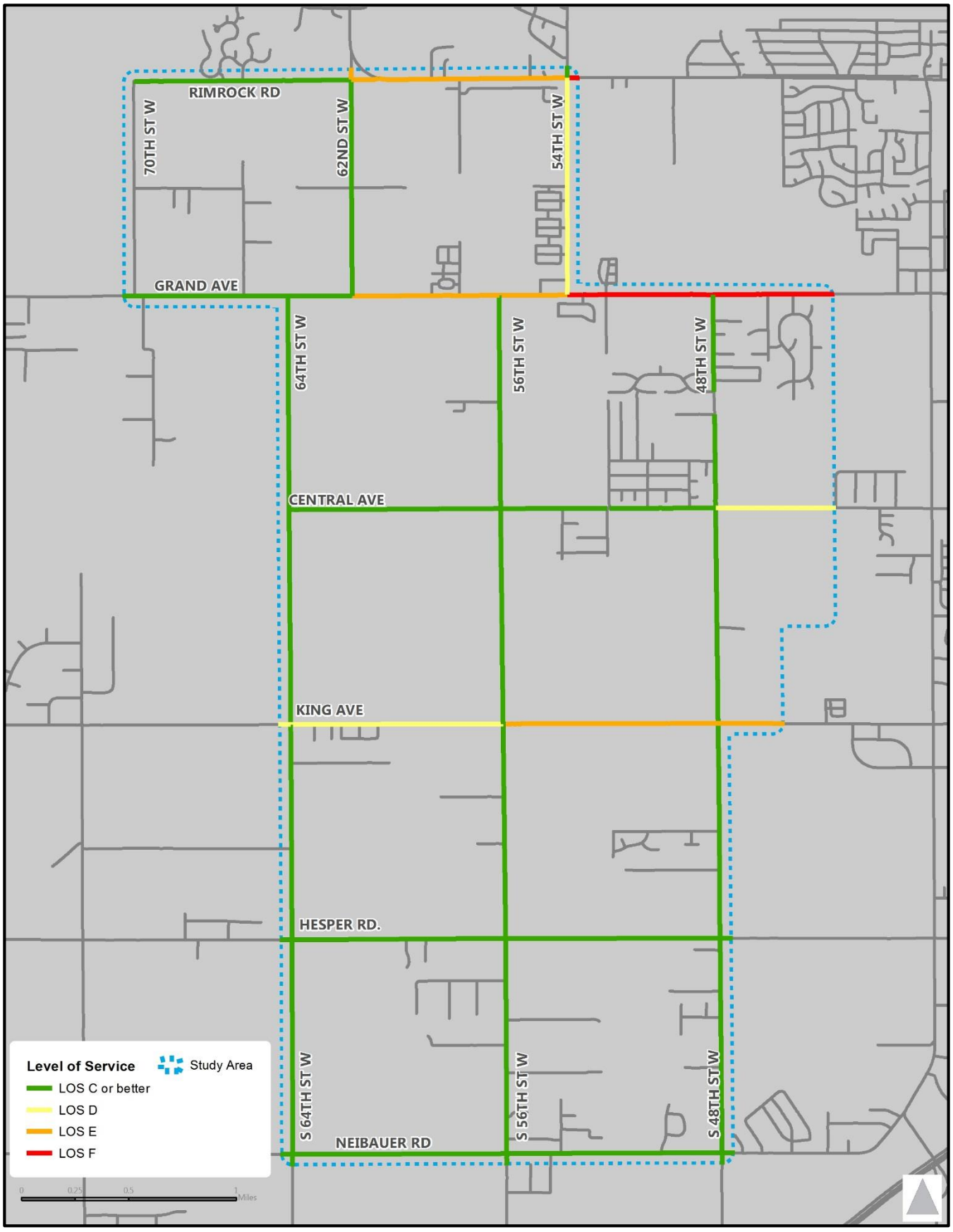


FIGURE 9. SCENARIO 1 (2035) CORRIDOR LEVEL OF SERVICE (LOS)

Scenario 2 (2035)

Under the higher-growth Scenario 2 (**Figure 10**, next page), conditions on these roadways become predictably more congested. Central Avenue joins Rimrock Road, Grand Avenue and King Avenue West in having one or more segments exhibit LOS E or worse conditions and the extent of the LOS F operation projection grows considerably, particularly along Grand Avenue. For the north-south corridors, 62nd Street West, north of Rimrock Road degrades to LOS F, while 54th Street West is projected at LOS D north of Rimrock Road and LOS E south of Rimrock Road. Chapter 6 of this report provides a discussion of mitigation alternatives for addressing the corridor LOS deficiencies identified for Scenarios 1 and 2.

Active Transportation Demand Analysis

The Latent Demand Model indicates areas where there is latent demand for active transportation (not necessarily usage); essentially places where walking or bicycling would be likely to occur if the conditions were favorable. Typically, favorable conditions mean the presence of bicycling facilities, sidewalks, and paths.

Two demand analyses were conducted; base year (2010) and future year (2035). The baseline analysis used current conditions based on GIS layers provided by the City of Billings and 2010 socio-economic data from the regional travel demand model provided by MDT. The second analysis was completed for the Horizon Year (2035). For this analysis, socio-economic data from the high-growth scenario - Scenario 2 - was used. Future retail and school locations were assumed based on local land use plans, zoning, and feedback from City staff.

Figure 11 (page 35) illustrates the analysis results, using blue color tones to indicate areas of lower demand and red/orange color tones to indicate the higher demand areas. For the 2010 baseline condition, higher active transportation demand is primarily limited to the northeast portion of the study area from 48th to 54th Street near Grand Avenue. This is rather intuitive since this district has established neighborhoods. Elsewhere there is very little demand, due to low density residential, few employment or commercial destinations, and predominantly agricultural land uses.

Based on the growth projections described in Chapter 3, demand for active transportation is expected to increase significantly in terms of relative magnitude and geographic area. Most of the study area north of King Avenue and east of 56th Street will generate demand, with the highest concentrations along 54th Street and Grand Avenue. This analysis suggests that investment in active transportation infrastructure should be prioritized in the northern and eastern portion of the study area.

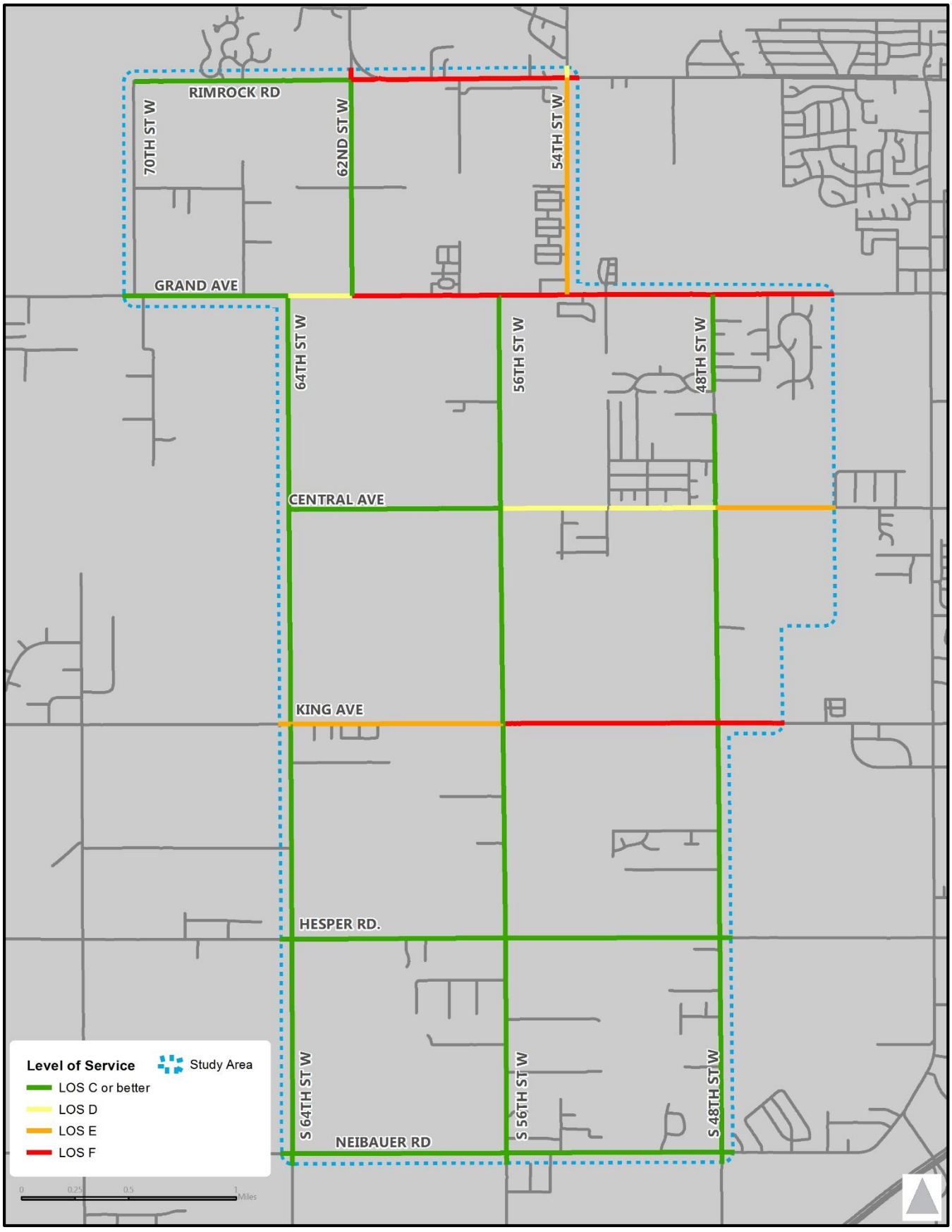


FIGURE 10. SCENARIO 2 (2035) CORRIDOR LEVEL OF SERVICE (LOS)

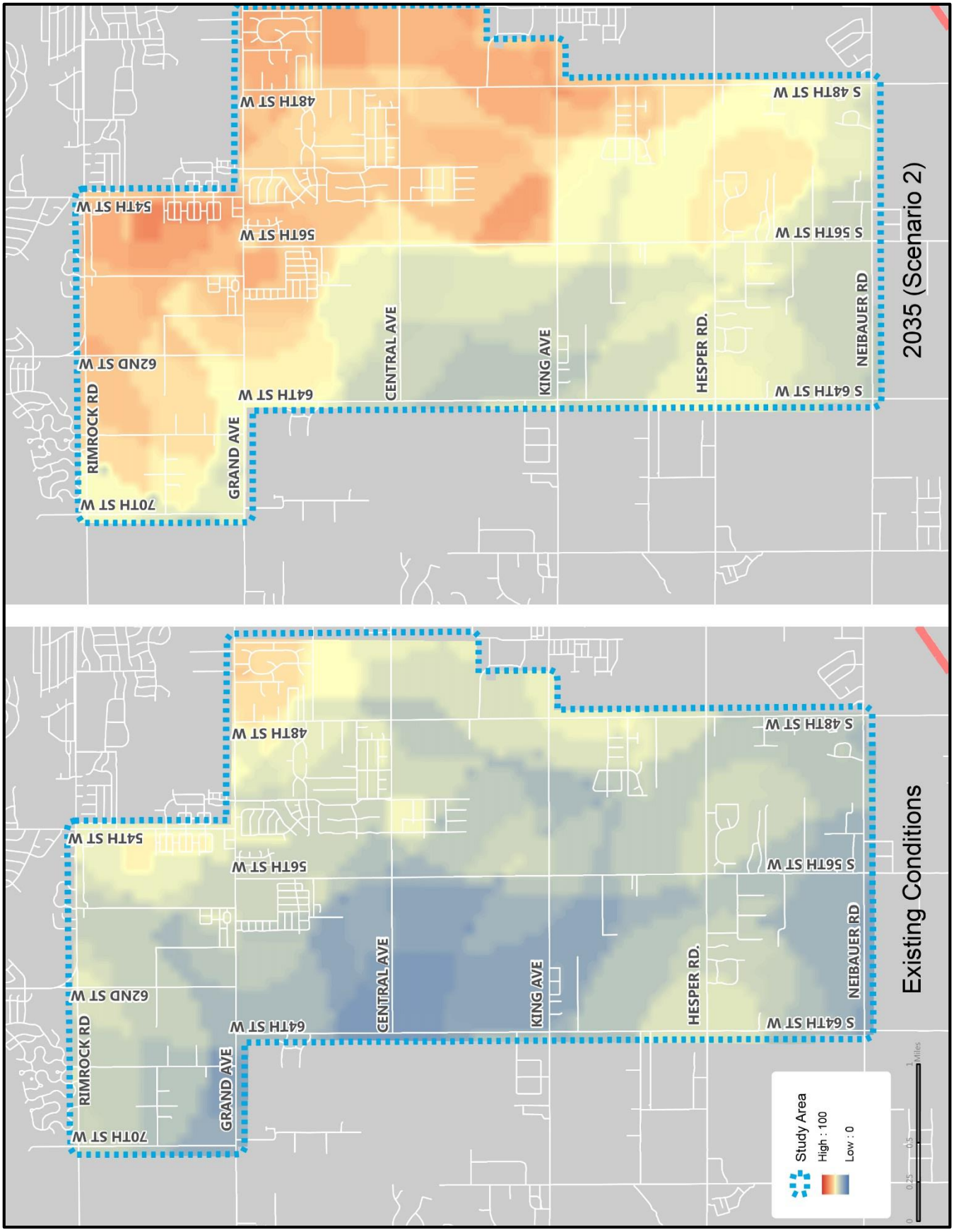
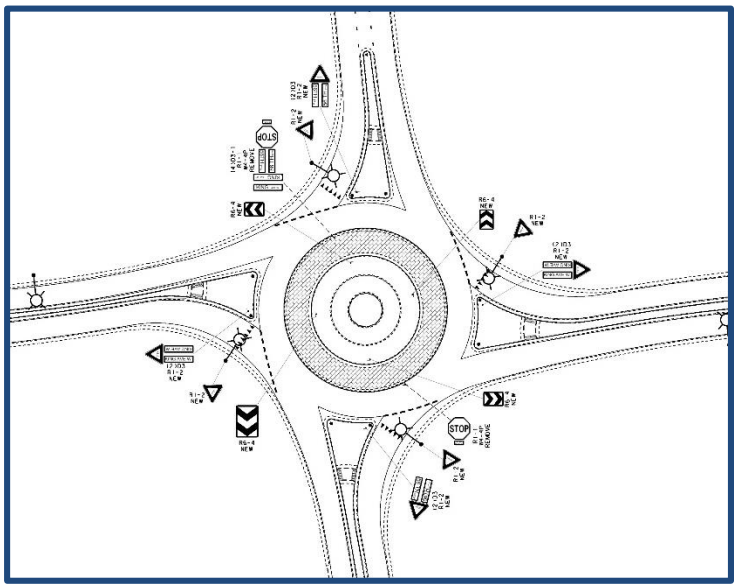


FIGURE 11. EXISTING CONDITIONS (2015) AND SCENARIO 2 (2035) LATENT DEMAND CONDITIONS MAPS

MITIGATION ALTERNATIVES

6



The previous section of this report identified the major study area intersections, street corridors and active transportation facilities that are expected to require improvement or expansion in order to accommodate projected traffic demands for Horizon Year (2035) growth scenarios 1 and 2. This chapter will discuss mitigation alternatives for addressing the deficiencies that were identified in the previous chapter, as well as provide a summary of analysis results for those alternatives to illustrate the relative effectiveness of each measure.

Intersections

Based on the intersection LOS deficiencies that were identified for Scenarios 1 and 2 (2035) for the no-build condition, the Project Team evaluated potential mitigation alternatives to address those deficiencies. The purpose of this exercise was to establish a minimum level of improvements needed to bring each intersection up to an acceptable LOS C. The Project Team did not evaluate Manual on Uniform Traffic Control Devices (MUTCD) Traffic Signal Warrants for any of the intersections. The analysis was purely operation. Both volume scenarios were analyzed for an "improved" scenario implementing changes in intersection traffic control and lane configurations as necessary to achieve the minimum LOS C for each intersection. The sensitivity analyses were conducted using Synchro, Version 8.0, for stop-controlled and signalized intersections and Rodel, Version 1.88, for roundabouts. **Table 14** and **Table 15** on pages 37 and 38 illustrate the results of the Horizon Year (2035) peak hour intersection capacity analyses for the "improved" condition for Scenarios 1 and 2, respectively. In any case where signalization was required in order to achieve the desired intersection capacity results, a roundabout was also evaluated as an alternative to a traffic signal and those results are concurrently displayed in the tables. Detailed intersection capacity calculation worksheets for the improved alternatives for both Horizon Year (2035) scenarios are included in **Appendix D**.

Scenario 1 (2035)

This section of the report discusses mitigation alternatives for each of the study area intersections that were found to be deficient in terms of Scenario 1 (2035) peak hour traffic operations. The evaluations were originally made independent of any consideration of corridor widening (from two lanes to four lanes, for example) though references to the potential need for such widening are made in several cases. Specific discussion about the marriage of intersection and corridor improvements will occur in a later section of the report.

TABLE 14. SCENARIO 1 (2035) IMPROVED INTERSECTION CAPACITY CALCULATION RESULTS

Intersection	Approach	Scenario 1 (2035) - Improved											
		AM Peak			PM Peak			AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Traffic Signal*						*Roundabout*					
62nd Street West & Rimrock Road	EB	15.0	B	6	10.7	B	3	8.2	A	2	4.5	A	1
	WB	9.0	A	3	9.4	A	2	4.5	A	2	6.9	A	4
	NB	18.4	B	4	18.8	B	5	5.9	A	1	4.9	A	1
	SB	11.0	B	12	12.3	B	7	10.1	B	8	5.6	A	3
	Intersection	12.2	B	--	12.1	B	--	8.1	A	--	5.9	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
54th Street West & Rimrock Road	EB	32.9	C	39	16.6	B	13	5.2	A	5	2.7	A	2
	WB	15.1	B	10	14.7	B	20	4.9	A	2	7.8	A	7
	NB	31.3	C	4	18.6	B	3	6.1	A	1	5.0	A	2
	SB	32.6	C	9	16.6	B	4	6.2	A	2	6.2	A	2
	Intersection	28.0	C	--	15.9	B	--	5.4	A	--	6.0	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
62nd Street West & Grand Avenue	EB	7.2	A	7	4.2	A	4	7.0	A	3	5.0	A	1
	WB	5.3	A	3	3.8	A	4	4.1	A	1	6.0	A	1
	SB	12.3	B	6	14.4	B	4	5.9	A	2	4.9	A	1
	Intersection	8.8	A	--	6.4	A	--	6.0	A	--	5.4	A	--
Intersection Control		*Stop Controlled (NB)*						*No Alternative Analysis Required*					
64th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0						
	WB	5.6	A	1	3.7	A	1						
	NB	13.9	B	2	16.1	C	3						
	Intersection	5.4	A	--	7.3	A	--						
Intersection Control		*Traffic Signal*						*Roundabout*					
56th Street West & Grand Avenue	EB	5.0	A	9	4.4	A	6	9.1	A	8	4.9	A	2
	WB	5.1	A	3	5.8	A	7	5.7	A	3	8.5	A	5
	NB	26.7	C	2	15.5	B	4	6.1	A	1	5.7	A	2
	Intersection	7.3	A	--	7.4	A	--	7.7	A	--	6.7	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
54th Street West & Grand Avenue	EB	17.4	B	24	6.2	A	8	4.9	A	4	3.1	A	2
	WB	7.8	A	6	6.0	A	10	2.5	A	1	4.1	A	3
	SB	27.4	C	15	15.2	B	5	8.4	A	5	5.6	A	2
	Intersection	18.6	B	--	7.9	A	--	5.5	A	--	4.1	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
48th Street West & Grand Avenue	EB	9.7	A	10	3.2	A	3	5.4	A	8	3.1	A	2
	WB	6.8	A	5	4.0	A	5	2.9	A	2	5.0	A	5
	NB	*44.7*	*D*	*10*	23.7	C	4	10.4	B	4	5.4	A	2
	Intersection	13.6	B	--	5.9	A	--	5.4	A	--	4.4	A	--
Intersection Control		*Stop Controlled (WB)*						*No Alternative Analysis Required*					
64th Street West & Central Avenue	WB	12.8	B	1	13.1	B	1						
	NB	0.0	A	0	0.0	A	0						
	SB	1.1	A	1	0.5	A	0						
	Intersection	2.0	A	--	2.3	A	--						
Intersection Control		*Roundabout (committed)*						*No Alternative Analysis Required*					
56th Street West & Central Avenue	EB	4.7	A	1	4.1	A	1						
	WB	4.1	A	1	4.9	A	2						
	NB	4.7	A	1	4.8	A	2						
	SB	4.9	A	2	4.6	A	2						
	Intersection	4.6	A	--	4.7	A	--						
Intersection Control		*Traffic Signal*						*Roundabout*					
48th Street West & Central Avenue	EB	8.8	B	12	5.3	A	3	12.2	A	3	4.5	A	1
	WB	5.5	A	3	8.2	A	7	4.0	A	1	6.5	A	3
	NB	14.4	B	3	11.0	B	3	5.7	A	1	4.2	A	1
	SB	16.2	B	5	10.8	B	2	4.7	A	1	4.7	A	1
	Intersection	10.6	B	--	8.5	A	--	8.3	A	--	5.4	A	--

Intersection	Approach	Scenario 1 (2035) - Improved											
		AM Peak			PM Peak			AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Traffic Signal*						*Roundabout*					
64th Street West & King Avenue West	EB	14.3	B	11	7.2	A	5	10.7	B	3	5.9	A	2
	WB	11.5	A	4	7.5	A	7	5.3	A	1	6.4	A	3
	NB	9.1	B	3	12.3	B	3	5.5	A	1	4.5	A	1
	SB	9.2	B	2	14.1	B	3	4.5	A	1	5.2	A	1
	Intersection	12.1	B	--	9.1	A	--	7.7	A	--	5.8	A	--
Intersection Control		*Roundabout (committed)*						*No Alternative Analysis Required*					
56th Street West & King Avenue West	EB	8.9	A	5	7.4	A	3						
	WB	5.1	A	2	20.1	C	15						
	NB	5.5	A	1	5.5	A	2						
	SB	5.9	A	2	6.5	A	1						
	Intersection	6.8	A	--	13.5	B	--						
Intersection Control		*Traffic Signal*						*Roundabout*					
48th Street West & King Avenue West	EB	8.1	A	16	6.3	A	8	12.5	B	4	6.8	A	3
	WB	5.8	A	8	9.0	A	14	5.4	A	1	9.9	A	7
	NB	18.6	B	3	21.2	C	4	5.9	A	1	5.0	A	1
	SB	21.4	C	8	21.0	C	3	5.0	A	1	5.4	A	1
	Intersection	10.1	B	--	10.5	B	--	8.7	A	--	7.9	A	--
Intersection Control		*Stop Controlled (EB & WB)*						*No Alternative Analysis Required*					
64th Street West & Hesper Road	EB	*25.4*	*D*	*5*	11.5	B	1						
	WB	11.7	B	1	10.9	B	1						
	NB	0.0	A	0	0.3	A	0						
	SB	4.3	A	1	2.5	A	1						
	Intersection	13.0	B	--	7.5	A	--						
Intersection Control		*Stop Controlled (EB & WB)*						*No Alternative Analysis Required*					
56th Street West & Hesper Road	EB	*33.6*	*D*	*6*	13.2	B	1						
	WB	*29.7*	*D*	*4*	16.0	C	3						
	NB	1.7	A	1	0.7	A	0						
	SB	2.2	A	1	1.1	A	0						
	Intersection	18.7	C	--	9.5	A	--						
Intersection Control		*Stop Controlled (NB & SB)*						*No Alternative Analysis Required*					
48th Street West & Hesper Road	EB	0.7	A	1	1.0	A	1						
	WB	0.6	A	0	0.4	A	1						
	NB	13.9	B	1	15.5	C	1						
	SB	22.1	C	3	16.0	C	1						
	Intersection	6.1	A	--	3.4	A	--						
Intersection Control		*Stop Controlled (EB & WB)*						*No Alternative Analysis Required*					
64th Street West & Neibauer Road	EB	10.7	B	1	10.1	B	1						
	WB	10.2	B	1	10.2	B	1						
	NB	0.0	A	0	0.0	A	0						
	SB	1.6	A	0	0.0	A	0						
	Intersection	5.9	A	--	5.3	A	--						
Intersection Control		*Stop Controlled (EB & WB)*						*No Alternative Analysis Required*					
56th Street West & Neibauer Road	EB	11.7	B	1	11.2	B	1						
	WB	11.9	B	1	11.3	B	1						
	NB	0.5	A	0	0.3	A	0						
	SB	1.0	A	0	1.4	A	0						
	Intersection	5.2	A	--	5.1	A	--						
Intersection Control		*Stop Controlled (NB & SB)*						*No Alternative Analysis Required*					
48th Street West & Neibauer Road	EB	0.1	A	0	0.2	A	0						
	WB	1.3	A	0	2.4	A	1						
	NB	9.9	A	1	10.6	B	1						
	SB	10.7	B	1	12.6	B	1						
	Intersection	3.4	A	--	4.3	A	--						

TABLE 15. SCENARIO 2 (2035) IMPROVED INTERSECTION CAPACITY CALCULATION RESULTS

Intersection	Approach	Scenario 2 (2035) - Improved											
		AM Peak			PM Peak			AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Traffic Signal*						*Roundabout*					
62nd Street West & Rimrock Road	EB	22.6	C	12	16.0	B	7	5.1	A	2	3.2	A	1
	WB	11.8	B	6	13.2	B	5	4.4	A	1	9.0	A	1
	NB	25.4	C	6	20.3	C	7	5.7	A	2	4.9	A	2
	SB	18.3	B	19	13.5	B	8	4.2	A	4	2.9	A	2
	Intersection	18.5	B	--	14.8	B	--	4.6	A	--	5.8	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
54th Street West & Rimrock Road	EB	33.7	C	23	17.8	B	9	8.8	A	11	3.1	A	2
	WB	13.0	B	9	29.7	C	18	3.2	A	2	3.3	A	3
	NB	33.0	C	4	24.7	C	6	7.9	A	2	5.7	A	2
	SB	*39.6*	*D*	*12*	17.1	B	6	7.0	A	3	6.1	A	2
	Intersection	29.1	C	--	24.6	C	--	6.8	A	--	3.9	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
62nd Street West & Grand Avenue	EB	9.9	A	9	6.1	A	5	10.6	B	6	6.0	A	3
	WB	6.6	A	4	5.4	A	6	4.5	A	2	8.0	A	5
	SB	14.9	B	9	12.1	B	4	7.8	A	5	5.8	A	2
	Intersection	11.2	B	--	7.2	A	--	8.2	A	--	6.9	A	--
Intersection Control		*Stop Controlled (NB)*						*No Alternative Analysis Required*					
64th Street West & Grand Avenue	EB	0.0	A	0	0.0	A	0						
	WB	5.9	A	1	3.8	A	1						
	NB	17.7	C	3	23.9	C	5						
	Intersection	6.5	A	--	10.0	B	--						
Intersection Control		*Traffic Signal*						*Roundabout*					
56th Street West & Grand Avenue	EB	13.3	B	21	5.9	A	7	4.9	A	6	3.1	A	2
	WB	5.3	A	3	8.8	A	10	3.0	A	2	3.6	A	3
	NB	*51.2*	*D*	*4*	16.9	B	6	6.1	A	2	6.3	A	3
	Intersection	14.8	B	--	9.5	A	--	4.4	A	--	4.0	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
54th Street West & Grand Avenue	EB	12.0	B	11	5.2	A	4	5.4	A	6	3.0	A	1
	WB	11.4	B	3	11.6	B	8	2.7	A	2	4.9	A	1
	SB	20.3	C	9	17.0	B	8	4.3	A	3	3.8	A	1
	Intersection	14.6	B	--	10.7	B	--	4.5	A	--	4.1	A	--
Intersection Control		*Traffic Signal*						*Roundabout*					
48th Street West & Grand Avenue	EB	14.4	B	19	3.2	A	4	15.7	A	16	4.0	A	4
	WB	13.0	B	5	6.7	A	12	3.4	A	1	8.5	A	12
	NB	*39.2*	*D*	*13*	*38.0*	*D*	*8*	*29.3*	*D*	*7*	6.7	A	2
	Intersection	17.4	B	--	9.0	A	--	14.2	B	--	6.7	A	--
Intersection Control		*Stop Controlled (WB)*						*No Alternative Analysis Required*					
64th Street West & Central Avenue	WB	14.6	B	1	15.1	C	1						
	NB	0.0	A	0	0.0	A	0						
	SB	1.2	A	1	0.5	A	0						
	Intersection	2.3	A	--	2.6	A	--						
Intersection Control		*Roundabout (committed)*						*No Alternative Analysis Required*					
56th Street West & Central Avenue	EB	8.3	A	2	4.5	A	1						
	WB	4.5	A	2	5.9	A	3						
	NB	6.5	A	2	5.6	A	2						
	SB	18.3	C	17	5.4	A	2						
	Intersection	12.6	B	--	5.5	A	--						
Intersection Control		*Traffic Signal*						*Roundabout*					
48th Street West & Central Avenue	EB	13.3	B	19	6.1	A	5	4.0	A	2	2.3	A	1
	WB	7.2	A	4	9.8	A	12	4.3	A	1	9.3	A	7
	NB	17.5	B	3	15.8	B	5	5.3	A	1	4.4	A	1
	SB	20.4	C	7	15.7	B	4	5.5	A	1	5.5	A	1
	Intersection	14.4	B	--	10.9	B	--	4.6	A	--	6.4	A	--

Intersection	Approach	Scenario 2 (2035) - Improved											
		AM Peak			PM Peak			AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Traffic Signal*						*Roundabout*					
64th Street West & King Avenue West	EB	11.5	B	11	8.6	A	7	4.2	A	2	3.1	A	2
	WB	10.7	B	6	8.4	A	11	6.3	A	1	8.4	A	5
	NB	15.1	B	4	17.5	B	4	5.3	A	1	4.3	A	1
	SB	15.2	B	4	22.1	C	4	4.9	A	1	6.1	A	2
	Intersection	12.3	B	--	11.9	B	--	5.0	A	--	5.8	A	--
Intersection Control		*Roundabout (committed)*						*No Alternative Analysis Required*					
56th Street West & King Avenue West	EB	17.1	C	14	7.2	A	4						
	WB	6.0	A	3	16.8	C	15						
	NB	7.0	A	2	6.5	A	2						
	SB	7.9	A	4	6.3	A	2						
	Intersection	10.9	B	--	11.1	B	--						
Intersection Control		*Traffic Signal*						*Roundabout*					
48th Street West & King Avenue West	EB	12.8	B	21	9.8	A	12	3.9	A	3	2.8	A	2
	WB	9.1	A	11	17.9	B	31	2.4	A	2	3.3	A	3
	NB	17.9	B	3	23.6	C	6	5.4	A	1	4.9	A	1
	SB	21.1	C	6	23.6	C	4	5.1	A	2	5.2	A	1
	Intersection	13.2	B	--	16.3	B	--	3.7	A	--	3.5	A	--
Intersection Control		*Stop Controlled (EB & WB)*						*No Alternative Analysis Required*					
64th Street West & Hesper Road	EB	*53.5*	*F*	*9*	12.4	B	1						
	WB	13.0	B	2	11.7	B	2						
	NB	0.0	A	0	0.3	A	0						
	SB	4.4	A	1	2.6	A	1						
	Intersection	23.6	C	--	8.0	A	--						
Intersection Control		*Stop Controlled (All-way)*						*Roundabout*					
56th Street West & Hesper Road	EB	20.8	C	5	10.1	B	1	5.5	A	2	3.9	A	1
	WB	16.2	C	3	13.2	B	3	4.2	A	1	4.5	A	1
	NB	14.3	B	2	10.9	B	2	4.9	A	1	3.7	A	1
	SB	16.2	C	3	10.3	B	1	4.0	A	1	3.8	A	1
	Intersection	17.4	C	--	11.6	B	--	4.8	A	--	4.1	A	--
Intersection Control		*Stop Controlled (NB & SB)*						*No Alternative Analysis Required*					
48th Street West & Hesper Road	EB	0.7	A	1	1.0	A	1						
	WB	0.5	A	0	0.4	A	1						
	NB	16.6	C	1	19.0	C	1						
	SB	*43.8*	*E*	*6*	20.7	C	2						
	Intersection	10.6	B	--	4.1	A	--						
Intersection Control		*Stop Controlled (EB & WB)*						*No Alternative Analysis Required*					
64th Street West & Neibauer Road	EB	11.1	B	1	10.4	B	1						
	WB	10.4	B	1	10.4	B	1						
	NB	0.0	A	0	0.0	A	0						
	SB	1.6	A	0	0.0	A	0						
	Intersection	6.1	A	--	5.4	A	--						
Intersection Control		*Stop Controlled (EB & WB)*						*No Alternative Analysis Required*					
56th Street West & Neibauer Road	EB	12.5	B	1	11.8	B	1						
	WB	12.9	B	1	12.1	B	1						
	NB	0.5	A	0	0.2	A	0						
	SB	1.1	A	1	1.5	A	0						
	Intersection	5.6	A	--	5.5	A	--						
Intersection Control		*Stop Controlled (NB & SB)*						*No Alternative Analysis Required*					
48th Street West & Neibauer Road	EB	0.1	A	0	0.2	A	0						
	WB	1.3	A	0	2.4	A	1						
	NB	10.2	B	1	11.5	B	1						
	SB	11.2	B	1	13.8	B	1						
	Intersection	3.5	A	--	4.5	A	--						

62nd Street West/Rimrock Road

For Scenario 1, a traffic signal with auxiliary left-turn bays on all four approaches and an auxiliary right-turn bay on the east (WB) approach would serve to provide excellent operational conditions. Thru movements could be served by single lanes (in the cases of the north, south and west approaches, shared with right turns). The east approach right-turn bay should be channelized given the high demand for that movement in both peak hours. Depending upon the relative demands of other movements and other approaches, the north approach may benefit from implementation of a southbound dual-left turn lane. However, two receiving lanes would then be required on the east approach.

A single-lane roundabout is also projected to operate fairly well for this intersection overall. That said, given the magnitude of the projected east approach (WB) right-turn volume, a westbound to northbound bypass (yielding to the north approach exit leg) would likely be implemented. Also, because the southbound left-turn demand is very high, the north approach would be susceptible to short periods of lengthy queuing, particularly during the peak hours. A flared approach to separate the southbound left-turn movement would help with to relieve some of the pressure.

54th Street West/Rimrock Road

A traffic signal at the intersection of 54th Street West and Rimrock Road would require auxiliary left-turn bays on all approaches, as well as auxiliary right-turn bays on all but the north (SB) approach, in combination with dedicated thru lanes on all but the north approach where a shared thru/right-turn lane would suffice. Although this configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, east and west approach queues would be very lengthy at times. In order to reduce those queues, widening to provide additional thru lanes would be necessary, at the very least to the east of the intersection.

A roundabout at this intersection would require dual entering and exit lanes for eastbound traffic and an east approach westbound to northbound right-turn bypass. This configuration would provide excellent operations with quite a bit of reserve capacity. Dual thru lanes for westbound traffic would extend that reserve capacity of the intersection considerably as well.

62nd Street West/Grand Avenue

For the intersection of 62nd Street West and Grand Avenue, a traffic signal with auxiliary left-turn bays on the north and west approaches and an auxiliary right-turn bay on the east approach projects to operate very well for Scenario 1 during both peaks. Max (95 percent) queues are projected to be limited to single digits for both the AM and PM peak hours.

A single-lane roundabout would also serve this intersection very well with no requirements for flared approaches or bypass lanes. Queuing projects to be minimal even during the busier surges of the AM and PM peak hours.

56th Street West/Grand Avenue

A traffic signal at the intersection of 56th Street West and Grand Avenue would require auxiliary left-turn bays on the east (WB) and south (NB) approaches, as well as auxiliary right-turn bays on the south (NB) and west (EB), in combination with dedicated thru lanes on the west (EB) and east (WB) approaches. This configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, and approach queues would be limited to the single digits for both the AM and PM peak hours.

A single-lane roundabout with an eastbound to southbound bypass would serve this intersection reasonably well during the standard peaks. However, the west approach (AM Peak) and east approach (PM Peak) would experience some extended queuing during surges within those peak periods.

54th Street West/Grand Avenue

A traffic signal at the intersection of 54th Street West and Grand Avenue would require auxiliary left-turn bays on the west (EB) and north (SB) approaches, as well as auxiliary right-turn bays on the north (SB) and east (WB), in combination with dedicated thru lanes on the west (EB) and east (WB) approaches. Although this configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, all approach queues would be very lengthy at times. In order to reduce those queues, widening to provide additional thru lanes would be necessary, at the very least to the west of the intersection. Depending upon the relative demands of other movements and other approaches, the north approach may benefit from implementation of a southbound dual-left turn lane. However, two receiving lanes would then be required on the east approach.

A roundabout for the intersection of 54th Street West and Grand Avenue would require dual entering, circulation and exit lanes for the east and west approaches. With that configuration in place, the intersection would operate very well with substantial reserve capacity on all but the north approach, where some queuing would be likely during the AM peak. A flared approach to split southbound left-turns and right-turns would help to address that issue.

48th Street West/Grand Avenue

A traffic signal at the intersection of 48th Street West and Grand Avenue would require auxiliary left-turn bays on the east (WB) and south (NB) approaches, as well as an auxiliary right-turn bay on the south (NB) approach. The east (WB) approach would require dual thru lanes in combination with a dedicated thru lane on and shared thru/right-turn lane on the west (EB) approach. Although this configuration would provide LOS C or better conditions during both peak hours for the intersections as a whole, the south (NB) approach would experience substandard delay in the AM peak hour as well as lengthy south and west approach queues at times. In order to reduce those queues and approach delay, widening to provide additional thru lanes would be necessary, at the very least to the east of the intersection.

A roundabout for the intersection of 48th Street West and Grand Avenue would also require dual entering, circulation and exit lanes for the east and west approaches. With that configuration in place, the intersection would operate very well with substantial reserve capacity on all approaches.

48th Street West/Central Avenue

A traffic signal at the intersection of 48th Street West and Central Avenue would require auxiliary left-turn bays on all approaches, in combination with shared thru/right-turn lanes on all approaches. This configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, and east and west approach queues would be lengthy but manageable. In order to reduce those queues, widening to provide additional thru lanes would be necessary.

For the intersection of 48th Street West and Central Avenue, a single-lane roundabout with no bypass lanes or flared approaches would provide excellent operations throughout the majority of the day. During the AM peak, however, there may be times when the relatively heavy eastbound thru volume would overwhelm that approach and cause substantial queues (greater than 20 vehicles) to occur for short periods. A flared approach would not provide much relief. An additional eastbound thru lane would be necessary to alleviate this condition.

64th Street West/King Avenue West

A traffic signal at the intersection of 64th Street West and King Avenue West would require auxiliary left-turn bays on all approaches, in combination with shared thru/right-turn lanes on all approaches. This configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, and east and west approach queues would be manageable.

For the intersection of 64th Street West and King Avenue West, a single-lane roundabout with no bypass lanes or flared approaches would provide excellent operations throughout the majority of the day. During the AM peak, however, there may be times when the eastbound thru demand would cause some lengthy queues to occur. In this case, a flared approach to separate eastbound left turns would help greatly with mitigating that risk.

48th Street West/King Avenue West

A traffic signal at the intersection of 48th Street West and King Avenue West would require auxiliary left-turn bays on all approaches, in combination with shared thru/right-turn lanes on all approaches. Although this configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, the east and west approach queues would be lengthy at times. In order to reduce those queues, widening to provide additional thru lanes would be necessary.

The intersection of 48th Street West and King Avenue West would operate much the same as the 48th Street West/Central Avenue intersection with a single-lane roundabout in place for Scenario 1. During the AM peak, there would be times when the heavy eastbound thru volume would overwhelm that approach and cause substantial queues (greater than 25 vehicles) to occur. A flared approach would not provide much relief. An additional eastbound thru lane would likely be necessary to alleviate this condition.

Scenario 2 (2035)

This section of the report discusses mitigation alternatives for each of the study area intersections that were found to be deficient in terms of Scenario 1 (2035) peak hour traffic operations. Once again, the evaluations were made independent of any consideration of corridor widening (from two lanes to four lanes, for example) though references to the potential need for such widening are made in several cases.

62nd Street West/Rimrock Road

For Scenario 2, a traffic signal with auxiliary left-turn bays on all four approaches and an auxiliary right-turn bay on the east (WB) approach would serve to provide excellent operational conditions. Thru movements could be served by single lanes (in the cases of the north, south and west approaches, shared with right turns). The east approach right-turn bay should be channelized given the high demand for that movement in both peak hours. Depending upon the relative demands of other movements and other approaches, the north approach may benefit from implementation of a southbound dual-left turn lane. However, two receiving lanes would then be required on the east approach.

For Scenario 2, a roundabout at this intersection would require the westbound to northbound bypass, as well as a southbound to eastbound dual left-turn configuration in order to function well. With this configuration in place, the intersection would operate very well with reserve capacity on all approaches.

54th Street West/Rimrock Road

A traffic signal at the intersection of 54th Street West and Rimrock Road would require auxiliary left-turn bays on all approaches, as well as a shared thru/right-turn lane on the north (SB) and south (NB) approach. The east (WB) and west (EB) approaches would require a combination with a dedicated thru lanes and shared thru/right-turn lanes. Although this configuration would provide LOS C conditions during both peak hours for the intersections as a whole, the north (SB) approach would experience substandard delay in the AM peak hour as well as lengthy north, east, and west approach queues at times. In order to reduce those queues and approach delay, the north approach may benefit from implementation of a southbound dual-left turn lane.

Scenario 2 peak hour traffic demands would require that a roundabout at the intersection of 54th Street West and Rimrock Road provide two lanes eastbound and westbound through the intersection. In addition, the west (EB) approach would need

a drop/bypass lane for right-turns. Even then, the V/C ratio would be very high for the west approach during the AM peak, but it does appear that there would be some reserve capacity there before the approach would break down.

62nd Street West/Grand Avenue

For the intersection of 62nd Street West and Grand Avenue, a traffic signal with auxiliary left-turn bays on the north and west approaches and an auxiliary right-turn bay on the east approach projects to operate very well for Scenario 2 during both peaks. Max (95 percent) queues are projected to be limited to single digits for both the AM and PM peak hours.

At the intersection of 62nd Street West and Grand Avenue, a single-lane roundabout would continue to provide very good operations even during peak periods for Scenario 2. A flared approach on the west leg would help with surge period queuing for that approach, but would not be necessary to provide adequate LOS conditions.

56th Street West/Grand Avenue

A traffic signal at the intersection of 56th Street West and Grand Avenue would require auxiliary left-turn bays on the east (WB) and south (NB) approaches, as well as auxiliary right-turn bays on the south (NB) and west (EB), in combination with dedicated thru lanes on the west (EB) and east (WB) approaches. This configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, except the south (NB) approach in the AM peak hour. The west (EB) approach experiences high queues in the AM peak hour. In order to reduce those queues, the north approach may benefit from widening to provide additional thru lanes.

For Scenario 2, a roundabout at the intersection of 56th Street West and Grand Avenue would require dual entering and exit lanes on the east and west approaches and a single approach to the south. This configuration would operate very well with a lot of reserve capacity relative to the traffic projections.

54th Street West/Grand Avenue

A traffic signal at the intersection of 54th Street West and Grand Avenue would require auxiliary left-turn bays on the north (SB) and west (EB), as well as dedicated right-turn lanes on the north (SB) and east (WB) approach. The east (WB) and west (EB) approaches would require dual dedicated thru lanes. This configuration would provide LOS C conditions during both peak hours for the intersections as a whole, with manageable queues.

A roundabout for the intersection of 54th Street West and Grand Avenue would require dual entering, circulation and exit lanes for the east and west approaches, as well as a dual left-turn configuration for the north (SB) approach. With that roundabout configuration in place, the intersection would operate very well with substantial reserve capacity on all approaches for Scenario 2.

48th Street West/Grand Avenue

A traffic signal at the intersection of 48th Street West and Grand Avenue would require auxiliary left-turn bays on the east (WB) and south (NB) approaches, as well as auxiliary right-turn bays on the west (EB) and south (NB) approaches. The east (WB) and west (EB) approaches would require dual thru lanes. Although this configuration would provide LOS C or better conditions during both peak hours for the intersections as a whole, the south (NB) approach would experience substandard delay in both the AM and PM peak hours as well as lengthy queues at times. In order to reduce those queues and approach delay, the south approach may benefit from implementation of a northbound dual-right turn lane.

Scenario 2 peak hour traffic demands for the intersection of 48th Street West and Grand Avenue are projected to be high enough that dual approach and receiving lanes on Grand Avenue would still not provide enough capacity through a roundabout during peak period surges. If Scenario 2 traffic demands are realized at some point in the future a roundabout is selected for this intersection, a third eastbound approach and receiving lane would be required along with a northbound dual-

left turn configuration in order to provide acceptable LOS conditions during the AM peak hour. However, dual lanes eastbound and westbound with a northbound dual-left turn would likely provide adequate capacity for a long period of time at this intersection regardless of growth.

48th Street West/Central Avenue

A traffic signal at the intersection of 48th Street West and Central Avenue would require auxiliary left-turn bays on all approaches, in combination with shared thru/right-turn lanes on all approaches. This configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, and east and west approach queues would be lengthy at times. In order to reduce those queues, widening to provide additional thru lanes would be necessary.

For the intersection of 48th Street West and Central Avenue, a roundabout configured with dual lanes for eastbound thru traffic and single lanes for all other movements would provide good operations with substantial reserve capacity. A westbound to northbound right-turn bypass would help alleviate potential for congestion on the east approach during the PM peak.

64th Street West/King Avenue West

A traffic signal at the intersection of 64th Street West and King Avenue West would require auxiliary left-turn bays on all approaches, in combination with shared thru/right-turn lanes on all approaches. This configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, and east and west approach queues would be manageable.

The intersection of 64th Street West and King Avenue West would function well as a roundabout configured with dual lanes for eastbound thru traffic and single lanes for all other movements, with substantial reserve capacity. Additional growth beyond what is projected for Scenario 2 would likely require dual entering and exit lanes for the westbound thru movement as well, though such growth is unlikely to occur during the 20-year horizon period for this study.

48th Street West/King Avenue West

A traffic signal at the intersection of 48th Street West and King Avenue West would require auxiliary left-turn bays on all approaches, in combination with shared thru/right-turn lanes on all approaches. Although this configuration would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, and east and west approach queues would be lengthy at times. In order to reduce those queues, widening to provide additional thru lanes would be necessary.

For the intersection of 48th Street West and King Avenue West, a roundabout configured with dual lanes for eastbound and westbound thru traffic would function very well even for the peak period projections of Scenario 2. No flared approaches or bypass lanes would be required and the intersection would have a substantial amount of reserve capacity.

56th Street West/Hesper Road

The implementation of an all-way stop control at the intersection of 56th Street West and Hesper Road with a shared left-turn, thru, and right-turn lane on all approaches would provide LOS C or better conditions during both peak hours for all approaches, as well as the intersections as a whole, east and minimal queues.

The intersection of 56th Street West and Hesper Road would function very well as a single-lane roundabout. No flared approaches or bypass lines would be required. Reserve capacity would be substantial.

Corridors

Various major streets within the study area were projected to operate below an acceptable LOS D for the Horizon Year (2035) analysis scenarios. This section of the report will stratify those streets into specific segments and provide alternatives for mitigation of the corridor LOS deficiencies for both scenarios. To quantify the value of two-way left-turn lane (or a series of auxiliary left-turn lanes) in terms of added capacity, the project team assumed 3,600 vehicles per day increase, which is 20 percent of the daily capacity for a two lane facility. For a 5-lane cross section, the assumed capacity increase was also 3,600 vehicles per day, utilized a factor of 0.2 lanes for a turn lane that would create a 3-lane section from a 2-lane section or a 5-lane section from a 4-lane section. The thought here was that the added capacity for the lane itself would not change whether it was part of a 3-lane or 5-lane section.

Scenario 1 (2035)

Figure 9 on page 32 provided a graphical representation of the corridor LOS projections for Scenario 1 (2035). **Table 16** below illustrates how the addition of center turn lanes and/or additional thru lanes for impacted corridors would improve V/C ratio and in some cases, LOS. Note that since a center turn lane only provides a 5 percent increase in total volume capacity over and above a 4-lane section (4.2 lanes vs. 4.0 lanes), the 4-lane and 5-lane typical sections were grouped together for the purposes of this planning level analysis.

TABLE 16. SCENARIO 1 (2035) CORRIDOR LOS MITIGATION ANALYSIS RESULTS

Segment	Scenario 1 - No Build		Scenario 1 - Mitigation			
	2 Lanes		3 Lanes		4/5 Lanes	
	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS
King Avenue West - East of 48th Street West	0.87	E	0.72	D	0.39	C or better
King Avenue West - 48th Street West to 56th Street West	0.77	E	0.65	D	0.35	C or better
Grand Avenue - East of 48th Street West	1.11	F	0.92	E	0.5	C or better
Grand Avenue - 48th Street West to 54th Street West	1.02	F	0.85	E	0.46	C or better
Grand Avenue - 54th Street West to 56th Street West	0.82	E	0.68	D	0.37	C or better
Grand Avenue - 56th Street West to 62nd Street West	0.84	E	0.70	D	0.38	C or better
Rimrock Road - East of 54th Street West	1.13	F	0.94	E	0.52	C or better
Rimrock Road - 54th Street West to 62nd Street West	0.77	E	0.64	D	0.35	C or better
62nd Street West - North of Rimrock Road	0.77	E	0.64	D	0.35	C or better

The analysis results show six of the impacted corridor segments could be improved to the required LOS D standard through the addition of a center turn lane or turn bays. However, Grand Avenue from east of 48th Street West to 54th Street West would need to be expanded to a 4-lane or 5-lane typical section in order to achieve LOS D or better corridor capacity results. The same is projected to be true for Rimrock Road east of 54th Street West.

Scenario 2 (2035)

Figure 10 on page 34 provided a graphical representation of the corridor LOS projections for Scenario 2 (2035). **Table 17** on the following page illustrates how the addition of lanes for impacted corridors would improve V/C ratio and in some cases, LOS.

As would be expected the number of corridors segments that would require additional thru lanes in order to meet the LOS D minimum planning standard would increase substantially. Nine (9) of the impacted Scenario 2 (2035) corridor segments would require 4 or 5-lane typical sections in order to achieve LOS D or better corridor metrics. Even with a 4-lane or 5-lane section in place, Grand Avenue would still only project to operate at LOS from east of 48th Street West to 54th Street West and the same is projected to be true for Rimrock Road east of 54th Street West.

TABLE 17. SCENARIO 2 (2035) CORRIDOR LOS MITIGATION ANALYSIS RESULTS

Segment	Scenario 2 - No Build		Scenario 2 - Mitigation			
	2 Lanes		3 Lanes		4/5 Lanes	
	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS
King Avenue West - East of 48th Street West	1.09	F	0.91	E	0.50	C or better
King Avenue West - 48th Street West to 56th Street West	0.98	F	0.81	E	0.44	C or better
King Avenue West - West of 56th Street West	0.81	E	0.67	D	0.37	C or better
Central Avenue - East of 48th Street West	0.76	E	0.63	D	0.34	C or better
Grand Avenue - East of 48th Street West	1.43	F	1.19	F	0.65	D
Grand Avenue - 48th Street West to 54th Street West	1.31	F	1.1	F	0.6	D
Grand Avenue - 54th Street West to 56th Street West	1.05	F	0.88	E	0.48	C or better
Grand Avenue - 56th Street West to 62nd Street West	1.08	F	0.9	E	0.49	C or better
Rimrock Road - East of 54th Street West	1.41	F	1.18	F	0.64	D
Rimrock Road - 54th Street West to 62nd Street West	0.99	F	0.82	E	0.45	C or better
54th Street West - Grand Avenue to Rimrock Road	0.80	E	0.67	D	0.36	C or better
62nd Street West - North of Rimrock Road	0.98	F	0.82	E	0.45	C or better

Another important consideration for the preservation of overall corridor capacity is access management. Access management is a process of regulating public access to and from properties adjacent to a roadway corridor. Common access management tools include curbed medians, driveway consolidation and turn restrictions (e.g. right-in/right-out driveways). Where access is managed, driveways and sidestreets are designed to enable vehicles to enter and leave the roadway with minimal disruption to vehicle flow. Where there is no access management, turning vehicles can increase crash potential, reduce capacity, and erode the mobility of a corridor. The reduction in frequency and severity of crashes is important from a public safety perspective, but crash reduction also improves travel reliability since crash incidents can create substantial traffic congestion. In the context of West Billings, good access management practices may help forestall roadway widening by preserving vehicle capacity. It is noted that the benefits of access management depend on the context of the corridor, and some corridors will benefit from access management more than others.

From a transportation system perspective, the roadway network ideally offers a range of functional types to balance regional mobility and local access. In West Billings, there is relatively poor road network connectivity at the collector level, which forces drivers to rely primarily on the arterial road system. As the region develops, it will be important to create a connected network of collector and local streets to help distribute traffic and minimize the number of accesses on the arterial roads.

RECOMMENDATIONS

7

Intersections and Corridors

Short-Term Priority Projects

Based on the results of the Existing Conditions (2015) and Horizon Year (2035) analyses performed for this study, the following list of street and intersection projects (listed in order of anticipated priority) should be given strong consideration for construction within the next two to ten years. Note that some references to street corridor segments which fall outside of the study are made where it would make sense to include those segments in an actual improvement project. Approximate costs for the projects listed on the following pages are presented in **Tables 18 and 19** on Page 51. The estimated costs do not consider right-of-way, irrigation systems modifications or street lighting other than as associated directly with traffic signals or roundabouts.

Intersections

1. Neibauer Road/56th Street West – it will likely be a surprise to many that this intersection tops the list of recommended short-term priority projects, because traffic volume demands are pretty low in this area. However, the crash and severity rates for this intersection were the second highest of the 19 intersections within the study area. This is likely because intersection sight distance is very poor at this intersection while speeds on the major street (56th Street West) are very high. There are large, mature trees and utility poles that fall within the clear vision triangle on three corners of the intersection and a corn field occupied the fourth intersection corner as of Fall 2015. The intersection is equipped with an overhead flashing beacon for all four approaches, but the crash history implies that more improvements are needed.

   The sight obstructions could be removed, but that might be difficult and/or controversial given that the mature trees are in all three cases in landowner's yards. The other solution would be to implement all-way stop control at this intersection. The traffic volumes are reasonably balanced here. All-way stop control would function well. It would introduce additional delay for northbound/southbound traffic on 56th Street West, which is an unrestricted truck route, but given the crash history and the potential risk for a fatal crash, the Project Team recommends that all-way stop be implemented. The overhead flasher should be converted to red lights on the north and south faces.

Appropriate warning signage should be installed on those approaches as well. The County should also consider installing transverse rumble strips on the north and south intersection approaches to warn drivers of the conversion to all-way stop control. If the conversion is to be installed, a media campaign would also be helpful in notifying drivers of the change.

2. Neibauer Road/48th Street West – similarly, although this intersection had the 2nd lowest average daily entering traffic volume out of the 19 study area intersections, it experienced the 6th highest number of crashes and the third highest number of injury crashes. The crash and severity rates for the intersection were quite easily the highest in the study area. Over half of the total reported crashes resulted in injuries. Unlike the Neibauer Road/56th Street West intersection, it is not immediately apparent why this intersection is experiencing such a negative crash history. There are utility poles on the northwest and northeast (minor approach) corners and also some trees on the northeast corner, but those trees are set back a reasonable distance from both streets. There appears to be an irrigation ditch along north shoulder of the road, west of 48th Street West, the banks for which are higher than the street centerlines. It's certainly possible that when grass grows tall on those banks, vision could be obstructed to the west. Nine of the 12 crashes occurred between late April and late October (seven between early June and late August), but that may not necessarily be indicative of a correlation to vegetation growth. This is an area that experiences farm and ranch-related traffic, but only one of the crashes obviously involved a slow-moving piece of equipment. An examination of the crash reports showed that for eight of the 12 reported crashes, a violation was issued for failure to stop or failure to yield right-of-way.

   Regardless of the lack of a clear cause, the effect has been alarming. Potential mitigation options include installation of an overhead flashing beacon, installation of transverse rumble strips on the minor street approaches and conversion to all-way stop control. The traffic volumes are not very well balanced for this intersection, so a conversion to all-way stop control would introduce delay for what is clearly the more heavily used street (Neibauer Road). Given the history of citations for failure to stop/yield, the Project Team recommends that an overhead flashing beacon be installed at this intersection to provide additional warning of the required stop condition on 48th Street West. This treatment would be consistent with several other rural, high-speed intersections in the area. The County should also consider installing transverse rumble strips on the north and south intersection approaches to provide additional warning to drivers.

3. Rimrock Road/54th Street West Intersection – a traffic signal or roundabout should be installed at this intersection to reduce delay for the minor approaches and improve safety for vehicles and pedestrians. Based on the Horizon Year (2035) scenario traffic projections, a roundabout would be advantageous in that dual eastbound and westbound thru lanes could be provided with short lane drops to the east and west such that a full 4/5-lane section would not be required for a long distance upstream or downstream. Conversely though, a roundabout could require acquisition of right-of-way and would likely be substantially more expensive given that signal may be able to be retrofitted to the existing intersection. If a traffic signal is constructed, consideration should be given to locating signal poles and other infrastructure to accommodate additional future corridor widening for both intersecting streets.

4. King Avenue West/64th Street West Intersection – although this intersection operates at LOS B and LOS A during the AM and PM peaks for existing conditions, both minor approaches operate at LOS D during the AM peak. The crash rate for the intersection was found to be 0.93 crashes/MVE, which falls just below the 1.0 crashes/MVE threshold for concern. It is not likely that traffic signal warrants will be met for this intersection any time soon. However, the MDT auxiliary lane warrant criteria are met for eastbound left turn and right-turn lanes. The addition of these auxiliary turn lanes (as well as a westbound left-turn lane to mirror the eastbound lane) would improve intersection capacity and would likely improve safety conditions as well and therefore should be strongly considered in

the near-term. Prior to construction of these improvements, consideration should also be given to whether a traffic signal or roundabout is to be constructed for future traffic control at the intersection.

5. Grand Avenue/48th Street West Intersection – the traffic impact study for Ben Steele Middle School (*West End Middle School TIS, Sanderson Stewart, September 2015)* stated that all three traffic volume-based MUTCD traffic signal warrants are projected to be met for this intersection once the new school is open and generating traffic demand. Although the intersection may operate at LOS C or better without traffic control improvements, the south (minor) approach will continue to degrade in terms of peak hour delays and queuing. As such, a traffic signal or roundabout should be planned for implementation at this intersection within the next two to four years. By the time Scenario 1-level traffic demands are realized, both intersection types would require dual thru lanes in both directions on Grand Avenue, but it's highly likely that Grand Avenue would have a 5-lane typical section upstream and downstream of this intersection at that point anyway. In this case, the two intersection types seem to be very similar in terms of performance. It's also worth noting that the MPO Functional Classification map shows a future Collector connection from this intersection north and east to tie into 46th Street West, south of Rimrock Road. That connection could change traffic patterns substantially in this area. Therefore, the recommendation is that either a roundabout or traffic signal be constructed with careful consideration given to the future expansion of Grand Avenue and the timing of that future connection to the north.

6. Molt Road/Rimrock Road/62nd Street West Intersection – this "intersection" is currently made up of three intersections, two of which have approach alignment characteristics that do not meet current AASHTO standards relative to intersection skew. Also, the offsets between the actual Rimrock Road/62nd Street intersection and the intersections on Molt Road are such that there is not much space for queuing. The actual intersection of Rimrock Road and 62nd Street West also exhibited a high crash and severity rate during the 5-year crash analysis period for this study with the majority of the collisions being of a right-angle nature. The collisions most likely result from minor approach (EB/WB) cars misjudging the speed or intentions of southbound vehicles exiting Molt Road onto 62nd Street West.

   This intersection area has been studied in the past to try to determine how best to improve the configuration for both safety and operation's sake. For the purposes of the Horizon Year (2035) analysis for this study, it was assumed that all traffic on all three of the associated streets would be routed through one intersection. Since additional development may be forthcoming soon in this area, it is recommended that a new project is planned to finalize at least a design for improvements at this location. From an operational standpoint, construction could potentially be delayed for several years depending upon the pace of development in this area.

7. Grand Avenue/56th Street West – this intersection is could realize a degradation in AM peak hour operations within a relatively short time frame after Ben Steele Middle School opens if land development continues to occur in that area as expected. The TIS for this school projects a very palatable AM peak hour LOS even for the stop-controlled minor (south) approach. However, schools often have a unique impact on traffic operations by virtue of the surges in traffic that they generate. As such, operations will need to be monitored for this intersection to determine how well it is handling traffic demands after the school is operational. A single-lane roundabout (with bypasses) or a relatively simple lane configuration with a traffic signal would provide excellent operations for this intersections up to and beyond a traffic demand level consistent with the Scenario 1 projections. Pedestrian traffic control will be a key consideration for the intersection given its proximity to the school. In addition, this intersection will need to operate in cooperation with either a traffic signal or roundabout at the Grand Avenue/54th Street West intersection. The decision on whether a traffic signal or roundabout is to be implemented at the 56th Street West intersection should be based on those factors, as well as cost and right-of-way considerations.

There are two other intersections in the study area that should be monitored in the short-term relative to their respective crash histories. The intersection of Central Avenue and 48th Street West has a slightly elevated crash rate (1.29 crashes/MVE), but of more concern is the relative severity of the crashes. Six of the nine reported crashes during the analysis period resulted in injuries, which pushes the severity rate up to 3.01 (compared to a study area average of 2.03). Four of those crashes resulted in citations for failure to yield right-of-way. A physical observation of the intersection showed that there is a stand of trees on the northeast corner of the intersection that in combination with a trio of utility poles, could obstruct vision for north approach vehicles to the east. The intersection is already fitted with overhead flashers and oversized stop signs with supplementary signs that say "CROSS TRAFFIC DOES NOT STOP." Regardless, the intersection should be monitored to determine if the high frequency and severity of crashes continues, in which case additional measures may be necessary.

The intersection of Hesper Road and 56th Street West also exhibited crash (1.44 crashes/MVE) and severity (2.64) rates that were substantially above average for the study area. Half of the crashes were right-angle collisions, but only two citations were written for failure-to-yield. Sight distance at the intersection appears to be relatively good, though there could be periods of time where crops serve as a sight obstruction on the northwest corner of the intersection. Again, the recommendation is that the intersection be monitored going forward to determine if additional action is needed.

Corridors

1. Grand Avenue – Shiloh Road to 52nd Street West – this segment of Grand Avenue should be widened to three lanes at a minimum in the near future to improve capacity and safety. However, if funding allows, strong consideration should be given to additional capacity-building improvements, since the analysis from this study shows that a 3-lane section will most likely not be adequate for maintaining LOS D or better operations for the Horizon Year (2035) even if only Scenario 1 growth is realized.

2. Rimrock Road – 50th Street West to 54th Street West – Rimrock Road currently carries three lanes from 50th Street West to the east. That three-lane section may need to be extended to 54th Street West, although depending on the timing of the project, the analysis in this study projects that Rimrock Road will need a 4 or 5-lane section in order to provide acceptable LOS operations for the Horizon Year (2035), much like for Grand Avenue above. However, the segment of Rimrock Road to the east of 50th Street West was recently reconstructed, so it's not likely that it will be reconstructed again as a 4/5-lane facility in the short-term. Therefore, it may make sense to extend the 3-lane section on Rimrock Road in conjunction with a roundabout or traffic signal project at the intersection of Rimrock Road and 54th Street West.

3. King Avenue West – Montana Sapphire Drive to 48th Street West – this segment of King Avenue West may need to be widened to three lanes within the short-term project timeframe. This will depend largely upon the progression of development west of 44th Street West. For the purposes of planning for future funding needs, it is recommended that this improvement be considered.

4. Grand Avenue – Wilderness Drive to 62nd Street West – this segment of Grand Avenue may need to be widened to three lanes as depending upon the progression of land development along its frontage and in the area of the Rimrock Road/62nd Street West intersection. As such, it should be considered strongly in the short-term improvements plans in the coming years.

Figure 12 on the following page provides a graphical depiction of the locations, priority and features associated with the short-term priority project recommendations from this study.

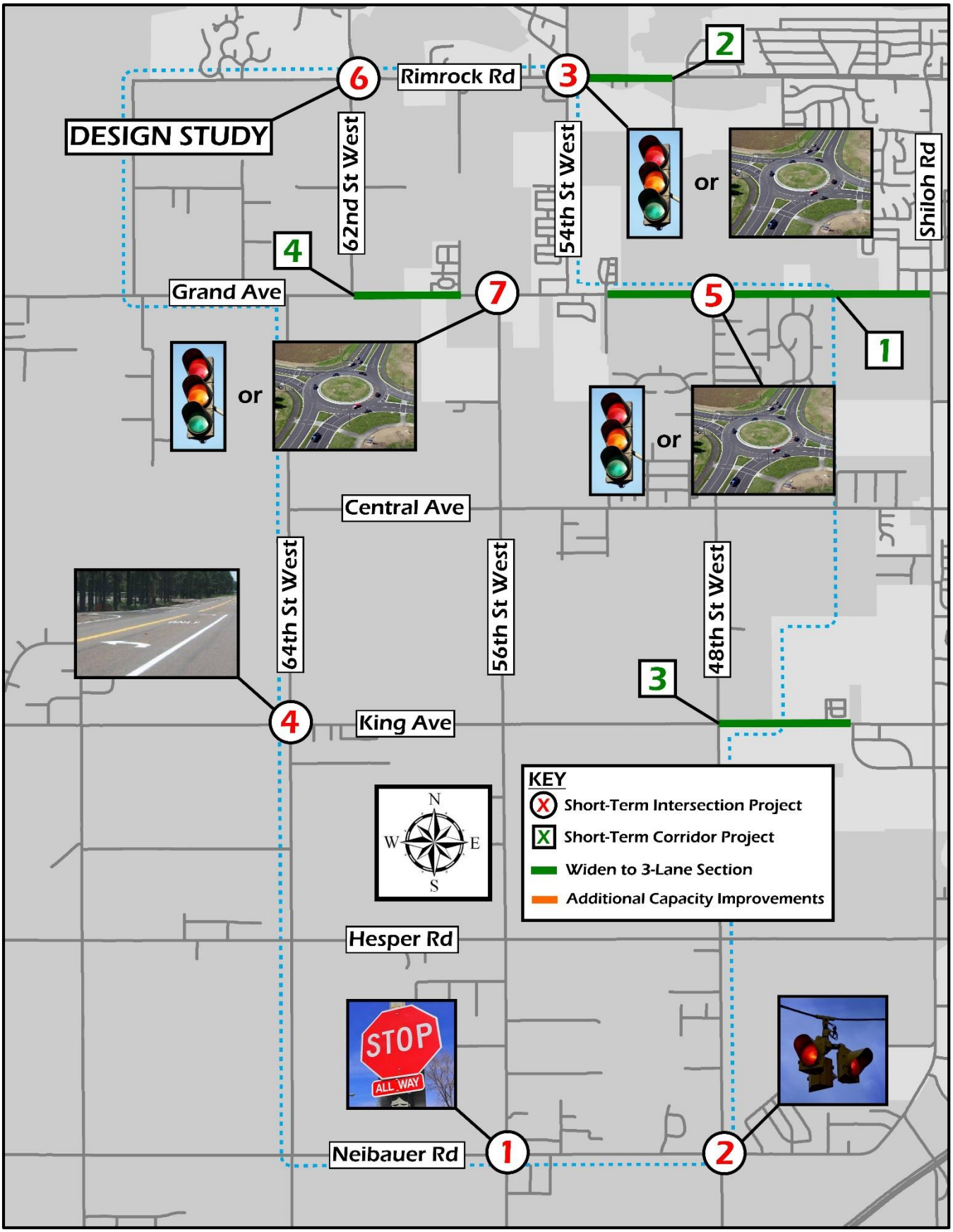


FIGURE 12 – SHORT-TERM PRIORITY STREET & INTERSECTION PROJECTS

TABLE 18. SHORT-TERM INTERSECTION PROJECT ESTIMATED CONSTRUCTION COSTS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Neibauer Rd. & 56th St. West	All-Way Stop Control/OH Flashing Beacons/Transverse Rumble Strips	$120,000-$200,000
2	Neibauer Rd. & 48th St. West	OH Flashing Beacons/Transverse Rumble Strips	$120,000-$200,000
3	Rimrock Rd. & 54th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
4	King Ave. West & 64th St. West	Auxiliary Turn Lanes	$400,000-$600,000
5	Grand Ave. & 48th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
6	Molt Rd./Rimrock Rd./62nd St. West	Design Study	$20,000-$30,000
7	Grand Ave. & 56th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000

TABLE 19. SHORT-TERM CORRIDOR PROJECT ESTIMATED CONSTRUCTION COSTS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Grand Ave. - Shiloh Rd. to 52nd St. West	Widening/Reconstruction (3-lane section)	$2,800,000-$4,500,000
2	Rimrock Rd. - 50th St. West to 54th St. West	Widening/Reconstruction (3-lane section)	$1,000,000-$1,600,000
3	King Ave. West - MT Sapphire Dr. to 48th St. West	Widening/Reconstruction (3-lane section)	$1,300,000-$2,000,000
4	Grand Ave. - Wilderness Dr. to 62nd St. West	Widening/Reconstruction (3-lane section)	$900,000-$1,400,000

Long-Term Priority Projects

The following list of projects will be needed in order to maintain safe and efficient traffic operations conditions with the study area. These projections are anticipated to be needed in addition to those identified as Short-Term Priority projects. Approximate costs for the projects listed on the following pages are presented in **Tables 20 and 21** on Page 55. The estimated costs do not consider right-of-way, irrigation systems modifications or street lighting other than as associated directly with traffic signals or roundabouts.

Intersections

1. Molt Road/Rimrock Road/62nd Street West Intersection – this intersection was referenced in the short-term priority project section, but the minimum recommendation was simply to commission a design study and program a project for planning purposes. Since this project may or may not be constructed as a short-term improvement, we are including it here with a formal recommendation for reconstruction of the intersection as a traffic signal or roundabout depending upon results of the design study.

2. King Avenue West/48th Street West Intersection – for this intersection, single thru lanes on King Avenue West would provide reasonably good operations for even Scenario 2 traffic demand projections, albeit with some pretty lengthy queues once you reach those demand levels. This is because there are a relatively small number of eastbound and westbound left-turn movements projected such that a protected left-turn phase would not necessarily be required even for Scenario 2. Conversely, a roundabout would be susceptible to extended queuing and potential short-term breakdowns on the east and west approaches during peak period surges even for Scenario 1. Those concerns could be addressed through the implementation of dual eastbound and westbound thru lanes. However, unless the major street left-turn demand grows to a point where protected left-turn phasing is required on the King Avenue West approaches, a traffic signal would seem to be a more cost-effective solution for this intersection.

3. Central Avenue/48th Street West Intersection – this intersection shares very similar operational characteristics to the King Avenue West/48th Street West intersection. A traffic signal with single eastbound and westbound thru lanes would handle projected traffic demands up to and beyond Scenario 2, whereas a roundabout would require dual entry

and receiving lanes east and west. As such, a traffic signal is recommended as the planned improvement for the intersection once traffic signal warrants are met and/or peak hour operations degrade substantially.

4. King Avenue West/64th Street West Intersection - it was previously recommended as a short-term project that auxiliary turn lanes be constructed on King Avenue West at 64th Street West to improve capacity (slightly) and safety for the intersection. However, it is also likely that improvements to traffic control will be required well before the advent of the Horizon Year of 2035. While either a traffic signal or roundabout would function well here for both Scenarios 1 and 2, a roundabout for Scenario 2 would need dual eastbound thru lanes. For that reason and given that the previously recommended auxiliary turn lanes would be sacrificial if a roundabout was constructed, a traffic signal would make more sense at this location in terms of a planning level recommendation now.

5. Grand Avenue/62nd Street West Intersection – this intersection would be served well for both Horizon Year (2035) traffic projection scenarios by either a traffic signal with auxiliary turn lanes or a single-lane roundabout. That being the case, right-of-way impacts and a comparison of cost should be considered prior to making a final decision on what type of intersection traffic control is to be programmed. It's also worth noting here that the MPO Functional Classification map shows a future Principal Arterial connection from this intersection to the north end of 64th Street West (which currently dead-ends north of Central Avenue). Such a connection would likely change traffic patterns for this intersection, possibly quite significantly.

6. Hesper Road/56th Street West Intersection – the intersection of Hesper Road and 56th Street West projects to fail during the AM peak hour for Scenario 2, though it would meet the minimum LOS criteria for Scenario 1. The Project Team's analysis showed that the deficiencies at this intersection could be addressed by implementing all-way stop control. That's not surprising given that the traffic demand is relatively balanced across the four approaches (at least during the peak hours). Traffic signal warrants would not be met for this intersection unless growth occurs much more rapidly than has been projected through Scenario 2 from this study, which is unlikely. A roundabout would also certainly address the AM peak LOS problems, but would be a very costly improvement for a problem that is projected to be isolated to the AM peak hour. All that taken into account, it shouldn't be necessary to plan or commit improvements for this project any time soon. If the intersection starts to break down at some point, all-way stop control.

The study area intersections not specifically referenced in the preceding sections are projected to operate acceptably from a peak hour LOS standpoint through both scenarios of the Horizon Year (2035) and they don't have recent crash history characteristics that raise specific concerns at this time. However, it is certainly possible that as traffic demand increase over time, safety concerns could arise for any of those intersections. As such, crash histories should be re-revaluated periodically to determine if improvements may be necessary to maintain safe operations. Likewise, as growth occurs, variations in traffic patterns could cause the projected impacts in the study area to very relative to the results of this study. As such, periodic re-evaluation of study area intersection and corridor operations is also recommended.

Corridors

1. Grand Avenue – Shiloh Road to 62nd Street West – if the segment of Grand Avenue from Shiloh Road to 54th Street West is not widened to a 4/5-lane section via an initial reconstruction project (as recommended in the Short-Term Priority Project section), that segment as a 3-lane street could very well remain as the highest priority project relative to V/C ratio. In addition, the segment of Grand Avenue from 54th Street West to 62nd Street West is projected to require 4 or 5 lanes based on Scenario 2 growth for the year 2035. At a minimum, it is recommended that plans be laid for Grand Avenue to be widened to 4/5 lanes from Shiloh Road to 54th Street West and three lanes from 54th Street West to 62nd Street West.

2. Rimrock Road – Shiloh Road to 62nd Street West – similarly, Rimrock Road projects to need 4/5 lanes from Shiloh Road to 62nd Street West for Scenario 2. At a minimum, it should be planned that Rimrock Road will be a 5-lane facility to 54th Street West and a 3-lane facility from 54th Street West to 62nd Street West.

3. King Avenue West – Montana Sapphire Drive to 64th Street West – the short-term priority project list included an expansion of King Avenue West to three lanes from Montana Sapphire Drive to 48th Street West. Longer-term, that 3-lane facility would likely need to extend to 56th Street West and possibly beyond. If the more aggressive growth progression is realized, four or five lanes may be necessary to 48th Street West or even to 56th Street West with the three-lane section needed as far west as 72nd Street West. The recommendation here is that the MPO plans long-term for 4/5 lanes from Montana Sapphire Drive to 48th Street West and three lanes from 48th Street West to 64th Street West.

4. 54th Street West – Grand Avenue to Rimrock Road – 54th Street West is projected to require a 3-lane section at some point in the future. That lane configuration is projected to be adequate for either growth scenario. This is one street segment that could benefit from the construction of future planned collectors or arterials as identified on the MPO functional classification map. The completion of 58th Street West between Grand Avenue and Rimrock Road would relieve some traffic demand on 54th Street West, as may the connection between 48th Street West (at Grand Avenue) to 46th Street West, south of Rimrock Road. Even so, it is recommended that the widening of 54th Street West to a 3-lane section be included in future CIP documents.

5. Central Avenue – Shiloh Road to 48th Street West – this segment of Central Avenue is projected to need three lanes if growth surpasses the Scenario 1 projection level and approaches the Scenario 2 level. The timing for that need will likely depend upon whether or not the rural agricultural properties along this segment are developed within the next 20 years. Our expectation is that development will progress in this corridor since water and sewer facilities are stubbed into Central Avenue part way into this stretch. As such, it is recommended that this widening improvement be programmed for long-term plans.

6. 62nd Street West – Rimrock Road to Western Bluffs Drive – the urgency of any improvement to this stretch of road depends largely upon what happens with the trio of intersections that were previously discussed in this chapter. If an intersection reconstruction occurs that results in Molt Road traffic being funneled through the Rimrock Road/62nd Street West intersection, widening to three lanes or even 4/5 lanes will be required. For the purposes of this study, it is recommended that 3-lane section is planned for this stretch of roadway.

Figure 13 in the following page provides a graphical representation of the location, priority and features associated with the long-term priority street and intersection project recommendations from this study.

As with the intersections, any study area street corridor segments not specifically referenced in the preceding pages is not projected to experience substandard corridor LOS conditions for either of the Horizon Year (2035) traffic projection scenarios. However, as development patterns change, those corridors may need to be monitored accordingly.

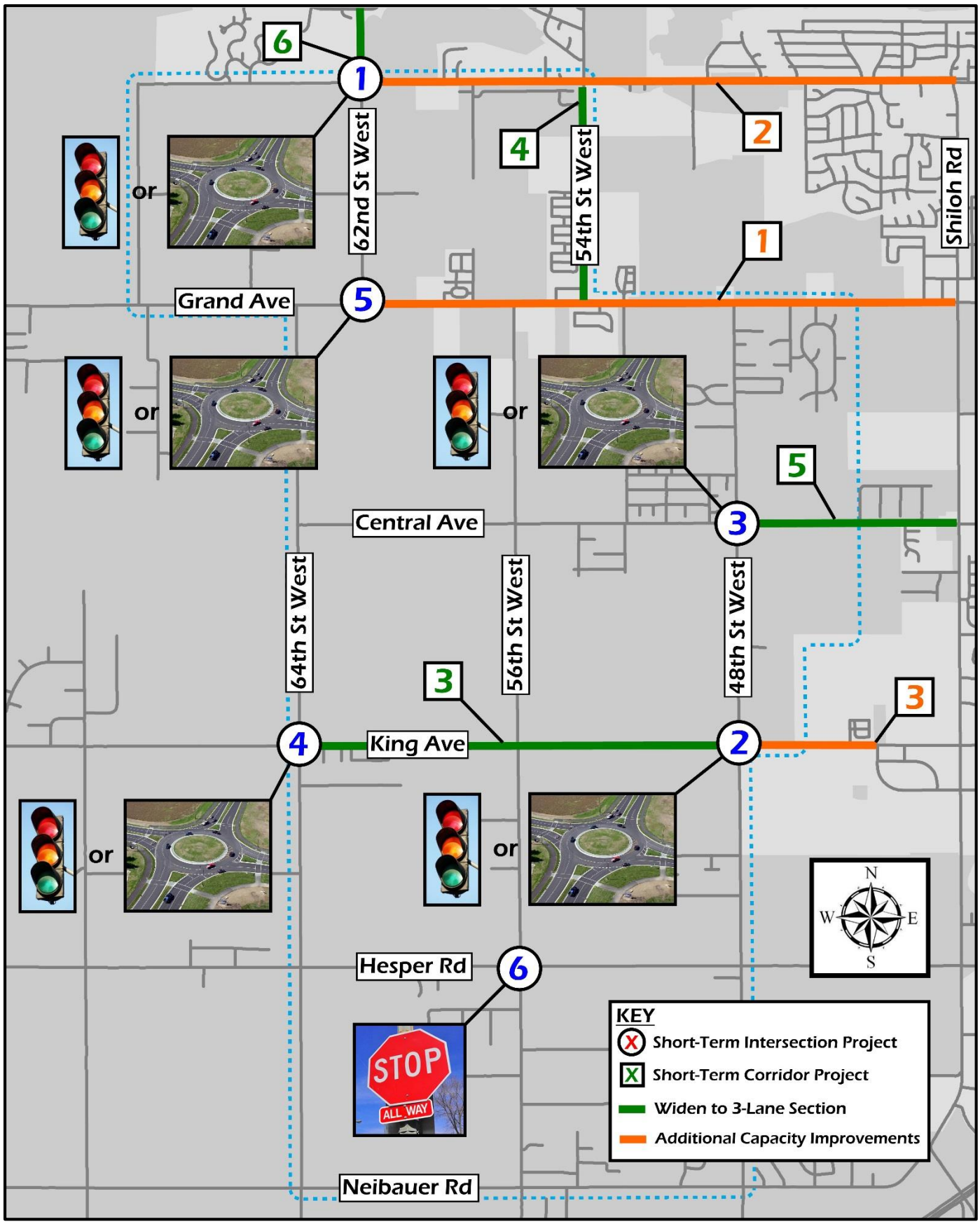


FIGURE 13 – LONG-TERM PRIORITY STREET & INTERSECTION PROJECTS

TABLE 20. LONG-TERM INTERSECTION PROJECT ESTIMATED CONSTRUCTION COSTS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Molt Rd./Rimrock Rd./62nd St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
2	King Ave. West & 48th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
3	Central Ave. & 48th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
4	King Ave. West & 64th St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
5	Grand Ave. & 62nd St. West	Traffic Signal or Roundabout	$400,000-$1,500,000
6	Hesper Rd. & 56th St. West	All-Way Stop	$4,000-$200,000

TABLE 21. LONG-TERM CORRIDOR PROJECT ESTIMATED CONSTRUCTION COSTS

Priority Ranking	Project Location	Project Type	Estimated Cost
1	Grand Ave. - Shiloh Rd. to 62nd St. West	Widening/Reconstruction (5-lane section)	$7,500,000-$11,000,000
2	Rimrock Rd. - Shiloh Rd. to 62nd St. West	Widening/Reconstruction (5-lane section/3-lane section)	$6,900,000-$10,300,000
3	King Ave. West - MT Sapphire Dr. to 64th St. West	Widening/Reconstruction (5-lane section/3-lane section)	$6,100,000-$9,300,000
4	54th St. West - Grand Ave. to Rimrock Rd.	Widening/Reconstruction (3-lane section)	$2,100,000-$3,300,000
5	Central Ave. - Shiloh Rd. to 48th St. West	Widening/Reconstruction (3-lane section)	$2,000,000-$3,100,000
6	62nd St. West - Rimrock Rd. to Western Bluffs Dr.	Widening/Reconstruction (3-lane section)	$700,000-$1,100,000

Active Transportation Recommendations

Combining the Latent Demand Model and Level of Traffic Stress, it is clear which geographic areas are most likely to generate walk/bike trips (based on land use) and that the existing arterial roadway network does not provide facilities the majority of people would feel comfortable using. Given the rural context of the area now, and understanding that over the next 20 years only a portion of the study area will begin to urbanize, this plan recommends a combination of short-term to meet immediate needs and long-term strategies that can leverage development-driven infrastructure.

Short-term Strategies

On-street Bicycle Facilities

There are few strategies for high-speed rural roads beyond shoulder widening; based on guidance for rural roadways from Minnesota Department of Transportation Bikeway Facility Design Manual and the AASHTO Guide for Development of Bicycle Facilities, a paved shoulder of six to eight feet is recommended to provide enough lateral separation to minimize wind blasts and other effects. However, the current arterial roadway system in the study area is likely to continue to exhibit high levels of traffic stress (LTS4) for bicyclists even if the roads are widened to provide better shoulders or on-street bike facilities, as long as speeds are higher than 35 mph and there is no physical separation from traffic. Speed limit modifications should be carefully considered, since arbitrarily lowering the speed limit below the design speed and/or the 85th-percentile speed can have negative unintended consequences for infractions and safety.

This means that widened arterials are not likely to attract or accommodate cyclists, except for the most confident user group. Furthermore, there is a significant amount of roadway centerline miles in the southern and western study area that are not likely to see even modest levels of demand in the near future. As such, the recommended strategies for short-term improvements focus on key corridors where there are gaps between existing land uses and existing trail/path systems (**Figure 14**, page 55):

- 54th Street from Rimrock Road to Grand Avenue
- 48th Street from Central Avenue to Grand Avenue

- Grand Avenue from 58th Street to Shiloh Road
- Central Avenue from 56th Street to Shiloh Road

Improvements could include shoulder widening to provide ridable space (five to eight feet of pavement left of the white line), protected bike lane ("cycletrack"), and sidewalks or sidepaths. Providing parallel multi-use pathways designed to serve both pedestrians and bicycles should be a focus to better accommodate the needs of multiple user groups. In many instances this road expansion could have major impacts to utilities and private property.

Pedestrian Facilities

Near-term improvements for pedestrian facilities should focus on improving sidewalk connectivity with neighborhoods and providing crosswalks in the on the corridors shown in green in Figure 12. In many instances the pedestrian facilities can be complementary with the bikeways, by providing wider (eight to ten feet) sidewalks that function as sidepaths. In general, as intersection modifications are made to accommodate vehicle traffic, consideration should be given to accommodate safe pedestrian crossings.

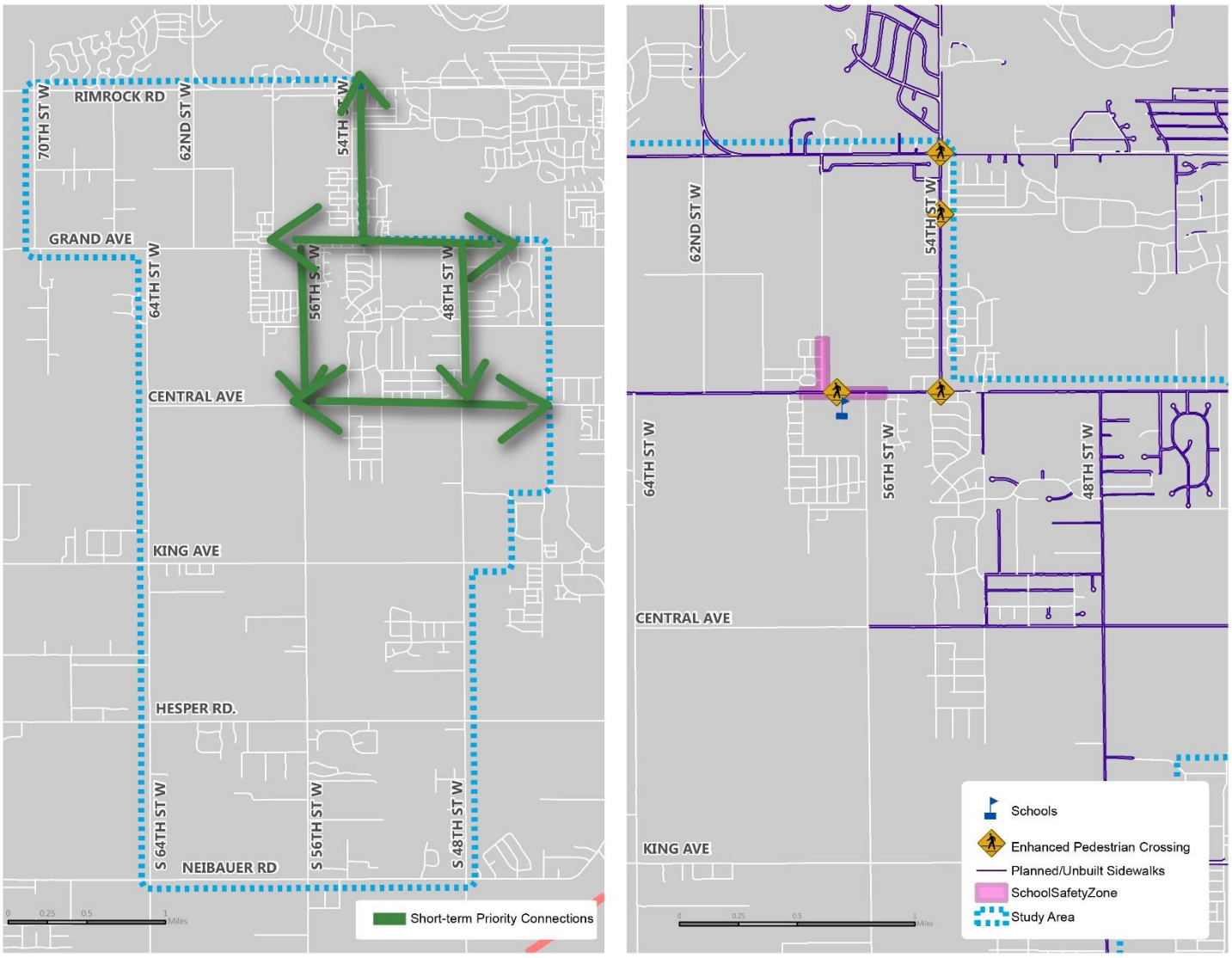


FIGURE 14 – SHORT-TERM IMPROVEMENTS FOR ON-STREET BICYCLE AND PEDESTRIAN FACILITIES

Crosswalks (note the following recommendations are planning-level, and the final determination of traffic control and safety measures should be based on an engineering study of prevailing vehicle patterns and pedestrian demand):

- Grand Ave/54th Street: crosswalk enhancements, possibly a traffic signal, to improve pedestrian safety near school zone
- Grand Avenue midway between 56th Street West and 58th Street West: pedestrian actuated mid-block beacon, possibly a pedestrian hybrid beacon ("HAWK signal") or rectangular rapid flashing beacon (RRFB)
- 54th Street West at terminus of multi-use path (north end of Cottonwood Park): pedestrian actuated mid-block beacon, possibly a pedestrian hybrid beacon ("HAWK signal") or rectangular rapid flashing beacon (RRFB)
- Rimrock Road/54th Street: crosswalk enhancements, possibly a traffic signal, to connect multi-use paths

Sidewalks:

- Multi-use path on Grand Ave from 52nd Street West to west boundary of Trails West Subdivision
- Sidewalk on Grand Ave from west boundary of Foxtail Subdivision to HAWK signal
- Multi-use path from Grand Avenue to north boundary of Cottonwood Park along west side of 54th Street West
- Sidewalk along east side of 54th Street West from Grand Avenue to north boundary of Grand Peaks Subdivision

Long-term Strategies

Except for local roads developed for master planned neighborhoods, there are few existing roadways internal to the arterial system. There is, however, a master plan (Functional Classification Map) for local and collector street system. The construction of those streets over time, if developed with multi-modal considerations directly in mind, could create a network of low-stress streets with organic active transportation facilities. This "layered network" principle is a way as to provide comfortable bike and pedestrian connectivity instead of force-fitting all modes onto the arterial corridors. Furthermore, a more developed collector street system can help disperse vehicle traffic and avoid over-reliance on arterial roadways. Since many of these future collector corridors are platted but not built, it is an ideal time to establish the roadway standards that incorporate bike lanes, sidewalks, and modest speed limits. In the event that some of the major arterials become more urbanized over time, with speed limit reductions and bike facilities they could also become useful low-stress bikeways. Recommended long-term low-stress corridors are (**Figure 15,** Page 58):

- 58th Street from Rimrock Road to Grand Avenue
- 66th Street from Rimrock Road to Grand Avenue
- 60th Street corridor
- 52nd Street corridor
- Monad Road
- Broadwater Avenue
- Colton Blvd

As shown by the black dashed lines in **Figure 15** (next page), this system of collector streets can also be linked by trail connectors similar to the way the Big Ditch Trail connects with local neighborhood streets. There are several planned multi-use pathways in the Long Range Transportation Plan that would complement a system of low-stress streets. Future pathway segments should be prioritized based on the proximity to high demand areas and the ability of the segment to provide connectivity through barriers and gaps in the street system.

Physical improvements and locations aside, the most important recommendation from a multi-modal transportation system perspective is that the City of Billings and Yellowstone County coordinate to implement a consistent and stringent set of

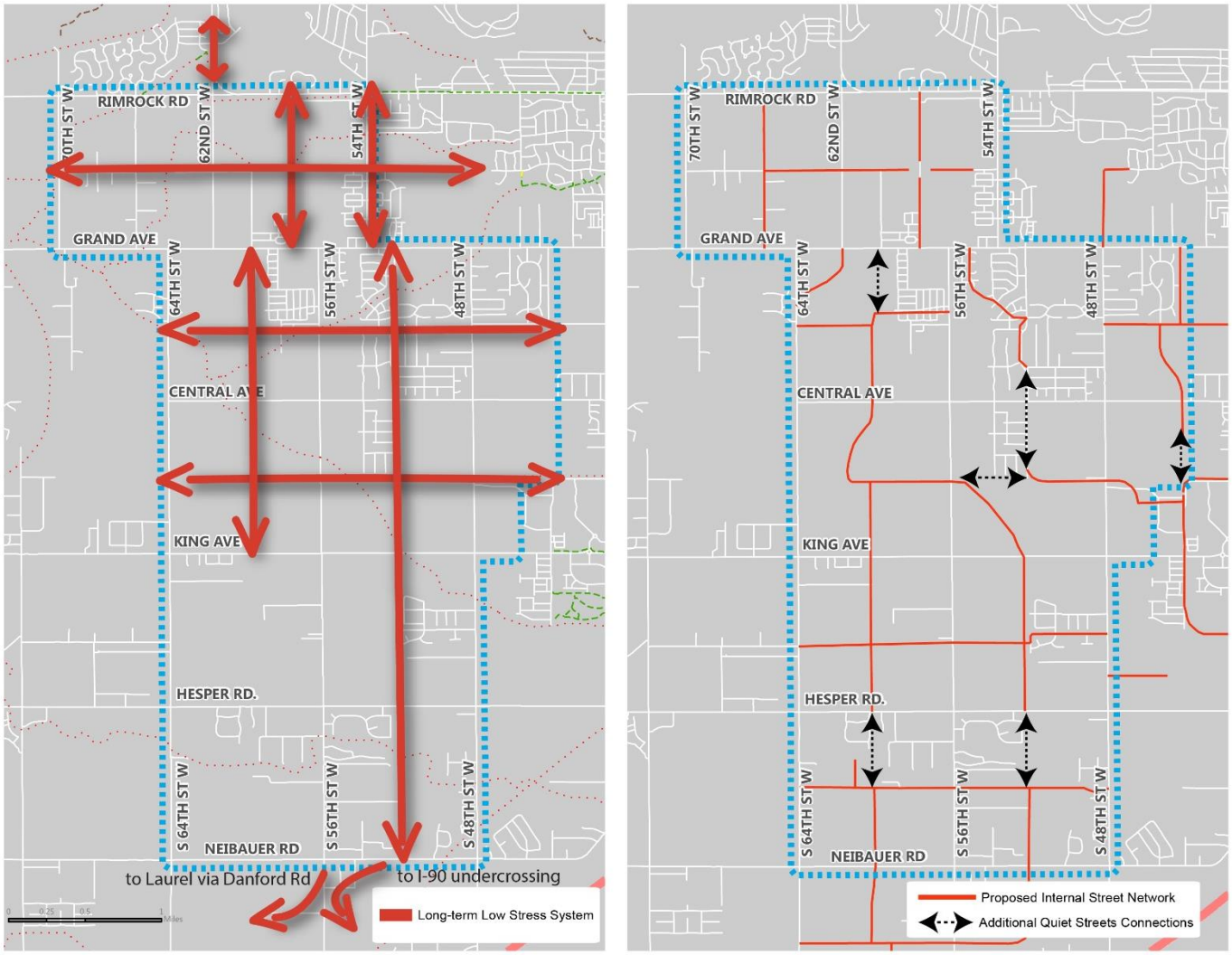


FIGURE 15 – LONG-TERM ACTIVE TRANSPORTATION STRATEGIES

requirements for the subdivision of land that requires dedication of right-of-way and construction of facilities to further the mission of expanding and improving safety for the multi-modal travel environment. If the development of multi-modal facilities becomes an integral part of the land development process, the system will inherently improve and expand in the general locations where demand for those facilities is also most likely to grow and the potential costs associated with independent multi-modal facility projects can be partially if not wholly defrayed.

APPENDIX A
TRAFFIC COUNT DATA

SANDERSON STEWART

FEHR & PEERS

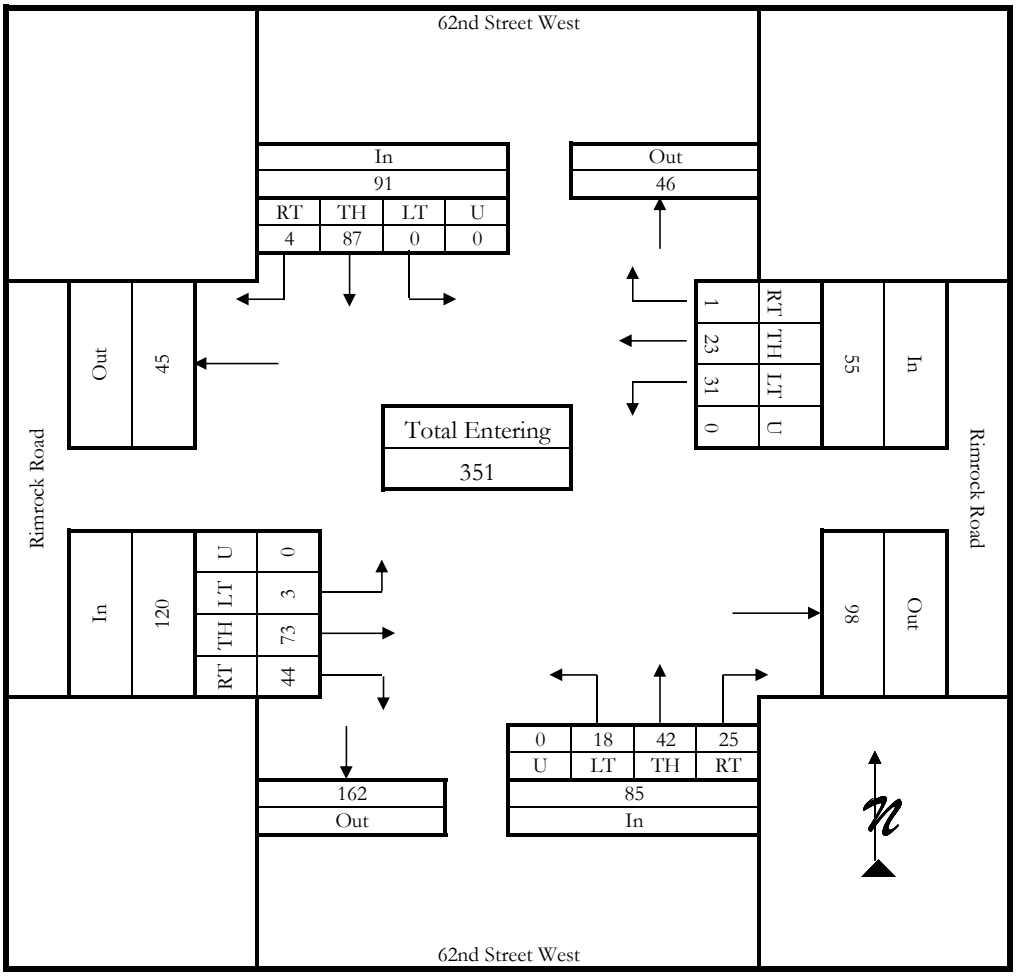
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Rimrock Road & 62nd Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Friday, May 29, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:30 - 8:30 AM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	62nd Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	62nd Street West Southbound					62nd Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	0.93	0.93	0.93	0.93		0.93	0.93	0.93	0.93		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:30 AM	0	29	0	0	29	9	7	0	0	16	13	26	0	0	39	0	4	8	0	12	96
7:45 AM	0	30	0	0	30	5	7	6	0	18	14	22	1	0	37	1	8	12	0	21	106
8:00 AM	2	11	0	0	13	5	10	3	0	18	8	14	1	0	23	0	3	6	0	9	63
8:15 AM	2	17	0	0	19	6	18	9	0	33	9	11	1	0	21	0	8	5	0	13	86
Grand Total	4	87	0	0	91	25	42	18	0	85	44	73	3	0	120	1	23	31	0	55	351
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.4	3.2	0.0	14.5	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.4	3.2	0.0	14.5	
Total %	1.1	24.8	0.0	0.0	25.9	7.1	12.0	5.1	0.0	24.2	12.5	20.8	0.9	0.0	34.2	0.3	6.6	8.8	0.0	15.7	100.0
PHF	0.76	0.76	0.76			0.64	0.64	0.64			0.77	0.77	0.77			0.65	0.65	0.65			0.83



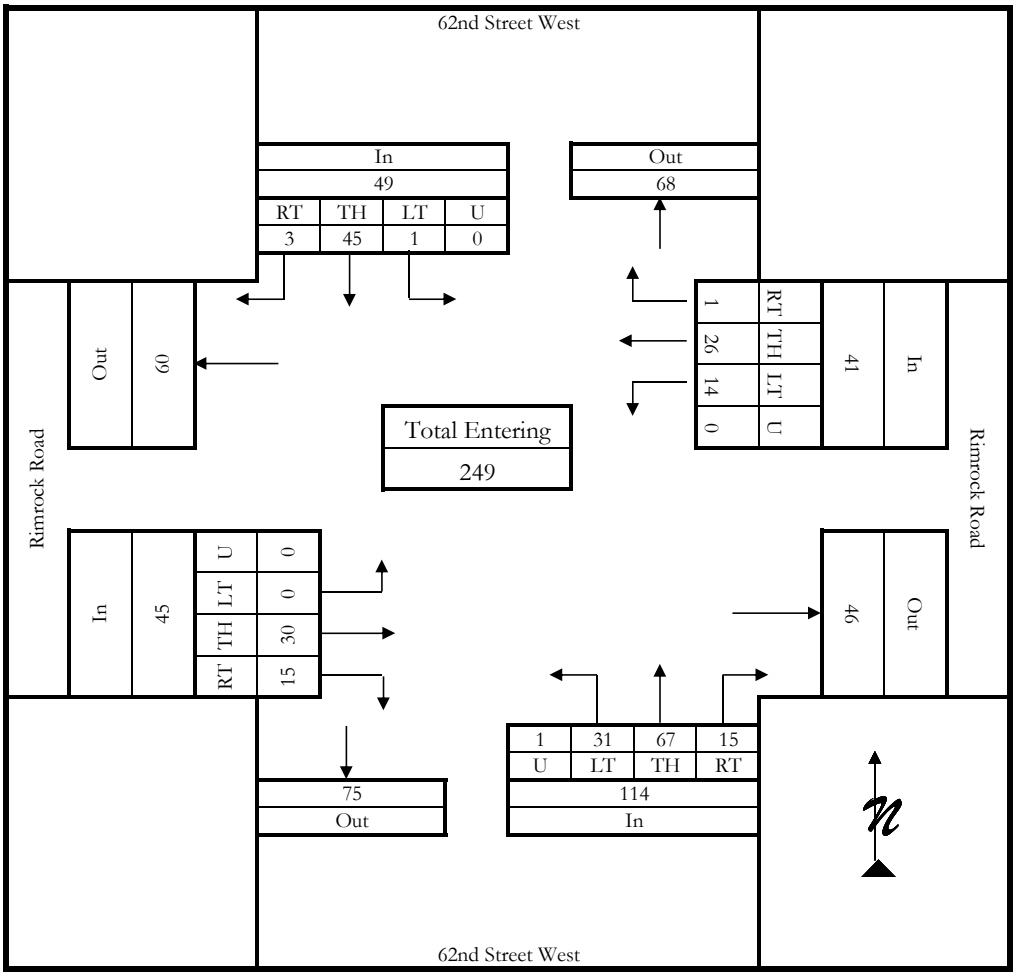
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Rimrock Road & 62nd Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, May 28, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (3:30 - 4:30 PM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	62nd Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	62nd Street West Southbound					62nd Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
3:30 PM	0	13	0	0	13	3	21	7	0	31	3	6	0	0	9	1	10	3	0	14	67
3:45 PM	1	8	1	0	10	4	12	8	0	24	2	6	0	0	8	0	4	4	0	8	50
4:00 PM	1	15	0	0	16	6	15	7	1	29	4	9	0	0	13	0	9	2	0	11	69
4:15 PM	1	9	0	0	10	2	19	9	0	30	6	9	0	0	15	0	3	5	0	8	63
Grand Total	3	45	1	0	49	15	67	31	1	114	15	30	0	0	45	1	26	14	0	41	249
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	33.3	2.2	0.0	0.0	4.1	6.7	1.5	3.2	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	33.3	2.2	0.0	0.0	4.1	6.7	1.5	3.2	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	1.2	18.1	0.4	0.0	19.7	6.0	26.9	12.4	0.4	45.8	6.0	12.0	0.0	0.0	18.1	0.4	10.4	5.6	0.0	16.5	100.0
PHF	0.77	0.77	0.77			0.92	0.92	0.92			0.75	0.75	0.75			0.73	0.73	0.73			0.90



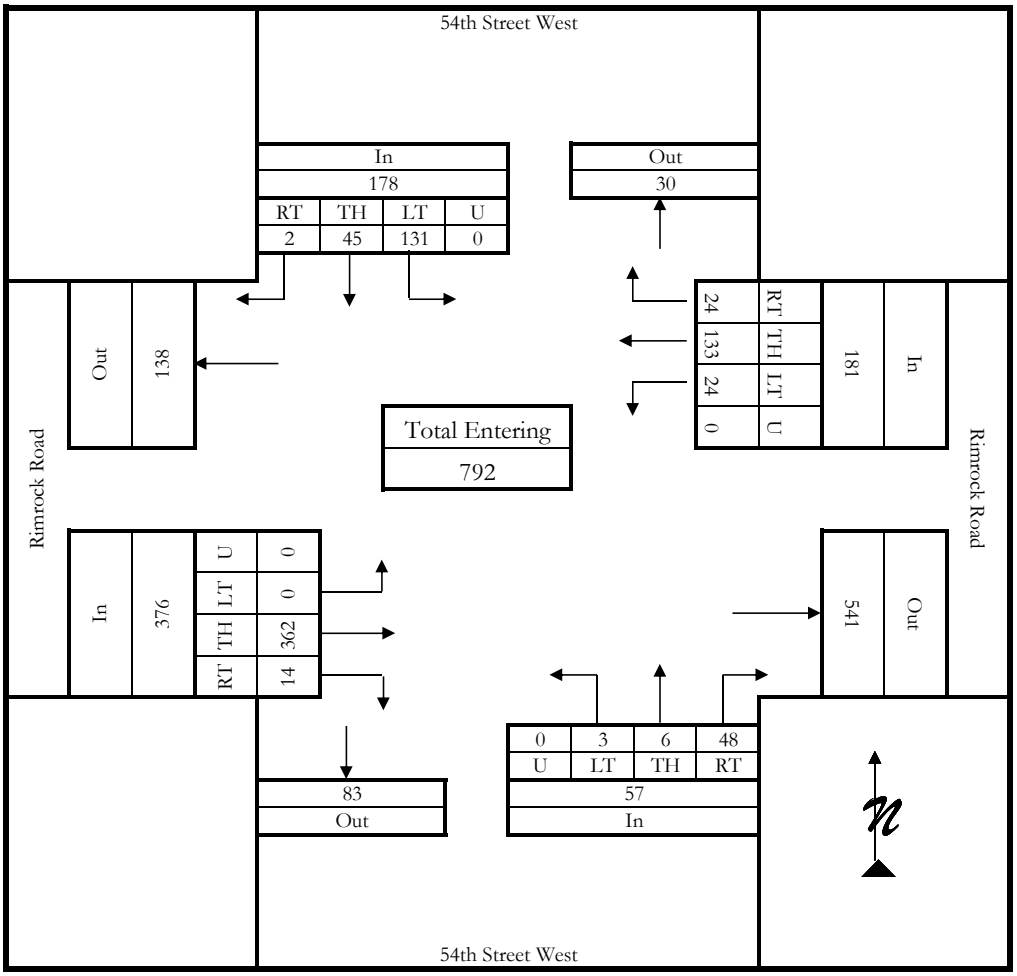
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Rimrock Road & 54th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, May 14, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	54th Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	54th Street West Southbound					54th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
7:15 AM	1	11	34	0	46	6	1	1	0	8	3	80	0	0	83	4	30	3	0	37	174
7:30 AM	0	12	34	0	46	13	1	0	0	14	4	130	0	0	134	6	24	7	0	37	231
7:45 AM	1	15	25	0	41	10	2	1	0	13	4	83	0	0	87	5	39	7	0	51	192
8:00 AM	0	7	38	0	45	19	2	1	0	22	3	69	0	0	72	9	40	7	0	56	195
Grand Total	2	45	131	0	178	48	6	3	0	57	14	362	0	0	376	24	133	24	0	181	792
Medium Truck %	50.0	2.2	0.8	0.0	1.7	8.3	0.0	33.3	0.0	8.8	7.1	3.0	0.0	0.0	3.2	12.5	10.5	12.5	0.0	11.0	
Heavy Truck %	50.0	0.0	0.0	0.0	0.6	4.2	0.0	0.0	0.0	3.5	0.0	0.3	0.0	0.0	0.3	0.0	0.0	4.2	0.0	0.6	
Total Truck %	100.0	2.2	0.8	0.0	2.2	12.5	0.0	33.3	0.0	12.3	7.1	3.3	0.0	0.0	3.5	12.5	10.5	16.7	0.0	11.6	
Total %	0.3	5.7	16.5	0.0	22.5	6.1	0.8	0.4	0.0	7.2	1.8	45.7	0.0	0.0	47.5	3.0	16.8	3.0	0.0	22.9	100.0
PHF	0.97	0.97	0.97			0.65	0.65	0.65			0.70	0.70	0.70			0.81	0.81	0.81			0.86



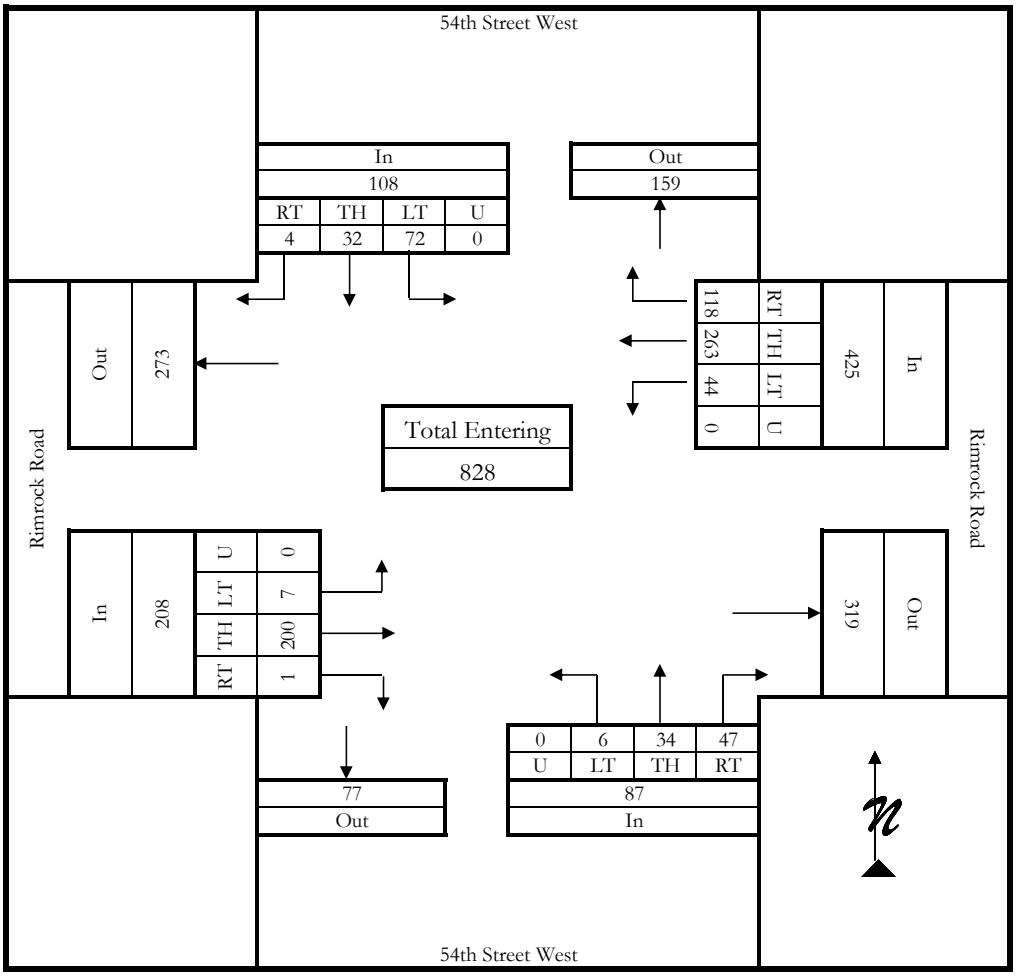
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Rimrock Road & 54th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, May 14, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	54th Street West	East/West Street:	Rimrock Road

Vehicle Volumes and Adjustments

	54th Street West Southbound					54th Street West Northbound					Rimrock Road Eastbound					Rimrock Road Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
4:45 PM	2	9	14	0	25	15	11	3	0	29	0	45	3	0	48	27	72	6	0	105	207
5:00 PM	0	6	21	0	27	12	6	2	0	20	0	53	1	0	54	32	42	14	0	88	189
5:15 PM	1	7	18	0	26	10	5	1	0	16	0	57	3	0	60	31	76	15	0	122	224
5:30 PM	1	10	19	0	30	10	12	0	0	22	1	45	0	0	46	28	73	9	0	110	208
Grand Total	4	32	72	0	108	47	34	6	0	87	1	200	7	0	208	118	263	44	0	425	828
Medium Truck %	0.0	0.0	1.4	0.0	0.9	4.3	0.0	0.0	0.0	2.3	0.0	2.0	14.3	0.0	2.4	0.0	0.0	4.5	0.0	0.5	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	0.0	1.4	0.0	0.9	4.3	0.0	0.0	0.0	2.3	0.0	2.0	14.3	0.0	2.4	0.0	0.0	4.5	0.0	0.5	
Total %	0.5	3.9	8.7	0.0	13.0	5.7	4.1	0.7	0.0	10.5	0.1	24.2	0.8	0.0	25.1	14.3	31.8	5.3	0.0	51.3	100.0
PHF	0.90	0.90	0.90			0.75	0.75	0.75			0.87	0.87	0.87			0.87	0.87	0.87			0.92



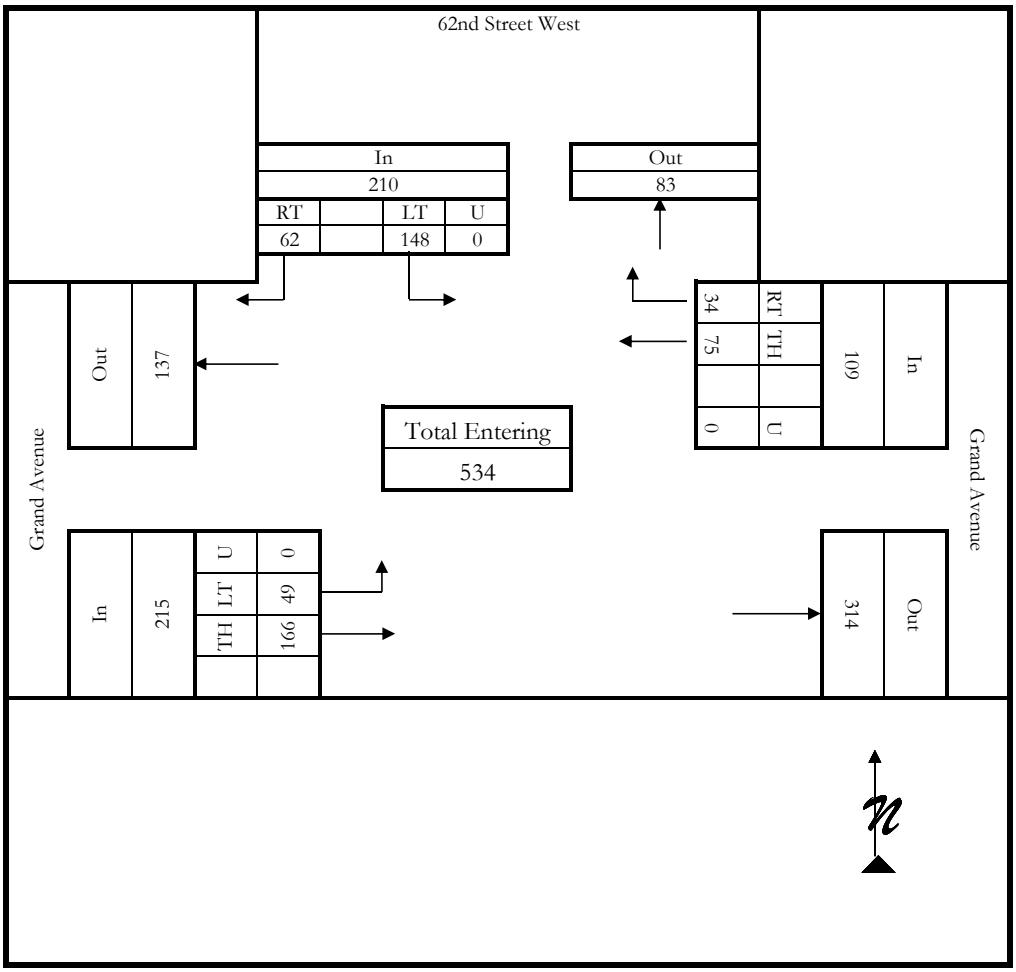
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 62nd Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	62nd Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	62nd Street West Southbound					Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	0.96	0.96	0.96	0.96		0.00	0.00	0.00	0.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
7:15 AM	18	0	29	0	47	0	0	0	0	0	0	38	11	0	49	5	19	0	0	24	120
7:30 AM	9	0	43	0	52	0	0	0	0	0	0	46	16	0	62	8	16	0	0	24	138
7:45 AM	19	0	47	0	66	0	0	0	0	0	0	43	11	0	54	7	20	0	0	27	147
8:00 AM	16	0	29	0	45	0	0	0	0	0	0	39	11	0	50	14	20	0	0	34	129
Grand Total	62	0	148	0	210	0	0	0	0	0	0	166	49	0	215	34	75	0	0	109	534
Medium Truck %	4.8	0.0	1.4	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	4.8	6.1	0.0	5.1	5.9	2.7	0.0	0.0	3.7	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	1.3	0.0	0.0	1.8	
Total Truck %	4.8	0.0	1.4	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	4.8	6.1	0.0	5.1	8.8	4.0	0.0	0.0	5.5	
Total %	11.6	0.0	27.7	0.0	39.3	0.0	0.0	0.0	0.0	0.0	0.0	31.1	9.2	0.0	40.3	6.4	14.0	0.0	0.0	20.4	100.0
PHF	0.80	0.80	0.80			0.00	0.00	0.00			0.87	0.87	0.87			0.80	0.80	0.80			0.91



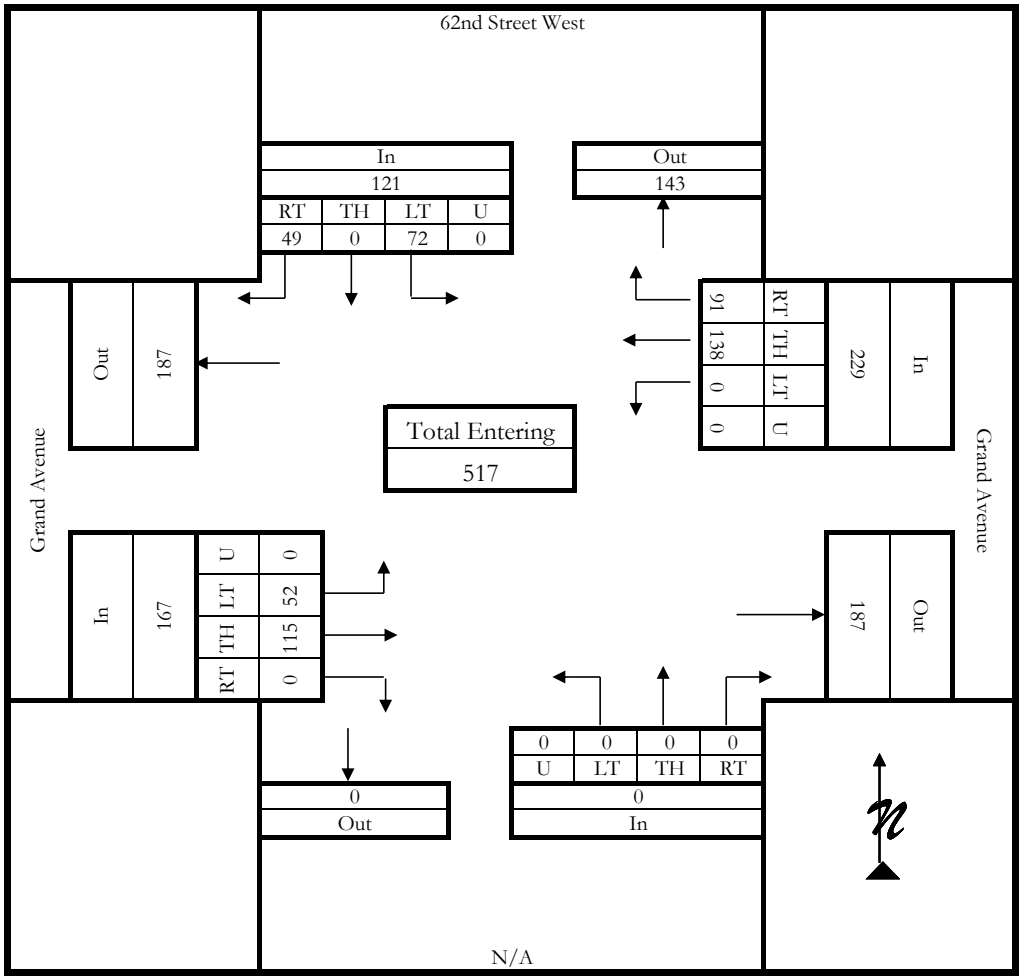
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 48th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	62nd Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	62nd Street West Southbound					N/A Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
4:45 PM	11	0	16	0	27	0	0	0	0	0	0	29	15	0	44	22	29	0	0	51	122
5:00 PM	14	0	16	0	30	0	0	0	0	0	0	31	14	0	45	19	33	0	0	52	127
5:15 PM	14	0	27	0	41	0	0	0	0	0	0	27	13	0	40	28	40	0	0	68	149
5:30 PM	10	0	13	0	23	0	0	0	0	0	0	28	10	0	38	22	36	0	0	58	119
Grand Total	49	0	72	0	121	0	0	0	0	0	0	115	52	0	167	91	138	0	0	229	517
Medium Truck %	2.0	0.0	2.8	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.9	0.0	1.8	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.4	
Total Truck %	2.0	0.0	2.8	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.9	0.0	1.8	0.0	0.7	0.0	0.0	0.4	
Total %	9.5	0.0	13.9	0.0	23.4	0.0	0.0	0.0	0.0	0.0	0.0	22.2	10.1	0.0	32.3	17.6	26.7	0.0	0.0	44.3	100.0
PHF	0.74	0.74	0.74			0.00	0.00	0.00			0.93	0.93	0.93			0.84	0.84	0.84			0.87



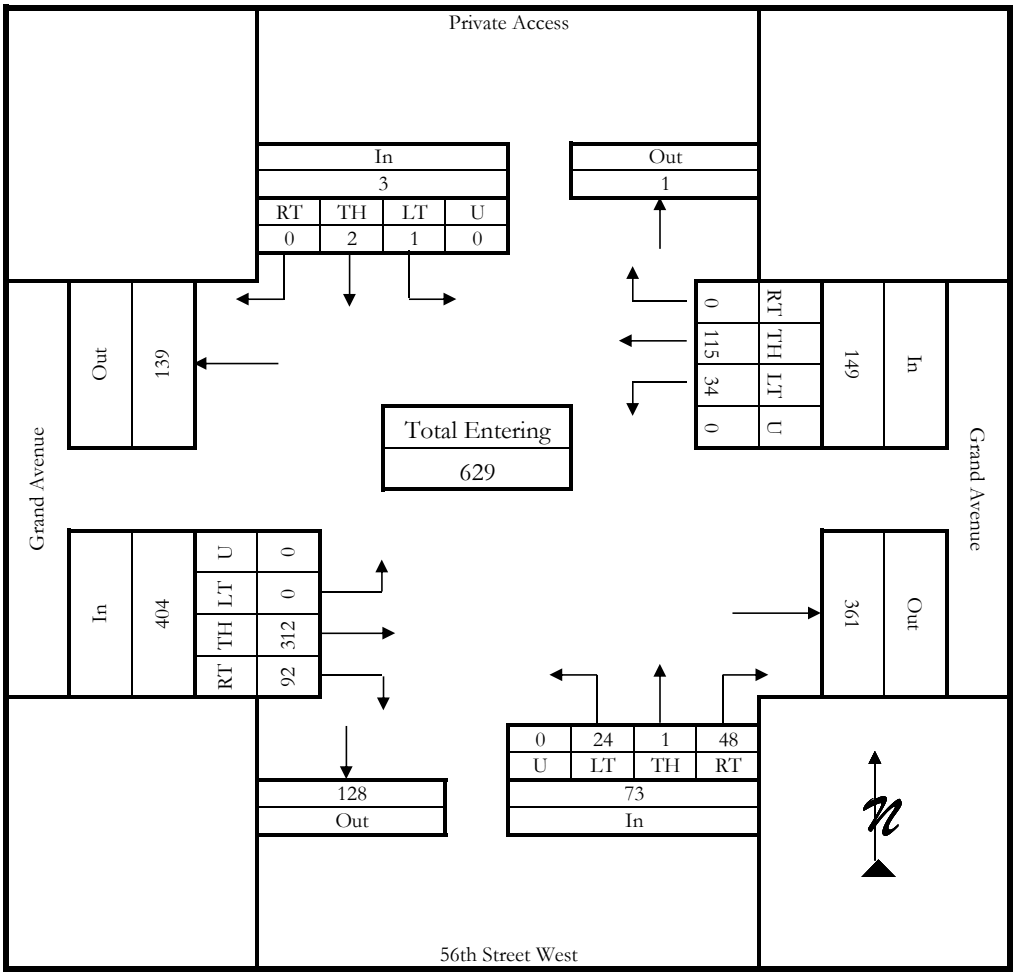
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 56th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	56th Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	Private Access Southbound					56th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
7:15 AM	0	0	1	0	1	9	0	4	0	13	18	72	0	0	90	0	28	9	0	37	141
7:30 AM	0	0	0	0	0	10	1	4	0	15	28	86	0	0	114	0	27	7	0	34	163
7:45 AM	0	2	0	0	2	17	0	7	0	24	30	83	0	0	113	0	24	14	0	38	177
8:00 AM	0	0	0	0	0	12	0	9	0	21	16	71	0	0	87	0	36	4	0	40	148
Grand Total	0	2	1	0	3	48	1	24	0	73	92	312	0	0	404	0	115	34	0	149	629
Medium Truck %	0.0	0.0	0.0	0.0	0.0	18.8	100.0	4.2	0.0	15.1	2.2	1.9	0.0	0.0	2.0	0.0	7.8	2.9	0.0	6.7	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.9	8.8	0.0	2.7	
Total Truck %	0.0	0.0	0.0	0.0	0.0	25.0	100.0	4.2	0.0	19.2	2.2	1.9	0.0	0.0	2.0	0.0	8.7	11.8	0.0	9.4	
Total %	0.0	0.3	0.2	0.0	0.5	7.6	0.2	3.8	0.0	11.6	14.6	49.6	0.0	0.0	64.2	0.0	18.3	5.4	0.0	23.7	100.0
PHF	0.38	0.38	0.38			0.76	0.76	0.76			0.89	0.89	0.89			0.93	0.93	0.93			0.89



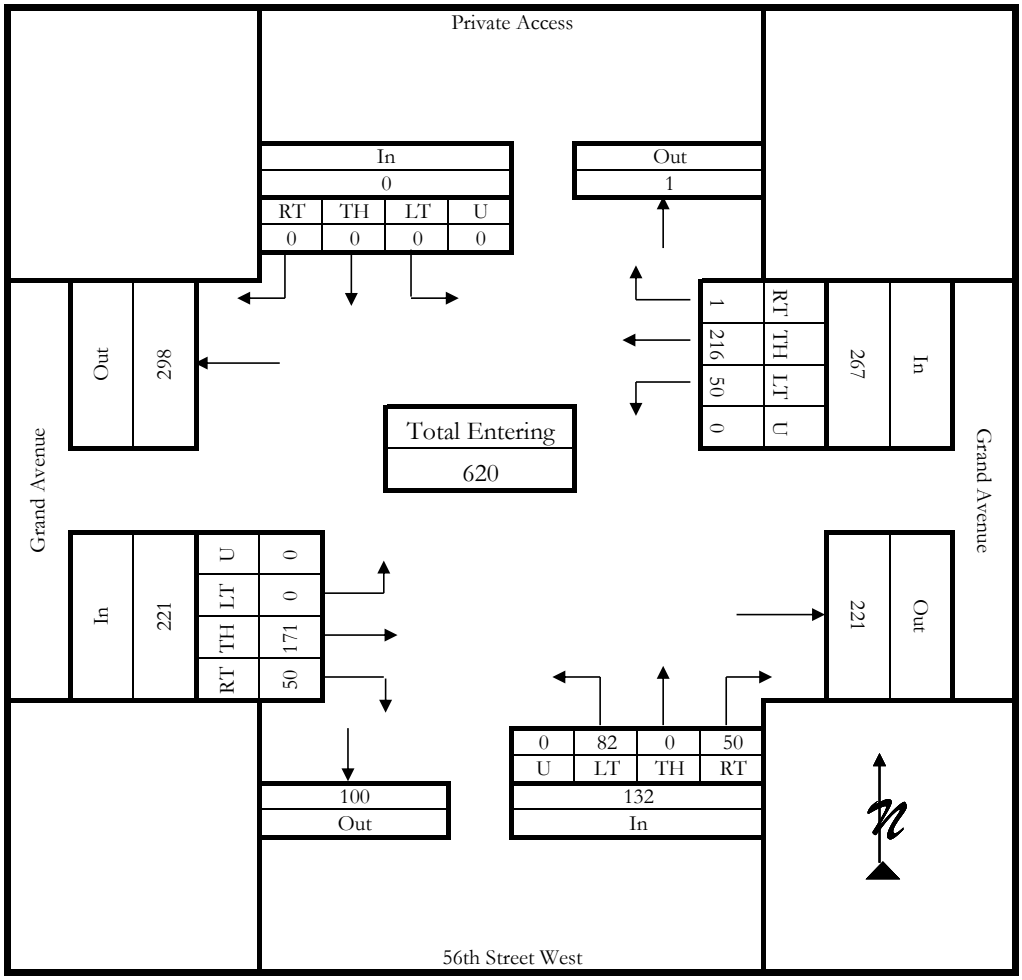
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 56th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	56th Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	Private Access Southbound					56th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
4:45 PM	0	0	0	0	0	8	0	16	0	24	11	43	0	0	54	0	50	9	0	59	137
5:00 PM	0	0	0	0	0	18	0	16	0	34	17	47	0	0	64	1	52	16	0	69	167
5:15 PM	0	0	0	0	0	14	0	30	0	44	14	41	0	0	55	0	58	14	0	72	171
5:30 PM	0	0	0	0	0	10	0	20	0	30	8	40	0	0	48	0	56	11	0	67	145
Grand Total	0	0	0	0	0	50	0	82	0	132	50	171	0	0	221	1	216	50	0	267	620
Medium Truck %	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	2.3	2.0	2.3	0.0	0.0	2.3	0.0	0.0	16.0	0.0	3.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.0	0.0	0.7	
Total Truck %	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	3.0	2.0	2.3	0.0	0.0	2.3	0.0	0.5	18.0	0.0	3.7	
Total %	0.0	0.0	0.0	0.0	0.0	8.1	0.0	13.2	0.0	21.3	8.1	27.6	0.0	0.0	35.6	0.2	34.8	8.1	0.0	43.1	100.0
PHF	0.00	0.00	0.00			0.75	0.75	0.75			0.86	0.86	0.86			0.93	0.93	0.93			0.91



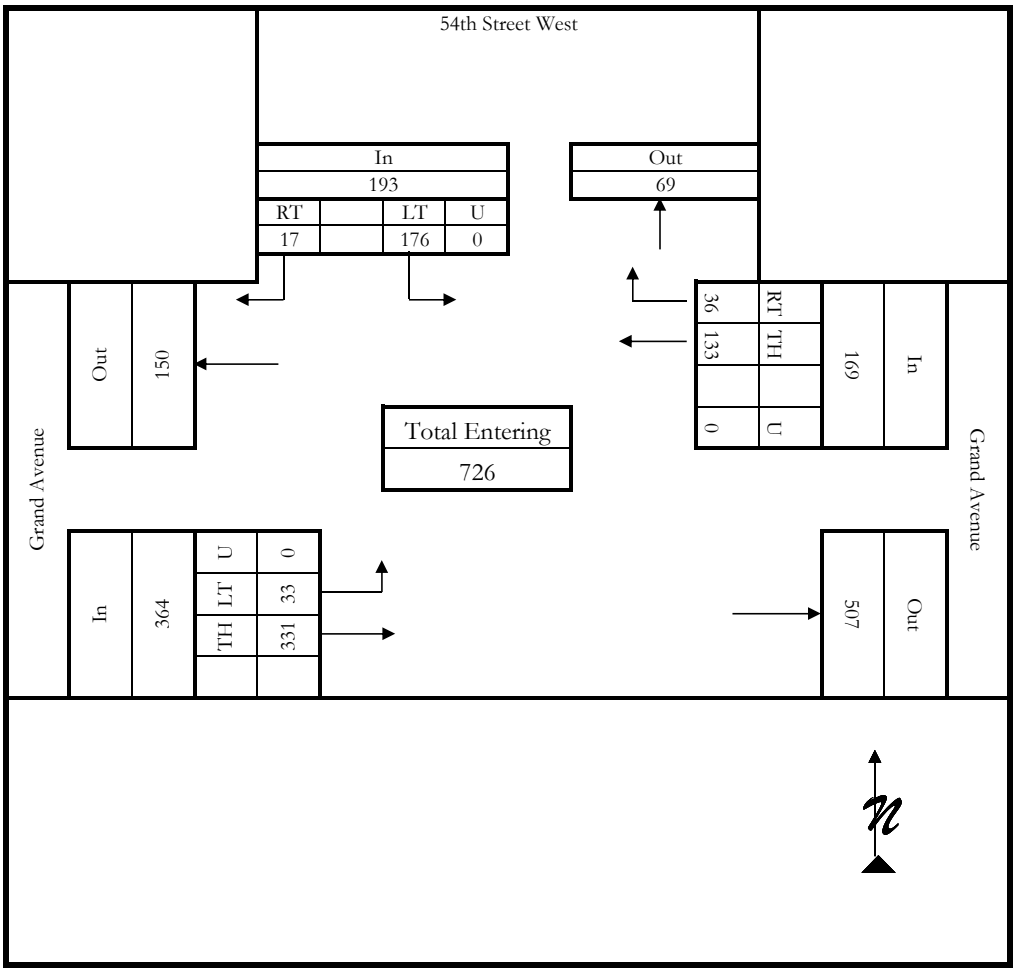
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 54th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	54th Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	54th Street West Southbound					Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
7:15 AM	2	0	44	0	46	0	0	0	0	0	0	75	7	0	82	7	36	0	0	43	171
7:30 AM	5	0	45	0	50	0	0	0	0	0	0	86	10	0	96	7	31	0	0	38	184
7:45 AM	9	0	42	0	51	0	0	0	0	0	0	93	5	0	98	8	27	0	0	35	184
8:00 AM	1	0	45	0	46	0	0	0	0	0	0	77	11	0	88	14	39	0	0	53	187
Grand Total	17	0	176	0	193	0	0	0	0	0	0	331	33	0	364	36	133	0	0	169	726
Medium Truck %	0.0	0.0	2.8	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	2.4	24.2	0.0	4.4	22.2	8.3	0.0	0.0	11.2	
Heavy Truck %	5.9	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	0.0	0.5	0.0	1.5	0.0	0.0	1.2	
Total Truck %	5.9	0.0	2.8	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	2.4	30.3	0.0	4.9	22.2	9.8	0.0	0.0	12.4	
Total %	2.3	0.0	24.2	0.0	26.6	0.0	0.0	0.0	0.0	0.0	0.0	45.6	4.5	0.0	50.1	5.0	18.3	0.0	0.0	23.3	100.0
PHF	0.95	0.95	0.95			0.00	0.00	0.00			0.93	0.93	0.93			0.80	0.80	0.80			0.97



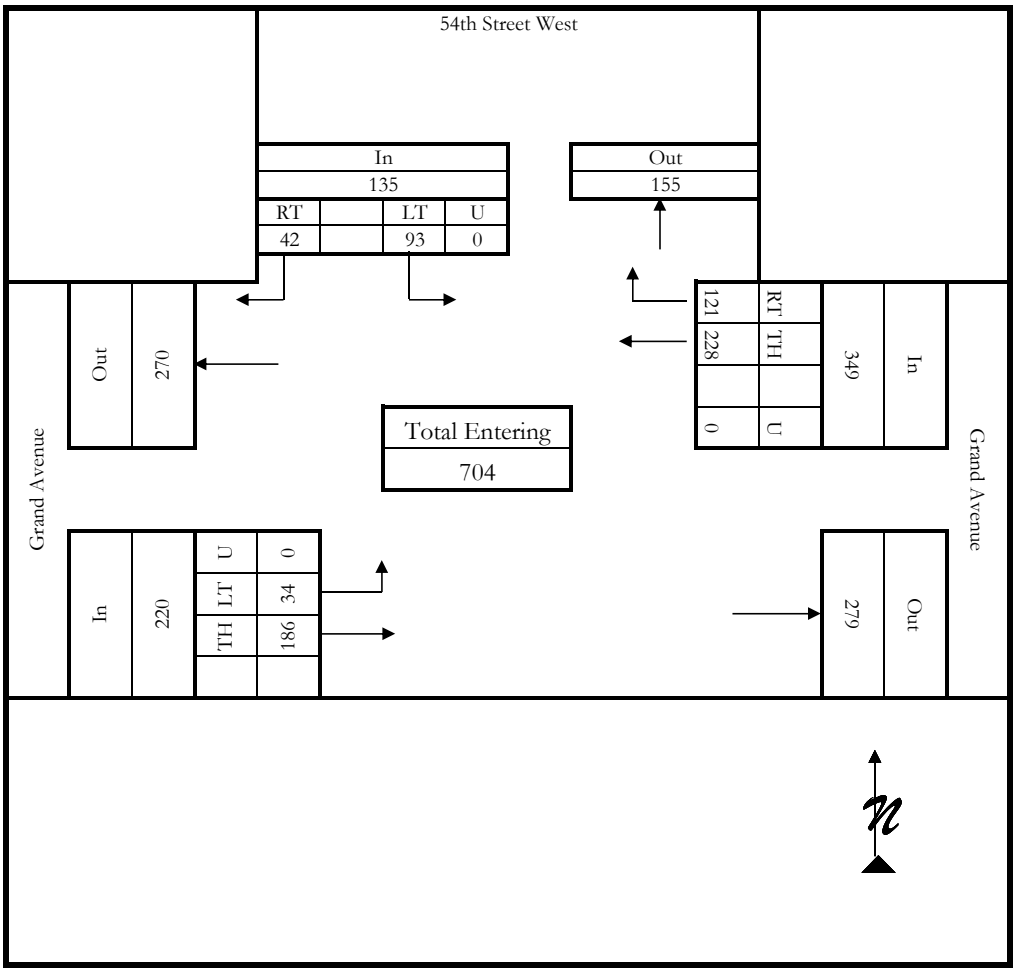
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 54th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	54th Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	54th Street West Southbound					Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
4:45 PM	9	0	27	0	36	0	0	0	0	0	0	49	4	0	53	30	51	0	0	81	170
5:00 PM	9	0	23	0	32	0	0	0	0	0	0	53	13	0	66	24	62	0	0	86	184
5:15 PM	12	0	18	0	30	0	0	0	0	0	0	42	11	0	53	33	61	0	0	94	177
5:30 PM	12	0	25	0	37	0	0	0	0	0	0	42	6	0	48	34	54	0	0	88	173
Grand Total	42	0	93	0	135	0	0	0	0	0	0	186	34	0	220	121	228	0	0	349	704
Medium Truck %	16.7	0.0	1.1	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.9	0.0	2.7	0.8	0.0	0.0	0.0	0.3	
Heavy Truck %	2.4	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.9	0.0	0.0	0.6	
Total Truck %	19.0	0.0	1.1	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	3.2	2.9	0.0	3.2	0.8	0.9	0.0	0.0	0.9	
Total %	6.0	0.0	13.2	0.0	19.2	0.0	0.0	0.0	0.0	0.0	0.0	26.4	4.8	0.0	31.3	17.2	32.4	0.0	0.0	49.6	100.0
PHF	0.91	0.91	0.91			0.00	0.00	0.00			0.83	0.83	0.83			0.93	0.93	0.93			0.96



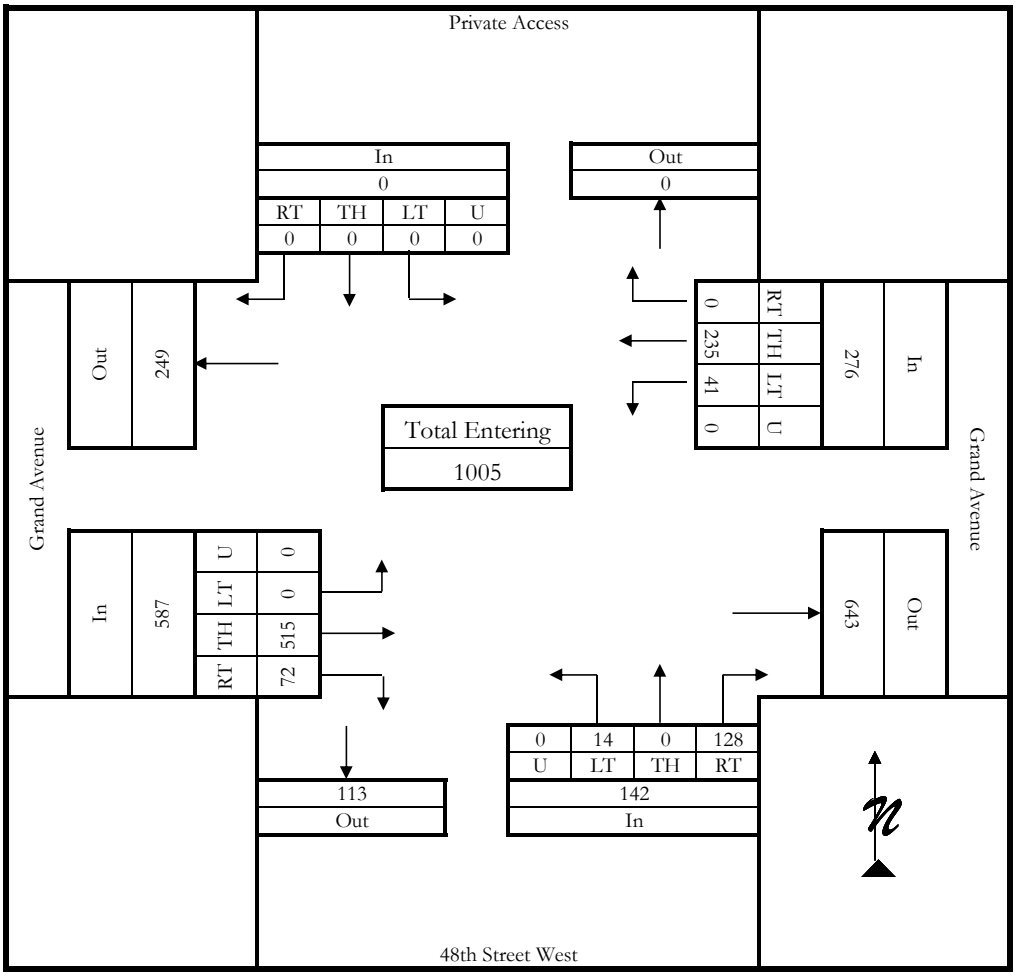
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 48th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	48th Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	Private Access Southbound					48th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
7:15 AM	0	0	0	0	0	26	0	2	0	28	19	110	0	0	129	0	51	5	0	56	213
7:30 AM	0	0	0	0	0	29	0	6	0	35	10	131	0	0	141	0	39	3	0	42	218
7:45 AM	0	0	0	0	0	36	0	6	0	42	19	135	0	0	154	0	61	15	0	76	272
8:00 AM	0	0	0	0	0	37	0	0	0	37	24	139	0	0	163	0	84	18	0	102	302
Grand Total	0	0	0	0	0	128	0	14	0	142	72	515	0	0	587	0	235	41	0	276	1005
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.8	0.0	7.1	0.0	1.4	1.4	2.1	0.0	0.0	2.0	0.0	5.5	2.4	0.0	5.1	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.7	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.8	0.0	7.1	0.0	1.4	1.4	2.1	0.0	0.0	2.0	0.0	6.4	2.4	0.0	5.8	
Total %	0.0	0.0	0.0	0.0	0.0	12.7	0.0	1.4	0.0	14.1	7.2	51.2	0.0	0.0	58.4	0.0	23.4	4.1	0.0	27.5	100.0
PHF	0.00	0.00	0.00			0.85	0.85	0.85			0.90	0.90	0.90			0.68	0.68	0.68			0.83



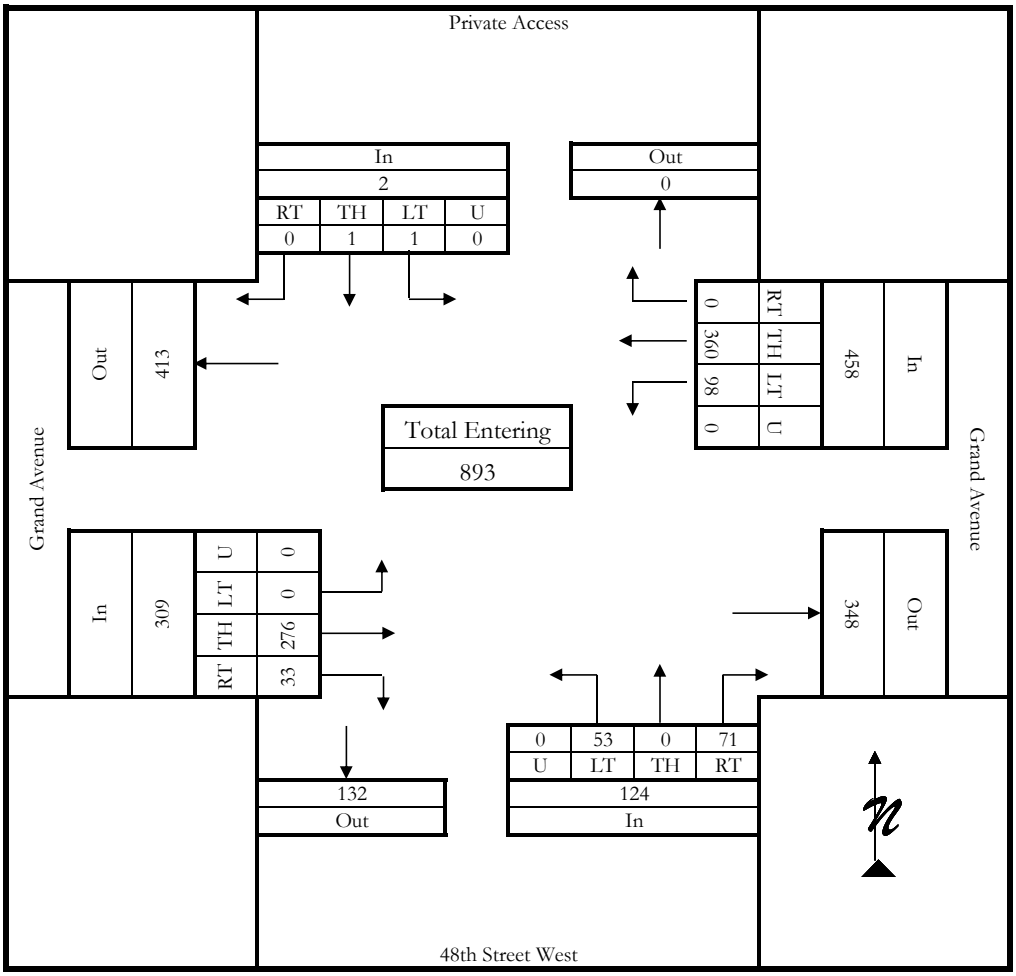
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Grand Avenue & 48th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, May 19, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	48th Street West	East/West Street:	Grand Avenue

Vehicle Volumes and Adjustments

	Private Access Southbound					48th Street West Northbound					Grand Avenue Eastbound					Grand Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		0.96	0.96	0.96	0.96		0.96	0.96	0.96	0.96		
4:45 PM	0	0	0	0	0	15	0	13	0	28	10	73	0	0	83	0	80	21	0	101	212
5:00 PM	0	0	0	0	0	22	0	13	0	35	7	76	0	0	83	0	93	26	0	119	237
5:15 PM	0	1	1	0	2	17	0	16	0	33	8	60	0	0	68	0	95	25	0	120	223
5:30 PM	0	0	0	0	0	17	0	11	0	28	8	67	0	0	75	0	92	26	0	118	221
Grand Total	0	1	1	0	2	71	0	53	0	124	33	276	0	0	309	0	360	98	0	458	893
Medium Truck %	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	1.6	3.0	1.8	0.0	0.0	1.9	0.0	0.3	0.0	0.0	0.2	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.6	0.0	0.0	0.4	
Total Truck %	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	1.6	3.0	2.2	0.0	0.0	2.3	0.0	0.8	0.0	0.0	0.7	
Total %	0.0	0.1	0.1	0.0	0.2	8.0	0.0	5.9	0.0	13.9	3.7	30.9	0.0	0.0	34.6	0.0	40.3	11.0	0.0	51.3	100.0
PHF	0.25	0.25	0.25			0.89	0.89	0.89			0.93	0.93	0.93			0.95	0.95	0.95			0.94



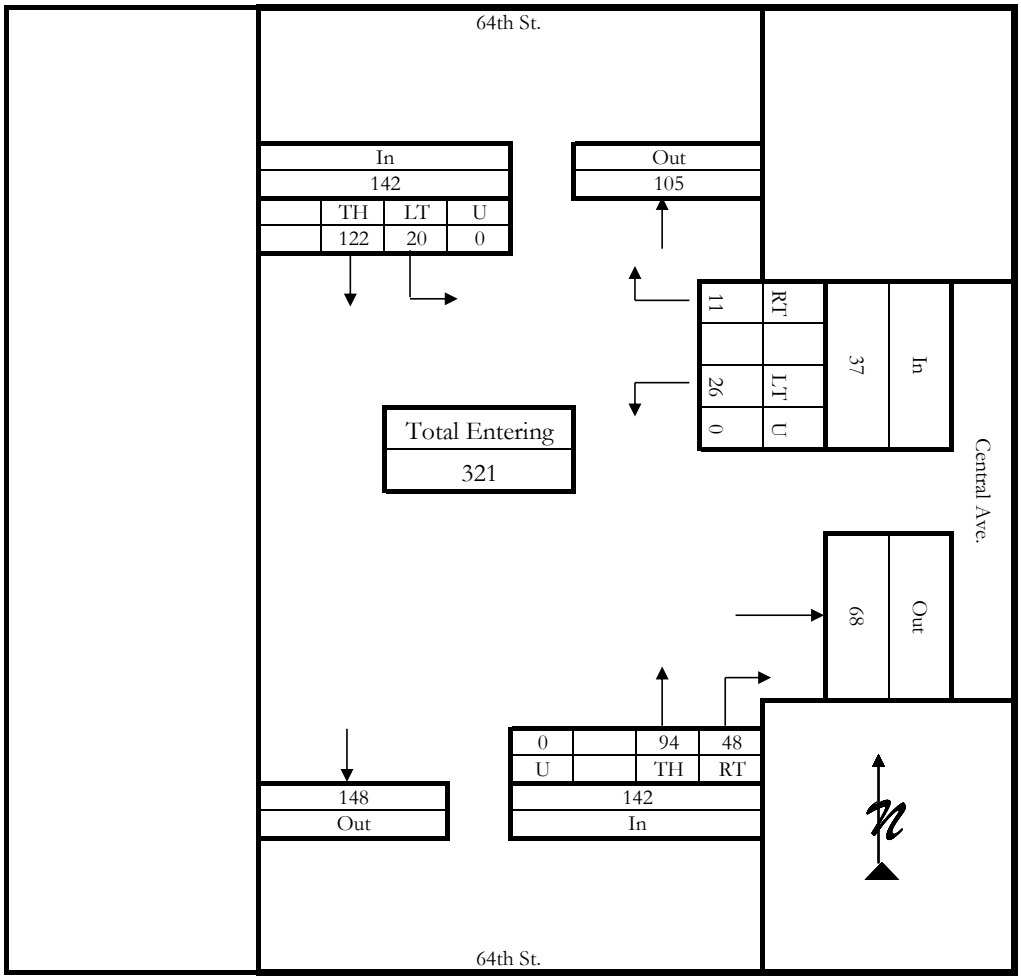
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Central Ave. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	Central Ave.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					N/A Eastbound					Central Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		0.00	0.00	0.00	0.00		1.12	1.12	1.12	1.12		
7:15 AM	0	26	8	0	34	9	16	0	0	25	0	0	0	0	0	1	0	3	0	4	63
7:30 AM	0	31	3	0	34	8	17	0	0	25	0	0	0	0	0	4	0	7	0	11	70
7:45 AM	0	41	9	0	50	15	30	0	0	45	0	0	0	0	0	6	0	10	0	16	111
8:00 AM	0	24	0	0	24	16	31	0	0	47	0	0	0	0	0	0	0	6	0	6	77
Grand Total	0	122	20	0	142	48	94	0	0	142	0	0	0	0	0	11	0	26	0	37	321
Medium Truck %	0.0	0.8	0.0	0.0	0.7	0.0	1.1	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	0.8	0.0	0.0	0.7	0.0	3.2	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	38.0	6.2	0.0	44.2	15.0	29.3	0.0	0.0	44.2	0.0	0.0	0.0	0.0	0.0	3.4	0.0	8.1	0.0	11.5	100.0
PHF	0.71	0.71	0.71			0.76	0.76	0.76			0.00	0.00	0.00			0.58	0.58	0.58			0.72



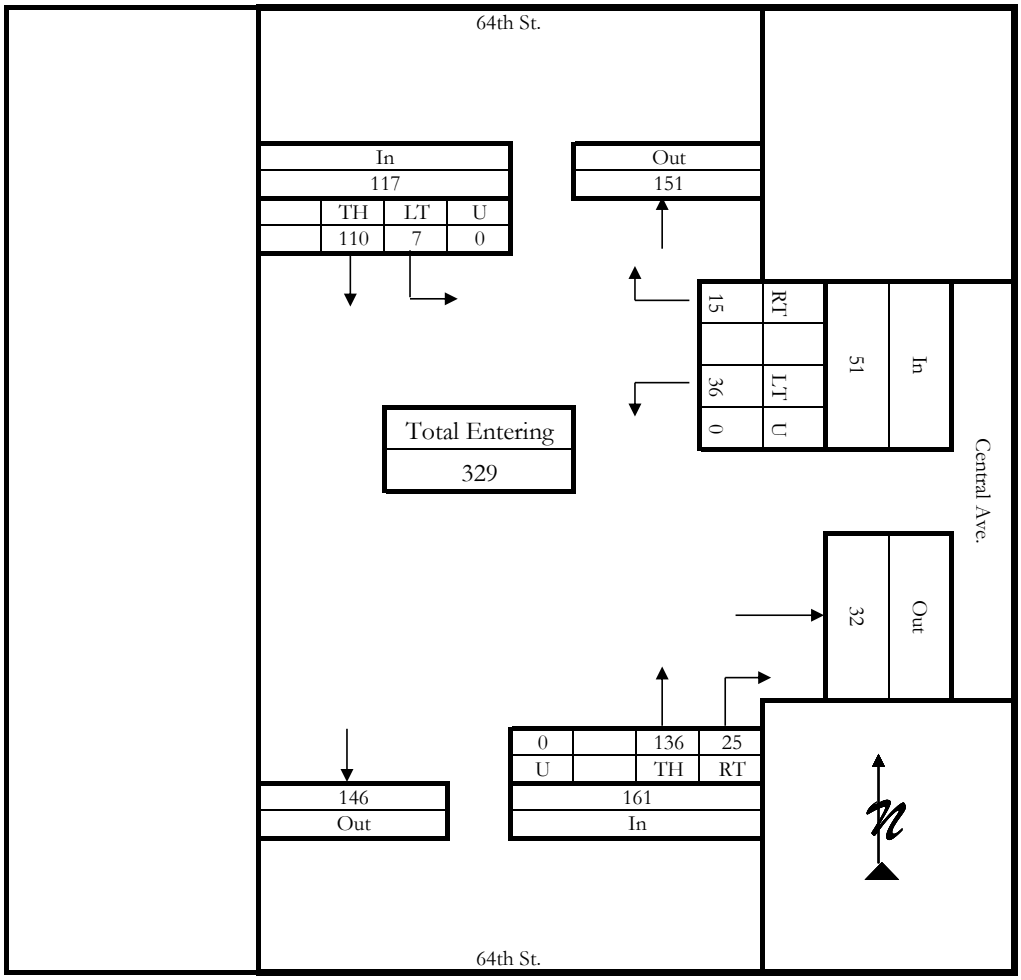
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Central Ave. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	Central Ave.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					N/A Eastbound					Central Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		0.00	0.00	0.00	0.00		1.12	1.12	1.12	1.12		
4:45 PM	0	29	2	0	31	2	32	0	0	34	0	0	0	0	0	4	0	8	0	12	77
5:00 PM	0	39	2	0	41	7	34	0	0	41	0	0	0	0	0	3	0	15	0	18	100
5:15 PM	0	21	1	0	22	7	40	0	0	47	0	0	0	0	0	4	0	7	0	11	80
5:30 PM	0	21	2	0	23	9	30	0	0	39	0	0	0	0	0	4	0	6	0	10	72
Grand Total	0	110	7	0	117	25	136	0	0	161	0	0	0	0	0	15	0	36	0	51	329
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.9	0.0	0.0	0.9	4.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	0.9	0.0	0.0	0.9	4.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	33.4	2.1	0.0	35.6	7.6	41.3	0.0	0.0	48.9	0.0	0.0	0.0	0.0	0.0	4.6	0.0	10.9	0.0	15.5	100.0
PHF	0.71	0.71	0.71			0.86	0.86	0.86			0.00	0.00	0.00			0.71	0.71	0.71			0.82



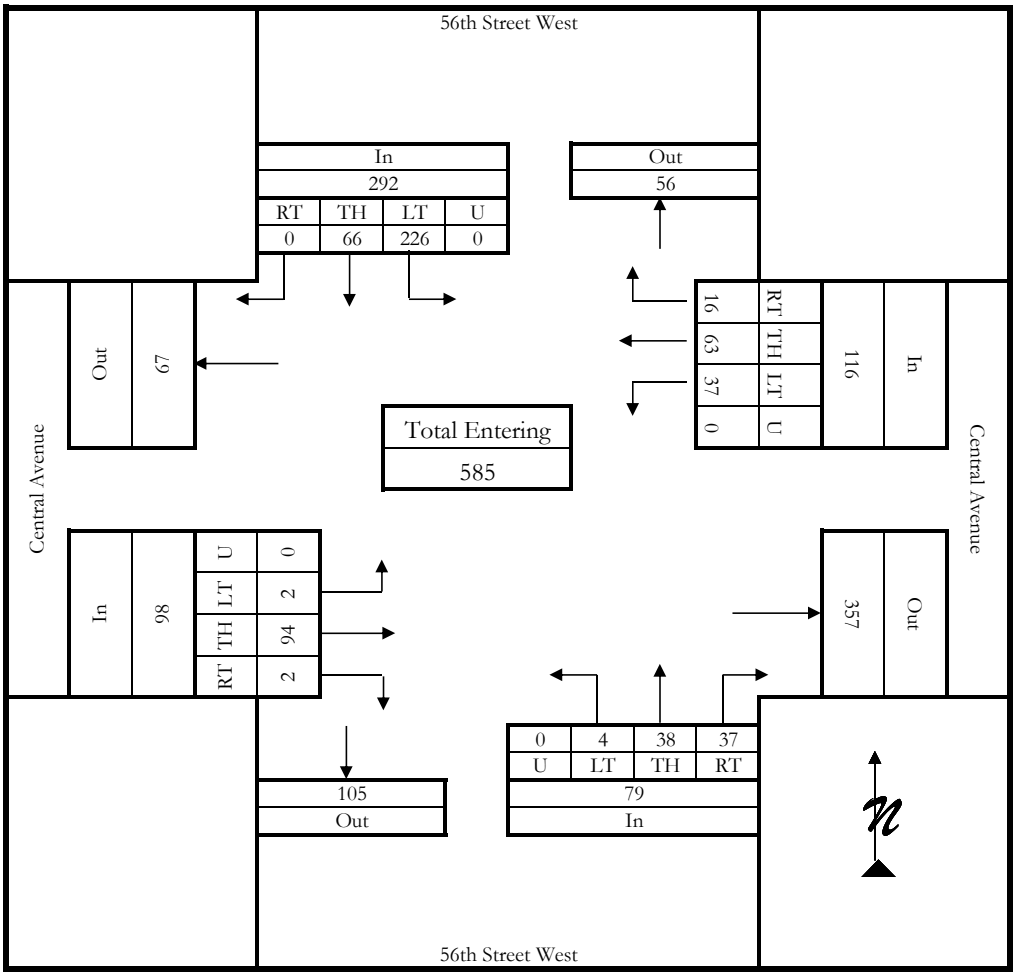
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Central Avenue & 56th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, April 14, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	14063.01	Project Description:	West End Middle School TIS
North/South Street:	56th Street West	East/West Street:	Central Avenue

Vehicle Volumes and Adjustments

	56th Street West Southbound					56th Street West Northbound					Central Avenue Eastbound					Central Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		
7:15 AM	0	18	51	0	69	7	7	2	0	16	1	16	0	0	17	4	16	7	0	27	129
7:30 AM	0	15	72	0	87	10	6	0	0	16	1	26	1	0	28	4	7	8	0	19	150
7:45 AM	0	16	53	0	69	9	9	1	0	19	0	30	1	0	31	5	24	15	0	44	163
8:00 AM	0	17	50	0	67	11	16	1	0	28	0	22	0	0	22	3	16	7	0	26	143
Grand Total	0	66	226	0	292	37	38	4	0	79	2	94	2	0	98	16	63	37	0	116	585
Medium Truck %	0.0	3.0	2.7	0.0	2.7	2.7	13.2	0.0	0.0	7.6	0.0	3.2	0.0	0.0	3.1	18.8	1.6	2.7	0.0	4.3	
Heavy Truck %	0.0	4.5	0.0	0.0	1.0	5.4	5.3	0.0	0.0	5.1	0.0	1.1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	7.6	2.7	0.0	3.8	8.1	18.4	0.0	0.0	12.7	0.0	4.3	0.0	0.0	4.1	18.8	1.6	2.7	0.0	4.3	
Total %	0.0	11.3	38.6	0.0	49.9	6.3	6.5	0.7	0.0	13.5	0.3	16.1	0.3	0.0	16.8	2.7	10.8	6.3	0.0	19.8	100.0
PHF	0.84	0.84	0.84			0.71	0.71	0.71			0.79	0.79	0.79			0.66	0.66	0.66			0.90



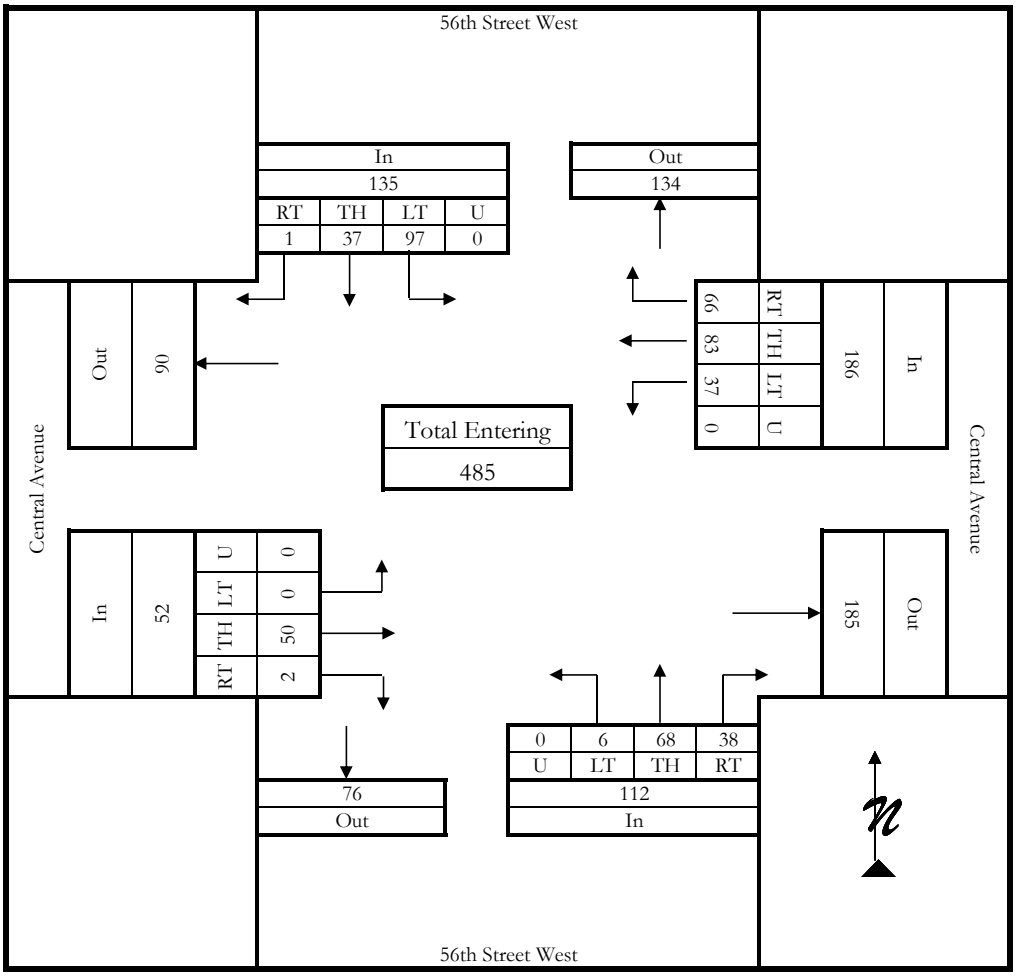
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	V. Morasko	Intersection:	Central Avenue & 56th Street West
Agency/Company:	Sanderson Stewart		
Date Performed:	Tuesday, April 14, 2015	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (5:00 - 6:00 PM)		
Project Number:	HSIP 56(82)	Project Description:	SF 139 - Rndabout Central & 56th
North/South Street:	56th Street West	East/West Street:	Central Avenue

Vehicle Volumes and Adjustments

	56th Street West Southbound					56th Street West Northbound					Central Avenue Eastbound					Central Avenue Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		
4:45 PM	0	11	27	0	38	6	12	1	0	19	0	10	0	0	10	13	25	4	0	42	109
5:00 PM	1	4	26	0	31	2	16	5	0	23	0	18	0	0	18	11	22	13	0	46	118
5:15 PM	0	11	22	0	33	15	20	0	0	35	1	11	0	0	12	21	18	10	0	49	129
5:30 PM	0	11	22	0	33	15	20	0	0	35	1	11	0	0	12	21	18	10	0	49	129
Grand Total	1	37	97	0	135	38	68	6	0	112	2	50	0	0	52	66	83	37	0	186	485
Medium Truck %	0.0	0.0	1.0	0.0	0.7	5.3	1.5	16.7	0.0	3.6	0.0	2.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	0.0	1.0	0.0	0.7	5.3	4.4	16.7	0.0	5.4	0.0	2.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	
Total %	0.2	7.6	20.0	0.0	27.8	7.8	14.0	1.2	0.0	23.1	0.4	10.3	0.0	0.0	10.7	13.6	17.1	7.6	0.0	38.4	100.0
PHF	0.89	0.89	0.89			0.80	0.80	0.80			0.72	0.72	0.72			0.95	0.95	0.95			0.94



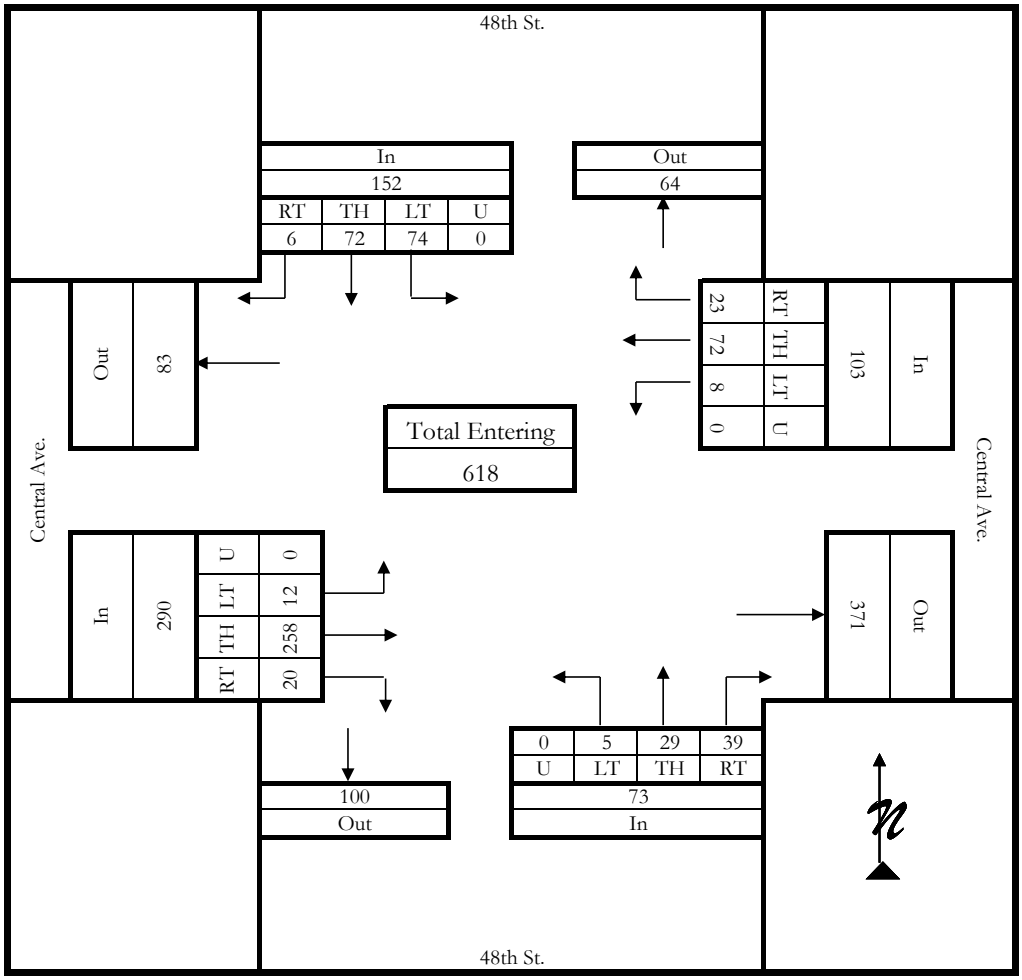
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Central Ave. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	Central Ave.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					Central Ave. Eastbound					Central Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
7:15 AM	1	15	7	0	23	6	4	1	0	11	3	58	2	0	63	9	15	1	0	25	122
7:30 AM	0	26	28	0	54	16	6	2	0	24	9	72	2	0	83	6	15	3	0	24	185
7:45 AM	1	13	20	0	34	9	7	0	0	16	1	80	6	0	87	4	24	2	0	30	167
8:00 AM	4	18	19	0	41	8	12	2	0	22	7	48	2	0	57	4	18	2	0	24	144
Grand Total	6	72	74	0	152	39	29	5	0	73	20	258	12	0	290	23	72	8	0	103	618
Medium Truck %	0.0	0.0	2.7	0.0	1.3	0.0	0.0	20.0	0.0	1.4	0.0	1.2	0.0	0.0	1.0	0.0	2.8	0.0	0.0	1.9	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	1.0	
Total Truck %	0.0	0.0	2.7	0.0	1.3	0.0	3.4	20.0	0.0	2.7	0.0	1.2	0.0	0.0	1.0	0.0	4.2	0.0	0.0	2.9	
Total %	1.0	11.7	12.0	0.0	24.6	6.3	4.7	0.8	0.0	11.8	3.2	41.7	1.9	0.0	46.9	3.7	11.7	1.3	0.0	16.7	100.0
PHF	0.70	0.70	0.70			0.76	0.76	0.76			0.83	0.83	0.83			0.86	0.86	0.86			0.84



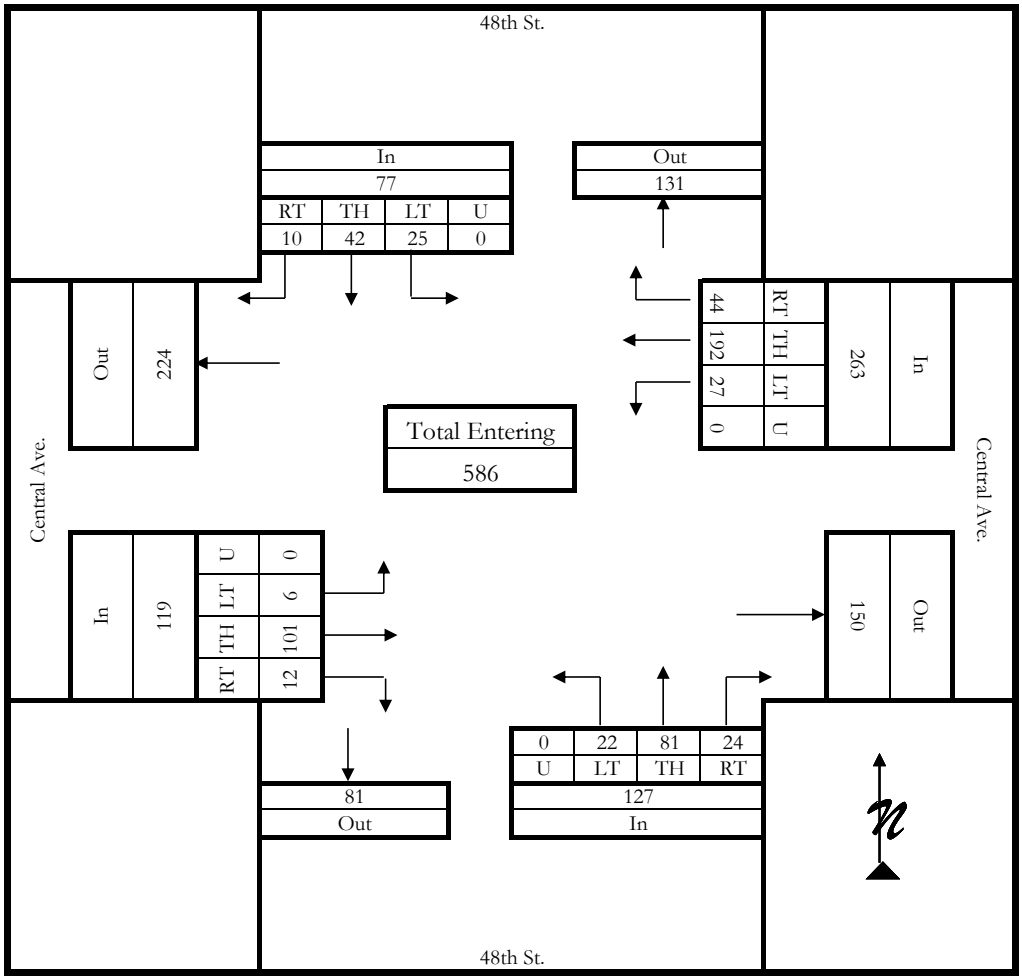
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Central Ave. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	Central Ave.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					Central Ave. Eastbound					Central Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
4:45 PM	1	12	10	0	23	6	20	6	0	32	4	22	1	0	27	7	35	10	0	52	134
5:00 PM	2	11	6	0	19	3	25	5	0	33	2	24	1	0	27	8	49	7	0	64	143
5:15 PM	2	10	6	0	18	9	22	5	0	36	3	25	3	0	31	17	52	6	0	75	160
5:30 PM	5	9	3	0	17	6	14	6	0	26	3	30	1	0	34	12	56	4	0	72	149
Grand Total	10	42	25	0	77	24	81	22	0	127	12	101	6	0	119	44	192	27	0	263	586
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	4.0	0.0	1.3	0.0	1.2	0.0	0.0	0.8	0.0	1.0	0.0	0.0	0.8	2.3	0.5	0.0	0.0	0.8	
Total Truck %	0.0	0.0	4.0	0.0	1.3	0.0	1.2	0.0	0.0	0.8	0.0	1.0	0.0	0.0	0.8	2.3	0.5	0.0	0.0	0.8	
Total %	1.7	7.2	4.3	0.0	13.1	4.1	13.8	3.8	0.0	21.7	2.0	17.2	1.0	0.0	20.3	7.5	32.8	4.6	0.0	44.9	100.0
PHF	0.84	0.84	0.84			0.88	0.88	0.88			0.88	0.88	0.88			0.88	0.88	0.88			0.92



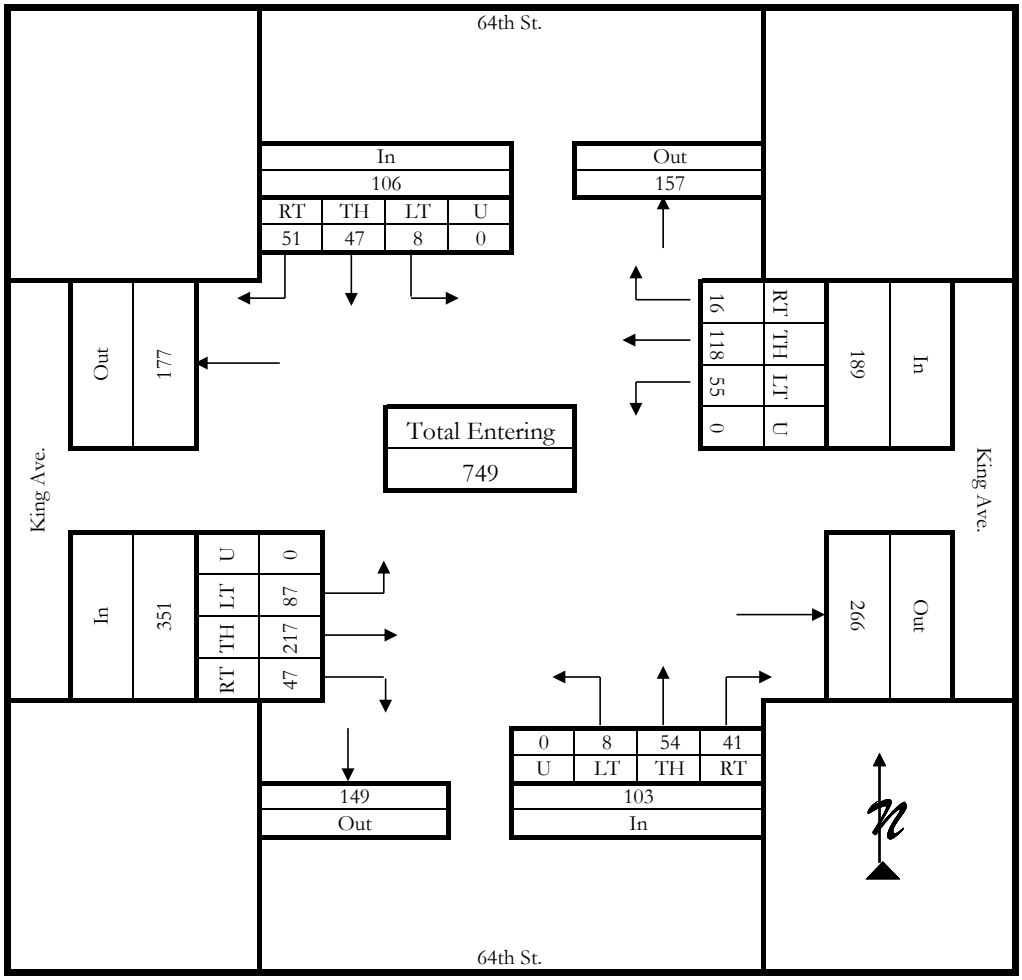
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	King Ave. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	King Ave.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					King Ave. Eastbound					King Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
7:15 AM	14	7	0	0	21	2	3	0	0	5	3	57	20	0	80	6	20	3	0	29	135
7:30 AM	10	8	3	0	21	0	6	1	0	7	13	66	22	0	101	4	38	18	0	60	189
7:45 AM	12	26	2	0	40	22	21	4	0	47	30	48	24	0	102	6	38	32	0	76	265
8:00 AM	15	6	3	0	24	17	24	3	0	44	1	46	21	0	68	0	22	2	0	24	160
Grand Total	51	47	8	0	106	41	54	8	0	103	47	217	87	0	351	16	118	55	0	189	749
Medium Truck %	0.0	2.1	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	4.3	0.5	0.0	0.0	0.9	6.3	1.7	0.0	0.0	1.6	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	1.0	0.0	1.4	0.0	0.0	0.9	12.5	5.9	0.0	0.0	4.8	
Total Truck %	0.0	2.1	0.0	0.0	0.9	2.4	0.0	0.0	0.0	1.0	4.3	1.8	0.0	0.0	1.7	18.8	7.6	0.0	0.0	6.3	
Total %	6.8	6.3	1.1	0.0	14.2	5.5	7.2	1.1	0.0	13.8	6.3	29.0	11.6	0.0	46.9	2.1	15.8	7.3	0.0	25.2	100.0
PHF	0.66	0.66	0.66			0.55	0.55	0.55			0.86	0.86	0.86			0.62	0.62	0.62			0.71



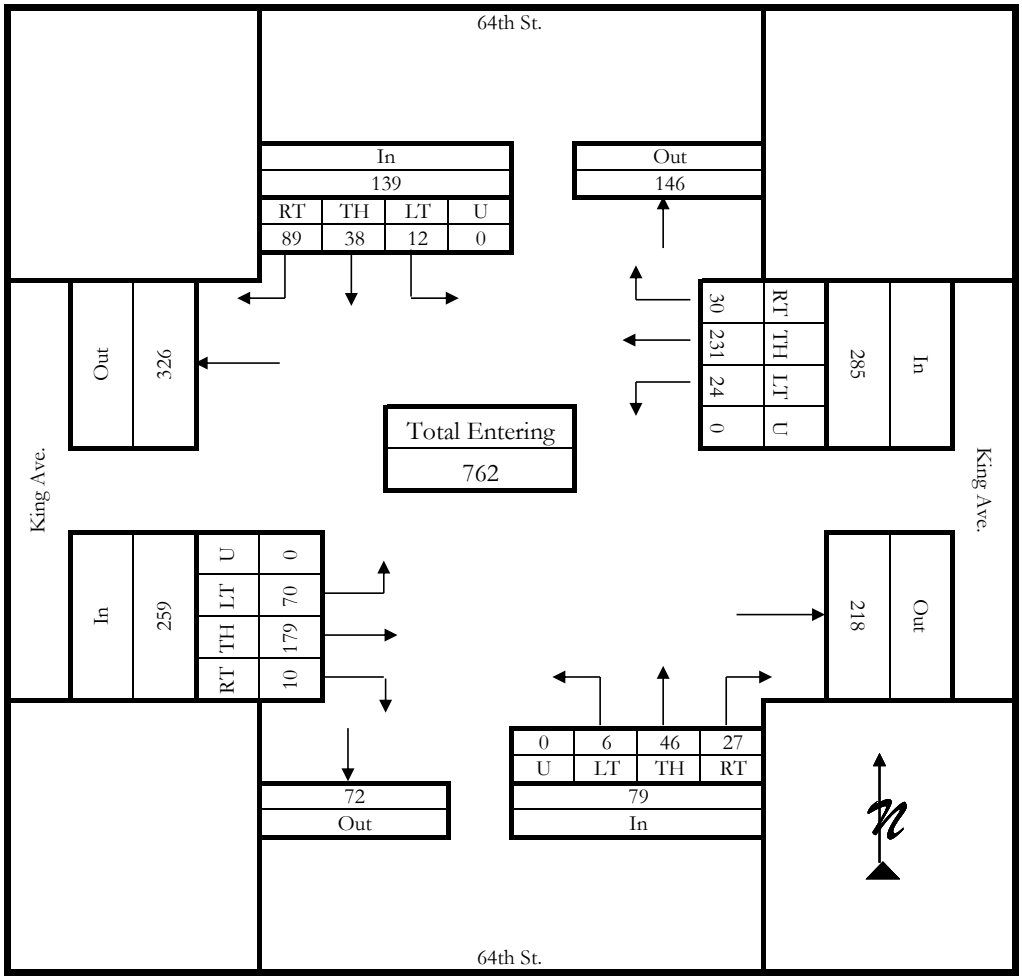
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	King Ave. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	King Ave.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					King Ave. Eastbound					King Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
4:45 PM	21	9	1	0	31	11	7	2	0	20	3	36	11	0	50	8	53	9	0	70	171
5:00 PM	30	12	6	0	48	6	13	1	0	20	6	59	19	0	84	8	71	8	0	87	239
5:15 PM	23	8	2	0	33	6	18	2	0	26	1	43	19	0	63	6	66	4	0	76	198
5:30 PM	15	9	3	0	27	4	8	1	0	13	0	41	21	0	62	8	41	3	0	52	154
Grand Total	89	38	12	0	139	27	46	6	0	79	10	179	70	0	259	30	231	24	0	285	762
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	1.1	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.3	0.0	0.0	1.4	
Total Truck %	1.1	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.3	0.0	0.0	1.4	
Total %	11.7	5.0	1.6	0.0	18.2	3.5	6.0	0.8	0.0	10.4	1.3	23.5	9.2	0.0	34.0	3.9	30.3	3.1	0.0	37.4	100.0
PHF	0.72	0.72	0.72			0.76	0.76	0.76			0.77	0.77	0.77			0.82	0.82	0.82			0.80



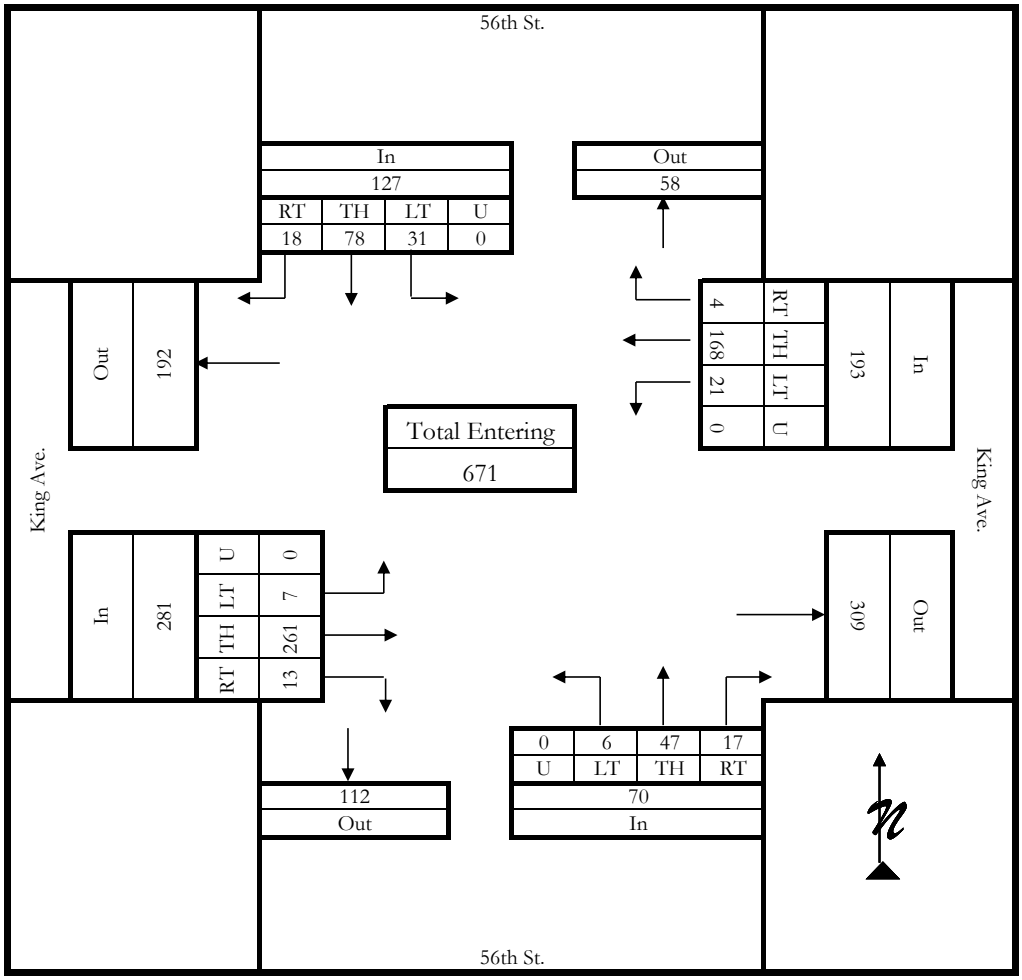
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	King Ave. West & 56th St. West
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	56th St.	East/West Street:	King Ave.

Vehicle Volumes and Adjustments

	56th St. Southbound					56th St. Northbound					King Ave. Eastbound					King Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
7:15 AM	0	12	8	0	20	7	3	3	0	13	4	53	1	0	58	1	27	6	0	34	125
7:30 AM	9	21	6	0	36	3	13	1	0	17	4	73	2	0	79	1	56	8	0	65	197
7:45 AM	8	25	10	0	43	3	21	2	0	26	3	78	1	0	82	1	56	4	0	61	212
8:00 AM	1	20	7	0	28	4	10	0	0	14	2	57	3	0	62	1	29	3	0	33	137
Grand Total	18	78	31	0	127	17	47	6	0	70	13	261	7	0	281	4	168	21	0	193	671
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0	0.4	0.0	1.8	0.0	0.0	1.6	
Heavy Truck %	0.0	3.8	0.0	0.0	2.4	0.0	2.1	16.7	0.0	2.9	7.7	1.5	14.3	0.0	2.1	0.0	6.5	9.5	0.0	6.7	
Total Truck %	0.0	3.8	0.0	0.0	2.4	0.0	2.1	16.7	0.0	2.9	15.4	1.5	14.3	0.0	2.5	0.0	8.3	9.5	0.0	8.3	
Total %	2.7	11.6	4.6	0.0	18.9	2.5	7.0	0.9	0.0	10.4	1.9	38.9	1.0	0.0	41.9	0.6	25.0	3.1	0.0	28.8	100.0
PHF	0.74	0.74	0.74			0.67	0.67	0.67			0.86	0.86	0.86			0.74	0.74	0.74			0.79



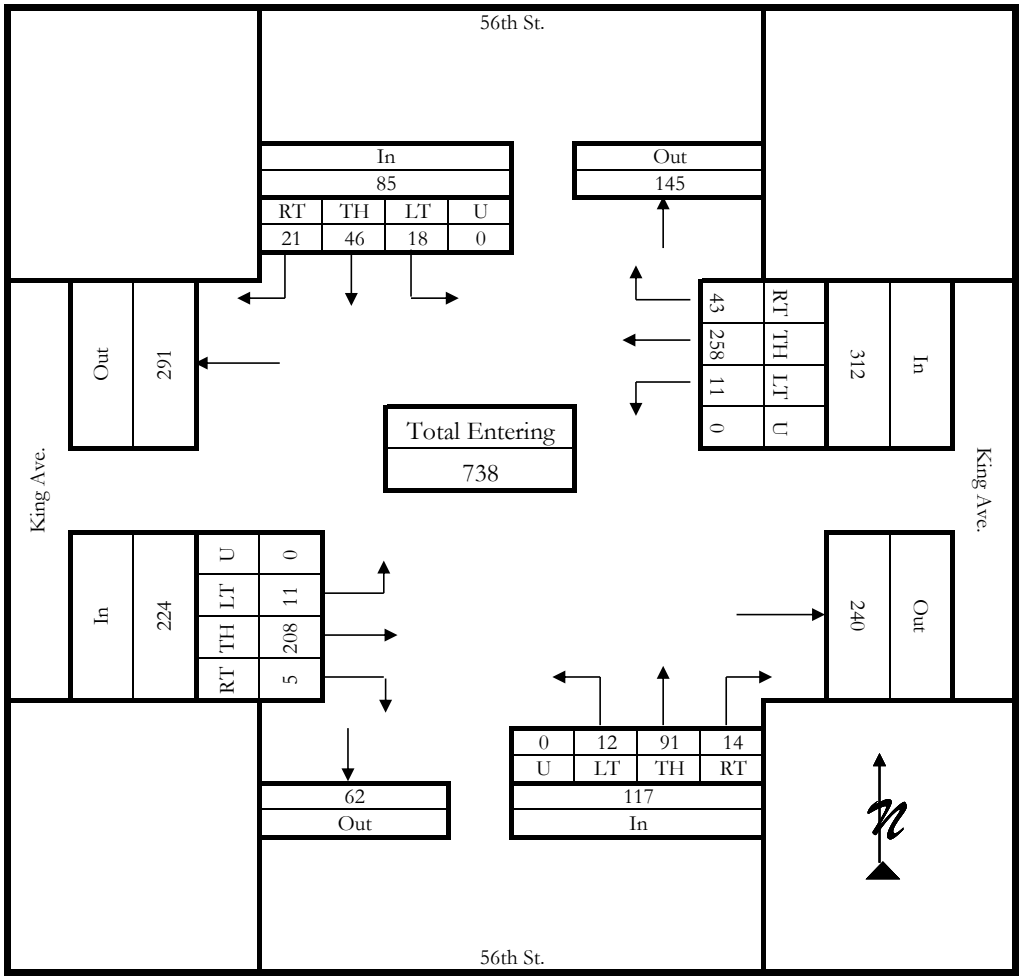
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	King Ave. West & 56th St. West
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	56th St.	East/West Street:	King Ave.

Vehicle Volumes and Adjustments

	56th St. Southbound					56th St. Northbound					King Ave. Eastbound					King Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
4:45 PM	4	7	4	0	15	1	22	2	0	25	2	44	1	0	47	10	58	2	0	70	157
5:00 PM	6	11	4	0	21	8	29	7	0	44	3	66	4	0	73	10	73	4	0	87	225
5:15 PM	4	18	8	0	30	3	25	2	0	30	0	54	2	0	56	11	74	2	0	87	203
5:30 PM	7	10	2	0	19	2	15	1	0	18	0	44	4	0	48	12	53	3	0	68	153
Grand Total	21	46	18	0	85	14	91	12	0	117	5	208	11	0	224	43	258	11	0	312	738
Medium Truck %	4.8	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	4.3	11.1	0.0	4.7	0.0	2.2	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	1.3	
Total Truck %	4.8	4.3	11.1	0.0	5.9	0.0	2.2	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	1.3	
Total %	2.8	6.2	2.4	0.0	11.5	1.9	12.3	1.6	0.0	15.9	0.7	28.2	1.5	0.0	30.4	5.8	35.0	1.5	0.0	42.3	100.0
PHF	0.71	0.71	0.71			0.66	0.66	0.66			0.77	0.77	0.77			0.90	0.90	0.90			0.82



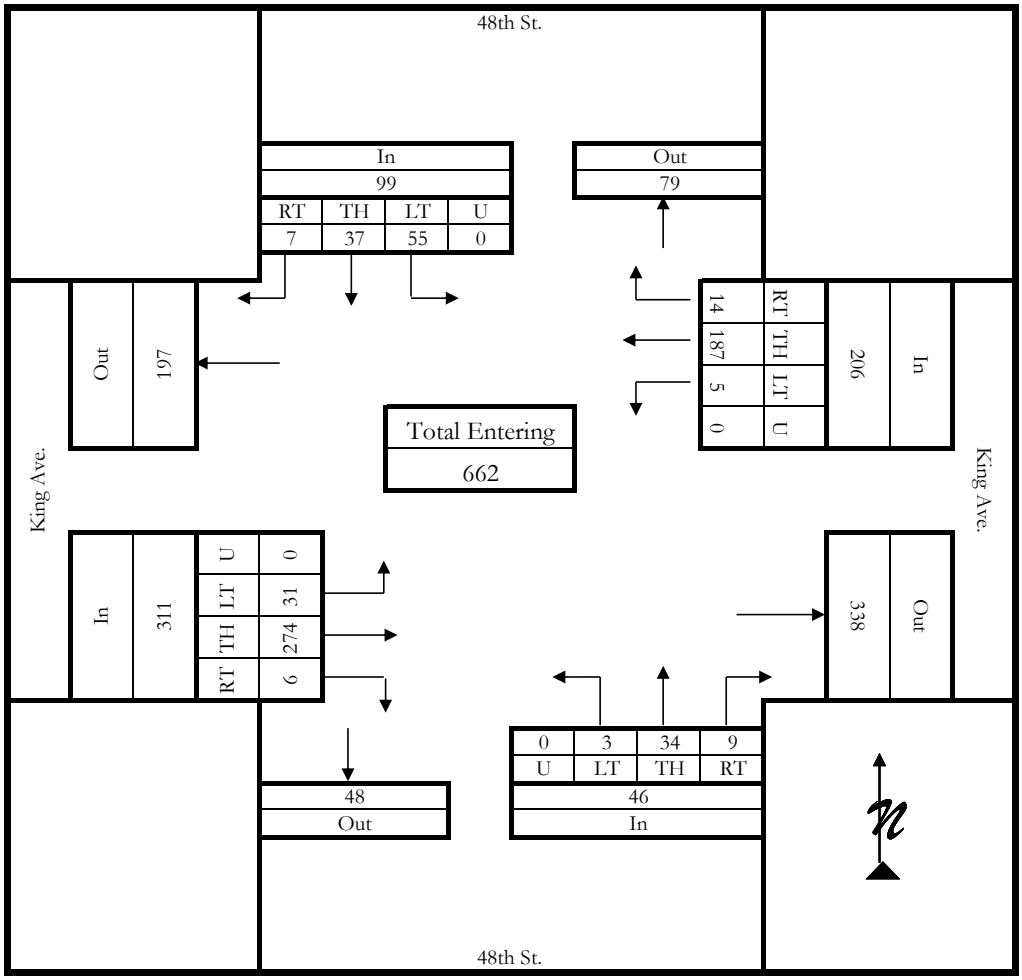
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	King Ave. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	King Ave.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					King Ave. Eastbound					King Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
7:15 AM	1	10	8	0	19	1	5	0	0	6	1	58	6	0	65	2	37	1	0	40	130
7:30 AM	2	12	19	0	33	4	11	1	0	16	2	82	9	0	93	3	59	1	0	63	205
7:45 AM	2	9	14	0	25	3	9	0	0	12	1	69	9	0	79	3	57	3	0	63	179
8:00 AM	2	6	14	0	22	1	9	2	0	12	2	65	7	0	74	6	34	0	0	40	148
Grand Total	7	37	55	0	99	9	34	3	0	46	6	274	31	0	311	14	187	5	0	206	662
Medium Truck %	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	7.1	1.6	0.0	0.0	1.9	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	2.2	0.0	1.5	0.0	0.0	1.3	0.0	7.0	40.0	0.0	7.3	
Total Truck %	0.0	0.0	0.0	0.0	0.0	11.1	0.0	33.3	0.0	4.3	0.0	1.5	0.0	0.0	1.3	7.1	8.6	40.0	0.0	9.2	
Total %	1.1	5.6	8.3	0.0	15.0	1.4	5.1	0.5	0.0	6.9	0.9	41.4	4.7	0.0	47.0	2.1	28.2	0.8	0.0	31.1	100.0
PHF	0.75	0.75	0.75			0.72	0.72	0.72			0.84	0.84	0.84			0.82	0.82	0.82			0.81



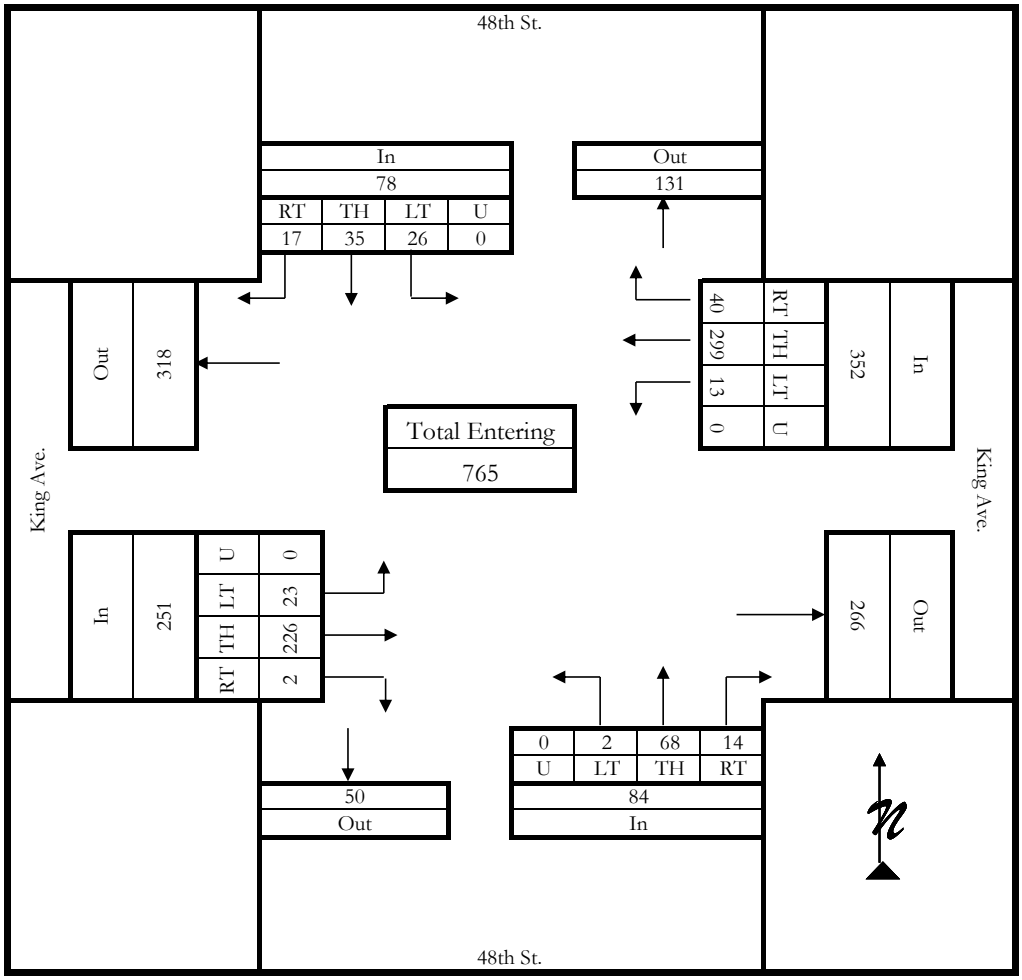
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	King Ave. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Thursday, January 21, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	King Ave.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					King Ave. Eastbound					King Ave. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
4:45 PM	4	12	7	0	23	5	21	1	0	27	1	47	3	0	51	9	68	3	0	80	181
5:00 PM	2	10	3	0	15	4	18	0	0	22	1	67	7	0	75	12	86	1	0	99	211
5:15 PM	6	8	8	0	22	2	21	1	0	24	0	60	6	0	66	11	83	2	0	96	208
5:30 PM	5	5	8	0	18	3	8	0	0	11	0	52	7	0	59	8	62	7	0	77	165
Grand Total	17	35	26	0	78	14	68	2	0	84	2	226	23	0	251	40	299	13	0	352	765
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	2.5	1.0	0.0	0.0	1.1	
Total Truck %	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	2.5	1.0	0.0	0.0	1.1	
Total %	2.2	4.6	3.4	0.0	10.2	1.8	8.9	0.3	0.0	11.0	0.3	29.5	3.0	0.0	32.8	5.2	39.1	1.7	0.0	46.0	100.0
PHF	0.85	0.85	0.85			0.78	0.78	0.78			0.84	0.84	0.84			0.89	0.89	0.89			0.91



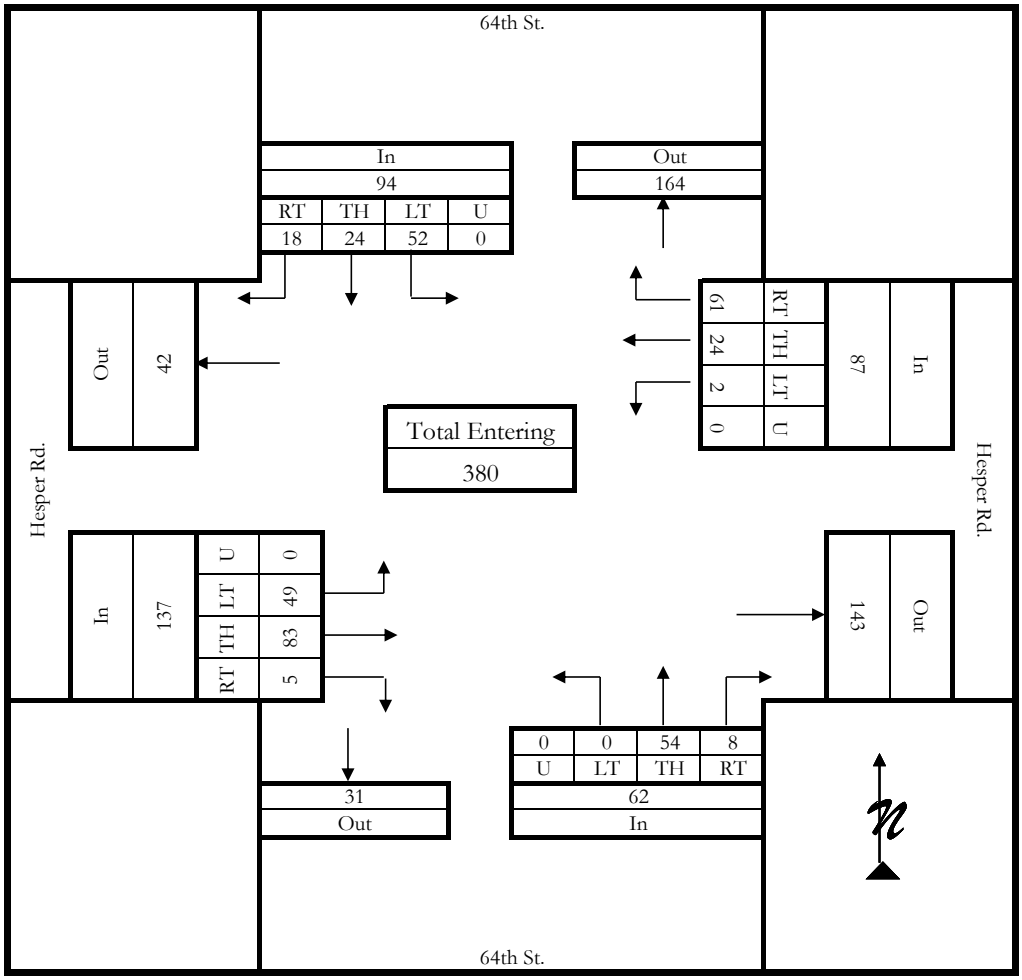
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Hesper Rd. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	Hesper Rd.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					Hesper Rd. Eastbound					Hesper Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	1	3	6	0	10	1	5	0	0	6	1	13	7	0	21	9	4	0	0	13	50
7:30 AM	1	3	7	0	11	2	13	0	0	15	1	19	16	0	36	6	4	0	0	10	72
7:45 AM	11	11	17	0	39	5	26	0	0	31	1	32	23	0	56	33	3	1	0	37	163
8:00 AM	5	7	22	0	34	0	10	0	0	10	2	19	3	0	24	13	13	1	0	27	95
Grand Total	18	24	52	0	94	8	54	0	0	62	5	83	49	0	137	61	24	2	0	87	380
Medium Truck %	0.0	0.0	1.9	0.0	1.1	0.0	1.9	0.0	0.0	1.6	0.0	6.0	0.0	0.0	3.6	1.6	0.0	0.0	0.0	1.1	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0	2.3	
Total Truck %	0.0	0.0	1.9	0.0	1.1	0.0	5.6	0.0	0.0	4.8	0.0	6.0	0.0	0.0	3.6	1.6	8.3	0.0	0.0	3.4	
Total %	4.7	6.3	13.7	0.0	24.7	2.1	14.2	0.0	0.0	16.3	1.3	21.8	12.9	0.0	36.1	16.1	6.3	0.5	0.0	22.9	100.0
PHF	0.60	0.60	0.60			0.50	0.50	0.50			0.61	0.61	0.61			0.59	0.59	0.59			0.58



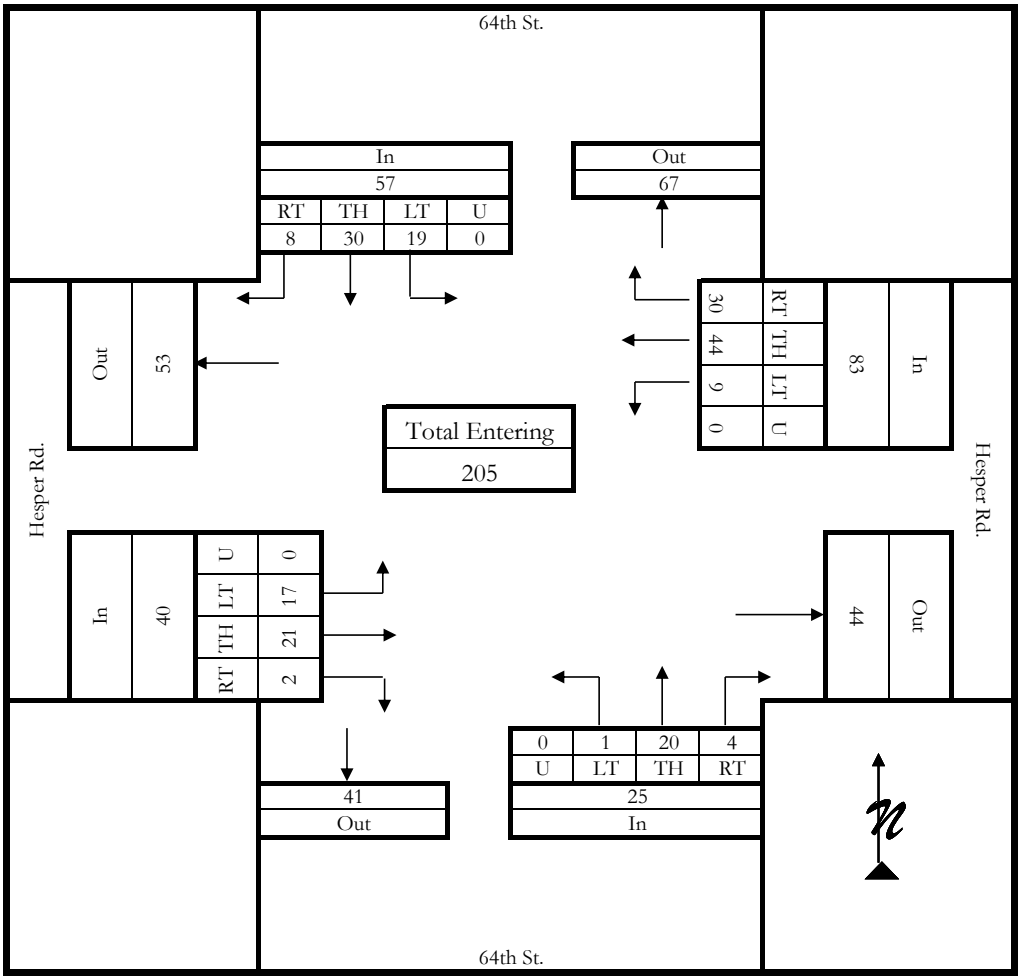
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Hesper Rd. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	Hesper Rd.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					Hesper Rd. Eastbound					Hesper Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	1	6	4	0	11	2	5	0	0	7	0	8	3	0	11	6	11	0	0	17	46
5:00 PM	2	7	2	0	11	1	9	0	0	10	1	5	4	0	10	12	14	4	0	30	61
5:15 PM	3	10	9	0	22	1	3	1	0	5	1	2	7	0	10	9	16	3	0	28	65
5:30 PM	2	7	4	0	13	0	3	0	0	3	0	6	3	0	9	3	3	2	0	8	33
Grand Total	8	30	19	0	57	4	20	1	0	25	2	21	17	0	40	30	44	9	0	83	205
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	
Total %	3.9	14.6	9.3	0.0	27.8	2.0	9.8	0.5	0.0	12.2	1.0	10.2	8.3	0.0	19.5	14.6	21.5	4.4	0.0	40.5	100.0
PHF	0.65	0.65	0.65			0.63	0.63	0.63			0.91	0.91	0.91			0.69	0.69	0.69			0.79



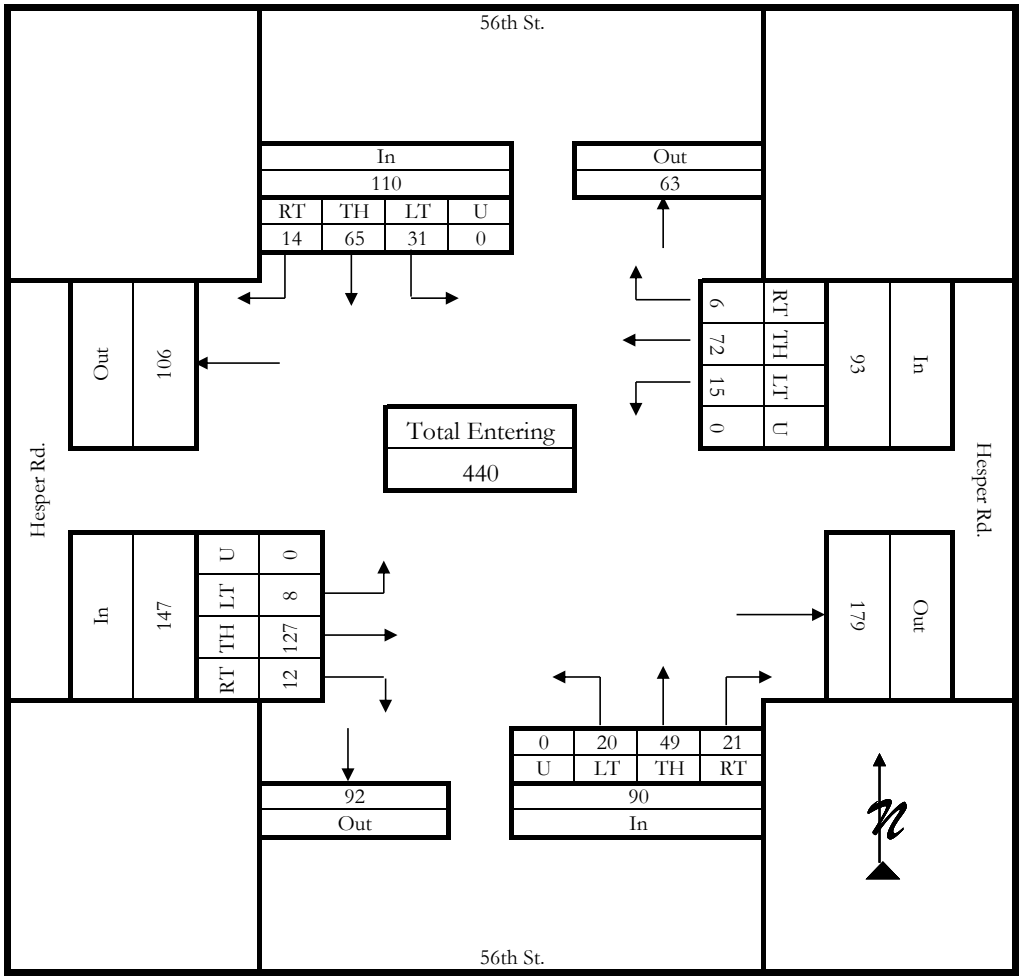
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Hesper Rd. & 56th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	56th St.	East/West Street:	Hesper Rd.

Vehicle Volumes and Adjustments

	56th St. Southbound					56th St. Northbound					Hesper Rd. Eastbound					Hesper Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	1	20	6	0	27	4	8	1	0	13	0	20	1	0	21	0	13	3	0	16	77
7:30 AM	4	17	15	0	36	4	10	1	0	15	2	27	3	0	32	2	10	5	0	17	100
7:45 AM	6	13	6	0	25	6	13	17	0	36	7	44	2	0	53	2	32	2	0	36	150
8:00 AM	3	15	4	0	22	7	18	1	0	26	3	36	2	0	41	2	17	5	0	24	113
Grand Total	14	65	31	0	110	21	49	20	0	90	12	127	8	0	147	6	72	15	0	93	440
Medium Truck %	7.1	0.0	0.0	0.0	0.9	4.8	0.0	0.0	0.0	1.1	0.0	3.9	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	1.5	0.0	0.0	0.9	0.0	2.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	4.2	26.7	0.0	7.5	
Total Truck %	7.1	1.5	0.0	0.0	1.8	4.8	2.0	0.0	0.0	2.2	0.0	3.9	0.0	0.0	3.4	0.0	4.2	26.7	0.0	7.5	
Total %	3.2	14.8	7.0	0.0	25.0	4.8	11.1	4.5	0.0	20.5	2.7	28.9	1.8	0.0	33.4	1.4	16.4	3.4	0.0	21.1	100.0
PHF	0.76	0.76	0.76			0.63	0.63	0.63			0.69	0.69	0.69			0.65	0.65	0.65			0.73



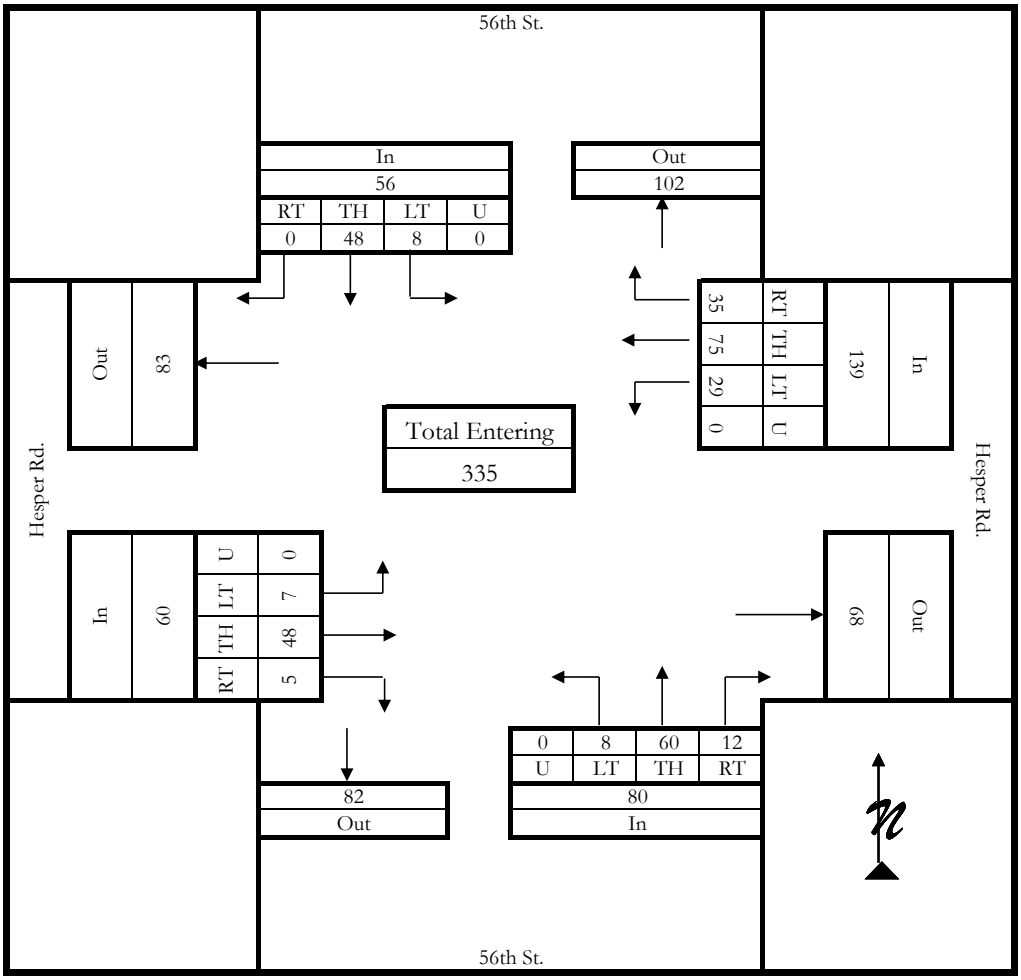
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Hesper Rd. & 56th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	56th St.	East/West Street:	Hesper Rd.

Vehicle Volumes and Adjustments

	56th St. Southbound					56th St. Northbound					Hesper Rd. Eastbound					Hesper Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	0	12	3	0	15	3	13	2	0	18	1	15	4	0	20	8	20	4	0	32	85
5:00 PM	0	10	2	0	12	6	25	3	0	34	0	13	2	0	15	12	25	9	0	46	107
5:15 PM	0	15	2	0	17	1	13	0	0	14	3	10	0	0	13	9	21	8	0	38	82
5:30 PM	0	11	1	0	12	2	9	3	0	14	1	10	1	0	12	6	9	8	0	23	61
Grand Total	0	48	8	0	56	12	60	8	0	80	5	48	7	0	60	35	75	29	0	139	335
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	2.1	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	2.1	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	14.3	2.4	0.0	16.7	3.6	17.9	2.4	0.0	23.9	1.5	14.3	2.1	0.0	17.9	10.4	22.4	8.7	0.0	41.5	100.0
PHF	0.82	0.82	0.82			0.59	0.59	0.59			0.75	0.75	0.75			0.76	0.76	0.76			0.78



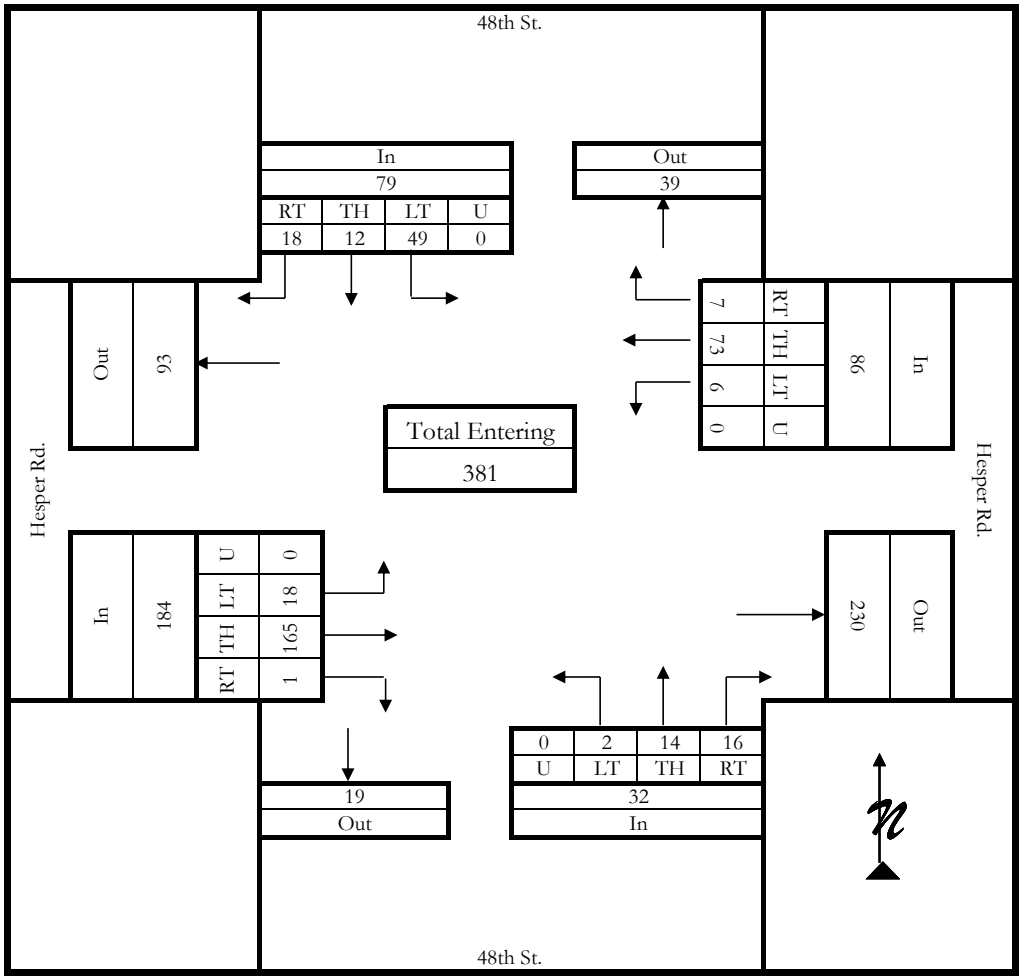
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Hesper Rd. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	Hesper Rd.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					Hesper Rd. Eastbound					Hesper Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
7:15 AM	1	3	8	0	12	7	0	0	0	7	0	31	3	0	34	1	17	1	0	19	72
7:30 AM	2	3	14	0	19	4	6	1	0	11	1	42	4	0	47	2	14	2	0	18	95
7:45 AM	13	2	20	0	35	2	4	0	0	6	0	47	3	0	50	0	21	1	0	22	113
8:00 AM	2	4	7	0	13	3	4	1	0	8	0	45	8	0	53	4	21	2	0	27	101
Grand Total	18	12	49	0	79	16	14	2	0	32	1	165	18	0	184	7	73	6	0	86	381
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	3.0	5.6	0.0	3.8	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.0	0.0	5.8	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	3.0	5.6	0.0	3.8	0.0	6.8	0.0	0.0	5.8	
Total %	4.7	3.1	12.9	0.0	20.7	4.2	3.7	0.5	0.0	8.4	0.3	43.3	4.7	0.0	48.3	1.8	19.2	1.6	0.0	22.6	100.0
PHF	0.56	0.56	0.56			0.73	0.73	0.73			0.87	0.87	0.87			0.80	0.80	0.80			0.84



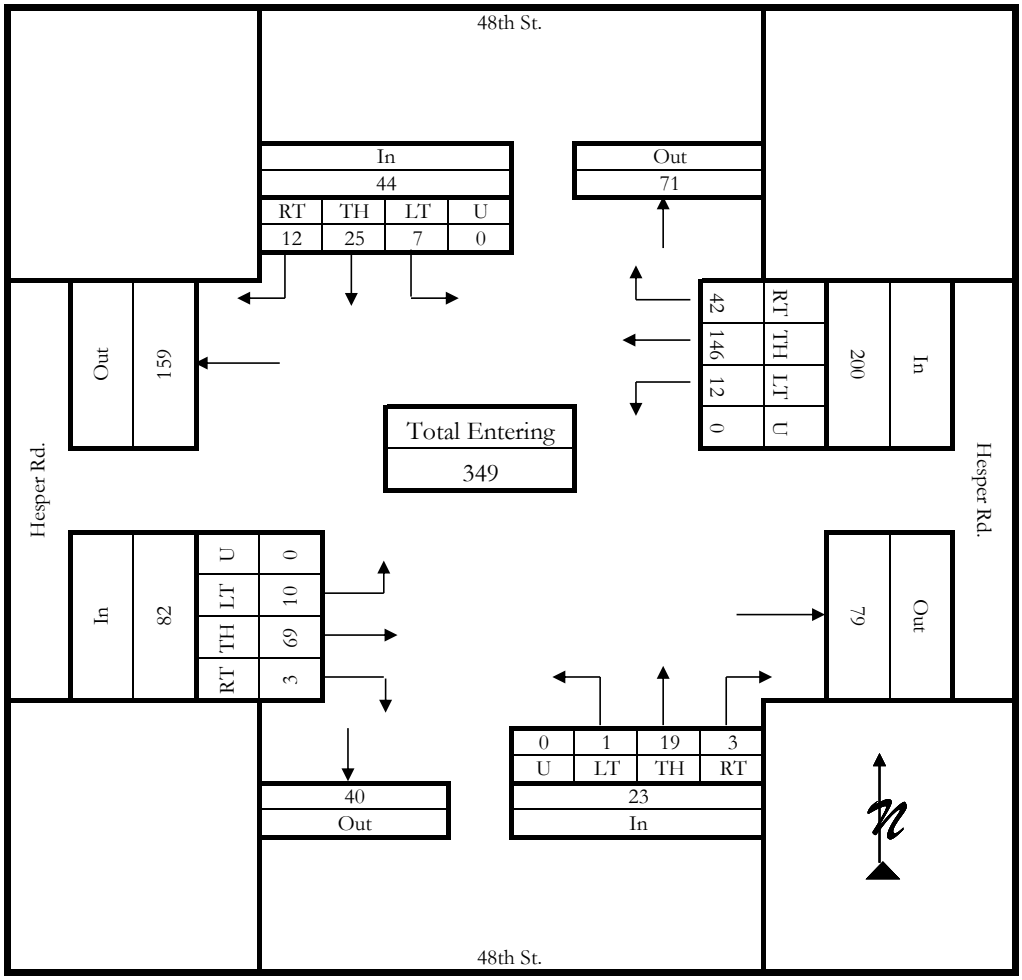
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Hesper Rd. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	Hesper Rd.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					Hesper Rd. Eastbound					Hesper Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		
4:45 PM	2	6	1	0	9	1	5	0	0	6	2	17	2	0	21	5	34	1	0	40	76
5:00 PM	4	6	1	0	11	2	8	1	0	11	0	18	2	0	20	16	44	4	0	64	106
5:15 PM	4	5	3	0	12	0	2	0	0	2	1	17	0	0	18	8	39	4	0	51	83
5:30 PM	2	8	2	0	12	0	4	0	0	4	0	17	6	0	23	13	29	3	0	45	84
Grand Total	12	25	7	0	44	3	19	1	0	23	3	69	10	0	82	42	146	12	0	200	349
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	4.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	33.3	1.4	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	4.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	33.3	1.4	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	
Total %	3.4	7.2	2.0	0.0	12.6	0.9	5.4	0.3	0.0	6.6	0.9	19.8	2.9	0.0	23.5	12.0	41.8	3.4	0.0	57.3	100.0
PHF	0.92	0.92	0.92			0.52	0.52	0.52			0.89	0.89	0.89			0.78	0.78	0.78			0.82



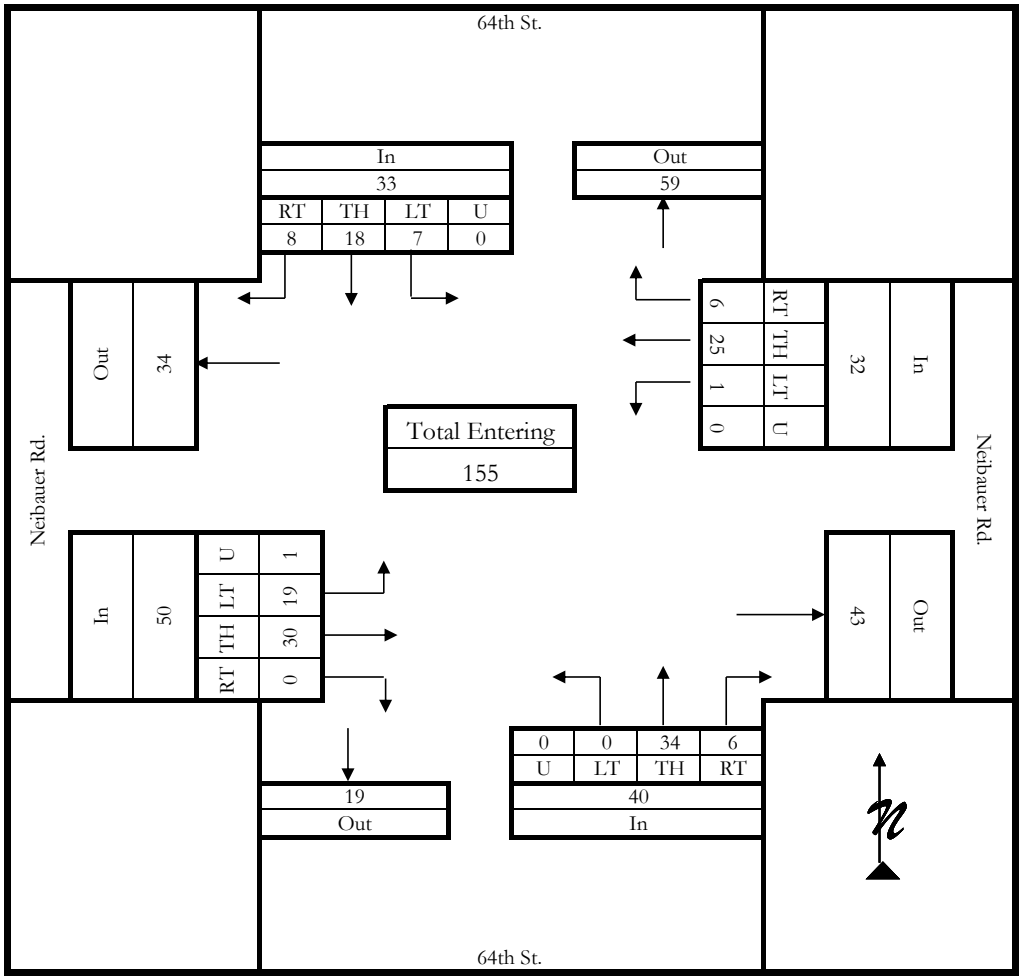
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Neibauer Rd. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	Neibauer Rd.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					Neibauer Rd. Eastbound					Neibauer Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
7:15 AM	1	1	1	0	3	3	4	0	0	7	0	13	0	0	13	0	6	0	0	6	29
7:30 AM	0	3	1	0	4	2	12	0	0	14	0	7	1	0	8	2	7	1	0	10	36
7:45 AM	2	9	3	0	14	0	12	0	0	12	0	8	17	1	26	4	10	0	0	14	66
8:00 AM	5	5	2	0	12	1	6	0	0	7	0	2	1	0	3	0	2	0	0	2	24
Grand Total	8	18	7	0	33	6	34	0	0	40	0	30	19	1	50	6	25	1	0	32	155
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	2.0	0.0	4.0	0.0	0.0	3.1	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	2.5	0.0	6.7	0.0	0.0	4.0	0.0	8.0	0.0	0.0	6.3	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	2.5	0.0	6.7	5.3	0.0	6.0	0.0	12.0	0.0	0.0	9.4	
Total %	5.2	11.6	4.5	0.0	21.3	3.9	21.9	0.0	0.0	25.8	0.0	19.4	12.3	0.6	32.3	3.9	16.1	0.6	0.0	20.6	100.0
PHF	0.59	0.59	0.59			0.71	0.71	0.71			0.48	0.48	0.48			0.57	0.57	0.57			0.59



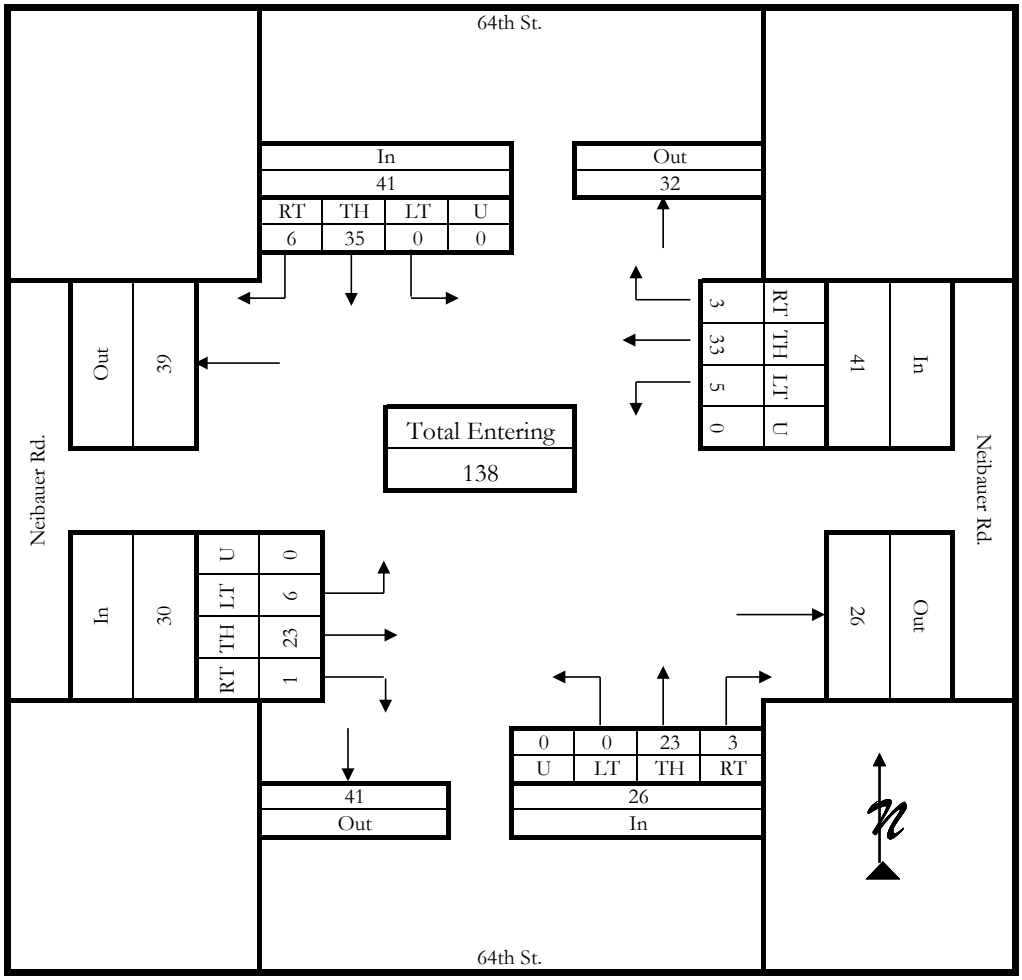
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Neibauer Rd. & 64th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	64th St.	East/West Street:	Neibauer Rd.

Vehicle Volumes and Adjustments

	64th St. Southbound					64th St. Northbound					Neibauer Rd. Eastbound					Neibauer Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
4:45 PM	2	4	0	0	6	0	4	0	0	4	0	6	2	0	8	1	7	2	0	10	28
5:00 PM	2	9	0	0	11	2	6	0	0	8	1	7	2	0	10	2	10	0	0	12	41
5:15 PM	1	13	0	0	14	0	4	0	0	4	0	6	2	0	8	0	9	2	0	11	37
5:30 PM	1	9	0	0	10	1	9	0	0	10	0	4	0	0	4	0	7	1	0	8	32
Grand Total	6	35	0	0	41	3	23	0	0	26	1	23	6	0	30	3	33	5	0	41	138
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	16.7	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	8.7	0.0	0.0	6.7	0.0	6.1	0.0	0.0	4.9	
Total Truck %	16.7	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	8.7	0.0	0.0	6.7	0.0	6.1	0.0	0.0	4.9	
Total %	4.3	25.4	0.0	0.0	29.7	2.2	16.7	0.0	0.0	18.8	0.7	16.7	4.3	0.0	21.7	2.2	23.9	3.6	0.0	29.7	100.0
PHF	0.73	0.73	0.73			0.65	0.65	0.65			0.75	0.75	0.75			0.85	0.85	0.85			0.84



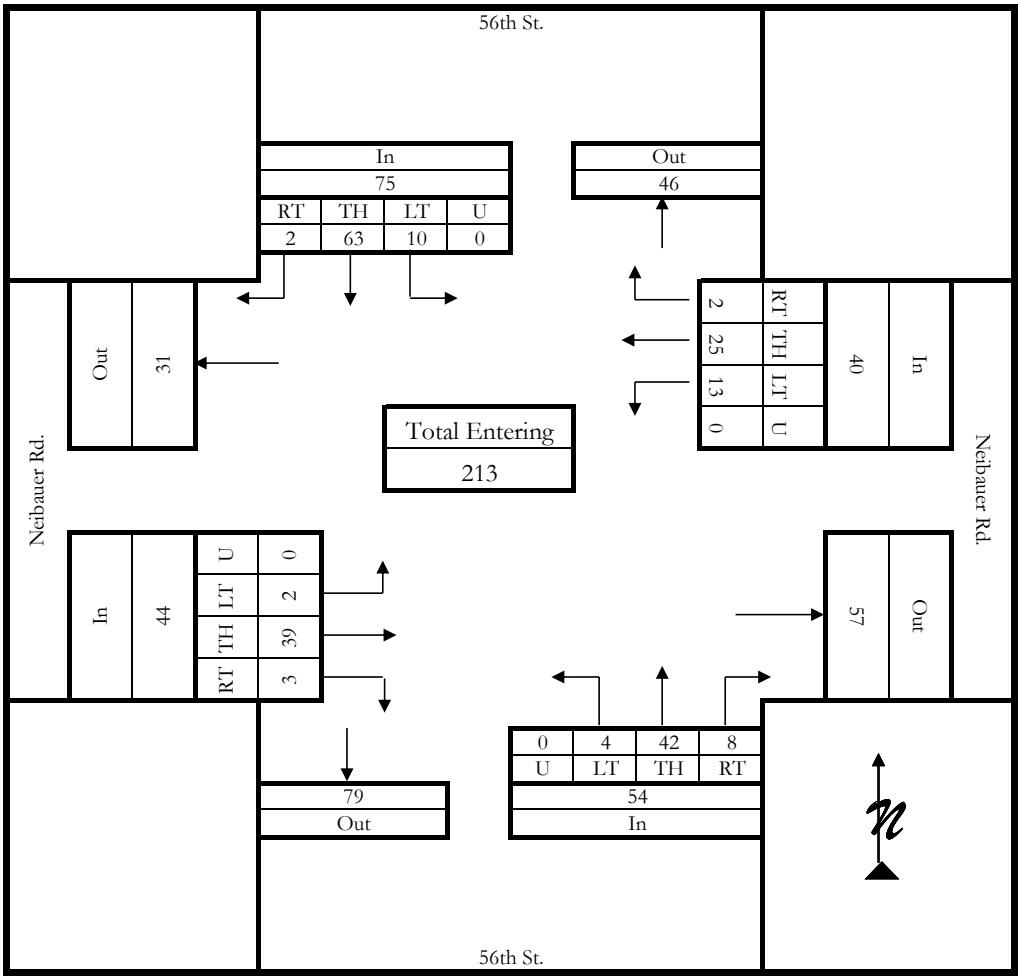
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Neibauer Rd. & 56th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	56th St.	East/West Street:	Neibauer Rd.

Vehicle Volumes and Adjustments

	56th St. Southbound					56th St. Northbound					Neibauer Rd. Eastbound					Neibauer Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
7:15 AM	0	13	2	0	15	1	3	2	0	6	0	13	0	0	13	1	2	2	0	5	39
7:30 AM	1	21	3	0	25	0	9	1	0	10	1	9	2	0	12	0	11	3	0	14	61
7:45 AM	1	17	4	0	22	3	12	1	0	16	2	11	0	0	13	0	9	6	0	15	66
8:00 AM	0	12	1	0	13	4	18	0	0	22	0	6	0	0	6	1	3	2	0	6	47
Grand Total	2	63	10	0	75	8	42	4	0	54	3	39	2	0	44	2	25	13	0	40	213
Medium Truck %	0.0	0.0	0.0	0.0	0.0	12.5	2.4	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	4.0	7.7	0.0	5.0	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	1.9	0.0	5.1	0.0	0.0	4.5	0.0	8.0	0.0	0.0	5.0	
Total Truck %	0.0	0.0	0.0	0.0	0.0	12.5	4.8	0.0	0.0	5.6	0.0	5.1	0.0	0.0	4.5	0.0	12.0	7.7	0.0	10.0	
Total %	0.9	29.6	4.7	0.0	35.2	3.8	19.7	1.9	0.0	25.4	1.4	18.3	0.9	0.0	20.7	0.9	11.7	6.1	0.0	18.8	100.0
PHF	0.75	0.75	0.75			0.61	0.61	0.61			0.85	0.85	0.85			0.67	0.67	0.67			0.81



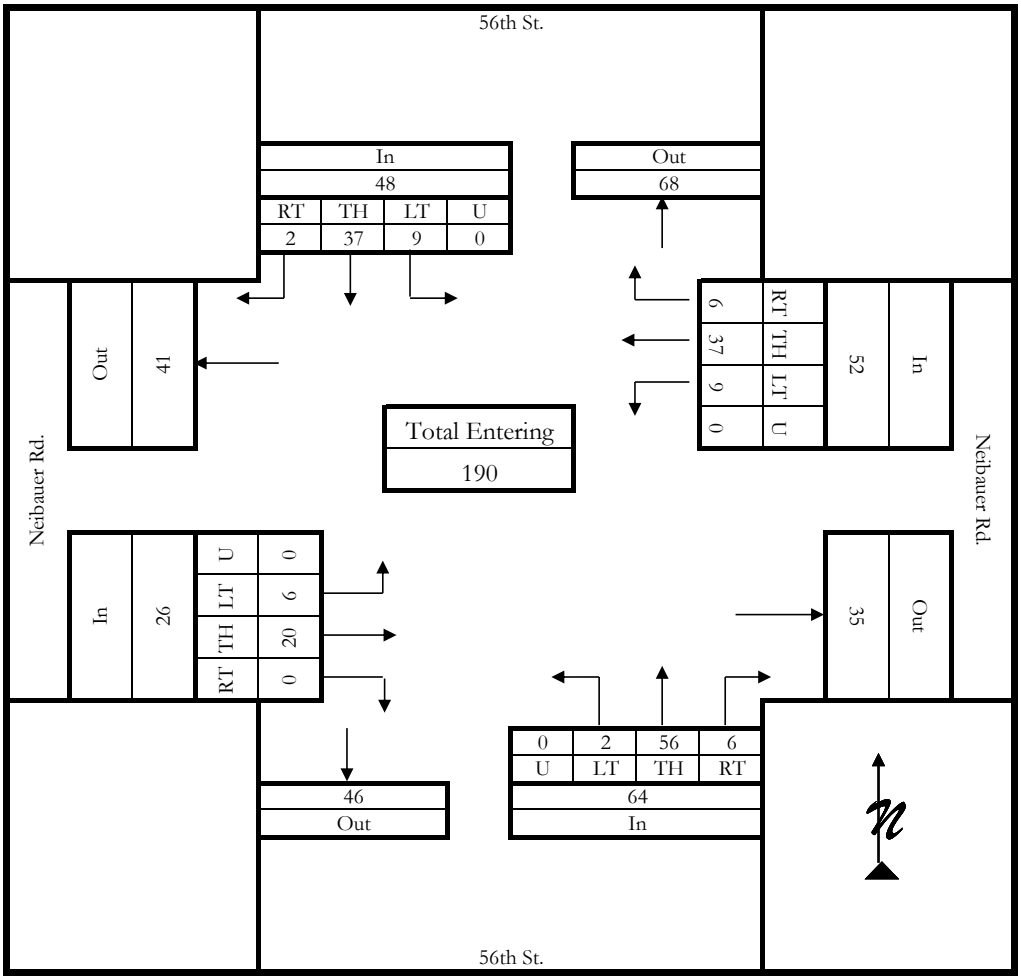
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Neibauer Rd. & 56th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	56th St.	East/West Street:	Neibauer Rd.

Vehicle Volumes and Adjustments

	56th St. Southbound					56th St. Northbound					Neibauer Rd. Eastbound					Neibauer Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
4:45 PM	0	13	4	0	17	2	17	0	0	19	0	3	0	0	3	4	11	2	0	17	56
5:00 PM	1	9	2	0	12	3	17	1	0	21	0	9	1	0	10	1	11	2	0	14	57
5:15 PM	0	7	2	0	9	1	13	1	0	15	0	6	1	0	7	1	9	4	0	14	45
5:30 PM	1	8	1	0	10	0	9	0	0	9	0	2	4	0	6	0	6	1	0	7	32
Grand Total	2	37	9	0	48	6	56	2	0	64	0	20	6	0	26	6	37	9	0	52	190
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	2.7	11.1	0.0	4.2	0.0	1.8	0.0	0.0	1.6	0.0	5.0	0.0	0.0	3.8	0.0	8.1	0.0	0.0	5.8	
Total Truck %	0.0	2.7	11.1	0.0	4.2	0.0	1.8	0.0	0.0	1.6	0.0	5.0	0.0	0.0	3.8	0.0	8.1	0.0	0.0	5.8	
Total %	1.1	19.5	4.7	0.0	25.3	3.2	29.5	1.1	0.0	33.7	0.0	10.5	3.2	0.0	13.7	3.2	19.5	4.7	0.0	27.4	100.0
PHF	0.71	0.71	0.71			0.76	0.76	0.76			0.65	0.65	0.65			0.76	0.76	0.76			0.83



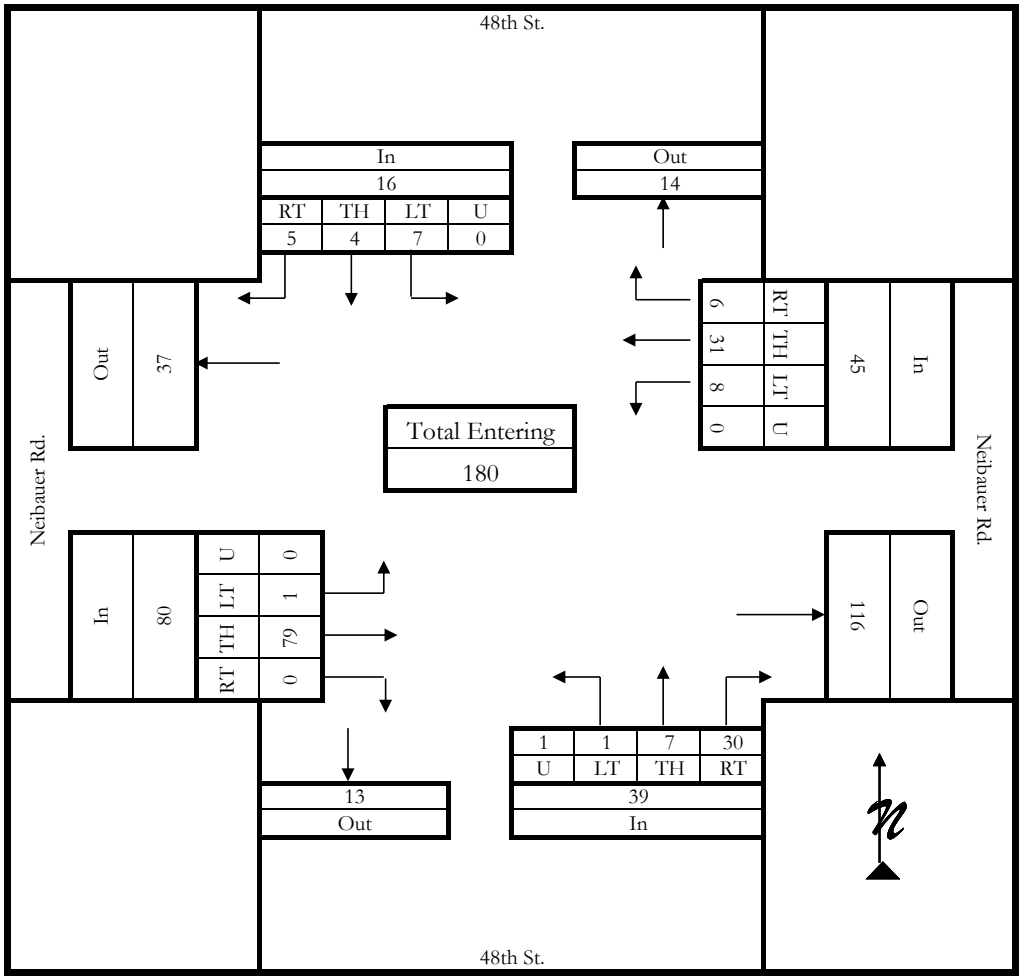
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Neibauer Rd. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	AM Peak Hour (7:15 - 8:15 AM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	Neibauer Rd.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					Neibauer Rd. Eastbound					Neibauer Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
7:15 AM	1	0	2	0	3	10	1	0	0	11	0	19	0	0	19	2	6	2	0	10	43
7:30 AM	3	1	2	0	6	9	4	0	0	13	0	26	0	0	26	1	9	0	0	10	55
7:45 AM	1	1	1	0	3	5	0	1	0	6	0	24	0	0	24	1	6	3	0	10	43
8:00 AM	0	2	2	0	4	6	2	0	1	9	0	10	1	0	11	2	10	3	0	15	39
Grand Total	5	4	7	0	16	30	7	1	1	39	0	79	1	0	80	6	31	8	0	45	180
Medium Truck %	0.0	25.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	2.2	
Heavy Truck %	0.0	0.0	14.3	0.0	6.3	3.3	0.0	0.0	0.0	2.6	0.0	2.5	0.0	0.0	2.5	0.0	9.7	0.0	0.0	6.7	
Total Truck %	0.0	25.0	14.3	0.0	12.5	3.3	0.0	0.0	0.0	2.6	0.0	2.5	0.0	0.0	2.5	0.0	12.9	0.0	0.0	8.9	
Total %	2.8	2.2	3.9	0.0	8.9	16.7	3.9	0.6	0.6	21.7	0.0	43.9	0.6	0.0	44.4	3.3	17.2	4.4	0.0	25.0	100.0
PHF	0.67	0.67	0.67			0.75	0.75	0.75			0.77	0.77	0.77			0.75	0.75	0.75			0.82



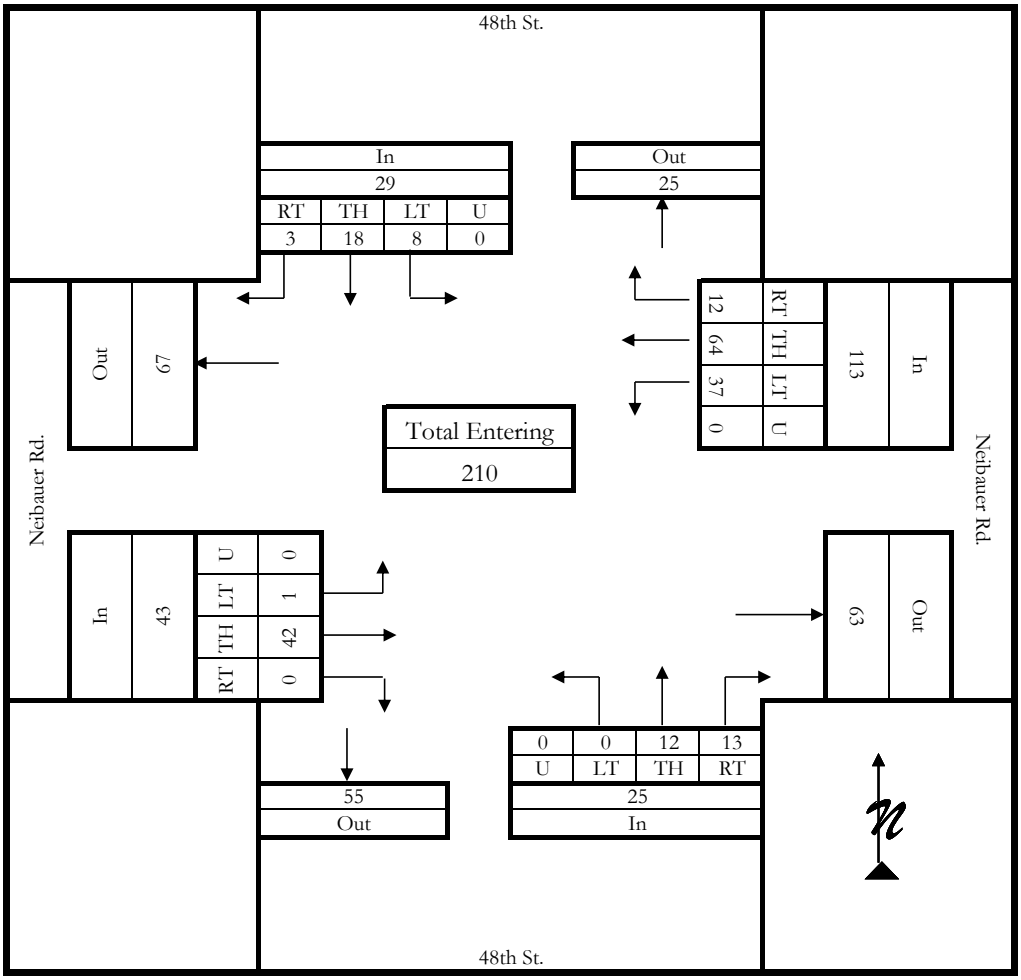
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	J. Staszcuk	Intersection:	Neibauer Rd. & 48th St.
Agency/Company:	Sanderson Stewart		
Date Performed:	Wednesday, January 20, 2016	Jurisdiction:	City of Billings / MDT
Count Time Period:	PM Peak Hour (4:45 - 5:45 PM)		
Project Number:	15053	Project Description:	West End Multi-Modal Traffic Modeling
North/South Street:	48th St.	East/West Street:	Neibauer Rd.

Vehicle Volumes and Adjustments

	48th St. Southbound					48th St. Northbound					Neibauer Rd. Eastbound					Neibauer Rd. Westbound					Int.
Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Total
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.12	1.12	1.12	1.12		1.12	1.12	1.12	1.12		
4:45 PM	1	5	3	0	9	1	4	0	0	5	0	7	1	0	8	0	21	15	0	36	58
5:00 PM	0	1	3	0	4	9	6	0	0	15	0	19	0	0	19	3	16	6	0	25	63
5:15 PM	1	7	1	0	9	1	0	0	0	1	0	7	0	0	7	6	17	7	0	30	47
5:30 PM	1	5	1	0	7	2	2	0	0	4	0	9	0	0	9	3	10	9	0	22	42
Grand Total	3	18	8	0	29	13	12	0	0	25	0	42	1	0	43	12	64	37	0	113	210
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Truck %	0.0	0.0	25.0	0.0	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	2.7	
Total Truck %	0.0	0.0	25.0	0.0	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	2.7	
Total %	1.4	8.6	3.8	0.0	13.8	6.2	5.7	0.0	0.0	11.9	0.0	20.0	0.5	0.0	20.5	5.7	30.5	17.6	0.0	53.8	100.0
PHF	0.81	0.81	0.81			0.42	0.42	0.42			0.57	0.57	0.57			0.78	0.78	0.78			0.83



APPENDIX B
EXISTING CONDITIONS (2015) INTERSECTION CAPACITY WORKSHEETS

SANDERSON STEWART

FEHR PEERS

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	3	73	44	31	23	1	18	42	25	0	87	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	65	65	65	64	64	64	76	76	76
Heavy Vehicles, %	0	0	0	3	30	0	0	0	0	0	0	0
Mvmt Flow	4	95	57	48	35	2	28	66	39	0	114	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	277	278	117	334	261	85	120	0	0	105	0	0
Stage 1	117	117	-	141	141	-	-	-	-	-	-	-
Stage 2	160	161	-	193	120	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.8	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.8	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.8	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4.27	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	679	633	941	618	599	980	1480	-	-	1499	-	-
Stage 1	892	803	-	860	730	-	-	-	-	-	-	-
Stage 2	847	769	-	806	746	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	637	620	941	505	587	980	1480	-	-	1499	-	-
Mov Cap-2 Maneuver	637	620	-	505	587	-	-	-	-	-	-	-
Stage 1	874	803	-	843	715	-	-	-	-	-	-	-
Stage 2	788	754	-	668	746	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.5	12.9	1.6	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1480	-	-	709	541	1499	-	-
HCM Lane V/C Ratio	0.019	-	-	0.22	0.156	-	-	-
HCM Control Delay (s)	7.5	0	-	11.5	12.9	0	-	-
HCM Lane LOS	A	A	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	0.6	0	-	-

Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	362	14	24	133	24	3	6	48	131	45	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	250	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	81	81	81	65	65	65	97	97	97
Heavy Vehicles, %	0	3	7	17	11	13	33	0	13	1	2	100
Mvmt Flow	0	517	20	30	164	30	5	9	74	135	46	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	164	0	0	537	0	0	775	750	527	792	760	164
Stage 1	-	-	-	-	-	-	527	527	-	223	223	-
Stage 2	-	-	-	-	-	-	248	223	-	569	537	-
Critical Hdwy	4.1	-	-	4.27	-	-	7.43	6.5	6.33	7.11	6.52	7.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.43	5.5	-	6.11	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.43	5.5	-	6.11	5.52	-
Follow-up Hdwy	2.2	-	-	2.353	-	-	3.797	4	3.417	3.509	4.018	4.2
Pot Cap-1 Maneuver	1427	-	-	960	-	-	280	342	530	308	336	678
Stage 1	-	-	-	-	-	-	482	532	-	782	719	-
Stage 2	-	-	-	-	-	-	692	723	-	509	523	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1427	-	-	960	-	-	242	330	530	253	324	678
Mov Cap-2 Maneuver	-	-	-	-	-	-	242	330	-	253	324	-
Stage 1	-	-	-	-	-	-	482	532	-	782	694	-
Stage 2	-	-	-	-	-	-	621	698	-	430	523	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.2	14.4	42.6
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	471	1427	-	-	960	-	-	270
HCM Lane V/C Ratio	0.186	-	-	-	0.031	-	-	0.68
HCM Control Delay (s)	14.4	0	-	-	8.9	0	-	42.6
HCM Lane LOS	B	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	4.5

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	100	57	83	42	23	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	76	76	78	78
Heavy Vehicles, %	5	4	1	2	9	0
Mvmt Flow	115	66	109	55	29	91

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	180	0	422	148
Stage 1	-	-	-	-	148	-
Stage 2	-	-	-	-	274	-
Critical Hdwy	-	-	4.11	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.209	-	3.581	3.3
Pot Cap-1 Maneuver	-	-	1402	-	575	904
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	756	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1402	-	529	904
Mov Cap-2 Maneuver	-	-	-	-	529	-
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	696	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.2	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	770	-	-	1402	-
HCM Lane V/C Ratio	0.157	-	-	0.078	-
HCM Control Delay (s)	10.5	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.3	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	52	115	138	91	72	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	84	84	74	74
Heavy Vehicles, %	2	2	1	0	3	2
Mvmt Flow	56	124	164	108	97	66

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	273	0	-	0	453	218
Stage 1	-	-	-	-	218	-
Stage 2	-	-	-	-	235	-
Critical Hdwy	4.12	-	-	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.218	-	-	-	3.527	3.318
Pot Cap-1 Maneuver	1290	-	-	-	563	822
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1290	-	-	-	537	822
Mov Cap-2 Maneuver	-	-	-	-	537	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	764	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1290	-	-	-	625
HCM Lane V/C Ratio	0.043	-	-	-	0.262
HCM Control Delay (s)	7.9	0	-	-	12.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	312	92	34	115	0	24	1	48	1	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	93	93	93	76	76	76	38	38	38
Heavy Vehicles, %	0	2	2	12	9	0	4	100	25	0	0	0
Mvmt Flow	0	351	103	37	124	0	32	1	63	3	5	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	124	0	0	454	0	0	601	599	402	631	651	124
Stage 1	-	-	-	-	-	-	402	402	-	197	197	-
Stage 2	-	-	-	-	-	-	199	197	-	434	454	-
Critical Hdwy	4.1	-	-	4.22	-	-	7.14	7.5	6.45	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	6.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	6.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.308	-	-	3.536	4.9	3.525	3.5	4	3.3
Pot Cap-1 Maneuver	1475	-	-	1056	-	-	409	308	601	396	390	932
Stage 1	-	-	-	-	-	-	621	462	-	809	742	-
Stage 2	-	-	-	-	-	-	798	587	-	604	573	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1475	-	-	1056	-	-	393	296	601	343	375	932
Mov Cap-2 Maneuver	-	-	-	-	-	-	393	296	-	343	375	-
Stage 1	-	-	-	-	-	-	621	462	-	809	714	-
Stage 2	-	-	-	-	-	-	762	565	-	539	573	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.9	13.8	15.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	506	1475	-	-	1056	-	-	364
HCM Lane V/C Ratio	0.19	-	-	-	0.035	-	-	0.022
HCM Control Delay (s)	13.8	0	-	-	8.5	0	-	15.1
HCM Lane LOS	B	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	33	331	133	36	176	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	80	80	95	95
Heavy Vehicles, %	30	2	10	22	3	6
Mvmt Flow	35	356	166	45	185	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	211	0	-	0	616	189
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	427	-
Critical Hdwy	4.4	-	-	-	6.43	6.26
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.47	-	-	-	3.527	3.354
Pot Cap-1 Maneuver	1210	-	-	-	452	843
Stage 1	-	-	-	-	841	-
Stage 2	-	-	-	-	656	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1210	-	-	-	436	843
Mov Cap-2 Maneuver	-	-	-	-	436	-
Stage 1	-	-	-	-	841	-
Stage 2	-	-	-	-	632	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	19.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1210	-	-	-	455
HCM Lane V/C Ratio	0.029	-	-	-	0.447
HCM Control Delay (s)	8.1	0	-	-	19.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	2.3

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	515	72	41	235	0	14	0	128	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	68	68	68	85	85	85	92	92	92
Heavy Vehicles, %	0	2	2	2	6	0	7	0	1	0	0	0
Mvmt Flow	0	572	80	60	346	0	16	0	151	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	346	0	0	652	0	0	1078	1078	612	1154	1118	346
Stage 1	-	-	-	-	-	-	612	612	-	466	466	-
Stage 2	-	-	-	-	-	-	466	466	-	688	652	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.17	6.5	6.21	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.563	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	1224	-	-	935	-	-	192	220	495	176	209	702
Stage 1	-	-	-	-	-	-	472	487	-	581	566	-
Stage 2	-	-	-	-	-	-	567	566	-	440	467	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1224	-	-	935	-	-	180	203	495	115	192	702
Mov Cap-2 Maneuver	-	-	-	-	-	-	180	203	-	115	192	-
Stage 1	-	-	-	-	-	-	472	487	-	581	521	-
Stage 2	-	-	-	-	-	-	522	521	-	306	467	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.4	19	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	422	1224	-	-	935	-	-	-
HCM Lane V/C Ratio	0.396	-	-	-	0.064	-	-	-
HCM Control Delay (s)	19	0	-	-	9.1	0	-	0
HCM Lane LOS	C	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	1.9	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	26	11	94	48	20	122
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	58	58	76	76	71	71
Heavy Vehicles, %	0	0	3	0	0	1
Mvmt Flow	45	19	124	63	28	172

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	383	155	0	0	187	0
Stage 1	155	-	-	-	-	-
Stage 2	228	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	624	896	-	-	1399	-
Stage 1	878	-	-	-	-	-
Stage 2	815	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	610	896	-	-	1399	-
Mov Cap-2 Maneuver	610	-	-	-	-	-
Stage 1	878	-	-	-	-	-
Stage 2	797	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	674	1399	-
HCM Lane V/C Ratio	-	-	0.095	0.02	-
HCM Control Delay (s)	-	-	10.9	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	94	2	37	63	16	4	38	37	65	66	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	66	66	66	71	71	71	84	84	84
Heavy Vehicles, %	0	4	0	3	2	19	0	18	8	3	8	0
Mvmt Flow	3	119	3	56	95	24	6	54	52	77	79	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	120	0	0	122	0	0	387	357	120	398	347	108
Stage 1	-	-	-	-	-	-	125	125	-	220	220	-
Stage 2	-	-	-	-	-	-	262	232	-	178	127	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.68	6.28	7.13	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.68	-	6.13	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.68	-	6.13	5.58	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4.162	3.372	3.527	4.072	3.3
Pot Cap-1 Maneuver	1480	-	-	1459	-	-	575	544	916	560	567	951
Stage 1	-	-	-	-	-	-	884	763	-	780	710	-
Stage 2	-	-	-	-	-	-	747	684	-	821	780	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1480	-	-	1459	-	-	492	521	916	471	543	951
Mov Cap-2 Maneuver	-	-	-	-	-	-	492	521	-	471	543	-
Stage 1	-	-	-	-	-	-	882	761	-	778	681	-
Stage 2	-	-	-	-	-	-	630	656	-	718	778	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.4	11.7	15.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	650	1480	-	-	1459	-	-	514
HCM Lane V/C Ratio	0.171	0.002	-	-	0.038	-	-	0.315
HCM Control Delay (s)	11.7	7.4	0	-	7.6	0	-	15.2
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	1.3

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	258	20	8	72	23	5	29	39	74	72	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	86	86	86	76	76	76	70	70	70
Heavy Vehicles, %	0	1	0	0	4	0	20	3	0	3	0	0
Mvmt Flow	14	311	24	9	84	27	7	38	51	106	103	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	110	0	0	335	0	0	523	481	323	513	480	97
Stage 1	-	-	-	-	-	-	352	352	-	116	116	-
Stage 2	-	-	-	-	-	-	171	129	-	397	364	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.53	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.53	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.53	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.68	4.027	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1493	-	-	1236	-	-	437	483	723	470	488	965
Stage 1	-	-	-	-	-	-	629	630	-	886	803	-
Stage 2	-	-	-	-	-	-	790	787	-	627	627	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1493	-	-	1236	-	-	356	473	723	404	478	965
Mov Cap-2 Maneuver	-	-	-	-	-	-	356	473	-	404	478	-
Stage 1	-	-	-	-	-	-	621	622	-	875	797	-
Stage 2	-	-	-	-	-	-	676	781	-	540	619	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.6	12.7	20.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	565	1493	-	-	1236	-	-	447
HCM Lane V/C Ratio	0.17	0.01	-	-	0.008	-	-	0.486
HCM Control Delay (s)	12.7	7.4	0	-	7.9	0	-	20.4
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	-	2.6

Intersection	
Int Delay, s/veh	11

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	87	217	47	55	118	16	8	54	41	8	47	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	62	62	62	55	55	55	66	66	66
Heavy Vehicles, %	0	2	4	0	8	19	0	0	2	0	2	0
Mvmt Flow	101	252	55	89	190	26	15	98	75	12	71	77

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	216	0	0	307	0	0	937	876	280	949	890	203
Stage 1	-	-	-	-	-	-	482	482	-	381	381	-
Stage 2	-	-	-	-	-	-	455	394	-	568	509	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.22	7.1	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.318	3.5	4.018	3.3
Pot Cap-1 Maneuver	1366	-	-	1265	-	-	247	290	759	242	282	843
Stage 1	-	-	-	-	-	-	569	557	-	645	613	-
Stage 2	-	-	-	-	-	-	589	609	-	511	538	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1366	-	-	1265	-	-	152	243	759	132	236	843
Mov Cap-2 Maneuver	-	-	-	-	-	-	152	243	-	132	236	-
Stage 1	-	-	-	-	-	-	518	507	-	587	564	-
Stage 2	-	-	-	-	-	-	430	560	-	338	490	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	2.3	32.3	25.7
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	313	1366	-	-	1265	-	-	331
HCM Lane V/C Ratio	0.598	0.074	-	-	0.07	-	-	0.485
HCM Control Delay (s)	32.3	7.8	0	-	8.1	0	-	25.7
HCM Lane LOS	D	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	3.6	0.2	-	-	0.2	-	-	2.5

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	261	13	21	168	4	6	47	17	31	78	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	74	74	74	67	67	67	74	74	74
Heavy Vehicles, %	14	2	15	10	8	0	17	2	0	0	4	0
Mvmt Flow	8	303	15	28	227	5	9	70	25	42	105	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	232	0	0	319	0	0	678	616	311	661	621	230
Stage 1	-	-	-	-	-	-	327	327	-	286	286	-
Stage 2	-	-	-	-	-	-	351	289	-	375	335	-
Critical Hdwy	4.24	-	-	4.2	-	-	7.27	6.52	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.27	5.52	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.27	5.52	-	6.1	5.54	-
Follow-up Hdwy	2.326	-	-	2.29	-	-	3.653	4.018	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1268	-	-	1197	-	-	347	406	734	379	401	814
Stage 1	-	-	-	-	-	-	655	648	-	726	671	-
Stage 2	-	-	-	-	-	-	636	673	-	650	639	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1268	-	-	1197	-	-	259	392	734	307	387	814
Mov Cap-2 Maneuver	-	-	-	-	-	-	259	392	-	307	387	-
Stage 1	-	-	-	-	-	-	650	643	-	720	653	-
Stage 2	-	-	-	-	-	-	503	655	-	555	634	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.9	16.4	21.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	421	1268	-	-	1197	-	-	391
HCM Lane V/C Ratio	0.248	0.006	-	-	0.024	-	-	0.439
HCM Control Delay (s)	16.4	7.9	0	-	8.1	0	-	21.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	2.2

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	31	274	6	5	187	14	3	34	9	55	37	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	82	82	82	72	72	72	75	75	75
Heavy Vehicles, %	0	2	0	40	8	7	33	0	11	0	0	0
Mvmt Flow	37	326	7	6	228	17	4	47	12	73	49	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	245	0	0	333	0	0	682	661	330	682	656	237
Stage 1	-	-	-	-	-	-	404	404	-	249	249	-
Stage 2	-	-	-	-	-	-	278	257	-	433	407	-
Critical Hdwy	4.1	-	-	4.5	-	-	7.43	6.5	6.31	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.43	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.43	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.56	-	-	3.797	4	3.399	3.5	4	3.3
Pot Cap-1 Maneuver	1333	-	-	1042	-	-	325	385	691	367	388	807
Stage 1	-	-	-	-	-	-	566	603	-	759	704	-
Stage 2	-	-	-	-	-	-	666	699	-	605	601	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1333	-	-	1042	-	-	280	369	691	315	372	807
Mov Cap-2 Maneuver	-	-	-	-	-	-	280	369	-	315	372	-
Stage 1	-	-	-	-	-	-	547	582	-	733	699	-
Stage 2	-	-	-	-	-	-	608	694	-	527	581	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.2	15.8	21.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	397	1333	-	-	1042	-	-	350
HCM Lane V/C Ratio	0.161	0.028	-	-	0.006	-	-	0.377
HCM Control Delay (s)	15.8	7.8	0	-	8.5	0	-	21.4
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-	-	1.7

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	49	83	5	2	24	61	0	54	8	52	24	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	61	61	61	59	59	59	50	50	50	60	60	60
Heavy Vehicles, %	0	6	0	0	8	2	0	6	0	2	0	0
Mvmt Flow	80	136	8	3	41	103	0	108	16	87	40	30

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	416	352	55	416	359	116	70	0	0	124	0	0
Stage 1	228	228	-	116	116	-	-	-	-	-	-	-
Stage 2	188	124	-	300	243	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.2	7.1	6.58	6.22	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.3	3.5	4.072	3.318	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	551	566	1018	551	558	936	1544	-	-	1463	-	-
Stage 1	779	708	-	894	788	-	-	-	-	-	-	-
Stage 2	818	786	-	713	694	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	439	531	1018	419	523	936	1544	-	-	1463	-	-
Mov Cap-2 Maneuver	439	531	-	419	523	-	-	-	-	-	-	-
Stage 1	779	664	-	894	788	-	-	-	-	-	-	-
Stage 2	690	786	-	527	651	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.8	11	0	4.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1544	-	-	502	751	1463	-	-
HCM Lane V/C Ratio	-	-	-	0.447	0.196	0.059	-	-
HCM Control Delay (s)	0	-	-	17.8	11	7.6	0	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2.3	0.7	0.2	-	-

Intersection	
Int Delay, s/veh	9.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	8	127	12	15	72	6	20	49	21	31	65	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	65	65	65	63	63	63	76	76	76
Heavy Vehicles, %	0	4	0	27	4	0	0	2	5	0	2	7
Mvmt Flow	12	184	17	23	111	9	32	78	33	41	86	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	394	351	95	435	344	94	104	0	0	111	0	0
Stage 1	176	176	-	158	158	-	-	-	-	-	-	-
Stage 2	218	175	-	277	186	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.2	7.37	6.54	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.3	3.743	4.036	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	569	570	967	491	575	968	1500	-	-	1492	-	-
Stage 1	831	750	-	789	763	-	-	-	-	-	-	-
Stage 2	789	750	-	678	742	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	457	541	967	342	545	968	1500	-	-	1492	-	-
Mov Cap-2 Maneuver	457	541	-	342	545	-	-	-	-	-	-	-
Stage 1	812	728	-	771	745	-	-	-	-	-	-	-
Stage 2	650	733	-	483	720	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	14.8	1.7	2.1
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1500	-	-	555	511	1492	-	-
HCM Lane V/C Ratio	0.021	-	-	0.384	0.28	0.027	-	-
HCM Control Delay (s)	7.5	0	-	15.5	14.8	7.5	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.8	1.1	0.1	-	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	18	165	1	6	73	7	2	14	16	49	12	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	80	80	80	73	73	73	56	56	56
Heavy Vehicles, %	6	3	100	0	7	0	0	0	0	0	0	0
Mvmt Flow	21	190	1	8	91	9	3	19	22	88	21	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	100	0	0	191	0	0	369	347	190	363	343	96
Stage 1	-	-	-	-	-	-	232	232	-	111	111	-
Stage 2	-	-	-	-	-	-	137	115	-	252	232	-
Critical Hdwy	4.16	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1468	-	-	1395	-	-	591	580	857	597	583	966
Stage 1	-	-	-	-	-	-	775	716	-	899	807	-
Stage 2	-	-	-	-	-	-	871	804	-	757	716	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1468	-	-	1395	-	-	546	567	857	557	570	966
Mov Cap-2 Maneuver	-	-	-	-	-	-	546	567	-	557	570	-
Stage 1	-	-	-	-	-	-	763	705	-	885	802	-
Stage 2	-	-	-	-	-	-	815	799	-	706	705	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.5	10.7	12.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	681	1468	-	-	1395	-	-	619
HCM Lane V/C Ratio	0.064	0.014	-	-	0.005	-	-	0.228
HCM Control Delay (s)	10.7	7.5	0	-	7.6	0	-	12.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.9

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	30	0	1	25	6	0	34	6	7	18	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	48	48	48	57	57	57	71	71	71	59	59	59
Heavy Vehicles, %	5	7	0	0	12	0	0	3	0	0	0	0
Mvmt Flow	42	62	0	2	44	11	0	48	8	12	31	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	140	117	37	144	120	52	44	0	0	56	0	0
Stage 1	61	61	-	52	52	-	-	-	-	-	-	-
Stage 2	79	56	-	92	68	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.57	6.2	7.1	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.063	3.3	3.5	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	823	764	1041	830	752	1021	1577	-	-	1562	-	-
Stage 1	943	834	-	966	832	-	-	-	-	-	-	-
Stage 2	922	838	-	920	819	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	773	758	1041	773	746	1021	1577	-	-	1562	-	-
Mov Cap-2 Maneuver	773	758	-	773	746	-	-	-	-	-	-	-
Stage 1	943	827	-	966	832	-	-	-	-	-	-	-
Stage 2	864	838	-	844	812	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	9.9	0	1.6
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1577	-	-	764	787	1562	-	-
HCM Lane V/C Ratio	-	-	-	0.136	0.071	0.008	-	-
HCM Control Delay (s)	0	-	-	10.5	9.9	7.3	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.2	0	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	39	3	13	25	2	4	42	8	10	63	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	67	67	67	61	61	61	75	75	75
Heavy Vehicles, %	0	5	0	7	12	0	0	5	13	0	0	0
Mvmt Flow	2	46	4	19	37	3	7	69	13	13	84	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	221	207	85	226	202	75	87	0	0	82	0	0
Stage 1	112	112	-	89	89	-	-	-	-	-	-	-
Stage 2	109	95	-	137	113	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.17	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.563	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	739	684	980	719	677	992	1522	-	-	1528	-	-
Stage 1	898	797	-	906	802	-	-	-	-	-	-	-
Stage 2	901	810	-	854	783	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	698	674	980	672	668	992	1522	-	-	1528	-	-
Mov Cap-2 Maneuver	698	674	-	672	668	-	-	-	-	-	-	-
Stage 1	894	790	-	901	798	-	-	-	-	-	-	-
Stage 2	852	806	-	794	776	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	10.8	0.5	1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1522	-	-	690	680	1528	-	-
HCM Lane V/C Ratio	0.004	-	-	0.075	0.088	0.009	-	-
HCM Control Delay (s)	7.4	0	-	10.6	10.8	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	79	0	8	31	6	2	7	30	7	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	75	75	75	75	75	75	67	67	67
Heavy Vehicles, %	0	3	0	0	13	0	0	0	3	14	25	0
Mvmt Flow	1	103	0	11	41	8	3	9	40	10	6	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	49	0	0	103	0	0	178	176	103	197	172	45
Stage 1	-	-	-	-	-	-	105	105	-	67	67	-
Stage 2	-	-	-	-	-	-	73	71	-	130	105	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.24	6.75	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.626	4.225	3.3
Pot Cap-1 Maneuver	1571	-	-	1502	-	-	789	721	949	737	682	1031
Stage 1	-	-	-	-	-	-	906	812	-	914	796	-
Stage 2	-	-	-	-	-	-	942	840	-	846	766	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1571	-	-	1502	-	-	773	715	949	694	676	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	773	715	-	694	676	-
Stage 1	-	-	-	-	-	-	905	811	-	913	790	-
Stage 2	-	-	-	-	-	-	921	833	-	800	765	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	9.3	9.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	887	1571	-	-	1502	-	-	767
HCM Lane V/C Ratio	0.059	0.001	-	-	0.007	-	-	0.031
HCM Control Delay (s)	9.3	7.3	0	-	7.4	0	-	9.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	49	166	75	34	148	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	80	80	80	80
Heavy Vehicles, %	6	5	4	9	1	5
Mvmt Flow	56	191	94	42	185	78

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	136	0	-	0	418	115
Stage 1	-	-	-	-	115	-
Stage 2	-	-	-	-	303	-
Critical Hdwy	4.16	-	-	-	6.41	6.25
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.254	-	-	-	3.509	3.345
Pot Cap-1 Maneuver	1424	-	-	-	593	929
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	751	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1424	-	-	-	567	929
Mov Cap-2 Maneuver	-	-	-	-	567	-
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	718	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1424	-	-	-	641
HCM Lane V/C Ratio	0.04	-	-	-	0.41
HCM Control Delay (s)	7.6	0	-	-	14.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	2

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	30	15	14	26	1	32	67	15	1	45	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	73	73	73	92	92	92	77	77	77
Heavy Vehicles, %	0	0	0	0	0	0	3	2	7	0	2	33
Mvmt Flow	0	40	20	19	36	1	35	73	16	1	58	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	232	222	60	244	216	81	62	0	0	89	0	0
Stage 1	63	63	-	151	151	-	-	-	-	-	-	-
Stage 2	169	159	-	93	65	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	727	680	1011	714	685	985	1535	-	-	1519	-	-
Stage 1	953	846	-	856	776	-	-	-	-	-	-	-
Stage 2	838	770	-	919	845	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	683	663	1011	655	668	985	1535	-	-	1519	-	-
Mov Cap-2 Maneuver	683	663	-	655	668	-	-	-	-	-	-	-
Stage 1	930	845	-	835	757	-	-	-	-	-	-	-
Stage 2	778	752	-	857	844	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	10.9	2.1	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1535	-	-	749	669	1519	-	-
HCM Lane V/C Ratio	0.023	-	-	0.08	0.084	0.001	-	-
HCM Control Delay (s)	7.4	0	-	10.2	10.9	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.3	0	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	200	1	44	263	118	6	34	47	72	32	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	250	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	75	75	75	90	90	90
Heavy Vehicles, %	14	2	0	5	0	0	0	0	4	1	0	0
Mvmt Flow	8	230	1	51	302	136	8	45	63	80	36	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	302	0	0	231	0	0	670	650	230	704	650	302
Stage 1	-	-	-	-	-	-	247	247	-	403	403	-
Stage 2	-	-	-	-	-	-	423	403	-	301	247	-
Critical Hdwy	4.24	-	-	4.15	-	-	7.1	6.5	6.24	7.11	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.11	5.5	-
Follow-up Hdwy	2.326	-	-	2.245	-	-	3.5	4	3.336	3.509	4	3.3
Pot Cap-1 Maneuver	1194	-	-	1319	-	-	373	391	804	353	391	742
Stage 1	-	-	-	-	-	-	761	706	-	626	603	-
Stage 2	-	-	-	-	-	-	613	603	-	710	706	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1194	-	-	1319	-	-	328	368	804	282	368	742
Mov Cap-2 Maneuver	-	-	-	-	-	-	328	368	-	282	368	-
Stage 1	-	-	-	-	-	-	755	700	-	621	572	-
Stage 2	-	-	-	-	-	-	542	572	-	607	700	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.8	14	23.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	514	1194	-	-	1319	-	-	311
HCM Lane V/C Ratio	0.226	0.007	-	-	0.038	-	-	0.386
HCM Control Delay (s)	14	8	0	-	7.8	0	-	23.7
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	1.8

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	34	186	228	121	93	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	93	93	91	91
Heavy Vehicles, %	3	3	1	1	1	19
Mvmt Flow	41	224	245	130	102	46

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	375	0	-	0	616	310
Stage 1	-	-	-	-	310	-
Stage 2	-	-	-	-	306	-
Critical Hdwy	4.13	-	-	-	6.41	6.39
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.227	-	-	-	3.509	3.471
Pot Cap-1 Maneuver	1178	-	-	-	456	692
Stage 1	-	-	-	-	746	-
Stage 2	-	-	-	-	749	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1178	-	-	-	438	692
Mov Cap-2 Maneuver	-	-	-	-	438	-
Stage 1	-	-	-	-	746	-
Stage 2	-	-	-	-	719	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	15.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1178	-	-	-	494
HCM Lane V/C Ratio	0.035	-	-	-	0.3
HCM Control Delay (s)	8.2	0	-	-	15.4
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.3

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	171	50	50	216	1	82	0	50	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	93	93	93	75	75	75	38	38	38
Heavy Vehicles, %	0	2	2	18	1	0	0	0	8	0	0	0
Mvmt Flow	0	199	58	54	232	1	109	0	67	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	233	0	0	257	0	0	568	569	228	601	597	233
Stage 1	-	-	-	-	-	-	228	228	-	340	340	-
Stage 2	-	-	-	-	-	-	340	341	-	261	257	-
Critical Hdwy	4.1	-	-	4.28	-	-	7.1	6.5	6.28	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.362	-	-	3.5	4	3.372	3.5	4	3.3
Pot Cap-1 Maneuver	1346	-	-	1220	-	-	437	435	797	415	419	811
Stage 1	-	-	-	-	-	-	779	719	-	679	643	-
Stage 2	-	-	-	-	-	-	679	642	-	748	699	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1346	-	-	1220	-	-	420	413	797	365	398	811
Mov Cap-2 Maneuver	-	-	-	-	-	-	420	413	-	365	398	-
Stage 1	-	-	-	-	-	-	779	719	-	679	610	-
Stage 2	-	-	-	-	-	-	644	609	-	685	699	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.5	15.7	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	512	1346	-	-	1220	-	-	-
HCM Lane V/C Ratio	0.344	-	-	-	0.044	-	-	-
HCM Control Delay (s)	15.7	0	-	-	8.1	0	-	0
HCM Lane LOS	C	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	1.5	0	-	-	0.1	-	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	276	33	98	360	0	53	0	71	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	95	95	95	89	89	89	25	25	25
Heavy Vehicles, %	0	2	3	0	1	0	0	0	3	0	0	0
Mvmt Flow	0	297	35	103	379	0	60	0	80	4	4	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	379	0	0	332	0	0	902	900	315	939	917	379
Stage 1	-	-	-	-	-	-	315	315	-	585	585	-
Stage 2	-	-	-	-	-	-	587	585	-	354	332	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	1191	-	-	1239	-	-	261	280	723	246	274	672
Stage 1	-	-	-	-	-	-	700	659	-	501	501	-
Stage 2	-	-	-	-	-	-	499	501	-	667	648	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1191	-	-	1239	-	-	237	251	723	201	245	672
Mov Cap-2 Maneuver	-	-	-	-	-	-	237	251	-	201	245	-
Stage 1	-	-	-	-	-	-	700	659	-	501	448	-
Stage 2	-	-	-	-	-	-	443	448	-	593	648	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.7	19.6	21.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	385	1191	-	-	1239	-	-	221
HCM Lane V/C Ratio	0.362	-	-	-	0.083	-	-	0.036
HCM Control Delay (s)	19.6	0	-	-	8.2	0	-	21.9
HCM Lane LOS	C	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	1.6	0	-	-	0.3	-	-	0.1

Intersection	
Int Delay, s/veh	5.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	59	29	84	100	42	103
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	84	84	76	76
Heavy Vehicles, %	0	0	0	2	0	0
Mvmt Flow	78	38	100	119	55	136

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	116	0	416	97
Stage 1	-	-	-	-	97	-
Stage 2	-	-	-	-	319	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1485	-	597	965
Stage 1	-	-	-	-	932	-
Stage 2	-	-	-	-	741	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1485	-	554	965
Mov Cap-2 Maneuver	-	-	-	-	554	-
Stage 1	-	-	-	-	932	-
Stage 2	-	-	-	-	688	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.5	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	794	-	-	1485	-
HCM Lane V/C Ratio	0.24	-	-	0.067	-
HCM Control Delay (s)	11	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.2	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	101	12	27	192	44	22	81	24	25	42	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	84	84	84
Heavy Vehicles, %	0	1	0	0	1	2	0	1	0	4	0	0
Mvmt Flow	7	115	14	31	218	50	25	92	27	30	50	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	128	0	0	470	465	122	500	447	243
Stage 1	-	-	-	-	-	-	135	135	-	305	305	-
Stage 2	-	-	-	-	-	-	335	330	-	195	142	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.51	6.2	7.14	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.51	-	6.14	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.51	-	6.14	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.009	3.3	3.536	4	3.3
Pot Cap-1 Maneuver	1307	-	-	1470	-	-	507	496	935	478	509	801
Stage 1	-	-	-	-	-	-	873	787	-	700	666	-
Stage 2	-	-	-	-	-	-	683	648	-	802	783	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1307	-	-	1470	-	-	450	481	935	387	493	801
Mov Cap-2 Maneuver	-	-	-	-	-	-	450	481	-	387	493	-
Stage 1	-	-	-	-	-	-	868	782	-	696	649	-
Stage 2	-	-	-	-	-	-	605	632	-	683	778	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.8	14.5	14.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	523	1307	-	-	1470	-	-	474
HCM Lane V/C Ratio	0.276	0.005	-	-	0.021	-	-	0.193
HCM Control Delay (s)	14.5	7.8	0	-	7.5	0	-	14.4
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.1	0	-	-	0.1	-	-	0.7

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	50	2	37	83	66	6	68	38	97	37	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	95	95	95	80	80	80	89	89	89
Heavy Vehicles, %	0	2	0	0	0	0	17	4	5	1	0	0
Mvmt Flow	7	69	3	39	87	69	8	85	48	109	42	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	157	0	0	72	0	0	306	320	71	351	286	122
Stage 1	-	-	-	-	-	-	85	85	-	200	200	-
Stage 2	-	-	-	-	-	-	221	235	-	151	86	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.27	6.54	6.25	7.11	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.27	5.54	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.27	5.54	-	6.11	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.653	4.036	3.345	3.509	4	3.3
Pot Cap-1 Maneuver	1435	-	-	1541	-	-	618	594	983	606	627	935
Stage 1	-	-	-	-	-	-	887	820	-	804	739	-
Stage 2	-	-	-	-	-	-	749	707	-	854	827	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1435	-	-	1541	-	-	570	574	983	499	606	935
Mov Cap-2 Maneuver	-	-	-	-	-	-	570	574	-	499	606	-
Stage 1	-	-	-	-	-	-	883	816	-	800	718	-
Stage 2	-	-	-	-	-	-	685	687	-	724	823	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.5	11.8	14.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	668	1435	-	-	1541	-	-	526
HCM Lane V/C Ratio	0.21	0.005	-	-	0.025	-	-	0.288
HCM Control Delay (s)	11.8	7.5	0	-	7.4	0	-	14.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.8	0	-	-	0.1	-	-	1.2

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	36	15	136	25	7	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	86	86	71	71
Heavy Vehicles, %	0	0	0	4	0	1
Mvmt Flow	51	21	158	29	10	155

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	348	173	0	0	187	0
Stage 1	173	-	-	-	-	-
Stage 2	175	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	653	876	-	-	1399	-
Stage 1	862	-	-	-	-	-
Stage 2	860	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	648	876	-	-	1399	-
Mov Cap-2 Maneuver	648	-	-	-	-	-
Stage 1	862	-	-	-	-	-
Stage 2	853	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	702	1399	-
HCM Lane V/C Ratio	-	-	0.102	0.007	-
HCM Control Delay (s)	-	-	10.7	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	23	226	2	13	299	40	2	68	14	26	35	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	89	89	89	78	78	78	85	85	85
Heavy Vehicles, %	0	0	0	0	1	3	0	0	7	0	0	0
Mvmt Flow	27	269	2	15	336	45	3	87	18	31	41	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	381	0	0	271	0	0	743	735	270	766	714	358
Stage 1	-	-	-	-	-	-	325	325	-	388	388	-
Stage 2	-	-	-	-	-	-	418	410	-	378	326	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.27	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.363	3.5	4	3.3
Pot Cap-1 Maneuver	1189	-	-	1304	-	-	334	349	757	322	359	691
Stage 1	-	-	-	-	-	-	692	653	-	640	612	-
Stage 2	-	-	-	-	-	-	616	599	-	648	652	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1189	-	-	1304	-	-	285	334	757	243	344	691
Mov Cap-2 Maneuver	-	-	-	-	-	-	285	334	-	243	344	-
Stage 1	-	-	-	-	-	-	673	635	-	623	603	-
Stage 2	-	-	-	-	-	-	549	590	-	531	634	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.3	18.8	19.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	367	1189	-	-	1304	-	-	334
HCM Lane V/C Ratio	0.293	0.023	-	-	0.011	-	-	0.275
HCM Control Delay (s)	18.8	8.1	0	-	7.8	0	-	19.8
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.2	0.1	-	-	0	-	-	1.1

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	208	5	11	258	43	12	91	14	18	46	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	90	90	90	66	66	66	71	71	71
Heavy Vehicles, %	0	0	0	0	2	0	0	2	0	11	4	5
Mvmt Flow	14	270	6	12	287	48	18	138	21	25	65	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	334	0	0	277	0	0	684	661	273	716	640	311
Stage 1	-	-	-	-	-	-	302	302	-	335	335	-
Stage 2	-	-	-	-	-	-	382	359	-	381	305	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.52	6.2	7.21	6.54	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.52	-	6.21	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.52	-	6.21	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.018	3.3	3.599	4.036	3.345
Pot Cap-1 Maneuver	1237	-	-	1298	-	-	365	383	771	334	391	722
Stage 1	-	-	-	-	-	-	712	664	-	660	639	-
Stage 2	-	-	-	-	-	-	645	627	-	623	659	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1237	-	-	1298	-	-	299	374	771	228	382	722
Mov Cap-2 Maneuver	-	-	-	-	-	-	299	374	-	228	382	-
Stage 1	-	-	-	-	-	-	703	655	-	651	632	-
Stage 2	-	-	-	-	-	-	549	620	-	472	650	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.3	21.8	19.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	388	1237	-	-	1298	-	-	372
HCM Lane V/C Ratio	0.457	0.012	-	-	0.009	-	-	0.322
HCM Control Delay (s)	21.8	7.9	0	-	7.8	0	-	19.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	2.3	0	-	-	0	-	-	1.4

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	70	179	10	24	231	30	6	46	27	12	38	89
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	82	82	82	76	76	76	72	72	72
Heavy Vehicles, %	0	0	0	0	1	3	0	0	0	0	0	1
Mvmt Flow	91	232	13	29	282	37	8	61	36	17	53	124

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	318	0	0	245	0	0	868	798	239	828	786	300
Stage 1	-	-	-	-	-	-	421	421	-	359	359	-
Stage 2	-	-	-	-	-	-	447	377	-	469	427	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.309
Pot Cap-1 Maneuver	1253	-	-	1333	-	-	275	321	805	293	326	742
Stage 1	-	-	-	-	-	-	614	592	-	663	631	-
Stage 2	-	-	-	-	-	-	595	619	-	579	589	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1253	-	-	1333	-	-	181	286	805	216	291	742
Mov Cap-2 Maneuver	-	-	-	-	-	-	181	286	-	216	291	-
Stage 1	-	-	-	-	-	-	562	542	-	607	614	-
Stage 2	-	-	-	-	-	-	441	602	-	450	540	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.2	0.7	19.8	18.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	347	1253	-	-	1333	-	-	454
HCM Lane V/C Ratio	0.3	0.073	-	-	0.022	-	-	0.425
HCM Control Delay (s)	19.8	8.1	0	-	7.8	0	-	18.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.2	0.2	-	-	0.1	-	-	2.1

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	21	2	9	44	30	1	20	4	19	30	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	69	69	69	63	63	63	65	65	65
Heavy Vehicles, %	0	0	50	0	0	0	0	0	0	0	0	0
Mvmt Flow	19	23	2	13	64	43	2	32	6	29	46	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	203	152	52	161	155	35	58	0	0	38	0	0
Stage 1	111	111	-	38	38	-	-	-	-	-	-	-
Stage 2	92	41	-	123	117	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.7	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.75	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	759	743	895	809	741	1044	1559	-	-	1585	-	-
Stage 1	899	807	-	982	867	-	-	-	-	-	-	-
Stage 2	920	865	-	886	803	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	668	728	895	776	726	1044	1559	-	-	1585	-	-
Mov Cap-2 Maneuver	668	728	-	776	726	-	-	-	-	-	-	-
Stage 1	898	792	-	981	866	-	-	-	-	-	-	-
Stage 2	816	864	-	842	788	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	10.1	0.3	2.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1559	-	-	708	822	1585	-	-
HCM Lane V/C Ratio	0.001	-	-	0.062	0.146	0.018	-	-
HCM Control Delay (s)	7.3	0	-	10.4	10.1	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.5	0.1	-	-

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	48	5	29	75	35	8	60	12	8	48	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	76	76	76	59	59	59	82	82	82
Heavy Vehicles, %	0	2	0	0	0	0	0	0	0	0	2	0
Mvmt Flow	9	64	7	38	99	46	14	102	20	10	59	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	289	227	59	252	217	112	59	0	0	122	0	0
Stage 1	78	78	-	139	139	-	-	-	-	-	-	-
Stage 2	211	149	-	113	78	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.52	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.018	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	667	672	1012	706	685	947	1558	-	-	1478	-	-
Stage 1	936	830	-	869	785	-	-	-	-	-	-	-
Stage 2	796	774	-	897	834	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	556	661	1012	641	673	947	1558	-	-	1478	-	-
Mov Cap-2 Maneuver	556	661	-	641	673	-	-	-	-	-	-	-
Stage 1	927	824	-	860	777	-	-	-	-	-	-	-
Stage 2	654	766	-	816	828	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	11.7	0.7	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1558	-	-	666	718	1478	-	-
HCM Lane V/C Ratio	0.009	-	-	0.12	0.255	0.007	-	-
HCM Control Delay (s)	7.3	0	-	11.1	11.7	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	1	0	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	69	3	12	146	42	1	19	3	7	25	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	78	78	78	52	52	52	92	92	92
Heavy Vehicles, %	0	1	33	0	0	0	0	0	0	0	4	0
Mvmt Flow	11	78	3	15	187	54	2	37	6	8	27	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	241	0	0	81	0	0	367	374	79	368	348	214
Stage 1	-	-	-	-	-	-	102	102	-	245	245	-
Stage 2	-	-	-	-	-	-	265	272	-	123	103	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1337	-	-	1529	-	-	593	560	987	592	572	831
Stage 1	-	-	-	-	-	-	909	815	-	763	700	-
Stage 2	-	-	-	-	-	-	745	688	-	886	806	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1337	-	-	1529	-	-	554	549	987	550	561	831
Mov Cap-2 Maneuver	-	-	-	-	-	-	554	549	-	550	561	-
Stage 1	-	-	-	-	-	-	901	808	-	756	692	-
Stage 2	-	-	-	-	-	-	697	680	-	833	799	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.4	11.7	11.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	583	1337	-	-	1529	-	-	613
HCM Lane V/C Ratio	0.076	0.008	-	-	0.01	-	-	0.078
HCM Control Delay (s)	11.7	7.7	0	-	7.4	0	-	11.4
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	23	1	5	33	3	0	23	3	0	35	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	85	85	85	65	65	65	73	73	73
Heavy Vehicles, %	0	9	0	0	6	0	0	0	0	0	0	17
Mvmt Flow	8	31	1	6	39	4	0	35	5	0	48	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	111	92	52	106	94	38	56	0	0	40	0	0
Stage 1	52	52	-	38	38	-	-	-	-	-	-	-
Stage 2	59	40	-	68	56	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.59	6.2	7.1	6.56	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.081	3.3	3.5	4.054	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	872	785	1021	878	789	1040	1562	-	-	1583	-	-
Stage 1	966	838	-	982	855	-	-	-	-	-	-	-
Stage 2	958	848	-	947	840	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	836	785	1021	851	789	1040	1562	-	-	1583	-	-
Mov Cap-2 Maneuver	836	785	-	851	789	-	-	-	-	-	-	-
Stage 1	966	838	-	982	855	-	-	-	-	-	-	-
Stage 2	911	848	-	911	840	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.7	9.7	0	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1562	-	-	801	811	1583	-	-
HCM Lane V/C Ratio	-	-	-	0.05	0.059	-	-	-
HCM Control Delay (s)	0	-	-	9.7	9.7	0	-	-
HCM Lane LOS	A	-	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	20	0	9	37	6	2	56	6	9	37	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	76	76	76	76	76	76	71	71	71
Heavy Vehicles, %	0	5	0	0	8	0	0	2	0	11	3	0
Mvmt Flow	9	31	0	12	49	8	3	74	8	13	52	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	190	166	54	177	163	78	55	0	0	82	0	0
Stage 1	79	79	-	83	83	-	-	-	-	-	-	-
Stage 2	111	87	-	94	80	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.58	6.2	4.1	-	-	4.21	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.072	3.3	2.2	-	-	2.299	-	-
Pot Cap-1 Maneuver	774	721	1019	790	719	988	1563	-	-	1460	-	-
Stage 1	935	823	-	930	814	-	-	-	-	-	-	-
Stage 2	899	817	-	918	817	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	722	713	1019	758	711	988	1563	-	-	1460	-	-
Mov Cap-2 Maneuver	722	713	-	758	711	-	-	-	-	-	-	-
Stage 1	933	816	-	928	812	-	-	-	-	-	-	-
Stage 2	837	815	-	875	810	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	10.3	0.2	1.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1563	-	-	715	743	1460	-	-
HCM Lane V/C Ratio	0.002	-	-	0.056	0.092	0.009	-	-
HCM Control Delay (s)	7.3	0	-	10.3	10.3	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	42	0	37	64	12	0	12	13	8	18	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	57	57	57	78	78	78	42	42	42	81	81	81
Heavy Vehicles, %	0	0	0	0	5	0	0	0	0	25	0	0
Mvmt Flow	2	74	0	47	82	15	0	29	31	10	22	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	97	0	0	74	0	0	275	269	74	292	262	90
Stage 1	-	-	-	-	-	-	77	77	-	185	185	-
Stage 2	-	-	-	-	-	-	198	192	-	107	77	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1509	-	-	1538	-	-	681	641	993	617	646	973
Stage 1	-	-	-	-	-	-	937	835	-	766	751	-
Stage 2	-	-	-	-	-	-	808	745	-	845	835	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1509	-	-	1538	-	-	643	620	993	562	625	973
Mov Cap-2 Maneuver	-	-	-	-	-	-	643	620	-	562	625	-
Stage 1	-	-	-	-	-	-	936	834	-	765	727	-
Stage 2	-	-	-	-	-	-	755	721	-	790	834	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.4	10.1	11.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	770	1509	-	-	1538	-	-	629
HCM Lane V/C Ratio	0.077	0.001	-	-	0.031	-	-	0.057
HCM Control Delay (s)	10.1	7.4	0	-	7.4	0	-	11.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.2

APPENDIX C
HORIZON YEAR (2035) - UNIMPROVED INTERSECTION CAPACITY WORKSHEETS

SANDERSON STEWART

FEHR PEERS

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	153	89	69	48	191	37	88	55	543	182	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	3	30	0	0	0	0	0	0	0
Mvmt Flow	7	170	99	77	53	212	41	98	61	603	202	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1756	1654	207	1759	1629	128	211	0	0	159	0	0
Stage 1	1413	1413	-	211	211	-	-	-	-	-	-	-
Stage 2	343	241	-	1548	1418	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.8	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.8	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.8	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4.27	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	67	~ 99	839	~ 66	88	927	1372	-	-	1433	-	-
Stage 1	173	206	-	789	678	-	-	-	-	-	-	-
Stage 2	676	710	-	142	177	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 50	839	-	~ 45	927	1372	-	-	1433	-	-
Mov Cap-2 Maneuver	-	~ 50	-	-	~ 45	-	-	-	-	-	-	-
Stage 1	167	~ 108	-	763	656	-	-	-	-	-	-	-
Stage 2	463	687	-	-	93	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			1.6	6.9
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1372	-	-	-	-	1433	-	-
HCM Lane V/C Ratio	0.03	-	-	-	-	0.421	-	-
HCM Control Delay (s)	7.7	0	-	-	-	9.3	0	-
HCM Lane LOS	A	A	-	-	-	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-	2.1	-	-

Notes

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

Intersection	
Int Delay, s/veh	1343.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	836	62	158	307	51	7	13	176	182	156	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	250	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	7	17	11	13	33	0	13	1	2	100
Mvmt Flow	0	929	69	176	341	57	8	14	196	202	173	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	341	0	0	998	0	0	1744	1655	963	1760	1690	341
Stage 1	-	-	-	-	-	-	963	963	-	692	692	-
Stage 2	-	-	-	-	-	-	781	692	-	1068	998	-
Critical Hdwy	4.1	-	-	4.27	-	-	7.43	6.5	6.33	7.11	6.52	7.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.43	5.5	-	6.11	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.43	5.5	-	6.11	5.52	-
Follow-up Hdwy	2.2	-	-	2.353	-	-	3.797	4	3.417	3.509	4.018	4.2
Pot Cap-1 Maneuver	1229	-	-	638	-	-	57	99	296	~ 66	~ 93	525
Stage 1	-	-	-	-	-	-	270	337	-	436	445	-
Stage 2	-	-	-	-	-	-	345	448	-	269	322	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1229	-	-	638	-	-	-	64	296	~ 14	~ 60	525
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	64	-	~ 14	~ 60	-
Stage 1	-	-	-	-	-	-	270	337	-	436	286	-
Stage 2	-	-	-	-	-	-	87	288	-	~ 87	322	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.9		$ 7661.1
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1229	-	-	638	-	-	22
HCM Lane V/C Ratio	-	-	-	-	0.275	-	-	17.273
HCM Control Delay (s)	-	0	-	-	12.8	0	-	$ 7661.1
HCM Lane LOS	-	A	-	-	B	A	-	F
HCM 95th %tile Q(veh)	-	0	-	-	1.1	-	-	47.7

Notes

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

Intersection	
Int Delay, s/veh	486.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	80	772	319	87	424	181
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	30	2	10	22	3	6
Mvmt Flow	89	858	354	97	471	201

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	451	0	-	0	1439	403
Stage 1	-	-	-	-	403	-
Stage 2	-	-	-	-	1036	-
Critical Hdwy	4.4	-	-	-	6.43	6.26
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.47	-	-	-	3.527	3.354
Pot Cap-1 Maneuver	977	-	-	-	~ 146	639
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	~ 341	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	977	-	-	-	~ 121	639
Mov Cap-2 Maneuver	-	-	-	-	~ 121	-
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	~ 282	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	$ 1497.1
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	977	-	-	-	160
HCM Lane V/C Ratio	0.091	-	-	-	4.201
HCM Control Delay (s)	9.1	0	-		$ 1497.1
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.3	-	-	-	67.7

Notes

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

Intersection	
Int Delay, s/veh	28.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	732	210	120	370	0	55	0	113	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	2	12	9	0	4	100	25	0	0	0
Mvmt Flow	0	813	233	133	411	0	61	0	126	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	411	0	0	1047	0	0	1608	1608	930	1671	1725	411
Stage 1	-	-	-	-	-	-	930	930	-	678	678	-
Stage 2	-	-	-	-	-	-	678	678	-	993	1047	-
Critical Hdwy	4.1	-	-	4.22	-	-	7.14	7.5	6.45	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	6.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	6.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.308	-	-	3.536	4.9	3.525	3.5	4	3.3
Pot Cap-1 Maneuver	1159	-	-	628	-	-	83	64	294	77	90	645
Stage 1	-	-	-	-	-	-	318	242	-	445	455	-
Stage 2	-	-	-	-	-	-	439	331	-	298	308	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1159	-	-	628	-	-	65	46	294	35	65	645
Mov Cap-2 Maneuver	-	-	-	-	-	-	65	46	-	35	65	-
Stage 1	-	-	-	-	-	-	318	242	-	445	330	-
Stage 2	-	-	-	-	-	-	319	240	-	171	308	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3	263.7	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	137	1159	-	-	628	-	-	-
HCM Lane V/C Ratio	1.363	-	-	-	0.212	-	-	-
HCM Control Delay (s)	263.7	0	-	-	12.3	0	-	0
HCM Lane LOS	F	A	-	-	B	A	-	A
HCM 95th %tile Q(veh)	12	0	-	-	0.8	-	-	-

Intersection	
Int Delay, s/veh	199.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	1241	164	93	566	0	32	0	292	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	2	2	6	0	7	0	1	0	0	0
Mvmt Flow	0	1379	182	103	629	0	36	0	324	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	629	0	0	1561	0	0	2306	2306	1470	2468	2397	629
Stage 1	-	-	-	-	-	-	1470	1470	-	836	836	-
Stage 2	-	-	-	-	-	-	836	836	-	1632	1561	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.17	6.5	6.21	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.563	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	963	-	-	423	-	-	~ 26	39	~ 157	21	34	486
Stage 1	-	-	-	-	-	-	154	193	-	364	385	-
Stage 2	-	-	-	-	-	-	354	385	-	129	175	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	963	-	-	423	-	-	~ 18	24	~ 157	-	21	486
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 18	24	-	-	21	-
Stage 1	-	-	-	-	-	-	154	193	-	364	241	-
Stage 2	-	-	-	-	-	-	222	241	-	-	175	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.3	$ 1467.5	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	89	963	-	-	423	-	-	-
HCM Lane V/C Ratio	4.045	-	-	-	0.244	-	-	-
HCM Control Delay (s)	$ 1467.5	0	-	-	16.2	0	-	0
HCM Lane LOS	F	A	-	-	C	A	-	A
HCM 95th %tile Q(veh)	37.5	0	-	-	0.9	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	5.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	187	100	159	78	40	136
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	4	1	2	9	0
Mvmt Flow	208	111	177	87	44	151

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	319	0	703	263
Stage 1	-	-	-	-	263	-
Stage 2	-	-	-	-	440	-
Critical Hdwy	-	-	4.11	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.209	-	3.581	3.3
Pot Cap-1 Maneuver	-	-	1247	-	393	781
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	635	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1247	-	334	781
Mov Cap-2 Maneuver	-	-	-	-	334	-
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	540	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	599	-	-	1247	-
HCM Lane V/C Ratio	0.326	-	-	0.142	-
HCM Control Delay (s)	13.9	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.4	-	-	0.5	-

Intersection	
Int Delay, s/veh	113.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	26	555	42	17	155	49	10	61	52	139	170	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	0	0	4	0	20	3	0	3	0	0
Mvmt Flow	29	617	47	19	172	54	11	68	58	154	189	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	227	0	0	663	0	0	1037	962	640	998	958	199
Stage 1	-	-	-	-	-	-	698	698	-	237	237	-
Stage 2	-	-	-	-	-	-	339	264	-	761	721	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.53	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.53	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.53	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.68	4.027	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1353	-	-	935	-	-	194	255	479	222	259	847
Stage 1	-	-	-	-	-	-	403	441	-	764	713	-
Stage 2	-	-	-	-	-	-	640	688	-	396	435	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1353	-	-	935	-	-	67	241	479	~ 147	244	847
Mov Cap-2 Maneuver	-	-	-	-	-	-	67	241	-	~ 147	244	-
Stage 1	-	-	-	-	-	-	389	426	-	738	697	-
Stage 2	-	-	-	-	-	-	448	672	-	283	420	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.7	37.9	$ 440.4
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	241	1353	-	-	935	-	-	194
HCM Lane V/C Ratio	0.567	0.021	-	-	0.02	-	-	1.844
HCM Control Delay (s)	37.9	7.7	0	-	8.9	0	-	$ 440.4
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.2	0.1	-	-	0.1	-	-	25.7

Notes

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

Intersection	
Int Delay, s/veh	327.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	191	4	80	128	35	8	84	80	311	336	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	3	2	19	0	18	8	3	8	0
Mvmt Flow	4	212	4	89	142	39	9	93	89	346	373	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	181	0	0	217	0	0	755	582	214	653	565	162
Stage 1	-	-	-	-	-	-	223	223	-	339	339	-
Stage 2	-	-	-	-	-	-	532	359	-	314	226	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.68	6.28	7.13	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.68	-	6.13	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.68	-	6.13	5.58	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4.162	3.372	3.527	4.072	3.3
Pot Cap-1 Maneuver	1407	-	-	1347	-	-	328	404	811	379	426	888
Stage 1	-	-	-	-	-	-	784	690	-	673	629	-
Stage 2	-	-	-	-	-	-	535	600	-	695	706	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1407	-	-	1347	-	-	47	373	811	~ 257	393	888
Mov Cap-2 Maneuver	-	-	-	-	-	-	47	373	-	~ 257	393	-
Stage 1	-	-	-	-	-	-	782	688	-	671	582	-
Stage 2	-	-	-	-	-	-	175	556	-	533	704	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.6	27.2	$ 625.4
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	348	1407	-	-	1347	-	-	316
HCM Lane V/C Ratio	0.549	0.003	-	-	0.066	-	-	2.31
HCM Control Delay (s)	27.2	7.6	0	-	7.9	0	-	$ 625.4
HCM Lane LOS	D	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.1	0	-	-	0.2	-	-	56.6

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

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	48	20	170	89	37	221
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	3	0	0	1
Mvmt Flow	53	22	189	99	41	246

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	566	238	0	0	288	0
Stage 1	238	-	-	-	-	-
Stage 2	328	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	489	806	-	-	1286	-
Stage 1	806	-	-	-	-	-
Stage 2	734	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	471	806	-	-	1286	-
Mov Cap-2 Maneuver	471	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	707	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	537	1286	-
HCM Lane V/C Ratio	-	-	0.141	0.032	-
HCM Control Delay (s)	-	-	12.8	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	141.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	65	607	12	10	414	30	6	42	44	139	73	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	40	8	7	33	0	11	0	0	0
Mvmt Flow	72	674	13	11	460	33	7	47	49	154	81	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	493	0	0	688	0	0	1374	1342	681	1372	1331	477
Stage 1	-	-	-	-	-	-	826	826	-	499	499	-
Stage 2	-	-	-	-	-	-	548	516	-	873	832	-
Critical Hdwy	4.1	-	-	4.5	-	-	7.43	6.5	6.31	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.43	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.43	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.56	-	-	3.797	4	3.399	3.5	4	3.3
Pot Cap-1 Maneuver	1081	-	-	752	-	-	105	154	435	~ 124	156	592
Stage 1	-	-	-	-	-	-	325	389	-	557	547	-
Stage 2	-	-	-	-	-	-	469	538	-	348	387	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1081	-	-	752	-	-	49	135	435	~ 73	136	592
Mov Cap-2 Maneuver	-	-	-	-	-	-	49	135	-	~ 73	136	-
Stage 1	-	-	-	-	-	-	290	347	-	497	536	-
Stage 2	-	-	-	-	-	-	379	527	-	238	345	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.2	52.7	$ 885.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	172	1081	-	-	752	-	-	92
HCM Lane V/C Ratio	0.594	0.067	-	-	0.015	-	-	2.742
HCM Control Delay (s)	52.7	8.6	0	-	9.9	0	-	$ 885.2
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.2	0.2	-	-	0	-	-	24

Notes

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

Intersection	
Int Delay, s/veh	504.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	530	25	43	341	9	11	95	35	257	158	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	14	2	15	10	8	0	17	2	0	0	4	0
Mvmt Flow	16	589	28	48	379	10	12	106	39	286	176	41

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	389	0	0	617	0	0	1222	1118	603	1185	1127	384
Stage 1	-	-	-	-	-	-	634	634	-	479	479	-
Stage 2	-	-	-	-	-	-	588	484	-	706	648	-
Critical Hdwy	4.24	-	-	4.2	-	-	7.27	6.52	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.27	5.52	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.27	5.52	-	6.1	5.54	-
Follow-up Hdwy	2.326	-	-	2.29	-	-	3.653	4.018	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1107	-	-	925	-	-	146	207	503	~ 167	203	668
Stage 1	-	-	-	-	-	-	443	473	-	571	552	-
Stage 2	-	-	-	-	-	-	470	552	-	430	463	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1107	-	-	925	-	-	20	189	503	~ 81	185	668
Mov Cap-2 Maneuver	-	-	-	-	-	-	20	189	-	~ 81	185	-
Stage 1	-	-	-	-	-	-	433	463	-	558	516	-
Stage 2	-	-	-	-	-	-	272	516	-	300	453	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	226.1	$ 1664.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	126	1107	-	-	925	-	-	111
HCM Lane V/C Ratio	1.243	0.014	-	-	0.052	-	-	4.525
HCM Control Delay (s)	226.1	8.3	0	-	9.1	0	-	$ 1664.1
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	9.8	0	-	-	0.2	-	-	52.5

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

Intersection	
Int Delay, s/veh	94.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	157	404	85	102	219	30	14	98	76	15	85	92
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	4	0	8	19	0	0	2	0	2	0
Mvmt Flow	174	449	94	113	243	33	16	109	84	17	94	102

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	277	0	0	543	0	0	1430	1348	496	1429	1379	260
Stage 1	-	-	-	-	-	-	845	845	-	487	487	-
Stage 2	-	-	-	-	-	-	585	503	-	942	892	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.22	7.1	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.318	3.5	4.018	3.3
Pot Cap-1 Maneuver	1298	-	-	1036	-	-	113	152	574	114	144	784
Stage 1	-	-	-	-	-	-	360	382	-	566	550	-
Stage 2	-	-	-	-	-	-	501	545	-	318	360	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1298	-	-	1036	-	-	~ 14	~ 107	574	-	101	784
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 14	~ 107	-	-	101	-
Stage 1	-	-	-	-	-	-	290	308	-	456	479	-
Stage 2	-	-	-	-	-	-	305	475	-	141	290	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	2.6	$ 678.9	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	92	1298	-	-	1036	-	-	-
HCM Lane V/C Ratio	2.271	0.134	-	-	0.109	-	-	-
HCM Control Delay (s)	$ 678.9	8.2	0	-	8.9	0	-	-
HCM Lane LOS	F	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	18.8	0.5	-	-	0.4	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	13

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	89	154	9	4	45	113	0	95	14	97	42	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	6	0	0	8	2	0	6	0	2	0	0
Mvmt Flow	99	171	10	4	50	126	0	106	16	108	47	37

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	482	402	65	484	412	113	83	0	0	121	0	0
Stage 1	281	281	-	113	113	-	-	-	-	-	-	-
Stage 2	201	121	-	371	299	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.2	7.1	6.58	6.22	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.3	3.5	4.072	3.318	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	498	531	1005	496	521	940	1527	-	-	1467	-	-
Stage 1	730	671	-	897	790	-	-	-	-	-	-	-
Stage 2	805	788	-	653	656	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	374	490	1005	338	480	940	1527	-	-	1467	-	-
Mov Cap-2 Maneuver	374	490	-	338	480	-	-	-	-	-	-	-
Stage 1	730	619	-	897	790	-	-	-	-	-	-	-
Stage 2	653	788	-	431	605	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.4	11.7	0	4.3
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1527	-	-	449	717	1467	-	-
HCM Lane V/C Ratio	-	-	-	0.624	0.251	0.073	-	-
HCM Control Delay (s)	0	-	-	25.4	11.7	7.6	0	-
HCM Lane LOS	A	-	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	4.2	1	0.2	-	-

Intersection	
Int Delay, s/veh	18.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	250	22	29	142	12	37	91	40	61	121	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	27	4	0	0	2	5	0	2	7
Mvmt Flow	17	278	24	32	158	13	41	101	44	68	134	30

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	576	513	149	642	506	123	164	0	0	146	0	0
Stage 1	285	285	-	206	206	-	-	-	-	-	-	-
Stage 2	291	228	-	436	300	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.2	7.37	6.54	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.3	3.743	4.036	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	431	462	903	354	466	933	1427	-	-	1448	-	-
Stage 1	727	672	-	742	728	-	-	-	-	-	-	-
Stage 2	721	712	-	553	662	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	285	424	903	154	428	933	1427	-	-	1448	-	-
Mov Cap-2 Maneuver	285	424	-	154	428	-	-	-	-	-	-	-
Stage 1	704	637	-	719	705	-	-	-	-	-	-	-
Stage 2	535	690	-	288	628	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.6	29.7	1.7	2.2
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1427	-	-	431	343	1448	-	-
HCM Lane V/C Ratio	0.029	-	-	0.74	0.593	0.047	-	-
HCM Control Delay (s)	7.6	0	-	33.6	29.7	7.6	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	6	3.6	0.1	-	-

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	35	335	2	12	148	14	4	26	31	97	22	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	6	3	100	0	7	0	0	0	0	0	0	0
Mvmt Flow	39	372	2	13	164	16	4	29	34	108	24	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	180	0	0	374	0	0	682	658	373	682	651	172
Stage 1	-	-	-	-	-	-	451	451	-	199	199	-
Stage 2	-	-	-	-	-	-	231	207	-	483	452	-
Critical Hdwy	4.16	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1372	-	-	1196	-	-	367	387	678	367	390	877
Stage 1	-	-	-	-	-	-	592	574	-	807	740	-
Stage 2	-	-	-	-	-	-	776	734	-	569	574	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1372	-	-	1196	-	-	321	369	678	316	371	877
Mov Cap-2 Maneuver	-	-	-	-	-	-	321	369	-	316	371	-
Stage 1	-	-	-	-	-	-	571	553	-	778	731	-
Stage 2	-	-	-	-	-	-	708	725	-	493	553	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.6	13.9	22.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	474	1372	-	-	1196	-	-	379
HCM Lane V/C Ratio	0.143	0.028	-	-	0.011	-	-	0.451
HCM Control Delay (s)	13.9	7.7	0	-	8	0	-	22.1
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	2.3

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	34	53	0	2	44	11	0	58	11	12	31	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	5	7	0	0	12	0	0	3	0	0	0	0
Mvmt Flow	38	59	0	2	49	12	0	64	12	13	34	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	170	146	42	169	148	71	50	0	0	77	0	0
Stage 1	69	69	-	71	71	-	-	-	-	-	-	-
Stage 2	101	77	-	98	77	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.57	6.2	7.1	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.063	3.3	3.5	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	787	736	1034	799	725	997	1570	-	-	1535	-	-
Stage 1	934	828	-	944	817	-	-	-	-	-	-	-
Stage 2	898	821	-	913	812	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	732	729	1034	745	718	997	1570	-	-	1535	-	-
Mov Cap-2 Maneuver	732	729	-	745	718	-	-	-	-	-	-	-
Stage 1	934	821	-	944	817	-	-	-	-	-	-	-
Stage 2	834	821	-	840	805	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	10.2	0	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1570	-	-	730	760	1535	-	-
HCM Lane V/C Ratio	-	-	-	0.132	0.083	0.009	-	-
HCM Control Delay (s)	0	-	-	10.7	10.2	7.4	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.3	0	-	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	71	5	23	45	4	7	74	14	18	111	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	7	12	0	0	5	13	0	0	0
Mvmt Flow	4	79	6	26	50	4	8	82	16	20	123	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	299	279	126	314	274	90	128	0	0	98	0	0
Stage 1	166	166	-	106	106	-	-	-	-	-	-	-
Stage 2	133	113	-	208	168	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.17	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.563	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	657	624	930	629	617	973	1470	-	-	1508	-	-
Stage 1	841	755	-	888	789	-	-	-	-	-	-	-
Stage 2	875	796	-	783	741	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	603	612	930	555	605	973	1470	-	-	1508	-	-
Mov Cap-2 Maneuver	603	612	-	555	605	-	-	-	-	-	-	-
Stage 1	836	744	-	883	784	-	-	-	-	-	-	-
Stage 2	811	791	-	686	731	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.7	11.9	0.5	1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1470	-	-	625	600	1508	-	-
HCM Lane V/C Ratio	0.005	-	-	0.142	0.133	0.013	-	-
HCM Control Delay (s)	7.5	0	-	11.7	11.9	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.5	0	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	143	0	14	56	11	4	12	53	13	7	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	0	0	13	0	0	0	3	14	25	0
Mvmt Flow	2	159	0	16	62	12	4	13	59	14	8	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	74	0	0	159	0	0	271	269	159	298	262	68
Stage 1	-	-	-	-	-	-	163	163	-	99	99	-
Stage 2	-	-	-	-	-	-	108	106	-	199	163	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.24	6.75	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.626	4.225	3.3
Pot Cap-1 Maneuver	1538	-	-	1433	-	-	686	641	884	631	606	1001
Stage 1	-	-	-	-	-	-	844	767	-	879	771	-
Stage 2	-	-	-	-	-	-	902	811	-	776	722	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1538	-	-	1433	-	-	666	633	884	574	598	1001
Mov Cap-2 Maneuver	-	-	-	-	-	-	666	633	-	574	598	-
Stage 1	-	-	-	-	-	-	843	766	-	878	762	-
Stage 2	-	-	-	-	-	-	873	801	-	711	721	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	9.9	10.7
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	813	1538	-	-	1433	-	-	669
HCM Lane V/C Ratio	0.094	0.001	-	-	0.011	-	-	0.048
HCM Control Delay (s)	9.9	7.3	0	-	7.5	0	-	10.7
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	91.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	102	358	162	75	328	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	6	5	4	9	1	5
Mvmt Flow	113	398	180	83	364	144

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	263	0	-	0	846	222
Stage 1	-	-	-	-	222	-
Stage 2	-	-	-	-	624	-
Critical Hdwy	4.16	-	-	-	6.41	6.25
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.254	-	-	-	3.509	3.345
Pot Cap-1 Maneuver	1278	-	-	-	~ 334	810
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	536	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1278	-	-	-	~ 296	810
Mov Cap-2 Maneuver	-	-	-	-	~ 296	-
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	475	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	228.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1278	-	-	-	361
HCM Lane V/C Ratio	0.089	-	-	-	1.41
HCM Control Delay (s)	8.1	0	-	-	228.9
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.3	-	-	-	25.9

Notes

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

Intersection	
Int Delay, s/veh	199.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	63	30	31	54	498	65	140	33	379	94	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	3	2	7	0	2	33
Mvmt Flow	0	70	33	34	60	553	72	156	37	421	104	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1575	1287	108	1320	1271	174	111	0	0	192	0	0
Stage 1	950	950	-	318	318	-	-	-	-	-	-	-
Stage 2	625	337	-	1002	953	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	90	166	951	135	169	875	1473	-	-	1394	-	-
Stage 1	315	341	-	698	657	-	-	-	-	-	-	-
Stage 2	476	645	-	295	340	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	14	106	951	46	108	875	1473	-	-	1394	-	-
Mov Cap-2 Maneuver	14	106	-	46	108	-	-	-	-	-	-	-
Stage 1	298	231	-	660	621	-	-	-	-	-	-	-
Stage 2	149	610	-	135	231	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	71.1	$ 459.7	2.1	6.9
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1473	-	-	149	334	1394	-	-
HCM Lane V/C Ratio	0.049	-	-	0.694	1.939	0.302	-	-
HCM Control Delay (s)	7.6	0	-	71.1	$ 459.7	8.7	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	4	44.7	1.3	-	-

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

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	462	32	146	608	226	14	73	183	136	68	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	250	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	14	2	0	5	0	0	0	0	4	1	0	0
Mvmt Flow	16	513	36	162	676	251	16	81	203	151	76	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	676	0	0	549	0	0	1604	1562	531	1704	1580	676
Stage 1	-	-	-	-	-	-	562	562	-	1000	1000	-
Stage 2	-	-	-	-	-	-	1042	1000	-	704	580	-
Critical Hdwy	4.24	-	-	4.15	-	-	7.1	6.5	6.24	7.11	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.11	5.5	-
Follow-up Hdwy	2.326	-	-	2.245	-	-	3.5	4	3.336	3.509	4	3.3
Pot Cap-1 Maneuver	862	-	-	1006	-	-	86	113	544	~ 73	110	457
Stage 1	-	-	-	-	-	-	515	513	-	294	324	-
Stage 2	-	-	-	-	-	-	280	324	-	429	503	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	862	-	-	1006	-	-	-	~ 71	544	-	~ 69	457
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 71	-	-	~ 69	-
Stage 1	-	-	-	-	-	-	501	499	-	286	210	-
Stage 2	-	-	-	-	-	-	114	210	-	219	489	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.4		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	862	-	-	1006	-	-	-
HCM Lane V/C Ratio	-	0.018	-	-	0.161	-	-	-
HCM Control Delay (s)	-	9.3	0	-	9.3	0	-	-
HCM Lane LOS	-	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-	0.6	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	122.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	82	436	523	292	224	101
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	3	1	1	1	19
Mvmt Flow	91	484	581	324	249	112

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	906	0	-	0	1410	743
Stage 1	-	-	-	-	743	-
Stage 2	-	-	-	-	667	-
Critical Hdwy	4.13	-	-	-	6.41	6.39
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.227	-	-	-	3.509	3.471
Pot Cap-1 Maneuver	747	-	-	-	~ 153	389
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	512	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	747	-	-	-	~ 127	389
Mov Cap-2 Maneuver	-	-	-	-	~ 127	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	426	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	$ 624.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	747	-	-	-	161
HCM Lane V/C Ratio	0.122	-	-	-	2.243
HCM Control Delay (s)	10.5	0	-	-	$ 624.5
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	29.6

Notes

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

Intersection	
Int Delay, s/veh	117.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	401	114	117	507	0	187	0	117	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	2	18	1	0	0	0	8	0	0	0
Mvmt Flow	0	446	127	130	563	0	208	0	130	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	563	0	0	572	0	0	1332	1332	509	1397	1395	563
Stage 1	-	-	-	-	-	-	509	509	-	823	823	-
Stage 2	-	-	-	-	-	-	823	823	-	574	572	-
Critical Hdwy	4.1	-	-	4.28	-	-	7.1	6.5	6.28	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.362	-	-	3.5	4	3.372	3.5	4	3.3
Pot Cap-1 Maneuver	1019	-	-	926	-	-	~ 133	156	552	120	143	530
Stage 1	-	-	-	-	-	-	550	541	-	371	391	-
Stage 2	-	-	-	-	-	-	371	391	-	507	508	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1019	-	-	926	-	-	~ 112	124	552	77	114	530
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 112	124	-	77	114	-
Stage 1	-	-	-	-	-	-	550	541	-	371	311	-
Stage 2	-	-	-	-	-	-	295	311	-	388	508	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.8	$ 555	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	162	1019	-	-	926	-	-	-
HCM Lane V/C Ratio	2.085	-	-	-	0.14	-	-	-
HCM Control Delay (s)	$ 555	0	-	-	9.5	0	-	0
HCM Lane LOS	F	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	26.7	0	-	-	0.5	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	489.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	665	75	223	868	0	121	0	112	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	3	0	1	0	0	0	3	0	0	0
Mvmt Flow	0	739	83	248	964	0	134	0	124	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	964	0	0	822	0	0	2241	2241	781	2303	2282	964
Stage 1	-	-	-	-	-	-	781	781	-	1460	1460	-
Stage 2	-	-	-	-	-	-	1460	1460	-	843	822	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	722	-	-	816	-	-	~ 30	43	393	27	40	312
Stage 1	-	-	-	-	-	-	391	408	-	162	196	-
Stage 2	-	-	-	-	-	-	162	196	-	361	391	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	722	-	-	816	-	-	~ 14	15	393	9	14	312
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 14	15	-	9	14	-
Stage 1	-	-	-	-	-	-	391	408	-	162	68	-
Stage 2	-	-	-	-	-	-	~ 56	68	-	247	391	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.3	$ 4322.7	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	26	722	-	-	816	-	-	-
HCM Lane V/C Ratio	9.957	-	-	-	0.304	-	-	-
HCM Control Delay (s)	$ 4322.7	0	-	-	11.3	0	-	0
HCM Lane LOS	F	A	-	-	B	A	-	A
HCM 95th %tile Q(veh)	32.1	0	-	-	1.3	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	7.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	110	51	161	187	74	198
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	2	0	0
Mvmt Flow	122	57	179	208	82	220

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	179	0	717	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	566	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1409	-	399	901
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	572	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1409	-	342	901
Mov Cap-2 Maneuver	-	-	-	-	342	-
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	490	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.7	16.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	624	-	-	1409	-
HCM Lane V/C Ratio	0.484	-	-	0.127	-
HCM Control Delay (s)	16.1	-	-	7.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	36.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	217	25	56	413	95	46	119	50	54	88	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	0	0	1	2	0	1	0	4	0	0
Mvmt Flow	14	241	28	62	459	106	51	132	56	60	98	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	564	0	0	269	0	0	981	973	255	1014	934	512
Stage 1	-	-	-	-	-	-	284	284	-	636	636	-
Stage 2	-	-	-	-	-	-	697	689	-	378	298	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.51	6.2	7.14	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.51	-	6.14	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.51	-	6.14	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.009	3.3	3.536	4	3.3
Pot Cap-1 Maneuver	1018	-	-	1306	-	-	231	253	789	215	268	566
Stage 1	-	-	-	-	-	-	727	678	-	463	475	-
Stage 2	-	-	-	-	-	-	435	448	-	640	671	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1018	-	-	1306	-	-	143	232	789	103	245	566
Mov Cap-2 Maneuver	-	-	-	-	-	-	143	232	-	103	245	-
Stage 1	-	-	-	-	-	-	715	667	-	456	442	-
Stage 2	-	-	-	-	-	-	301	417	-	469	660	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.8	102.3	127.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	239	1018	-	-	1306	-	-	178
HCM Lane V/C Ratio	1	0.014	-	-	0.048	-	-	1.024
HCM Control Delay (s)	102.3	8.6	0	-	7.9	0	-	127.2
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	9.5	0	-	-	0.1	-	-	8.5

Intersection	
Int Delay, s/veh	94.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	102	4	80	168	146	12	151	82	215	82	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	0	0	0	17	4	5	1	0	0
Mvmt Flow	11	113	4	89	187	162	13	168	91	239	91	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	349	0	0	118	0	0	630	665	116	713	586	268
Stage 1	-	-	-	-	-	-	138	138	-	446	446	-
Stage 2	-	-	-	-	-	-	492	527	-	267	140	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.27	6.54	6.25	7.11	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.27	5.54	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.27	5.54	-	6.11	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.653	4.036	3.345	3.509	4	3.3
Pot Cap-1 Maneuver	1221	-	-	1483	-	-	374	378	928	348	425	776
Stage 1	-	-	-	-	-	-	830	779	-	593	577	-
Stage 2	-	-	-	-	-	-	531	525	-	741	785	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1221	-	-	1483	-	-	286	346	928	~ 183	389	776
Mov Cap-2 Maneuver	-	-	-	-	-	-	286	346	-	~ 183	389	-
Stage 1	-	-	-	-	-	-	822	771	-	587	533	-
Stage 2	-	-	-	-	-	-	406	485	-	518	777	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.5	26.5	$ 307.8
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	432	1221	-	-	1483	-	-	215
HCM Lane V/C Ratio	0.63	0.009	-	-	0.06	-	-	1.545
HCM Control Delay (s)	26.5	8	0	-	7.6	0	-	$ 307.8
HCM Lane LOS	D	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	4.2	0	-	-	0.2	-	-	20.7

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

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	67	28	246	47	13	199
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	0	1
Mvmt Flow	74	31	273	52	14	221

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	549	299	0	0	326	0
Stage 1	299	-	-	-	-	-
Stage 2	250	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	500	745	-	-	1245	-
Stage 1	757	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	494	745	-	-	1245	-
Mov Cap-2 Maneuver	494	-	-	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	786	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	548	1245	-
HCM Lane V/C Ratio	-	-	0.193	0.012	-
HCM Control Delay (s)	-	-	13.1	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0	-

Intersection	
Int Delay, s/veh	352.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	48	501	4	27	662	86	4	84	79	56	69	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	1	3	0	0	7	0	0	0
Mvmt Flow	53	557	4	30	736	96	4	93	88	62	77	40

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	831	0	0	561	0	0	1568	1557	559	1599	1511	783
Stage 1	-	-	-	-	-	-	666	666	-	843	843	-
Stage 2	-	-	-	-	-	-	902	891	-	756	668	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.27	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.363	3.5	4	3.3
Pot Cap-1 Maneuver	810	-	-	1020	-	-	91	114	519	87	121	397
Stage 1	-	-	-	-	-	-	452	460	-	361	382	-
Stage 2	-	-	-	-	-	-	335	363	-	403	459	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	810	-	-	1020	-	-	29	97	519	~ 9	103	397
Mov Cap-2 Maneuver	-	-	-	-	-	-	29	97	-	~ 9	103	-
Stage 1	-	-	-	-	-	-	409	416	-	327	361	-
Stage 2	-	-	-	-	-	-	224	343	-	235	415	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.3	231.7	$ 3381.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	144	810	-	-	1020	-	-	23
HCM Lane V/C Ratio	1.289	0.066	-	-	0.029	-	-	7.778
HCM Control Delay (s)	231.7	9.8	0	-	8.6	0	-	$ 3381.6
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	11.3	0.2	-	-	0.1	-	-	22.5

Notes

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

Intersection	
Int Delay, s/veh	65.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	22	422	10	22	524	92	23	185	28	39	93	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	2	0	0	2	0	11	4	5
Mvmt Flow	24	469	11	24	582	102	26	206	31	43	103	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	684	0	0	480	0	0	1281	1256	474	1324	1211	633
Stage 1	-	-	-	-	-	-	523	523	-	682	682	-
Stage 2	-	-	-	-	-	-	758	733	-	642	529	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.52	6.2	7.21	6.54	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.52	-	6.21	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.52	-	6.21	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.018	3.3	3.599	4.036	3.345
Pot Cap-1 Maneuver	919	-	-	1093	-	-	144	~ 171	595	127	181	474
Stage 1	-	-	-	-	-	-	541	530	-	425	447	-
Stage 2	-	-	-	-	-	-	402	426	-	448	524	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	919	-	-	1093	-	-	63	~ 159	595	-	168	474
Mov Cap-2 Maneuver	-	-	-	-	-	-	63	~ 159	-	-	168	-
Stage 1	-	-	-	-	-	-	522	511	-	410	431	-
Stage 2	-	-	-	-	-	-	265	411	-	245	505	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.3	$ 414.6	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	150	919	-	-	1093	-	-	-
HCM Lane V/C Ratio	1.748	0.027	-	-	0.022	-	-	-
HCM Control Delay (s)	$ 414.6	9	0	-	8.4	0	-	-
HCM Lane LOS	F	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	19.2	0.1	-	-	0.1	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	73.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	127	333	18	45	430	56	11	83	50	22	69	161
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	1	3	0	0	0	0	0	1
Mvmt Flow	141	370	20	50	478	62	12	92	56	24	77	179

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	540	0	0	390	0	0	1399	1302	380	1345	1281	509
Stage 1	-	-	-	-	-	-	662	662	-	609	609	-
Stage 2	-	-	-	-	-	-	737	640	-	736	672	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.309
Pot Cap-1 Maneuver	1039	-	-	1180	-	-	119	162	671	130	167	566
Stage 1	-	-	-	-	-	-	454	462	-	486	488	-
Stage 2	-	-	-	-	-	-	413	473	-	414	458	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1039	-	-	1180	-	-	37	126	671	41	130	566
Mov Cap-2 Maneuver	-	-	-	-	-	-	37	126	-	41	130	-
Stage 1	-	-	-	-	-	-	375	382	-	401	458	-
Stage 2	-	-	-	-	-	-	221	444	-	238	378	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	0.7	182.3	299.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	140	1039	-	-	1180	-	-	186
HCM Lane V/C Ratio	1.143	0.136	-	-	0.042	-	-	1.505
HCM Control Delay (s)	182.3	9	0	-	8.2	0	-	299.4
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	9.1	0.5	-	-	0.1	-	-	17.7

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	31	39	4	16	82	56	2	35	7	35	53	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	50	0	0	0	0	0	0	0	0	0
Mvmt Flow	34	43	4	18	91	62	2	39	8	39	59	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	268	195	67	215	199	43	74	0	0	47	0	0
Stage 1	144	144	-	47	47	-	-	-	-	-	-	-
Stage 2	124	51	-	168	152	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.7	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.75	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	689	704	877	746	700	1033	1538	-	-	1573	-	-
Stage 1	864	782	-	972	860	-	-	-	-	-	-	-
Stage 2	885	856	-	839	775	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	569	685	877	692	681	1033	1538	-	-	1573	-	-
Mov Cap-2 Maneuver	569	685	-	692	681	-	-	-	-	-	-	-
Stage 1	863	762	-	971	859	-	-	-	-	-	-	-
Stage 2	743	855	-	767	755	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.5	10.9	0.3	2.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1538	-	-	638	779	1573	-	-
HCM Lane V/C Ratio	0.001	-	-	0.129	0.22	0.025	-	-
HCM Control Delay (s)	7.3	0	-	11.5	10.9	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.8	0.1	-	-

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	95	9	56	148	69	15	112	23	16	89	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	0	0	0	0	0	0	0	2	0
Mvmt Flow	14	106	10	62	164	77	17	124	26	18	99	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	425	317	99	363	305	137	99	0	0	150	0	0
Stage 1	134	134	-	171	171	-	-	-	-	-	-	-
Stage 2	291	183	-	192	134	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.52	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.018	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	543	599	962	597	612	917	1507	-	-	1444	-	-
Stage 1	874	785	-	836	761	-	-	-	-	-	-	-
Stage 2	721	748	-	814	789	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	385	584	962	499	597	917	1507	-	-	1444	-	-
Mov Cap-2 Maneuver	385	584	-	499	597	-	-	-	-	-	-	-
Stage 1	864	775	-	826	752	-	-	-	-	-	-	-
Stage 2	510	739	-	687	779	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.2	16	0.7	1.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1507	-	-	569	627	1444	-	-
HCM Lane V/C Ratio	0.011	-	-	0.228	0.484	0.012	-	-
HCM Control Delay (s)	7.4	0	-	13.2	16	7.5	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	2.6	0	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	140	6	23	296	83	2	35	6	14	47	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	33	0	0	0	0	0	0	0	4	0
Mvmt Flow	22	156	7	26	329	92	2	39	7	16	52	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	421	0	0	162	0	0	669	675	159	652	633	375
Stage 1	-	-	-	-	-	-	203	203	-	426	426	-
Stage 2	-	-	-	-	-	-	466	472	-	226	207	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1149	-	-	1429	-	-	374	378	892	384	394	676
Stage 1	-	-	-	-	-	-	804	737	-	610	582	-
Stage 2	-	-	-	-	-	-	581	562	-	781	727	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1149	-	-	1429	-	-	310	361	892	338	376	676
Mov Cap-2 Maneuver	-	-	-	-	-	-	310	361	-	338	376	-
Stage 1	-	-	-	-	-	-	787	722	-	597	568	-
Stage 2	-	-	-	-	-	-	495	549	-	718	712	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.4	15.5	16
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	390	1149	-	-	1429	-	-	421
HCM Lane V/C Ratio	0.123	0.019	-	-	0.018	-	-	0.224
HCM Control Delay (s)	15.5	8.2	0	-	7.6	0	-	16
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	40	2	9	58	5	0	39	5	0	60	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	9	0	0	6	0	0	0	0	0	0	17
Mvmt Flow	11	44	2	10	64	6	0	43	6	0	67	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	153	121	72	142	124	46	78	0	0	49	0	0
Stage 1	72	72	-	46	46	-	-	-	-	-	-	-
Stage 2	81	49	-	96	78	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.59	6.2	7.1	6.56	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.081	3.3	3.5	4.054	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	819	756	996	832	759	1029	1533	-	-	1571	-	-
Stage 1	943	821	-	973	849	-	-	-	-	-	-	-
Stage 2	932	840	-	916	822	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	762	756	996	793	759	1029	1533	-	-	1571	-	-
Mov Cap-2 Maneuver	762	756	-	793	759	-	-	-	-	-	-	-
Stage 1	943	821	-	973	849	-	-	-	-	-	-	-
Stage 2	857	840	-	864	822	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	10.2	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1533	-	-	764	777	1571	-	-
HCM Lane V/C Ratio	-	-	-	0.076	0.103	-	-	-
HCM Control Delay (s)	0	-	-	10.1	10.2	0	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	36	0	16	67	11	4	98	11	16	65	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	0	8	0	0	2	0	11	3	0
Mvmt Flow	12	40	0	18	74	12	4	109	12	18	72	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	277	240	74	254	236	115	77	0	0	121	0	0
Stage 1	110	110	-	124	124	-	-	-	-	-	-	-
Stage 2	167	130	-	130	112	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.58	6.2	4.1	-	-	4.21	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.072	3.3	2.2	-	-	2.299	-	-
Pot Cap-1 Maneuver	679	656	993	703	654	943	1535	-	-	1412	-	-
Stage 1	900	799	-	885	782	-	-	-	-	-	-	-
Stage 2	840	783	-	878	791	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	604	646	993	662	644	943	1535	-	-	1412	-	-
Mov Cap-2 Maneuver	604	646	-	662	644	-	-	-	-	-	-	-
Stage 1	897	789	-	882	780	-	-	-	-	-	-	-
Stage 2	748	781	-	823	781	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	11.3	0.3	1.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1535	-	-	636	672	1412	-	-
HCM Lane V/C Ratio	0.003	-	-	0.082	0.155	0.013	-	-
HCM Control Delay (s)	7.4	0	-	11.2	11.3	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.5	0	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	76	0	65	116	22	0	21	23	14	32	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	5	0	0	0	0	25	0	0
Mvmt Flow	2	84	0	72	129	24	0	23	26	16	36	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	153	0	0	84	0	0	395	387	84	399	375	141
Stage 1	-	-	-	-	-	-	89	89	-	286	286	-
Stage 2	-	-	-	-	-	-	306	298	-	113	89	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1440	-	-	1526	-	-	568	551	981	522	559	912
Stage 1	-	-	-	-	-	-	923	825	-	674	679	-
Stage 2	-	-	-	-	-	-	708	671	-	839	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1440	-	-	1526	-	-	514	522	981	471	529	912
Mov Cap-2 Maneuver	-	-	-	-	-	-	514	522	-	471	529	-
Stage 1	-	-	-	-	-	-	922	824	-	673	644	-
Stage 2	-	-	-	-	-	-	630	636	-	793	824	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.4	10.6	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	691	1440	-	-	1526	-	-	533
HCM Lane V/C Ratio	0.071	0.002	-	-	0.047	-	-	0.106
HCM Control Delay (s)	10.6	7.5	0	-	7.5	0	-	12.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.4

Intersection	
Int Delay, s/veh	16.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	109	248	297	202	159	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	1	0	3	2
Mvmt Flow	121	276	330	224	177	113

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	554	0	-	0	960	442
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	518	-
Critical Hdwy	4.12	-	-	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.218	-	-	-	3.527	3.318
Pot Cap-1 Maneuver	1016	-	-	-	284	615
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	596	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1016	-	-	-	244	615
Mov Cap-2 Maneuver	-	-	-	-	244	-
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	512	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	66.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1016	-	-	-	319
HCM Lane V/C Ratio	0.119	-	-	-	0.909
HCM Control Delay (s)	9	0	-	-	66.8
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	8.8

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	191	110	87	60	235	45	109	70	669	226	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	3	30	0	0	0	0	0	0	0
Mvmt Flow	8	212	122	97	67	261	50	121	78	743	251	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2167	2042	257	2171	2009	160	262	0	0	199	0	0
Stage 1	1743	1743	-	260	260	-	-	-	-	-	-	-
Stage 2	424	299	-	1911	1749	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.8	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.8	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.8	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4.27	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	34	~ 57	787	~ 33	~ 50	890	1314	-	-	1385	-	-
Stage 1	111	~ 142	-	743	644	-	-	-	-	-	-	-
Stage 2	612	670	-	~ 87	119	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 20	787	-	~ 18	890	1314	-	-	1385	-	-
Mov Cap-2 Maneuver	-	~ 20	-	-	~ 18	-	-	-	-	-	-	-
Stage 1	106	~ 53	-	711	616	-	-	-	-	-	-	-
Stage 2	369	641	-	-	~ 44	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			1.6	7.8
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1314	-	-	-	-	1385	-	-
HCM Lane V/C Ratio	0.038	-	-	-	-	0.537	-	-
HCM Control Delay (s)	7.8	0	-	-	-	10.6	0	-
HCM Lane LOS	A	A	-	-	-	B	A	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-	3.3	-	-

Notes

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

Intersection	
Int Delay, s/veh	2275.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	1070	71	205	393	64	28	16	172	231	200	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	250	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	7	17	11	13	33	0	13	1	2	100
Mvmt Flow	0	1189	79	228	437	71	31	18	191	257	222	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	437	0	0	1268	0	0	2234	2120	1228	2225	2160	437
Stage 1	-	-	-	-	-	-	1228	1228	-	892	892	-
Stage 2	-	-	-	-	-	-	1006	892	-	1333	1268	-
Critical Hdwy	4.1	-	-	4.27	-	-	7.43	6.5	6.33	7.11	6.52	7.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.43	5.5	-	6.11	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.43	5.5	-	6.11	5.52	-
Follow-up Hdwy	2.2	-	-	2.353	-	-	3.797	4	3.417	3.509	4.018	4.2
Pot Cap-1 Maneuver	1134	-	-	500	-	-	~ 25	51	206	~ 31	~ 47	457
Stage 1	-	-	-	-	-	-	189	253	-	338	360	-
Stage 2	-	-	-	-	-	-	255	363	-	~ 191	240	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1134	-	-	500	-	-	-	18	206	0	~ 17	457
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	18	-	0	~ 17	-
Stage 1	-	-	-	-	-	-	189	253	-	338	~ 129	-
Stage 2	-	-	-	-	-	-	-	130	-	~ 13	240	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.6		$ 12806
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1134	-	-	500	-	-	17
HCM Lane V/C Ratio	-	-	-	-	0.456	-	-	28.497
HCM Control Delay (s)	-	0	-	-	18.1	0	-	$ 12806
HCM Lane LOS	-	A	-	-	C	A	-	F
HCM 95th %tile Q(veh)	-	0	-	-	2.3	-	-	61.4

Notes

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

Intersection	
Int Delay, s/veh	1680.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	103	1009	399	112	549	233
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	30	2	10	22	3	6
Mvmt Flow	114	1121	443	124	610	259

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	568	0	-	0	1856	506
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	1350	-
Critical Hdwy	4.4	-	-	-	6.43	6.26
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.47	-	-	-	3.527	3.354
Pot Cap-1 Maneuver	879	-	-	-	~ 80	558
Stage 1	-	-	-	-	~ 603	-
Stage 2	-	-	-	-	~ 240	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	879	-	-	-	~ 52	558
Mov Cap-2 Maneuver	-	-	-	-	~ 52	-
Stage 1	-	-	-	-	~ 603	-
Stage 2	-	-	-	-	~ 157	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	$ 5167.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	879	-	-	-	71
HCM Lane V/C Ratio	0.13	-	-	-	12.238
HCM Control Delay (s)	9.7	0	-	-	$ 5167.4
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	102.9

Notes

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

Intersection	
Int Delay, s/veh	158.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	939	267	152	476	0	70	0	144	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	2	12	9	0	4	100	25	0	0	0
Mvmt Flow	0	1043	297	169	529	0	78	0	160	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	529	0	0	1340	0	0	2059	2059	1192	2139	2207	529
Stage 1	-	-	-	-	-	-	1192	1192	-	867	867	-
Stage 2	-	-	-	-	-	-	867	867	-	1272	1340	-
Critical Hdwy	4.1	-	-	4.22	-	-	7.14	7.5	6.45	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	6.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	6.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.308	-	-	3.536	4.9	3.525	3.5	4	3.3
Pot Cap-1 Maneuver	1048	-	-	483	-	-	~ 40	30	205	36	45	554
Stage 1	-	-	-	-	-	-	226	173	-	350	373	-
Stage 2	-	-	-	-	-	-	345	262	-	208	223	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1048	-	-	483	-	-	~ 24	15	205	5	23	554
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 24	15	-	5	23	-
Stage 1	-	-	-	-	-	-	226	173	-	350	188	-
Stage 2	-	-	-	-	-	-	174	132	-	46	223	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4	$ 1506.4	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	59	1048	-	-	483	-	-	-
HCM Lane V/C Ratio	4.03	-	-	-	0.35	-	-	-
HCM Control Delay (s)	$ 1506.4	0	-	-	16.4	0	-	0
HCM Lane LOS	F	A	-	-	C	A	-	A
HCM 95th %tile Q(veh)	25.8	0	-	-	1.6	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	1627.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	1607	209	119	733	0	41	0	372	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	2	2	6	0	7	0	1	0	0	0
Mvmt Flow	0	1786	232	132	814	0	46	0	413	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	814	0	0	2018	0	0	2981	2981	1902	3187	3097	814
Stage 1	-	-	-	-	-	-	1902	1902	-	1079	1079	-
Stage 2	-	-	-	-	-	-	1079	1079	-	2108	2018	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.17	6.5	6.21	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.563	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	822	-	-	282	-	-	~ 8	14	~ 87	6	12	381
Stage 1	-	-	-	-	-	-	86	118	-	267	297	-
Stage 2	-	-	-	-	-	-	259	297	-	68	103	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	822	-	-	282	-	-	~ 2	2	~ 87	-	2	381
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 2	2	-	-	2	-
Stage 1	-	-	-	-	-	-	86	118	-	267	43	-
Stage 2	-	-	-	-	-	-	~ 38	43	-	-	103	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4	$ 12129.7	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	17	822	-	-	282	-	-	-
HCM Lane V/C Ratio	26.993	-	-	-	0.469	-	-	-
HCM Control Delay (s)	$ 12129.7	0	-	-	28.5	0	-	0
HCM Lane LOS	F	A	-	-	D	A	-	A
HCM 95th %tile Q(veh)	58.2	0	-	-	2.4	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	225	118	193	94	48	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	4	1	2	9	0
Mvmt Flow	250	131	214	104	53	183

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	381	0	849	316
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	533	-
Critical Hdwy	-	-	4.11	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.209	-	3.581	3.3
Pot Cap-1 Maneuver	-	-	1183	-	322	729
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	575	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1183	-	260	729
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	465	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.9	17.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	518	-	-	1183	-
HCM Lane V/C Ratio	0.457	-	-	0.181	-
HCM Control Delay (s)	17.7	-	-	8.7	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.4	-	-	0.7	-

Intersection	
Int Delay, s/veh	373.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	32	694	52	21	194	62	13	75	61	174	212	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	0	0	4	0	20	3	0	3	0	0
Mvmt Flow	36	771	58	23	216	69	14	83	68	193	236	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	284	0	0	829	0	0	1294	1202	800	1244	1197	250
Stage 1	-	-	-	-	-	-	871	871	-	297	297	-
Stage 2	-	-	-	-	-	-	423	331	-	947	900	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.53	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.53	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.53	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.68	4.027	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1290	-	-	811	-	-	128	184	388	~ 150	~ 187	794
Stage 1	-	-	-	-	-	-	322	367	-	709	671	-
Stage 2	-	-	-	-	-	-	575	643	-	312	360	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1290	-	-	811	-	-	-	169	388	~ 71	~ 171	794
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	169	-	~ 71	~ 171	-
Stage 1	-	-	-	-	-	-	305	348	-	672	648	-
Stage 2	-	-	-	-	-	-	346	621	-	~ 186	341	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.7		$ 1492.1
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1290	-	-	811	-	-	108
HCM Lane V/C Ratio	-	0.028	-	-	0.029	-	-	4.136
HCM Control Delay (s)	-	7.9	0	-	9.6	0	-	$ 1492.1
HCM Lane LOS	-	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	-	0.1	-	-	0.1	-	-	46

Notes

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

Intersection	
Int Delay, s/veh	769

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	235	5	100	158	45	10	106	100	393	423	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	3	2	19	0	18	8	3	8	0
Mvmt Flow	6	261	6	111	176	50	11	118	111	437	470	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	226	0	0	267	0	0	940	723	264	812	701	201
Stage 1	-	-	-	-	-	-	275	275	-	423	423	-
Stage 2	-	-	-	-	-	-	665	448	-	389	278	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.68	6.28	7.13	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.68	-	6.13	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.68	-	6.13	5.58	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4.162	3.372	3.527	4.072	3.3
Pot Cap-1 Maneuver	1354	-	-	1291	-	-	246	334	760	~ 296	~ 356	845
Stage 1	-	-	-	-	-	-	736	654	-	607	577	-
Stage 2	-	-	-	-	-	-	453	547	-	633	670	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1354	-	-	1291	-	-	-	299	760	~ 162	~ 319	845
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	299	-	~ 162	~ 319	-
Stage 1	-	-	-	-	-	-	732	651	-	604	520	-
Stage 2	-	-	-	-	-	-	39	493	-	440	667	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.7		$ 1476.6
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1354	-	-	1291	-	-	220
HCM Lane V/C Ratio	-	0.004	-	-	0.086	-	-	4.187
HCM Control Delay (s)	-	7.7	0	-	8.1	0		$ 1476.6
HCM Lane LOS	-	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	-	0	-	-	0.3	-	-	91.4

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

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	58	25	202	107	45	262
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	3	0	0	1
Mvmt Flow	64	28	224	119	50	291

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	675	284	0	0	343	0
Stage 1	284	-	-	-	-	-
Stage 2	391	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	422	760	-	-	1227	-
Stage 1	769	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	401	760	-	-	1227	-
Mov Cap-2 Maneuver	401	-	-	-	-	-
Stage 1	769	-	-	-	-	-
Stage 2	654	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.6	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	468	1227	-
HCM Lane V/C Ratio	-	-	0.197	0.041	-
HCM Control Delay (s)	-	-	14.6	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	689.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	80	766	15	13	523	38	8	47	58	174	89	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	40	8	7	33	0	11	0	0	0
Mvmt Flow	89	851	17	14	581	42	9	52	64	193	99	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	623	0	0	868	0	0	1728	1689	859	1727	1677	602
Stage 1	-	-	-	-	-	-	1037	1037	-	631	631	-
Stage 2	-	-	-	-	-	-	691	652	-	1096	1046	-
Critical Hdwy	4.1	-	-	4.5	-	-	7.43	6.5	6.31	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.43	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.43	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.56	-	-	3.797	4	3.399	3.5	4	3.3
Pot Cap-1 Maneuver	968	-	-	637	-	-	58	94	343	~ 70	~ 96	503
Stage 1	-	-	-	-	-	-	245	311	-	472	477	-
Stage 2	-	-	-	-	-	-	389	467	-	261	308	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	968	-	-	637	-	-	-	75	343	~ 21	~ 76	503
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	75	-	~ 21	~ 76	-
Stage 1	-	-	-	-	-	-	201	256	-	388	461	-
Stage 2	-	-	-	-	-	-	283	451	-	~ 139	253	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.2		$ 4487.2
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	968	-	-	637	-	-	30
HCM Lane V/C Ratio	-	0.092	-	-	0.023	-	-	10.407
HCM Control Delay (s)	-	9.1	0	-	10.8	0	-	$ 4487.2
HCM Lane LOS	-	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	-	0.3	-	-	0.1	-	-	38.3

Notes

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

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	18	654	30	53	421	11	14	118	43	322	195	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	14	2	15	10	8	0	17	2	0	0	4	0
Mvmt Flow	20	727	33	59	468	12	16	131	48	358	217	50

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	480	0	0	760	0	0	1508	1381	743	1465	1392	474
Stage 1	-	-	-	-	-	-	783	783	-	592	592	-
Stage 2	-	-	-	-	-	-	725	598	-	873	800	-
Critical Hdwy	4.24	-	-	4.2	-	-	7.27	6.52	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.27	5.52	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.27	5.52	-	6.1	5.54	-
Follow-up Hdwy	2.326	-	-	2.29	-	-	3.653	4.018	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1023	-	-	817	-	-	92	144	418	~ 107	~ 141	595
Stage 1	-	-	-	-	-	-	365	404	-	496	491	-
Stage 2	-	-	-	-	-	-	394	491	-	~ 348	394	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1023	-	-	817	-	-	-	~ 125	418	-	~ 123	595
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 125	-	-	~ 123	-
Stage 1	-	-	-	-	-	-	353	390	-	479	442	-
Stage 2	-	-	-	-	-	-	166	442	-	~ 198	381	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.1		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1023	-	-	817	-	-	-
HCM Lane V/C Ratio	-	0.02	-	-	0.072	-	-	-
HCM Control Delay (s)	-	8.6	0	-	9.7	0	-	-
HCM Lane LOS	-	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-	0.2	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	187	485	101	123	264	36	17	116	92	18	101	110
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	4	0	8	19	0	0	2	0	2	0
Mvmt Flow	208	539	112	137	293	40	19	129	102	20	112	122

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	333	0	0	651	0	0	1715	1618	595	1713	1654	313
Stage 1	-	-	-	-	-	-	1011	1011	-	587	587	-
Stage 2	-	-	-	-	-	-	704	607	-	1126	1067	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.22	7.1	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.318	3.5	4.018	3.3
Pot Cap-1 Maneuver	1238	-	-	945	-	-	72	~ 104	504	72	~ 98	732
Stage 1	-	-	-	-	-	-	291	320	-	499	497	-
Stage 2	-	-	-	-	-	-	431	489	-	251	299	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1238	-	-	945	-	-	-	~ 63	504	-	~ 59	732
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 63	-	-	~ 59	-
Stage 1	-	-	-	-	-	-	213	234	-	365	408	-
Stage 2	-	-	-	-	-	-	214	401	-	66	219	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	2.7		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1238	-	-	945	-	-	-
HCM Lane V/C Ratio	-	0.168	-	-	0.145	-	-	-
HCM Control Delay (s)	-	8.5	0	-	9.5	0	-	-
HCM Lane LOS	-	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	-	0.6	-	-	0.5	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	23.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	105	186	10	4	54	136	0	112	17	116	50	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	6	0	0	8	2	0	6	0	2	0	0
Mvmt Flow	117	207	11	4	60	151	0	124	19	129	56	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	574	478	77	578	491	134	99	0	0	143	0	0
Stage 1	335	335	-	134	134	-	-	-	-	-	-	-
Stage 2	239	143	-	444	357	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.2	7.1	6.58	6.22	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.3	3.5	4.072	3.318	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	433	481	990	430	470	915	1507	-	-	1440	-	-
Stage 1	683	635	-	874	774	-	-	-	-	-	-	-
Stage 2	769	771	-	597	618	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	299	435	990	249	425	915	1507	-	-	1440	-	-
Mov Cap-2 Maneuver	299	435	-	249	425	-	-	-	-	-	-	-
Stage 1	683	575	-	874	774	-	-	-	-	-	-	-
Stage 2	592	771	-	342	559	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	53.5	13	0	4.4
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1507	-	-	382	665	1440	-	-
HCM Lane V/C Ratio	-	-	-	0.876	0.324	0.09	-	-
HCM Control Delay (s)	0	-	-	53.5	13	7.7	0	-
HCM Lane LOS	A	-	-	F	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	8.6	1.4	0.3	-	-

Intersection	
Int Delay, s/veh	106.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	19	306	27	35	174	14	45	110	49	75	145	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	27	4	0	0	2	5	0	2	7
Mvmt Flow	21	340	30	39	193	16	50	122	54	83	161	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	700	623	179	780	612	149	197	0	0	177	0	0
Stage 1	346	346	-	249	249	-	-	-	-	-	-	-
Stage 2	354	277	-	531	363	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.2	7.37	6.54	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.3	3.743	4.036	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	357	400	869	284	406	903	1388	-	-	1411	-	-
Stage 1	674	632	-	703	697	-	-	-	-	-	-	-
Stage 2	667	678	-	489	621	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	189	359	869	40	364	903	1388	-	-	1411	-	-
Mov Cap-2 Maneuver	189	359	-	40	364	-	-	-	-	-	-	-
Stage 1	647	590	-	675	669	-	-	-	-	-	-	-
Stage 2	447	651	-	187	580	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	109.2	$ 313.8	1.7	2.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1388	-	-	358	163	1411	-	-
HCM Lane V/C Ratio	0.036	-	-	1.092	1.52	0.059	-	-
HCM Control Delay (s)	7.7	0	-	109.2	$ 313.8	7.7	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	14.4	16.3	0.2	-	-

Notes

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

Intersection	
Int Delay, s/veh	10.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	43	413	2	14	183	17	5	31	37	118	27	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	6	3	100	0	7	0	0	0	0	0	0	0
Mvmt Flow	48	459	2	16	203	19	6	34	41	131	30	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	222	0	0	461	0	0	839	809	460	837	801	213
Stage 1	-	-	-	-	-	-	556	556	-	244	244	-
Stage 2	-	-	-	-	-	-	283	253	-	593	557	-
Critical Hdwy	4.16	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1324	-	-	1111	-	-	288	317	605	288	320	832
Stage 1	-	-	-	-	-	-	519	516	-	764	708	-
Stage 2	-	-	-	-	-	-	728	701	-	496	515	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1324	-	-	1111	-	-	239	297	605	233	299	832
Mov Cap-2 Maneuver	-	-	-	-	-	-	239	297	-	233	299	-
Stage 1	-	-	-	-	-	-	494	491	-	727	697	-
Stage 2	-	-	-	-	-	-	646	690	-	409	490	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.5	16.6	43.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	392	1324	-	-	1111	-	-	290
HCM Lane V/C Ratio	0.207	0.036	-	-	0.014	-	-	0.72
HCM Control Delay (s)	16.6	7.8	0	-	8.3	0	-	43.8
HCM Lane LOS	C	A	A	-	A	A	-	E
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-	-	5.1

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	62	0	2	52	12	0	68	12	14	36	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	5	7	0	0	12	0	0	3	0	0	0	0
Mvmt Flow	44	69	0	2	58	13	0	76	13	16	40	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	198	169	49	196	171	82	58	0	0	89	0	0
Stage 1	80	80	-	82	82	-	-	-	-	-	-	-
Stage 2	118	89	-	114	89	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.57	6.2	7.1	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.063	3.3	3.5	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	754	715	1025	767	704	983	1559	-	-	1519	-	-
Stage 1	921	819	-	931	808	-	-	-	-	-	-	-
Stage 2	879	811	-	896	802	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	691	707	1025	704	696	983	1559	-	-	1519	-	-
Mov Cap-2 Maneuver	691	707	-	704	696	-	-	-	-	-	-	-
Stage 1	921	810	-	931	808	-	-	-	-	-	-	-
Stage 2	805	811	-	811	793	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	10.4	0	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1559	-	-	701	735	1519	-	-
HCM Lane V/C Ratio	-	-	-	0.162	0.1	0.01	-	-
HCM Control Delay (s)	0	-	-	11.1	10.4	7.4	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.3	0	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	84	6	27	54	4	8	87	17	22	130	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	7	12	0	0	5	13	0	0	0
Mvmt Flow	4	93	7	30	60	4	9	97	19	24	144	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	352	329	147	370	322	106	149	0	0	116	0	0
Stage 1	196	196	-	124	124	-	-	-	-	-	-	-
Stage 2	156	133	-	246	198	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.17	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.563	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	607	585	905	577	579	954	1445	-	-	1485	-	-
Stage 1	810	733	-	868	774	-	-	-	-	-	-	-
Stage 2	851	781	-	747	719	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	545	570	905	491	565	954	1445	-	-	1485	-	-
Mov Cap-2 Maneuver	545	570	-	491	565	-	-	-	-	-	-	-
Stage 1	804	720	-	862	769	-	-	-	-	-	-	-
Stage 2	775	776	-	634	706	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.5	12.9	0.5	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1445	-	-	583	549	1485	-	-
HCM Lane V/C Ratio	0.006	-	-	0.179	0.172	0.016	-	-
HCM Control Delay (s)	7.5	0	-	12.5	12.9	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.6	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	170	0	17	67	13	4	14	62	15	8	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	0	0	13	0	0	0	3	14	25	0
Mvmt Flow	2	189	0	19	74	14	4	16	69	17	9	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	89	0	0	189	0	0	323	320	189	355	312	82
Stage 1	-	-	-	-	-	-	193	193	-	119	119	-
Stage 2	-	-	-	-	-	-	130	127	-	236	193	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.24	6.75	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.626	4.225	3.3
Pot Cap-1 Maneuver	1519	-	-	1397	-	-	634	600	850	578	567	983
Stage 1	-	-	-	-	-	-	813	745	-	857	755	-
Stage 2	-	-	-	-	-	-	878	795	-	741	700	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1519	-	-	1397	-	-	611	591	850	515	559	983
Mov Cap-2 Maneuver	-	-	-	-	-	-	611	591	-	515	559	-
Stage 1	-	-	-	-	-	-	812	744	-	856	744	-
Stage 2	-	-	-	-	-	-	845	784	-	666	699	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	10.2	11.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	775	1519	-	-	1397	-	-	622
HCM Lane V/C Ratio	0.115	0.001	-	-	0.014	-	-	0.061
HCM Control Delay (s)	10.2	7.4	0	-	7.6	0	-	11.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	272.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	127	448	203	95	414	161
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	6	5	4	9	1	5
Mvmt Flow	141	498	226	106	460	179

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	331	0	-	0	1058	278
Stage 1	-	-	-	-	278	-
Stage 2	-	-	-	-	780	-
Critical Hdwy	4.16	-	-	-	6.41	6.25
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.254	-	-	-	3.509	3.345
Pot Cap-1 Maneuver	1206	-	-	-	~ 250	754
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	~ 454	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1206	-	-	-	~ 210	754
Mov Cap-2 Maneuver	-	-	-	-	~ 210	-
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	~ 380	-

Approach	EB	WB	SB
HCM Control Delay, s	1.9	0	$ 684.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1206	-	-	-	263
HCM Lane V/C Ratio	0.117	-	-	-	2.429
HCM Control Delay (s)	8.4	0	-	-	$ 684.3
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	51.6

Notes

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

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	191	38	39	68	613	80	174	42	467	117	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	3	2	7	0	2	33
Mvmt Flow	0	212	42	43	76	681	89	193	47	519	130	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1945	1590	134	1693	1570	217	138	0	0	240	0	0
Stage 1	1172	1172	-	394	394	-	-	-	-	-	-	-
Stage 2	773	418	-	1299	1176	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	49	~ 109	920	74	112	828	1440	-	-	1339	-	-
Stage 1	237	269	-	635	609	-	-	-	-	-	-	-
Stage 2	395	594	-	200	267	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 59	920	-	~ 60	828	1440	-	-	1339	-	-
Mov Cap-2 Maneuver	-	~ 59	-	-	~ 60	-	-	-	-	-	-	-
Stage 1	220	~ 156	-	589	565	-	-	-	-	-	-	-
Stage 2	56	551	-	-	155	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			2.1	7.4
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1440	-	-	-	-	1339	-	-
HCM Lane V/C Ratio	0.062	-	-	-	-	0.388	-	-
HCM Control Delay (s)	7.7	0	-	-	-	9.4	0	-
HCM Lane LOS	A	A	-	-	-	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	-	-	1.9	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	18	591	36	158	777	316	27	91	176	173	86	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	250	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	14	2	0	5	0	0	0	0	4	1	0	0
Mvmt Flow	20	657	40	176	863	351	30	101	196	192	96	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	863	0	0	697	0	0	1985	1931	677	2079	1951	863
Stage 1	-	-	-	-	-	-	717	717	-	1214	1214	-
Stage 2	-	-	-	-	-	-	1268	1214	-	865	737	-
Critical Hdwy	4.24	-	-	4.15	-	-	7.1	6.5	6.24	7.11	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.11	5.5	-
Follow-up Hdwy	2.326	-	-	2.245	-	-	3.5	4	3.336	3.509	4	3.3
Pot Cap-1 Maneuver	731	-	-	885	-	-	46	~ 67	449	~ 39	~ 65	357
Stage 1	-	-	-	-	-	-	424	437	-	223	257	-
Stage 2	-	-	-	-	-	-	209	257	-	350	428	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	731	-	-	885	-	-	-	~ 20	449	-	~ 19	357
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 20	-	-	~ 19	-
Stage 1	-	-	-	-	-	-	405	417	-	213	~ 78	-
Stage 2	-	-	-	-	-	-	-	~ 78	-	~ 143	409	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.3		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	731	-	-	885	-	-	-
HCM Lane V/C Ratio	-	0.027	-	-	0.198	-	-	-
HCM Control Delay (s)	-	10.1	0	-	10.1	0	-	-
HCM Lane LOS	-	B	A	-	B	A	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-	0.7	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	449.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	106	556	680	378	290	131
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	3	1	1	1	19
Mvmt Flow	118	618	756	420	322	146

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1176	0	-	0	1819	966
Stage 1	-	-	-	-	966	-
Stage 2	-	-	-	-	853	-
Critical Hdwy	4.13	-	-	-	6.41	6.39
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.227	-	-	-	3.509	3.471
Pot Cap-1 Maneuver	590	-	-	-	~ 86	287
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	419	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	590	-	-	-	~ 60	287
Mov Cap-2 Maneuver	-	-	-	-	~ 60	-
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	~ 291	-

Approach	EB	WB	SB
HCM Control Delay, s	2	0	$ 2284.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	590	-	-	-	80
HCM Lane V/C Ratio	0.2	-	-	-	5.847
HCM Control Delay (s)	12.6	0	-		$ 2284.2
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.7	-	-	-	51.9

Notes

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

Intersection	
Int Delay, s/veh	446

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	515	145	151	650	0	238	0	151	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	2	18	1	0	0	0	8	0	0	0
Mvmt Flow	0	572	161	168	722	0	264	0	168	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	722	0	0	733	0	0	1711	1711	653	1795	1791	722
Stage 1	-	-	-	-	-	-	653	653	-	1058	1058	-
Stage 2	-	-	-	-	-	-	1058	1058	-	737	733	-
Critical Hdwy	4.1	-	-	4.28	-	-	7.1	6.5	6.28	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.362	-	-	3.5	4	3.372	3.5	4	3.3
Pot Cap-1 Maneuver	889	-	-	803	-	-	~ 72	92	457	63	82	430
Stage 1	-	-	-	-	-	-	460	467	-	274	304	-
Stage 2	-	-	-	-	-	-	274	304	-	413	429	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	889	-	-	803	-	-	~ 52	60	457	29	53	430
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 52	60	-	29	53	-
Stage 1	-	-	-	-	-	-	460	467	-	274	198	-
Stage 2	-	-	-	-	-	-	~ 178	198	-	261	429	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2	$ 2116.9	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	79	889	-	-	803	-	-	-
HCM Lane V/C Ratio	5.471	-	-	-	0.209	-	-	-
HCM Control Delay (s)	$ 2116.9	0	-	-	10.7	0	-	0
HCM Lane LOS	F	A	-	-	B	A	-	A
HCM 95th %tile Q(veh)	47.6	0	-	-	0.8	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	883.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	861	96	285	1123	0	154	0	146	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	3	0	1	0	0	0	3	0	0	0
Mvmt Flow	0	957	107	317	1248	0	171	0	162	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1248	0	0	1063	0	0	2891	2891	1010	2972	2944	1248
Stage 1	-	-	-	-	-	-	1010	1010	-	1881	1881	-
Stage 2	-	-	-	-	-	-	1881	1881	-	1091	1063	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	565	-	-	663	-	-	~ 10	16	290	9	15	213
Stage 1	-	-	-	-	-	-	292	320	-	93	121	-
Stage 2	-	-	-	-	-	-	~ 93	121	-	263	302	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	565	-	-	663	-	-	~ 10	16	290	4	15	213
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 10	16	-	4	15	-
Stage 1	-	-	-	-	-	-	292	320	-	93	121	-
Stage 2	-	-	-	-	-	-	~ 93	121	-	116	302	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.1	$ 7835	0
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	19	565	-	-	663	-	-	-
HCM Lane V/C Ratio	17.544	-	-	-	0.478	-	-	-
HCM Control Delay (s)	$ 7835	0	-	-	15.3	0	-	0
HCM Lane LOS	F	A	-	-	C	A	-	A
HCM 95th %tile Q(veh)	42.2	0	-	-	2.6	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	10

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	132	60	195	225	87	239
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	2	0	0
Mvmt Flow	147	67	217	250	97	266

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	213	0	863	180
Stage 1	-	-	-	-	180	-
Stage 2	-	-	-	-	683	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1369	-	328	868
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	505	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1369	-	268	868
Mov Cap-2 Maneuver	-	-	-	-	268	-
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	412	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	23.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	543	-	-	1369	-
HCM Lane V/C Ratio	0.667	-	-	0.158	-
HCM Control Delay (s)	23.9	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	4.9	-	-	0.6	-

Intersection	
Int Delay, s/veh	115.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	272	31	70	516	118	57	150	62	67	109	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	0	0	1	2	0	1	0	4	0	0
Mvmt Flow	18	302	34	78	573	131	63	167	69	74	121	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	704	0	0	337	0	0	1225	1215	319	1267	1166	639
Stage 1	-	-	-	-	-	-	355	355	-	794	794	-
Stage 2	-	-	-	-	-	-	870	860	-	473	372	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.51	6.2	7.14	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.51	-	6.14	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.51	-	6.14	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.009	3.3	3.536	4	3.3
Pot Cap-1 Maneuver	903	-	-	1234	-	-	157	182	726	144	196	480
Stage 1	-	-	-	-	-	-	666	631	-	378	403	-
Stage 2	-	-	-	-	-	-	349	374	-	568	622	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	903	-	-	1234	-	-	~ 57	~ 159	726	-	171	480
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 57	~ 159	-	-	171	-
Stage 1	-	-	-	-	-	-	649	615	-	369	360	-
Stage 2	-	-	-	-	-	-	194	334	-	365	606	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.8	$ 638.5	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	133	903	-	-	1234	-	-	-
HCM Lane V/C Ratio	2.247	0.02	-	-	0.063	-	-	-
HCM Control Delay (s)	$ 638.5	9.1	0	-	8.1	0	-	-
HCM Lane LOS	F	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	25.2	0.1	-	-	0.2	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	484.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	125	5	100	208	184	15	190	102	271	103	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	0	0	0	17	4	5	1	0	0
Mvmt Flow	14	139	6	111	231	204	17	211	113	301	114	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	436	0	0	144	0	0	785	829	142	889	729	333
Stage 1	-	-	-	-	-	-	171	171	-	556	556	-
Stage 2	-	-	-	-	-	-	614	658	-	333	173	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.27	6.54	6.25	7.11	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.27	5.54	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.27	5.54	-	6.11	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.653	4.036	3.345	3.509	4	3.3
Pot Cap-1 Maneuver	1134	-	-	1451	-	-	293	304	898	~ 265	352	713
Stage 1	-	-	-	-	-	-	797	753	-	517	516	-
Stage 2	-	-	-	-	-	-	454	458	-	683	760	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1134	-	-	1451	-	-	191	269	898	~ 75	311	713
Mov Cap-2 Maneuver	-	-	-	-	-	-	191	269	-	~ 75	311	-
Stage 1	-	-	-	-	-	-	787	743	-	510	462	-
Stage 2	-	-	-	-	-	-	305	410	-	422	750	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.6	83.7	$ 1624.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	342	1134	-	-	1451	-	-	95
HCM Lane V/C Ratio	0.997	0.013	-	-	0.077	-	-	4.409
HCM Control Delay (s)	83.7	8.2	0	-	7.7	0	-	$ 1624.6
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	11.3	0	-	-	0.2	-	-	44.1

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

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	80	34	292	56	16	237
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	0	1
Mvmt Flow	89	38	324	62	18	263

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	655	356	0	0	387	0
Stage 1	356	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	434	693	-	-	1183	-
Stage 1	713	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	426	693	-	-	1183	-
Mov Cap-2 Maneuver	426	-	-	-	-	-
Stage 1	713	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	481	1183	-
HCM Lane V/C Ratio	-	-	0.263	0.015	-
HCM Control Delay (s)	-	-	15.1	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	60	632	5	34	836	108	5	104	97	70	84	44
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	1	3	0	0	7	0	0	0
Mvmt Flow	67	702	6	38	929	120	6	116	108	78	93	49

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1049	0	0	708	0	0	1974	1962	705	2014	1905	989
Stage 1	-	-	-	-	-	-	838	838	-	1064	1064	-
Stage 2	-	-	-	-	-	-	1136	1124	-	950	841	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.27	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.363	3.5	4	3.3
Pot Cap-1 Maneuver	671	-	-	900	-	-	47	~ 64	428	~ 44	~ 69	302
Stage 1	-	-	-	-	-	-	364	384	-	272	302	-
Stage 2	-	-	-	-	-	-	248	283	-	315	383	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	671	-	-	900	-	-	-	~ 48	428	-	~ 52	302
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 48	-	-	~ 52	-
Stage 1	-	-	-	-	-	-	304	321	-	227	270	-
Stage 2	-	-	-	-	-	-	122	253	-	126	320	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.3		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	671	-	-	900	-	-	-
HCM Lane V/C Ratio	-	0.099	-	-	0.042	-	-	-
HCM Control Delay (s)	-	11	0	-	9.2	0	-	-
HCM Lane LOS	-	B	A	-	A	A	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-	0.1	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	28	521	12	28	646	116	28	228	35	48	115	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	2	0	0	2	0	11	4	5
Mvmt Flow	31	579	13	31	718	129	31	253	39	53	128	59

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	847	0	0	592	0	0	1586	1557	586	1638	1498	782
Stage 1	-	-	-	-	-	-	648	648	-	844	844	-
Stage 2	-	-	-	-	-	-	938	909	-	794	654	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.52	6.2	7.21	6.54	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.52	-	6.21	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.52	-	6.21	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.018	3.3	3.599	4.036	3.345
Pot Cap-1 Maneuver	799	-	-	994	-	-	88	~ 113	514	76	~ 121	390
Stage 1	-	-	-	-	-	-	462	466	-	345	376	-
Stage 2	-	-	-	-	-	-	320	354	-	368	460	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	799	-	-	994	-	-	-	~ 100	514	-	~ 107	390
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 100	-	-	~ 107	-
Stage 1	-	-	-	-	-	-	435	439	-	325	353	-
Stage 2	-	-	-	-	-	-	163	332	-	136	433	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.3		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	799	-	-	994	-	-	-
HCM Lane V/C Ratio	-	0.039	-	-	0.031	-	-	-
HCM Control Delay (s)	-	9.7	0	-	8.7	0	-	-
HCM Lane LOS	-	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-	0.1	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	151	400	22	54	516	67	13	99	60	27	82	191
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	1	3	0	0	0	0	0	1
Mvmt Flow	168	444	24	60	573	74	14	110	67	30	91	212

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	648	0	0	469	0	0	1674	1560	457	1612	1535	611
Stage 1	-	-	-	-	-	-	792	792	-	731	731	-
Stage 2	-	-	-	-	-	-	882	768	-	881	804	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.309
Pot Cap-1 Maneuver	947	-	-	1103	-	-	77	113	608	85	117	496
Stage 1	-	-	-	-	-	-	385	404	-	416	430	-
Stage 2	-	-	-	-	-	-	344	414	-	344	398	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	947	-	-	1103	-	-	-	~ 78	608	-	~ 81	496
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 78	-	-	~ 81	-
Stage 1	-	-	-	-	-	-	292	307	-	316	393	-
Stage 2	-	-	-	-	-	-	138	378	-	149	302	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.5	0.7		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	947	-	-	1103	-	-	-
HCM Lane V/C Ratio	-	0.177	-	-	0.054	-	-	-
HCM Control Delay (s)	-	9.6	0	-	8.5	0	-	-
HCM Lane LOS	-	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	-	0.6	-	-	0.2	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	47	4	19	98	67	2	41	9	42	62	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	50	0	0	0	0	0	0	0	0	0
Mvmt Flow	41	52	4	21	109	74	2	46	10	47	69	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	319	232	78	255	236	51	88	0	0	56	0	0
Stage 1	172	172	-	55	55	-	-	-	-	-	-	-
Stage 2	147	60	-	200	181	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.7	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.75	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	638	672	864	702	668	1023	1520	-	-	1562	-	-
Stage 1	835	760	-	962	853	-	-	-	-	-	-	-
Stage 2	860	849	-	806	754	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	502	650	864	639	646	1023	1520	-	-	1562	-	-
Mov Cap-2 Maneuver	502	650	-	639	646	-	-	-	-	-	-	-
Stage 1	834	736	-	961	852	-	-	-	-	-	-	-
Stage 2	695	848	-	721	730	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.4	11.7	0.3	2.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1520	-	-	584	745	1562	-	-
HCM Lane V/C Ratio	0.001	-	-	0.167	0.274	0.03	-	-
HCM Control Delay (s)	7.4	0	-	12.4	11.7	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	1.1	0.1	-	-

Intersection	
Int Delay, s/veh	12.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	116	11	67	181	84	18	134	28	19	107	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	0	0	0	0	0	0	0	2	0
Mvmt Flow	18	129	12	74	201	93	20	149	31	21	119	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	513	381	119	436	365	164	119	0	0	180	0	0
Stage 1	161	161	-	204	204	-	-	-	-	-	-	-
Stage 2	352	220	-	232	161	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.52	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.018	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	475	552	938	534	566	886	1482	-	-	1408	-	-
Stage 1	846	765	-	803	737	-	-	-	-	-	-	-
Stage 2	669	721	-	775	769	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	297	535	938	419	549	886	1482	-	-	1408	-	-
Mov Cap-2 Maneuver	297	535	-	419	549	-	-	-	-	-	-	-
Stage 1	833	753	-	791	726	-	-	-	-	-	-	-
Stage 2	426	710	-	624	757	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.3	22.3	0.7	1.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1482	-	-	506	568	1408	-	-
HCM Lane V/C Ratio	0.013	-	-	0.314	0.649	0.015	-	-
HCM Control Delay (s)	7.5	0	-	15.3	22.3	7.6	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	4.7	0	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	24	173	7	28	365	101	2	42	7	17	56	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	33	0	0	0	0	0	0	0	4	0
Mvmt Flow	27	192	8	31	406	112	2	47	8	19	62	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	518	0	0	200	0	0	820	829	196	801	777	462
Stage 1	-	-	-	-	-	-	249	249	-	524	524	-
Stage 2	-	-	-	-	-	-	571	580	-	277	253	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1058	-	-	1384	-	-	296	308	850	305	326	604
Stage 1	-	-	-	-	-	-	759	704	-	540	527	-
Stage 2	-	-	-	-	-	-	509	503	-	734	694	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1058	-	-	1384	-	-	226	289	850	253	306	604
Mov Cap-2 Maneuver	-	-	-	-	-	-	226	289	-	253	306	-
Stage 1	-	-	-	-	-	-	737	684	-	524	510	-
Stage 2	-	-	-	-	-	-	410	487	-	658	674	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.4	19	20.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	314	1058	-	-	1384	-	-	342
HCM Lane V/C Ratio	0.18	0.025	-	-	0.022	-	-	0.331
HCM Control Delay (s)	19	8.5	0	-	7.7	0	-	20.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.1	-	-	1.4

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	48	2	10	68	6	0	46	6	0	70	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	9	0	0	6	0	0	0	0	0	0	17
Mvmt Flow	13	53	2	11	76	7	0	51	7	0	78	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	180	142	84	166	145	54	91	0	0	58	0	0
Stage 1	84	84	-	54	54	-	-	-	-	-	-	-
Stage 2	96	58	-	112	91	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.59	6.2	7.1	6.56	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.081	3.3	3.5	4.054	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	786	736	981	803	739	1019	1517	-	-	1559	-	-
Stage 1	929	812	-	963	842	-	-	-	-	-	-	-
Stage 2	916	833	-	898	812	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	720	736	981	757	739	1019	1517	-	-	1559	-	-
Mov Cap-2 Maneuver	720	736	-	757	739	-	-	-	-	-	-	-
Stage 1	929	812	-	963	842	-	-	-	-	-	-	-
Stage 2	828	833	-	837	812	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	10.4	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1517	-	-	739	756	1559	-	-
HCM Lane V/C Ratio	-	-	-	0.093	0.123	-	-	-
HCM Control Delay (s)	0	-	-	10.4	10.4	0	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.4	0	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	43	0	19	80	13	4	116	12	19	77	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	0	8	0	0	2	0	11	3	0
Mvmt Flow	14	48	0	21	89	14	4	129	13	21	86	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	326	281	88	298	276	136	90	0	0	142	0	0
Stage 1	130	130	-	144	144	-	-	-	-	-	-	-
Stage 2	196	151	-	154	132	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.58	6.2	4.1	-	-	4.21	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.072	3.3	2.2	-	-	2.299	-	-
Pot Cap-1 Maneuver	631	622	976	658	621	918	1518	-	-	1387	-	-
Stage 1	878	783	-	864	766	-	-	-	-	-	-	-
Stage 2	810	767	-	853	776	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	544	610	976	610	609	918	1518	-	-	1387	-	-
Mov Cap-2 Maneuver	544	610	-	610	609	-	-	-	-	-	-	-
Stage 1	875	770	-	861	764	-	-	-	-	-	-	-
Stage 2	702	765	-	787	764	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.8	12.1	0.2	1.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1518	-	-	593	634	1387	-	-
HCM Lane V/C Ratio	0.003	-	-	0.105	0.196	0.015	-	-
HCM Control Delay (s)	7.4	0	-	11.8	12.1	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.7	0	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	90	0	77	138	26	0	25	27	17	37	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	5	0	0	0	0	25	0	0
Mvmt Flow	2	100	0	86	153	29	0	28	30	19	41	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	182	0	0	100	0	0	467	457	100	472	443	168
Stage 1	-	-	-	-	-	-	104	104	-	339	339	-
Stage 2	-	-	-	-	-	-	363	353	-	133	104	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1405	-	-	1505	-	-	509	503	961	466	512	881
Stage 1	-	-	-	-	-	-	907	813	-	630	643	-
Stage 2	-	-	-	-	-	-	660	634	-	818	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1405	-	-	1505	-	-	448	470	961	410	478	881
Mov Cap-2 Maneuver	-	-	-	-	-	-	448	470	-	410	478	-
Stage 1	-	-	-	-	-	-	905	811	-	629	602	-
Stage 2	-	-	-	-	-	-	571	593	-	764	811	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.4	11.2	13.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	640	1405	-	-	1505	-	-	477
HCM Lane V/C Ratio	0.09	0.002	-	-	0.057	-	-	0.14
HCM Control Delay (s)	11.2	7.6	0	-	7.5	0	-	13.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.5

Intersection	
Int Delay, s/veh	83.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	135	311	373	254	201	127
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	1	0	3	2
Mvmt Flow	150	346	414	282	223	141

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	697	0	-	0	1202	556
Stage 1	-	-	-	-	556	-
Stage 2	-	-	-	-	646	-
Critical Hdwy	4.12	-	-	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.218	-	-	-	3.527	3.318
Pot Cap-1 Maneuver	899	-	-	-	~ 203	531
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	520	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	899	-	-	-	~ 161	531
Mov Cap-2 Maneuver	-	-	-	-	~ 161	-
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	413	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	$ 353.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	899	-	-	-	220
HCM Lane V/C Ratio	0.167	-	-	-	1.657
HCM Control Delay (s)	9.8	0	-	-	$ 353.5
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.6	-	-	-	23.8

Notes

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

APPENDIX D
HORIZON YEAR (2035) - IMPROVED INTERSECTION CAPACITY WORKSHEETS

SANDERSON STEWART

FEHR PEERS

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	48	20	170	89	37	221
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	3	0	0	1
Mvmt Flow	53	22	189	99	41	246

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	566	238	0	0	288	0
Stage 1	238	-	-	-	-	-
Stage 2	328	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	489	806	-	-	1286	-
Stage 1	806	-	-	-	-	-
Stage 2	734	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	471	806	-	-	1286	-
Mov Cap-2 Maneuver	471	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	707	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	537	1286	-
HCM Lane V/C Ratio	-	-	0.141	0.032	-
HCM Control Delay (s)	-	-	12.8	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	13

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	89	154	9	4	45	113	0	95	14	97	42	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	6	0	0	8	2	0	6	0	2	0	0
Mvmt Flow	99	171	10	4	50	126	0	106	16	108	47	37

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	482	402	65	484	412	113	83	0	0	121	0	0
Stage 1	281	281	-	113	113	-	-	-	-	-	-	-
Stage 2	201	121	-	371	299	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.2	7.1	6.58	6.22	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.3	3.5	4.072	3.318	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	498	531	1005	496	521	940	1527	-	-	1467	-	-
Stage 1	730	671	-	897	790	-	-	-	-	-	-	-
Stage 2	805	788	-	653	656	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	374	490	1005	338	480	940	1527	-	-	1467	-	-
Mov Cap-2 Maneuver	374	490	-	338	480	-	-	-	-	-	-	-
Stage 1	730	619	-	897	790	-	-	-	-	-	-	-
Stage 2	653	788	-	431	605	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.4	11.7	0	4.3
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1527	-	-	449	717	1467	-	-
HCM Lane V/C Ratio	-	-	-	0.624	0.251	0.073	-	-
HCM Control Delay (s)	0	-	-	25.4	11.7	7.6	0	-
HCM Lane LOS	A	-	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	4.2	1	0.2	-	-

Intersection	
Int Delay, s/veh	18.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	250	22	29	142	12	37	91	40	61	121	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	27	4	0	0	2	5	0	2	7
Mvmt Flow	17	278	24	32	158	13	41	101	44	68	134	30

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	576	513	149	642	506	123	164	0	0	146	0	0
Stage 1	285	285	-	206	206	-	-	-	-	-	-	-
Stage 2	291	228	-	436	300	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.2	7.37	6.54	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.37	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.3	3.743	4.036	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	431	462	903	354	466	933	1427	-	-	1448	-	-
Stage 1	727	672	-	742	728	-	-	-	-	-	-	-
Stage 2	721	712	-	553	662	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	285	424	903	154	428	933	1427	-	-	1448	-	-
Mov Cap-2 Maneuver	285	424	-	154	428	-	-	-	-	-	-	-
Stage 1	704	637	-	719	705	-	-	-	-	-	-	-
Stage 2	535	690	-	288	628	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.6	29.7	1.7	2.2
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1427	-	-	431	343	1448	-	-
HCM Lane V/C Ratio	0.029	-	-	0.74	0.593	0.047	-	-
HCM Control Delay (s)	7.6	0	-	33.6	29.7	7.6	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	6	3.6	0.1	-	-

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	35	335	2	12	148	14	4	26	31	97	22	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	6	3	100	0	7	0	0	0	0	0	0	0
Mvmt Flow	39	372	2	13	164	16	4	29	34	108	24	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	180	0	0	374	0	0	682	658	373	682	651	172
Stage 1	-	-	-	-	-	-	451	451	-	199	199	-
Stage 2	-	-	-	-	-	-	231	207	-	483	452	-
Critical Hdwy	4.16	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1372	-	-	1196	-	-	367	387	678	367	390	877
Stage 1	-	-	-	-	-	-	592	574	-	807	740	-
Stage 2	-	-	-	-	-	-	776	734	-	569	574	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1372	-	-	1196	-	-	321	369	678	316	371	877
Mov Cap-2 Maneuver	-	-	-	-	-	-	321	369	-	316	371	-
Stage 1	-	-	-	-	-	-	571	553	-	778	731	-
Stage 2	-	-	-	-	-	-	708	725	-	493	553	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.6	13.9	22.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	474	1372	-	-	1196	-	-	379
HCM Lane V/C Ratio	0.143	0.028	-	-	0.011	-	-	0.451
HCM Control Delay (s)	13.9	7.7	0	-	8	0	-	22.1
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	2.3

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	34	53	0	2	44	11	0	58	11	12	31	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	48	48	48	57	57	57	71	71	71	59	59	59
Heavy Vehicles, %	5	7	0	0	12	0	0	3	0	0	0	0
Mvmt Flow	71	110	0	4	77	19	0	82	15	20	53	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	243	202	64	249	206	89	76	0	0	97	0	0
Stage 1	105	105	-	89	89	-	-	-	-	-	-	-
Stage 2	138	97	-	160	117	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.57	6.2	7.1	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.063	3.3	3.5	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	705	685	1006	709	673	975	1536	-	-	1509	-	-
Stage 1	893	799	-	923	802	-	-	-	-	-	-	-
Stage 2	858	805	-	847	780	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	623	675	1006	614	664	975	1536	-	-	1509	-	-
Mov Cap-2 Maneuver	623	675	-	614	664	-	-	-	-	-	-	-
Stage 1	893	788	-	923	802	-	-	-	-	-	-	-
Stage 2	760	805	-	718	769	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.6	10.9	0	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1536	-	-	654	705	1509	-	-
HCM Lane V/C Ratio	-	-	-	0.277	0.142	0.013	-	-
HCM Control Delay (s)	0	-	-	12.6	10.9	7.4	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.5	0	-	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	71	5	23	45	4	7	74	14	18	111	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	7	12	0	0	5	13	0	0	0
Mvmt Flow	4	79	6	26	50	4	8	82	16	20	123	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	299	279	126	314	274	90	128	0	0	98	0	0
Stage 1	166	166	-	106	106	-	-	-	-	-	-	-
Stage 2	133	113	-	208	168	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.17	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.563	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	657	624	930	629	617	973	1470	-	-	1508	-	-
Stage 1	841	755	-	888	789	-	-	-	-	-	-	-
Stage 2	875	796	-	783	741	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	603	612	930	555	605	973	1470	-	-	1508	-	-
Mov Cap-2 Maneuver	603	612	-	555	605	-	-	-	-	-	-	-
Stage 1	836	744	-	883	784	-	-	-	-	-	-	-
Stage 2	811	791	-	686	731	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.7	11.9	0.5	1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1470	-	-	625	600	1508	-	-
HCM Lane V/C Ratio	0.005	-	-	0.142	0.133	0.013	-	-
HCM Control Delay (s)	7.5	0	-	11.7	11.9	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.5	0	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	143	0	14	56	11	4	12	53	13	7	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	0	0	13	0	0	0	3	14	25	0
Mvmt Flow	2	159	0	16	62	12	4	13	59	14	8	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	74	0	0	159	0	0	271	269	159	298	262	68
Stage 1	-	-	-	-	-	-	163	163	-	99	99	-
Stage 2	-	-	-	-	-	-	108	106	-	199	163	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.24	6.75	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.626	4.225	3.3
Pot Cap-1 Maneuver	1538	-	-	1433	-	-	686	641	884	631	606	1001
Stage 1	-	-	-	-	-	-	844	767	-	879	771	-
Stage 2	-	-	-	-	-	-	902	811	-	776	722	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1538	-	-	1433	-	-	666	633	884	574	598	1001
Mov Cap-2 Maneuver	-	-	-	-	-	-	666	633	-	574	598	-
Stage 1	-	-	-	-	-	-	843	766	-	878	762	-
Stage 2	-	-	-	-	-	-	873	801	-	711	721	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	9.9	10.7
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	813	1538	-	-	1433	-	-	669
HCM Lane V/C Ratio	0.094	0.001	-	-	0.011	-	-	0.048
HCM Control Delay (s)	9.9	7.3	0	-	7.5	0	-	10.7
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	5.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	187	100	159	78	40	136
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	4	1	2	9	0
Mvmt Flow	208	111	177	87	44	151

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	319	0	703	263
Stage 1	-	-	-	-	263	-
Stage 2	-	-	-	-	440	-
Critical Hdwy	-	-	4.11	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.209	-	3.581	3.3
Pot Cap-1 Maneuver	-	-	1247	-	393	781
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	635	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1247	-	334	781
Mov Cap-2 Maneuver	-	-	-	-	334	-
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	540	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	599	-	-	1247	-
HCM Lane V/C Ratio	0.326	-	-	0.142	-
HCM Control Delay (s)	13.9	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.4	-	-	0.5	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	153	89	69	48	191	37	88	55	543	182	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1845	1462	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	7	170	99	77	53	212	41	98	61	603	202	9
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	3	30	0	0	0	0	0	0	0
Cap, veh/h	435	303	177	314	393	929	412	171	107	806	770	34
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.04	0.16	0.16	0.31	0.43	0.43
Sat Flow, veh/h	1132	1128	657	1095	1462	1615	1810	1097	683	1810	1805	80
Grp Volume(v), veh/h	7	0	269	77	53	212	41	0	159	603	0	211
Grp Sat Flow(s),veh/h/ln	1132	0	1784	1095	1462	1615	1810	0	1780	1810	0	1886
Q Serve(g_s), s	0.2	0.0	5.8	2.9	1.2	2.9	0.8	0.0	3.7	11.0	0.0	3.2
Cycle Q Clear(g_c), s	1.4	0.0	5.8	8.7	1.2	2.9	0.8	0.0	3.7	11.0	0.0	3.2
Prop In Lane	1.00		0.37	1.00		1.00	1.00		0.38	1.00		0.04
Lane Grp Cap(c), veh/h	435	0	480	314	393	929	412	0	278	806	0	804
V/C Ratio(X)	0.02	0.00	0.56	0.25	0.13	0.23	0.10	0.00	0.57	0.75	0.00	0.26
Avail Cap(c_a), veh/h	535	0	639	411	523	1073	509	0	637	901	0	1182
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.9	0.0	14.0	17.8	12.4	4.6	14.9	0.0	17.5	8.8	0.0	8.3
Incr Delay (d2), s/veh	0.0	0.0	1.0	0.4	0.2	0.1	0.1	0.0	1.8	3.1	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	3.0	0.9	0.5	1.3	0.4	0.0	2.0	5.9	0.0	1.7
LnGrp Delay(d),s/veh	12.9	0.0	15.1	18.2	12.5	4.8	15.0	0.0	19.3	11.9	0.0	8.4
LnGrp LOS	B		B	B	B	A	B		B	B		A
Approach Vol, veh/h		276			342			200			814	
Approach Delay, s/veh		15.0			9.0			18.4			11.0	
Approach LOS		B			A			B			B	

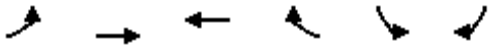
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	17.7	11.0		16.0	5.6	23.1		16.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	16.0	16.0		16.0	4.0	28.0		16.0
Max Q Clear Time (g_c+I1), s	13.0	5.7		7.8	2.8	5.2		10.7
Green Ext Time (p_c), s	0.7	1.3		1.8	0.0	1.8		1.3

Intersection Summary	
HCM 2010 Ctrl Delay	12.2
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	836	62	158	307	51	7	13	176	182	156	4
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1845	1776	1624	1712	1681	1429	1900	1681	1881	1823	1900
Adj Flow Rate, veh/h	0	929	69	176	341	57	8	14	196	202	173	4
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	3	7	17	11	13	33	0	13	1	2	2
Cap, veh/h	627	995	826	227	1123	1004	195	297	323	346	347	8
Arrive On Green	0.00	0.54	0.54	0.07	0.66	0.66	0.01	0.16	0.16	0.05	0.20	0.20
Sat Flow, veh/h	1810	1845	1509	1547	1712	1429	1361	1900	1429	1792	1775	41
Grp Volume(v), veh/h	0	929	69	176	341	57	8	14	196	202	0	177
Grp Sat Flow(s),veh/h/ln	1810	1845	1509	1547	1712	1429	1361	1900	1429	1792	0	1816
Q Serve(g_s), s	0.0	39.9	1.8	4.0	7.3	1.1	0.4	0.5	10.5	4.0	0.0	7.4
Cycle Q Clear(g_c), s	0.0	39.9	1.8	4.0	7.3	1.1	0.4	0.5	10.5	4.0	0.0	7.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.02
Lane Grp Cap(c), veh/h	627	995	826	227	1123	1004	195	297	323	346	0	355
V/C Ratio(X)	0.00	0.93	0.08	0.77	0.30	0.06	0.04	0.05	0.61	0.58	0.00	0.50
Avail Cap(c_a), veh/h	710	995	826	229	1123	1004	248	401	401	346	0	383
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	18.2	9.1	19.4	6.3	3.9	30.0	30.6	29.6	30.8	0.0	30.6
Incr Delay (d2), s/veh	0.0	16.4	0.2	15.1	0.7	0.1	0.1	0.1	1.8	2.5	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	24.7	0.8	3.3	3.6	0.4	0.2	0.3	4.3	2.7	0.0	3.8
LnGrp Delay(d),s/veh	0.0	34.6	9.3	34.5	7.0	4.0	30.1	30.6	31.4	33.4	0.0	31.7
LnGrp LOS		C	A	C	A	A	C	C	C	C		C
Approach Vol, veh/h		998			574			218			379	
Approach Delay, s/veh		32.9			15.1			31.3			32.6	
Approach LOS		C			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	17.3	9.9	50.0	4.7	20.7	0.0	59.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	4.0	18.0	6.0	46.0	4.0	18.0	4.0	48.0
Max Q Clear Time (g_c+I1), s	6.0	12.5	6.0	41.9	2.4	9.4	0.0	9.3
Green Ext Time (p_c), s	0.0	0.9	0.0	2.8	0.0	1.2	0.0	10.9

Intersection Summary	
HCM 2010 Ctrl Delay	28.0
HCM 2010 LOS	C



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	80	772	319	87	424	181
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1462	1863	1727	1557	1845	1792
Adj Flow Rate, veh/h	89	858	354	97	471	201
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	30	2	10	22	3	6
Cap, veh/h	450	1037	962	737	534	463
Arrive On Green	0.56	0.56	0.56	0.56	0.30	0.30
Sat Flow, veh/h	734	1863	1727	1324	1757	1524
Grp Volume(v), veh/h	89	858	354	97	471	201
Grp Sat Flow(s),veh/h/ln	734	1863	1727	1324	1757	1524
Q Serve(g_s), s	4.4	21.8	6.6	2.0	14.7	6.1
Cycle Q Clear(g_c), s	11.0	21.8	6.6	2.0	14.7	6.1
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	450	1037	962	737	534	463
V/C Ratio(X)	0.20	0.83	0.37	0.13	0.88	0.43
Avail Cap(c_a), veh/h	450	1037	962	737	611	530
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.2	10.5	7.1	6.1	19.0	16.0
Incr Delay (d2), s/veh	1.0	7.6	1.1	0.4	12.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	13.1	3.3	0.8	9.0	2.6
LnGrp Delay(d),s/veh	11.2	18.1	8.2	6.5	31.9	16.7
LnGrp LOS	B	B	A	A	C	B
Approach Vol, veh/h		947	451		672	
Approach Delay, s/veh		17.4	7.8		27.4	
Approach LOS		B	A		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				36.0		21.5		36.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				32.0		20.0		32.0
Max Q Clear Time (g_c+I1), s				23.8		16.7		8.6
Green Ext Time (p_c), s				5.0		0.8		9.4

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	732	210	120	370	55	113
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1696	1743	1827	1520
Adj Flow Rate, veh/h	813	233	133	411	61	126
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	12	9	4	25
Cap, veh/h	1306	1110	395	1222	220	164
Arrive On Green	0.70	0.70	0.70	0.70	0.13	0.13
Sat Flow, veh/h	1863	1583	489	1743	1740	1292
Grp Volume(v), veh/h	813	233	133	411	61	126
Grp Sat Flow(s),veh/h/ln	1863	1583	489	1743	1740	1292
Q Serve(g_s), s	10.1	2.2	8.6	4.0	1.4	4.1
Cycle Q Clear(g_c), s	10.1	2.2	18.7	4.0	1.4	4.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1306	1110	395	1222	220	164
V/C Ratio(X)	0.62	0.21	0.34	0.34	0.28	0.77
Avail Cap(c_a), veh/h	1306	1110	395	1222	280	208
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	3.5	2.3	8.4	2.5	17.2	18.4
Incr Delay (d2), s/veh	2.2	0.4	2.3	0.7	0.7	12.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.1	1.4	2.1	0.7	2.0
LnGrp Delay(d),s/veh	5.7	2.7	10.7	3.3	17.9	30.9
LnGrp LOS	A	A	B	A	B	C
Approach Vol, veh/h	1046			544	187	
Approach Delay, s/veh	5.0			5.1	26.7	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		9.5		34.0				34.0
Change Period (Y+Rc), s		4.0		3.5				3.5
Max Green Setting (Gmax), s		7.0		30.5				30.5
Max Q Clear Time (g_c+I1), s		6.1		12.1				20.7
Green Ext Time (p_c), s		0.0		9.7				6.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.3
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1241	164	93	566	32	292
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1792	1776	1881
Adj Flow Rate, veh/h	1379	182	103	629	36	324
Adj No. of Lanes	2	0	1	2	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	6	7	1
Cap, veh/h	1983	260	255	2146	372	352
Arrive On Green	0.63	0.63	0.63	0.63	0.22	0.22
Sat Flow, veh/h	3241	412	329	3495	1691	1599
Grp Volume(v), veh/h	770	791	103	629	36	324
Grp Sat Flow(s),veh/h/ln	1770	1790	329	1703	1691	1599
Q Serve(g_s), s	14.3	14.6	15.1	4.2	0.8	9.9
Cycle Q Clear(g_c), s	14.3	14.6	29.8	4.2	0.8	9.9
Prop In Lane		0.23	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1115	1128	255	2146	372	352
V/C Ratio(X)	0.69	0.70	0.40	0.29	0.10	0.92
Avail Cap(c_a), veh/h	1115	1128	255	2146	372	352
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.1	6.1	16.0	4.2	15.5	19.1
Incr Delay (d2), s/veh	3.5	3.6	4.7	0.3	0.1	28.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	8.2	1.7	2.0	0.4	7.1
LnGrp Delay(d),s/veh	9.6	9.8	20.7	4.5	15.7	47.9
LnGrp LOS	A	A	C	A	B	D
Approach Vol, veh/h	1561			732	360	
Approach Delay, s/veh	9.7			6.8	44.7	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		15.0		35.0				35.0
Change Period (Y+Rc), s		4.0		3.5				3.5
Max Green Setting (Gmax), s		11.0		31.5				31.5
Max Q Clear Time (g_c+I1), s		11.9		16.6				31.8
Green Ext Time (p_c), s		0.0		12.1				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	555	42	17	155	49	10	61	52	139	170	13
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1883	1900	1900	1844	1900	1583	1870	1900	1845	1900	1900
Adj Flow Rate, veh/h	29	617	47	19	172	54	11	68	58	154	189	14
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	1	1	0	4	4	20	3	3	3	0	0
Cap, veh/h	765	998	76	429	778	244	313	228	195	391	428	32
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1173	1728	132	784	1347	423	998	933	796	1247	1748	129
Grp Volume(v), veh/h	29	0	664	19	0	226	11	0	126	154	0	203
Grp Sat Flow(s),veh/h/ln	1173	0	1859	784	0	1769	998	0	1729	1247	0	1877
Q Serve(g_s), s	0.6	0.0	10.6	0.7	0.0	2.8	0.4	0.0	2.7	5.2	0.0	4.1
Cycle Q Clear(g_c), s	3.3	0.0	10.6	11.3	0.0	2.8	4.5	0.0	2.7	7.8	0.0	4.1
Prop In Lane	1.00		0.07	1.00		0.24	1.00		0.46	1.00		0.07
Lane Grp Cap(c), veh/h	765	0	1074	429	0	1022	313	0	423	391	0	459
V/C Ratio(X)	0.04	0.00	0.62	0.04	0.00	0.22	0.04	0.00	0.30	0.39	0.00	0.44
Avail Cap(c_a), veh/h	765	0	1074	429	0	1022	423	0	615	529	0	667
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	5.4	0.0	6.2	10.0	0.0	4.6	16.3	0.0	13.8	17.0	0.0	14.4
Incr Delay (d2), s/veh	0.1	0.0	2.7	0.2	0.0	0.5	0.0	0.0	0.4	0.6	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	6.1	0.2	0.0	1.5	0.1	0.0	1.3	1.8	0.0	2.2
LnGrp Delay(d),s/veh	5.5	0.0	8.9	10.2	0.0	5.1	16.4	0.0	14.2	17.7	0.0	15.1
LnGrp LOS	A		A	B		A	B		B	B		B
Approach Vol, veh/h		693			245			137			357	
Approach Delay, s/veh		8.8			5.5			14.4			16.2	
Approach LOS		A			A			B			B	

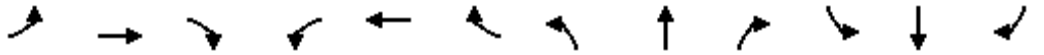
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		15.0		30.0		15.0		30.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		26.0		16.0		26.0
Max Q Clear Time (g_c+I1), s		6.5		12.6		9.8		13.3
Green Ext Time (p_c), s		1.6		4.5		1.2		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	10.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	65	607	12	10	414	30	6	42	44	139	73	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1867	1900	1900	1749	1900	1900	1768	1900	1900	1900	1900
Adj Flow Rate, veh/h	72	674	13	11	460	33	7	47	49	154	81	17
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	8	8	8	0	0	0	0	0	0
Cap, veh/h	141	1049	19	75	1032	73	80	165	157	292	115	22
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	104	1615	30	11	1590	112	41	814	776	909	566	107
Grp Volume(v), veh/h	759	0	0	504	0	0	103	0	0	252	0	0
Grp Sat Flow(s),veh/h/ln	1750	0	0	1713	0	0	1632	0	0	1581	0	0
Q Serve(g_s), s	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0
Cycle Q Clear(g_c), s	13.2	0.0	0.0	7.8	0.0	0.0	2.9	0.0	0.0	7.9	0.0	0.0
Prop In Lane	0.09		0.02	0.02		0.07	0.07		0.48	0.61		0.07
Lane Grp Cap(c), veh/h	1209	0	0	1180	0	0	402	0	0	428	0	0
V/C Ratio(X)	0.63	0.00	0.00	0.43	0.00	0.00	0.26	0.00	0.00	0.59	0.00	0.00
Avail Cap(c_a), veh/h	1209	0	0	1180	0	0	581	0	0	595	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.6	0.0	0.0	4.7	0.0	0.0	18.3	0.0	0.0	20.1	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.0	0.0	1.1	0.0	0.0	0.3	0.0	0.0	1.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	0.0	0.0	4.0	0.0	0.0	1.3	0.0	0.0	3.7	0.0	0.0
LnGrp Delay(d),s/veh	8.1	0.0	0.0	5.8	0.0	0.0	18.6	0.0	0.0	21.4	0.0	0.0
LnGrp LOS	A			A			B			C		
Approach Vol, veh/h		759			504			103			252	
Approach Delay, s/veh		8.1			5.8			18.6			21.4	
Approach LOS		A			A			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		14.9		39.0		14.9		39.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		17.0		35.0		17.0		35.0
Max Q Clear Time (g_c+I1), s		4.9		15.2		9.9		9.8
Green Ext Time (p_c), s		1.4		7.8		1.0		8.6

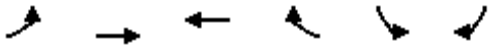
Intersection Summary	
HCM 2010 Ctrl Delay	10.1
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	157	404	85	102	219	30	14	98	76	15	85	92
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1856	1900	1900	1738	1900	1900	1884	1900	1900	1882	1900
Adj Flow Rate, veh/h	174	449	94	113	243	33	16	109	84	17	94	102
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	2	2	0	8	8	0	0	0	0	2	2
Cap, veh/h	498	596	125	304	599	81	569	395	305	574	331	359
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1121	1490	312	877	1499	204	1206	988	761	1209	827	897
Grp Volume(v), veh/h	174	0	543	113	0	276	16	0	193	17	0	196
Grp Sat Flow(s),veh/h/ln	1121	0	1801	877	0	1702	1206	0	1749	1209	0	1724
Q Serve(g_s), s	5.3	0.0	10.4	5.1	0.0	4.6	0.4	0.0	3.0	0.4	0.0	3.1
Cycle Q Clear(g_c), s	9.9	0.0	10.4	15.4	0.0	4.6	3.4	0.0	3.0	3.4	0.0	3.1
Prop In Lane	1.00		0.17	1.00		0.12	1.00		0.44	1.00		0.52
Lane Grp Cap(c), veh/h	498	0	721	304	0	681	569	0	700	574	0	689
V/C Ratio(X)	0.35	0.00	0.75	0.37	0.00	0.41	0.03	0.00	0.28	0.03	0.00	0.28
Avail Cap(c_a), veh/h	498	0	721	304	0	681	569	0	700	574	0	689
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.1	0.0	10.3	16.9	0.0	8.6	9.3	0.0	8.1	9.2	0.0	8.1
Incr Delay (d2), s/veh	0.4	0.0	4.5	0.8	0.0	0.4	0.1	0.0	1.0	0.1	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	5.9	1.3	0.0	2.2	0.1	0.0	1.6	0.1	0.0	1.6
LnGrp Delay(d),s/veh	12.6	0.0	14.8	17.7	0.0	9.0	9.4	0.0	9.1	9.3	0.0	9.2
LnGrp LOS	B		B	B		A	A		A	A		A
Approach Vol, veh/h		717			389			209			213	
Approach Delay, s/veh		14.3			11.5			9.1			9.2	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.0		20.0		20.0		20.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		16.0		16.0		16.0
Max Q Clear Time (g_c+I1), s		5.4		12.4		5.4		17.4
Green Ext Time (p_c), s		1.6		2.0		1.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.1
HCM 2010 LOS	B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	102	358	162	75	328	130
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1810	1827	1743	1881	1810
Adj Flow Rate, veh/h	113	398	180	83	364	144
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	6	5	4	9	1	5
Cap, veh/h	675	876	884	717	491	421
Arrive On Green	0.48	0.48	0.48	0.48	0.27	0.27
Sat Flow, veh/h	1070	1810	1827	1482	1792	1538
Grp Volume(v), veh/h	113	398	180	83	364	144
Grp Sat Flow(s),veh/h/ln	1070	1810	1827	1482	1792	1538
Q Serve(g_s), s	2.2	4.8	1.9	1.0	6.1	2.5
Cycle Q Clear(g_c), s	4.1	4.8	1.9	1.0	6.1	2.5
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	675	876	884	717	491	421
V/C Ratio(X)	0.17	0.45	0.20	0.12	0.74	0.34
Avail Cap(c_a), veh/h	675	876	884	717	867	745
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.1	5.6	4.9	4.7	10.9	9.6
Incr Delay (d2), s/veh	0.5	1.7	0.5	0.3	2.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	2.7	1.0	1.2	3.2	1.1
LnGrp Delay(d),s/veh	6.6	7.3	5.4	5.0	13.2	10.1
LnGrp LOS	A	A	A	A	B	B
Approach Vol, veh/h		511	263		508	
Approach Delay, s/veh		7.2	5.3		12.3	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				20.0		13.1		20.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				16.0		16.0		16.0
Max Q Clear Time (g_c+I1), s				6.8		8.1		3.9
Green Ext Time (p_c), s				2.7		1.0		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	8.8
HCM 2010 LOS	A

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	269	77	53	212	41	159	603	211
v/c Ratio	0.02	0.58	0.39	0.15	0.19	0.11	0.43	0.75	0.21
Control Delay	14.7	18.8	22.1	16.0	1.2	7.9	16.9	14.4	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	18.8	22.1	16.0	1.2	7.9	16.9	14.4	8.5
Queue Length 50th (ft)	1	53	18	12	0	4	26	83	21
Queue Length 95th (ft)	9	120	52	35	17	15	74	#222	80
Internal Link Dist (ft)		919		4037			5231		921
Turn Bay Length (ft)	250		250		250	250		250	
Base Capacity (vph)	494	677	302	526	1178	382	677	853	1195
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.40	0.25	0.10	0.18	0.11	0.23	0.71	0.18

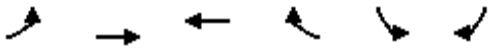
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	929	69	176	341	57	8	14	196	202	177
v/c Ratio	0.91	0.07	0.93	0.30	0.04	0.07	0.08	0.73	0.55	0.62
Control Delay	33.6	2.1	70.5	7.4	0.8	32.0	34.2	33.6	35.6	43.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	2.1	70.5	7.4	0.8	32.0	34.2	33.6	35.6	43.1
Queue Length 50th (ft)	435	0	50	69	0	4	7	48	92	89
Queue Length 95th (ft)	#776	16	#191	130	9	14	23	94	#174	154
Internal Link Dist (ft)	1084			924			5202			920
Turn Bay Length (ft)		250	250		250	250		250	250	
Base Capacity (vph)	1020	1004	189	1152	1350	122	411	267	365	394
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.07	0.93	0.30	0.04	0.07	0.03	0.73	0.55	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	89	858	354	97	471	201
v/c Ratio	0.22	0.84	0.37	0.13	0.86	0.33
Control Delay	9.2	21.8	9.4	2.3	36.2	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	21.8	9.4	2.3	36.2	4.3
Queue Length 50th (ft)	15	244	68	0	152	0
Queue Length 95th (ft)	39	#476	118	17	#297	37
Internal Link Dist (ft)		1579	867		5202	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	406	1022	947	770	600	654
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.84	0.37	0.13	0.79	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

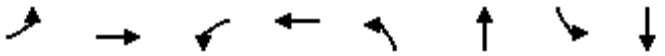
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	813	233	133	411	61	126
v/c Ratio	0.57	0.18	0.35	0.31	0.26	0.45
Control Delay	5.6	0.9	6.5	3.4	20.9	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	0.9	6.5	3.4	20.9	10.1
Queue Length 50th (ft)	86	0	11	32	16	0
Queue Length 95th (ft)	163	12	37	60	39	34
Internal Link Dist (ft)	884			1579	5173	
Turn Bay Length (ft)		250	250			250
Base Capacity (vph)	1426	1266	375	1334	248	292
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.18	0.35	0.31	0.25	0.43

Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1561	103	629	36	324
v/c Ratio	0.70	0.69	0.29	0.10	0.84
Control Delay	7.9	36.8	4.6	16.5	37.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	36.8	4.6	16.5	37.8
Queue Length 50th (ft)	123	16	35	8	74
Queue Length 95th (ft)	184	#94	54	26	#192
Internal Link Dist (ft)	2574		424	5188	
Turn Bay Length (ft)		250		250	250
Base Capacity (vph)	2231	150	2164	374	400
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.70	0.69	0.29	0.10	0.81

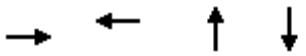
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



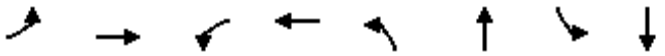
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	29	664	19	226	11	126	154	203
v/c Ratio	0.04	0.59	0.05	0.21	0.05	0.28	0.54	0.46
Control Delay	5.5	9.5	5.9	4.8	12.9	9.8	22.2	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.5	9.5	5.9	4.8	12.9	9.8	22.2	17.7
Queue Length 50th (ft)	3	88	2	18	2	14	34	42
Queue Length 95th (ft)	13	225	10	54	11	43	75	85
Internal Link Dist (ft)		1097		420		5201		5188
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	705	1124	355	1088	315	625	420	639
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.59	0.05	0.21	0.03	0.20	0.37	0.32

Intersection Summary



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	759	504	103	252
v/c Ratio	0.70	0.47	0.25	0.71
Control Delay	12.9	8.1	11.6	31.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.9	8.1	11.6	31.3
Queue Length 50th (ft)	156	80	14	76
Queue Length 95th (ft)	316	158	46	142
Internal Link Dist (ft)	5180	420	5199	5201
Turn Bay Length (ft)				
Base Capacity (vph)	1083	1081	495	432
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.70	0.47	0.21	0.58

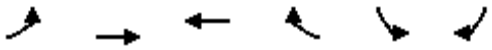
Intersection Summary



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	174	543	113	276	16	193	17	196
v/c Ratio	0.43	0.79	0.57	0.43	0.03	0.25	0.03	0.25
Control Delay	12.7	20.6	24.3	10.5	7.6	5.8	7.7	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	20.6	24.3	10.5	7.6	5.8	7.7	5.3
Queue Length 50th (ft)	26	90	18	38	2	15	2	12
Queue Length 95th (ft)	62	#220	#72	80	9	43	10	40
Internal Link Dist (ft)		420		5100		5198		5203
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	457	775	224	727	505	786	506	786
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.70	0.50	0.38	0.03	0.25	0.03	0.25

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	113	398	180	83	364	144
v/c Ratio	0.21	0.47	0.21	0.11	0.63	0.24
Control Delay	8.6	10.3	8.0	3.0	15.8	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	10.3	8.0	3.0	15.8	3.2
Queue Length 50th (ft)	12	50	20	0	57	0
Queue Length 95th (ft)	40	123	54	16	112	21
Internal Link Dist (ft)		1482	2578		5231	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	539	846	853	736	753	731
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.47	0.21	0.11	0.48	0.20

Intersection Summary

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	67	28	246	47	13	199
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	250	-	250	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	0	1
Mvmt Flow	74	31	273	52	14	221

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	523	273	0	0	273	0
Stage 1	273	-	-	-	-	-
Stage 2	250	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	518	771	-	-	1302	-
Stage 1	778	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	512	771	-	-	1302	-
Mov Cap-2 Maneuver	512	-	-	-	-	-
Stage 1	778	-	-	-	-	-
Stage 2	787	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.2	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	512	771	1302	-
HCM Lane V/C Ratio	-	-	0.145	0.04	0.011	-
HCM Control Delay (s)	-	-	13.2	9.9	7.8	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.5	0.1	0	-

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	31	39	4	16	82	56	2	35	7	35	53	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	50	0	0	0	0	0	0	0	0	0
Mvmt Flow	34	43	4	18	91	62	2	39	8	39	59	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	268	195	67	215	199	43	74	0	0	47	0	0
Stage 1	144	144	-	47	47	-	-	-	-	-	-	-
Stage 2	124	51	-	168	152	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.7	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.75	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	689	704	877	746	700	1033	1538	-	-	1573	-	-
Stage 1	864	782	-	972	860	-	-	-	-	-	-	-
Stage 2	885	856	-	839	775	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	569	685	877	692	681	1033	1538	-	-	1573	-	-
Mov Cap-2 Maneuver	569	685	-	692	681	-	-	-	-	-	-	-
Stage 1	863	762	-	971	859	-	-	-	-	-	-	-
Stage 2	743	855	-	767	755	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.5	10.9	0.3	2.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1538	-	-	638	779	1573	-	-
HCM Lane V/C Ratio	0.001	-	-	0.129	0.22	0.025	-	-
HCM Control Delay (s)	7.3	0	-	11.5	10.9	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.8	0.1	-	-

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	95	9	56	148	69	15	112	23	16	89	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	0	0	0	0	0	0	0	2	0
Mvmt Flow	14	106	10	62	164	77	17	124	26	18	99	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	425	317	99	363	305	137	99	0	0	150	0	0
Stage 1	134	134	-	171	171	-	-	-	-	-	-	-
Stage 2	291	183	-	192	134	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.52	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.018	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	543	599	962	597	612	917	1507	-	-	1444	-	-
Stage 1	874	785	-	836	761	-	-	-	-	-	-	-
Stage 2	721	748	-	814	789	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	385	584	962	499	597	917	1507	-	-	1444	-	-
Mov Cap-2 Maneuver	385	584	-	499	597	-	-	-	-	-	-	-
Stage 1	864	775	-	826	752	-	-	-	-	-	-	-
Stage 2	510	739	-	687	779	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.2	16	0.7	1.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1507	-	-	569	627	1444	-	-
HCM Lane V/C Ratio	0.011	-	-	0.228	0.484	0.012	-	-
HCM Control Delay (s)	7.4	0	-	13.2	16	7.5	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	2.6	0	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	140	6	23	296	83	2	35	6	14	47	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	33	0	0	0	0	0	0	0	4	0
Mvmt Flow	22	156	7	26	329	92	2	39	7	16	52	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	421	0	0	162	0	0	669	675	159	652	633	375
Stage 1	-	-	-	-	-	-	203	203	-	426	426	-
Stage 2	-	-	-	-	-	-	466	472	-	226	207	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1149	-	-	1429	-	-	374	378	892	384	394	676
Stage 1	-	-	-	-	-	-	804	737	-	610	582	-
Stage 2	-	-	-	-	-	-	581	562	-	781	727	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1149	-	-	1429	-	-	310	361	892	338	376	676
Mov Cap-2 Maneuver	-	-	-	-	-	-	310	361	-	338	376	-
Stage 1	-	-	-	-	-	-	787	722	-	597	568	-
Stage 2	-	-	-	-	-	-	495	549	-	718	712	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.4	15.5	16
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	390	1149	-	-	1429	-	-	421
HCM Lane V/C Ratio	0.123	0.019	-	-	0.018	-	-	0.224
HCM Control Delay (s)	15.5	8.2	0	-	7.6	0	-	16
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	40	2	9	58	5	0	39	5	0	60	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	9	0	0	6	0	0	0	0	0	0	17
Mvmt Flow	11	44	2	10	64	6	0	43	6	0	67	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	153	121	72	142	124	46	78	0	0	49	0	0
Stage 1	72	72	-	46	46	-	-	-	-	-	-	-
Stage 2	81	49	-	96	78	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.59	6.2	7.1	6.56	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.081	3.3	3.5	4.054	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	819	756	996	832	759	1029	1533	-	-	1571	-	-
Stage 1	943	821	-	973	849	-	-	-	-	-	-	-
Stage 2	932	840	-	916	822	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	762	756	996	793	759	1029	1533	-	-	1571	-	-
Mov Cap-2 Maneuver	762	756	-	793	759	-	-	-	-	-	-	-
Stage 1	943	821	-	973	849	-	-	-	-	-	-	-
Stage 2	857	840	-	864	822	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	10.2	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1533	-	-	764	777	1571	-	-
HCM Lane V/C Ratio	-	-	-	0.076	0.103	-	-	-
HCM Control Delay (s)	0	-	-	10.1	10.2	0	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	36	0	16	67	11	4	98	11	16	65	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	0	8	0	0	2	0	11	3	0
Mvmt Flow	12	40	0	18	74	12	4	109	12	18	72	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	277	240	74	254	236	115	77	0	0	121	0	0
Stage 1	110	110	-	124	124	-	-	-	-	-	-	-
Stage 2	167	130	-	130	112	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.58	6.2	4.1	-	-	4.21	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.072	3.3	2.2	-	-	2.299	-	-
Pot Cap-1 Maneuver	679	656	993	703	654	943	1535	-	-	1412	-	-
Stage 1	900	799	-	885	782	-	-	-	-	-	-	-
Stage 2	840	783	-	878	791	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	604	646	993	662	644	943	1535	-	-	1412	-	-
Mov Cap-2 Maneuver	604	646	-	662	644	-	-	-	-	-	-	-
Stage 1	897	789	-	882	780	-	-	-	-	-	-	-
Stage 2	748	781	-	823	781	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	11.3	0.3	1.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1535	-	-	636	672	1412	-	-
HCM Lane V/C Ratio	0.003	-	-	0.082	0.155	0.013	-	-
HCM Control Delay (s)	7.4	0	-	11.2	11.3	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.5	0	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	76	0	65	116	22	0	21	23	14	32	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	5	0	0	0	0	25	0	0
Mvmt Flow	2	84	0	72	129	24	0	23	26	16	36	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	153	0	0	84	0	0	395	387	84	399	375	141
Stage 1	-	-	-	-	-	-	89	89	-	286	286	-
Stage 2	-	-	-	-	-	-	306	298	-	113	89	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1440	-	-	1526	-	-	568	551	981	522	559	912
Stage 1	-	-	-	-	-	-	923	825	-	674	679	-
Stage 2	-	-	-	-	-	-	708	671	-	839	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1440	-	-	1526	-	-	514	522	981	471	529	912
Mov Cap-2 Maneuver	-	-	-	-	-	-	514	522	-	471	529	-
Stage 1	-	-	-	-	-	-	922	824	-	673	644	-
Stage 2	-	-	-	-	-	-	630	636	-	793	824	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.4	10.6	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	691	1440	-	-	1526	-	-	533
HCM Lane V/C Ratio	0.071	0.002	-	-	0.047	-	-	0.106
HCM Control Delay (s)	10.6	7.5	0	-	7.5	0	-	12.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.4

Intersection	
Int Delay, s/veh	7.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	110	51	161	187	74	198
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	2	0	0
Mvmt Flow	122	57	179	208	82	220

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	179	0	717	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	566	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1409	-	399	901
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	572	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1409	-	342	901
Mov Cap-2 Maneuver	-	-	-	-	342	-
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	490	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.7	16.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	624	-	-	1409	-
HCM Lane V/C Ratio	0.484	-	-	0.127	-
HCM Control Delay (s)	16.1	-	-	7.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.6	-	-	0.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	63	30	31	54	498	65	140	33	379	94	6
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1845	1845	1900	1900	1828	1900
Adj Flow Rate, veh/h	0	70	33	34	60	553	72	156	37	421	104	7
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	3	2	2	0	2	2
Cap, veh/h	158	430	203	568	668	923	459	238	56	633	563	38
Arrive On Green	0.00	0.35	0.35	0.35	0.35	0.35	0.05	0.16	0.16	0.22	0.33	0.33
Sat Flow, veh/h	822	1222	576	1312	1900	1615	1757	1443	342	1810	1694	114
Grp Volume(v), veh/h	0	0	103	34	60	553	72	0	193	421	0	111
Grp Sat Flow(s),veh/h/ln	822	0	1798	1312	1900	1615	1757	0	1785	1810	0	1808
Q Serve(g_s), s	0.0	0.0	1.8	0.8	1.0	10.2	1.5	0.0	4.6	7.9	0.0	2.0
Cycle Q Clear(g_c), s	0.0	0.0	1.8	2.6	1.0	10.2	1.5	0.0	4.6	7.9	0.0	2.0
Prop In Lane	1.00		0.32	1.00		1.00	1.00		0.19	1.00		0.06
Lane Grp Cap(c), veh/h	158	0	632	568	668	923	459	0	294	633	0	600
V/C Ratio(X)	0.00	0.00	0.16	0.06	0.09	0.60	0.16	0.00	0.66	0.67	0.00	0.18
Avail Cap(c_a), veh/h	158	0	632	568	668	923	521	0	628	672	0	914
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	10.1	11.0	9.9	6.4	14.5	0.0	17.8	10.4	0.0	10.8
Incr Delay (d2), s/veh	0.0	0.0	0.6	0.2	0.3	2.9	0.2	0.0	2.5	2.3	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	1.0	0.3	0.5	5.1	0.7	0.0	2.5	4.3	0.0	1.0
LnGrp Delay(d),s/veh	0.0	0.0	10.7	11.3	10.1	9.2	14.7	0.0	20.3	12.7	0.0	11.0
LnGrp LOS			B	B	B	A	B		C	B		B
Approach Vol, veh/h		103			647			265			532	
Approach Delay, s/veh		10.7			9.4			18.8			12.3	
Approach LOS		B			A			B			B	

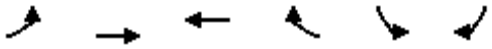
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.0	11.5		20.0	6.4	19.1		20.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	11.0	16.0		16.0	4.0	23.0		16.0
Max Q Clear Time (g_c+I1), s	9.9	6.6		3.8	3.5	4.0		12.2
Green Ext Time (p_c), s	0.2	1.0		2.4	0.0	1.3		1.2

Intersection Summary	
HCM 2010 Ctrl Delay	12.1
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	462	32	146	608	226	14	73	183	136	68	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	1863	1900	1810	1900	1900	1900	1900	1827	1881	1900	1900
Adj Flow Rate, veh/h	16	513	36	162	676	251	16	81	203	151	76	9
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	14	2	0	5	0	0	0	0	4	1	0	0
Cap, veh/h	231	696	629	390	837	833	388	320	390	414	379	45
Arrive On Green	0.02	0.37	0.37	0.08	0.44	0.44	0.02	0.17	0.17	0.08	0.23	0.23
Sat Flow, veh/h	1587	1863	1615	1723	1900	1615	1810	1900	1553	1792	1668	197
Grp Volume(v), veh/h	16	513	36	162	676	251	16	81	203	151	0	85
Grp Sat Flow(s),veh/h/ln	1587	1863	1615	1723	1900	1615	1810	1900	1553	1792	0	1865
Q Serve(g_s), s	0.3	12.7	0.7	2.8	16.5	4.8	0.4	2.0	6.0	3.6	0.0	2.0
Cycle Q Clear(g_c), s	0.3	12.7	0.7	2.8	16.5	4.8	0.4	2.0	6.0	3.6	0.0	2.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	231	696	629	390	837	833	388	320	390	414	0	424
V/C Ratio(X)	0.07	0.74	0.06	0.42	0.81	0.30	0.04	0.25	0.52	0.36	0.00	0.20
Avail Cap(c_a), veh/h	325	839	753	409	891	879	495	570	595	414	0	560
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	14.4	10.2	10.1	12.9	7.4	17.9	19.3	17.2	15.8	0.0	16.7
Incr Delay (d2), s/veh	0.1	2.8	0.0	0.7	5.3	0.2	0.0	0.4	1.1	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	6.9	0.3	1.4	9.7	2.1	0.2	1.1	2.7	1.8	0.0	1.0
LnGrp Delay(d),s/veh	11.8	17.2	10.2	10.8	18.2	7.6	17.9	19.7	18.3	16.4	0.0	16.9
LnGrp LOS	B	B	B	B	B	A	B	B	B	B		B
Approach Vol, veh/h		565			1089			300			236	
Approach Delay, s/veh		16.6			14.7			18.6			16.6	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	13.0	8.4	23.9	4.8	16.1	4.8	27.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	4.0	16.0	5.0	24.0	4.0	16.0	4.0	25.0
Max Q Clear Time (g_c+I1), s	5.6	8.0	4.8	14.7	2.4	4.0	2.3	18.5
Green Ext Time (p_c), s	0.0	1.0	0.0	5.2	0.0	1.2	0.0	4.0

Intersection Summary	
HCM 2010 Ctrl Delay	15.9
HCM 2010 LOS	B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	82	436	523	292	224	101
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1881	1881	1881	1597
Adj Flow Rate, veh/h	91	484	581	324	249	112
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	1	1	1	19
Cap, veh/h	437	1069	1090	927	358	271
Arrive On Green	0.58	0.58	0.58	0.58	0.20	0.20
Sat Flow, veh/h	608	1845	1881	1599	1792	1357
Grp Volume(v), veh/h	91	484	581	324	249	112
Grp Sat Flow(s),veh/h/ln	608	1845	1881	1599	1792	1357
Q Serve(g_s), s	3.9	5.4	6.8	3.9	4.7	2.6
Cycle Q Clear(g_c), s	10.7	5.4	6.8	3.9	4.7	2.6
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	437	1069	1090	927	358	271
V/C Ratio(X)	0.21	0.45	0.53	0.35	0.70	0.41
Avail Cap(c_a), veh/h	437	1069	1090	927	791	599
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.9	4.3	4.6	4.0	13.5	12.6
Incr Delay (d2), s/veh	1.1	1.4	1.9	1.0	2.4	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	3.1	4.0	1.9	2.5	1.0
LnGrp Delay(d),s/veh	9.0	5.7	6.5	5.1	15.9	13.7
LnGrp LOS	A	A	A	A	B	B
Approach Vol, veh/h		575	905		361	
Approach Delay, s/veh		6.2	6.0		15.2	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				25.0		11.2		25.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				21.0		16.0		21.0
Max Q Clear Time (g_c+I1), s				12.7		6.7		8.8
Green Ext Time (p_c), s				4.9		0.8		6.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.9
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	401	114	117	507	187	117
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1610	1881	1900	1759
Adj Flow Rate, veh/h	446	127	130	563	208	130
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	18	1	0	8
Cap, veh/h	1117	950	548	1128	311	257
Arrive On Green	0.60	0.60	0.60	0.60	0.17	0.17
Sat Flow, veh/h	1863	1583	723	1881	1810	1495
Grp Volume(v), veh/h	446	127	130	563	208	130
Grp Sat Flow(s),veh/h/ln	1863	1583	723	1881	1810	1495
Q Serve(g_s), s	4.4	1.2	4.0	6.0	3.8	2.8
Cycle Q Clear(g_c), s	4.4	1.2	8.5	6.0	3.8	2.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1117	950	548	1128	311	257
V/C Ratio(X)	0.40	0.13	0.24	0.50	0.67	0.51
Avail Cap(c_a), veh/h	1117	950	548	1128	569	470
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	3.7	3.0	5.9	4.0	13.6	13.2
Incr Delay (d2), s/veh	1.1	0.3	1.0	1.6	2.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.6	0.9	3.5	2.1	1.2
LnGrp Delay(d),s/veh	4.8	3.3	6.9	5.6	16.1	14.7
LnGrp LOS	A	A	A	A	B	B
Approach Vol, veh/h	573			693	338	
Approach Delay, s/veh	4.4			5.8	15.5	
Approach LOS	A			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		10.0		25.0				25.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		11.0		21.0				21.0
Max Q Clear Time (g_c+I1), s		5.8		6.4				10.5
Green Ext Time (p_c), s		0.5		6.2				5.1

Intersection Summary	
HCM 2010 Ctrl Delay	7.4
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	665	75	223	868	121	112
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1861	1900	1900	1881	1900	1845
Adj Flow Rate, veh/h	739	83	248	964	134	124
Adj No. of Lanes	2	0	1	2	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	0	1	0	3
Cap, veh/h	2290	257	577	2553	213	184
Arrive On Green	0.71	0.71	0.71	0.71	0.12	0.12
Sat Flow, veh/h	3298	360	676	3668	1810	1568
Grp Volume(v), veh/h	407	415	248	964	134	124
Grp Sat Flow(s),veh/h/ln	1768	1797	676	1787	1810	1568
Q Serve(g_s), s	4.1	4.1	10.2	5.0	3.4	3.6
Cycle Q Clear(g_c), s	4.1	4.1	14.3	5.0	3.4	3.6
Prop In Lane		0.20	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1263	1284	577	2553	213	184
V/C Ratio(X)	0.32	0.32	0.43	0.38	0.63	0.67
Avail Cap(c_a), veh/h	1263	1284	577	2553	304	264
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	2.5	2.5	5.2	2.7	20.0	20.1
Incr Delay (d2), s/veh	0.7	0.7	2.3	0.4	3.1	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	2.2	2.2	2.6	1.9	1.8
LnGrp Delay(d),s/veh	3.2	3.2	7.5	3.1	23.1	24.3
LnGrp LOS	A	A	A	A	C	C
Approach Vol, veh/h	822			1212	258	
Approach Delay, s/veh	3.2			4.0	23.7	
Approach LOS	A			A	C	

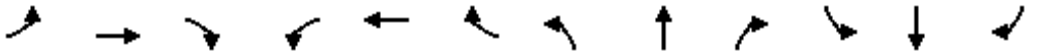
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		9.6		38.0				38.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		8.0		34.0				34.0
Max Q Clear Time (g_c+I1), s		5.6		6.1				16.3
Green Ext Time (p_c), s		0.2		15.8				11.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.9
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	217	25	56	413	95	46	119	50	54	88	22
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1883	1900	1900	1878	1900	1900	1887	1900	1827	1900	1900
Adj Flow Rate, veh/h	14	241	28	62	459	106	51	132	56	60	98	24
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	1	1	0	1	1	0	1	1	4	0	0
Cap, veh/h	476	843	98	709	752	174	464	298	126	401	349	85
Arrive On Green	0.51	0.51	0.51	0.51	0.51	0.51	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	859	1657	192	1128	1477	341	1289	1259	534	1168	1475	361
Grp Volume(v), veh/h	14	0	269	62	0	565	51	0	188	60	0	122
Grp Sat Flow(s),veh/h/ln	859	0	1849	1128	0	1818	1289	0	1793	1168	0	1836
Q Serve(g_s), s	0.4	0.0	2.6	1.1	0.0	7.0	1.1	0.0	2.8	1.5	0.0	1.7
Cycle Q Clear(g_c), s	7.3	0.0	2.6	3.7	0.0	7.0	2.8	0.0	2.8	4.3	0.0	1.7
Prop In Lane	1.00		0.10	1.00		0.19	1.00		0.30	1.00		0.20
Lane Grp Cap(c), veh/h	476	0	941	709	0	925	464	0	424	401	0	434
V/C Ratio(X)	0.03	0.00	0.29	0.09	0.00	0.61	0.11	0.00	0.44	0.15	0.00	0.28
Avail Cap(c_a), veh/h	476	0	941	709	0	925	815	0	912	719	0	935
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.1	0.0	4.4	5.5	0.0	5.5	10.9	0.0	10.2	12.1	0.0	9.8
Incr Delay (d2), s/veh	0.1	0.0	0.8	0.2	0.0	3.0	0.1	0.0	0.7	0.2	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	1.5	0.4	0.0	4.2	0.4	0.0	1.4	0.5	0.0	0.9
LnGrp Delay(d),s/veh	8.2	0.0	5.2	5.7	0.0	8.5	11.0	0.0	11.0	12.2	0.0	10.2
LnGrp LOS	A		A	A		A	B		B	B		B
Approach Vol, veh/h		283			627			239			182	
Approach Delay, s/veh		5.3			8.2			11.0			10.8	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		11.4		20.0		11.4		20.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		16.0		16.0		16.0
Max Q Clear Time (g_c+I1), s		4.8		9.3		6.3		9.0
Green Ext Time (p_c), s		1.5		2.8		1.4		2.9

Intersection Summary	
HCM 2010 Ctrl Delay	8.5
HCM 2010 LOS	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	48	501	4	27	662	86	4	84	79	56	69	36
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1877	1900	1900	1837	1900	1900	1900	1900
Adj Flow Rate, veh/h	53	557	4	30	736	96	4	93	88	62	77	40
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	383	1239	9	575	1070	140	313	171	162	254	232	120
Arrive On Green	0.66	0.66	0.66	0.66	0.66	0.66	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	670	1884	14	862	1627	212	1295	870	823	1222	1179	613
Grp Volume(v), veh/h	53	0	561	30	0	832	4	0	181	62	0	117
Grp Sat Flow(s),veh/h/ln	670	0	1898	862	0	1839	1295	0	1692	1222	0	1792
Q Serve(g_s), s	2.9	0.0	7.9	1.0	0.0	15.5	0.1	0.0	5.3	2.6	0.0	3.1
Cycle Q Clear(g_c), s	18.4	0.0	7.9	8.8	0.0	15.5	3.2	0.0	5.3	7.9	0.0	3.1
Prop In Lane	1.00		0.01	1.00		0.12	1.00		0.49	1.00		0.34
Lane Grp Cap(c), veh/h	383	0	1248	575	0	1210	313	0	332	254	0	352
V/C Ratio(X)	0.14	0.00	0.45	0.05	0.00	0.69	0.01	0.00	0.54	0.24	0.00	0.33
Avail Cap(c_a), veh/h	383	0	1248	575	0	1210	437	0	495	371	0	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	4.6	6.7	0.0	5.9	20.3	0.0	19.8	23.4	0.0	18.9
Incr Delay (d2), s/veh	0.8	0.0	1.2	0.2	0.0	3.2	0.0	0.0	1.4	0.5	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	4.5	0.3	0.0	8.7	0.1	0.0	2.6	0.9	0.0	1.6
LnGrp Delay(d),s/veh	12.4	0.0	5.7	6.9	0.0	9.1	20.3	0.0	21.2	23.8	0.0	19.5
LnGrp LOS	B		A	A		A	C		C	C		B
Approach Vol, veh/h		614			862			185			179	
Approach Delay, s/veh		6.3			9.0			21.2			21.0	
Approach LOS		A			A			C			C	

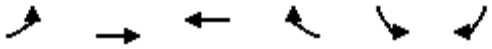
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		14.7		40.0		14.7		40.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		36.0		16.0		36.0
Max Q Clear Time (g_c+I1), s		7.3		20.4		9.9		17.5
Green Ext Time (p_c), s		1.1		8.0		0.9		8.9

Intersection Summary	
HCM 2010 Ctrl Delay	10.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	127	333	18	45	430	56	11	83	50	22	69	161
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1877	1900	1900	1900	1900	1900	1887	1900
Adj Flow Rate, veh/h	141	370	20	50	478	62	12	92	56	24	77	179
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	505	969	52	622	884	115	314	266	162	411	121	282
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	879	1786	97	1010	1628	211	1141	1107	674	1259	505	1174
Grp Volume(v), veh/h	141	0	390	50	0	540	12	0	148	24	0	256
Grp Sat Flow(s),veh/h/ln	879	0	1883	1010	0	1840	1141	0	1781	1259	0	1680
Q Serve(g_s), s	4.6	0.0	4.4	1.1	0.0	7.0	0.4	0.0	2.5	0.6	0.0	5.0
Cycle Q Clear(g_c), s	11.6	0.0	4.4	5.5	0.0	7.0	5.4	0.0	2.5	3.1	0.0	5.0
Prop In Lane	1.00		0.05	1.00		0.11	1.00		0.38	1.00		0.70
Lane Grp Cap(c), veh/h	505	0	1022	622	0	998	314	0	428	411	0	404
V/C Ratio(X)	0.28	0.00	0.38	0.08	0.00	0.54	0.04	0.00	0.35	0.06	0.00	0.63
Avail Cap(c_a), veh/h	505	0	1022	622	0	998	566	0	821	689	0	775
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	4.9	6.5	0.0	5.5	15.0	0.0	11.6	12.9	0.0	12.5
Incr Delay (d2), s/veh	1.4	0.0	1.1	0.3	0.0	2.1	0.0	0.0	0.5	0.1	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	2.6	0.3	0.0	4.0	0.1	0.0	1.3	0.2	0.0	2.5
LnGrp Delay(d),s/veh	10.6	0.0	5.9	6.7	0.0	7.6	15.0	0.0	12.1	13.0	0.0	14.2
LnGrp LOS	B		A	A		A	B		B	B		B
Approach Vol, veh/h		531			590			160			280	
Approach Delay, s/veh		7.2			7.5			12.3			14.1	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		12.9		24.0		12.9		24.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		17.0		20.0		17.0		20.0
Max Q Clear Time (g_c+I1), s		7.4		13.6		7.0		9.0
Green Ext Time (p_c), s		1.6		3.2		1.6		4.6

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	109	248	297	202	159	102
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1881	1900	1845	1863
Adj Flow Rate, veh/h	121	276	330	224	177	113
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	1	0	3	2
Cap, veh/h	654	1102	1113	955	280	252
Arrive On Green	0.59	0.59	0.59	0.59	0.16	0.16
Sat Flow, veh/h	851	1863	1881	1615	1757	1583
Grp Volume(v), veh/h	121	276	330	224	177	113
Grp Sat Flow(s),veh/h/ln	851	1863	1881	1615	1757	1583
Q Serve(g_s), s	2.6	2.3	2.8	2.1	3.0	2.1
Cycle Q Clear(g_c), s	5.4	2.3	2.8	2.1	3.0	2.1
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	654	1102	1113	955	280	252
V/C Ratio(X)	0.19	0.25	0.30	0.23	0.63	0.45
Avail Cap(c_a), veh/h	654	1102	1113	955	711	641
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	4.6	3.1	3.2	3.1	12.6	12.2
Incr Delay (d2), s/veh	0.6	0.5	0.7	0.6	2.4	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.3	1.6	3.0	1.6	1.0
LnGrp Delay(d),s/veh	5.2	3.7	3.9	3.7	15.0	13.5
LnGrp LOS	A	A	A	A	B	B
Approach Vol, veh/h		397	554		290	
Approach Delay, s/veh		4.2	3.8		14.4	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				23.0		9.1		23.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				19.0		13.0		19.0
Max Q Clear Time (g_c+I1), s				7.4		5.0		4.8
Green Ext Time (p_c), s				3.7		0.5		4.0

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

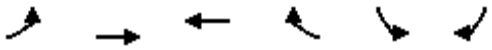
Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	103	34	60	553	72	193	421	111
v/c Ratio	0.16	0.07	0.09	0.43	0.19	0.49	0.71	0.16
Control Delay	10.3	13.3	13.1	1.8	8.5	19.5	15.1	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	13.3	13.1	1.8	8.5	19.5	15.1	10.5
Queue Length 50th (ft)	14	7	12	1	9	43	69	20
Queue Length 95th (ft)	44	24	35	32	23	90	121	46
Internal Link Dist (ft)	919		4467			5231		921
Turn Bay Length (ft)		250		250	250		250	
Base Capacity (vph)	662	464	673	1280	376	649	623	928
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.07	0.09	0.43	0.19	0.30	0.68	0.12

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	16	513	36	162	676	251	16	81	203	151	85
v/c Ratio	0.06	0.76	0.04	0.47	0.70	0.22	0.05	0.29	0.32	0.44	0.20
Control Delay	6.4	22.9	0.5	11.2	16.6	1.4	14.8	23.8	4.3	20.6	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	22.9	0.5	11.2	16.6	1.4	14.8	23.8	4.3	20.6	20.1
Queue Length 50th (ft)	2	131	0	22	129	0	3	23	0	35	21
Queue Length 95th (ft)	9	241	3	50	#391	25	15	58	38	80	57
Internal Link Dist (ft)		654			924			5202			920
Turn Bay Length (ft)	250		250	250		250	250		250	250	
Base Capacity (vph)	261	874	877	342	1006	1161	339	594	641	343	591
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.59	0.04	0.47	0.67	0.22	0.05	0.14	0.32	0.44	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	91	484	581	324	249	112
v/c Ratio	0.22	0.43	0.50	0.29	0.53	0.26
Control Delay	8.1	8.0	8.9	1.9	16.8	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	8.0	8.9	1.9	16.8	4.6
Queue Length 50th (ft)	9	57	73	0	46	0
Queue Length 95th (ft)	37	146	186	29	92	23
Internal Link Dist (ft)		1579	2667		5202	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	417	1135	1157	1108	700	600
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.43	0.50	0.29	0.36	0.19

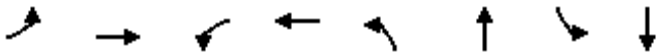
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	446	127	130	563	208	130
v/c Ratio	0.38	0.12	0.26	0.47	0.50	0.29
Control Delay	6.4	1.7	7.2	7.4	17.1	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	1.7	7.2	7.4	17.1	5.1
Queue Length 50th (ft)	47	0	13	65	38	0
Queue Length 95th (ft)	101	15	39	137	80	26
Internal Link Dist (ft)	884			1579	5173	
Turn Bay Length (ft)		250	250			250
Base Capacity (vph)	1187	1054	491	1198	500	508
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.12	0.26	0.47	0.42	0.26

Intersection Summary

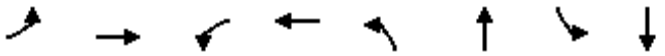
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	822	248	964	134	124
v/c Ratio	0.31	0.52	0.36	0.51	0.37
Control Delay	3.1	9.0	3.5	27.2	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	3.1	9.0	3.5	27.2	8.3
Queue Length 50th (ft)	36	28	48	36	0
Queue Length 95th (ft)	54	86	71	78	35
Internal Link Dist (ft)	774		424	5188	
Turn Bay Length (ft)		250			250
Base Capacity (vph)	2632	481	2688	278	346
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.31	0.52	0.36	0.48	0.36

Intersection Summary



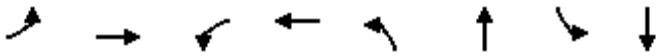
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	14	269	62	565	51	188	60	122
v/c Ratio	0.03	0.24	0.09	0.51	0.17	0.40	0.22	0.27
Control Delay	5.2	5.4	5.4	7.6	10.5	9.9	11.4	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	5.4	5.4	7.6	10.5	9.9	11.4	9.5
Queue Length 50th (ft)	1	20	4	50	7	18	8	13
Queue Length 95th (ft)	6	54	18	132	21	46	24	35
Internal Link Dist (ft)		837		420		5201		5188
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	439	1114	675	1105	623	900	564	903
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.24	0.09	0.51	0.08	0.21	0.11	0.14

Intersection Summary



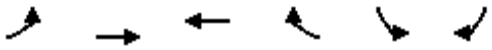
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	53	561	30	832	4	181	62	117
v/c Ratio	0.14	0.40	0.05	0.61	0.02	0.53	0.37	0.35
Control Delay	5.0	5.2	3.9	7.7	17.8	17.7	25.7	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	5.2	3.9	7.7	17.8	17.7	25.7	16.6
Queue Length 50th (ft)	4	59	2	108	1	29	17	21
Queue Length 95th (ft)	19	143	11	276	7	75	46	57
Internal Link Dist (ft)		5180		420		5199		5201
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	371	1398	583	1364	383	558	302	561
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.40	0.05	0.61	0.01	0.32	0.21	0.21

Intersection Summary



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	390	50	540	12	148	24	256
v/c Ratio	0.31	0.35	0.09	0.50	0.06	0.36	0.09	0.52
Control Delay	7.6	5.9	5.0	7.3	11.3	10.3	11.5	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	5.9	5.0	7.3	11.3	10.3	11.5	8.6
Queue Length 50th (ft)	11	31	3	47	2	15	4	12
Queue Length 95th (ft)	46	89	16	135	10	44	15	51
Internal Link Dist (ft)		420		5100		5198		5188
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	449	1104	578	1085	437	826	559	849
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.35	0.09	0.50	0.03	0.18	0.04	0.30

Intersection Summary



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	121	276	330	224	177	113
v/c Ratio	0.19	0.24	0.28	0.20	0.43	0.25
Control Delay	6.3	5.8	6.0	1.7	14.9	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.3	5.8	6.0	1.7	14.9	4.4
Queue Length 50th (ft)	10	24	30	0	29	0
Queue Length 95th (ft)	36	65	79	22	63	22
Internal Link Dist (ft)		1482	2578		5231	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	653	1165	1176	1094	598	614
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.24	0.28	0.20	0.30	0.18

Intersection Summary

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	Yield	117	191	131	131	751	1062	1000	0.1116	0.1937
2	62nd	None	733		154		285	1044		0.7208	
3	Rimrock	None	248		794		93	606		0.4209	
4	62nd	None	180		702		340	749		0.2459	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	Yield	3.62	4.40	4.10	0.35	0.71	A	A	A
2	62nd	None	10.09		10.09	7.13		B		B
3	Rimrock	None	8.21		8.21	1.92		A		A
4	62nd	None	5.93		5.93	0.96		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	Yield	85	498	205	205	475	1092	996	0.0788	0.5103
2	62nd	None	479		150		638	1095		0.4450	
3	Rimrock	None	93		504		125	846		0.1118	
4	62nd	None	238		442		155	973		0.2489	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	Yield	3.51	7.15	6.62	0.25	3.21	A	A	A
2	62nd	None	5.59		5.59	2.35		A		A
3	Rimrock	None	4.46		4.46	0.36		A		A
4	62nd	None	4.85		4.85	1.01		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	Yield	465	51	20	20	1194	1120	1058	0.4214	0.0488
2	54th	None	342		472		64	879		0.3971	
3	Rimrock	None	898		496		318	1456		0.6284	
4	54th	None	196		1018		376	745		0.2693	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	Yield	5.09	3.54	4.94	2.05	0.15	A	A	A
2	54th	None	6.22		6.22	1.92		A		A
3	Rimrock	None	5.21		5.21	4.49		A		A
4	54th	None	6.14		6.14	1.09		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	Yield	754	226	101	101	781	1147	1049	0.6731	0.2184
2	54th	None	212		768		313	769		0.2821	
3	Rimrock	None	508		350		630	1821		0.2823	
4	54th	None	270		612		246	987		0.2782	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	Yield	8.89	4.32	7.84	6.34	0.83	A	A	A
2	54th	None	6.24		6.24	1.21		A		A
3	Rimrock	None	2.70		2.70	1.19		A		A
4	54th	None	4.96		4.96	1.17		A		A

Operational Results

2017 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	62nd St West	None	458		162		177	1021		0.4609	
2	Grand Avenue	None	460		328		292	936		0.5081	
3	Grand Avenue	None	237		102		686	1053		0.2304	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	62nd St West	None	5.90		5.90	2.41		A		A
2	Grand Avenue	None	7.01		7.01	2.95		A		A
3	Grand Avenue	None	4.13		4.13	0.84		A		A

Operational Results

2017 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	62nd St West	None	261		297		311	952		0.2819	
2	Grand Avenue	None	357		159		399	1023		0.3580	
3	Grand Avenue	None	499		109		407	1049		0.4889	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	62nd St West	None	4.88		4.88	1.12		A		A
2	Grand Avenue	None	5.03		5.03	1.57		A		A
3	Grand Avenue	None	6.02		6.02	2.68		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th Street West	None	168		732		330	727		0.2410	
2	Grand Avenue	None	490		55		845	1077		0.4669	
3	Grand Avenue	Yield	732	210	120	120	425	1043	994	0.7282	0.2164

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th Street West	None	6.12		6.12	0.94		A		A
2	Grand Avenue	None	5.65		5.65	2.44		A		A
3	Grand Avenue	Yield	10.42	4.58	9.12	7.29	0.82	B	A	A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th Street West	None	304		401		231	898		0.3494	
2	Grand Avenue	None	624		187		518	1009		0.6400	
3	Grand Avenue	Yield	401	114	117	117	694	1045	996	0.3937	0.1171

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th Street West	None	5.67		5.67	1.54		A		A
2	Grand Avenue	None	8.54		8.54	4.97		A		A
3	Grand Avenue	Yield	5.18	4.06	4.94	1.82	0.39	A	A	A

Operational Results

2017 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	54th St West	None	605		319		167	996		0.6287	
2	Grand Avenue	None	852		424		500	1611		0.5453	
3	Grand Avenue	None	406		80		1196	2100		0.1971	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	54th St West	None	8.42		8.42	4.76		A		A
2	Grand Avenue	None	4.89		4.89	3.92		A		A
3	Grand Avenue	None	2.54		2.54	0.88		A		A

Operational Results

2017 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	54th St West	None	325		523		374	925		0.3619	
2	Grand Avenue	None	518		224		624	1811		0.2926	
3	Grand Avenue	None	815		82		660	2098		0.3973	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	54th St West	None	5.60		5.60	1.62		A		A
2	Grand Avenue	None	3.10		3.10	1.40		A		A
3	Grand Avenue	None	4.05		4.05	2.85		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	48th Street West	None	324		1241		257	658		0.5219	
2	Grand Avenue	None	659		32		1533	2002		0.3356	
3	Grand Avenue	None	1405		93		598	2087		0.6909	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	48th Street West	None	10.42		10.42	3.39		B		B
2	Grand Avenue	None	2.91		2.91	1.65		A		A
3	Grand Avenue	None	5.44		5.44	7.17		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	48th Street West	None	233		665		298	865		0.2780	
2	Grand Avenue	None	1091		121		777	1913		0.5848	
3	Grand Avenue	None	740		223		989	1953		0.3875	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	48th Street West	None	5.35		5.35	1.11		A		A
2	Grand Avenue	None	5.04		5.04	4.98		A		A
3	Grand Avenue	None	3.08		3.08	2.01		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th	None	330		216		123	1017		0.3296	
2	Central	None	199		400		146	916		0.2208	
3	56th	None	172		309		290	822		0.2126	
4	Central	None	243		96		385	1066		0.2310	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th	None	4.90		4.90	1.40		A		A
2	Central	None	4.72		4.72	0.81		A		A
3	56th	None	4.72		4.72	0.69		A		A
4	Central	None	4.10		4.10	0.84		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th	None	299		260		307	1062		0.2859	
2	Central	None	116		377		182	975		0.1207	
3	56th	None	245		327		166	935		0.2662	
4	Central	None	394		173		399	1120		0.3574	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th	None	4.62		4.62	1.19		A		A
2	Central	None	4.06		4.06	0.40		A		A
3	56th	None	4.80		4.80	1.02		A		A
4	Central	None	4.90		4.90	1.68		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Central	None	221		97		746	1079		0.2076	
2	48th	None	322		182		136	1030		0.3175	
3	Central	None	623		326		178	814		0.7899	
4	48th	None	123		720		229	721		0.1744	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Central	None	3.96		3.96	0.74		A		A
2	48th	None	4.74		4.74	1.32		A		A
3	Central	None	12.15		12.15	7.53		B		B
4	48th	None	5.66		5.66	0.63		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Central	None	564		178		321	1106		0.5197	
2	48th	None	164		515		227	902		0.1849	
3	Central	None	255		198		481	999		0.2591	
4	48th	None	215		284		169	1057		0.2064	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Central	None	6.47		6.47	3.29		A		A
2	48th	None	4.71		4.71	0.67		A		A
3	Central	None	4.46		4.46	0.97		A		A
4	48th	None	4.23		4.23	0.78		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	King	None	351		269		495	983		0.3632	
2	64th	None	192		335		285	950		0.2052	
3	King	None	646		202		325	870		0.7640	
4	64th	None	188		576		272	797		0.2408	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	King	None	5.32		5.32	1.63		A		A
2	64th	None	4.47		4.47	0.74		A		A
3	King	None	10.68		10.68	6.63		B		B
4	64th	None	5.54		5.54	0.93		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	King	None	531		221		405	1080		0.5013	
2	64th	None	252		486		266	918		0.2797	
3	King	None	478		136		602	1029		0.4725	
4	64th	None	144		482		132	943		0.1553	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	King	None	6.40		6.40	3.06		A		A
2	64th	None	5.21		5.21	1.16		A		A
3	King	None	5.86		5.86	2.47		A		A
4	64th	None	4.46		4.46	0.56		A		A

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	58	25	202	107	45	262
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	3	0	0	1
Mvmt Flow	64	28	224	119	50	291

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	675	284	0	0	343	0
Stage 1	284	-	-	-	-	-
Stage 2	391	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	422	760	-	-	1227	-
Stage 1	769	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	401	760	-	-	1227	-
Mov Cap-2 Maneuver	401	-	-	-	-	-
Stage 1	769	-	-	-	-	-
Stage 2	654	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.6	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	468	1227	-
HCM Lane V/C Ratio	-	-	0.197	0.041	-
HCM Control Delay (s)	-	-	14.6	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	23.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	105	186	10	4	54	136	0	112	17	116	50	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	6	0	0	8	2	0	6	0	2	0	0
Mvmt Flow	117	207	11	4	60	151	0	124	19	129	56	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	574	478	77	578	491	134	99	0	0	143	0	0
Stage 1	335	335	-	134	134	-	-	-	-	-	-	-
Stage 2	239	143	-	444	357	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.2	7.1	6.58	6.22	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.3	3.5	4.072	3.318	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	433	481	990	430	470	915	1507	-	-	1440	-	-
Stage 1	683	635	-	874	774	-	-	-	-	-	-	-
Stage 2	769	771	-	597	618	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	299	435	990	249	425	915	1507	-	-	1440	-	-
Mov Cap-2 Maneuver	299	435	-	249	425	-	-	-	-	-	-	-
Stage 1	683	575	-	874	774	-	-	-	-	-	-	-
Stage 2	592	771	-	342	559	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	53.5	13	0	4.4
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1507	-	-	382	665	1440	-	-
HCM Lane V/C Ratio	-	-	-	0.876	0.324	0.09	-	-
HCM Control Delay (s)	0	-	-	53.5	13	7.7	0	-
HCM Lane LOS	A	-	-	F	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	8.6	1.4	0.3	-	-

Intersection	
Int Delay, s/veh	10.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	43	413	2	14	183	17	5	31	37	118	27	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	6	3	100	0	7	0	0	0	0	0	0	0
Mvmt Flow	48	459	2	16	203	19	6	34	41	131	30	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	222	0	0	461	0	0	839	809	460	837	801	213
Stage 1	-	-	-	-	-	-	556	556	-	244	244	-
Stage 2	-	-	-	-	-	-	283	253	-	593	557	-
Critical Hdwy	4.16	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1324	-	-	1111	-	-	288	317	605	288	320	832
Stage 1	-	-	-	-	-	-	519	516	-	764	708	-
Stage 2	-	-	-	-	-	-	728	701	-	496	515	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1324	-	-	1111	-	-	239	297	605	233	299	832
Mov Cap-2 Maneuver	-	-	-	-	-	-	239	297	-	233	299	-
Stage 1	-	-	-	-	-	-	494	491	-	727	697	-
Stage 2	-	-	-	-	-	-	646	690	-	409	490	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.5	16.6	43.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	392	1324	-	-	1111	-	-	290
HCM Lane V/C Ratio	0.207	0.036	-	-	0.014	-	-	0.72
HCM Control Delay (s)	16.6	7.8	0	-	8.3	0	-	43.8
HCM Lane LOS	C	A	A	-	A	A	-	E
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-	-	5.1

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	62	0	2	52	12	0	68	12	14	36	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	5	7	0	0	12	0	0	3	0	0	0	0
Mvmt Flow	44	69	0	2	58	13	0	76	13	16	40	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	198	169	49	196	171	82	58	0	0	89	0	0
Stage 1	80	80	-	82	82	-	-	-	-	-	-	-
Stage 2	118	89	-	114	89	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.57	6.2	7.1	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.57	-	6.1	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.063	3.3	3.5	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	754	715	1025	767	704	983	1559	-	-	1519	-	-
Stage 1	921	819	-	931	808	-	-	-	-	-	-	-
Stage 2	879	811	-	896	802	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	691	707	1025	704	696	983	1559	-	-	1519	-	-
Mov Cap-2 Maneuver	691	707	-	704	696	-	-	-	-	-	-	-
Stage 1	921	810	-	931	808	-	-	-	-	-	-	-
Stage 2	805	811	-	811	793	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	10.4	0	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1559	-	-	701	735	1519	-	-
HCM Lane V/C Ratio	-	-	-	0.162	0.1	0.01	-	-
HCM Control Delay (s)	0	-	-	11.1	10.4	7.4	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.3	0	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	84	6	27	54	4	8	87	17	22	130	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	7	12	0	0	5	13	0	0	0
Mvmt Flow	4	93	7	30	60	4	9	97	19	24	144	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	352	329	147	370	322	106	149	0	0	116	0	0
Stage 1	196	196	-	124	124	-	-	-	-	-	-	-
Stage 2	156	133	-	246	198	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.17	6.62	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.17	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.563	4.108	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	607	585	905	577	579	954	1445	-	-	1485	-	-
Stage 1	810	733	-	868	774	-	-	-	-	-	-	-
Stage 2	851	781	-	747	719	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	545	570	905	491	565	954	1445	-	-	1485	-	-
Mov Cap-2 Maneuver	545	570	-	491	565	-	-	-	-	-	-	-
Stage 1	804	720	-	862	769	-	-	-	-	-	-	-
Stage 2	775	776	-	634	706	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.5	12.9	0.5	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1445	-	-	583	549	1485	-	-
HCM Lane V/C Ratio	0.006	-	-	0.179	0.172	0.016	-	-
HCM Control Delay (s)	7.5	0	-	12.5	12.9	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.6	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	170	0	17	67	13	4	14	62	15	8	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	0	0	13	0	0	0	3	14	25	0
Mvmt Flow	2	189	0	19	74	14	4	16	69	17	9	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	89	0	0	189	0	0	323	320	189	355	312	82
Stage 1	-	-	-	-	-	-	193	193	-	119	119	-
Stage 2	-	-	-	-	-	-	130	127	-	236	193	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.23	7.24	6.75	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.24	5.75	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.327	3.626	4.225	3.3
Pot Cap-1 Maneuver	1519	-	-	1397	-	-	634	600	850	578	567	983
Stage 1	-	-	-	-	-	-	813	745	-	857	755	-
Stage 2	-	-	-	-	-	-	878	795	-	741	700	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1519	-	-	1397	-	-	611	591	850	515	559	983
Mov Cap-2 Maneuver	-	-	-	-	-	-	611	591	-	515	559	-
Stage 1	-	-	-	-	-	-	812	744	-	856	744	-
Stage 2	-	-	-	-	-	-	845	784	-	666	699	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	10.2	11.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	775	1519	-	-	1397	-	-	622
HCM Lane V/C Ratio	0.115	0.001	-	-	0.014	-	-	0.061
HCM Control Delay (s)	10.2	7.4	0	-	7.6	0	-	11.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	225	118	193	94	48	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	4	1	2	9	0
Mvmt Flow	250	131	214	104	53	183

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	381	0	849	316
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	533	-
Critical Hdwy	-	-	4.11	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.209	-	3.581	3.3
Pot Cap-1 Maneuver	-	-	1183	-	322	729
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	575	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1183	-	260	729
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	465	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.9	17.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	518	-	-	1183	-
HCM Lane V/C Ratio	0.457	-	-	0.181	-
HCM Control Delay (s)	17.7	-	-	8.7	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.4	-	-	0.7	-

Intersection	
Intersection Delay, s/veh	17.4
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	19	306	27	0	35	174	14	0	45	110	49
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	4	0	2	27	4	0	2	0	2	5
Mvmt Flow	0	21	340	30	0	39	193	16	0	50	122	54
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	20.8	16.2	14.3
HCM LOS	C	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	22%	5%	16%	30%
Vol Thru, %	54%	87%	78%	58%
Vol Right, %	24%	8%	6%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	204	352	223	252
LT Vol	45	19	35	75
Through Vol	110	306	174	145
RT Vol	49	27	14	32
Lane Flow Rate	227	391	248	280
Geometry Grp	1	1	1	1
Degree of Util (X)	0.414	0.668	0.476	0.507
Departure Headway (Hd)	6.577	6.147	6.913	6.516
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	544	587	520	552
Service Time	4.65	4.208	4.983	4.583
HCM Lane V/C Ratio	0.417	0.666	0.477	0.507
HCM Control Delay	14.3	20.8	16.2	16.2
HCM Lane LOS	B	C	C	C
HCM 95th-tile Q	2	5	2.5	2.8

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	75	145	32
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	2	7
Mvmt Flow	0	83	161	36
Number of Lanes	0	0	1	0

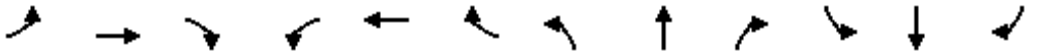
Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	16.2
HCM LOS	C

Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	191	110	87	60	235	45	109	70	669	226	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1845	1462	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	8	212	122	97	67	261	50	121	78	743	251	11
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	3	30	0	0	0	0	0	0	0
Cap, veh/h	381	318	183	237	410	1032	372	176	114	837	875	38
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.04	0.16	0.16	0.36	0.48	0.48
Sat Flow, veh/h	1069	1133	652	1032	1462	1615	1810	1081	697	1810	1807	79
Grp Volume(v), veh/h	8	0	334	97	67	261	50	0	199	743	0	262
Grp Sat Flow(s),veh/h/ln	1069	0	1785	1032	1462	1615	1810	0	1777	1810	0	1886
Q Serve(g_s), s	0.3	0.0	10.0	5.6	2.1	4.2	1.4	0.0	6.4	18.8	0.0	5.0
Cycle Q Clear(g_c), s	2.4	0.0	10.0	15.6	2.1	4.2	1.4	0.0	6.4	18.8	0.0	5.0
Prop In Lane	1.00		0.37	1.00		1.00	1.00		0.39	1.00		0.04
Lane Grp Cap(c), veh/h	381	0	500	237	410	1032	372	0	290	837	0	913
V/C Ratio(X)	0.02	0.00	0.67	0.41	0.16	0.25	0.13	0.00	0.69	0.89	0.00	0.29
Avail Cap(c_a), veh/h	381	0	500	237	410	1032	423	0	498	904	0	1151
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.4	0.0	19.3	26.2	16.5	4.7	19.9	0.0	23.9	11.2	0.0	9.4
Incr Delay (d2), s/veh	0.0	0.0	3.4	1.1	0.2	0.1	0.2	0.0	2.9	10.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	5.4	1.7	0.9	1.9	0.7	0.0	3.4	11.5	0.0	2.7
LnGrp Delay(d),s/veh	17.4	0.0	22.7	27.4	16.6	4.8	20.1	0.0	26.8	21.4	0.0	9.5
LnGrp LOS	B		C	C	B	A	C		C	C		A
Approach Vol, veh/h		342			425			249			1005	
Approach Delay, s/veh		22.6			11.8			25.4			18.3	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	25.7	13.9		21.0	6.3	33.4		21.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	24.0	17.0		17.0	4.0	37.0		17.0
Max Q Clear Time (g_c+I1), s	20.8	8.4		12.0	3.4	7.0		17.6
Green Ext Time (p_c), s	0.9	1.5		1.6	0.0	2.4		0.0

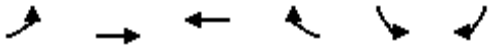
Intersection Summary	
HCM 2010 Ctrl Delay	18.5
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1070	71	205	393	64	28	16	172	231	200	5
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1840	1900	1624	1707	1900	1429	1698	1900	1881	1817	1900
Adj Flow Rate, veh/h	0	1189	79	228	437	71	31	18	191	257	222	6
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	3	3	17	11	11	33	0	0	1	2	2
Cap, veh/h	473	1348	89	299	1598	258	244	23	245	289	404	11
Arrive On Green	0.00	0.40	0.40	0.11	0.57	0.57	0.03	0.18	0.18	0.07	0.23	0.23
Sat Flow, veh/h	1810	3328	221	1547	2798	452	1361	126	1336	1792	1761	48
Grp Volume(v), veh/h	0	624	644	228	252	256	31	0	209	257	0	228
Grp Sat Flow(s),veh/h/ln	1810	1748	1801	1547	1622	1628	1361	0	1462	1792	0	1808
Q Serve(g_s), s	0.0	22.8	22.9	5.5	5.5	5.5	1.3	0.0	9.4	5.0	0.0	7.7
Cycle Q Clear(g_c), s	0.0	22.8	22.9	5.5	5.5	5.5	1.3	0.0	9.4	5.0	0.0	7.7
Prop In Lane	1.00		0.12	1.00		0.28	1.00		0.91	1.00		0.03
Lane Grp Cap(c), veh/h	473	708	729	299	926	929	244	0	268	289	0	415
V/C Ratio(X)	0.00	0.88	0.88	0.76	0.27	0.28	0.13	0.00	0.78	0.89	0.00	0.55
Avail Cap(c_a), veh/h	576	708	729	333	926	929	287	0	360	289	0	471
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	19.0	19.1	14.7	7.5	7.5	22.3	0.0	26.9	26.0	0.0	23.5
Incr Delay (d2), s/veh	0.0	14.8	14.6	8.9	0.7	0.7	0.2	0.0	7.6	26.8	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	13.8	14.2	3.0	2.6	2.7	0.5	0.0	4.3	4.5	0.0	3.9
LnGrp Delay(d),s/veh	0.0	33.8	33.6	23.6	8.3	8.3	22.5	0.0	34.5	52.8	0.0	24.6
LnGrp LOS		C	C	C	A	A	C		C	D		C
Approach Vol, veh/h		1268			736			240			485	
Approach Delay, s/veh		33.7			13.0			33.0			39.6	
Approach LOS		C			B			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	16.7	11.5	32.0	5.8	19.9	0.0	43.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	17.0	9.0	28.0	4.0	18.0	4.0	33.0
Max Q Clear Time (g_c+I1), s	7.0	11.4	7.5	24.9	3.3	9.7	0.0	7.5
Green Ext Time (p_c), s	0.0	1.2	0.1	2.4	0.0	1.6	0.0	11.9

Intersection Summary	
HCM 2010 Ctrl Delay	29.1
HCM 2010 LOS	C



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	103	1009	399	112	549	233
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1462	1863	1727	1557	1845	1792
Adj Flow Rate, veh/h	114	1121	443	124	610	259
Adj No. of Lanes	1	2	2	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	30	2	10	22	3	6
Cap, veh/h	395	1698	1120	971	689	705
Arrive On Green	0.07	0.48	0.34	0.34	0.39	0.39
Sat Flow, veh/h	1392	3632	3368	1324	1757	1524
Grp Volume(v), veh/h	114	1121	443	124	610	259
Grp Sat Flow(s),veh/h/ln	1392	1770	1641	1324	1757	1524
Q Serve(g_s), s	2.5	12.4	5.3	1.4	16.6	5.7
Cycle Q Clear(g_c), s	2.5	12.4	5.3	1.4	16.6	5.7
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	395	1698	1120	971	689	705
V/C Ratio(X)	0.29	0.66	0.40	0.13	0.89	0.37
Avail Cap(c_a), veh/h	419	1698	1120	971	809	809
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.1	10.2	12.9	2.0	14.6	9.0
Incr Delay (d2), s/veh	0.4	2.0	1.0	0.3	10.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	6.4	2.6	1.3	9.9	5.7
LnGrp Delay(d),s/veh	9.5	12.2	14.0	2.3	25.0	9.3
LnGrp LOS	A	B	B	A	C	A
Approach Vol, veh/h		1235	567		869	
Approach Delay, s/veh		12.0	11.4		20.3	
Approach LOS		B	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				28.0		23.5	7.1	20.9
Change Period (Y+Rc), s				* 3.3		3.3	3.5	* 3.3
Max Green Setting (Gmax), s				* 25		23.7	4.5	* 17
Max Q Clear Time (g_c+I1), s				14.4		18.6	4.5	7.3
Green Ext Time (p_c), s				6.7		1.5	0.0	6.3

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	939	267	152	476	70	144
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1696	1743	1827	1520
Adj Flow Rate, veh/h	1043	297	169	529	78	160
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	12	9	4	25
Cap, veh/h	1213	1031	316	1379	127	181
Arrive On Green	0.65	0.65	0.07	0.79	0.07	0.07
Sat Flow, veh/h	1863	1583	1616	1743	1740	1292
Grp Volume(v), veh/h	1043	297	169	529	78	160
Grp Sat Flow(s),veh/h/ln	1863	1583	1616	1743	1740	1292
Q Serve(g_s), s	24.4	4.4	1.6	5.0	2.4	4.0
Cycle Q Clear(g_c), s	24.4	4.4	1.6	5.0	2.4	4.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1213	1031	316	1379	127	181
V/C Ratio(X)	0.86	0.29	0.53	0.38	0.62	0.88
Avail Cap(c_a), veh/h	1213	1031	325	1379	127	181
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.6	4.1	12.3	1.7	24.8	23.2
Incr Delay (d2), s/veh	8.1	0.7	1.6	0.8	8.7	36.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.9	2.1	1.9	2.7	1.5	4.2
LnGrp Delay(d),s/veh	15.7	4.8	13.9	2.5	33.4	59.9
LnGrp LOS	B	A	B	A	C	E
Approach Vol, veh/h	1340			698	238	
Approach Delay, s/veh	13.3			5.3	51.2	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		8.0	7.7	39.3				47.0
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		4.0	4.0	35.5				43.5
Max Q Clear Time (g_c+I1), s		6.0	3.6	26.4				7.0
Green Ext Time (p_c), s		0.0	0.0	6.6				16.3

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1607	209	119	733	41	372
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1792	1776	1881
Adj Flow Rate, veh/h	1786	232	132	814	46	413
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	6	7	1
Cap, veh/h	2017	902	172	1941	474	448
Arrive On Green	0.57	0.57	0.57	0.57	0.28	0.28
Sat Flow, veh/h	3632	1583	211	3495	1691	1599
Grp Volume(v), veh/h	1786	232	132	814	46	413
Grp Sat Flow(s),veh/h/ln	1770	1583	211	1703	1691	1599
Q Serve(g_s), s	21.9	3.7	6.6	6.8	1.0	12.5
Cycle Q Clear(g_c), s	21.9	3.7	28.5	6.8	1.0	12.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2017	902	172	1941	474	448
V/C Ratio(X)	0.89	0.26	0.77	0.42	0.10	0.92
Avail Cap(c_a), veh/h	2017	902	172	1941	474	448
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.3	5.4	24.3	6.1	13.3	17.5
Incr Delay (d2), s/veh	6.2	0.7	27.5	0.7	0.1	24.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	1.8	3.1	3.2	0.5	8.6
LnGrp Delay(d),s/veh	15.5	6.1	51.8	6.7	13.4	42.1
LnGrp LOS	B	A	D	A	B	D
Approach Vol, veh/h	2018			946	459	
Approach Delay, s/veh	14.4			13.0	39.2	
Approach LOS	B			B	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		18.0		32.0				32.0
Change Period (Y+Rc), s		4.0		3.5				3.5
Max Green Setting (Gmax), s		14.0		28.5				28.5
Max Q Clear Time (g_c+I1), s		14.5		23.9				30.5
Green Ext Time (p_c), s		0.0		4.4				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.4
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	694	52	21	194	62	13	75	61	174	212	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1844	1900	1583	1869	1900	1845	1900	1900
Adj Flow Rate, veh/h	36	771	58	23	216	69	14	83	68	193	236	18
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	1	1	0	4	4	20	3	3	3	0	0
Cap, veh/h	693	1020	77	300	791	253	275	258	212	371	473	36
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	1112	1729	130	672	1340	428	953	952	780	1219	1744	133
Grp Volume(v), veh/h	36	0	829	23	0	285	14	0	151	193	0	254
Grp Sat Flow(s),veh/h/ln	1112	0	1860	672	0	1769	953	0	1732	1219	0	1877
Q Serve(g_s), s	0.9	0.0	19.0	1.5	0.0	4.5	0.7	0.0	4.0	8.7	0.0	6.6
Cycle Q Clear(g_c), s	5.5	0.0	19.0	20.5	0.0	4.5	7.3	0.0	4.0	12.7	0.0	6.6
Prop In Lane	1.00		0.07	1.00		0.24	1.00		0.45	1.00		0.07
Lane Grp Cap(c), veh/h	693	0	1097	300	0	1043	275	0	470	371	0	509
V/C Ratio(X)	0.05	0.00	0.76	0.08	0.00	0.27	0.05	0.00	0.32	0.52	0.00	0.50
Avail Cap(c_a), veh/h	693	0	1097	300	0	1043	314	0	541	421	0	586
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.1	0.0	8.7	16.3	0.0	5.8	20.8	0.0	16.8	21.8	0.0	17.7
Incr Delay (d2), s/veh	0.1	0.0	4.9	0.5	0.0	0.6	0.1	0.0	0.4	1.1	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	10.9	0.3	0.0	2.4	0.2	0.0	1.9	3.0	0.0	3.5
LnGrp Delay(d),s/veh	7.3	0.0	13.6	16.8	0.0	6.4	20.9	0.0	17.2	23.0	0.0	18.5
LnGrp LOS	A		B	B		A	C		B	C		B
Approach Vol, veh/h		865			308			165			447	
Approach Delay, s/veh		13.3			7.2			17.5			20.4	
Approach LOS		B			A			B			C	

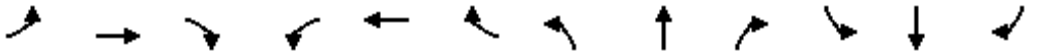
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		19.6		38.0		19.6		38.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		18.0		34.0		18.0		34.0
Max Q Clear Time (g_c+I1), s		9.3		21.0		14.7		22.5
Green Ext Time (p_c), s		1.9		5.8		1.0		5.4

Intersection Summary	
HCM 2010 Ctrl Delay	14.4
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	80	766	15	13	523	38	8	47	58	174	89	18
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1357	1760	1900	1429	1791	1900	1900	1900	1900
Adj Flow Rate, veh/h	89	851	17	14	581	42	9	52	64	193	99	20
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	2	2	40	8	8	33	0	0	0	0	0
Cap, veh/h	450	1117	22	253	996	72	315	180	222	370	378	76
Arrive On Green	0.61	0.61	0.61	0.61	0.61	0.61	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	814	1821	36	463	1622	117	972	732	901	1296	1535	310
Grp Volume(v), veh/h	89	0	868	14	0	623	9	0	116	193	0	119
Grp Sat Flow(s),veh/h/ln	814	0	1857	463	0	1740	972	0	1632	1296	0	1845
Q Serve(g_s), s	4.2	0.0	19.3	1.3	0.0	12.3	0.4	0.0	3.3	8.1	0.0	3.0
Cycle Q Clear(g_c), s	16.5	0.0	19.3	20.6	0.0	12.3	3.4	0.0	3.3	11.4	0.0	3.0
Prop In Lane	1.00		0.02	1.00		0.07	1.00		0.55	1.00		0.17
Lane Grp Cap(c), veh/h	450	0	1140	253	0	1068	315	0	402	370	0	454
V/C Ratio(X)	0.20	0.00	0.76	0.06	0.00	0.58	0.03	0.00	0.29	0.52	0.00	0.26
Avail Cap(c_a), veh/h	450	0	1140	253	0	1068	365	0	487	438	0	550
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	8.0	15.5	0.0	6.6	18.7	0.0	17.5	22.1	0.0	17.3
Incr Delay (d2), s/veh	1.0	0.0	4.8	0.4	0.0	2.3	0.0	0.0	0.4	1.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	11.2	0.2	0.0	6.4	0.1	0.0	1.5	3.0	0.0	1.5
LnGrp Delay(d),s/veh	12.6	0.0	12.8	15.9	0.0	9.0	18.7	0.0	17.8	23.2	0.0	17.6
LnGrp LOS	B		B	B		A	B		B	C		B
Approach Vol, veh/h		957			637			125			312	
Approach Delay, s/veh		12.8			9.1			17.9			21.1	
Approach LOS		B			A			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		18.0		39.0		18.0		39.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		17.0		35.0		17.0		35.0
Max Q Clear Time (g_c+I1), s		5.4		21.3		13.4		22.6
Green Ext Time (p_c), s		1.4		8.0		0.7		7.5

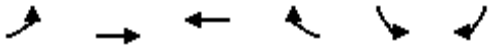
Intersection Summary	
HCM 2010 Ctrl Delay	13.2
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	187	485	101	123	264	36	17	116	92	18	101	110
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1856	1900	1900	1738	1900	1900	1883	1900	1900	1882	1900
Adj Flow Rate, veh/h	208	539	112	137	293	40	19	129	102	20	112	122
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	2	2	0	8	8	0	0	0	0	2	2
Cap, veh/h	564	763	159	333	766	105	402	318	251	407	269	293
Arrive On Green	0.51	0.51	0.51	0.51	0.51	0.51	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1064	1492	310	793	1497	204	1165	976	772	1168	825	899
Grp Volume(v), veh/h	208	0	651	137	0	333	19	0	231	20	0	234
Grp Sat Flow(s),veh/h/ln	1064	0	1802	793	0	1702	1165	0	1747	1168	0	1723
Q Serve(g_s), s	7.3	0.0	13.6	7.8	0.0	5.8	0.6	0.0	5.0	0.7	0.0	5.2
Cycle Q Clear(g_c), s	13.1	0.0	13.6	21.4	0.0	5.8	5.8	0.0	5.0	5.7	0.0	5.2
Prop In Lane	1.00		0.17	1.00		0.12	1.00		0.44	1.00		0.52
Lane Grp Cap(c), veh/h	564	0	922	333	0	871	402	0	569	407	0	561
V/C Ratio(X)	0.37	0.00	0.71	0.41	0.00	0.38	0.05	0.00	0.41	0.05	0.00	0.42
Avail Cap(c_a), veh/h	583	0	953	347	0	900	402	0	569	407	0	561
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.3	0.0	9.2	17.4	0.0	7.3	15.2	0.0	12.9	15.1	0.0	12.9
Incr Delay (d2), s/veh	0.4	0.0	2.3	0.8	0.0	0.3	0.2	0.0	2.1	0.2	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	7.3	1.8	0.0	2.7	0.2	0.0	2.8	0.2	0.0	2.8
LnGrp Delay(d),s/veh	11.7	0.0	11.5	18.2	0.0	7.6	15.4	0.0	15.0	15.3	0.0	15.2
LnGrp LOS	B		B	B		A	B		B	B		B
Approach Vol, veh/h		859			470			250			254	
Approach Delay, s/veh		11.5			10.7			15.1			15.2	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.0		29.1		20.0		29.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		26.0		16.0		26.0
Max Q Clear Time (g_c+I1), s		7.8		15.6		7.7		23.4
Green Ext Time (p_c), s		1.7		5.3		1.7		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	12.3
HCM 2010 LOS	B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	127	448	203	95	414	161
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1810	1827	1743	1881	1810
Adj Flow Rate, veh/h	141	498	226	106	460	179
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	6	5	4	9	1	5
Cap, veh/h	591	869	878	712	568	488
Arrive On Green	0.48	0.48	0.48	0.48	0.32	0.32
Sat Flow, veh/h	1004	1810	1827	1482	1792	1538
Grp Volume(v), veh/h	141	498	226	106	460	179
Grp Sat Flow(s),veh/h/ln	1004	1810	1827	1482	1792	1538
Q Serve(g_s), s	3.8	7.8	2.9	1.6	9.3	3.6
Cycle Q Clear(g_c), s	6.7	7.8	2.9	1.6	9.3	3.6
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	591	869	878	712	568	488
V/C Ratio(X)	0.24	0.57	0.26	0.15	0.81	0.37
Avail Cap(c_a), veh/h	591	869	878	712	816	700
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.1	7.4	6.1	5.7	12.4	10.4
Incr Delay (d2), s/veh	1.0	2.7	0.7	0.4	4.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	4.5	1.6	1.8	5.2	1.6
LnGrp Delay(d),s/veh	9.0	10.1	6.8	6.2	16.5	10.9
LnGrp LOS	A	B	A	A	B	B
Approach Vol, veh/h		639	332		639	
Approach Delay, s/veh		9.9	6.6		14.9	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				23.0		16.5		23.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				19.0		18.0		19.0
Max Q Clear Time (g_c+I1), s				9.8		11.3		4.9
Green Ext Time (p_c), s				3.4		1.2		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	334	97	67	261	50	199	743	262
v/c Ratio	0.02	0.71	0.69	0.19	0.22	0.15	0.55	0.88	0.26
Control Delay	19.4	28.9	51.4	21.0	1.2	10.4	24.7	22.9	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	28.9	51.4	21.0	1.2	10.4	24.7	22.9	9.3
Queue Length 50th (ft)	2	101	33	20	0	7	55	167	56
Queue Length 95th (ft)	13	#223	#112	53	21	17	112	#379	97
Internal Link Dist (ft)		919		4037			5231		921
Turn Bay Length (ft)	250		250		250	250		250	
Base Capacity (vph)	402	561	169	434	1257	331	562	906	1223
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.60	0.57	0.15	0.21	0.15	0.35	0.82	0.21

Intersection Summary

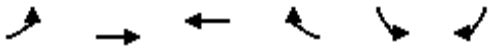
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1268	228	508	31	209	257	228
v/c Ratio	0.88	0.77	0.26	0.15	0.59	1.02	0.54
Control Delay	28.8	32.3	7.0	19.2	14.2	88.4	28.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	32.3	7.0	19.2	14.2	88.4	28.8
Queue Length 50th (ft)	224	41	36	10	14	~94	77
Queue Length 95th (ft)	#446	#179	85	27	69	#223	158
Internal Link Dist (ft)	1084		924		5202		920
Turn Bay Length (ft)		250		250		250	
Base Capacity (vph)	1439	299	1934	202	496	252	482
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.76	0.26	0.15	0.42	1.02	0.47

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	114	1121	443	124	610	259
v/c Ratio	0.36	0.67	0.42	0.12	0.87	0.28
Control Delay	12.7	13.9	16.3	0.6	29.5	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	13.9	16.3	0.6	29.5	3.4
Queue Length 50th (ft)	21	145	60	0	165	13
Queue Length 95th (ft)	47	208	95	5	#332	39
Internal Link Dist (ft)		1579	867		5202	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	319	1668	1046	1125	792	912
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.67	0.42	0.11	0.77	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1043	297	169	529	78	160
v/c Ratio	0.82	0.25	0.67	0.36	0.63	0.46
Control Delay	15.5	1.2	21.6	2.4	51.1	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.5	1.2	21.6	2.4	51.1	10.9
Queue Length 50th (ft)	223	0	8	29	26	8
Queue Length 95th (ft)	#514	19	#41	51	#80	49
Internal Link Dist (ft)	884			1579	5173	
Turn Bay Length (ft)		250	250			250
Base Capacity (vph)	1265	1170	251	1451	123	346
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.25	0.67	0.36	0.63	0.46

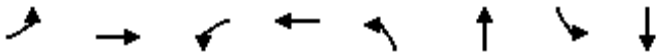
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1786	232	132	814	46	413
v/c Ratio	0.88	0.23	0.89	0.42	0.10	0.91
Control Delay	16.7	1.6	69.8	6.9	14.1	45.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.7	1.6	69.8	6.9	14.1	45.6
Queue Length 50th (ft)	205	0	29	60	10	111
Queue Length 95th (ft)	#380	20	#79	91	29	#255
Internal Link Dist (ft)	2574			424	5188	
Turn Bay Length (ft)		250	250			250
Base Capacity (vph)	2022	1004	148	1946	473	459
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.23	0.89	0.42	0.10	0.90

Intersection Summary

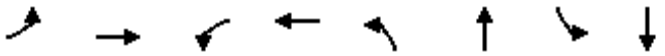
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	829	23	285	14	151	193	254
v/c Ratio	0.05	0.72	0.10	0.26	0.08	0.32	0.66	0.56
Control Delay	5.8	13.4	7.0	5.6	16.5	11.8	30.4	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	13.4	7.0	5.6	16.5	11.8	30.4	22.7
Queue Length 50th (ft)	4	162	3	31	4	22	57	71
Queue Length 95th (ft)	15	#365	13	73	15	59	115	129
Internal Link Dist (ft)		1097		420		5201		5188
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	685	1154	242	1114	236	603	389	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.72	0.10	0.26	0.06	0.25	0.50	0.42

Intersection Summary

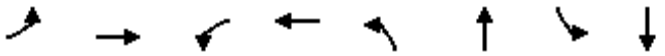
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	89	868	14	623	9	116	193	119
v/c Ratio	0.21	0.73	0.08	0.56	0.04	0.28	0.67	0.28
Control Delay	7.2	13.3	6.8	9.1	16.4	10.7	31.7	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	13.3	6.8	9.1	16.4	10.7	31.7	16.5
Queue Length 50th (ft)	11	174	2	102	2	14	58	28
Queue Length 95th (ft)	35	#406	9	214	11	47	115	63
Internal Link Dist (ft)		5180		420		5199		5201
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	421	1190	172	1119	281	520	374	547
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.73	0.08	0.56	0.03	0.22	0.52	0.22

Intersection Summary

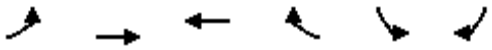
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	208	651	137	333	19	231	20	234
v/c Ratio	0.47	0.78	0.74	0.43	0.05	0.33	0.05	0.33
Control Delay	11.9	17.0	38.1	9.2	11.9	9.6	12.0	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	17.0	38.1	9.2	11.9	9.6	12.0	8.3
Queue Length 50th (ft)	33	119	26	48	3	26	3	21
Queue Length 95th (ft)	74	217	#105	91	15	75	15	67
Internal Link Dist (ft)		420		5100		5198		5203
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	584	1086	242	1021	420	696	423	707
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.60	0.57	0.33	0.05	0.33	0.05	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	141	498	226	106	460	179
v/c Ratio	0.28	0.60	0.27	0.14	0.74	0.27
Control Delay	10.1	13.2	9.1	2.9	19.8	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	13.2	9.1	2.9	19.8	3.2
Queue Length 50th (ft)	20	85	32	0	90	0
Queue Length 95th (ft)	53	176	72	19	168	26
Internal Link Dist (ft)		1472	2578		5231	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	508	832	840	738	768	763
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.60	0.27	0.14	0.60	0.23

Intersection Summary

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	80	34	292	56	16	237
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	0	1
Mvmt Flow	89	38	324	62	18	263

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	655	356	0	0	387	0
Stage 1	356	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	434	693	-	-	1183	-
Stage 1	713	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	426	693	-	-	1183	-
Mov Cap-2 Maneuver	426	-	-	-	-	-
Stage 1	713	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	481	1183	-
HCM Lane V/C Ratio	-	-	0.263	0.015	-
HCM Control Delay (s)	-	-	15.1	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1	0	-

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	47	4	19	98	67	2	41	9	42	62	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	50	0	0	0	0	0	0	0	0	0
Mvmt Flow	41	52	4	21	109	74	2	46	10	47	69	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	319	232	78	255	236	51	88	0	0	56	0	0
Stage 1	172	172	-	55	55	-	-	-	-	-	-	-
Stage 2	147	60	-	200	181	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.7	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.75	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	638	672	864	702	668	1023	1520	-	-	1562	-	-
Stage 1	835	760	-	962	853	-	-	-	-	-	-	-
Stage 2	860	849	-	806	754	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	502	650	864	639	646	1023	1520	-	-	1562	-	-
Mov Cap-2 Maneuver	502	650	-	639	646	-	-	-	-	-	-	-
Stage 1	834	736	-	961	852	-	-	-	-	-	-	-
Stage 2	695	848	-	721	730	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.4	11.7	0.3	2.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1520	-	-	584	745	1562	-	-
HCM Lane V/C Ratio	0.001	-	-	0.167	0.274	0.03	-	-
HCM Control Delay (s)	7.4	0	-	12.4	11.7	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	1.1	0.1	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	24	173	7	28	365	101	2	42	7	17	56	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	1	33	0	0	0	0	0	0	0	4	0
Mvmt Flow	27	192	8	31	406	112	2	47	8	19	62	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	518	0	0	200	0	0	820	829	196	801	777	462
Stage 1	-	-	-	-	-	-	249	249	-	524	524	-
Stage 2	-	-	-	-	-	-	571	580	-	277	253	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.036	3.3
Pot Cap-1 Maneuver	1058	-	-	1384	-	-	296	308	850	305	326	604
Stage 1	-	-	-	-	-	-	759	704	-	540	527	-
Stage 2	-	-	-	-	-	-	509	503	-	734	694	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1058	-	-	1384	-	-	226	289	850	253	306	604
Mov Cap-2 Maneuver	-	-	-	-	-	-	226	289	-	253	306	-
Stage 1	-	-	-	-	-	-	737	684	-	524	510	-
Stage 2	-	-	-	-	-	-	410	487	-	658	674	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.4	19	20.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	314	1058	-	-	1384	-	-	342
HCM Lane V/C Ratio	0.18	0.025	-	-	0.022	-	-	0.331
HCM Control Delay (s)	19	8.5	0	-	7.7	0	-	20.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.1	-	-	1.4

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	48	2	10	68	6	0	46	6	0	70	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	9	0	0	6	0	0	0	0	0	0	17
Mvmt Flow	13	53	2	11	76	7	0	51	7	0	78	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	180	142	84	166	145	54	91	0	0	58	0	0
Stage 1	84	84	-	54	54	-	-	-	-	-	-	-
Stage 2	96	58	-	112	91	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.59	6.2	7.1	6.56	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.59	-	6.1	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.081	3.3	3.5	4.054	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	786	736	981	803	739	1019	1517	-	-	1559	-	-
Stage 1	929	812	-	963	842	-	-	-	-	-	-	-
Stage 2	916	833	-	898	812	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	720	736	981	757	739	1019	1517	-	-	1559	-	-
Mov Cap-2 Maneuver	720	736	-	757	739	-	-	-	-	-	-	-
Stage 1	929	812	-	963	842	-	-	-	-	-	-	-
Stage 2	828	833	-	837	812	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	10.4	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1517	-	-	739	756	1559	-	-
HCM Lane V/C Ratio	-	-	-	0.093	0.123	-	-	-
HCM Control Delay (s)	0	-	-	10.4	10.4	0	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.4	0	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	43	0	19	80	13	4	116	12	19	77	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	5	0	0	8	0	0	2	0	11	3	0
Mvmt Flow	14	48	0	21	89	14	4	129	13	21	86	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	326	281	88	298	276	136	90	0	0	142	0	0
Stage 1	130	130	-	144	144	-	-	-	-	-	-	-
Stage 2	196	151	-	154	132	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.58	6.2	4.1	-	-	4.21	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.072	3.3	2.2	-	-	2.299	-	-
Pot Cap-1 Maneuver	631	622	976	658	621	918	1518	-	-	1387	-	-
Stage 1	878	783	-	864	766	-	-	-	-	-	-	-
Stage 2	810	767	-	853	776	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	544	610	976	610	609	918	1518	-	-	1387	-	-
Mov Cap-2 Maneuver	544	610	-	610	609	-	-	-	-	-	-	-
Stage 1	875	770	-	861	764	-	-	-	-	-	-	-
Stage 2	702	765	-	787	764	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.8	12.1	0.2	1.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1518	-	-	593	634	1387	-	-
HCM Lane V/C Ratio	0.003	-	-	0.105	0.196	0.015	-	-
HCM Control Delay (s)	7.4	0	-	11.8	12.1	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.7	0	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	90	0	77	138	26	0	25	27	17	37	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	5	0	0	0	0	25	0	0
Mvmt Flow	2	100	0	86	153	29	0	28	30	19	41	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	182	0	0	100	0	0	467	457	100	472	443	168
Stage 1	-	-	-	-	-	-	104	104	-	339	339	-
Stage 2	-	-	-	-	-	-	363	353	-	133	104	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.35	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1405	-	-	1505	-	-	509	503	961	466	512	881
Stage 1	-	-	-	-	-	-	907	813	-	630	643	-
Stage 2	-	-	-	-	-	-	660	634	-	818	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1405	-	-	1505	-	-	448	470	961	410	478	881
Mov Cap-2 Maneuver	-	-	-	-	-	-	448	470	-	410	478	-
Stage 1	-	-	-	-	-	-	905	811	-	629	602	-
Stage 2	-	-	-	-	-	-	571	593	-	764	811	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.4	11.2	13.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	640	1405	-	-	1505	-	-	477
HCM Lane V/C Ratio	0.09	0.002	-	-	0.057	-	-	0.14
HCM Control Delay (s)	11.2	7.6	0	-	7.5	0	-	13.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.5

Intersection	
Int Delay, s/veh	10

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	132	60	195	225	87	239
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	2	0	0
Mvmt Flow	147	67	217	250	97	266

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	213	0	863	180
Stage 1	-	-	-	-	180	-
Stage 2	-	-	-	-	683	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1369	-	328	868
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	505	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1369	-	268	868
Mov Cap-2 Maneuver	-	-	-	-	268	-
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	412	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	23.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	543	-	-	1369	-
HCM Lane V/C Ratio	0.667	-	-	0.158	-
HCM Control Delay (s)	23.9	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	4.9	-	-	0.6	-

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	16	116	11	0	67	181	84	0	18	134	28
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	2	0	2	0	0	0	2	0	0	0
Mvmt Flow	0	18	129	12	0	74	201	93	0	20	149	31
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	10.1	13.2	10.9
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	11%	20%	15%
Vol Thru, %	74%	81%	55%	85%
Vol Right, %	16%	8%	25%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	180	143	332	126
LT Vol	18	16	67	19
Through Vol	134	116	181	107
RT Vol	28	11	84	0
Lane Flow Rate	200	159	369	140
Geometry Grp	1	1	1	1
Degree of Util (X)	0.303	0.238	0.512	0.22
Departure Headway (Hd)	5.452	5.389	5	5.66
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	658	666	719	633
Service Time	3.492	3.431	3.034	3.703
HCM Lane V/C Ratio	0.304	0.239	0.513	0.221
HCM Control Delay	10.9	10.1	13.2	10.3
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.3	0.9	2.9	0.8

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	19	107	0
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	2	0
Mvmt Flow	0	21	119	0
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	10.3
HCM LOS	B

Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	191	38	39	68	613	80	174	42	467	117	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1845	1845	1900	1900	1830	1900
Adj Flow Rate, veh/h	0	212	42	43	76	681	89	193	47	519	130	8
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	3	2	2	0	2	2
Cap, veh/h	142	488	97	380	601	929	474	269	65	681	664	41
Arrive On Green	0.00	0.32	0.32	0.32	0.32	0.32	0.06	0.19	0.19	0.26	0.39	0.39
Sat Flow, veh/h	719	1541	305	1143	1900	1615	1757	1434	349	1810	1707	105
Grp Volume(v), veh/h	0	0	254	43	76	681	89	0	240	519	0	138
Grp Sat Flow(s),veh/h/ln	719	0	1846	1143	1900	1615	1757	0	1783	1810	0	1812
Q Serve(g_s), s	0.0	0.0	5.5	1.6	1.4	15.7	2.0	0.0	6.4	10.5	0.0	2.5
Cycle Q Clear(g_c), s	0.0	0.0	5.5	7.1	1.4	15.7	2.0	0.0	6.4	10.5	0.0	2.5
Prop In Lane	1.00		0.17	1.00		1.00	1.00		0.20	1.00		0.06
Lane Grp Cap(c), veh/h	142	0	584	380	601	929	474	0	334	681	0	705
V/C Ratio(X)	0.00	0.00	0.43	0.11	0.13	0.73	0.19	0.00	0.72	0.76	0.00	0.20
Avail Cap(c_a), veh/h	142	0	584	380	601	929	513	0	565	786	0	1004
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	13.7	16.5	12.3	7.9	15.2	0.0	19.3	10.5	0.0	10.2
Incr Delay (d2), s/veh	0.0	0.0	2.3	0.6	0.4	5.1	0.2	0.0	2.9	3.8	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	3.1	0.6	0.8	8.0	1.0	0.0	3.4	5.8	0.0	1.3
LnGrp Delay(d),s/veh	0.0	0.0	16.0	17.1	12.7	13.0	15.4	0.0	22.2	14.3	0.0	10.3
LnGrp LOS			B	B	B	B	B		C	B		B
Approach Vol, veh/h		254			800			329			657	
Approach Delay, s/veh		16.0			13.2			20.3			13.5	
Approach LOS		B			B			C			B	

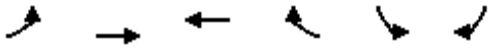
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	17.1	13.5		20.0	6.9	23.7		20.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	16.0	16.0		16.0	4.0	28.0		16.0
Max Q Clear Time (g_c+I1), s	12.5	8.4		7.5	4.0	4.5		17.7
Green Ext Time (p_c), s	0.6	1.1		3.0	0.0	1.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	591	36	158	777	316	27	91	176	173	86	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	1865	1900	1810	1900	1900	1900	1851	1900	1881	1900	1900
Adj Flow Rate, veh/h	20	657	40	176	863	351	30	101	196	192	96	11
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	14	2	2	5	0	0	0	0	0	1	0	0
Cap, veh/h	187	1027	62	397	949	384	480	127	247	333	459	53
Arrive On Green	0.02	0.30	0.30	0.09	0.38	0.38	0.03	0.23	0.23	0.08	0.27	0.27
Sat Flow, veh/h	1587	3394	206	1723	2509	1016	1810	564	1094	1792	1674	192
Grp Volume(v), veh/h	20	343	354	176	620	594	30	0	297	192	0	107
Grp Sat Flow(s),veh/h/ln	1587	1772	1828	1723	1805	1721	1810	0	1658	1792	0	1866
Q Serve(g_s), s	0.5	8.9	8.9	3.4	17.3	17.4	0.7	0.0	9.0	4.0	0.0	2.3
Cycle Q Clear(g_c), s	0.5	8.9	8.9	3.4	17.3	17.4	0.7	0.0	9.0	4.0	0.0	2.3
Prop In Lane	1.00		0.11	1.00		0.59	1.00		0.66	1.00		0.10
Lane Grp Cap(c), veh/h	187	536	554	397	683	651	480	0	375	333	0	512
V/C Ratio(X)	0.11	0.64	0.64	0.44	0.91	0.91	0.06	0.00	0.79	0.58	0.00	0.21
Avail Cap(c_a), veh/h	276	600	620	428	683	651	567	0	500	333	0	562
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.1	16.0	16.0	10.9	15.6	15.7	15.1	0.0	19.4	15.8	0.0	14.8
Incr Delay (d2), s/veh	0.2	1.9	1.9	0.8	16.0	17.4	0.1	0.0	6.3	2.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.6	4.7	1.7	11.5	11.4	0.3	0.0	4.7	1.0	0.0	1.2
LnGrp Delay(d),s/veh	14.4	17.9	17.9	11.7	31.6	33.0	15.1	0.0	25.7	18.3	0.0	15.0
LnGrp LOS	B	B	B	B	C	C	B		C	B		B
Approach Vol, veh/h		717			1390			327			299	
Approach Delay, s/veh		17.8			29.7			24.7			17.1	
Approach LOS		B			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	16.0	9.0	20.1	5.4	18.6	5.0	24.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	4.0	16.0	6.0	18.0	4.0	16.0	4.0	20.0
Max Q Clear Time (g_c+I1), s	6.0	11.0	5.4	10.9	2.7	4.3	2.5	19.4
Green Ext Time (p_c), s	0.0	1.0	0.0	5.2	0.0	1.8	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	24.6
HCM 2010 LOS	C



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	106	556	680	378	290	131
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1881	1881	1881	1597
Adj Flow Rate, veh/h	118	618	756	420	322	146
Adj No. of Lanes	1	2	2	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	1	1	1	19
Cap, veh/h	413	2058	1529	684	416	409
Arrive On Green	0.07	0.59	0.43	0.43	0.23	0.23
Sat Flow, veh/h	1757	3597	3668	1599	1792	1357
Grp Volume(v), veh/h	118	618	756	420	322	146
Grp Sat Flow(s),veh/h/ln	1757	1752	1787	1599	1792	1357
Q Serve(g_s), s	1.5	3.9	6.8	9.0	7.4	3.7
Cycle Q Clear(g_c), s	1.5	3.9	6.8	9.0	7.4	3.7
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	413	2058	1529	684	416	409
V/C Ratio(X)	0.29	0.30	0.49	0.61	0.77	0.36
Avail Cap(c_a), veh/h	530	2058	1529	684	647	584
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.1	4.6	9.2	9.8	15.9	12.1
Incr Delay (d2), s/veh	0.4	0.4	1.1	4.1	3.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	2.0	3.5	4.7	4.0	3.1
LnGrp Delay(d),s/veh	6.5	5.0	10.3	13.9	19.0	12.6
LnGrp LOS	A	A	B	B	B	B
Approach Vol, veh/h		736	1176		468	
Approach Delay, s/veh		5.2	11.6		17.0	
Approach LOS		A	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				30.0		14.3	7.1	22.9
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				26.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s				5.9		9.4	3.5	11.0
Green Ext Time (p_c), s				10.2		0.9	0.1	3.7

Intersection Summary	
HCM 2010 Ctrl Delay	10.7
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	515	145	151	650	238	151
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1610	1881	1900	1759
Adj Flow Rate, veh/h	572	161	168	722	264	168
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	18	1	0	8
Cap, veh/h	1094	930	444	1105	360	298
Arrive On Green	0.59	0.59	0.59	0.59	0.20	0.20
Sat Flow, veh/h	1863	1583	623	1881	1810	1495
Grp Volume(v), veh/h	572	161	168	722	264	168
Grp Sat Flow(s),veh/h/ln	1863	1583	623	1881	1810	1495
Q Serve(g_s), s	6.9	1.7	8.2	9.6	5.1	3.8
Cycle Q Clear(g_c), s	6.9	1.7	15.1	9.6	5.1	3.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1094	930	444	1105	360	298
V/C Ratio(X)	0.52	0.17	0.38	0.65	0.73	0.56
Avail Cap(c_a), veh/h	1094	930	444	1105	483	399
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	4.6	3.6	9.1	5.2	14.1	13.5
Incr Delay (d2), s/veh	1.8	0.4	2.4	3.0	3.8	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.8	1.7	5.7	2.9	1.7
LnGrp Delay(d),s/veh	6.4	4.0	11.5	8.2	17.9	15.2
LnGrp LOS	A	A	B	A	B	B
Approach Vol, veh/h	733			890	432	
Approach Delay, s/veh	5.9			8.8	16.9	
Approach LOS	A			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		11.5		26.0				26.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		10.0		22.0				22.0
Max Q Clear Time (g_c+I1), s		7.1		8.9				17.1
Green Ext Time (p_c), s		0.4		7.8				3.6

Intersection Summary	
HCM 2010 Ctrl Delay	9.5
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	861	96	285	1123	154	146
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1900	1881	1900	1845
Adj Flow Rate, veh/h	957	107	317	1248	171	162
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	3	0	1	0	3
Cap, veh/h	2597	1151	462	2623	240	208
Arrive On Green	0.73	0.73	0.73	0.73	0.13	0.13
Sat Flow, veh/h	3632	1568	539	3668	1810	1568
Grp Volume(v), veh/h	957	107	317	1248	171	162
Grp Sat Flow(s),veh/h/ln	1770	1568	539	1787	1810	1568
Q Serve(g_s), s	5.9	1.2	31.3	8.6	5.4	6.0
Cycle Q Clear(g_c), s	5.9	1.2	37.2	8.6	5.4	6.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2597	1151	462	2623	240	208
V/C Ratio(X)	0.37	0.09	0.69	0.48	0.71	0.78
Avail Cap(c_a), veh/h	2597	1151	462	2623	241	209
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	2.9	2.3	9.7	3.3	24.9	25.1
Incr Delay (d2), s/veh	0.4	0.2	8.0	0.6	9.4	16.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.6	5.5	4.4	3.3	3.5
LnGrp Delay(d),s/veh	3.3	2.4	17.7	3.9	34.3	41.9
LnGrp LOS	A	A	B	A	C	D
Approach Vol, veh/h	1064			1565	333	
Approach Delay, s/veh	3.2			6.7	38.0	
Approach LOS	A			A	D	

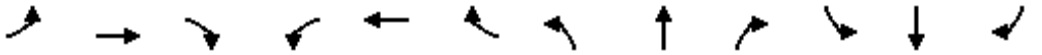
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		12.0		48.0				48.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		8.0		44.0				44.0
Max Q Clear Time (g_c+I1), s		8.0		7.9				39.2
Green Ext Time (p_c), s		0.0		26.4				4.5

Intersection Summary	
HCM 2010 Ctrl Delay	9.0
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	272	31	70	516	118	57	150	62	67	109	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1883	1900	1900	1878	1900	1900	1887	1900	1827	1900	1900
Adj Flow Rate, veh/h	18	302	34	78	573	131	63	167	69	74	121	30
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	1	1	0	1	1	0	1	1	4	0	0
Cap, veh/h	390	956	108	669	851	194	386	315	130	309	365	91
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	755	1663	187	1061	1480	338	1256	1270	525	1118	1471	365
Grp Volume(v), veh/h	18	0	336	78	0	704	63	0	236	74	0	151
Grp Sat Flow(s),veh/h/ln	755	0	1850	1061	0	1818	1256	0	1794	1118	0	1836
Q Serve(g_s), s	0.8	0.0	4.3	1.9	0.0	12.2	2.0	0.0	5.1	2.8	0.0	3.0
Cycle Q Clear(g_c), s	12.9	0.0	4.3	6.1	0.0	12.2	5.0	0.0	5.1	7.9	0.0	3.0
Prop In Lane	1.00		0.10	1.00		0.19	1.00		0.29	1.00		0.20
Lane Grp Cap(c), veh/h	390	0	1063	669	0	1045	386	0	446	309	0	456
V/C Ratio(X)	0.05	0.00	0.32	0.12	0.00	0.67	0.16	0.00	0.53	0.24	0.00	0.33
Avail Cap(c_a), veh/h	390	0	1063	669	0	1045	519	0	635	427	0	649
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.2	0.0	5.0	6.6	0.0	6.7	16.0	0.0	14.7	18.1	0.0	13.9
Incr Delay (d2), s/veh	0.2	0.0	0.8	0.4	0.0	3.5	0.2	0.0	1.0	0.4	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	2.4	0.6	0.0	6.9	0.7	0.0	2.6	0.9	0.0	1.6
LnGrp Delay(d),s/veh	11.4	0.0	5.8	6.9	0.0	10.1	16.2	0.0	15.7	18.5	0.0	14.3
LnGrp LOS	B		A	A		B	B		B	B		B
Approach Vol, veh/h		354			782			299			225	
Approach Delay, s/veh		6.1			9.8			15.8			15.7	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		15.2		30.0		15.2		30.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		26.0		16.0		26.0
Max Q Clear Time (g_c+I1), s		7.1		14.9		9.9		14.2
Green Ext Time (p_c), s		1.7		5.0		1.3		5.2

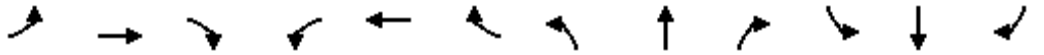
Intersection Summary	
HCM 2010 Ctrl Delay	10.9
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	60	632	5	34	836	108	5	104	97	70	84	44
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1877	1900	1900	1838	1900	1900	1900	1900
Adj Flow Rate, veh/h	67	702	6	38	929	120	6	116	108	78	93	49
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	216	1223	10	447	1060	137	312	195	182	237	261	138
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	546	1881	16	752	1629	210	1266	877	817	1175	1173	618
Grp Volume(v), veh/h	67	0	708	38	0	1049	6	0	224	78	0	142
Grp Sat Flow(s),veh/h/ln	546	0	1897	752	0	1840	1266	0	1694	1175	0	1791
Q Serve(g_s), s	7.2	0.0	13.1	1.9	0.0	29.2	0.3	0.0	7.5	4.0	0.0	4.2
Cycle Q Clear(g_c), s	36.4	0.0	13.1	15.0	0.0	29.2	4.5	0.0	7.5	11.5	0.0	4.2
Prop In Lane	1.00		0.01	1.00		0.11	1.00		0.48	1.00		0.35
Lane Grp Cap(c), veh/h	216	0	1234	447	0	1196	312	0	377	237	0	399
V/C Ratio(X)	0.31	0.00	0.57	0.09	0.00	0.88	0.02	0.00	0.59	0.33	0.00	0.36
Avail Cap(c_a), veh/h	216	0	1234	447	0	1196	351	0	430	273	0	454
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.8	0.0	6.2	10.3	0.0	9.0	22.6	0.0	21.9	27.1	0.0	20.7
Incr Delay (d2), s/veh	3.7	0.0	1.9	0.4	0.0	9.2	0.0	0.0	1.7	0.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	7.4	0.4	0.0	17.6	0.1	0.0	3.7	1.4	0.0	2.2
LnGrp Delay(d),s/veh	27.5	0.0	8.1	10.7	0.0	18.2	22.6	0.0	23.7	27.9	0.0	21.2
LnGrp LOS	C		A	B		B	C		C	C		C
Approach Vol, veh/h		775			1087			230			220	
Approach Delay, s/veh		9.8			17.9			23.6			23.6	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		18.0		45.0		18.0		45.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		41.0		16.0		41.0
Max Q Clear Time (g_c+I1), s		9.5		38.4		13.5		31.2
Green Ext Time (p_c), s		1.2		2.2		0.6		7.4

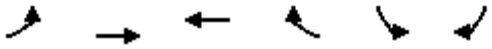
Intersection Summary	
HCM 2010 Ctrl Delay	16.3
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	151	400	22	54	516	67	13	99	60	27	82	191
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1877	1900	1900	1900	1900	1900	1887	1900
Adj Flow Rate, veh/h	168	444	24	60	573	74	14	110	67	30	91	212
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	449	1077	58	583	983	127	221	267	163	333	122	284
Arrive On Green	0.60	0.60	0.60	0.60	0.60	0.60	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	796	1786	97	940	1629	210	1093	1107	674	1227	504	1175
Grp Volume(v), veh/h	168	0	468	60	0	647	14	0	177	30	0	303
Grp Sat Flow(s),veh/h/ln	796	0	1883	940	0	1840	1093	0	1781	1227	0	1679
Q Serve(g_s), s	8.4	0.0	6.7	1.9	0.0	11.1	0.6	0.0	4.3	1.1	0.0	8.6
Cycle Q Clear(g_c), s	19.5	0.0	6.7	8.6	0.0	11.1	9.2	0.0	4.3	5.4	0.0	8.6
Prop In Lane	1.00		0.05	1.00		0.11	1.00		0.38	1.00		0.70
Lane Grp Cap(c), veh/h	449	0	1136	583	0	1110	221	0	430	333	0	405
V/C Ratio(X)	0.37	0.00	0.41	0.10	0.00	0.58	0.06	0.00	0.41	0.09	0.00	0.75
Avail Cap(c_a), veh/h	449	0	1136	583	0	1110	298	0	554	419	0	523
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.2	0.0	5.4	7.7	0.0	6.2	22.3	0.0	16.4	18.7	0.0	18.1
Incr Delay (d2), s/veh	2.4	0.0	1.1	0.4	0.0	2.2	0.1	0.0	0.6	0.1	0.0	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	3.7	0.5	0.0	6.3	0.2	0.0	2.2	0.4	0.0	4.4
LnGrp Delay(d),s/veh	14.6	0.0	6.5	8.0	0.0	8.5	22.4	0.0	17.1	18.8	0.0	22.4
LnGrp LOS	B		A	A		A	C		B	B		C
Approach Vol, veh/h		636			707			191			333	
Approach Delay, s/veh		8.6			8.4			17.5			22.1	
Approach LOS		A			A			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		16.4		35.0		16.4		35.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		16.0		31.0		16.0		31.0
Max Q Clear Time (g_c+I1), s		11.2		21.5		10.6		13.1
Green Ext Time (p_c), s		1.2		5.1		1.3		7.5

Intersection Summary	
HCM 2010 Ctrl Delay	11.9
HCM 2010 LOS	B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	135	311	373	254	201	127
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1881	1900	1845	1863
Adj Flow Rate, veh/h	150	346	414	282	223	141
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	1	0	3	2
Cap, veh/h	533	984	994	853	364	328
Arrive On Green	0.53	0.53	0.53	0.53	0.21	0.21
Sat Flow, veh/h	746	1863	1881	1615	1757	1583
Grp Volume(v), veh/h	150	346	414	282	223	141
Grp Sat Flow(s),veh/h/ln	746	1863	1881	1615	1757	1583
Q Serve(g_s), s	4.6	3.3	4.0	3.0	3.5	2.3
Cycle Q Clear(g_c), s	8.6	3.3	4.0	3.0	3.5	2.3
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	533	984	994	853	364	328
V/C Ratio(X)	0.28	0.35	0.42	0.33	0.61	0.43
Avail Cap(c_a), veh/h	533	984	994	853	928	837
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.9	4.1	4.3	4.1	10.9	10.4
Incr Delay (d2), s/veh	1.3	1.0	1.3	1.0	1.7	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	1.9	2.4	1.6	1.8	1.1
LnGrp Delay(d),s/veh	8.2	5.1	5.6	5.1	12.6	11.3
LnGrp LOS	A	A	A	A	B	B
Approach Vol, veh/h		496	696		364	
Approach Delay, s/veh		6.1	5.4		12.1	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				20.0		10.3		20.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				16.0		16.0		16.0
Max Q Clear Time (g_c+I1), s				10.6		5.5		6.0
Green Ext Time (p_c), s				2.8		0.8		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

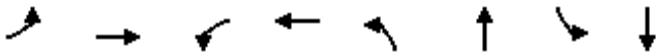
Queues
1: 62nd Street West & Rimrock Road

3/30/2016

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	254	43	76	681	89	240	519	138
v/c Ratio	0.45	0.15	0.13	0.58	0.23	0.60	0.76	0.16
Control Delay	19.1	17.8	16.7	4.5	9.1	24.6	15.7	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	17.8	16.7	4.5	9.1	24.6	15.7	9.3
Queue Length 50th (ft)	65	11	19	29	12	66	91	26
Queue Length 95th (ft)	133	34	49	99	26	125	#159	53
Internal Link Dist (ft)	919		4467			5231		921
Turn Bay Length (ft)		250		250	250		250	
Base Capacity (vph)	562	287	565	1223	394	548	721	949
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.15	0.13	0.56	0.23	0.44	0.72	0.15

Intersection Summary

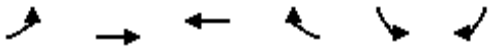
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	697	176	1214	30	297	192	107
v/c Ratio	0.08	0.55	0.46	0.70	0.08	0.64	0.71	0.21
Control Delay	9.1	17.2	12.8	15.5	11.9	16.3	31.3	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.1	17.2	12.8	15.5	11.9	16.3	31.3	15.9
Queue Length 50th (ft)	3	94	27	121	6	38	42	20
Queue Length 95th (ft)	13	164	69	#347	20	103	#110	61
Internal Link Dist (ft)		654		924		5202		920
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	243	1375	383	1723	385	666	272	649
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.51	0.46	0.70	0.08	0.45	0.71	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	118	618	756	420	322	146
v/c Ratio	0.29	0.31	0.53	0.47	0.67	0.22
Control Delay	7.8	6.6	14.5	3.8	22.9	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	6.6	14.5	3.8	22.9	5.6
Queue Length 50th (ft)	14	42	89	0	76	14
Queue Length 95th (ft)	35	76	147	48	141	36
Internal Link Dist (ft)		1579	2667		5202	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	406	1986	1431	892	586	667
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.31	0.53	0.47	0.55	0.22

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	572	161	168	722	264	168
v/c Ratio	0.53	0.16	0.48	0.66	0.66	0.36
Control Delay	7.8	1.5	11.4	10.1	22.8	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	1.5	11.4	10.1	22.8	5.4
Queue Length 50th (ft)	69	0	19	98	52	0
Queue Length 95th (ft)	131	15	#63	189	#109	31
Internal Link Dist (ft)	884			1579	5173	
Turn Bay Length (ft)		250	250			250
Base Capacity (vph)	1089	992	353	1099	432	485
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.16	0.48	0.66	0.61	0.35

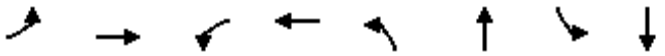
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	957	107	317	1248	171	162
v/c Ratio	0.36	0.09	0.78	0.47	0.75	0.48
Control Delay	3.3	0.8	23.5	3.9	48.5	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.3	0.8	23.5	3.9	48.5	10.0
Queue Length 50th (ft)	47	0	53	70	60	0
Queue Length 95th (ft)	67	8	#227	97	#143	45
Internal Link Dist (ft)	774			424	5188	
Turn Bay Length (ft)		250	250			250
Base Capacity (vph)	2640	1197	404	2666	229	341
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.09	0.78	0.47	0.75	0.48

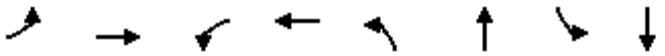
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	336	78	704	63	236	74	151
v/c Ratio	0.05	0.29	0.12	0.62	0.23	0.55	0.36	0.36
Control Delay	5.6	5.7	5.6	9.6	15.6	17.4	19.1	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	5.7	5.6	9.6	15.6	17.4	19.1	14.0
Queue Length 50th (ft)	2	32	7	88	13	42	16	26
Queue Length 95th (ft)	9	84	26	232	35	89	42	61
Internal Link Dist (ft)		837		420		5201		5188
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	336	1139	643	1128	429	646	325	647
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.29	0.12	0.62	0.15	0.37	0.23	0.23

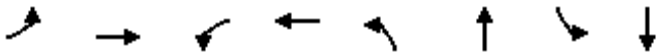
Intersection Summary



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	67	708	38	1049	6	224	78	142
v/c Ratio	0.37	0.54	0.09	0.81	0.03	0.63	0.54	0.41
Control Delay	12.6	7.2	4.8	15.2	19.4	23.8	36.2	19.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.6	7.2	4.8	15.2	19.4	23.8	36.2	19.1
Queue Length 50th (ft)	8	101	4	213	2	51	26	33
Queue Length 95th (ft)	44	228	15	#607	10	110	63	75
Internal Link Dist (ft)		5180		420		5199		5201
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	182	1320	422	1288	313	489	211	491
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.54	0.09	0.81	0.02	0.46	0.37	0.29

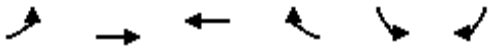
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	168	468	60	647	14	177	30	303
v/c Ratio	0.40	0.38	0.11	0.54	0.09	0.46	0.13	0.62
Control Delay	9.0	5.9	5.0	7.5	16.5	15.8	16.9	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	5.9	5.0	7.5	16.5	15.8	16.9	11.9
Queue Length 50th (ft)	17	45	5	70	3	30	7	22
Queue Length 95th (ft)	72	130	22	205	14	71	23	74
Internal Link Dist (ft)		420		5100		5198		5188
Turn Bay Length (ft)	250		250		250		250	
Base Capacity (vph)	423	1224	569	1202	262	618	381	690
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.38	0.11	0.54	0.05	0.29	0.08	0.44

Intersection Summary



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	150	346	414	282	223	141
v/c Ratio	0.35	0.39	0.46	0.31	0.46	0.26
Control Delay	9.4	7.9	8.6	2.2	13.0	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	7.9	8.6	2.2	13.0	3.6
Queue Length 50th (ft)	14	34	42	0	32	0
Queue Length 95th (ft)	50	88	109	26	67	21
Internal Link Dist (ft)		1482	2578		5231	
Turn Bay Length (ft)	250			250	250	
Base Capacity (vph)	430	894	902	921	840	833
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.39	0.46	0.31	0.27	0.17

Intersection Summary

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	Yield	147	235	161	161	930	1046	985	0.1424	0.2423
2	62nd	None	922		192		351	2021		0.4626	
3	Rimrock	None	308		999		115	890		0.3530	
4	62nd	None	224		867		440	815		0.2805	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	Yield	3.79	4.75	4.38	0.47	0.95	A	A	A
2	62nd	None	4.16		4.16	3.36		A		A
3	Rimrock	None	5.13		5.13	1.43		A		A
4	62nd	None	5.69		5.69	1.14		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	Yield	107	613	254	254	587	1066	971	0.1018	0.6486
2	62nd	None	591		187		786	2122		0.2817	
3	Rimrock	None	116		623		155	1172		0.1002	
4	62nd	None	296		545		194	1017		0.2960	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	Yield	3.69	9.98	9.04	0.33	5.84	A	A	A
2	62nd	None	2.87		2.87	1.45		A		A
3	Rimrock	None	3.18		3.18	0.31		A		A
4	62nd	None	4.94		4.94	1.28		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	None	662		44		1473	2187		0.3061	
2	54th	None	436		626		80	908		0.4907	
3	Rimrock	None	1070		636		426	1332		0.8258	
4	54th	None	216		1301		405	640		0.3476	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	None	3.21		3.21	1.80		A		A
2	54th	None	7.00		7.00	2.80		A		A
3	Rimrock	None	8.75		8.75	10.60		A		A
4	54th	None	7.92		7.92	1.64		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Rimrock	None	935		136		940	2227		0.4249	
2	54th	None	269		962		109	837		0.3285	
3	Rimrock	None	645		417		814	1754		0.3725	
4	54th	None	294		782		280	923		0.3248	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Rimrock	None	3.28		3.28	2.68		A		A
2	54th	None	6.11		6.11	1.49		A		A
3	Rimrock	None	3.14		3.14	1.80		A		A
4	54th	None	5.66		5.66	1.49		A		A

Operational Results

2017 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	62nd St West	None	575		203		222	1000		0.5938	
2	Grand Avenue	None	575		414		364	891		0.6732	
3	Grand Avenue	None	298		127		862	1040		0.2937	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	62nd St West	None	7.75		7.75	4.11		A		A
2	Grand Avenue	None	10.55		10.55	5.92		B		B
3	Grand Avenue	None	4.53		4.53	1.17		A		A

Operational Results

2017 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	62nd St West	None	328		373		389	912		0.3708	
2	Grand Avenue	None	446		201		500	1001		0.4583	
3	Grand Avenue	None	627		135		512	1035		0.6252	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	62nd St West	None	5.75		5.75	1.69		A		A
2	Grand Avenue	None	6.00		6.00	2.39		A		A
3	Grand Avenue	None	8.02		8.02	4.65		A		A

Operational Results

2017 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th St West	None	214		939		419	774		0.2873	
2	Grand Avenue	None	628		70		1083	2114		0.3030	
3	Grand Avenue	None	1206		152		546	2070		0.5973	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th St West	None	6.08		6.08	1.18		A		A
2	Grand Avenue	None	2.98		2.98	1.61		A		A
3	Grand Avenue	None	4.90		4.90	5.35		A		A

Operational Results

2017 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th St West	None	389		515		296	924		0.4347	
2	Grand Avenue	None	801		238		666	1951		0.4204	
3	Grand Avenue	None	660		151		888	2070		0.3254	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th St West	None	6.27		6.27	2.20		A		A
2	Grand Avenue	None	3.59		3.59	2.55		A		A
3	Grand Avenue	None	3.05		3.05	1.74		A		A

Operational Results

2017 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	54th St West	None	782		399		215	1903		0.4217	
2	Grand Avenue	None	1112		549		632	1798		0.6375	
3	Grand Avenue	None	511		103		1558	2110		0.2469	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	54th St West	None	4.26		4.26	2.95		A		A
2	Grand Avenue	None	5.38		5.38	5.74		A		A
3	Grand Avenue	None	2.70		2.70	1.18		A		A

Operational Results

2017 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	54th St West	None	421		680		484	1706		0.2539	
2	Grand Avenue	None	662		290		811	1979		0.3419	
3	Grand Avenue	None	1058		106		846	2108		0.5142	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	54th St West	None	3.82		3.82	1.42		A		A
2	Grand Avenue	None	3.04		3.04	1.76		A		A
3	Grand Avenue	None	4.90		4.90	4.55		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	48th Street West	None	413		1607		328	553		0.8344	
2	Grand Avenue	None	852		41		1978	1997		0.4356	
3	Grand Avenue	None	1816		119		774	2060		0.9260	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	48th Street West	None	29.34		29.34	14.41		D		D
2	Grand Avenue	None	3.38		3.38	2.52		A		A
3	Grand Avenue	None	15.74		15.74	31.09		C		C

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	48th Street West	None	300		861		381	809		0.3850	
2	Grand Avenue	None	1408		154		1007	1893		0.7691	
3	Grand Avenue	None	957		285		1277	1889		0.5196	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	48th Street West	None	6.65		6.65	1.83		A		A
2	Grand Avenue	None	8.47		8.47	11.51		A		A
3	Grand Avenue	None	3.98		3.98	3.48		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th	None	439		268		156	990		0.4519	
2	Central	None	245		526		181	851		0.2937	
3	56th	None	216		402		369	781		0.2817	
4	Central	None	303		121		497	1052		0.2921	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th	None	6.05		6.05	2.37		A		A
2	Central	None	5.56		5.56	1.21		A		A
3	56th	None	5.36		5.36	1.01		A		A
4	Central	None	4.48		4.48	1.16		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th	None	377		323		387	1028		0.3731	
2	Central	None	143		474		226	924		0.1573	
3	56th	None	307		409		208	895		0.3495	
4	Central	None	492		218		498	1094		0.4579	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th	None	5.41		5.41	1.80		A		A
2	Central	None	4.46		4.46	0.55		A		A
3	56th	None	5.60		5.60	1.52		A		A
4	Central	None	5.91		5.91	2.59		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Central	None	277		120		929	1067		0.2634	
2	48th	None	402		228		169	1006		0.4066	
3	Central	None	778		407		223	1534		0.5149	
4	48th	None	149		900		285	788		0.1928	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Central	None	4.29		4.29	1.01		A		A
2	48th	None	5.52		5.52	1.95		A		A
3	Central	None	4.03		4.03	2.86		A		A
4	48th	None	5.29		5.29	0.70		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Central	None	704		223		401	1082		0.6674	
2	48th	None	203		643		284	835		0.2480	
3	Central	None	319		246		600	1923		0.1676	
4	48th	None	269		355		210	1084		0.2518	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Central	None	9.28		9.28	6.26		A		A
2	48th	None	5.50		5.50	1.00		A		A
3	Central	None	2.31		2.31	0.62		A		A
4	48th	None	4.37		4.37	1.01		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th	None	443		488		147	853		0.5321	
2	King	None	702		451		480	872		0.8406	
3	56th	None	175		874		278	653		0.2752	
4	King	None	485		150		899	1028		0.4804	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th	None	7.89		7.89	3.27		A		A
2	King	None	17.10		17.10	13.30		C		C
3	56th	None	6.99		6.99	1.14		A		A
4	King	None	5.99		5.99	2.57		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	56th	None	216		702		372	742		0.2976	
2	King	None	561		191		727	1006		0.5689	
3	56th	None	291		597		155	796		0.3736	
4	King	None	790		284		604	958		0.8591	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	56th	None	6.32		6.32	1.24		A		A
2	King	None	7.18		7.18	3.66		A		A
3	56th	None	6.53		6.53	1.73		A		A
4	King	None	16.76		16.76	14.35		C		C

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	King	None	574		135		998	2085		0.2780	
2	48th	None	281		544		165	936		0.3053	
3	King	None	861		276		549	1650		0.5292	
4	48th	None	113		1020		117	744		0.1553	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	King	None	2.40		2.40	1.18		A		A
2	48th	None	5.13		5.13	1.26		A		A
3	King	None	3.94		3.94	3.06		A		A
4	48th	None	5.38		5.38	0.54		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	King	None	978		169		799	2189		0.4521	
2	48th	None	198		875		272	867		0.2327	
3	King	None	697		188		885	1980		0.3560	
4	48th	None	206		762		123	929		0.2257	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	King	None	3.27		3.27	2.83		A		A
2	48th	None	5.19		5.19	0.91		A		A
3	King	None	2.81		2.81	1.70		A		A
4	48th	None	4.92		4.92	0.89		A		A

Operational Results

2035 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Hesper	None	223		174		430	1039		0.2177	
2	56th	None	152		254		143	992		0.1554	
3	Hesper	None	352		155		251	890		0.4020	
4	56th	None	204		400		107	898		0.2310	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Hesper	None	4.16		4.16	0.79		A		A
2	56th	None	4.04		4.04	0.52		A		A
3	Hesper	None	5.46		5.46	1.66		A		A
4	56th	None	4.86		4.86	0.86		A		A

Operational Results

2035 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Hesper	None	332		168		163	1111		0.3032	
2	56th	None	126		266		234	1034		0.1236	
3	Hesper	None	143		193		199	1001		0.1448	
4	56th	None	180		151		185	1132		0.1610	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Hesper	None	4.52		4.52	1.29		A		A
2	56th	None	3.84		3.84	0.41		A		A
3	Hesper	None	3.90		3.90	0.47		A		A
4	56th	None	3.74		3.74	0.57		A		A

PCC Agenda

Meeting Date: 07/19/2016

Information

Subject

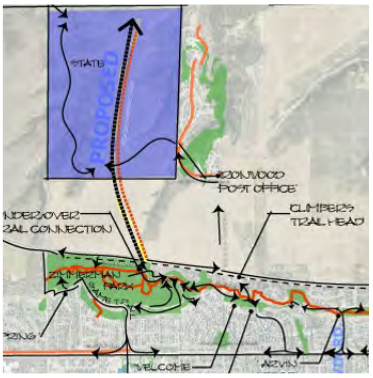
Motion. Rims to Valley Feasibility Study. Scott Walker, Transportation Coordinator, presenting.

Attachments

Rims_Valley_DRAFT

RIMROCKS TO VALLEY

BIKE|PED FEASIBILITY STUDY



BILLINGS - YELLOWSTONE COUNTY MPO METROPOLITAN PLANNING ORGANIZATION

DRAFT REPORT

APRIL 2016

SANDERSON STEWART

ACKNOWLEDGEMENTS

The Rimrocks to Valley Bike/Pedestrian Feasibility Study was conducted under the direction of the Project Oversight Committee, which included the members listed below. Along with the input of numerous community members, the guidance of the Project Oversight Committee has been essential to the success of this process and is very much appreciated.

Project Oversight Committee

Wyeth Friday, City-County Planning Division

Scott Walker, City-County Planning Division

Lora Mattox, City-County Planning Division

Jeffrey Butts, City-County Planning Division

Jared Le Fevre, Billings Chamber of Commerce

Jim Downs, Billings TrailNet

Mark Jarvis, City Parks & Recreation

Alan Woodmansey, Federal Highway Administration

Katie Potts, MDT Planning

Lyle Gabrian, Rimrock Neighborhoods Task Force

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INTRODUCTION

1

The Billings Metropolitan Planning Organization (MPO) has identified the need to study the feasibility and to evaluate alternatives for the development of separated bicycle and pedestrian facilities from Highway 3 atop the Rimrocks to existing bicycle and pedestrian facilities below. The Rimrocks are a geological sandstone formation that form an approximately 300-foot high cliff that frames the north side of Billings, Montana. The study area for the feasibility study is bound by Highway 3 on the north, Rimrock Road on the south, Zimmerman Trail on the west and North 27th Street on the east.

The following report summarizes the planning process that evaluated these bike and pedestrian route alternatives, including identification of the potential routes, recommended design features, and the public process that was conducted to gain valuable input on each of these items.

Study Area Description

One or more bike and pedestrian connections from the Rims to the Valley would provide neighborhood connectivity and access to both transportation commuters and recreational users. In addition, the City of Billings, with support and encouragement from Billings TrailNet and the Billings Chamber of Commerce Trails Committee, has been focused on the development of the Marathon Loop Trail in recent years. When all missing links are completed, this trail will form an approximately 26-mile loop around Billings with an almost entirely off-street trail system. This feasibility study evaluates alternatives for the portion of the loop that would create a connection from the top of the Rimrocks to the bottom.

Figure 1 on the following page shows the study area for the Rimrocks to Valley Bike/Pedestrian Feasibility Study and how it relates to the proposed Marathon Loop.

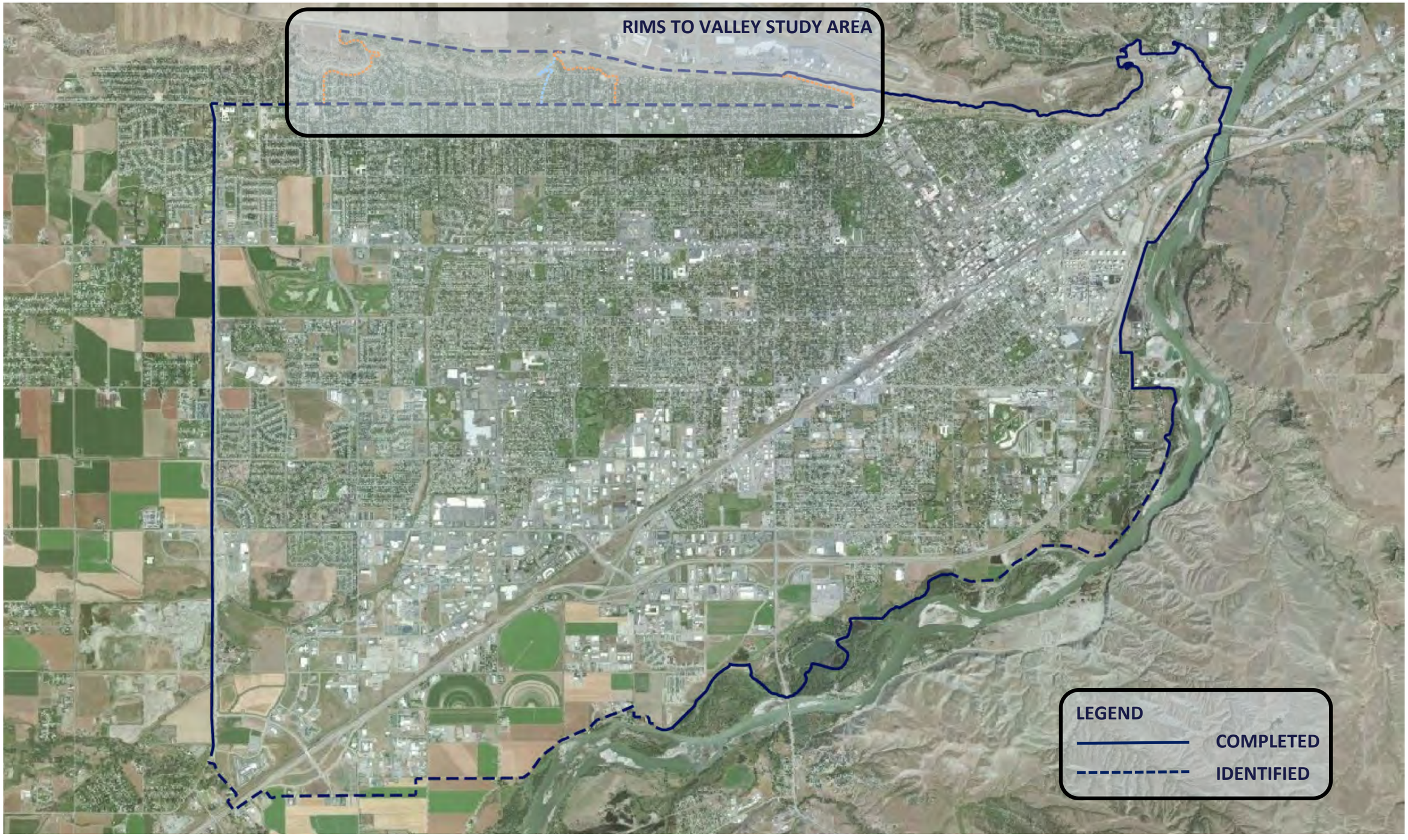

FIGURE 1 – STUDY AREA RELATIVE TO MARATHON LOOP

Goals & Objectives

The Rimrocks to Valley Bike/Pedestrian Feasibility Study provides an evaluation of bike and pedestrian route alternatives from the top to the bottom of the Rimrocks. The following objectives were outlined by the Project Oversight Committee at the onset of the study.

1. Identify routes that safely convey bicyclists and pedestrians addressing the needs of both recreational users and commuters.
2. Evaluate the feasibility of achieving ADA compliance.
3. Identify access points and place-making opportunities.
4. Consider the unique geology of the Rimrocks in the evaluation of alternatives.
5. Maintain consistency with existing community plans.
6. Identify and engage all relevant stakeholders, particularly the Rimrock neighborhoods.
7. Enhance recreational and aesthetic opportunities from atop the Rims.
8. Provide a key connection within the proposed 26-mile marathon loop trail around Billings.
9. Develop a prioritized list of short-term and long-term projects.

Public Participation Process

A thorough public participation process was conducted for the Rimrocks to Valley Bike/Pedestrian Feasibility Study in conformance with the 2009 Yellowstone County Board of Planning Participation Plan.

The following meetings were conducted as part of the plan development:

- **Project Oversight Committee Meetings** were held monthly to guide the direction of the feasibility study and a walking tour with the POC was held at the onset of the project.
- **Neighborhood Meetings** were held on October 13 and 14, 2015 adjacent to the proposed trail routes to discuss design concepts, ideas and concerns of nearby property owners.
- A **Rimrock Neighborhoods Task Force** meeting was attended on October 21, 2015 and a project overview was provided.
- **Public Meeting No. 1** was held on December 2, 2015 to introduce the feasibility study and identify issues important to stakeholders.
- **Public Meeting No. 2** was held on February 3, 2016 to present the route alternatives and request input on various access points and amenities for each route.

The following additional public meetings will be held for review and approval of the feasibility study, the dates of which are to be determined:

- **Technical Advisory Committee**
- **Yellowstone County Board of Planning (Public Hearing)**
- **Billings City Council**
- **Yellowstone County Commission**
- **Policy Coordinating Committee**

A project website was developed as a location to post draft documents for review and as a tool to request additional public input. The web address is www.sandersonstewart.com/projects/rimstovalley.

The draft and final document will also be posted on the City of Billings website at http://ci.billings.mt.us/index.aspx?NID=2336.

Related Projects

Highway 3 Corridor Study. Completed in 2015, the Highway 3 Corridor Study addresses current vehicle and non-motorized traffic circulation and access along the corridor, as well as plans for future changes to traffic patterns caused by the Inner Belt Loop connection and development activity. Recommendations consisted of several projects that relate to the Rims to Valley Feasibility Study, including a multi-use pathway that extends from North 27th Street to Apache Trail, a roundabout and grade separated crossing at the Highway 3/Zimmerman Trail intersection, and parking/trailhead facilities along Highway 3.

Zimmerman Trail. The City of Billings recently completed a rock fall mitigation project on Zimmerman Trail and they are currently designing additional improvements to the roadway and surrounding areas in coordination with the Montana Department of Transportation (MDT). Design alternatives were still being considered at the time of this study, but it is anticipated that they will generally consist of wider shoulders, stormwater improvements and slope stabilization. MDT has also recently nominated an intersection improvement project with safety funds for the installation of a roundabout at Zimmerman Trail and Highway 3.

Inner Belt Loop. The Inner Belt Loop is a proposed rural bypass roadway project that will provide a new connection between the Heights and West End regions of Billings. The south terminus of the new road has been proposed at the existing intersection of Highway 3 and Zimmerman Trail, but other options are still being considered. Alignment alternatives and intersection improvements were evaluated in the 2006 Inner Belt Loop Connection Planning Study and the 2010 Inner Belt Loop Design Traffic Report. Recommendations include a multi-use pathway along the east/south side of the roadway.

Billings Urban Area Long Range Transportation Plan. The 2014 transportation plan identifies long-range transportation projects in the area. It identifies improvements along Zimmerman Trail and the proposed Inner Belt Loop, as well as a future connection between Highway 3 and Molt Road.

Billings Area Bikeway & Trail Master Plan. This plan outlines a proposed short-range, on-street bike lane along Highway 3 east of Rod & Gun Club Road and a long-range bike lane west of this intersection. The plan also identifies proposed short-range bike lanes on North 27th Street, Airport Road and Zimmerman Trail, as well as long-range bike lanes on Rod & Gun Club Road and the Inner Belt Loop. The plan also identifies several existing primitive/unimproved trails around the Rimrocks.

ROUTE ALTERNATIVES

2

The study area for this project is approximately 3 miles in length measured from east to west. Although it's fairly vast, the terrain is very steep and there are really only a very small number of locations where a route from the top to the bottom of the Rims is even possible. The project team was aware of these possible routes from past projects and our own recreational experiences in the area, but these potential routes were further explored with the Project Oversight Committee during a walking tour held early in the project process.

The following paragraphs provide a summary of the four route alternatives identified. These routes are also illustrated in Figure 2 on page 7.

Alternative 1: Stagecoach Trail

Referred to as the Stagecoach Trail, the first route alternative is adjacent to Zimmerman Trail, a two lane roadway that traverses from the bottom to the top of the Rimrocks at the western boundary of the study area. This roadway is steep and narrow and does not provide a safe on-street facility for bikes and pedestrians. The Zimmerman Trail right-of-way is owned and maintained by the City of Billings. The City of Billings and MDT have a design project currently underway for reconstruction of Zimmerman Trail and a separate project for the design of a roundabout at the intersection of Zimmerman Trail and Highway 3. The proposed trail along this route would be located along the east side of the roadway and would be placed below the grade of the road along the roadside slope.

Alternative 2: Myers Trail

The second route alternative would follow an existing natural trail known as the Myers Trail. It runs from the north end of Country Club Circle below the Rims and traverses up to the top of the Rims just east of Sky Ranch Condominiums. This trail was at one time a private driveway used to access the old Myers family home on top of

the Rims. The terminus of the Myers Trail at the top of the Rims coincides well with one of the trailheads/parking areas recommended in the Highway 3 Corridor Study.

This is an existing trail that is used often, but the current alignment crosses private property at the south end and it has some challenging sections that may be difficult for some users.

Alternative 3: Morledge Trail

The third alternative is the Morledge Trail. This route begins at the north end of 17th Street West and routes west through property owned by City of Billings Public Works. Just north of the large water tank on this property, the trail would transition onto private property owned by the Morledge family. The trail would be located toward the south side of their property and would route up and around a couple of coulees before transitioning back to public property. The trail would then need to cross a large coulee area, possibly with a boardwalk type of structure, as it ramps up toward the top of the Rims and ends in approximately the same location as the Myers Trail at the top.

The Morledge property is undeveloped and is approximately 10 acres in size. The project team has had several conversations with the Morledge family through this process and they have stated their approval of the proposed trail location and their willingness to grant a trail easement.

Alternative 4: 27th Street Trail

The final route alternative considered in this study runs along North 27th Street. It would begin near the existing trail underpass at the intersection of North 27th Street/Highway 3/Airport Road and would continue to the southeast along North 27th Street. It would be located behind the existing guard rail on the south side of the roadway. Right-of-way is limited around the ramp that curves around to Rimrock Road, so the proposed trail would instead route through public property and connect to the north end of Yucca Street.

It appears that there is existing width available on North 27th Street to consider an on-street option for bicycles as well. Both bikes and pedestrians could use the off-street multi-use trail, but bikes will likely be traveling at a fairly high speed when going downhill. In this case, a safer option may be to consider separate facilities for bikes and pedestrians. On-street bike lanes in this location would require restriping on North 27th Street and approval to do so would be needed from MDT. If possible, a 3-foot striped buffer would be ideal for this alternative in order to provide greater separation between the bike lane and the outside travel lane.

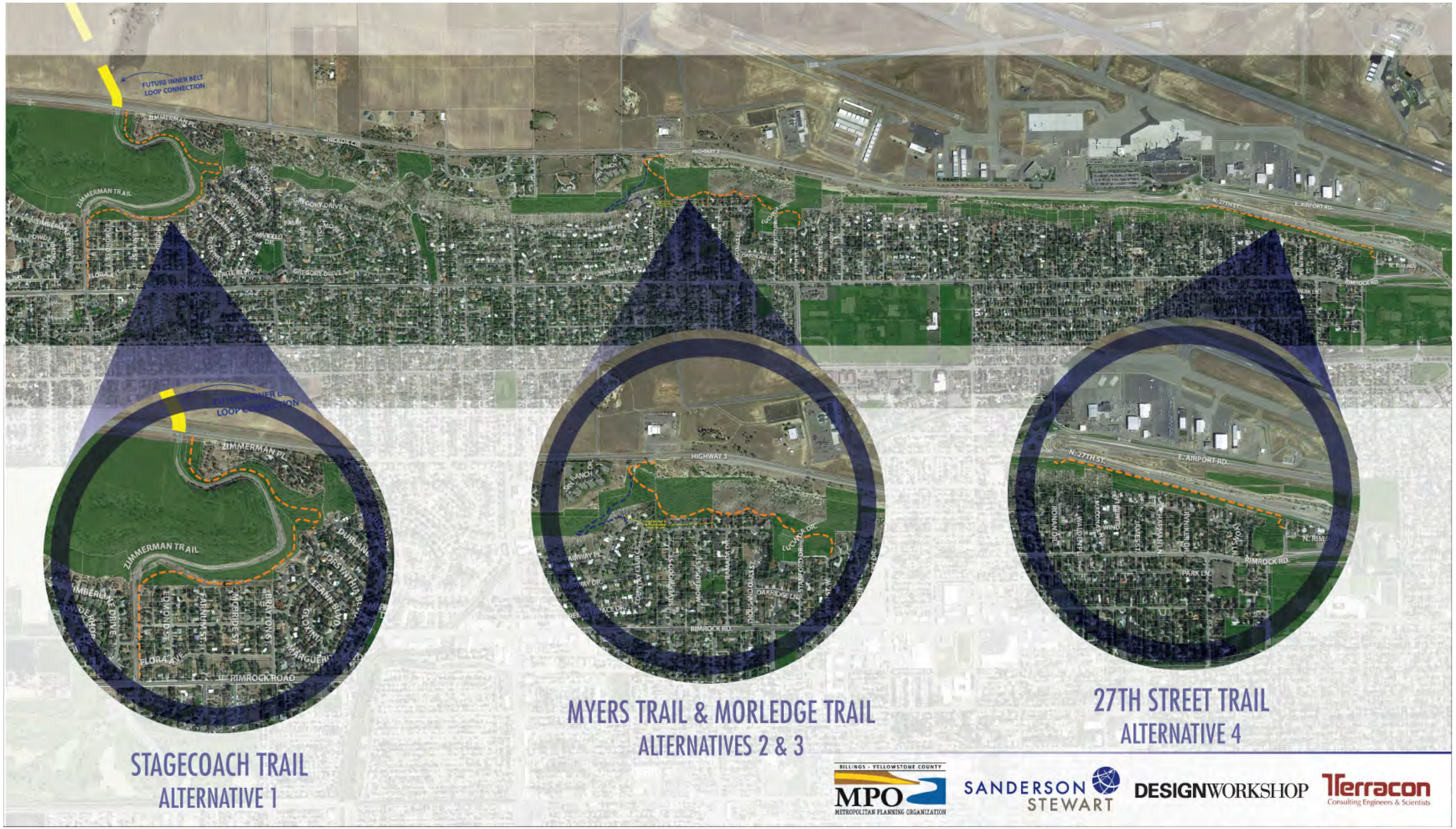

FIGURE 2 – ROUTE ALTERNATIVES

RECOMMENDED IMPROVEMENTS

3

A preliminary design of each of the four route alternatives was completed in order to evaluate slopes, consider different surfacing options, and ultimately to provide a well-vetted opinion of probable cost for each alternative. The following section provides an overview of those considerations.

Design Features

The development of this feasibility study began with 3-D laser scanning of the Rim face within the areas identified for the four potential route alternatives. The resulting scan data was then reduced into AutoCAD format for the development of base drawings for preliminary design. A trail alignment was then drafted for each of four alternatives including a preliminary design in plan and profile view in order to determine the best fit available for both horizontal and vertical alignment. The resulting plan and profile sheets are provided in Appendix A.

Longitudinal Slope

One of the primary goals of this study was to evaluate the feasibility of achieving compliance with the Americans with Disabilities Act (ADA) design standards, primarily as they relate to longitudinal slopes. The maximum longitudinal slope for ADA compliance is generally considered to be 5%. Although some guidelines allow for steeper slopes for short distances as long as level landing areas are provided in between.

Considering the challenging terrain of the Rimrocks, and as can be seen by the profiles in Appendix A, it was clear that we would not be able to meet these traditional slope standards with any of the four routes being evaluated. This is a concern because the federal funding sources often used for trail design and construction require ADA compliance. However, after further research and discussions with the Federal Highway Administration (FHWA), it is our assessment that although the routes may not be considered "ADA accessible," they could be considered "ADA compliant" to the extent practicable and could therefore still be considered eligible for federal funding. They will likely require additional documentation during design to support the exceptions to ADA standards and show that ADA compliance is not practicable due to terrain.

There are many different guidelines available and the determination of which standards to use can depend on how the routes are designated: trails, access routes, paths, etc. The guidelines that were considered most applicable to this particular situation include the following:

- US Access Board's Architectural Barriers Act (ABA) standards (Sections 1016, 1017 and 1019), which discuss outdoor recreation access routes and trails - https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/aba-standards/chapter-10-recreation-facilities
- FHWA's Best Practices Design Guide (Chapters 14 and 15) - http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks214.cfm
- Proposed Public Rights-of-Way Accessibility Guidelines (PROWAG) - https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/proposed-rights-of-way-guidelines

Although the Stagecoach and 27th Street alternatives may be at least partially located within highway right-of-way, the PROWAG standards do not adequately address the unique challenges associated with terrain on these routes. Therefore, it is our assessment that documentation of conditions for exceptions outlined in the other documents, namely "Compliance is not practicable due to terrain," would adequately address ADA compliance.

Surfacing

ADA compliant routes are also traditionally considered to have a paved surface, either asphalt or concrete. However, the ABA standards referenced above state that surfaces "shall be firm and stable," but are not necessarily required to be paved. If snow removal during winter months is not considered a necessity, then firm and stable surfaces do not need to be paved surfaces. Shared-use paths are generally paved with asphalt or concrete, but may also use prepared surfaces such as crushed stone or soil stabilizing agents mixed with native soils or aggregates. It's possible that an asphalt surface may not hold up very well within the direct vicinity of the Rimrocks and a natural surface would allow for more flexibility in terms of fixing problem areas (heaving and settling) that will be inherent in this terrain. The selected surface should be fitting of the landscape and easy to maintain.

There is a strong desire by the Chamber Trail Committee to eventually promote the Marathon Loop as a destination for running events that would draw athletes from throughout the Country. To that end, they are encouraging the use of asphalt or crushed rock surfaces, rather than concrete, because runners prefer the softer surfaces.

There is one location along the Morledge Trail alternative where a boardwalk may be used to "bridge" the coulee area at the west end and limit impacts to the natural drainage and terrain. This boardwalk would need to be constructed with the longitudinal slope needed to climb to the top of the Rims in this location. A variety of materials are available for construction of the boardwalk (i.e. wood, concrete, plastic, and steel). All of these materials should be considered "firm and stable" by the ABA standards noted above.

Railings

There are many locations where the terrain would also require trail construction with steep side slopes. The designs shown in Appendix A include side slopes steeper than 3:1 (vertical to horizontal) in many locations in order to avoid impacts to adjacent properties associated with long catch slopes. It has been assumed that a combination of slope stabilization (e.g. retaining walls) and railings would be required in these locations. Railings and other built

structures would be designed to utilize textures, colors, and materials that fit the surrounding context of the trail. Construction of these elements could include the use of natural materials, steel and concrete with natural color or self-weathering finishes, steel and concrete with standard finishes, or a combination thereof.

Geology of the Rimrocks

Another important design consideration in this feasibility study is the geology of the Rimrocks. There has been a history of rock fall hazards and drainage concerns that could potentially be exacerbated with new infrastructure improvement projects if not planned for accordingly. Terracon, a geotechnical engineering firm with extensive experience working in and around the Rimrocks, provided valuable input on this feasibility study. Their report is provided in Appendix B. It provides a summary of potential geologic concerns associated with each of the four route alternatives along with the potential mitigation required.

The primary concern raised by Terracon is associated with the Stagecoach Trail and the segment that follows the base of the cliff directly above Forsythia Boulevard in particular. This is a rockfall area that should either be avoided or mitigated in some way. Terracon is part of the consultant team working on the Zimmerman Trail project, including the bid alternate for the trail. This allows for good coordination between this feasibility study and the upcoming design effort.

Before and After Graphics

The following illustrations demonstrate how the possible future alignments could be woven into the existing landform of the Rimrocks. While not intended to be an exact representation of the future, they serve to help visualize some of the key aspects related to each trail alignment including how they integrate into the dramatic topography, trailhead locations, connections to other trails, and points of interest/scenic overlooks. The four views reveal the general nature of each alignment and their relationship to the Rimrocks and surrounding neighborhood context. More detailed programming and design for each of the alignments would occur in the future when funding was available for construction.

HIGHWAY 3 / ZIMMERMAN PARK TRAILHEAD

STAGECOACH TRAIL ALIGNMENT

POTENTIAL POINT OF INTEREST / TRAILHEAD LOCATION

TRAIL PARALLELS ZIMMERMAN TRAIL TO RIMROCK RD

POTENTIAL POINT OF INTEREST ALONG TRAIL

FORSYTHIA BLVD. TRAIL CONNECTION

FIGURE 3 – STAGECOACH TRAIL – BEFORE AND AFTER

FIGURE 4 - MYERS TRAIL – BEFORE AND AFTER

FIGURE 5 - MORLEDGE TRAIL – BEFORE AND AFTER

FIGURE 6 - 27TH STREET TRAIL – BEFORE AND AFTER

FIGURE 7 - 27TH STREET ON-STREET CONCEPT

Trailheads

The nature of the trailhead amenities at each potential trail access point can range in the level of improvements from very low intensity such as a simple sign/trail marker to more high intensity trailhead options with parking and other facilities. The following classifications describe potential trailhead improvements that build from low to high intensity. Different treatments and combinations of the amenities can be explored in later design phases to suit the range of needs and character of the locations along the potential alignments.

- **Low Intensity or Trail Access Point**
  - Simple trail signage/wayfinding. No formal parking or other amenities.
- **Medium Intensity or Minor Trailhead**
  - Potential amenities include parking for 3-5 cars, signage kiosk, trash receptacles, seating, bike racks, etc.
- **High Intensity or Major Trailhead**
  - Potential amenities include parking for 5-15 cars, shade structures, picnic tables, restrooms, etc.

The community engagement process revealed the stakeholders' preferences for the level of intensity desired for each distinct location. Figure 8 on the following page summarizes the polling results from the second public meeting and identifies high, medium and low intensity trailhead locations. Participants generally supported more high intensity or major trailheads along the top of the Rimrocks in conjunction with proposed trail and parking improvements along Highway 3. Lower intensity treatments were preferred for most of the other locations, especially those that were situated in residential neighborhoods. The location along the Stagecoach Trail near the southern end of Zimmerman Park received a mixed response divided between the high, medium and low options. At the moderate and high intensity trailheads, participants were most interested in including amenities such as signage and wayfinding, trash receptacles/dog waste stations, and restrooms.

Place-making Opportunities

The feasibility study identifies several opportunities for place-making and scenic viewpoints that take advantage of the Rimrocks' dramatic and unique topography. In these locations, the user experience can be enhanced by integrating standard amenities with custom elements tailored to celebrate and communicate information about the Rimrocks geology, vegetation, and cultural history. Similar to trailheads, amenities at scenic viewpoints can range from simple educational or directional signage to more elaborate overlooks or shade structures.

Stakeholder input showed a preference for lower intensity amenities such as interpretive signage at key locations along the trails or medium intensity elements including kiosks and seating opportunities. Higher intensity features such as large shade structures were not as well supported.

Two important place-making opportunities were identified in the study that could substantially enhance the overall trail experience. The first is located at the top of the Rims near where the Myers and Morledge trails intersect. This area also coincides with proposed parking and trailhead improvements identified in the Highway 3 Corridor Study completed in 2014. A relatively large flat bench in the steep topography creates an excellent zone for picnic and seating areas that would be easily accessible from the nearby parking area along Highway 3. Scenic views down the coulee and out over the city of Billings are also quite striking in this location.

Another opportunity for place-making is near the top of the 27th Street Trail alignment at the junction with the Swords Park Trail underpass. This is an important trail connection and adds to the multi-use capacity of the proposed improvements. The Swords Park Trail continues from this point east to connect with another parking and trailhead location along Airport Road. This location currently acts as an entrance into the community and a significant overlook structure would add to the distinct sense of arrival.

FIGURE 8 - COMMUNITY POLLING PREFERRED TRAILHEAD INTENSITY

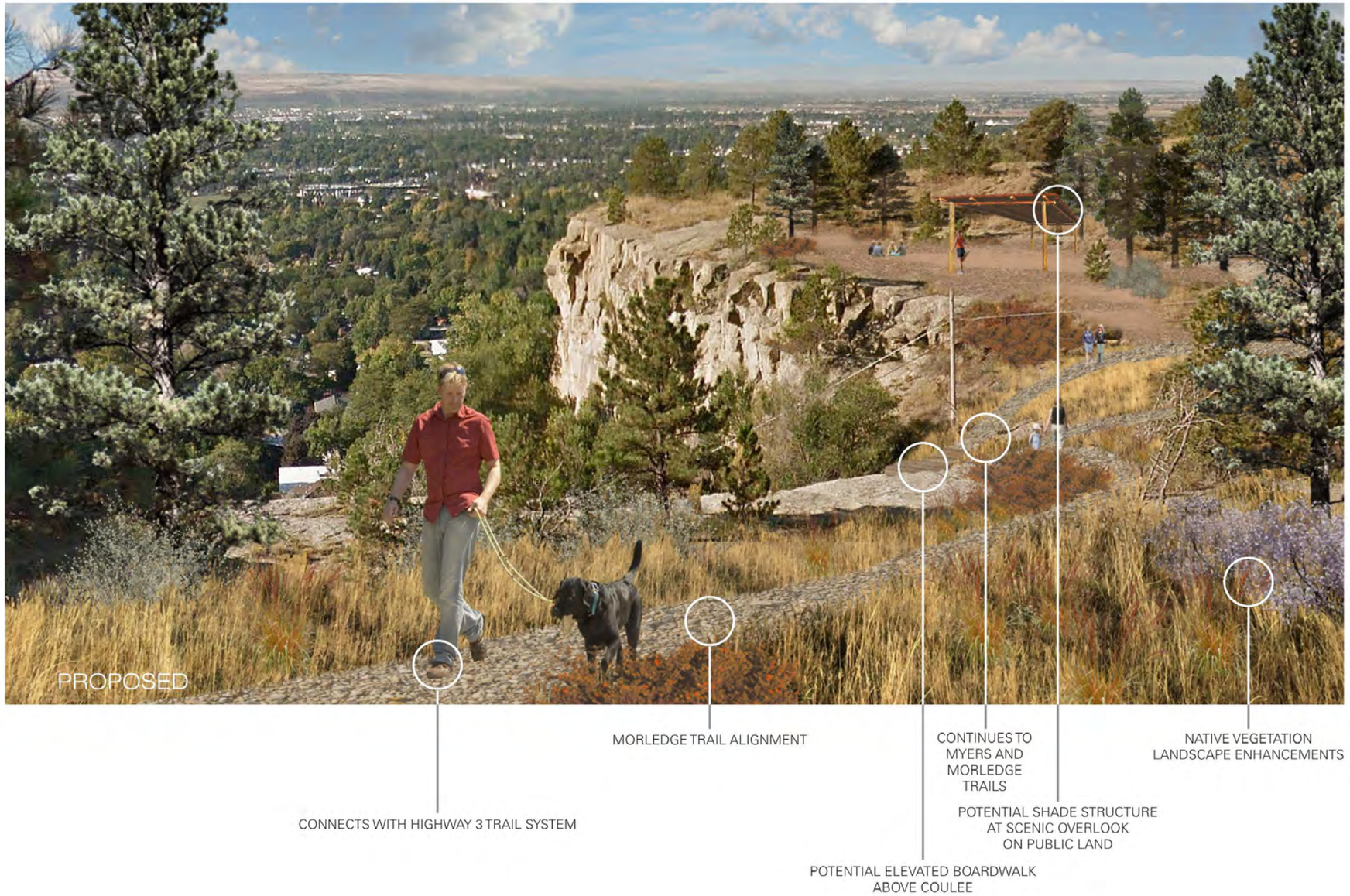

FIGURE 9 - MYERS AND MORLEDGE TRAIL – POTENTIAL POINT OF INTEREST

FIGURE 10 - 27TH STREET TRAIL – POTENTIAL POINT OF INTEREST

Public Input

Public Meeting No. 1 Comments

At the first public meeting, a questionnaire was distributed to attendees and 20 responses were received. It included questions about the potential benefits and anticipated use of these routes, as well as parking, access, safety and maintenance. A brief summary of the responses is provided in Table 1 on the following page and detailed responses are included in Appendix C.

Overall, it was clear that the majority of respondents (95%) recreate within or around the Rims and the majority (95%) are in support of a trail from the top to the bottom of the Rims. Respondents were split on whether the trail should have a paved or natural surface, but there was clear support for parking at trailheads and more clearly defined public access points.

Public Meeting No. 2 Community Polling Results

During the second public meeting, a series of questions were presented regarding the proposed design alternatives and attendees provided their answers on a response sheet. Topics included the trail surface and character for each of the alternatives, prioritization criteria, locations and amenities for trailheads, and improvements for more developed points of interest. A total of 42 people participated in the community polling, including representatives from the City, County and MDT that were in attendance at the public meeting. Table 2 on page 22 provides a summary of the top-rated response(s) for each question presented. A complete compilation of the key pad polling results is provided in Appendix D.

Several key observations were made based on the results of the polling activity. Addressing safety concerns and providing recreational value were the respondents' top two prioritization criteria whereas funding and low cost/maintenance were rated much lower as a determinant for selecting which alignments to proceed with first.

Alignment #1 – Stagecoach Trail, followed closely by Alignment #4 – 27th Street Trail, received the highest rankings for improving connectivity and safety, both in terms of impact and urgency, in traveling from the Rimrocks to the valley floor. A multi-use, dual surface pathway was the preferred trail character for the Stagecoach Trail Alignment, whereas a multi-use paved surface was preferred for the 27th Street Alignment

Generally, there was a preference for natural surface or dual surface trails for the two interior alignments (Myers and Morledge Trails) and paved options for the exterior alternatives (Stagecoach and 27th Street). Natural materials, colors, textures, and self-weathering finishes were preferred overall for the character of built structures on all four alignments. Standard finishes on steel and concrete structures were not rated highly, which speaks to the recognition by the community that the Rimrocks are a special environment and warrant more context-sensitive solutions.

The community's preferences for low, medium, and high intensity trailhead locations were also identified, as well as the most important amenities to include. Signage and wayfinding, trash receptacles and dog waste stations, and restrooms were shown to be the most desired improvements at more developed trailheads.

TABLE 1. PUBLIC MEETING NO. 1 COMMENT SUMMARY

General	
Do you think a trail would be beneficial from the top to the bottom of the Rims?	**Yes - 19 (95%)** **No - 1 (5%)**
If such a trail existed, would you use it?	**Yes - 18 (90%)** **No - 2 (10%)**
Should the trail be paved or a natural surface?	**Paved - 7 (35%)** **Natural - 3 (15%)** **Combo - 10 (50%)**
Parking & Facilities	
Should parking or other facilities be provided at the trailheads?	**Yes - 14 (70%)** **No - 4 (20%)** **Maybe - 2 (10%)**
Access	
Do you support more clearly defined public access points and routes?	**Yes - 17 (85%)** **No - 2 (10%)** **Didn't Answer - 1 (5%)**
Safety	
Would you be interested in participating in a volunteer patrol?	**Yes - 9 (45%)** **No - 6 (30%)** **Maybe - 3 (15%)** **Didn't Answer - 2 (10%)**
Maintenance	
Would you support or be willing to participate in volunteer maintenance & cleanup events?	**Yes - 16 (80%)** **No - 3 (15%)** **Maybe - 1 (5%)**
Are you concerned about proper on-going maintenance being provided on a new trail?	**Yes - 11 (55%)** **No - 6 (30%)** **Didn't Answer - 3 (15%)**
Usage	
Do you live and/or work adjacent to the Rims?	**Yes - 15 (75%)** **No - 4 (20%)** **Didn't Answer - 1 (5%)**
Do you recreate within or around the Rims?	**Yes - 19 (95%)** **No - 0 (0%)** **Didn't Answer - 1 (5%)**

TABLE 2. PUBLIC MEETING NO. 2 COMMUNITY POLLING SUMMARY

Question Summary [1]	Top Rated Response [1]	
	% of Total Votes	Description
Trail Character:		
Preferred trail type/surface for Alignment #1: Stagecoach Trail?	34%	Multi-Use (Dual Surface)
Preferred trail type/surface for Alignment #2: Myers Trail?	24%	Improved (Paved)
Preferred trail type/surface for Alignment #3: Morledge Trail?	24%	Improved (Crushed Rock)
	24%	Multi-Use (Dual Surface)
Preferred trail type/surface for Alignment #4: 27th Street Trail?	34%	Multi-use (Paved)
Character of Built Structures:		
Appropriate character for built structures for the two outer alignments near existing roadways (Stagecoach Trail and 27th Street Trail)?	49%	Any of the choices shown would be fine (Natural materials; Steel/Concrete with natural materials, weathered finish, or color; and/or Steel/concrete with galvanized or standard finish)
	37%	Steel/concrete with natural materials, weathered finish, or color
Appropriate character for built structures for the two alignments that connect through the center of the Rims (Myers Trail and Morledge Trail)?	34%	Any of the choices shown would be fine (Natural materials; Steel/Concrete with natural materials, weathered finish, or color; and/or Steel/concrete with galvanized or standard finish)
	32%	Natural materials only (boulders, wood, etc.)
Impact vs. Urgency Rankings		
Connectivity Ranking - Most Immediate Need and Greatest Impact	#1	Alignment #1 - Stagecoach Trail
	#2	Alignment #4 - 27th Street Trail
Safety Ranking - Most Immediate Need and Greatest Impact	#1	Alignment #1 - Stagecoach Trail
	#2	Alignment #4 - 27th Street Trail
Prioritization Criteria:		
Most important criteria when selecting which trail alignment(s) to implement first are?	61%	Addressing safety concerns
	61%	Providing recreational value
Trailhead Locations:		
Potential trailhead locations appropriate for LOW INTENSITY amenities? (no formal parking, trail signs only, etc.)	54%	Stagecoach Trail at Forsythia Blvd
	56%	Myers Trail at Country Club Circle
Potential trailhead locations appropriate for MEDIUM INTENSITY amenities? (minimal parking (3-5 cars), signage kiosk, trash receptacles, seating, bike rack, etc.)	34%	27th Street Trail at Yucca Street
	29%	Stagecoach Trail near southern end of Zimmerman Park
	29%	Myers/Morledge Trails at Highway 3
Potential trailhead locations appropriate for HIGH INTENSITY amenities? (parking for 5-15 cars, shade structure, picnic tables, restrooms, etc.)	66%	27th Street Trail at Highway 3
	59%	Stagecoach Trail at Highway 3
Trailhead Amenities:		
The trailhead amenities I am most interested in seeing at the moderate and high intensity trailheads include:	71%	Signage and wayfinding
	68%	Trash receptacles / dog waste stations
	41%	Restrooms
Points of Interest:		
Would you like to see points of interest at specific locations along the potential trail alignments?	41%	Yes, specific points of interest are appropriate for LOW intensity amenities.
	37%	Yes, specific points of interest are appropriate for MEDIUM intensity amenities.

[1] Complete question descriptions, lower-rated responses, and additional voting information is shown in Appendix D.

Opinion of Probable Cost

In order to plan for the future implementation of the routes proposed within this feasibility study, it is important to consider the associated construction costs of such projects. An opinion of probable cost for each route has been developed for both the crushed stone and paved surfacing alternatives. The results are summarized in Table 3 below and Appendix Eoh. These cost estimates all include unclassified excavation and imported fill as needed to achieve the design slopes, as well as surfacing materials, geotextile reinforcement, slope stabilization and walls, railing, erosion control fabric, miscellaneous signage, topsoil and seeding. The estimate for the Morledge Trail alternative includes the boardwalk structure recommended at the west end. All of the estimates also include a 20% contingency and 15% for design and construction administration services.

The Stagecoach Trail and the Morledge Trail are the two most expensive options. This is not only because they are longer routes, but also because they require much more earthwork and slope stabilization than the Myers Trail and the 27th Street Trail.

TABLE 3. OPINION OF PROBABLE COSTS

Trail Route Alternative	Opinion of Probable Cost[1]	
	Compacted Crushed Stone 8 ft wide	Paved Surface 8 ft wide
Stagecoach Trail	$912,300	$1,213,400
Myers Trail	$501,600	$632,500
Morledge Trail	$1,005,600	$1,195,300
27th Street Trail	$260,800	$437,700

[1] All cost estimates include 20% contingency and 15% for design and construction administration services.

Next Steps

It is important to note that the intent of this project was never to select one single bike/pedestrian route from the top of the Rims to the bottom. Some alignments will serve more recreational-based needs and others will provide more multi-use transportation connectivity. Overall, all four routes that have been identified are viable alternatives and should be considered with equal priority as opportunities for implementation arise.

For example, there is a possibility that the Stagecoach Trail will be designed and constructed with the City of Billings/MDT road project on Zimmerman Trail. This element of the work will be included as an alternate, so whether it is actually implemented will depend on the cost of the construction bids and if it can be incorporated into the overall project budget. However, this is a great opportunity to establish momentum and build one of these routes within the very near future. Other routes should be considered in coordination with other adjacent projects or when the opportunity arises to secure funding or to acquire right-of-way or easements where needed.

Potential funding sources available for standalone trail projects include the MDT's Transportation Alternatives Program and Montana Fish, Wildlife and Parks Recreational Trails Program. Additional information on these funding programs is available on the following websites:

- Transportation Alternatives – www.mdt.mt.gov/mdt/ta_application.shtml
- Recreational Trails – www.stateparks.mt.gov/recreation/rtpGrants.html

Both of these programs are funded through the Federal Highway Administration and both were included in the recent federal transportation bill reauthorization, so funding should be available through these programs for at least the next four to five years. All four route alternatives may not necessarily be eligible for both programs, depending on their primary use as a transportation or recreational facility, so consideration would need to be given to determine the best funding source for each individual project.

APPENDIX A: PLAN & PROFILE SHEETS

SANDERSON STEWART
WWW.SANDERSONSTEWART.COM

DATE: XX/XX/20XX
FILE: 15055_CONCEPT_BASE.DWG
PROJECT NO: XXXXX.XX
CAD: XXX
QUALITY ASSURANCE:
REVISIONS
DATE DESCRIPTION

RIMROCKS TO VALLEY
RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASABILITY STUDY
BILLINGS, MONTANA
PLAN AND PROFILE - ZIMMERMAN TRAIL

C1.0

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TO PLAN AND DESIGN ENDURING COMMUNITIES...

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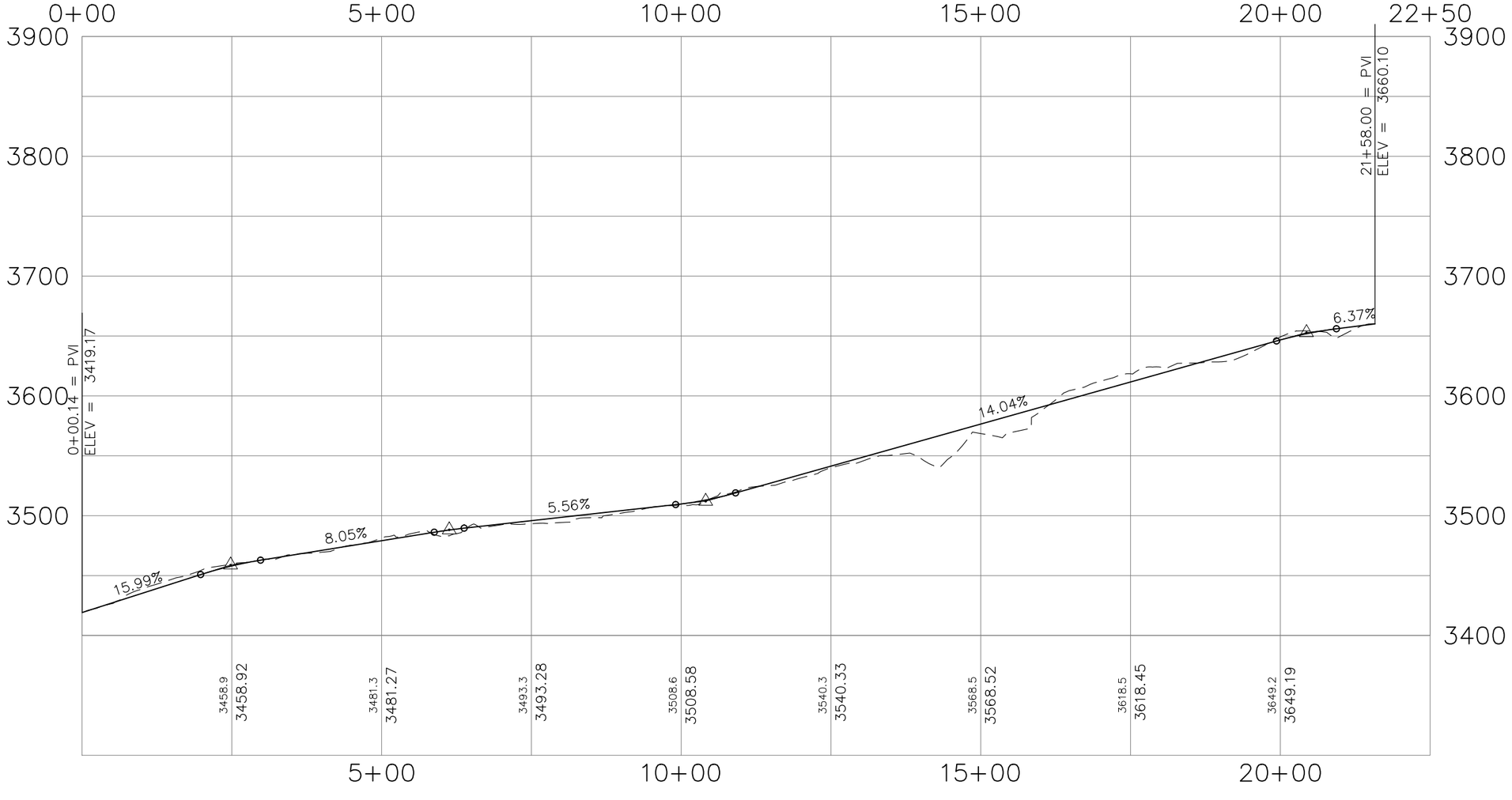

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RIMROCKS TO VALLEY
RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASABILITY STUDY
BILLINGS, MONTANA
PLAN AND PROFILE - COUNTRY CLUB CIRCLE

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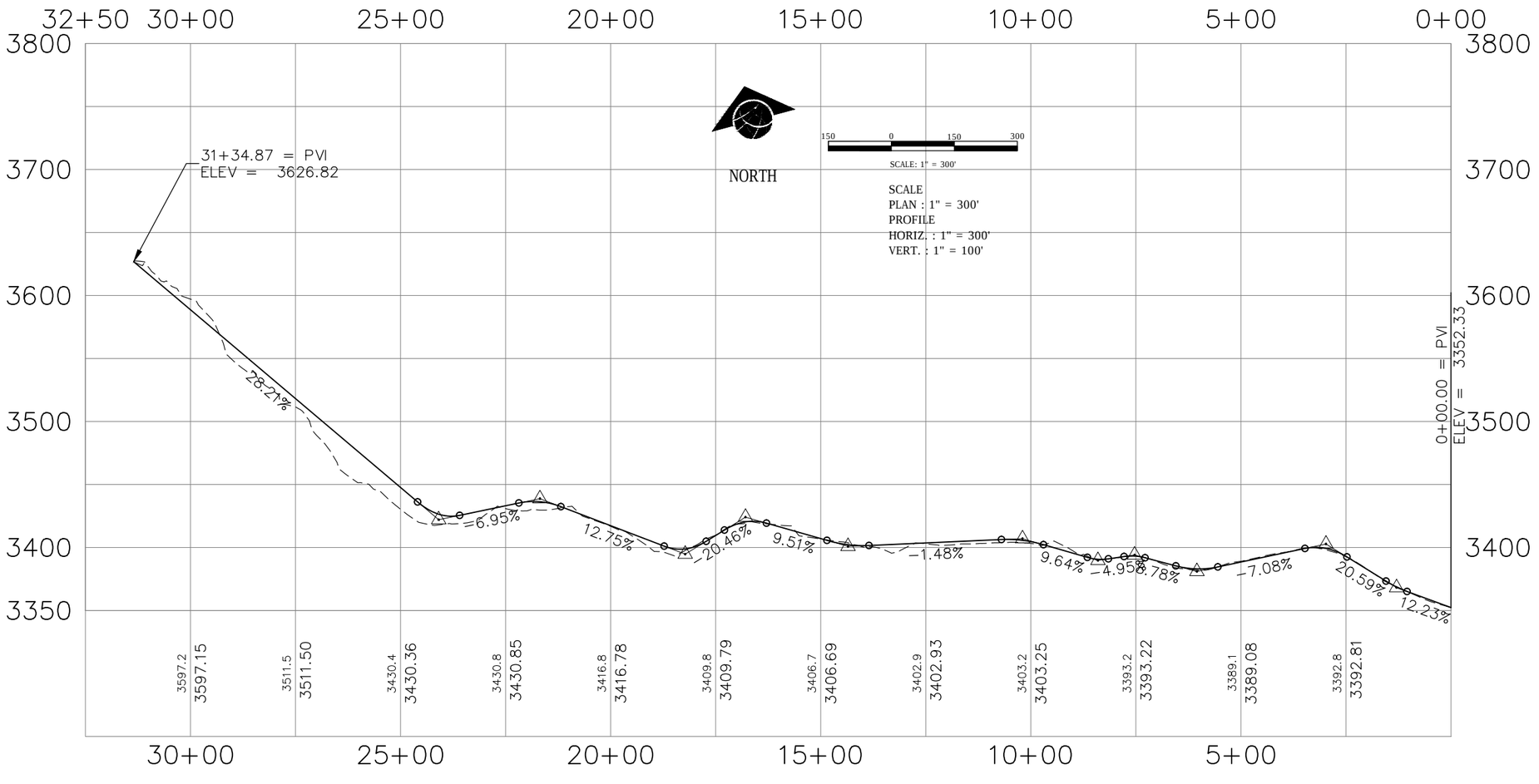

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RIMROCKS TO VALLEY
RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASABILITY STUDY
BILLINGS, MONTANA
PLAN AND PROFILE - COUNTRY CLUB CIRCLE EAST OPTION

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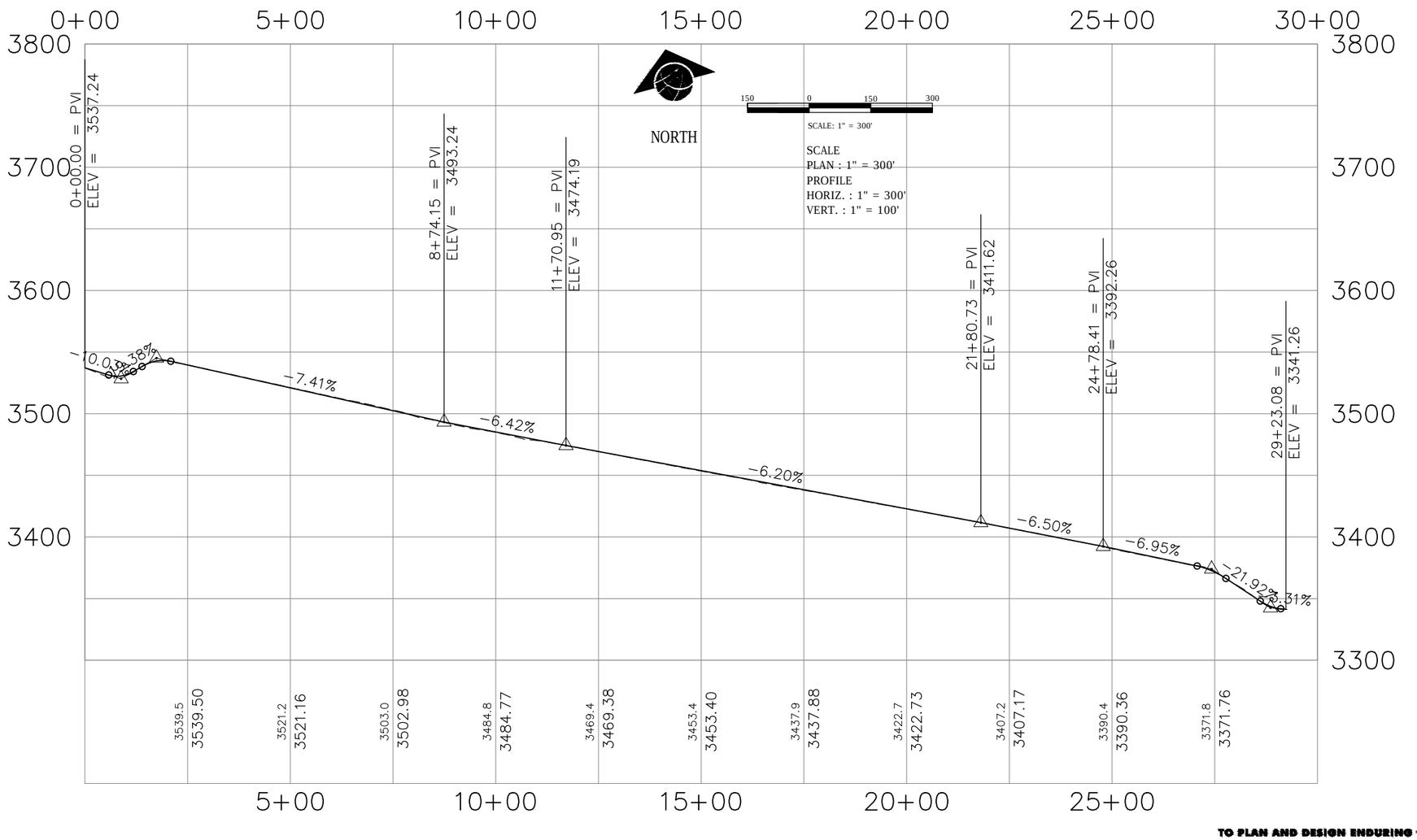

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REVISIONS

DATE	DESCRIPTION

RIMROCKS TO VALLEY
RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASABILITY STUDY

BILLINGS, MONTANA

PLAN AND PROFILE - NORTH 27TH STREET

C4.0

TO PLAN AND DESIGN ENDURING COMMUNITIES...

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APPENDIX B: GEOLOGY & ROCKFALL EVALUATION

ROCKFALL POTENTIAL EVALUATION
RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASIBILITY STUDY
Terracon Consultants, Inc.

Terracon Consultants, Inc. (Terracon) has completed a pedestrian survey of potential rockfall that could affect the proposed trail alignments that have been developed for the Rimrocks to Valley Bike and Pedestrian Feasibility Study. A general discussion of the geology of the rims and rockfall mechanics is provided below and is followed by a brief discussion of each trail alternate.

Rims Geology and Rockfall

The rims on the north side of the Yellowstone Valley are cut into sandstone and shale of the Cretaceous Eagle Sandstone and Telegraph Creek formations. Along most of the rims between North 27th and Zimmerman Trail there are two sequences of the Eagle Sandstone which can be seen (Sequence #1 and Sequence #2). The lowest, Sequence #1, is located directly above the Telegraph Creek shale and the transition from shale into the overlaying sandstone is gradual. The change between the sandstones of Sequence #1 and Sequence #2 is more dramatic and can easily be traced. The top of Sequence #1 contains a fine-grained, well-sorted sandstone whereas Sequence #2 is a very fined-grained, siltstone (Hearn and Hansen, Reexamination of the Cretaceous (Campanian) Eagle Sandstone at Billings, Montana, Montana Geological Society: 1989 Field Conference Guidebook: Montana Centennial Edition: Geologic Resources of Montana: Vol. 1, 1989). Sequence #1 tends to break at near vertical fractures spanning the entire height of the member while Sequence #2 tends to break or splay with a more convex or concoidal fractures.

A series of near vertical joints is the main structural feature of the Eagle Sandstone. The primary joint set trends in an east to west orientation, joints are spaced approximately 10 feet apart, and except near the face of the rims, the joints are tight. The face of the rims is formed along this joint set. The joints open up near the face of the rims due to a release of tension on the face side. Freeze/thaw periods, wetting and drying periods, and erosional effects are the main causes of rockfall along the rimrocks with toppling failure mechanisms as the primary way in which the rockfalls occur. A secondary joint set trends north to south on a random spacing. The side drainages that are formed in the face of the rims are formed along the secondary north/south trending joint set.

Lopez (Lopez, D. A., 2003, Areas of Potential Rock-Fall Hazard in the Billings Area, Yellowstone County, Montana, Montana Bureau of Mines and Geology Geologic Map 61-C) reports that as the sandstone cliffs are undermined, progressive opening of the joints occurs primarily due to freeze-thaw cycles and root wedging action that force the blocks outward from the cliff face. Gravity then acts on these separated blocks causing them to fall or topple. Lopez identifies “two mechanisms occurring along the Rimrocks in the Billings area; rockfall and rock topple. A rockfall

is defined as a vertical free fall without any rotation and without any associated sliding of the underlying shale. A rock topple is defined as vertical fall with rotation away from the cliff face, so that the top of the block proceeds down slope first. The block then commonly tumbles end-over-end down the slope."

Geologic Stratigraphy at Zimmerman Trail

Based on observation of recent rockfall events at several locations along the rims, failures do not occur in a uniform manner that can be readily projected by monitoring. In some cases, an obvious gradual widening of joints that eventually leads to failure of a rock block can be observed. And, in these cases a monitoring program is extremely useful in identifying rock blocks that may be in a mode of imminent failure. However, in some cases the widening may reach an equilibrium where there is no observable movement for decades or more until the rock block suddenly fails. In still other cases, there may be no observable indication that a failure is imminent before a rock block suddenly fails. In any case, the presence of rock blocks in various stages of weathering on the slopes below the cliff faces attest to the fact that the rims are in continual state of recession away from the cliff face, much like a deck of cards, and all areas of the rims are eventually subject to rockfall.

Stagecoach Trail (Zimmerman Trail Alignment)

The Stagecoach Trail (Zimmerman Trail) alignment is generally located away from areas of active rockfall except where the alignments traverse directly below the cliff face from about Station. 20+00 to 25+00. In this area, recent rockfall is scattered across the slopes below the cliff face and there remain a number of loose rock blocks that have separated from the cliff face. Additional rockfall that could impact the trail alignments appears imminent in this area.

Rockfall Hazard: Very High

Recommendation: Avoid the area of active rockfall or institute a rockfall mitigation program that includes scaling of loose rock blocks and long-term monitoring. Note however, monitoring cannot distinguish all rock blocks that may fail.

Looking east along cliff face above Sta. 20+00 to 24+00

Looking north along cliff face above Sta. 25+00

Myers Trail Alignment

The Myers Trail alignment mostly follows an existing trail that was constructed in the early 1900's to provide access from the top of the rim's before Zimmerman Trail was developed. The trail has deteriorated considerably, but is still utilized for foot and bike access. The cliff face in this area is relatively solid with only scattered small blocks at the top of the cliff face that are slowly dislodging over time. The east facing cliff face where the trail alignment ascends to the top of the rims exhibits a lack of large loose rock blocks that span the cliff face, with a layer of smaller cubical rock blocks at the top of the cliff that are actively failing.

Sloughing of the soil slope below the cliff face would seem to be a greater concern than rockfall along this alignment.

Rockfall Hazard: Low to Moderate

Recommendation: Institute a long-term monitoring program that includes annual observation of the rock faces above the trail alignments. Note however, monitoring cannot distinguish all rock blocks that may fail.

Cliff face above Country Club Circle. Note the relatively solid nature of the cliff face.

Upper portion of the Myers Trail alignment. Note the lack of large loose rock blocks that span the cliff face and the smaller cubical rock blocks at the top of the cliff that are actively failing.

Morledge Trail Alignment

The Morledge Trail alignment will traverse along the base of the slope below the rims between 17th Street and the side drainage where both Myers Trail and Morledge Trail alignments ascend to the top of the rims. In this area, the sequence #2 cliff face above the unconformity separating sequences #1 and #2 has mostly failed, leaving a distinct ledge that serves as a catchment for rock block failures above the unconformity. Also, until the trail alignment begins to approach and climb up the side drainage, the alignment is mostly at the lower end of the boulder field and appears to be outside the run-out zone of most any modern rockfall.

As the trail alignment progresses to the west and begins to climb into the side drainage, there are several larger hanging rock blocks that appear to stable at this time, but at some time in the future will fail and may roll onto the alignment. In the side drainage, the west facing cliff face is rounded and weathered, and appears relatively stable.

Rockfall Hazard: Low to Moderate

Recommendation: Institute a long-term monitoring program that includes annual observation of the rock faces above the trail alignments. Note however, monitoring cannot distinguish all rock blocks that may fail.

Looking east toward 17th Street. Note the east half of the alignment follows along a landslide bench that appears outside of the modern run-out zone. The west half of the alignment appears at the bottom of the modern run-out zone.

Upper portion of the Morledge Trail alignment. Note the weathered and rounded nature of the west facing cliff face.

North 27th Street Alignment

The North 27th Street Trail alignment will be located on the downslope side of 27th street, opposite the cliff face. During the construction of North 27th Street, the rock face was reduced and scaled and now is very stable with only occasional small rocks separating from the rock face and rolling onto road. There is no indication that there is the potential for a large rockfall event to impact the trail alignment.

Rockfall Hazard: Very Low to Non-existent

Recommendation: Monitoring does not appear warranted.

Looking west up North 27th Street. Note, the stable nature of the rock slope. The trail alignment would be on the outside of the guard rail on the south side of the roadway.

Sincerely,

Dan C. Nebel, P.G., L.E.G.
Terracon Consultants, Inc.

APPENDIX C: PUBLIC MEETING NO.1 COMMENT SUMMARY

Rims to Valley Bike/Ped Feasibility Study
Public Meeting No. 1 Comment Summary
12/2/2015

	Response 1	Response 2	Response 3	Response 4	Response 5	Response 6	Response 7	Response 8	Response 9	Response 10	Response 11	Response 12	Response 13	Response 14	Response 15	Response 16	Response 17	Response 18	Response 19	Response 20	**Totals**
General																					
Do you think a trail would be beneficial from the top to the bottom of the Rims?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes - 19 (95%) No - 1 (5%)**
If such a trail existed, would you use it?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes (everyday)	Yes	Yes	Yes	Yes	No	Yes	**Yes - 18 (90%) No - 2 (10%)**
Should the trail be paved or a natural surface?	Combo	Paved	Combo	Paved	Natural	Paved	Paved	Combo	Combo	Paved	Combo	Paved	Combo	Combo	Combo	Natural	Combo	Paved	Natural	Combo	**Paved - 7 (35%) Natural - 3 (15%) Combo - 10 (50%)**
Parking & Facilities																					
Should parking or other facilities be provided at the trailheads?	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Maybe	Yes	Maybe	Yes	Yes	Yes	Yes	Yes	No	No	**Yes - 14 (70%) No - 4 (20%) Maybe - 2 (10%)**
If so, what type of facilities?	I don't think each "trailhead" needs parking. Depends on the area & availability of land. Parking along Hwy 3 is more critical.		Swords Park and Black Otter Trail parking lots are well used. Seems like a similar approach should occur all along the Marathon Loop. I would not support parking facilities in developed neighborhoods.	At least at one end.		Parking would be helpful for Alternates 1-3. Existing Rims parking may be close enough and sufficient for Alternate 4.		Parking can be provided, but it would not a priority for me. The Rims-Valley connection eliminates the need to drive up the Rims for trail along the Rims in my mind. So a low priority.			A few: after all we're talking about riding bikes - I don't see why people would drive to the trails.	Parking, bike racks.	Maybe/Maybe not depending on availability - access is most important/connecting travelers on foot/bike. Look for shared use - example - parking at MSUB to access 27th St.		Restrooms, dog pick-up bags, trash cans.		It is always nice to have parking and in some cases a toilet.		Do not add parking in residential areas.	Not at each trailhead, but spread out to allow for less project expense & quicker completion.	
Access																					
Do you support more clearly defined public access points and routes?	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes - 17 (85%) No - 2 (10%) Didn't Answer - 1 (5%)**
If not, what are your concerns?							Routes need to be any place except next to current major streets like Hwy 3 & 27th & Zimmerman Trail														
Safety																					
Would you be interested in participating in a volunteer patrol?	No	No	Maybe		Yes	No	No	Maybe	Yes	Maybe	No	Yes	Yes	Yes	Yes		Yes	Yes	No	Yes	**Yes - 9 (45%) No - 6 (30%) Maybe - 3 (15%) Didn't Answer - 2 (10%)**
What safety issues do you fell will need to be considered?			Patrol person training to deal with unruly or uncooperative people on the trail.		Underpass highway and Zimmerman Trail. Stability of ground under trail.	Trash and other debris though most paths I've ridden have been well maintained and clean. Falling rock and steep edges may also be a concern but these will likely be addressed.	A presence of police - community or otherwise, lighting, means to summon help - call box?	I'm mostly interested in using my volunteer time planning for making Billings a highly desirable place to live w/ bike trails that allow access throughout town and to the Rims & river. But occaisonally being on patrol could be a good excuse to actually get out and enjoy what's been put into place.					Access to rims on 27th via roadway feels very dangerous currently (when on road).	Yes, I am a member of BP Bike Patrol				Not sure, but would support it if it means more public access.	Street traffic, maintenance (repair and cleaning), unwanted dangerous people.		
Maintenance																					
Would you support or be willing to participate in volunteer maintenance & cleanup events?	Yes	No	Maybe	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes (possibly)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	**Yes - 16 (80%) No - 3 (15%) Maybe - 1 (5%)**
Are you concerned about proper on-going maintenance being provided on a new trail?	Yes	No	Yes	Yes	Yes	No		Yes	Yes	Yes	Yes	No			No	Yes	No	Yes	No	Yes	**Yes - 11 (55%) No - 6 (30%) Didn't Answer - 3 (15%)**
If so, what are your concerns?	Cleaning off debris/rocks/dirt and long-term viability		Having perpetual funding to maintain & repair improvements & facilities. It would be unfortunate to build a trail & then fall into disrepair.		Does the City have funds to maintain the trail?		Trash that will blow onto adjacent properties, dog poop.	Broken glass, loose gravel.	It is a long segment vulnerable to weather effects and will be labor intensive.	They need to be kept clean but hopefully users would not litter.	I'm not seeing good maintenance on existing trails, weeds encroaching on trail, goat heads, trash and broken glass in places.		Needs to include maintenance. All part of planning - new roads are more costly - development inside city with existing infrastructure makes sense.				If there is a concern, I support volunteer clean up efforts.	Wear & tear due to aging and weather damage, striping of centerlines and signage.		Graffiti	
Additional Comments																					
Please use the space to provide additional comments or concerns.	I currently run up N 27th St and the current dirt trail works. It needs help in a few spots. On 27th, I'd prefer to see bike lanes on-street & separate bikes & peds there - especially going downhill. I also ride to work up 27th & there is almost enough room for a bike lane now, it just needs to be restriped & maybe reduce lane widths.	Need to connect to some part of trail currently in existence - ie - 27th St underpass. Picnic tables, etc. could be on existing city property at bottom of trail.	I am drawn to the idea of bike ped path along Hwy 3 as an extension of the Swords Park Path. The Zimmerman Trail path seems like a natural connection. The N 27th St path already exists to a degree, whereas the Zimmerman Path does not. Developing Zimmerman creates more options vs. N 27th which just improves the existing system. I believe an off-street connection at the west end of the Hwy 3 corridor is a great asset for the community & would be highly used.	We really need to get the underpass into the Zimmerman/Hwy 3 roundabout.	What is the cost of each route? Timeline?		Who is paying & why are we putting this right next to 27th St and Hwy 3 - but who pays & how much? Connecting use of Aronson is valid and should be considered.	As a new business owner, one of the most challenging tasks I face is attracting and retaining top-notch talent in Billings. If we're going to attract the best brightest, we need a bikable, walkable community for both everyday transit and for recreation. A large body of research supports this conclusion. The Rims-to-Valley connection is one of the most critical missing pieces in creating a comprehensive multi-use trail network in Billings. Along with one of the most challenging. But if we can pull this off, we will be on our way to having a world-class recreational asset.	This is an important project that, when completed, can greatly enhance the quality of life in Billings going forward, and serve as a stimulus to recruit businesses.	The Morledge trail would be above our back yard. I am in favor of improving trails.		Let's do this thing! Keep moving our city forward. Thanks	Shouldn't the 27th St Trail have been improved already when 27th St was resurfaced? The on-street bike lane and trail off street on 27th makes great sense (should be both) - airport to downtown, next to MSUB, etc. Need a bike friendly storm drain on descent side of 27th St.	What is the plan for vehicular Zimmerman when loop connects?				Some trail plans might not include paved surfaces? How will trails incorporate the Highway 3 enhancement design? How would these designs incorporate the inner belt design? What is the timeline?			
Usage																					
Do you live and/or work adjacent to the Rims?	Yes	Yes	Yes	Yes	Yes		Yes	Sort of (S of MSUB)	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	Yes	**Yes - 15 (75%) No - 4 (20%) Didn't Answer - 1 (5%)**
Do you recreate within or around the Rims?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes - 19 (95%) No - 0 (0%) Didn't Answer - 1 (5%)**
If not, would you use a trail if a more established access point/alignment existed?	N/A	N/A	N/A	N/A	N/A		No	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

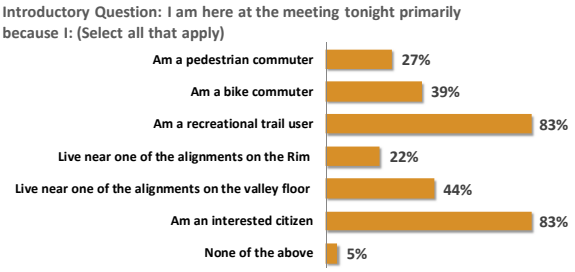
APPENDIX D: PUBLIC MEETING NO. 2 COMMUNITY POLLING RESULTS

RIMROCKS TO VALLEY
BIKE|PED FEASIBILITY STUDY

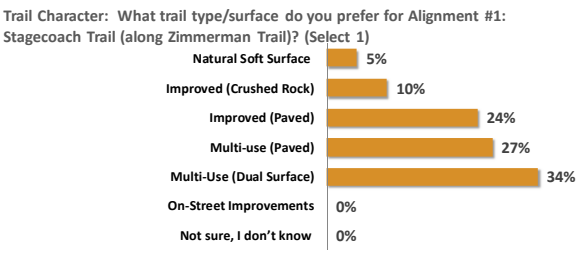
KEYPAD POLLING RESPONSES

February 3, 2015
Total Participants: 42

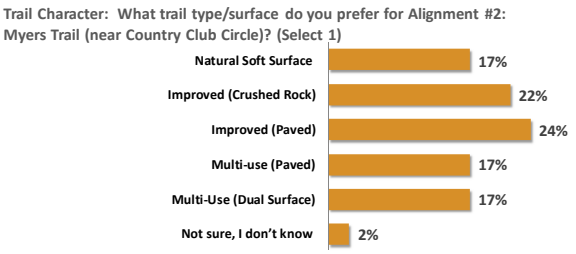
Introductory Question: I am here at the meeting tonight primarily because I: (Select all that apply)	Total Reponses	Percentage of Participants
Am a pedestrian commuter	11	27%
Am a bike commuter	16	39%
Am a recreational trail user	34	83%
Live near one of the alignments on the Rim	9	22%
Live near one of the alignments on the valley floor	18	44%
Am an interested citizen	34	83%
None of the above	2	5%



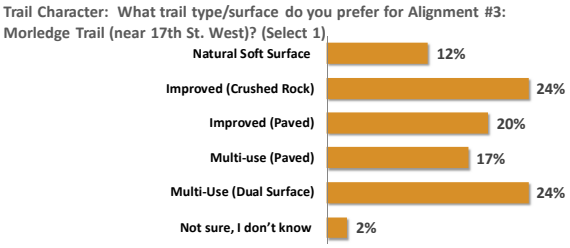
Trail Character: What trail type/surface do you prefer for Alignment #1: Stagecoach Trail (along Zimmerman Trail)? (Select 1)	Total Reponses	Percentage of Participants
Natural Soft Surface	2	5%
Improved (Crushed Rock)	4	10%
Improved (Paved)	10	24%
Multi-use (Paved)	11	27%
Multi-Use (Dual Surface)	14	34%
On-Street Improvements	0	0%
Not sure, I don't know	0	0%



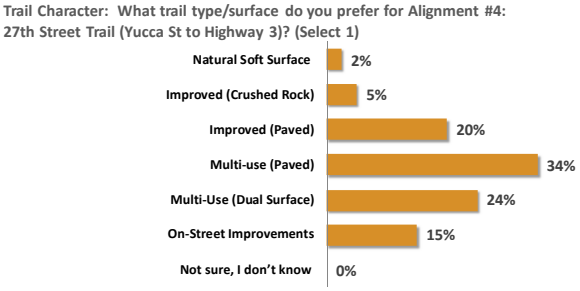
Trail Character: What trail type/surface do you prefer for Alignment #2: Myers Trail (near Country Club Circle)? (Select 1)	Total Reponses	Percentage of Participants
Natural Soft Surface	7	17%
Improved (Crushed Rock)	9	22%
Improved (Paved)	10	24%
Multi-use (Paved)	7	17%
Multi-Use (Dual Surface)	7	17%
Not sure, I don't know	1	2%



Trail Character: What trail type/surface do you prefer for Alignment #3: Morledge Trail (near 17th St. West)? (Select 1)	Total Reponses	Percentage of Participants
Natural Soft Surface	5	12%
Improved (Crushed Rock)	10	24%
Improved (Paved)	8	20%
Multi-use (Paved)	7	17%
Multi-Use (Dual Surface)	10	24%
Not sure, I don't know	1	2%

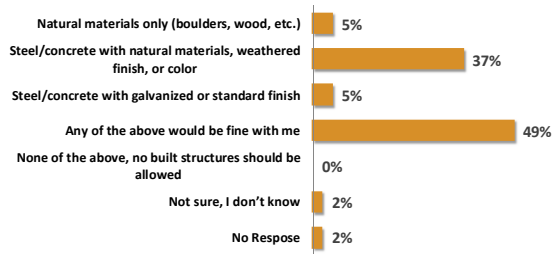


Trail Character: What trail type/surface do you prefer for Alignment #4: 27th Street Trail (Yucca St to Highway 3)? (Select 1)	Total Reponses	Percentage of Participants
Natural Soft Surface	1	2%
Improved (Crushed Rock)	2	5%
Improved (Paved)	8	20%
Multi-use (Paved)	14	34%
Multi-Use (Dual Surface)	10	24%
On-Street Improvements	6	15%
Not sure, I don't know	0	0%



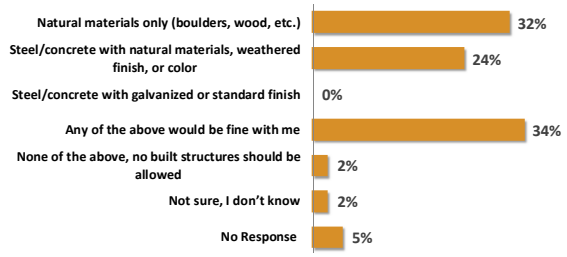
Character of Built Structures: What do you feel is the appropriate character for built structures if needed for the two outer alignments near existing roadways (Stagecoach Trail and 27th Street Trail)? (Select 1)	Total Reponses	Percentage of Participants
Natural materials only (boulders, wood, etc.)	2	5%
Steel/concrete with natural materials, weathered finish, or color	15	37%
Steel/concrete with galvanized or standard finish	2	5%
Any of the above would be fine with me	20	49%
None of the above, no built structures should be allowed	0	0%
Not sure, I don't know	1	2%
No Respose	1	2%

Character of Built Structures: What do you feel is the appropriate character for built structures if needed for the two outer alignments near existing roadways (Stagecoach Trail and 27th Street Trail)? (Select 1)

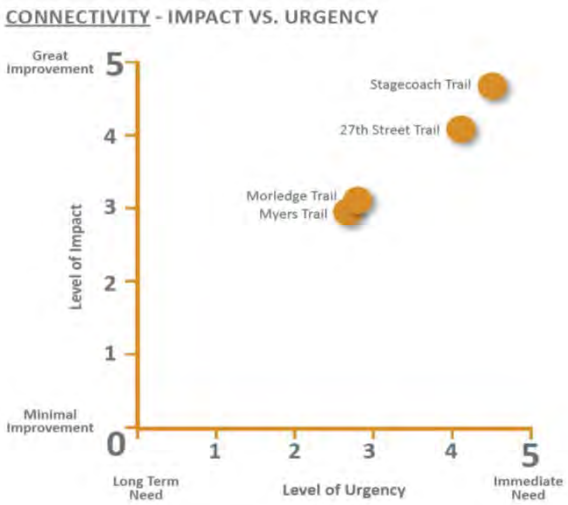


Character of Built Structures: What do you feel is the appropriate character for built structures if needed for the two alignments that connect through the center of the Rims (Myers Trail and Morledge Trail)? (Select 1)	Total Reponses	Percentage of Participants
Natural materials only (boulders, wood, etc.)	13	32%
Steel/concrete with natural materials, weathered finish, or color	10	24%
Steel/concrete with galvanized or standard finish	0	0%
Any of the above would be fine with me	14	34%
None of the above, no built structures should be allowed	1	2%
Not sure, I don't know	1	2%
No Response	2	5%

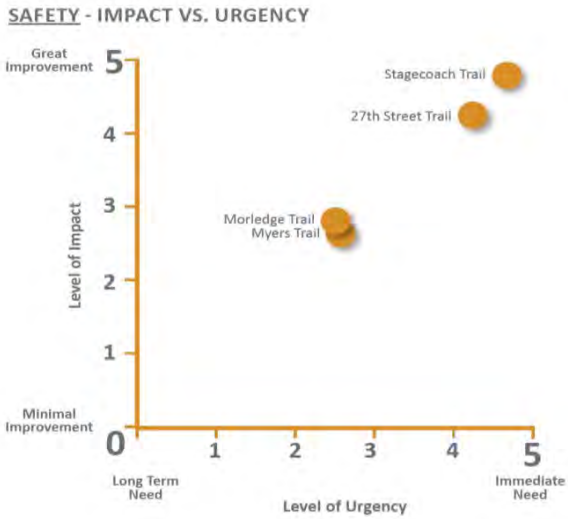
Character of Built Structures: What do you feel is the appropriate character for built structures if needed for the two alignments that connect through the center of the Rims (Myers Trail and Morledge Trail)? (Select 1)



URGENCY vs IMPACT - CONNECTIVITY	
LEVEL OF URGENCY (CONNECTIVITY)	
Stagecoach Trail (along Zimmerman Trail) - Alignment 1 Level of Urgency (CONNECTIVITY)	4.5
Myers Trail (near Country Club Circle) - Alignment 2 Level of Urgency (CONNECTIVITY)	2.7
Morledge Trail (near 17th St. West) - Alignment 3 Level of Urgency (CONNECTIVITY)	2.8
27th Street Trail (Yucca St to Highway 3) - Alignment 4 Level of Urgency (CONNECTIVITY)	4.1
LEVEL OF IMPACT (CONNECTIVITY)	
Stagecoach Trail (along Zimmerman Trail) -Alignment 1 Level of Impact (CONNECTIVITY)	4.6
Myers Trail (near Country Club Circle) - Alignment 2 Level of Impact (CONNECTIVITY)	3.0
Morledge Trail (near 17th St. West) - Alignment 3 Level of Impact (CONNECTIVITY)	3.1
27th Street Trail (Yucca St to Highway 3) - Alignment 4 Level of Impact (CONNECTIVITY)	4.1

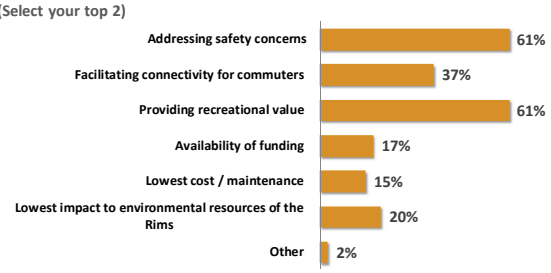


URGENCY vs IMPACT - CONNECTIVITY	
LEVEL OF URGENCY (SAFETY)	
Stagecoach Trail (along Zimmerman Trail) - Alignment 1 Level of Urgency (SAFETY)	4.60
Myers Trail (near Country Club Circle) - Alignment 2 Level of Urgency (SAFETY)	2.48
Morledge Trail (near 17th St. West) - Alignment 3 Level of Urgency (SAFETY)	2.55
27th Street Trail (Yucca St to Highway 3) - Alignment 4 Level of Urgency (SAFETY)	4.28
LEVEL OF IMPACT (SAFETY)	
Stagecoach Trail (along Zimmerman Trail) -Alignment 1 Level of Impact (SAFETY)	4.70
Myers Trail (near Country Club Circle) - Alignment 2 Level of Impact (SAFETY)	2.68
Morledge Trail (near 17th St. West) - Alignment 3 Level of Impact (SAFETY)	2.73
27th Street Trail (Yucca St to Highway 3) - Alignment 4 Level of Impact (SAFETY)	4.33



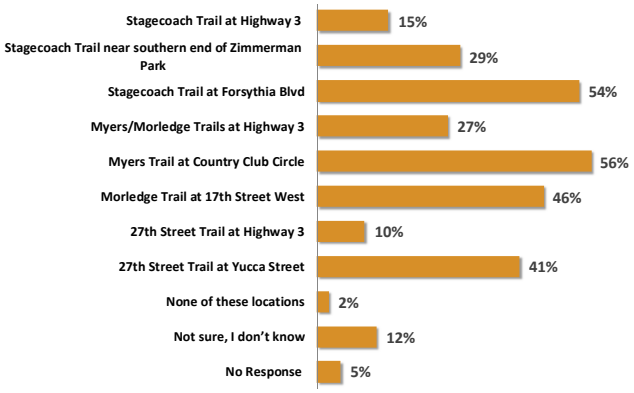
Prioritization Criteria: The criteria I feel are most important when selecting which trail alignment(s) to implement first are? (Select your top 2)	Total Reponses	Percentage of Participants
Addressing safety concerns	25	61%
Facilitating connectivity for commuters	15	37%
Providing recreational value	25	61%
Availability of funding	7	17%
Lowest cost / maintenance	6	15%
Lowest impact to environmental resources of the Rims	8	20%
Other	1	2%

Prioritization Criteria: The criteria I feel are most important when selecting which trail alignment(s) to implement first are? (Select your top 2)



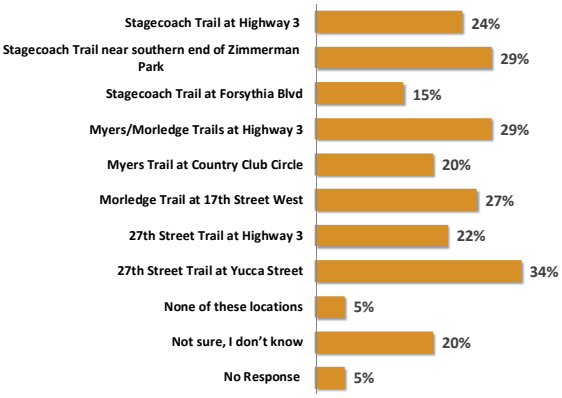
Trailhead Locations: Which of the following potential trailhead locations are appropriate for LOW INTENSITY amenities (no formal parking, trail signs only, etc.)? (Select all that apply)	Total Reponses	Percentage of Participants
Stagecoach Trail at Highway 3	6	15%
Stagecoach Trail near southern end of Zimmerman Park	12	29%
Stagecoach Trail at Forsythia Blvd	22	54%
Myers/Morledge Trails at Highway 3	11	27%
Myers Trail at Country Club Circle	23	56%
Morledge Trail at 17th Street West	19	46%
27th Street Trail at Highway 3	4	10%
27th Street Trail at Yucca Street	17	41%
None of these locations	1	2%
Not sure, I don't know	5	12%
No Response	2	5%

Trailhead Locations: Which of the following potential trailhead locations are appropriate for LOW INTENSITY amenities (no formal parking, trail signs only, etc.)? (Select all that apply)



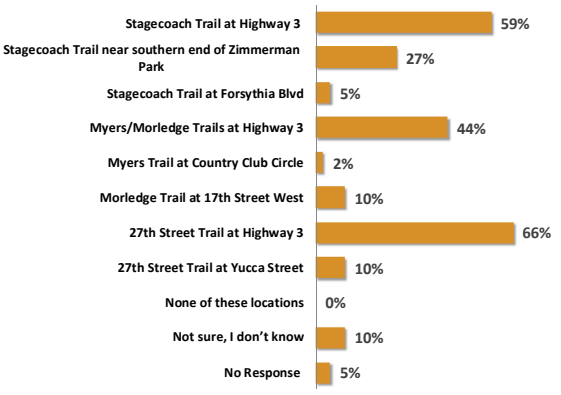
Trailhead Locations: Which of the following potential trailhead locations are appropriate for MEDIUM INTENSITY amenities (minimal parking (3-5 cars), signage kiosk, trash receptacles, seating, bike rack, etc.)? (Select all that apply)	Total Reponses	Percentage of Participants
Stagecoach Trail at Highway 3	10	24%
Stagecoach Trail near southern end of Zimmerman Park	12	29%
Stagecoach Trail at Forsythia Blvd	6	15%
Myers/Morledge Trails at Highway 3	12	29%
Myers Trail at Country Club Circle	8	20%
Morledge Trail at 17th Street West	11	27%
27th Street Trail at Highway 3	9	22%
27th Street Trail at Yucca Street	14	34%
None of these locations	2	5%
Not sure, I don't know	8	20%
No Response	2	5%

Trailhead Locations: Which of the following potential trailhead locations are appropriate for MEDIUM INTENSITY amenities (minimal parking (3-5 cars), signage kiosk, trash receptacles, seating, bike rack, etc.)? (Select all that apply)



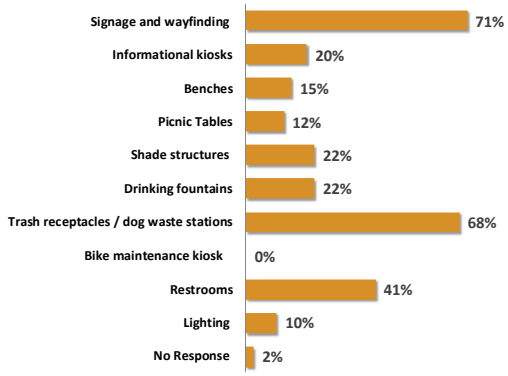
Trailhead Locations: Which of the following potential trailhead locations are appropriate for HIGH INTENSITY amenities (parking for 5-15 cars, shade structure, picnic tables, restrooms, etc.)? (Select all that apply)	Total Reponses	Percentage of Participants
Stagecoach Trail at Highway 3	24	59%
Stagecoach Trail near southern end of Zimmerman Park	11	27%
Stagecoach Trail at Forsythia Blvd	2	5%
Myers/Morledge Trails at Highway 3	18	44%
Myers Trail at Country Club Circle	1	2%
Morledge Trail at 17th Street West	4	10%
27th Street Trail at Highway 3	27	66%
27th Street Trail at Yucca Street	4	10%
None of these locations	0	0%
Not sure, I don't know	4	10%
No Response	2	5%

Trailhead Locations: Which of the following potential trailhead locations are appropriate for HIGH INTENSITY amenities (parking for 5-15 cars, shade structure, picnic tables, restrooms, etc.)? (Select all that apply)



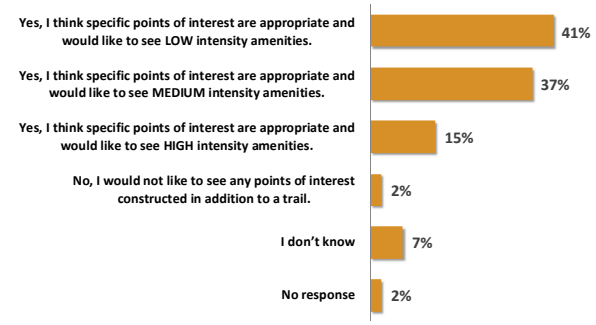
Trailhead Amenities: **The trailhead amenities I am most interested in seeing at the moderate and high intensity trailheads include: (Select your top 3)**	**Total Reponses**	**Percentage of Participants**
Signage and wayfinding	29	71%
Informational kiosks	8	20%
Benches	6	15%
Picnic Tables	5	12%
Shade structures	9	22%
Drinking fountains	9	22%
Trash receptacles / dog waste stations	28	68%
Bike maintenance kiosk	0	0%
Restrooms	17	41%
Lighting	4	10%
No Response	1	2%

Trailhead Amenities: The trailhead amenities I am most interested in seeing at the moderate and high intensity trailheads include: (Select your top 3)



Points of Interest: **Would you like to see points of interest at specific locations along the potential trail alignments? (Select 1)**	**Total Reponses**	**Percentage of Participants**
Yes, I think specific points of interest are appropriate and would like to see **LOW** intensity amenities.	17	41%
Yes, I think specific points of interest are appropriate and would like to see **MEDIUM** intensity amenities.	15	37%
Yes, I think specific points of interest are appropriate and would like to see **HIGH** intensity amenities.	6	15%
No, I would not like to see any points of interest constructed in addition to a trail.	1	2%
I don't know	3	7%
No response	1	2%

Points of Interest: Would you like to see points of interest at specific locations along the potential trail alignments? (Select 1)



APPENDIX E: OPINION OF PROBABLE COSTS

ENGINEER'S OPINION OF PROBABLE COST BASED ON CONCEPT DESIGN PLANS

RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASIBILITY STUDY
Stagecoach Trail

ITEM NO.	EST. QTY		DESCRIPTION	UNIT PRICE		TOTAL PRICE
				$		$
100	1	LS	Mobilization/Demobilization (5%)	31,285.00 /	LS =	31,285.00
101	1	LS	Taxes, Bonds, Insurance (3%)	18,771.00 /	LS =	18,771.00
102	1	LS	Stormwater Management and Erosion Control	12,000.00 /	LS =	12,000.00
103	1	LS	Traffic Control During Construction	1,000.00 /	LS =	1,000.00
104	4	AC	Clearing and Grubbing	6,200.00 /	AC =	24,800.00
105	5,400	CY	Unclassified Excavation	20.00 /	CY =	108,000.00
106	600	CY	Imported Fill	20.00 /	CY =	12,000.00
107	1,855	CY	12-inch Thick Gravel Surface (8-foot Wide)	40.00	CY =	74,200.00
108	1	LS	Miscellaneous Signage	5,000.00 /	LS =	5,000.00
109	15,000	SY	Erosion Control Blanket	3.50 /	SY =	52,500.00
110	4	AC	Apply Topsoil and Seed Disturbed Areas	6,000.00 /	AC =	24,000.00
111	500	LF	Railing	40.00 /	LF =	20,000.00
112	1	LS	Slope Stabilization and Walls	270,000.00 /	LS =	270,000.00
113	4,440	SY	Geogrid Reinforcement	5.00 /	SY =	22,200.00

TOTAL PRICE FOR BASE BID	$ 675,756.00
TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA	$ **912,270.60**

Asphalt Surfacing Alternate

ALT1-1	4,440	SY	2 1/2-inch Thick Asphalt Surface (8-foot Wide) with 10-inch Thick Base Coarse (Includes Deduct of 2-inches of Gravel)	50.00 /	SY =	222,000.00
ALT1-2	1	LS	Miscellaneous Striping	1,000.00 /	LS =	1,000.00

TOTAL PRICE FOR ALTERNATE 1	$ 223,000.00
TOTAL PRICE WITH ALTERNATE 1	$ 898,756.00
TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA	$ **1,213,320.60**

ENGINEER'S OPINION OF PROBABLE COST BASED ON CONCEPT DESIGN PLANS

RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASIBILITY STUDY

Myers Trail

ITEM NO.	EST. QTY		DESCRIPTION	UNIT PRICE			TOTAL PRICE
				$			$
100	1	LS	Mobilization/Demobilization (5%)	17,200.00	/ LS	=	17,200.00
101	1	LS	Taxes, Bonds, Insurance (3%)	10,320.00	/ LS	=	10,320.00
102	1	LS	Stormwater Management and Erosion Control	10,000.00	/ LS	=	10,000.00
103	1	LS	Traffic Control During Construction	1,000.00	/ LS	=	1,000.00
104	2	AC	Clearing and Grubbing	6,200.00	/ AC	=	12,400.00
105	1,890	CY	Unclassified Excavation	20.00	/ CY	=	37,800.00
106	2,200	CY	Imported Fill	20.00	/ CY	=	44,000.00
107	800	CY	12-inch Thick Gravel Surface (8-foot Wide)	40.00	CY	=	32,000.00
108	1	LS	Miscellaneous Signage	5,000.00	/ LS	=	5,000.00
109	8,000	SY	Erosion Control Blanket	3.50	/ SY	=	28,000.00
110	2	AC	Apply Topsoil and Seed Disturbed Areas	6,000.00	/ AC	=	12,000.00
111	880	LF	Railing	40.00	/ LF	=	35,200.00
112	1	LS	Slope Stabilization and Walls	117,000.00	/ LS	=	117,000.00
113	1,920	SY	Geogrid Reinforcement	5.00	/ SY	=	9,600.00

TOTAL PRICE FOR BASE BID	$ 371,520.00
TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA	$ **501,552.00**

Asphalt Surfacing Alternate

ALT1-1	1,920	SY	2 1/2-inch Thick Asphalt Surface (8-foot Wide) with 10-inch Thick Base Coarse (Includes Deduct of 2-inches of Gravel)	50.00	/ SY	=	96,000.00
ALT1-2	1	LS	Miscellaneous Striping	1,000.00	/ LS	=	1,000.00

TOTAL PRICE FOR ALTERNATE 1	$ 97,000.00
TOTAL PRICE WITH ALTERNATE 1	$ 468,520.00
TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA	$ **632,502.00**

SANDERSON STEWART

ENGINEER'S OPINION OF PROBABLE COST BASED ON CONCEPT DESIGN PLANS

RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASIBILITY STUDY

Morledge Trail

ITEM NO.	EST. QTY		DESCRIPTION	UNIT PRICE			TOTAL PRICE
				$			$
100	1	LS	Mobilization/Demobilization (5%)	27,540.00	/ LS	=	27,540.00
101	1	LS	Taxes, Bonds, Insurance (3%)	16,524.00	/ LS	=	16,524.00
102	1	LS	Stormwater Management and Erosion Control	11,000.00	/ LS	=	11,000.00
103	1	LS	Traffic Control During Construction	1,000.00	/ LS	=	1,000.00
104	3	AC	Clearing and Grubbing	6,200.00	/ AC	=	18,600.00
105	800	CY	Unclassified Excavation	20.00	/ CY	=	16,000.00
106	9,800	CY	Imported Fill	20.00	/ CY	=	196,000.00
107	1,175	CY	12-inch Thick Gravel Surface (8-foot Wide)	40.00	CY	=	47,000.00
108	1	LS	Miscellaneous Signage	5,000.00	/ LS	=	5,000.00
109	11,500	SY	Erosion Control Blanket	3.50	/ SY	=	40,250.00
110	3	AC	Apply Topsoil and Seed Disturbed Areas	6,000.00	/ AC	=	18,000.00
111	325	LF	Railing	40.00	/ LF	=	13,000.00
112	1	LS	Slope Stabilization and Walls	171,000.00	/ LS	=	171,000.00
113	2,790	SY	Geogrid Reinforcement	5.00	/ SY	=	13,950.00
114	500	LF	Suspension Boardwalk Structure	300.00	/ LF	=	150,000.00
			TOTAL PRICE FOR BASE BID				$ 744,864.00
			TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA				$ **1,005,566.40**

Asphalt Surfacing Alternate

ALT1-1	2,790	SY	2 1/2-inch Thick Asphalt Surface (8-foot Wide) with 10-inch Thick Base Coarse (Includes Deduct of 2-inches of Gravel)	50.00	/ SY	=	139,500.00
ALT1-2	1	LS	Miscellaneous Striping	1,000.00	/ LS	=	1,000.00
			TOTAL PRICE FOR ALTERNATE 1				$ 140,500.00
			TOTAL PRICE WITH ALTERNATE 1				$ 885,364.00
			TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA				$ **1,195,241.40**

ENGINEER'S OPINION OF PROBABLE COST BASED ON CONCEPT DESIGN PLANS

RIMROCKS TO VALLEY BIKE AND PEDESTRIAN FEASIBILITY STUDY
27th Street Trail

ITEM NO.	EST. QTY		DESCRIPTION	UNIT PRICE		TOTAL PRICE
				$		$
100	1	LS	Mobilization/Demobilization (5%)	8,942.50 /	LS =	8,942.50
101	1	LS	Taxes, Bonds, Insurance (3%)	5,365.50 /	LS =	5,365.50
102	1	LS	Stormwater Management and Erosion Control	10,000.00 /	LS =	10,000.00
103	1	LS	Traffic Control During Construction	5,000.00 /	LS =	5,000.00
104	1.25	AC	Clearing and Grubbing	6,200.00 /	AC =	7,750.00
105	700	CY	Unclassified Excavation	20.00 /	CY =	14,000.00
106	50	CY	Imported Fill	20.00 /	CY =	1,000.00
107	1,100	CY	12-inch Thick Gravel Surface (8-foot Wide)	40.00	CY =	44,000.00
108	1	LS	Miscellaneous Signage	5,000.00 /	LS =	5,000.00
109	6,000	SY	Erosion Control Blanket	3.50 /	SY =	21,000.00
110	1.25	AC	Apply Topsoil and Seed Disturbed Areas	6,000.00 /	AC =	7,500.00
111	590	LF	Railing	40.00 /	LF =	23,600.00
112	1	LS	Slope Stabilization and Walls	27,000.00 /	LS =	27,000.00
113	2,600	SY	Geogrid Reinforcement	5.00 /	SY =	13,000.00

TOTAL PRICE FOR BASE BID	$ 193,158.00
TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA	$ **260,763.30**

Asphalt Surfacing Alternate

ALT1-1	2,600	SY	2 1/2-inch Thick Asphalt Surface (8-foot Wide) with 10-inch Thick Base Coarse (Includes Deduct of 2-inches of Gravel)	50.00 /	SY =	130,000.00
ALT1-2	1	LS	Miscellaneous Striping	1,000.00 /	LS =	1,000.00

TOTAL PRICE FOR ALTERNATE 1	$ 131,000.00
TOTAL PRICE WITH ALTERNATE 1	$ 324,158.00
TOTAL WITH 20% CONTINGENCY & 15% DESIGN/CA	$ **437,613.30**

SANDERSON STEWART

DESIGNWORKSHOP

Terracon
Consulting Engineers & Scientists

PCC Agenda

Meeting Date: 07/19/2016

Information

Subject

Update/Discussion. 5th Avenue Corridor Feasibility Study. Scott Walker, Transportation Coordinator presenting.

Attachments

KLJ_5th Ave N Cor Fesibility_Proposal

March 2016

PROPOSAL TO PROVIDE PLANNING SERVICES FOR

FIFTH AVENUE NORTH CORRIDOR FEASIBILITY STUDY – SW03112016

BILLINGS, MT

2611 Gabel Road
PO Box 80303
Billings, MT 59108-0303
406 245 5499
kljeng.com

March 11, 2016

City-County Planning Division
c/o Scott Walker, Transportation Planning Coordinator
2825 3rd Avenue North, 4th Floor
Billings, MT 59101

RE: 5th Avenue North Corridor Feasibility Study Request for Proposals – SW03112016

Dear Scott and Evaluation Committee Members:

The 5th Avenue North corridor concept is an idea consistent with the Billings City Council Strategic Plan, addressing strategies for a comprehensive, multi-modal transportation system, sustainable economic development and quality of life. It has long been considered a possible connector for pedestrians, bicyclists and perhaps even a trolley connecting the Pedestrian Core of downtown, the YMCA, Yellowstone Art Museum, Billings Public Library and retail establishments to the MetraPark and planned Exposition Gateway redevelopment.

Yet, with the potential this corridor serves, it has never been studied to determine whether it is feasible to implement a functional transportation facility along its length. And if feasible, what steps should be undertaken to move these improvements forward to fruition?

KLJ brings a uniquely qualified team to undertake this study:

- Steve Grabill, PE, PTOE will serve as project manager. Steve has more than 25 years of experience in transportation and corridor planning and brings a wealth of experience working with steering committees, landowner representatives and the public.
- Becky Bey will serve as our primary facilitator of community engagement efforts. She has more than 20 years of experience in the Billings area facilitating groups and garnering stakeholder and public input, as well as facilitating communication through email, newsletters and social media.
- Chris Harris will provide animated visualization to give study participants a vision of what an improved corridor could look like.

KLJ's strong relationship with Montana Rail Link (MRL) and Burlington Northern Santa Fe (BNSF) will be essential in determining availability of land and the feasibility of improvement alternatives. We anticipate availability of railroad property, and the railroad's willingness to allow other transportation facilities on their land will be a critical issue this study will need to address early in the study process.

We are confident we can provide the high-quality transportation planning services you desire for your project. As you review our proposal, please do not hesitate to call our project manager, Steve Grabill at 406 441 5783 if you have any questions or concerns. We look forward to hearing from you about this exciting project.

Sincerely,

Kadrmas, Lee & Jackson, Inc.

Steve A Grabill, PE, PTOE
Project Manager

Mark Anderson, PE
Director of Transportation Services

National perspective
Regional expertise
Trusted advisor

Most of the corridor is owned by Montana Rail Link (MRL) and some tracks are still active.

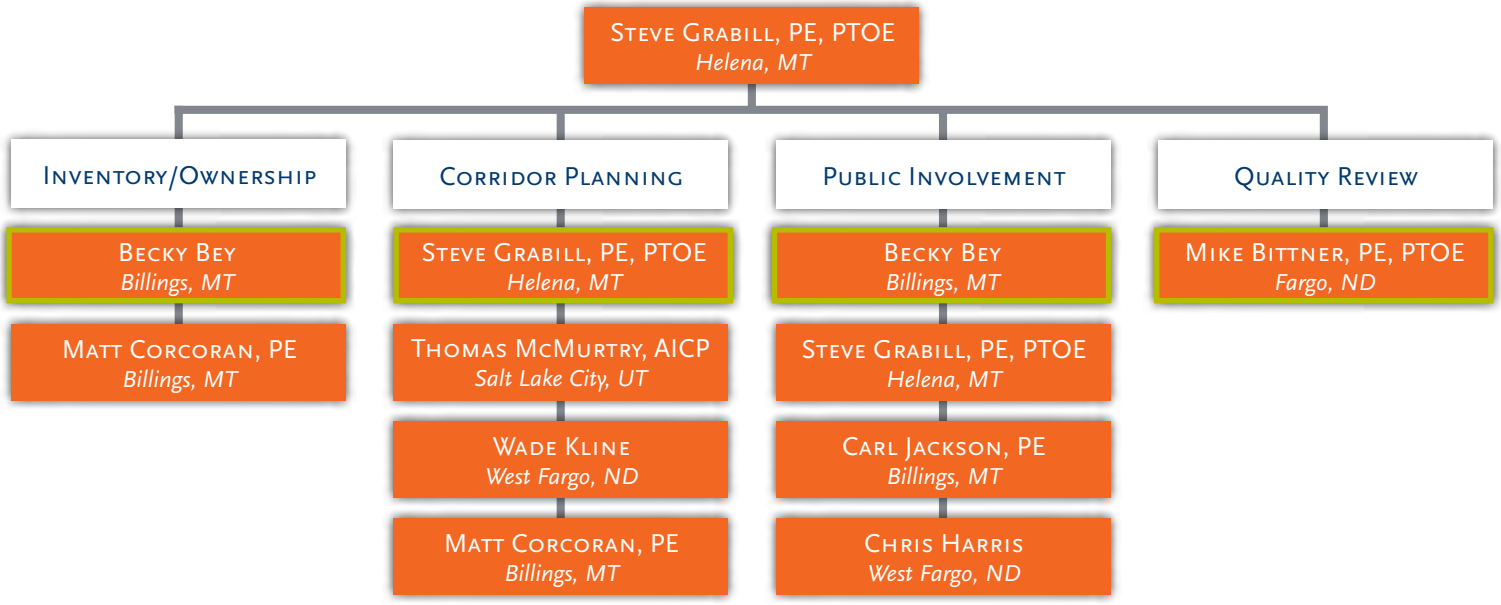
Introduction

Previous plans have clearly described the need for better connectivity between downtown Billings and the Exposition Gateway and MetraPark. The 5th Avenue North corridor stands as one of few options to make this desired connection a reality. Yet, this is a dynamic corridor with uncertain availability.

KLJ has assembled a team and prepared an approach that will answer the right questions for the corridor and quickly determine availability of the corridor and positions of key stakeholders. Once these areas of feasibility have been determined, use of animated visualization will build a vision of corridor opportunities among stakeholders, resulting in the best potential for a consensus on phased implementation of future projects.

Key Project Team Members

KLJ has assembled a team of planners, visual artists, engineers and public involvement specialists who will examine the corridor and facilitate community dialog needed to thoroughly investigate the feasibility of corridor improvements.



STEVE GRABILL, PE, PTOE, LSIT

ROLE: Steve will serve as project manager and be responsible for team and client coordination. He will also lead planning efforts and facilitate steering committee meetings.

WHY STEVE IS A GREAT FIT FOR THIS PROJECT: Steve has more than 25 years of experience as a project manager for transportation planning and public involvement projects. His extensive experience in urban planning and his record of success in consensus building on challenging public involvement projects gives Steve a unique ability to facilitate a successful project.

Registration
Professional Engineer – MT, ND, SD, MN, CO
Professional Traffic Operations Engineer (PTOE)
Land Surveyor in Training – MN

2016 Capacity
85% Available

Office Location
Helena, MT

Education
BS Civil Engineering – North Dakota State University

EXPERIENCE: Five years as Fargo-Moorhead Council of Governments Transportation Planner, authoring multiple corridor studies; Project manager and author of several corridor studies and pedestrian/bicycle facility plans throughout Minnesota and North Dakota.

BECKY BEY

ROLE: Becky will serve as the primary facilitator for community engagement efforts, including coordinating of landowners, stakeholders and the general public. Becky will also lead the corridor conditions inventory and documentation of ownership.

WHY BECKY IS A GREAT FIT FOR THIS PROJECT: Becky has been a Billings resident for more than 20 years and has an in-depth and thorough knowledge of downtown and the 5th Avenue North corridor. She has more than 10 years of experience in facilitating groups and garnering stakeholder and public input, as well as facilitating communication through email, newsletters and social media. Additionally, Becky has 30 years of grant writing and innovative funding experience that will lend itself to consideration of funding options for study implementation.

Certifications
FAST Facilitation Certification – 2015
Mediation Certification – 2013

2016 Capacity
75% Available

Office Location
Billings, MT

Education
BA English Literature/ Creative Writing – Montana State University

EXPERIENCE: Five years as Chief Operating Officer and Director of Public Communications for a large Billings non-profit agency (The Center for Children and Families); SWOT analysis lead Montana Traffic Records Strategic Plan update (2015); Facilitator Public Relations/ Marketing and Funding Subcommittees-Custer County/Miles City Flood Protection project (2015-2016).

MATT CORCORAN, PE

ROLE: Matt will assist Becky with the corridor conditions inventory. He will also prepare typical sections, engineering layouts and cost estimates.

WHY MATT IS A GREAT FIT FOR THIS PROJECT: Matt has extensive experience in new development, redevelopment and streetscape projects throughout the region. He has worked on projects for almost every different land use and followed them from concept phase through construction. Matt also has experience in Low Impact Development techniques and incorporation of landscape features into design.

Registration
Professional Engineer – MT

2016 Capacity
70% Available

Office Location
Billings, MT

Education
BS Civil Engineering – University of Iowa

EXPERIENCE: Matt has experience in concept development, estimating, design and construction on projects throughout the region. He has worked with project planning and estimating on a number of Special Improvement Districts for Billings and other municipalities.

THOMAS MCMURTRY, AICP, GISP

ROLE: Thomas will assist with development of non-traditional motorized and non-motorized corridor options. He will also assist with report documentation.

WHY THOMAS IS A GREAT FIT FOR THIS PROJECT: Thomas has 12 years of transportation planning experience in the Mountain West. He brings a wealth of corridor study and limited access highway experience involving a variety of traffic operations and facilities.

Certifications
AICP Certified (American Institute of Certified Planners)
Geographic Information Systems Professional Certified

2016 Capacity
80% Available

Office Location
Salt Lake City, UT

Education
MBA – University of Utah
BA Geography – Bowling Green State University

EXPERIENCE: Transportation planning is Thomas' primary expertise, and he has significant experience in travel demand modeling, traffic engineering, access management, bike/ped planning, multi-modal analysis, land use planning and public involvement.

WADE KLINE

2016 Capacity
50% Available

Office Location
West Fargo, ND

Education
BA Urban Planning – St. Cloud State University

ROLE: Wade will prepare innovative funding options for the study. He will also assist in development of corridor improvement options.

WHY WADE IS A GREAT FIT FOR THIS PROJECT: Wade has nearly 15 years of experience as a Community Development Planner and Executive Director in a metropolitan planning organization (MPO) setting. He has experience in intergovernmental affairs and as a liaison in local/regional/metropolitan and Department of Transportation (DOT) coordination issues covering a range of modal areas. Wade developed multiple strategic work programs to guide investment programming into need areas identified at both the area-wide and corridor level.

EXPERIENCE: Wade has developed countless subarea and corridor level studies that have lead directly into project development and construction. As such, he has successfully developed plans and studies that move projects from concept to project quickly through a consensus-driven financial and fiscal constraint strategy approach.

CARL JACKSON, PE

Registration
Professional Engineer – MT, WY, ND

2016 Capacity
40% Available

Office Location
Billings, MT

Education
BS Civil Engineering – North Dakota State University

BS Sport and Recreation Leadership – North Dakota State University

ROLE: Carl will provide coordination with MRL and Burlington Northern Sante Fe (BNSF) railroads and will assist with overall public involvement.

WHY CARL IS A GREAT FIT FOR THIS PROJECT: Carl has been KLJ's rail company liaison on a variety of projects since 2013. His typical role has included management, planning, permitting, general coordination and infrastructure design.

EXPERIENCE: Carl's past projects have included the Yellowstone County Industrial Park Feasibility Analysis in Billings, Trailhead Commerce Park in Lockwood, Poplar Industrial Park, Power Road Bridge Repairs, MRL Bridge 207 Reconstruction and MRL Laurel Yard Lighting. A number of Carl's projects have included stakeholder coordination involving MRL and BNSF.

CHRIS HARRIS

2016 Capacity
60% Available

Office Location
West Fargo, ND

Education
BLA Landscape Architecture – North Dakota State University

BS Environmental Design – North Dakota State University

ROLE: Chris will prepare 3D visualizations to enhance public perception of corridor options and benefits.

WHY CHRIS IS A GREAT FIT FOR THIS PROJECT: Chris has a variety of visualization tools to choose from to effectively communicate what the project could look like before it is built. Whether it is a photo simulation to show the project in its proper context and correct scale within a photograph, or a full 3D render, or an animated 3D walk-through of the project, he can provide it.

EXPERIENCE: Chris has 11 years of experience in the master planning, landscape architecture and engineering industries creating visualizations such as illustrative plan drawings, photo simulations, static 3D renderings and 3D animations of projects, including streetscapes, bridges, interstate interchanges, transmission lines, solar power plants and wind turbines.

MIKE BITTNER, PE

Registration
Professional Engineer – MT, ND, MN, WY, SD

2016 Capacity
30% Available

Office Location
West Fargo, ND

Education
MS Civil Engineering – North Dakota State University

BS Civil Engineering – University of North Dakota

ROLE: Mike will provide quality review.

WHY MIKE IS A GREAT FIT FOR THIS PROJECT: As a Professional Transportation Planner (PTP), PE, PTOE and IMSA-certified Traffic Signal Field Technician Level II, Mike is the rare hybrid transportation professional that can carry a project from the earliest phases of planning to the most technical phases of construction.

EXPERIENCE: Multiple corridor planning projects, including: Fargo 32nd Avenue Corridor project, Grand Forks US 2 Corridor Study, West Fargo Sheyenne Street Corridor Study, Grand Forks Washington Street Corridor Study, Watford City US 85 Bypass and Business Route Study, Minneapolis Hennepin Avenue Corridor project, West Fargo Downtown Sheyenne Street Study, Casper 15th and 21st Street Subarea Study, Moorhead 20th Street Corridor project and Quiet Zone Study and Moorhead SE Main Corridor project and Quiet Zone Study.

KLJ highlights two critical areas of expertise needed for successful completion of this project. Our expertise includes experience working with the railroads and experience in all facets of a corridor study.

Railroad Experience: KLJ's relationships with BNSF and MRL started in 2004 and continues today through a variety of economic development initiatives such as rail parks, rail utilization studies, quiet zones, and rail-served business relocation. Our services routinely begin with concept and feasibility planning, continue through grant assistance, environmental services and property acquisition, and finally conclude with design and construction engineering services. All services are provided by specialized KLJ work groups that are accustomed to collaborating together to address dynamics, typically unique to rail-related projects. Carl Jackson will lead our efforts to communicate and collaborate with railroad representatives on this project.

Corridor Study Experience: KLJ has extensive experience in completing transportation planning corridor studies. These studies have addressed the tasks that will be essential to successful completion of the 5th Avenue North Corridor Feasibility Study. Below is a matrix highlighting some of the recent corridor studies completed by our KLJ team.

Similar Corridor Planning Experience	Corridor Planning	Bike/Pedestrian Facilities	Steering Committee	Stakeholder Meetings	Railroad Coordination	Landowner Coordination	Public Meetings
Casper 15th and 21st Street Subarea Study	X	X	X	X		X	X
Grand Forks US 2 Corridor Study	X	X	X	X	X	X	X
Grand Forks Washington Street Corridor Study	X	X	X	X	X	X	X
Mandan Division Street Corridor Study	X	X		X	X	X	X
Mandan Old Red Trail Corridor Study	X	X		X		X	X
Fargo Main Avenue Corridor Study	X	X	X	X	X	X	X
Fargo 13th Avenue South Corridor Study	X	X	X	X		X	X
Fargo 40th Avenue South Corridor Study	X	X	X	X		X	X
Fargo 19th Avenue North Corridor Study	X	X		X		X	X
Fargo NP/1st Avenue Corridor Study	X	X	X	X	X	X	X
Fargo South University Corridor Study	X	X	X	X		X	X
Moorhead 11th Street North Corridor Study	X	X	X	X			X
Bismarck Schafer Street Corridor Study	X	X		X		X	X
Bismarck 12 Street South Corridor Study	X	X	X	X	X		X
Bismarck-Mandan North-South Beltway Corridor Study	X	X	X	X	X	X	X
Lincoln Road Corridor Study	X	X	X	X			X
Minot US 2/52 Bypass Corridor Study	X	X	X	X		X	X
Fargo 32nd Avenue Corridor Project	X	X	X	X		X	X
West Fargo Sheyenne Street Corridor Study	X	X	X	X		X	X
Watford City US 85 Bypass and Business Route Study	X	X	X	X		X	X
Minneapolis Hennepin Avenue Corridor Project	X	X	X	X		X	X
West Fargo Downtown Sheyenne Street Study	X	X	X	X		X	X
Moorhead 20th Street Corridor Project and Quiet Zone Study	X	X	X	X	X	X	X
Moorhead SE Main Corridor Project and Quiet Zone Study	X	X	X	X	X	X	X

A central issue that will carry strong implications on the feasibility of 5th Avenue Corridor improvements is the ownership of large portions of the corridor by MRL and BNSF railroads. Existing spurs serve a number of businesses along the corridor. Therefore, identifying and defining this key issue, and discussing options with the railroads and service users, will play an important role in the direction of this study.

A desired outcome of this study is to build consensus among stakeholders and landowners in support of transportation facilities that are feasible. We recognize that if use of private property is required in order for corridor improvements to be feasible, then their support for future projects is essential.

Therefore, we intend to identify many of the benefits of a transportation corridor early, so that when we meet with key stakeholders and landowners, they can begin to understand why they should support future project improvements, and in some cases, why they should be open to providing easements or right-of-way (ROW) dedications. Ideally, we will find stakeholders who will become champions to promote project improvements for years to come.

We have organized the scope listed in the Request for Proposal (RFP) into three principal tasks and have written the following project approach that addresses every element with a heavy emphasis on community involvement.

Task 1.0 Corridor Conditions Analysis

The purpose of this task is to determine the availability of the corridor for locating and implementing some form of transportation facility improvements.

This task will include gathering existing corridor conditions, including ROW widths, land ownership and contact information and corridor use information. While some of the corridor is currently used for rail spur activity, the level and locations of rail use are unknown, and other uses along the corridor may be present as well.

Much of the corridor area is industrial, which may make this a good Brownfield project.

- Corridor Constraints Evaluation – Perhaps the most difficult constraint we will evaluate is the location and availability of land owned by MRL and BNSF railroads. KLJ has a strong relationship with MRL and BNSF, and we intend to open a dialog with them early in the process to determine their existing or planned corridor use and opportunities for City use.

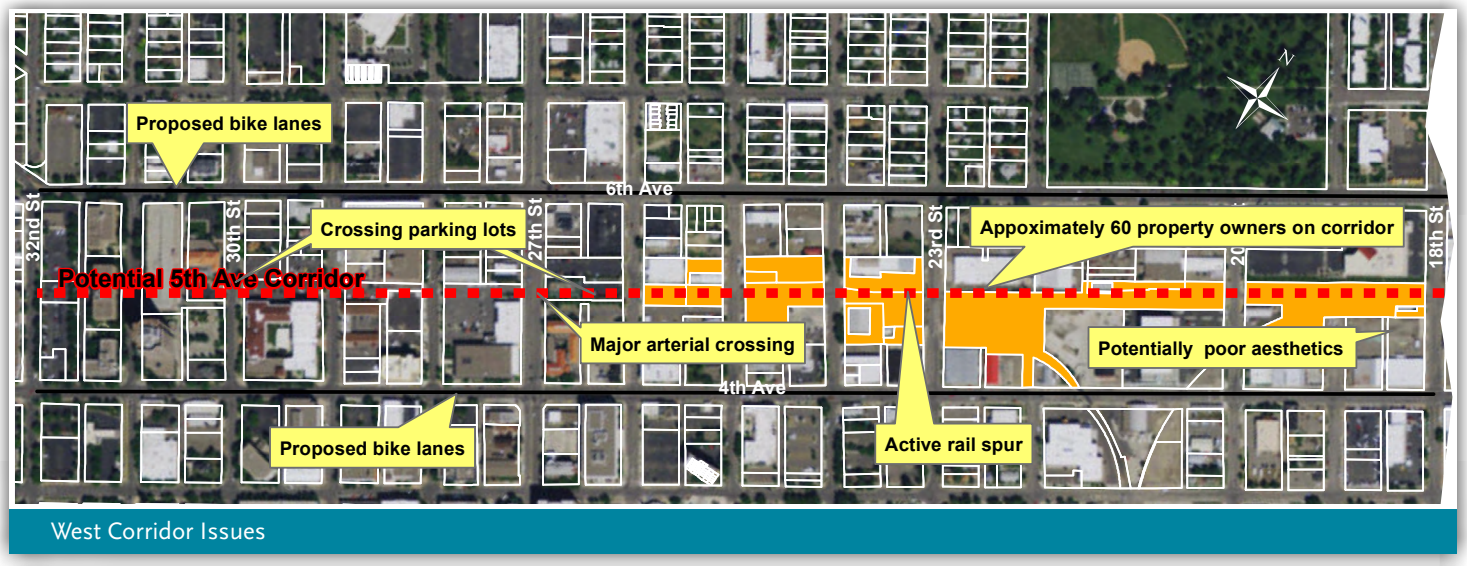
  We have learned that a number of businesses along the corridor are still being served by the railroad. This issue has the potential to eliminate feasibility for portions of the corridor, or for the corridor as a whole. We will map these businesses and meet with them to determine what their future plans are for rail service.

  Physical features of the corridor will also be identified and documented. These features include grade and drainage issues, use by utilities and other identified conditions. West of 25th Street, there is no remaining rail corridor and no obvious space for a facility bisecting the properties. Opportunities to connect to the 32nd Street corridor will need to consider potential use of parking lots and other parallel corridors.

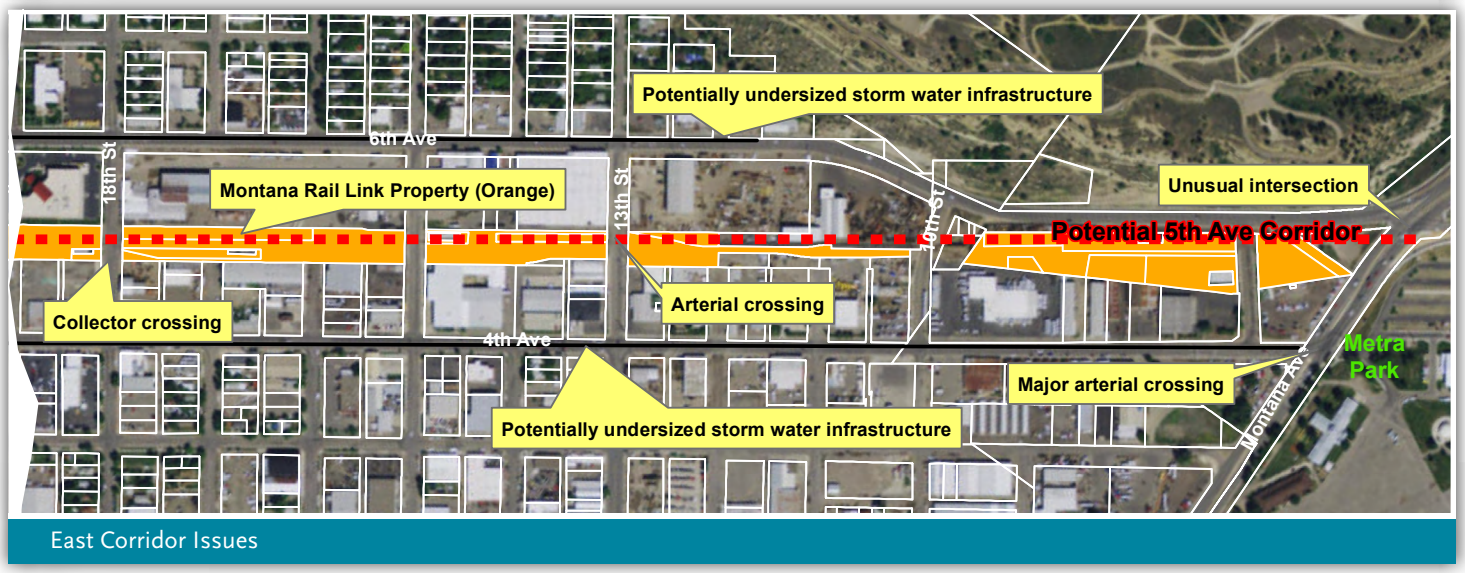
  Positions and desires of landowners in and adjacent to the corridor will be assessed once other constraints and opportunities have been identified. This effort is discussed further in the public involvement portion of our approach.

- Corridor Opportunities Evaluation – Once the corridor constraints have been defined, the question that remains is, what is left? What opportunities can reasonably be pursued given the current uses and constraints of the corridor? If some constraints appear to be roadblocks in the development of a corridor improvement solution, can efforts be made to remove them as roadblocks? Corridor opportunities will be mapped and described for review by the Steering Committee.

- Initial Feasibility Evaluation – A Corridor Conditions Analysis Summary document will be prepared that shows corridor constraints and opportunities and provides an overall evaluation of the corridor. At this stage in the study, an initial determination will be made on whether a corridor appears to be feasible or not. It will be further decided on which elements of the study, if any, should proceed for further analysis, corridor planning and recommendations.



West Corridor Issues



East Corridor Issues

Task 2.0 Corridor Planning

Once constraints and opportunities along the corridor have been identified, both non-traditional motorized and non-motorized improvement alternatives for the corridor will be prepared. Corridor planning will consider not only the use of the corridor as a transportation facility, but also corridor beautification, screening and provision of other amenities that would benefit corridor users. The Billings Trail Master Plan will serve as a resource for beneficial trail site amenities.

Past planning documents say much about the context of the Billings Downtown and the Billings Exposition Gateway, and it is important to understand how the 5th Avenue corridor can enrich the central core of the community. Planning will need to consider potential major redevelopment east of 10th Street North, as proposed by the Billings Exposition Gateway Concept Plan.

Connectivity is a significant opportunity provided by developing transportation facilities along this corridor. Connections between MetraPark, Exposition Gateway and downtown area establishments, such as the YMCA, Art Museum and the Library, could benefit residents, tourists and businesses alike.

» Non-traditional Motorized Travel Facilities – Corridor conditions will be assessed to determine the feasibility of corridor use by non-traditional motorized vehicles. A list and description of potential non-traditional motorized candidates (such as a trolley) will be prepared and reviewed with the Steering Committee. A typical section will be prepared relative to chosen candidates. Alternative horizontal alignments will be developed for consideration by the Steering Committee.

YMCA

Yellowstone Art Museum

Billings Public Library

» Non-motorized Travel Facilities – Corridor conditions will be assessed to determine the feasibility of corridor use by non-motorized users. Linkages to existing and proposed pedestrian and bicycle facilities and with transit, as well as to anticipated high use origins and destinations, will be identified and documented. A typical section will be prepared relative to chosen candidates. Alternative horizontal alignments will be developed for consideration by the Steering Committee.

» Cost Estimates and Innovative Funding – Planning and programming level costs for basic corridor improvements will be estimated.

Early in development of the 5th Avenue North Corridor Study, KLJ will determine existing local options to move potential project concepts out of the planning phase and into the project development phase. Most importantly will be a discussion and evaluation of the potential to include project elements into either the Billings Capital Improvement Program (CIP) or Billings Transportation Improvement Program (TIP).

As a potential signature project growing out of the Downtown Billings Framework Plan, there is excitement regarding the potential to develop an investment strategy for improvements along the 5th Avenue North corridor. While investments in the 5th Avenue North corridor are not currently included in either the Billings CIP or TIP, as the project moves into the middle phases and project concepts are more clearly understood, consensus will be achieved regarding the potential priority for investments in the corridor through future CIP or TIP development efforts.

Funding options must go beyond the traditional local, state and federal transportation funding through the City or MPO. Following development of the corridor constraints evaluation, KLJ will determine if the 5th Street Corridor may be a potential candidate to seek funding through the Environmental Protection Agency (EPA) Brownfields Program. As part of the corridor constraints evaluation, KLJ will develop a dialogue with the Montana Department of Environmental Quality (DEQ) and discuss the potential for some or all of the corridor to seek EPA Brownfields funding. Two potential Brownfields grant opportunities would be an **EPA Assessment Grant** to develop more specific site assessments or an **Area-Wide Planning Program** grant, which is tailored more towards multiple sites connected by infrastructure.

At the end of the 5th Avenue North Corridor Study, KLJ will finalize the funding strategy refined through the planning process. KLJ will develop an achievable implementation plan that will facilitate continuity of the prioritized project concepts to move further into project development.

» Draft and Final Reports – Draft and final reports will be prepared as outlined in the RFP. The plans will provide recommended phases for improvements and potential funding sources for implementation. The draft report will be presented for feedback by interested stakeholders and the general public. All comments received will be included in the final report.

Task 3.0 Public Involvement

Involving property owners, local businesses, community leaders, elected officials, the general public and a wide range of audiences is vital to overall project success. An effective community involvement approach will allow all issues to be raised in a balanced setting so that unbiased and well-informed decisions can be made. KLJ understands the Billings MPO's commitment to the community, and we are proposing an extensive outreach effort and proactive approach to engage the community through several methods.

Becky Bey will lead the community involvement portion of this study. Her expertise in this area makes her a valuable asset to the team. She will be dedicated to working with property owners and interested parties to make sure all voices are heard and documented.

Beyond our online outreach, KLJ will conduct interviews with property owners, key businesses and stakeholders. Becky will lead the individual meetings targeted around ROW analysis and designed to get in-depth information that will shape the plan and future of the 5th Avenue corridor. We will work with the project team to identify all groups and individuals that we need to meet with to get their important insight. Becky will be available to meet in the field and take phone calls at any time during the study.

This recent 3D rendering by KLJ of a new non-motorized corridor helped communicate the vision with stakeholders.

Visualization will be used in meetings and provided on the website and YouTube to show stakeholders and the public how the corridor could look after improvements are made. Users will have the ability to pan to either side of the facility to examine improvements that are proposed. The level of this effort will be determined during negotiations, as effort level can vary. Minutes from all meetings will be attached as an appendix to the final report.

» Steering Committee Interaction – The Steering Committee will include local staff, key stakeholders and concerned citizens from along the corridor. They will meet bi-monthly starting in May and continuing until the end of the study. Their role will be to provide input and direction on study activities, and feedback on study findings.

» Key Stakeholder Interaction – Key stakeholders include landowners who own property in or along either side of the corridor, special interest groups such as the MPO Technical Advisory Committee (TAC) and Policy Coordinating Committee (PCC), Downtown Business Association, East Billings Urban Renewal District (EBURD), Big Sky Economic Development Authority, MRL, BNSF, Billings TrailNet and the City of Billings. Key landowners and businesses served by the rail spurs or adjacent to the corridor will be contacted for one-on-one meetings. This will allow assessment of interest in being involved throughout the study and will give us a better sense of their willingness to support a future project.

At these one-on-one meetings we will discuss how corridor improvements can benefit both them and the community. We will listen to any concerns they may have, and seek to maintain an open dialog so that any concerns they raise may be addressed in later conversations.

A number of methods will be used to provide opportunities for key stakeholders to participate in study activities. These include individual meetings, focus group meetings and involvement on the Steering Committee or general public interaction.

The first public meeting will facilitate discussion and will include corridor maps and early ROW research.

» General Public Interaction – General public interaction will include development and maintenance of a project website and conducting two public input meetings. We will provide a link to the public using email, two newsletters and social media.

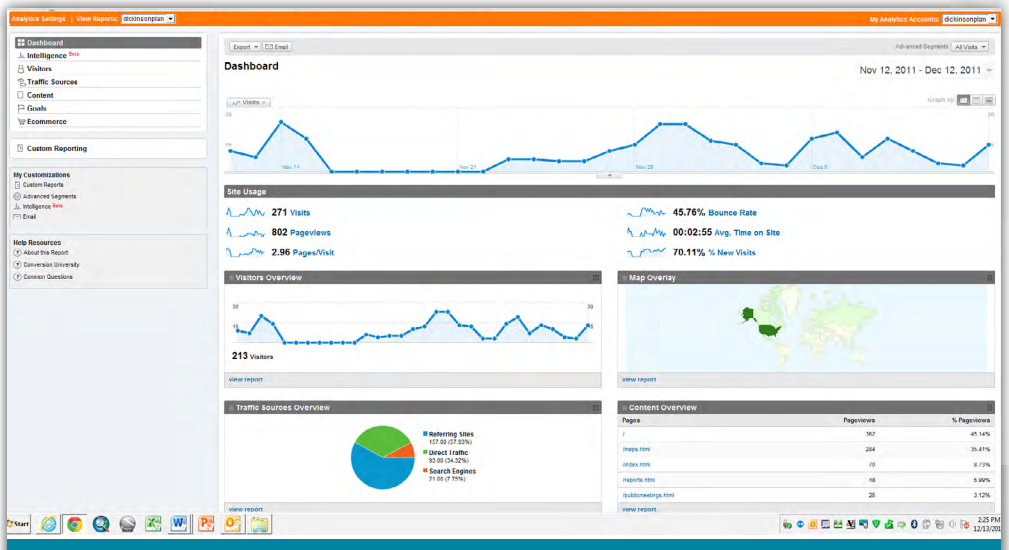
Prior to each public meeting, a mailout to all landowners within 500 feet of the corridor will be sent notifying them of the meeting and information available on the website.

The first public meeting will be held about one month into the study. At this meeting, we intend to limit formal presentation in order to facilitate discussion and ideas from the public on corridor-related issues and solutions. This meeting will include corridor maps and some of the early ROW research that we will complete. After a brief introduction and orientation, we will potentially break into small groups that will work with a member of KLJ staff to talk through corridor issues and discuss possible ideas. We want this plan to resonate with the public and convey their values; that is why we plan on listening more than presenting at this first meeting.

The second public meeting will be an open house style meeting near the end of the study. At this meeting, we will give a presentation covering what we learned throughout the study and the analysis, which will lead into the detailed plan. We anticipate having maps of alternatives, as well as a handout with final recommendations and next steps. The presentation will be combined with key pad polling to engage and get feedback from the public. After the presentation, we will invite the public to comment on the recommended action items on the maps, complete comment forms and respond to the information provided. We will consider all the comments received before completing the final report.

» Website and Online Survey – Our team will create an interactive website to inform and engage the community. We will use a domain similar to www.5thaveBillings.com. The website will be updated periodically and include all relevant information, surveys, maps, documentation, draft reports and presentation materials. The website will include web analytic tools to track visitors, top content, page views and sources of web traffic.

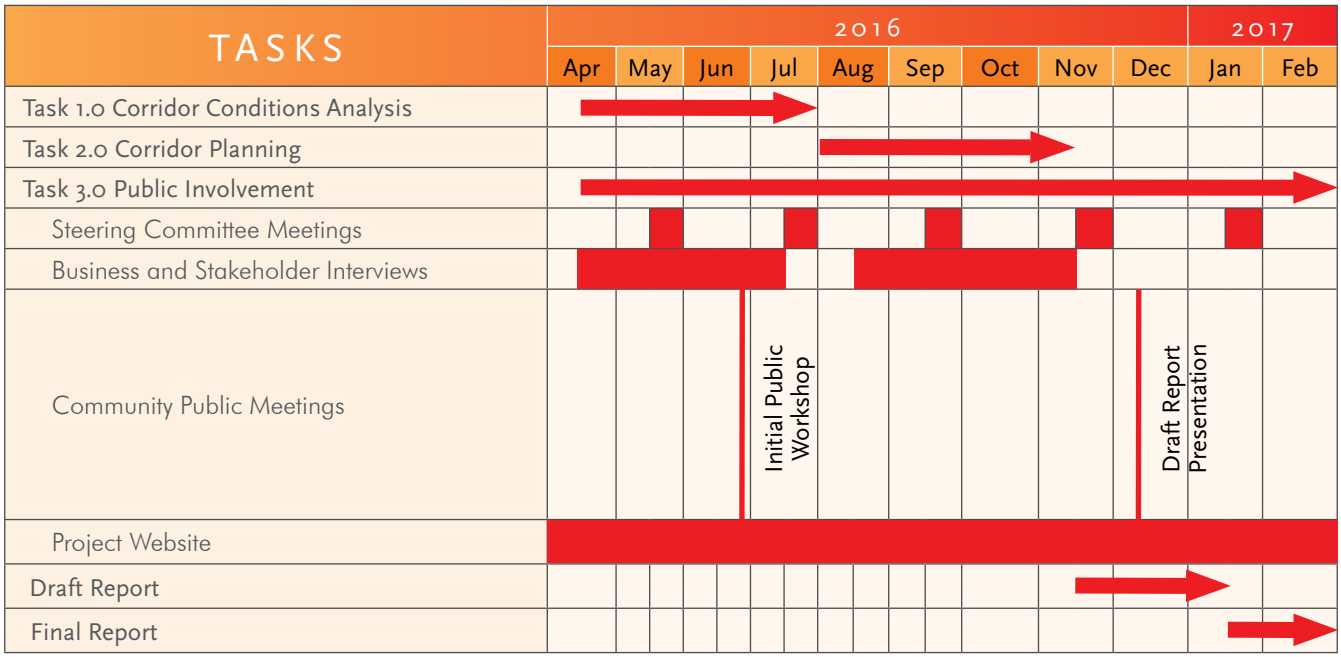
Project websites have been effective tools for us to inform the community and reach individuals who may not attend a meeting.



KLJ uses Google web analytics to track visitors to project websites so you know how many people participated in the study.

Along with the website, we will also reach out to all the property owners, local business and community leaders through an online survey that they can complete at their leisure. The survey will be focused on location and issues related to developing the best corridor we can. The survey will be available on the website, and a link will be emailed out to key individuals.

» Public Involvement Schedule – Public involvement is scheduled to occur on a regular basis throughout the study's duration. A preliminary schedule, including public involvement, is provided as follows:



Project Cost Estimate

KLJ proposes to complete the 5th Avenue North Corridor Feasibility Study for the following fee:

PROPOSED FEE	
Tasks	Estimated Fee
Project Management	$4,734.00
Corridor Conditions Analysis	$16,402.00
Corridor Planning	$31,511.00
Public Involvement	$27,153.00
TOTAL	$79,800.00

City of Billings

BILLINGS - YELLOWSTONE COUNTY MPO METROPOLITAN PLANNING ORGANIZATION

Yellowstone County

ATTACHMENT B

CONDITIONS AND NON-COLLUSION FORM

To receive consideration, this form must be signed in full by a responsible, authorized agent, officer, employee or representative of your firm.

CONDITIONS AND NON-COLLUSION AGREEMENT

We have read and agree to the conditions and stipulations contained herein and to the Standard Terms and Conditions contained on the attached.

We further agree to furnish the services specified at the prices stated herein, to be delivered to the location and on that date set forth herein.

In signing this proposal, you also certify that you have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a proposal; that this proposal has been independently arrived at without collusion with any other proposer, competitor or potential competitor; that this proposal has not been knowingly disclosed prior to the due date and time to any other proposer or competitor; that the above statement is accurate under penalty of perjury.

Kadrmas, Lee & Jackson, Inc.	
Legal Name of Firm/Corporation	Authorized Signature
4585 Coleman Street	Mark Anderson
Address	Printed Name
Bismarck, ND 58503	Director of Transportation Services
City/State/Zip	Title
2/25/2016	701.355.8400
Date	Telephone Number

NATIONAL PERSPECTIVE.

KLJ has the size and scope of engineering-based services you need, with the local expertise to drive your project forward to a successful result.

REGIONAL EXPERTISE.

KLJ is dedicated to improving the health, safety and welfare of our communities.

TRUSTED ADVISOR.

KLJ delivers quality and accuracy you expect from a trusted advisor and dedicated partner.

KLJ

EOE/M/F/Vet/Disability